Packard

Advanced Training School

Lecture Course
1919

Delivered before the Foreman's Assemblies of the Packard Motor Car Co.

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INTRODUCTION

In the political, social, financial, or industrial world nothing is more difficult than to successfully introduce a new idea, or effect a radical change of policy. The opposition to any innovation, however, usually decreases in direct proportion to the evident practicability of the new plan. It is purely axiomatic to state that not every newly-devised policy is wise and feasible.

It is for this reason that it has not been the custom of the Packard Motor Car Company to adopt hastily-devised and uncertain changes in the established methods. Each plan proposed for the improvement of our organization receives a close analysis and scrutiny. Having thus guarded against hastily-conceived and erratic policies, the Packard Management has experienced a relatively small loss through the necessity for abandoning newly-adopted, impracticable methods.

When it was suggested that we extend our Training School Activities and enroll a large per cent of our executives for the purpose of studying the fundamental problems of our organization, the proposal was at once recognized as being worthy of consideration. From a purely selfish standpoint, the Management might have been at first inclined to reject the plan as entailing a large expense. But no selfish motive was allowed to influence the decision; it was recognized that such a course as outlined would be of inestimable value to the executives themselves. It could not but make them better qualified for their work.

It was clearly recognized by the Packard Management that one of the imperative needs in modern industry is for better and closer supervision of the productive processes. Big Business is calling for bigger men to exercise this better supervision; men who are willing and able to grapple with the increasingly complex problems of industrial management, and master them; men who have been careful to learn and are ready to learn more of the possible ways and means of surmounting the difficulties which stand in the way of our more complete success.

These are, broadly speaking, the reasons why the Packard Management accepted the proposal to institute these Foreman's Assemblies. Specifically, it is expected that all executives enrolled in the Advanced School will have gained a broader and firmer understanding of the fundamental principles in conformity with which the business of the Packard Motor Car Company is conducted;

That they will have a clearer conception of the extent to which it is expected that the Foremen of the various departments will co-ordinate their functions and unite to remove such causes of friction and delay as may arise;

That each executive will have acquired a more comprehensive grasp of the work in his department in its relation to that of the various other departments;

That he will have become better qualified to cope with any undesirable situation which may at any time exist in his department;

That all will have become conscious of a higher appreciation of Packard Standards, both of production and conduct, which have long characterized our organization;

That all will unite in an effort to acquire a better standardised and a more justly remunerated class of workmen, a more efficient executive force;

And, withal, to attain a higher individual and collective achievement throughout our organization.

F. F. BEALL, *Vice-President of Manufacturing*

EXECUTIVE OFFICERS
of
Packard Motor Car Company

Administration

President and General Manager ..... Alvan Macauley
Assistant Secretary ..... F. L. Jandron
Comptroller ..... F. R. Robinson

Distribution

Vice-President of Distribution ..... H. H. Hills

Manufacturing

Vice-President of Manufacturing ..... F. F. Beall
Factory Manager ..... E. F. Roberts
Manager of Production ..... C. F. Tollaien
General Superintendent ..... D. G. Stanbrough

Engineering

Vice-President of Engineering ..... J. G. Vincent
Chief Engineer—Carriage ..... O. E. Hunt
Chief Engineer—Truck ..... H. D. Church
Chief Engineer—Service ..... H. B. Knap

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First Session

Subject: ENROLLMENT

Speaker: MR. E. E. MEAD, *Superintendent of Advanced Training*

The Foreman's Assemblies, inaugurated by the Packard Motor Car Company, are so organized as to bring together at each session the executives of the Plant, both from the office and the shop. We are endeavoring to bring into closer relationship the supervising Force of the Plant in order that we may be able more thoroughly to explain to them the aims in pursuance of which and the methods under which the business of the Packard Motor Car Company is conducted; and also in order that a definite system of operation may be given a more general recognition throughout our Plant. We trust that all who attend these sessions will gain a clearer conception of their duties; that they will be enabled to apply the knowledge here gained, thereby bringing

their work into a closer relation with the Packard Aim and to a more general conformity with the Packard System.

All Executives to Unite Forces

We are convinced that these Foreman's assemblies will be productive of very beneficial results. It has been found that one of the chief obstacles in the way of a more successful prosecution of our work is the lack of a sufficiently close relationship existing between those who plan our program and those who carry out that program. The executives who have planned this work will come here and meet with you who are to execute those plans. They will talk to you and with you as to how best to bring the work to a highly successful completion. They are glad of the opportunity to come here and personally state to you what their particular department is expected to accomplish and give you direct information as to the most feasible ways of more efficiently conducting the various departments.

Course Outlined

The course consists of lectures on various subjects which we believe will be of interest to our executives and an aid to them in carrying on the work in their departments. Subjects of a general character have been chosen, those which cover the larger problems of our organization. It is not expected that each lecture will appeal to various executives in the same way, as we are only dealing with general phases of our work. The following subjects will be discussed in consecutive order: (1) "Discipline", (2) "Premium System", (3) "Inspection and Scrap", (4) "Tools", (5) "Time Study", (6) "Routine System", (7) "Stock", (8) "Production", (9) "Care of Machinery", (10) "Employment", (11) "Timekeeping", (12) "Safety and Sanitation", and (13) "What Makes An Executive".

The following executives have been selected to discuss the above named subjects, also in consecutive order: Messrs. Holderman, Verner, Stark, Brown, Rheinfeldt, Diem, Haines, Tollzien, Mead, Dryden, Kumerow, Marks, Stan-

brough. Each speaker will, therefore, discuss the problems which relate to that department of which he is the chief executive.

Discipline

The first subject, "Discipline", will be presented to you by Mr. C. F. Holderman. The subject is rightly considered as being of great importance. It has a direct bearing upon the morale of the organization, and one of the desirable attributes of an executive is his ability to create a proper morale among his men. It is well known what the high morale of the American Army and Navy had to do with the success of the Allied Arms. Just how it is planned to improve the disciplinary conditions in the Packard Plant, and your duties relative to carrying out the plan, will be explained by Mr. Holderman, our Factory Disciplinarian.

Premium System

The next lecture will be on the subject of our "Premium System". This will, of course, be of

greater interest to the executives in the Production Department, but it is, we believe, a subject which should be thoroughly understood by every executive here. It has been discovered that many executives are not thoroughly familiar with it; and, therefore, Mr. P. P. Verner, our Clerical Superintendent, has been asked to present this subject to you.

Inspection and Scrap

Our Chief Inspector, Mr. C. S. Stark, is to tell you how much Scrap is being produced in the Factory. The figures he will give will be very interesting to all who realize the seriousness of this problem in any manufacturing establishment. The production of scrap is, of course, no particular individual's fault to the exclusion of all others. It may be at one time the fault of the Foreman; at another time that of his assistants; or, again, it may be due to a number of distinctly different causes. This will be thoroughly discussed by Mr. Stark.

Tools

No one in our Plant, I am sure, knows as much about tools as does our Mechanical Superintendent, Mr. R. N. Brown. It is of vital importance to our organization that we have enough tools and that they be the right kind. To this subject Mr. Brown devotes his entire attention, and he will discuss some very interesting problems relative to the designing and manufacture of tools for a new product.

Time Study

Mr. J. T. B. Rheinfeldt will speak to you upon the subject of "Time Study". Often, as viewed by the machine operator, Time Study is a mysterious matter. Just how the calculations are made and how the procedure by which the time of an operation is established, how it is done and why, will be carefully explained.

Routine System

Issuing the Routine Instructions, keeping them up-to-date, and general supervision of

General Office Building, Packard Motor Car Company

their care are the duties of Mr. A. G. Diem. He will explain how these instructions are used, how they are made out and why it is essential to our success that the Foreman follow the established routine.

Stock

The multifarious and always harassing problems of a storekeeper will be discussed by Mr. J. M. Haines, our Supervisor of Stores. We are not surprised that it is often the opinion of the Storekeeper that every man in the factory is trying to lay all of his troubles at the Stock-room door, while demanding the impossible of those who deal out the stock; and Mr. Haines will explain to you how it is possible for you to aid him in his efforts and thereby lessen both your troubles and his.

Production

The subject of "Production" is undoubtedly the one which is most constantly in the minds of a large majority of Packard executives. It

devolves upon Mr. C. F. Tollzien, our Manager of Production, to maintain a high production standard, and he will tell you how and when Production Schedules are made out for this purpose and how they should be used by the Foremen.

Care of Machinery

At the next session of the Assembly the duty will devolve upon me to discuss with you the subject of the "Care of Machinery". There are many abuses to which machinery is subjected in the ordinary Shop, and it will be my purpose to point out to you the ways and means of preventing these wasteful and unnecessary practices.

Employment

The subject, "Employment", is of vital importance to all departments of the Packard Plant for, without the proper kind of workmen, it is impossible to attain the production expected from each department throughout the

Plant. Mr. E. A. Dryden, our Employment Manager, will explain why you do not always get the class of workmen which you desire and need. He will explain to you the recent changes in the policy of the Employment Department and how the new policy in operation is benefiting both the employee and employer.

Timekeeping

Mr. W. A. Kumerow, our Chief Timekeeper, will explain to you the relation between the Time Office and the Factory; just how the Time Office handles their business; also, how and upon what special occasions the Foreman should be particularly careful to co-operate with the Time Office in order to guard against errors in pay and the discord arising therefrom.

Safety and Sanitation

A fund of information on the subject of "Safety and Sanitation" has been collected and arranged for presentation to you by our

Construction Superintendent, Mr. J. H. Marks. This data will be found as interesting as it is valuable.

What Makes An Executive

The subject of the last lecture in this course is "What Makes An Executive". Mr. D. G. Stanbrough, our General Superintendent, will discuss the requisite qualities of a good executive as desired by the Packard Management. He will deal only with fundamental conceptions, an understanding of which is essential in the making of a good executive.

Organization of School, Attendance, Etc.

This lecture completes our course, and it is hoped that each member of the school will have a 100% attendance record at the close of the course. There will be a roll call at each daily session to determine who is present and here at the proper time. A record will also be kept of the attendance of each man, and at the close of the course each member will be

credited with the per cent of his attendance. Each member who is in attendance at each of the meetings, and is here promptly at the hour of 10:00 a. m., will receive 6.6% credit for each session. If he arrives late he will receive 4% credit; and if he is absent, no credit at all. It is readily seen that it is far better to come late than to be absent.

At the close of the course an examination will be given and the papers will be graded on the basis of each writer's grasp of the various subjects discussed. There will be twenty questions to be answered and these will be selected only from subjects discussed at the assemblies. The papers will be graded on the percentage basis, similar to the percentage used in the attendance record. These percentages will be sent to each member at the close of the course. At the same time a general report will be turned over to the Management, informing them of the per cent of attendance and grade per cent on the examination of each member of the class.

General Aim of the Packard Plan

I trust that I have given you a general understanding of our plan. This plan was adopted primarily for the purpose of placing before you in a direct manner the various fundamental problems relating to our work here. The best way for us to put into effect the propositions intended to solve our problem is, we believe, to have the executives who originated those propositions come here and present them to you in person. You will thereby gain a clearer knowledge of the policies which have been adopted by the Management and they will have reason to be more fully assured of your hearty co-operation in carrying out the plans which they have definitely adopted.

Plan Comprehends Intensive and Extensive Co-operation

In order that we shall secure this co-operation, each executive must thoroughly understand the proposition as presented for our

consideration and the reason why certain methods for carrying out a definite plan were adopted. Each executive must realize that co-operation is necessary if we are to achieve the highest degree of success in our work. The Management has become convinced that closer supervision must be exercised throughout our Plant and you are the men who are employed to exercise that supervision. You should strive to make your men understand just the idea which the Management is endeavoring to convey to you, viz: a knowledge of the problem, an understanding of the plan for solving it and the reason for the adoption of that particular plan. But you yourselves must first become thoroughly familiar with the Company's policy; otherwise you cannot, in an intelligent way, convey this information to your men. It should be realized that the aims and plans of the Company, which originate with the more responsible executives, do not end in their proper execution until all, from the highest executive to the

man who sweeps the floor, have established a correct relationship between their work and the plan of operation as established by the Management.

How Loyalty to Packard Principles Will Reduce Difficulties of Production

Our aim is, therefore, to get direct information to those who need it. The time has passed when an executive, whatever his station may be, keeps everything secret about his particular job. Today the more information an executive can give to his assistants, the less trouble he will have in his department. Executives now realize that the most difficult department to supervise is the one that is full of ignorant men. Your duty, then, is to impart information which will better educate the workmen in your department. You will thereby increase production in your department and reduce your troubles in general. Employers are constantly searching for more capable men. They are discarding the idea of

employing workmen who can barely hold down the job; they are now looking for the very best man available for the job. The spirit of loyalty and unselfish service with which you conduct your respective departments will determine your own worth and the value to the Company of those under your supervision.

The program as laid down for these assemblies will be adhered to as closely as possible, but it is subject to change. We desire that every executive who is on the seventy roll shall attend these assemblies, viz: Assistant Foremen, Foremen, General Foremen and Assistant Superintendents. In conclusion I wish again to emphasize the fact that the fundamental purpose of these assemblies is to get important information to you in the simplest and most direct manner possible.

Second Session

Subject: DISCIPLINE

Speaker: MR. C. F. HOLDERMAN, *Factory Disciplinarian*

The Disciplinary Department of the Packard Motor Car Company is of very recent origin. Its purpose, as conceived by the Packard Management, is to improve the discipline and raise the morale of our organization.

Those who are now in the dark, so to speak, as to the necessity or occasion for the organization of such a department will readily become converted to the idea when it is realized that recent investigations have shown that over 50% of all discharges directly result from violation of cardinal rules of factory conduct. The figure is often placed as high as 66%.

This condition, together with that of our present labor market, was next to intolerable,

and hence our present campaign to overcome these conditions.

Army Discipline Vs. Bolshevism

No organization, whether it be a commercial establishment, a Government, an Army or a Navy, or any other institution, can be successful without discipline. We are all aware of the effect in Russia of Bolshevism, an institution which was born of a spirit of lawlessness. Its resulting social depravity has stamped it with disfavor among the more intelligent peoples of the world.

With it we may fittingly contrast the recent achievements of our own army and navy, where scrupulous attention to discipline fostered a very high morale. It was the spirit of courage and determination thus aroused in our men which started the victorious advance of the Allied Armies. Without this element of discipline our armies would have been as ineffective as a mob; and, for the same reason, any department in our factory is altogether

incompetent without a due observance of the rules of conduct as established by the Packard Management.

Disciplinary Department a Tool of the Executives

That is the reason why the Packard Management, in selecting a Foreman for a particular department, gives principal consideration to his ability to maintain proper discipline. Other minor qualities may be lacking, but that essential quality must not be lacking in an executive. For, even though we have a disciplinary department, you, as Foremen, are the real disciplinarians. This department stands, in the conception of the Packard Management, as an organization to be used by the various Foremen. It is your department, organized to aid you in securing proper disciplinary conditions in your departments. It is the outcome of an urgent need and is essentially a co-operative, not a coercive, institution.

I shall endeavor to confine my remarks to five principal issues, viz:

1. Generally accepted definitions of the word "Discipline".
2. The conception of Discipline which the Packard Management would have you adopt and put into practice.
3. How may we best carry out our plan to secure better disciplinary conditions?
4. The functions of the Disciplinary Department and its relation to executives.
5. An explanation of Packard rules which are not generally understood.

Generally Accepted Definitions of Discipline

When we begin our search for generally accepted meanings of discipline our attention is quickly brought to a consideration of military discipline, which, it is said, relieves a soldier of any initiative in his own mind. He need not think for himself. Obedience to his

superior officer's command is a mechanical, automatic resultant.

The next conception of discipline that comes to our attention is that which is enforced by our police authorities. Obedience to civil law is promoted by the fear of severe punishment which is meted out to all offenders, and requires the maintenance of jails and penitentiaries.

In the spinning mills where children and old people are employed, in sweat shops and wherever cheap labor is found, still another method is followed, that of securing discipline by intimidating the employees by threatening to discharge or even shortpay them. This is probably the most undesirable and unjust system of all.

Home and school discipline, as symbolized by the hickory stick in the earlier days of our national life, represented a very distinct method of securing proper discipline, a method probably quite familiar to all of you, and one which by no means needs to be disparaged in view of its outstanding results.

Packard Conception of Discipline

The definition of discipline, as accepted by the Packard Motor Car Company, reads as follows: "Discipline is the *rule, method* or *order* of obtaining regularity."

Plainly, the Packard aim is to obtain regularity. Since the exact method, rule or order as accepted by the Packard Management is not indicated in the definition, I shall attempt to interpret their meaning of it to you.

As you will have noted, in the methods of securing proper conduct which have been discussed, they, to a large degree, depend upon the element of fear for their success. Invariably there is a form of punishment provided for infraction of the law. This is a negative process rather than a positive one. In contra-distinction to it stands the method as conceived by the Packard Management, which, in their own words, is as follows: "Obedience to these rules or methods is to be secured by induction through our Foremen." In other words, there is created a desire to obey, not

because there is punishment for disobedience, but because there is pleasure in voluntary obedience, an outgrowth of a fostered desire to respect the motives of the Packard Motor Car Company. The employee's sense of honor is appealed to, and the intangible reward for a proper attitude of respect is bound to be followed by a tangible reward in the future.

How Best to Apply the Packard Plan

Under the third topic, viz: how to carry out our plan, the Packard Management desires above all that Foremen distinctly understand that there is no desire on their part to dictate to any Foreman as to how he shall exercise his executive responsibility beyond one reservation. It is that "The Packard Management will not support you in the use of rough methods, such as loud and boisterous talking, cursing, threats of dismissal or any other attempt to intimidate the workman."

This rule is based upon the following grounds: First, it is impossible to scare an

American; the recent war has proven that. I refer to a real American in ideals and sentiment. Second, the Packard Motor Car Company does not care to retain or employ any who are not Americans or desirous of becoming Americans. Hence, rough methods of any kind are not in keeping with Packard principles.

Three Basic Principles

Under our discussion of ways and means of securing good discipline, allow me to present three basic Packard principles for your guidance in applying this plan:

1. Be sure that each employee becomes familiar with Packard rules.
2. Do all in your power to create such an environment in your department as will render obedience to our rules practicable and possible.
3. Depend upon an employee's sense of honor for his proper conduct.

Teach Packard Rules

The necessity for teaching each new employee Packard rules of conduct requires only "horse sense" to be understood. This duty falls entirely upon the Foreman. It is absurd to expect a workman to follow established rules when he is wholly unfamiliar with those rules. I realize that Foremen are often placed at a disadvantage in this respect by having illiterate foreigners in their departments. But these are generally the exception, not the rule; and even foreigners may be taught by example.

Responsibility for Discharge Generally Misplaced

To further indicate the extent to which Foremen are indirectly responsible for infractions of the Company's rules of conduct, I will state some of the principal facts gathered in a recent investigation of the cause of discharges in a large industrial company. The first outstanding discovery was that only ten per cent of them were due to workman's irresponsibility.

The other ninety per cent of discharges were chargeable to failures of management. In other words, employers were responsible for ninety per cent of discharges and employees for ten per cent. Further analysis of the causes for the ninety per cent of discharges disclosed the fact that sixty-three per cent of this ninety per cent, or nearly two-thirds of all discharges, were due to violations of the employer's rules of conduct which were not generally understood. It is, therefore, easily comprehended how closely related to our problem of labor turnover is that of a proper understanding of Packard rules of conduct.

Give Proper Place to "Human Element"

One of the chief objections to modern industrial organization is generally recognized to be the failure to give proper recognition to the "human element". Therefore, our program aims to bring the new employee and his Foreman into immediate and close relationship. This personal contact will be an imme-

diate result of the Foreman's effort to familiarize the new employee with the rules and regulations of the Plant, and this purpose should be prominent in the Foreman's mind when he has occasion to speak with his men.

It is well known that many employees remain with a company because they have formed a friendship with their Foreman, and, although they are offered more money elsewhere, they stay. A Foreman who lacks this ability to establish friendly relations should read paragraph No. 19 in the pamphlet entitled: "Duties of a Foreman." I shall now read part of that paragraph to you: "When the Employment Department engages a workman, the Foreman of the department to which he is assigned should spend a few minutes in getting acquainted with him. *He should explain the rules of the Company to him*, see that he is properly instructed as to tools, machines, system, etc."

These talks between a Foreman and his men have an effect similar to that which results

from the system of industrial training which has cut the labor turnover fifty per cent, according to a recent report of two hundred manufacturers. Moreover, this general plan of "breaking in" new employees has resulted in increased production. These manufacturers have given industrial training a long and severe test. Ninety per cent of the manufacturers report that their training departments are profitable. The remaining ten per cent have not had a sufficiently long experience with their training schools so as to be able to classify them.

Importance of Good Shop Environment

The second point in our discussion of how to best carry out our plan I consider to be the most important of the three. "Create such an environment as to render obedience practicable and possible." By this I mean that you should see to it that your workmen have proper sanitary conditions throughout the department.

You should make sure that the department is properly ventilated, sufficiently lighted, and that the conditions under which he works are safe. Everything within your power should be done to make his surroundings generally pleasant, and do not forget the important element of your personality which always carries great weight with a workman.

In the event that you desire these sanitary conditions improved, Form RZ-559 (Cleanliness and General Conditions Questionnaire) is provided for your use and is a part of your weekly report. This form informs you of the proper way to secure good light, heat, sanitation, safety, building repair, etc. (Form RZ-559 which is mentioned in the above paragraph is reproduced on the accompanying insert).

Justice the Keynote of Wages

I also desire to call your attention to the fact that a workman's wage has a great deal to do with his morale. That fact is quite self-evident. Therefore, be careful to satisfy your

men to as great a degree as is possible and just with respect to their wages. Endeavor to make conditions as favorable as possible so that your men may make their premium. This helps the man as well as the Company. Endeavor to be just with respect to the workman's wages and the Company will support you in your efforts.

Rely Upon the Honor System

Our third basic principle in applying the Packard plan is: "Rely upon the employee's sense of honor to abide by our rules"; depend upon a workman's sense of honor to do as we wish him to do. It may be objected that there are some men without a sense of honor. Experience has taught us that very few men, when rightly appealed to, come under that classification. And, if you discover that there are any men here who unmistakably have no sense of honor, you have every assurance that the Management will sustain you in discharging them as that is also a class of men that the

Packard Motor Car Company does not care to employ.

I trust this fact is firmly fixed in your minds, that Packard discipline differs primarily from other methods in that greater emphasis is placed upon the practical application of the Golden Rule. This may sound idealistic, but it is a basic principle of our plan to believe every person honest until it is proven that he is not honest. And in this same connection, I desire to discuss with you the importance of securing the unfailing respect and confidence of your men, and the way in which this may be done.

Mutual Confidence and Respect Essential

Remember that, in dealing with men, the essential achievement is to secure their co-operation in word and in deed. Strive to acquire their confidence and strive to make your personal relationships pleasant and agreeable.

Of course, delicate and distasteful circumstances are bound to arise. This is only

natural and is to be expected. But this is the critical time when the caliber of your own character is put to the acid test, the event which will determine the difference between you and the ordinary man. The control which you can at all times maintain over your temper, the justice and discretion which you can manifest at these critical times, and the satisfaction which the employee expresses over your decisions constitute the chief evidence of your success as an executive.

Self-Control the Gauge of an Executive

Whenever you reprimand an employee in such a manner that you leave him with a spirit of revenge, or with a sense of undue restraint, or with a feeling of malice and contempt toward you, you will have undone all you ever did in the right direction. So, regardless of what the evil spirit within us may attempt to dictate, we should prove ourselves the master of these ugly promptings to fly at each other in wrath when we are challenged.

We should cultivate self-control to the extent that under all conditions we shall be found able to display an even temperament. We have all observed men who were able to do this and we invariably envy them; but this course is possible for us all and, when the unpleasant circumstance has passed and the dispute is settled, our character as an executive is again severely tested by our readiness and ability to reinstate the workman in his former place of respect and confidence. There are few disputes of such a nature as to make this reinstatement not only possible, but an achievement highly complimentary to the Foreman.

How and Where to Reprimand Workmen

I desire at this time to call your attention again to a statement from the pamphlet entitled "Duties of a Foreman" relative to reprimanding an employee. "Reprimand him privately" is an unqualified instruction from the Management. Yet very frequently it is discovered that a Foreman is acting directly

contrary to this instruction. There is no excuse for this infraction of the Packard rules on the part of the Foreman. One of the first qualifications of a good executive is to be able and willing to obey his superiors. A Foreman who does not respect the orders given him by his superiors can scarcely expect different treatment of his orders by his men. There is a reason for the above-mentioned instructions. When a Foreman takes occasion to reprimand an employee openly he places himself in danger of losing control of his temper, and if he does become openly incensed all the above-mentioned ill effects result, in addition to a loss of time on the part of workers who are witnessing the disturbance. Give this matter due consideration and you, I am sure, will not be one of those who violate this rule.

Relation of Disciplinary Department to Executives

Our fourth principal subject for consideration is the function of the Disciplinary Depart-

ment and its relation to executives. In the first place, let it be distinctly understood that this department was not created to assume any duty whatever with which you have been entrusted. To endow this department with authority which rightfully belongs to you would be a reflection upon your ability and an acknowledgment of your failure, which, if true, would not justify your retention in your present position. Instead, we of the Disciplinary Department are properly your agents to bring to your notice any insubordination or irregularity of conduct which we may observe and, when we have done this, our duty is fulfilled. We report to you any offense on a query form as follows:

> Mr..... was observed smoking during working hours which is a violation of Instruction No. 19, Paragraph No. 76, rule (e), which makes an offender liable to discharge.

Discharge As a Last Resort

The duties of this department are, then, to secure through the co-operation of the executives obedience to all the rules established by the Packard Management. We solicit your efforts to teach any offender to obey the rules by such methods as you suggest, and we recommend discharge as a very last resort, only after all other methods have proven unsuccessful.

The Disciplinary Department places itself at your service in any disciplinary capacity in which you may desire assistance. I desire to state, also, that if any employee in this department attempts to violate any of the above rules for conducting this department it would be appreciated if any Foreman acquainted with this fact would inform the head of the department accordingly. I again repeat that our duty is positively confined to reporting to you violations of rules by those under your direction. Nine-tenths of all infractions which we report are observed when the employee is absent from your department, out of your

sight, so to speak. We merely secure his name and number and report the matter to you. When we find an infraction of rules occurring in your department we only ask you to give us the employee's roll number. We of this department never attempt to reprimand an employee. That is the Foreman's duty.

Welfare of Our Employees Our First Consideration

In concluding my remarks upon this subject, permit me to state that the reason for placing the services of this department at your command was to secure better working conditions for Packard employees generally. We are glad to take your message relative to light, heat and sanitation. We will endeavor to aid you in securing action on any request you may make.

Another branch of our duties is the Matron Service. All Matrons come under the jurisdiction of this department, and, hence, all Matrons are properly constituted disciplinarians. The Disciplinary Department is giv-

ing more attention to the welfare of Packard employees than I now have the opportunity to mention. We trust our work will result in better working conditions generally and be of mutual benefit to both employee and employer.

Packard Rules—Written and Unwritten

Our last subject for discussion is an "Explanation of Packard Rules not generally understood." It has been found that many Packard employees either do not understand or misinterpret some of our rules. It is my desire to clearly define these to you, so that you will understand your proper jurisdiction in enforcing these rules. Also, it is, of course, inevitable that our rules written in the Book of Instructions should be found not complete enough to cover all offences which occur. This is to be expected, but it does not make the offence less real or less deserving of correction. I shall attempt to enumerate and explain some of our misinterpreted, written as well as our unwritten, rules of conduct.

Loss of Personal Property by Theft

You should inform your employees that the Company is not responsible for their personal property. Our legal counsel has made this decision. The loss of money and valuables will be investigated if you will notify this department, but we cannot promise such results as are secured by our police departments; our employees who practice the careless habit of bringing valuables to the Plant should be warned against the danger attached thereto.

The circulation of petitions, a subscription list or passing the hat, any form of soliciting funds is prohibited except by permission of the Employment Manager. Written instruments of any nature are prohibited from circulation in the Plant.

The Restrictions on Smoking

The following notice explains the views of the Company with regard to restrictions on smoking: "*Smoking is not allowed at any*

place or at any time except as noted on the signs posted throughout the Factory. Smoking is permitted in no place during regular working hours and the employees who work overtime or through the lunch period are not permitted to smoke. One exception is made to this rule with regard to smoking overtime by employees in building No. 13, who are permitted to smoke in this building on overtime and Sundays."

Employees who arrive late, employees who leave the Factory for any reason before the regular closing time, employees who come to the Plant while on leave of absence, and night workers who may come to the Plant during the day, are not permitted to smoke on the Company's property and outside of the Plant. Employees must not smoke in going from one division to another.

With regard to the prohibition of smoking on the streets and thoroughfares outside of the Plant during working hours, the Company is not unreasonable in expecting employees to use all the time for which they are paid in the inter-

ests of the Company and not to spend any of it in smoking.

These are the rules of the Company and are not subject to arbitration on our part. In other words, the way an employee interprets the rule as applied to himself or as he understands it has nothing to do with the matter. When a rule or instruction is issued by the Company, an explanation of why such a rule is made, whether it is satisfactory to an employee or any other point for argument, is not necessary; it simply demands obedience.

Miscellaneous Rules Applied

You never fail to satisfy an employee if you explain the objections to your giving him a letter of recommendation when he seeks other employment, and the disadvantages of using his last employer as a reference. The Management strongly objects, for well-founded reasons, to your issuing recommendations of any kind.

Gambling is prohibited at any hour, at any place about the Plant and for any stake what-

ever. Games of chance of any form are considered gambling, for money or any form of property. And a Foreman is responsible for obedience to this rule by his workmen; he should guard against any infraction of it at lunch hour or any other time.

Aimless wandering of men through the factory is likewise so objectionable that we must call upon each of you for co-operation that we may at least reduce this nuisance.

Women walking in pairs has been prohibited by the Management. They have requested that I demand dismissal of all who violate this rule.

Spitting on the floor is positively prohibited. The aggressive campaign begun by the Management has done much to do away with the filthy practice.

Attention to the correct manner in which women employees are required to wear shop uniforms has been very badly neglected and each Foreman has therefore been given the following instructions:

"Attention is invited to the fact that some of the Foremen do not give the matter of the proper appearance of the women employed in their department that attention which it deserves. Work dresses have been supplied for all women employees in order to protect their clothes, reduce the number of accidents to a minimum, and to give the shop a uniform appearance in so far as its women employees are concerned. It is noticed from time to time that some of the women make a practice of wearing collars and cuffs outside of the uniform, which are not part of the same. This is wrong and should not be permitted. The women who have been graduated from the school have been properly instructed on this point and the others should be so instructed upon receipt of this query."

It is also noted that some women wear aprons over their work dresses. There is no objection to women wearing the proper kind of an apron, but this apron must be necessary, due to the nature of the employment. In such

cases the approved kind of apron can be obtained upon application to the Garment room in the Krit Building. Aprons, other than standard, are not to be worn.

Will you please see that these instructions are carried out in the department under your charge? It is needless for me to further discuss this matter of correct uniforms.

Your attention is called to the fact that the nuisance of paying Liberty Loan installments during working hours has been ordered stopped. The Liberty Loan office is only open for this purpose between the hours of 11:30 and 1:00 o'clock and from 5:00 until 6:00 o'clock in the afternoon.

Packard Rules Definite and Just

In conclusion, I wish to state that, in contradistinction to ordinary civil law which is subject to test for its constitutionality, "Packard rules of conduct are not to be arbitrated." They are reasonable and just. They await no one's approval for their enforcement. Having

been established, there is but one course for each of us: that is the path of implicit obedience.

Third Session

Subject: PREMIUM SYSTEM

Speaker: MR. P. P. VERNER, *Clerical Superintendent*

Our subject for today is the Premium System, but before I say anything directly upon that subject I wish to bring to your attention various methods of paying wages that are now in use.

Historical Development of Wage System

I was about to say that there has always been some accepted system of paying wages. That, however, is not entirely true, because, if you will go back in history some three or four hundred years, you will find that men did not receive any wages at all. They were merely slaves belonging to the soil and were bought and sold with the soil like the cattle.

In English History, until a comparatively short time ago, a few men, known as Feudal Lords, owned the soil as well as the inhabit-

ants that lived on it. These people who lived on the land and worked for the Feudal Lords could not move away because they belonged to the Feudal Lord, and they received in the way of wages nothing more than their mere livelihood.

In Russia we find that the serfs who likewise belonged to the soil were freed by Czar Alexander the Second only sixty years ago.

Strikingly similar conditions have existed in the early history of our own country. It is only fifty-six years ago since President Lincoln freed three and one-half million slaves, who up till then belonged to plantation owners and were bought and sold in the open market.

Wage System a Recent Development

The method of rewarding labor is, then, a comparatively recent development. The relations existing between employer and employee are likewise new. It is even now only in the process of development and improve-

ment. We have not yet established a wage-paying method that is final, one which we can consider definite or absolutely correct. Neither is there at the present time any certain well-defined, single method of paying wages.

The principal methods which have been accepted and used are as follows:

(1) The Day Work Plan
(2) The Piece Work Plan
(3) The Profit-Sharing Plan
(4) The Premium Plan

The Day Work Plan

Under the Day Work Plan a workman is paid a certain amount of money for a given length of time, regardless of how much work he performs. It then becomes a matter of driving on the part of the employer in order to get as much production as possible, and a matter of shirking on the part of the workman in order to do as little as possible for the wages he receives. When analyzed to its basic elements, this system is found to be but

a slight advance over that which we had in the days of Serfdom.

Under this system there is no fixed amount of work which the employee is supposed to do, nor is there a fixed salary that he should be paid for a certain class or amount of work. The employer tries to have the work done as cheaply as possible, while the workman tries to obtain as much money as he can for the least amount of work. The plan leads to dissatisfaction on the part of both workman and employer.

The Piece Work Plan

The Piece Work Plan was hailed as a great discovery some years ago. It is now quite universally used in all parts of the country, and has been extended continuously since first devised. It was expected that this system would overcome all the objections of the Day Work Plan. By this system the workman is paid for pieces produced, regardless of the amount of time spent. In this way the workman can increase his salary in proportion to his ability

and the employer on the other hand is able to know his cost in advance of production.

This system, however, led to a number of abuses. As soon as the workman became proficient and could earn considerably more than the standard rate of wages in the community the employer felt that this workman was being overpaid and consequently he cut the piece rate. As soon as the workman found out that by increasing his output his rate would be cut he held back on production and thus the benefits of the Piece Work Plan were lost.

The Profit-Sharing Plan

The Profit-Sharing Plan is one that is not in general use, although there are a few companies that have made a success of it. The Proctor & Gamble Company, makers of Ivory soap, and a few other establishments have adopted the Profit-Sharing Plan. According to this system the workmen share the profits with the company, and in order to have any share they must produce as much as

they can and with as little expense as possible. The lack of confidence which the workmen have in the figures tabulated by the company and the rapid labor turnover, and the fact that the profits received by the workmen at the end of each year were not commensurate with the efforts made, make this plan more or less impracticable.

The Premium System

The Premium System of paying wages is based upon the idea of guaranteeing the workman a certain day work rate for the hours spent on the job and then paying a premium for all time saved. There are a number of different Premium Plans, among them being the following:

(1) The Halsey System
(2) The Taylor Differential Piece Work System
(3) The Gantt Bonus System
(4) The Emerson Efficiency System
(5) The Rowan Premium System

The Halsey System, invented by Mr. F. A. Halsey, is based on the idea of paying a man a premium of one-half the time he saves at his day work rate, in addition to his regular day work rate, for the time spent on the job. If the standard time is sixteen hours and the workman performs the job in eight hours he saves eight hours. Under this system he would then be paid for one-half of the eight hours at his day work rate in addition to his regular wages.

The Taylor Differential Piece Work System was invented by Mr. Frederick W. Taylor, who is known as the "Father of Scientific Management". This system is really piece work, but may be classed as premium because a premium is paid in the form of a high rate for doing the job in the standard time or less. It is based on the idea of having two rates. One is a low rate, which is paid to a man who fails to do the work within a certain standard time. The other is a high rate, which is paid if the workman reaches or surpasses that stand-

ard time. Usually this system works out so that if a man cannot make the high rate he does not stay, and so it acts as an incentive to the workman to produce a larger amount of work in order to receive the higher amount of wages.

The Gantt Bonus System, invented by Mr. H. L. Gantt, is very similar to the Taylor Differential Piece Work System in that it increases the wages 25% or 35% above the day work rate, providing the man produces the job within the standard time. If it takes him longer than the standard time to complete the work he will obtain only day work rate, and in some cases less than day work rate, according to the plan adopted.

The Emerson Efficiency System, invented by Mr. Harrington Emerson, is one of the more recent premium methods of paying wages. It was first introduced in the Santa Fe Railroad Shops a number of years ago. This system is based on the idea of paying a man a certain percentage of increase above his

salary, which is determined by the per cent of efficiency which he shows in his work. For instance, if a man demonstrated that he was 100% efficient, according to the standard time allowed, he would be given 20% increase over his regular wages. If he were 120% efficient, he would be given 40% increase above his regular wages, etc. One of the features of the Emerson System is that the premium is averaged over a pay period. If a man gains on one job and loses on another he is paid the average premium earned on all the jobs.

The Rowan System, which is the one used throughout the Packard Plant, was invented by Mr. James Rowan, about twenty years ago, and has now been in use in the Packard Plant for nearly ten years.

The Rowan System Found to be the Least Objectionable

I do not want to convey the impression that I believe this to be the best system that it is

possible to devise. I am convinced that in common with all other methods of paying wages it has various defects, but we believe that the Rowan System is the very best that has been devised up to date, and the fact that it has been in operation here, as I have mentioned, for nearly ten years, is proof that it is successful.

The foundation of the Rowan System is based on the following formula: PER CENT OF PREMIUM EARNED EQUALS PER CENT OF TIME SAVED. This is the fundamental rule and governs the whole premium system of the Packard Plant. You will probably hear it said that by this plan workmen do not receive as much per piece for high production as they do for low production. That is true, since we do not compare the Premium System with a Piece Work System, but the fundamental rule is, nevertheless, the same, that per cent of premium earned always equals the per cent of time saved.

The following is an example to show you how the premium is figured:

Standard Time = 16 hours
Elapsed Time = 12 hours
Gained Time = 4 hours
Rate per hour, 40c.

The way to work this problem is:

$$\frac{\text{Elapsed Time} \times \text{Gained Time}}{\text{Standard Time}} = \text{Premium Hours}$$

$$\frac{12 \times 4}{16} = \frac{48}{16} = 3 \text{ premium hours.}$$

To obtain premium earned:

Multiply the premium hours by the rate per hour.

$3 \times .40 = \$1.20$ premium earned.

To obtain total earned:

Add the premium hours to the elapsed hours and multiply by rate per hour.

$12 + 3 = 15.$

$15 \times .40 = \$6.00$ total earned on job.

To obtain percentage of premium earned:

Divide gained hours by standard hours.

$24 \div 16 = 5\%.$

Rowan System Simple and Just

What we want to do here in these classes is to explain exactly the system we have in operation and the method used in figuring. I know that it has been more or less of a mystery as to the method which we use. The outline which I have given you is based exactly on Mr. Rowan's book, which I have here before me.

I said that the per cent of premium earned is equal to the per cent of time saved. If a man should save 75% of the time he would have 75% of his day work rate added to his day work earnings for the time spent on the job. It should be remembered that we are not working a piece work system, but a premium system. Do not forget that this is per cent all the way through and not so much per piece.

Under any premium system a workman will earn less per piece the higher the production, but under the Rowan System the rule always holds good that whatever per cent of

time he saves he adds the same per cent of his regular salary to the wages which he earns.

Of course, you can easily see that it will be impossible for a man to earn 100% of his wages, because to do that he would have to do the job in no time and consequently he would receive no pay.

Let us, however, take an example that is perfectly likely to occur. Let us demonstrate, for instance, how the premium is figured if 75% of the time is saved. We will assume the following example:

Standard Time = 16 hours
Elapsed Time = 4 hours

Gained Time = 12 hours

To obtain percentage of premium earned: Divide gained hours by standard hours.

12 hours ÷ 16 hours = 75%.

In the first case he did the job in twelve hours and earned three premium hours, while in the second case he did the job in four hours

and also obtained three premium hours, but in the second case it only took him one-third as long to do the job as it did in the first instance, and he, therefore, earned 75% premium instead of 25%.

Now is there anyone who would like to ask any questions? Does everyone understand the method of figuring? We want to get this right, as I have an idea that Mr. Mead may spring an examination on you, so everyone should understand thoroughly our premium system.

I have often been asked: "Why do men stop at 50%?" One reason is that most workmen are accustomed to the piece work system, and they figure their earnings on that basis. They seem to think that beyond 50% they do not obtain as much per piece, and consequently they do not put forth the extra effort after they have accomplished the task in half the standard time.

Our system cannot be compared with a piece work system. If workmen wish to have their

wages figured on a piece work basis they should work in a piece work shop with all its disadvantages, and not in a premium shop such as we have.

Another reason why men do not ordinarily go above 50% is because they are afraid their rate will be cut. I want to say that there is absolutely no incentive to cut the time under the Rowan System. One of the fundamental rules of the Company is that once a standard time has been set it will not be cut unless the method of performing the operation is changed. Anyone who knows of an infraction of this rule should bring it up in detail, giving piece number, name and all the circumstances. In what I am saying to you I am giving you the view of the Management; it may, of course, be possible that mistakes are made in the application of the system.

While it is true that we will not cut the standard time once it is set, the reverse is not the case. If we find that a time has been set too low it will be increased and thus the

Rowan System works to the advantage of the workman.

Explain Rowan System to Men

The reason this system is now being explained in detail to the Foremen is so that they may carry the message to the men. The idea of a factory is to get out a large quantity of production. A man must certainly be very narrow-minded if he wants to hold back on production and penalize his own pocketbook. If a workman can be shown that, by increasing his effort, he can increase his earnings per hour, no matter what the rate per piece may be, he certainly ought to make the effort.

I have also been asked: "Why does the Clerical Force change the tickets if the time is too high?" To this I can only answer that the Clerical Force has no right and should never change any of the figures on the time tickets. There is no limit to the per cent of premium that may be earned by a workman and no one has a right to change a ticket arbitrarily.

It is true that the tickets which show high time are sometimes sent back to the factory for correction. The reason for this is that in applying this system we have found that a great many errors creep in. Other systems, such as the day work, depend upon the number of hours a man works; piece work depends upon the number of pieces produced, and does not recognize the length of time it takes. The Rowan System, however, depends upon both. We must have absolutely correct elapsed time and correct standard time, as determined from the number of pieces produced. Tickets are then returned, because we have found that errors are being made, either in the standard time or in the elapsed time.

There may be errors on any tickets that are sent through, no matter what per cent premium is earned, but since we receive from ninety to one hundred thousand time slips every day period it is impossible to investigate them all. At one time all tickets that showed 50% or over were sent out for investigation,

but we have found that a great many of the workmen make 50% and over, so now no ticket below 66⅔% is investigated. All tickets that show premium in excess of 66⅔% are investigated, not because we do not want the men to make this much premium, but merely to see if some error has been made. If we find that the man did his work according to the ticket, no matter whether he earned 66%, 75% or 85%, we are glad to pay him that premium. No one has a right to take it away from him, and no one can cut the time as shown on the tickets. As far as the Company is concerned, we want every workman to get every cent that he is entitled to. The premium system should be applied fairly and squarely. Whatever time it took a man to produce a job should be recorded on the tickets and he should be paid according to those figures.

Success Depends Upon Organization

The Rowan Premium System cannot be applied in a "slip-shod" shop. In order that a

man may be paid for what he produced we must know the exact elapsed time and the exact number of pieces turned out. This can only be done in departments that are well organized and well supervised, and where the work is run through in a logical order according to a well-defined plan. It is up to every man, including Foremen, Jobsetters, Clerks and workmen to do their share of the work. The trouble comes when we have wrong conditions in a department and that causes men to cheat; night men steal from day men and such conditions defeat the operation of the premium system entirely.

Remove Error By Lot System

My idea of a premium system is that we should run the work through in lots and have the lots pass from one machine to another, and then there will be no question as to the quantities produced. There are, of course, many places in the shop where a lot system cannot be applied, but I believe that some system can

be worked out for every division and for every department that will make the premium system workable.

Understand that anything that touches a man's pocketbook is of a vital concern to him. Our Foremen, Jobsetters, Clerks, Inspectors and workmen are all interested in the proper operation of the premium system. It takes the co-operation of all concerned to make it work. No one should say: "That is the Clerk's job," "The Foreman's job" or "The Inspector's job." You are the ones on whom the proper execution of the system absolutely depends. If you don't look after it, surely no one else will.

Fourth Session

Subject: INSPECTION AND SCRAP

Speaker: MR. C. S. STARK, *Chief Inspector*

In introducing the subject of my lecture this morning I wish to quote Webster on his definition both of inspection and of scrap.

Webster defines inspection as being the act or process of "examining, inspecting, or scrutinizing". Inspection, therefore, as applied in the Packard Motor Car Company, has for its object examining, inspecting, or scrutinizing whatever part of it may be, whether finished parts, or assemblies, or a completed product; and it is the work of the Inspection Department to maintain and control the quality of that output in strict accordance with certain standards that have been previously adopted by the Packard Management, however high those standards may appear to be. This Department also has a less specific duty, that of acting to a certain degree as a moral

governor over our Superintendents, Assistant Superintendents, General Foremen, Assistant Foremen and Jobsetters, in order to aid in the maintaining of the Packard Standard of quality in accordance with the request of the Management.

Webster defines scrap as being a "remnant, remains, a fragment, or a discarded refuse". Scrap, therefore, as applied to the Packard Motor Car Company, consists of all parts and assemblies which have been inspected and scrutinized by the Inspection Department, and found not to be in accordance with the Packard standards. Such material is set to one side by the Inspection Department. Later it may be re-claimed, salvaged or finally relegated to the "junkpile".

The Inspection Department and Its Relation To Production

The first relation which we aim to establish between the Inspection and Production Departments is that of reciprocal co-operation

with a single purpose of maintaining Packard quality and standards of production. In this connection I regret to state that the status of the Inspection Department is not thoroughly understood by many Foremen. This inability on the part of the Foremen to understand the status of the Packard Inspection Department may be partially excused in some instances, for the reason that many of these Foremen have never before been employed in Plants where Inspection Departments were operating. It is, therefore, due to ignorance on their part that they take rather arbitrary stands against inspection of any kind whatsoever. To those in particular I desire to emphasize the fact that the Inspection Department of the Packard Motor Car Company is primarily maintained to help and not to delay them in carrying on the work of their departments and that the Inspection Department, if used for the purpose for which it was established, will be found to be of great benefit to them.

I regret that the Inspection Department has

often been said to be a part of the Production Department. I desire emphatically to contradict that statement. The Inspection Department is organized independently of the Production Department and is directly responsible to the Factory Manager. Foremen have brought to my attention matters of economy, thinking that it would lessen expense to place certain Inspectors on production operations. This work is far from coming within the province of the Inspection Department, the exact duties of which I will explain to you in the course of my discussion.

Quality Our Aim

It is superfluous for me to again state that the purpose of the Inspection Department is to maintain a superior standard of quality. The moral influence which this department exercises over your operators in their efforts to maintain this standard is readily seen to be of unmistakable value, and this influence will be productive of still better results to the

extent that the spirit of co-operation is increasingly manifested by all of us.

Inspection Systems — Past and Present

Before proceeding further with the discussion of this subject, I desire to call your attention to some of the experiences that the Packard Motor Car Company has had in years past with various kinds of Inspection Systems. We have had many plans for maintaining quality, several of which were very good, but not adaptable to our class of work. Many of the older Foremen present can remember, no doubt, when Packard Inspection was carried on by Floor Inspectors. Under that system men passed from one machine to another in a department, inspecting a part from this machine or that, checking it carefully and pronouncing it either good or bad; if bad, he would call a Jobsetter's or Assistant Foreman's attention to it, one who was responsible for the operator's work. There was no doubt that the defect on the particular piece

inspected was detected, but there was a fundamental weakness in this kind of inspection. Many times material was not up to the standard, since machinery would inevitably become worn and dull, with the result that, during the time intervening between the visits of a particular Inspector to a machine, the operator would be liable to produce some defective work. While striving, therefore, to maintain our quality, we were of little aid to our Assembly Departments, because much of this defective material would be thrown with the good material before the return of the Floor Inspector and it could not be easily separated after being placed with quality material. The result was a condition of constant confusion in the Assembly Departments. Hence the Floor Inspection System was soon discarded.

100% Detail Inspection System

In our attempt to correct this loose Floor Inspection System we passed to the other

extreme and instituted a 100% Detail Inspection System. All Floor Inspectors were removed and they, together with several assistants, were assigned to spaces in our departments reserved for them. With the aid of the assistants, this late Floor Inspector now inspected all of the work of each operator, giving it a 100% detail inspection.

From the standpoint of quality this was indisputably the ideal type of inspection and we received the very best of results from it. But many difficulties of operation in this system made it inadequate to meet our conditions, principally for the reason that in the previous year to that in which a new model was produced it was necessary to go into the open market and purchase raw material. The delay caused by giving this material a 100% inspection made it necessary that we have an excess of material over that which we now require in order to keep all the machinery busy. Dealers did not furnish it and we were continually running into shortages, causing a

further delay for which the Inspection Department was criticized. However, the whole difficulty lay in the fact that the system was illy adapted to Packard conditions, but our experiences with it brought out the fact that the 100% Detail or the Crib System of Inspection was ideal from a quality standpoint, and our method of procedure was to develop it and adapt it to our work rather than discard it entirely, and it is the type of inspection which we have now in operation.

But instead of inspecting after each operation, the more *important points* are now selected from the operation sheet and the Stock is taken from this point and brought into the Inspection Cribs for a check which covers all the previous operations performed. In addition to this, operation sheets specify by symbols certain inspection points which were selected for a general inspection. These points are represented by symbols as G-1, G-2, etc., and it is at this point that an inspection is given to all previous operations. In this way we

are not liable to the delay which occurred under the old system, and at the same time we are able to maintain our Crib Inspections. This ultimately guarantees to a greater measure that good parts will be sent to the Assembly Departments. In these Inspection Cribs we do not in every case give a 100% Detail Inspection. By that statement I mean that we do not inspect every piece brought into the Crib, but parts which do require a 100% Detail Inspection receive it. To other parts, such as those from the Automatic Screw Machine Departments, we give what is termed a General Inspection. On this inspection a certain per cent of the parts is taken from a particular box and if it is found to be of good quality the entire lot is passed by the Inspector. In this General Inspection we frequently find a few parts that are defective, but the per cent of defective parts is so small that it is not expedient to pick them out, since an Assembly Department could not use them as they are obviously defective. Thus we are

still assured that these defective parts will not be used in the final assembly of the car.

Jobsetters and Point Inspection

The Jobsetter has been enrolled as an Inspector and he is expected to perform the duties of an Inspector, similar to those of our Floor Inspectors. He is, of course, responsible for setting up the machine and passing upon the first piece. He is held responsible for its quality, since he cannot determine whether or not the operation is being performed right if he does not inspect the first piece.

In addition to our Jobsetters acting in the capacity of Inspectors and our Crib Inspection, we have another type of Inspection which is named "Point Inspection", and which many of our Foremen falsely denominate as "Floor Inspection". Allow me to distinguish between the two. In certain departments having machinery lined up on a progressive basis we have inserted on important operations an "inspect and count

point", as indicated on the operation sheet. These inspection points were provided for when the progressive lineup of machinery was made, and the Inspector at a particular point is responsible for all operations which have been performed since the last previous inspection of the particular part. It is inspected in detail by him and he separates the good from the bad and allows the good to proceed on the regular progressive line of machine operations. The defective stock is taken care of by a defective stock tag routine which I will explain in the course of my discussion.

How Inspection Points Are Changed

All Inspection Points are determined at the time of making an original layout of the machinery and tools. This is done in the Mechanical Superintendent's Office. It is there decided what tools and machinery shall be placed at certain points. The operations which are non-essential are analyzed and the

Inspection Point is determined upon with reference to the sequence of the operations according to the regular operation sheets. Experience with the operation often reveals the fact that these Inspection Points are not located to the best advantage. However, I wish to emphasize that no operation sequence nor an addition of an Inspection Point can be changed without the consent of the Inspection Department. Our reasons for this are very clear; in the first place every addition of a Point Inspection in a progressive lineup of machinery requires an additional employee, and if all of these requests were granted it would require the addition of a large number of employees. It must be borne in mind that the Inspection Department, being a department of expense, is required to keep within the appropriation made for the expenses of the department. However, a request made for an addition, change, or removal of an inspection operation receives proper consideration, and, if it is found to be for the best interests

of our organization as a whole, the request is granted.

Accuracy Required At "Inspect and Count" Point

The Inspectors also perform the duty of finally examining the work covering such points as represented by the "inspect and count" points on the operation sheet. Their duty here is to both inspect and count the pieces which the operator has completed and these calculations are entered upon the copy of the workman's premium tickets, upon which basis their pay is computed. The balance of the operations not represented by an "inspect and count" point is passed upon by the Job-setters, they acting in the capacity of Inspectors. It is highly important that they exercise considerable care when passing upon these tickets, because upon them devolves the responsibility of giving the correct pay to the operators. However, this duty of supplying counts to determine the workman's pay is

being now taken over by a group of "counters" operating under the Inspection Department. This new system of counting is now being perfected and is operating very successfully in some departments, and will eventually be extended to all departments in the Plant.

Accurate Information From Up-To-Date Blue Prints

I am sure it is generally recognized that what we are all aiming to attain is a superior Packard quality of workmanship. We have been able to do this with a fair degree of success in the past, but we still have some expensive practices lingering with us which tend to lower our standard, and which should be eliminated. I refer to a too general disregard of the primary and only accurate source of information, both for inspection and for production, viz: blue prints. We have had many old shop practice limits which you and I considered to be good enough for Packard quality. It is needless to

debate as to whether or not these practices are productive of as good results as are attained through strict reliance upon blue prints, when the latter are up-to-date as they should always be. The Management holds that blue prints are the only proper rule and guide; and since January 1st we have purposed to definitely observe this rule. It may be difficult for some departments to adhere to this rule, but it will eventually be found to be entirely feasible. In the event that your past shop practice is found to be for the best interests of the Plant as a whole, then it is best to see to it that these blue prints are changed and brought up-to-date to conform to our established shop standard, providing this general procedure does not affect quality adversely.

One of the principal sources of our trouble has been primarily due to the use of obsolete blue prints. Recently we checked all blue prints in the Main Division, first securing from the record department the latest date of the blue prints, and to our great astonishment

we found over 822 obsolete prints in our files. It was certainly the surprise of my life to find that nearly 15% of my own blue prints were not up-to-date. I assure you we lost no time in making the necessary corrections, and I believe that not only are our own files now correct, but those of the entire Main Division are now checked and brought up-to-date. Similar action is to be taken soon with respect to the blue print files both of the Service and the Truck Divisions. In view of these conditions obtaining in our blue print files, an additional cause of our frequent failure to observe alterations may be discerned, together with a cause for a large per cent of our scrap.

How to Secure Alterations

As you are aware, operation sheets are intended to indicate the proper sequence of given operations in accordance with the information contained on the blue print. But, in common with all of us, the men of the Engineering Department often make mistakes, and

the blue prints which they furnish are not exactly correct. Therefore, the blue print must be changed.

I desire to emphasize the fact that we have a definite system whereby it is possible to secure these alterations through a regular routine. This routine or procedure is often disregarded. Many Foremen, without consulting the Alteration Committee or any one else, assume the responsibility and make the change. This is an absurd and expensive practice. We have a system whereby each one of us may make requests for the necessary changes, and if the Management, acting through the Alteration Committee, sees fit to change the blue print, it will be changed.

Therefore, on what ground of good policy can it be rightly argued that any one else is justified in assuming this specially-delegated responsibility?

However, I recognize the fact that unusual situations frequently result from accidents and various other causes and it is necessary to

act contrary to the above instructions in order to secure the required, immediate change. The circumstances do not afford time in which to consult the System or Alteration Committee. The order for a change may in this case come from a higher executive, who has been informed of the situation by telephone. He immediately proceeds to get the machinery in motion to effect the required change. Your own order relative to the same may come up via the telephone, or by direct verbal order. This method of issuing these orders is a most dangerous practice. The instruction as it originated is very likely to be enlarged upon, not willfully, but naturally, and by the time it has been passed by four or five individuals in this manner it has lost a large amount of its original meaning and does not improve the condition which it was intended to rectify. I emphasize this point in order to impress upon you the fact of your responsibility in making sure that the information which you receive is correct. It requires but a short time to make

sure you are right. Every executive would be willing to confirm his order in writing and many make it their practice to do so. In order to protect himself, each Foreman should request the written, not the verbal, order. If each Foreman will hereafter adhere to this method of securing Alterations in special cases and will at all other times follow the regular routine by receiving the approval of the Alteration Committee a prominent source of misunderstanding will be removed.

How We Handle Defective Material

The next subject which I wish to present to you for your consideration is that of our method of handling defective stock. As you know, we have a defective stock tag, provided by the Inspection Department, and which indicates the amount of defective material and the nature of the defect. This material is sent with the tag to what is known as our Central Inspection, where a Committee, consisting of one representative each of the Engineering,

Tool, and Inspection Departments, meet and decide upon the disposition of the defective material. At the same time they decide as to who is responsible for causing the defective work.

And, in this connection, I especially desire to review in your minds the fact that this committee alone, acting with the Inspection Department, can properly make charges for the defective work. Their decision is, of course, subject to protest and may only be over-ruled by a decision from the General Superintendent. It is a regrettable fact that many Foremen attempt to assume this specially-delegated responsibility in direct violation of specific instructions. It is recognized that there is much opportunity for an error of charge to be made, and, therefore, a definite method of protecting himself against unjust charges has been provided the Foreman.

In your instructions of one year ago you will remember that each Foreman was requested to present himself at his Central

Inspection Department each day before one o'clock in order to see the material which was about to be scrapped and charged to him. There he is given the opportunity to protest any action which he considers incorrect and enter his arguments against such action being taken. The case is then thoroughly investigated and justice is dealt out. But what results when the Foreman assumes the responsibility and makes a correction of his own accord? In the first place, he usually makes the correction only on one copy of the defective stock tag, failing to enter the correction on the other two copies.

The result is always congestion and confusion; conflicting records are discovered, and the disturbance is charged to the discredit of the Inspection Department; that department is held responsible for the error being made. It is, therefore, impossible to lay too strong emphasis upon the necessity for all Foremen to refrain from making any correction whatsoever on defective stock tags. This would not

be just if the Foremen were given no recourse to prevent injustice, but there is a positive and definite procedure to prevent error, and it is the only method whereby justice will be assured. I again repeat: use the established method.

The Causes for Scrap

Having thus far reviewed the various processes by which we detect bad material and maintain Packard quality, I now invite your attention to the question: "What is the cause of Scrap?" The causes may be generally distributed as follows: defective machinery and tools; improper and insufficient information; ignorance and malicious intent. However, we believe only a small per cent of scrap is caused by malicious intent, probably less than one-half of one per cent. It is well known that we, in common with manufacturers in general, have an enormous scrap account. The cause for it refer back to what I have stated relative to the disregard of blue prints, verbal orders, relative to alterations, etc. It

is also found that a large per cent of our difficulty is caused by the careless manner with which announcements from our Alteration Committee are treated.

This Committee decides, from orders which they receive from the Management, that certain work is to be changed; specified parts are to be removed from stock rooms, assembly departments or production departments, and either scrapped or altered. The Committee issues its orders accordingly. I realize it is difficult for every Foreman to read all orders from this Committee which pass his desk, but some regulation should be enforced whereby all Alteration Queries which pass your desk will receive a check either by your clerk or by your Production Foreman, or some one specially delegated to review all information which is received on Alteration Queries which are always authoritative.

Obsolete Stock Three Years Old

Much trouble ensues when our Stock Room

Foremen fail to observe these queries. I have known of cases in which orders have been sent out to remove and scrap certain stock on a given date, and soon thereafter both the new and obsolete stock has been given out. I have known of cases in which obsolete stock was allowed to remain in the Stock Rooms for three years without being removed. It is easy to perceive how hopeless was the situation in the Assembly Department where it was discovered that this obsolete stock had been sent out and used. It was discovered by the Alteration Committee when, in checking up some old operations, they found that the records were at zero, and, in spite of there being no record of any stock at all, there were three full bins of this stock.

Scrap Prevention a Matter of Close Supervision

We have answered the main aspects of the question: "What are the causes of Scrap?" But our problem does not end here. We must

also decide upon a remedy or remedies for this condition. As in the medical world, so with us, our attention should be focused upon preventative rather than curative methods. "How shall we prevent Scrap?" is then the principal answer which we must answer.

I have already indirectly answered some of the minor phases of the question, but the principal answer is yet to be stated. Briefly, the answer is: by better and closer supervision of the operators. Each and every one of us should get into the habit of acting as an instructor, taking it upon ourselves to persist in this line of action farther than we ever have before. The class of labor which we are getting today requires better and more persistent instruction and supervision. Many of these workmen have never before seen the inside of a machine shop, and unless we all get busy and make them more thoroughly acquainted with their jobs we may expect more scrap than ever before. This close supervision is especially needed with respect to the use of poor

tools. Through the operator's ignorance many tools are rendered unfit for use and yet they continue to use them, producing nothing but scrap. Many Foremen are sometimes negligent about requesting that such tools be repaired, owing to their erroneous belief that production requirements deserve higher consideration than tool repairs. But I am sure that I express the opinion of the Management when I state that you are absolutely and always wrong in permitting the use of any tool or any apparatus whatever which is unfit to make the part correctly. We too often forget that, after having instructed them properly once, they will continue for weeks afterward to perform the operation as they were instructed. But they do not, and unless their work is regularly and frequently checked you will soon be sending out a large amount of scrap from your department.

Packard Quality Makes High Scrap Account

I trust that it will be understood that our

Fifth Session

Subject: TOOLS

Speaker: MR. R. N. BROWN, *Mechanical Superintendent*

The designing and making of tools bears a peculiar significance to the work of the Packard Motor Car Company, as we probably make more of our own motor parts than is the practice of any other automobile or motor truck manufacturer in America. There are now employed about nine hundred men in various departments of our Plant having to do with the designing, making, routine, and care of tools. The organization which is given general supervision of our machine and tool equipment is composed of the Mechanical Superintendent, the Time Study Department, Routing Department, Mechanical Engineers, Tool Designing Department, Tool Repair and Machine Repair Department, and Tool Stock Room.

While we were engaged in the production of the Liberty Motor there were eighty-six (86) different tool shops which were doing work for us, employing in the aggregate about sixteen hundred (1600) men, bringing the total number of workmen engaged in producing Packard tools to approximately twenty-five hundred (2500) men. Quite frequently it has come to my attention that certain Foremen become, at times, greatly perturbed over the delay in the production of some necessary tools, but all those who visited our Tool Store Rooms on the second floor of building 17 were soon satisfied when they saw the enormous amount of tools which these men were producing.

The Packard Tool Department and the Liberty Motor

The work entailed by the production of the Liberty Motor was undoubtedly one of the biggest jobs any manufacturer could undertake. The task of "tooling up" the motor

especially involved difficulties which seemed nearly impossible to surmount. The job required even more accurate workmanship than has ever been put on a motor before, and we were asked to do it for the most part with unskilled help. The majority of our workmen had never seen the inside of a shop before, and it was therefore necessary to make the tools more foolproof than is the case at present, now that we are able to employ a higher grade of workmen.

The total number of tools made by the Packard Motor Car Company for the Liberty Motor was one million, seven hundred and ninety-six thousand, nine hundred and ten (1,796,910). The cost of the non-perishable tools was one million, five hundred and fifty-one thousand and eighteen dollars ($1,551,-018.00). The cost of the perishable tools was one million, four hundred and sixty-six thousand, five hundred and forty dollars ($1,466,540.00). The standard tools, such as drills, reamers, counter-bores, taps, dies,

emery wheels (all devices which are commonly obtainable from the tool cribs in a department) cost approximately five hundred thousand dollars ($500,000.00), bringing the total cost of the tools for the Liberty Motor to three million, five hundred and seventeen thousand, five hundred and fifty-eight dollars ($3,517,558.00). But this is not all; the new machinery which was necessary to build the motor cost about one million, five hundred thousand dollars ($1,500,000).

Simple Parts Require Great Accuracy

It may be well, also, to mention the fact that one of the apparently simplest operations connected with the construction of the motor caused greatest delay and expense. This was getting the connecting rods properly made. This was partially due to the great accuracy with which these must be made. They could not vary a hair's breadth, and it entailed more effort to get these accurately made than we were required to expend on the much more

complicated task of building the cylinder. We used 48,000 special tools for machining the connecting rods, 42,862 of which were perishable tools such as cutter blades, arbors, special shanks, and miscellaneous small tools. About 5000 were special gauges, while there were 338 jigs and fixtures. For the large cutters which were used for straddle milling the large ends of the connecting rods there were made 25,000 cutter blades, costing $4.00 each. The large cutter, having the blades inserted in the cutter and not ground on the outside, cost $135.00 each. About 36 cutters of this style were made and were used for milling the inside of the forked rod. There were used 1800 end mills for milling out the channel of the rod, and an idea of the magnitude of our task may also be gained from the fact that there were 4100 doming tools used on the cylinder; also, we had to keep the above-mentioned cutters in good condition and resharpened.

Twenty-two and one-half (22½) hours were

required to resharpen the large cutters used for milling the inside of the forked end. It was necessary to sharpen two or three daily and thirteen operations were required to complete the grinding. This necessitated that the tool grinding department work 22 hours daily (Saturday and Sunday included). It became essential that we place girls on this work, for it was difficult to retain experienced men on the job. The girls were trained for the work in our Apprentice School, and this was only one of the many problems which we were called upon to solve in carrying out our War Program.

The total number of Plant tool orders issued on the Liberty Motor job was eleven thousand and five hundred (11,500). It is easily perceived that some of our orders called for large quantities. We were obliged to keep an exact account of each tool made in order to have our records clear for the Government audit. This has been difficult in many instances, owing to the fact that some of the

Foremen have been careless with the tools that were broken and worn and the proper record of them was not made. We must either prove to the Government that the tool is here in a worn condition or show a satisfactory record of its having been scrapped.

These tools must all be inventoried, tagged and marked to enable the Government officials to readily check them. I trust I have enabled you to gain a proper conception of the task with which the Mechanical Department was confronted during theWar period.

General Routine of Mechanical Department

I shall now attempt to convey to your minds a proper conception of the general routine of the Mechanical and Engineering Departments of the Packard Plant. From the Engineering Department the drawings are first received by the Mechanical Superintendent who inspects them and passes them on to the Routing Department, where it is decided what parts shall be made in the Plant and

what parts shall be made by another company. Record cards are here made and after the drawings have been marked they are then sent to the ordering division and orders are placed for all operations, both in the factory and with other companies, in accordance with the decision of the Routing Department. The Mechanical Engineers next receive the drawings and proceed to line up the machining operations, determine upon the kind and amount of machinery, tools, gauges, and fixtures; and, working in co-ordination with the Foremen, they decide as to what new tools will be needed for the new model.

Status of Engineers Defined

At the present time the Engineers engaged in tooling up our Twin-Six jobs are all new men. Their duty is to follow through the various operations and decide as to whether or not the job is being run to the best advantage, and recommend changes in the tools and method. May I state that these mechanical

men are in a position to materially help each and every Foreman in this Assembly? It has been found that some Foremen are not altogether familiar with the Engineer's duties, but I believe this situation is rapidly improving and nearly all the Foremen are working in co-operation with the Engineers to a good advantage. Every Foreman should be careful to keep the Engineers posted as to needed improvements of a mechanical nature, and in this way we are bound to acquire a still higher grade of tooling equipment.

Many times it is found that a particular machine is poorly adapted to a certain operation, and it is the duty of the Mechanical Engineers to discover this and recommend a better machine.

When the Plant tool order requests have received the approval of the Mechanical Engineer they are sent to the Mechanical Superintendent for his approval. In case it is a gauge order it is sent to the Gauge Engineer for his approval. I trust I have clearly de-

fined for you the status and duties of the Mechanical Engineer with respect to making changes in methods, tools, or machines.

Tool Designing, Past and Present

We will now discuss the regime of the Tool Designing Department. As the Superintendent of the school has mentioned, the tool designer of today is a much better equipped workman than was the so-called tool designer of a few years ago. I was about to state that there were no real tool designers in those days. Now tools must be foolproof, easy to load and unload; and, above all, they must be made to be very substantial, not easily broken or destroyed.

Tool Designing and Toolmakers on Production Basis Through Specialization

The Designing Department consists at the present time of one hundred (100) men, divided into squads according to the work on which they have individually specialized.

We have our motor squad, axle squad, transmission squad, clutch squad, automatic screw machine squad, and squads for miscellaneous parts. Each squad specializes on a particular part of the car, and are familiar with all the designs and methods that have ever been tried out for their special part, and they are thus better enabled to design tools for the particular part than would be true if they were required to work on a design for a crankcase one day and on a small carburetor part the next day.

However, not all of these one hundred men are Tool Designers, as this department has a number of records to be kept. We have a record of every tool that has been made since the making of the first model for the Packard Car, and, while some of the tools have been destroyed, we still have in store large quantities of old tools in the Service Division which are not in daily use, but are used occasionally, because some old models are used today and it is necessary to supply service parts.

After tools are designed they are sent to the tool room to be made. The Toolmaking Department is also divided into groups or squads and they specialize on certain classes of work. We have our Lathe Department, Milling Department, Jig Boring Department, and Tool Repair Department. The reason for specializing on tool work is really because it is thereby putting it on a production basis, and we are able to produce more and better work. For instance, a man who runs the same lathe continually is enabled to produce more and better work than did the old-time toolmakers who operated a planer or grinder or any machine which they were called upon to operate; also, the specialist has his own tools and tool equipment for the particular machine on which he works, and thus he gets a job started much more readily than did the old-time toolmaker. The same thing applies to the Milling Department, Boring Department, and Grinding Department.

The Gauge Department also specializes.

However, in this department each man does practically all the work on the small, simple gauges, specializing only on parts of the larger gauges.

Jobsetter's Maltreatment of Tools Inexcusable

After tools are placed in the Shop and are being used on production we find that they are often abused in a great many departments. I dare say if I were to pick out some tools from each department and exhibit them here you would not own them as being from your department. We find that the jobsetters and workmen have very little respect for tools. They use a steel hammer or wrench or anything they may get to pound with and abuse them in every way possible until one is scarcely able to identify them. In one department which I visited recently a workman was using a small jig which had two small clamping levers used to hold the part into the jig. Instead of operating the levers with his hands

as they were intended to be used he was pounding it with a magic chuck sleeve attached to one of the tools and which was to be used with the jig. After laying this tool down he picked up another one, with which he pounded the magic chuck, which evidently did not manipulate freely. After that he used the magic chuck sleeve again to tighten up the feed nut on the spindle feed. You may imagine the condition in which these tools were found after this man had used them as a hammer for several days and months.

The Jobsetters are the men who are really responsible for the condition of tools. They are now being instructed by our Advanced Training School Superintendent as to the proper use of tools and also as to their duties in the Plant, but he must have the help of each Foreman in order to meet this vital problem. It is too much to expect of one man that he shall educate all Jobsetters throughout the Plant as to the proper use of tools. If each Foreman would instruct the Jobsetters I

know our tools would be in a great deal better condition; we would get more and better work. It would not then be necessary to call our Chief Inspector in on the job in order to get something passed that is not within the drawing limits. If we were to use a little more care in keeping tools in good shape and take the same pride in doing this which the old-time toolmaker took in finishing up his tool, and making it look nice, we would get much better work and we would be well repaid for our effort.

Why Keep Tools and Machines Clean?

With respect to keeping tools and fixtures clean, may I state that it is just as important to keep the dirt from the locating points as it is to have a tool on the job at all? Some of you had that experience on the Liberty Motor. You found that unless you kept the tools clean you would have an immense amount of scrap. On one job in particular I spent a great deal of time and I know the Foreman

did also. He did his best to keep the fixture clean, but it was almost impossible, for the Jobsetters and workmen were careless about allowing dirt to accumulate on the locating points, and I know that a great many pieces were scrap for this one reason. We cannot too strongly impress on the Jobsetter's mind the importance of teaching the operator just how to use tools right. He should see to it that the workmen understand their use and every Foreman should instruct the Jobsetters with respect to keeping tools clean.

In regard to keeping machines as well as tools in good condition we all recognize that it is just as important that the machines are kept clean as it is that the tools be clean. A great many times a Foreman will decide that, because he is behind on production, it will be expedient for him to run a machine another day or another week before he has it repaired, and presently he finds that the machine is in such condition that he cannot do anything with it at all. He should repair it

when he first learns that it is not doing good work. Above all, keep the machines well oiled so that the bearings will not "freeze up". Another bad fault that we have is carelessly fitting a taper sleeve into the socket of a machine spindle. There is not one out of a dozen workmen who wipes off the dirt. They use a lead hammer to drive the sleeve into the spindle, and when there is no one looking they may use a steel hammer, with the result that the sleeve soon becomes useless.

Start with Right Tools and Use Them Right

I discovered a tool recently that had been in use for four years. During all this time the tool was never used right. It had a pair of floating jaws which were supposed to equalize the casting and were to be clamped in place with a locking screw. I know that the locking screw had never been used because there was so much dirt on the fixture that I could not at first find the screw. It projected beyond the casting about $\frac{5}{8}$ of an inch. So much dirt had

accumulated that I could not see the locking screw at all, and one of my men asked me how I expected the thing to be located, for "it was free to float". It is such practices as this which prompts me to emphasize that our tools should be used right.

Many of our tools could be improved. All jobs put in the factory could, perhaps, be somewhat improved with respect to the method of machining if we desired to change them. If you Foremen were responsible for tooling up a job in the first place, or if you were to tool it up again you would undoubtedly tool it up differently, and, in this connection, please remember that whenever you get a piece of scrap from a tool the tool should be investigated to find out if the fault lies in that particular tool or operation or in some previous operation. Nine times out of ten we find that, instead of scrap being caused by the particular operation we were working on, it was caused by some previous one. Probably a part was improperly machined in the first operation and

was allowed to go on through. If we all more closely observe the machining conditions I am sure we will greatly reduce our loss from scrap.

Therefore, every piece of scrap that goes through a department should be investigated to determine whether it is caused by the tool, carelessness of the Jobsetter or operator, or what is the cause. We certainly must find out what the trouble is, at least. If you all do that and then consult the Mechanical Engineer and show him where the machine or tool is wrong it will greatly improve our conditions.

Know How to Procure Necessary Tools

In order for a Foreman to get the best results out of tools and the best results out of his department he should know how to go about it to get the tools or machines that are needed. I believe that is one of the greatest difficulties you Foremen have; you do not know how to go about it to get work done. Of course, there is a lot of red tape connected

with it, but please remember that red tape is necessary in a big organization like this. It is not easy for some of you to get things done the way you want them done, but if you know the method of procedure it is not nearly so difficult. In the machining departments, in which we are, of course, the most interested, there are Mechanical Engineers who are the representatives of the Mechanical Superintendent. They are instructed to help you line up the job and make the parts so that the parts will come within the drawing limits.

At the same time I do not want you to ask too much of the Mechanical Engineer on that job. We should not depend too much upon them along general lines such as stock chasing, etc. However, if it is tool trouble, you should by all means get in touch with them.

I have not the time in which to fully describe how to get every job done in a department, but let us each find out for himself and not rely too much on someone else for these details. We have often in the past found that the parts

which we are asked to make could not be made within the drawing limits and then we made them differently than the drawing specified, calling on the Inspection Department to pass them. Those days are past now, for they will not pass anything that is not within the drawing limits.

In conclusion, I wish to state that the tooling up of a Plant of our size and making every tool foolproof, and a tool for every operation, and a gauge for every machine dimension, which is now necessary, is a big task. As the instructions now stand, there is not a machine dimension on any part of the car but that it is necessary that we have a gauge for it. The Inspection Department must now have a gauge for every piece of work they inspect, all of which is clearly in line with the Packard Principle of progress and improvement, and will enable us to raise the quality of our product to a still higher plane.

Sixth Session

Subject: TIME STUDY

Speaker: MR. J. T. B. RHEINFELDT
Industrial Engineer

Time Study is a recent industrial innovation which enables a manufacturer to establish standard times for production operations. There are various methods of setting standard times, one method which is used for piece work, another for the bonus system, another for the premium system, and still other methods, but we will for the present confine our discussion to that system which is in operation in the Packard Plant.

The Origin and Development of Time Study

Kindly permit me, before continuing, to digress sufficiently to outline a brief history of the invention and development of the new element of Time Study. This was first con-

ceived by the late Dr. Frederick W. Taylor in 1881, then employed at the Midvale Steel Works at Philadelphia, Pennsylvania. It might be conjectured that Dr. Taylor secured the idea of his subsequently developed Time Study principles from his frequent attendance at the race track, where he observed the judges "clocking" the time of the horse race with a stop watch. He, no doubt, brought this principle into the factory, using it for the purpose of measuring the speed of certain operators on well-established operations.

Dr. Taylor said: "Time Study is the accurate, scientific method by which the great mass of laws governing the best, easiest, and most productive movements of men are investigated. They substitute exact knowledge for prejudiced opinions of the forces operative in determining all conditions of work and pay."

Just to what extent and to what operations Dr. Taylor saw fit to apply the system need not enter our discussion here. It is sufficient to say that, in the earlier days, Time Study

men were somewhat unenlightened as to their exact duties. In those earlier days they were in the habit of standing far away from the operator, and, unobserved, they would take the time which he required for the operations. Today, Time Study men stand near the operator and allow the man to observe everything that is going on and everything is done in an openly frank manner with nothing secretive about it, and it is found that this has a wholesome psychological effect.

Time Study in the First Stages of Development

All the data which has been collected in our Plant relative to Time Study has been tabulated and filed in book form. We have in this Plant tens of thousands of distinct observations, and from this immense amount of data we have only been able to give adequate study to two thousand of the elements entering into the time required for productive operations. My sixteen years of experience along this line

has resulted in my being able to include in my observation but a small per cent of the actual elements which I am ultimately aiming to include.

The Time Study man first observes the set-up in the particular job for the purpose of determining whether the job has been set up in accordance with what he believes to be most conducive to quality and maximum production. It is often found that the job is not set up in such a way as to secure the desired results; however, he refrains for the time being from objecting to the set-up, owing to the friction which is often caused by such situations between the Foreman and the Time Study Department, but proceeds to observe the actual time required to perform the operation.

Time Allowance

After his observation is made he allows a certain amount of time for personal necessities. In our Plant this time has been set at fifteen minutes for men and thirty minutes for

women. The allowance is based on an extensive study of this subject throughout the Eastern states as well as in the Middle West section. The greatest amount of time that was found to be allowed in any Manufacturing Plant was thirteen minutes per day for men, and in many of the Eastern states only ten minutes was allowed. Therefore, the Packard fifteen minutes' allowance is over and above the time that has been generally found necessary to allow for the personal necessities of men each day.

Another allowance is made for tool trouble. This, of course, must be based on a general estimate. There is always an opportunity for argument relative to this allowance, because Time Study men must, of necessity, calculate all allowances from general observations.

The third allowance which is given on all operations is that which might be designated by the personal element or attitude of the operator. This calculation is based on the

various attitudes which different individuals assume toward their work.

Some operators hold back when being timed, and the Jobsetters are not able to secure the operator's co-operation. In a case of this kind the Time Study man will *make no time allowance*, and *in some cases will subtract a certain per cent from the actual time and thus set a standard time.*

Sometimes the operator completes the operation *working very satisfactorily and conscientiously.* He would be given *an allowance of from 30 to 50 per cent* on the actual time required.

Other operators who have a *nervous temperament and are excitable, who work so fast that they cannot keep it up all day without injury to their health,* would be given from 50 to 200 per cent allowance on their actual time.

Three Distinct Types of Operators

Therefore, we classify operators on this basis as follows:

1. The operator who does as little as possible and "gets by" with it.

2. The conscientious workman who does not need supervision and will go about his work with a calm demeanor.

3. The excitable, temperamental man who, when under supervision, has a tendency to speed up beyond the point which he is able to maintain throughout the day without injury to his health.

This latter type of workman must be carefully supervised, because it is most difficult to determine the time in which he can with reasonable exertion perform the operation. With the second type, or conscientious workman, who is steady and unperturbed under supervision, it is, of course, very easy to determine the actual standard time.

At this time I should like anyone who desires to do so to ask any questions relative to the above discussion. Any point which you do not understand I should like to have clear in your minds before we proceed with our discussion.

Question:

It was mentioned by the speaker that in timesetting there was found three types of workmen. It would appear to me that, in setting a time, it would be necessary for the timesetter to scrutinize the workman very closely in order to determine his respective type; and, owing to the fact that he is unknown to you, it would appear to me that there would be a likelihood of your reading the man wrongly.

Answer:

In answer to your question let us consider three types of men: first, the lazy man; second, the conscientious man; and third, the excitable man. Let us presume that the time study is being made on an operation as follows:

Operator picks up a piece of metal weighing ten pounds, raises it four feet high and then walks a distance of four feet.

We will also let A, B and C represent each of these men, viz., the lazy, the conscientious

and the excitable man in consecutive order. In tabulating the time required for these three men we will derive a tabulation similar to the following:

(A) would do the operation in .06″, .06″, .06″, .06″, .06″, .06″.

(B) would do the operation in .04″, .03″, .05″, .04″, .03″, .04″.

(C) would do the operation in .01″, .02″, .01″, .03″, .01″, .02″.

From these tabulations it is very clearly perceived that (A) has been "marking time" or "soldiering", as Dr. Taylor would express it, because his movements are too regular to include any elements of speed.

B's rate of work is seen to be more irregular than is A's, but it is easily calculated that the modal time is .04″, because this time is the mean between five and three. It shows also that the man's rate of working is regulated by the conditions which surround his work and is not affected by the human element.

C's rate of working seems to be more rapid and also much more irregular than that of either of the other two. His movements are easily noted to be spasmodic and his rate and the general conditions surrounding his work demonstrated the fact that he would be unable to keep up this high speed without doing material injury to his health.

These three classifications constitute the basis of our Time Study, which I shall more fully discuss in the course of my remarks.

How "Low and High" Time Affect Production

After the standard time has been set for a particular operation it follows as a matter of course that the operator either makes or fails to make his premium. In this connection I wish to state that it has been found that by far the greater per cent of Foremen have a marked tendency to secure as great a standard time as it is possible to secure for each operation in their departments.

You will all agree with me when I state that the beginning of the season's work is the most unfavorable time in which to set a proper standard, and in the majority of operations the time which is then set is considered by us as being only a temporary calculation, but, owing to the opposition which many Foremen manifest toward any change, this temporary standard time is often allowed to remain throughout the season. It eventually develops, however, that this time which has been set is too high, and the Foreman suddenly comes to a realization that this condition is retarding his production, because the workman has gauged his production in accordance with the premium which he expects to receive, and he will not exceed that production.

Foremen's Efficiency Reports Misleading

Insofar as I am able to distinguish the correct reason for the Foreman's desire to secure as high time as possible for the operations, it is that he considers that this condition

will raise his rate on the efficiency report, but when this report is analyzed it is easily perceived that ordinarily the department whose Foreman is at the top of the list in the report is not necessarily the most efficiently conducted department. I am convinced of the correctness of this statement because of the widely different conditions which prevail in the various departments; for example, RDL Department is a very difficult one to conduct on a relative efficiency basis because in that department all the work is done by automatic operations and, to my mind, if the Foreman in such a department has an efficiency record of 90% he is often doing better work than are Foremen of higher rating in departments in which these peculiar conditions do not exist. Many departments which show a very high efficiency record are often, then, not particularly efficient, because, when the Time Study was taken of the department, it was not in full operation, nor were the Time Study men then sufficiently acquainted with their duties, with

the result that the time throughout the department has been set altogether too high.

Are the Interests of the Time Study and Production Departments Opposed?

I believe that the reason for the lack of co-operation between the Time Study and Production Departments is that the Foremen do not place the Time Study Department in the proper light. It must be distinctly understood in the beginning that we of the Time Study Department are not working for merely personal credit. In fact, we receive no credit as a result of the success of the Production Departments. The Production Departments alone receive the credit for the production which they turn out. The Time Study man in a particular department is merely a unit in the department, obviously there for the sole purpose of assisting the Foreman in getting out his production, and, when the Foreman of the department fails to give the Time Study man proper support, he is injuring no one's

interest but his own. The Time Study man is there for the purpose of loaning that department his information, gained from observations which have been collected for the benefit of the department and our organization as a whole. I believe that I need not say anything further along this line, trusting that the good judgment of each of you will lead you to concur in the above statements.

How Time Study Data Is Compiled

The Time Study data that is gathered throughout the Plant is collected and compiled under the following four divisions:

(a) The handling of materials (See Fig. 1)
(b) The handling of tools (See Fig. 2)
(c) The handling of machines (See Fig. 3)
(d) Machining (See Fig. 4)

The study of the elements which enter into the handling of the materials has progressed to a very much more advanced stage than has the study of the remaining three classifications. We have condensed our information relative

to the handling of material to approximately five distinct movements, which I have tabulated and placed in two different forms. It is very difficult to tabulate information for handling of machines and tools, as represented in the classes (b), (c), (d) without the use of symbols.

Use of Symbols to Classify Tools

For indexing purposes it has been found that the name of the machine itself is not sufficient nor is it sufficient for the tools and material. In order to quickly refer to a particular machine or tool it was found necessary to use symbols for classifying tools and machines. This system of classifying by means of symbols has been formulated, and it serves the purpose very satisfactorily. The classification of tools by symbols first came under my observation in 1899, and I, in common with a great many other toolmakers, ridiculed those who instituted such a system, but when I was at length engaged as a ratesetter and began to learn the principles of time and ratesetting I

quickly recognized the value of the use of symbols. After one year of careful study of time and ratesetting I arrived at the conclusion that symbolizing was a short method of indexing and tabulating data pertaining to machines, tools, machining and materials. This system is, perhaps, complex to the novice, but when once the system is studied the principles upon which it is based are very easy to understand.

The Relation of Time Study to Factory Efficiency

When once the elements are tabulated which enter into our Time Study calculations, according to the previously-mentioned classes, the Time Study man is then able to estimate either a piece work rate, a bonus rate, or a premium rate *in advance of the operations.* This we are doing at the present time in the woodmill. The Time Study man is, by this method, enabled to devote more of his attention to the planning of the work throughout the department, rendering valuable assistance

to Foremen and Mechanical Engineers for the planning of the work of the machines and the general system of producing the work effectively and quickly.

The Time Study man is naturally, by virtue of his position, able to do this to a good advantage, as he has definite information on which to base his calculations. He is also in a position to give valuable information to the tool designer, because he can inform the latter as to the amount of time required to use one type of tool compared with the time required to use another kind of tool, and it often occurs that a better tool is turned out than would be in the case if either were confining their efforts exclusively to their special lines of endeavor and were unwilling to co-operate with each other.

Machine Standardization

The Time Study Department has been able to bring about, in an indirect way, a system of machine standardization throughout the Factory. When a Foreman now requests

information relative to a particular machine he finds that he can quickly get the information. You, perhaps, wonder why it is possible for us to arrange this quick and effective service in view of the fact that there are six thousand machines in our Plant, and it would naturally be expected that the detailed information relative to each machine would not be quickly available; but our success is due simply to the tabulated form which is used by the Time Study Department for quick reference.

I present this plan to you for consideration, as it shows clearly the method by which we classify and standardize our machines. (See Fig. 5). This tabulated information is kept in our department for the purpose of giving information to Mr. Roberts and Mr. Brown in order that they may guide themselves in ordering new machinery. Some of the Foremen frequently disagree with the Mechanical Superintendent on this subject, and probably they have wondered where he got his definite and complete information. I remember that

one fellow said that he did not know where he got the "dope" from, nor did he care. He believed that it was not right. Therefore he argued against the removal of the idle machines, although finally he realized that the Mechanical Superintendent did have the right "dope".

Machine Loading

The cross section to the right of Fig. No. 5 is used for the purpose of making a graphic chart of a machine load. The machine load is found by using the standard time of operation and adding 25% to it, which, it is estimated, will generally cover operator's absenteeism. When machines are studied for the full amount of their load in the department the resulting calculation is transferred to this cross section (g), indicated by the blue pencil mark starting from the right hand side and proceeding to the left to the eighteen-hour point or "double shift". This calculation is kept in our department for the information of the Management and by which they may be

guided in ordering the correct amount of new machinery.

How Machine Loads Are Tabulated

The information contained on the Machine Load Sheet is based upon the actual time and standard time. Please note that the symbol which is at the top of sheet number ten (10) corresponds to the first two digits in our operation code. In the operation code you will see the figure 101. This does not mean one hundred and one, but it should read 10-1; or, in other words, it indicates that the number ten operation, which happens to be a milling operation, was assigned to that particular piece and this is milling operation number one (1). The next letter designates the type of the machine. In this case it happens to be a type A, a horizontal type. The dash separating them refers to the order or serial number assigned to that machine. In this case it is number 275. The next letter, A, stands for the name of the machine, which is here a Brown

& Sharpe Milling Machine. The next letter, B, represents the size of the machine, which is No. OY Milling Machine, horizontal type. The last letter, C, refers to the productive ability of the machine.

The productive ability of the machine may be found to be similar to another Brown & Sharpe machine, yet they are dissimilar because one has the belt-drive feeding mechanism and the other machine has a gear-drive feeding mechanism. Thus they may be distinctly classified. Also both of them have the same kind of work, but the production of any given piece of work may not be the same. The gear-drive type may do the work a little more rapidly, more accurately, and with less difficulty; therefore, productive ability does not mean the amount of production of any one article, but it signifies that it is different in various respects from any other type of machine that we have assigned for that work.

If you were to write this all out in detail you would find that it would necessitate a

great deal of writing, but it is very easy to read all of this information in the symbol. Thus IOA-ABC stands for a Brown & Sharpe; No. OY Plain Horizontal Milling Machine, belt feed. When we tabulate our information on machine standardization and elementary Time Studies we use the symbol in each tabulation.

Three Classes of Time Study

I now desire to discuss with you the three classes of Time Study. One of the principal reasons for the analytical study of these records which we have compiled is to disclose unnecessary movements which can be eliminated from the operation.

Time Study is divided into the three following divisions:

1. Inventive Time Studies or observations of methods, tools, movements and operators.
2. Statistical Time Studies or a tabulation of the time units collected from reports of observations.

3. Elemental Time Studies or conclusions drawn from the tabulation.

Inventive Time Study

Inventive Time Study consists of acquainting the men who make the observation with the general conditions surrounding the operation. It enables them to determine whether the method of doing the work can be improved upon; whether the machine is correctly set up; whether tools or implements that are to be used are the best adapted to do the work; whether they can be improved upon and how; whether the speed and feed are correct to produce the work in the least time that will insure quality of finish and correct dimensions. These elements must be observed before we record the results of Inventive Time Studies of the operation.

In making Inventive Time Studies it is very often found that the operation is not correct; that sometimes the parts of the operation can be separated, eliminated, or rearranged to

obtain better results; one or more operations may be combined by making slight changes in the tool or in the "set-up".

One of the duties of a Time Study man is also to observe general conditions that surround the operator.

The standardization of the conditions surrounding the operator should be begun immediately. In most cases it is not possible to spend the time to secure the desired standardization of conditions on each of the operations. If this is the case, the Time Study man who makes and records the observation should make a note of the necessary changes so that his recommendations may be acted upon at some future time.

To standardize all conditions that surround the operator requires a great deal of time, patience and perseverance if it is to be done correctly. Many manufacturers believe that they cannot afford to spend the time to get all conditions that surround the operator standardized, due to the immediate demand

for the product; they insist upon keeping the machine working and producing, even if the work is not being produced economically, until sometime in the near future when manufacturing conditions will permit better standardization. They fully realize, however, that Time Study is an aid to production. Inventive Time Study or observation shows very plainly the reason why it is highly expedient to standardize the conditions surrounding the operator.

How Inventive Time Study Aids the Production

The next element which the Time Study man observes is the varying productive ability (so-called efficiency) of the various workmen, which he will make note of, either mentally or in writing, in order to make comparisons of similar operations of different workmen at a later date.

Inventive Time Study will reveal how and why certain workmen have not the same productive ability as their fellows, and will sug-

gest various ways and means for them to increase their productive ability. It will show them the useless motions that are being made and how to eliminate them. This is why we give it the name "Inventive", because this study very often results in changes in the design of machinery and general innovations.

Inventive Time Study Furnishes Only Temporary Standard

A great many students believe that observation or Inventive Time Study is all that constitutes Time Study. They do not realize that it is but the beginning.

It is true, however, that a piece rate or a bonus and premium rate can be given from an observation sheet of that particular operation, but it will be only a temporary standard and must be changed as the more complete Time Study is developed and all of the elements are given consideration. They fail to save their observations for use in a future analysis, so that these elemental Time Studies may be

used to set rates and for use as the basis of a complete study of the work throughout the Plant.

The use of a shorthand method in the making and recording of an Inventive Time Study is very desirable because the observer can record more in short space and in a short time. It is necessary to teach Time Study men a simple shorthand method that can be quickly acquired.

When an Inventive Time Study or Observation is taken of a given operation the next step is to prepare the Tabulation or Statistical Time Study.

Statistical Time Study

Statistical Time Study is the compilation of all the time units and data pertaining to them as follows:

Machine

1. Name and number.
2. Symbol, if it has one.

Man

1. Type of man.

2. His ability.
3. Approximate height.
4. Approximate weight.

Tools

1. Kind of tool.
2. Shape of tool.
3. Sketch and weight.

Material

1. Kind of material (Analysis if necessary).
2. Sketch.
3. Weight.
4. Dimensions.

In compiling Statistical Time Studies great care should be taken to make a clear analysis of the job and to file it in a book or card index by some clear, comprehensive indexing method. My own method of indexing, which was first used in Philadelphia in 1906, is to file all the Statistical Time Studies under four general titles as follows:

1. Handling Time for Manipulation of Machines.
2. Handling Time for Small Tools,

3. Handling Time for Materials.
4. Machining of Materials.

The general titles are then subdivided into as many sub-titles as will be found necessary, due to the great variety of operations and conditions surrounding the operation when it is being timed.

Analysis of Statistical Data

Under the general title of "Handling Time for Manipulation of Machines" we have sub-titles for milling machines, drill presses, etc. Milling machine titles are subdivided into kinds of milling (Plain, Vertical or Universal), their size, Manufacturer's name, and the productive ability of the machine. All these can be nicely taken care of by a symbolizing system, one which corresponds to the operation codes. (See machine standardization photo).

The method of compiling data for Statistical Time Study is as follows:

1. Compile all data of the Observation sheet on the Analysis sheet No. 1.

2. Combine or dissect the data of Analysis sheet No. 1 into separate groups known as Analysis No. 2.

3. Combine or separate the various groups of Analysis No. 2, preparatory to computing Elementary Time.

Analysis is the compilation of the data taken directly from the Observation sheet and placed under sub-titles of the general indexing title.

The information collected from the Observation sheets consists of sizes, diameter, sketches, general machine and machining conditions under well-defined headings, showing all the conditions under which the time was taken and the individual's time for each operation.

Analysis No. 2 is the combination of like conditions and like work and individual times into a series of groups, so as to get an idea of the various laws that govern each group or combination.

Analysis No. 3 is the compilation of the

data collected on Analyses Nos. 1 and 2 into plots from which curves and formulae are derived, preparatory to applying them on Elemental Time Studies.

In order to collect and compile this mass of data from Observation sheets on the various analyses it is necessary for a certain amount of time to be set apart each day for the Time Study men to compile the results of their observations. It has been my custom to set aside the last hour of the day for this purpose. The men do this work in a special room, removed from the noise of the machinery, so that they may concentrate their minds and energy on the compilation of the data in the various analyses.

Elemental Time Studies

After the Statistical Time Study is made we find that it is very closely connected with Elementary Time insofar as determining the elements is concerned, which elements go to make up Elementary Time Studies. Very

often Elementary Times can be found and written direct from Analysis No. 2, but quite often it is necessary to conduct a third and fourth analysis before the elements for Elementary Time Study are found, and sometimes not until a curve is plotted on cross section paper to determine the various relations of the elements to each other.

Thus, when finding the elements that go into the various clamping times, it requires months of observation and compilation of data so that the results could be plotted on cross section paper. It required approximately one hundred and fifty curves. These were afterwards combined into resultants and plotted together, which gave the accepted curve to be used, which was afterwards resolved into a formulae and charted.

When an element is found it is typewritten or charted on a printed form by typewriter, using carbon on the back so that a blue print may be made from it. (See Figs. 6, 7 and 8).

Great care should be taken to place on the Elemental Sheet the minute details of all the elements that go to make up the Elemental Time so that the information thereon may be understood by every one from the President of the Company to the operator in the Plant; in fact, by anyone who may have occasion to use this information.

The impression one may receive, when looking at an Elemental Time Study, is that it contains much detail which appears superfluous and unnecessary. But these details are altogether necessary. They eliminate the possibility of a dispute when anyone takes occasion to question it after it has been placed in the form of a rate. The details are given and they furnish proof of the correctness of the calculation. They bear out Dr. Taylor's statement that Time Study is the accurate, scientific method by which the great mass of laws governing the best, easiest, and most productive movements are investigated. They substitute exact knowledge for prejudiced opinion in deter-

mining all the conditions which surround the operator.

The Standard Time and Premium which are in operation in our Factory are figured on the circular slide rule, such as I have here. This circular slide (See Fig. No. 7) rule may be procured from the RPS Department by filling out a requisition for same. However, for calculating time in the department, slide rules are furnished to Time Study men. This mysterious slide rule, or "slip-stick" as some falsely call it, makes it possible for the Time Study men to easily and quickly furnish you with a great deal of information.

I trust that my discussion has enabled you to gain a reasonably clear understanding of how we are developing our science of Time Study.

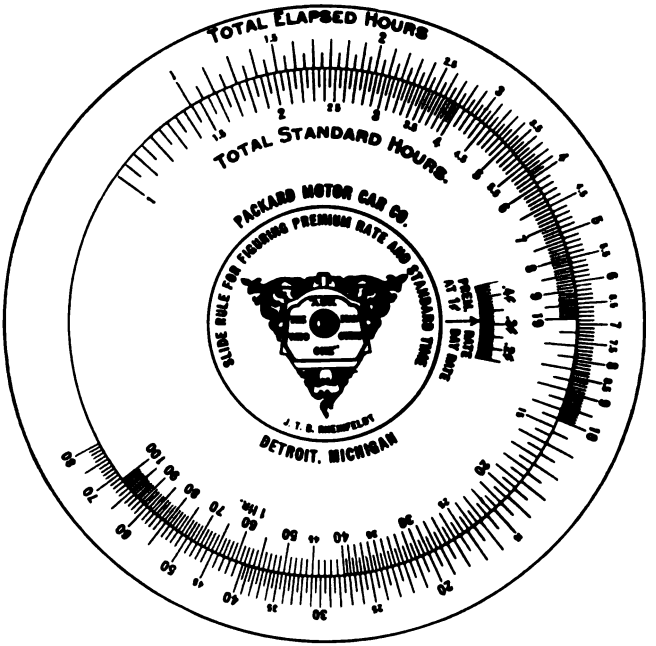


Fig. 9

Slide Rule for Figuring Premium

RULE I—Place total standard hours on a line with total elapsed hours. The arrow at the opening will point to the amount of premium for each cent of day rate.

Example: Arrow points to .3c and the man's rate is 50c an hour.

Solution: Multiply .3c by 50c = 15c. 15c equals the premium. Add 15c to 50c = 65c total rate while working the operation. Therefore, multiply 65c by the number of hours working on operation which will equal total earnings on operation.

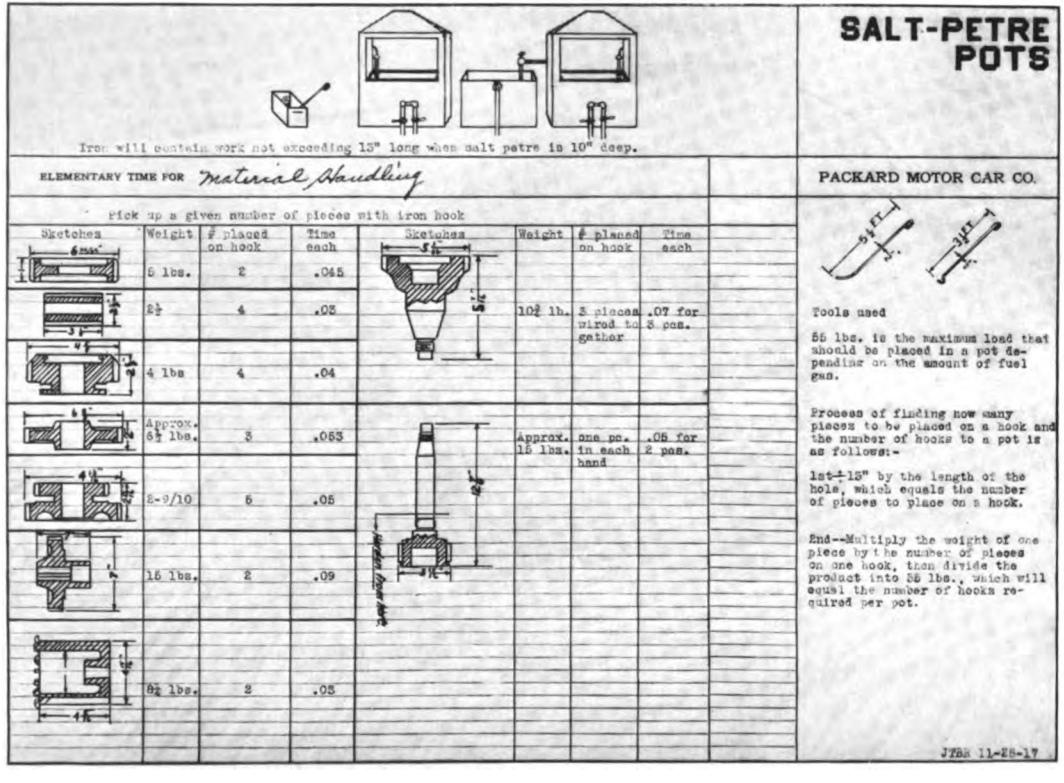


Fig. 1—Elementary Sheets — Material Handling on Salt-Petre Pots

	Pitch	Thickness	Root Dia.	Dia. Head	Width of slot	Depth of slot	Portion not threaded
#6	16	5/32	1/9	5/16	1/32	3/64	1/3 of length
#8	14	3/16	9/64	3/8	3/64	1/16	1/3 of length
#10	12	7/32	5/32	7/16	1/16	3/64	1/3 of length
#12	10	1/4	11/64	15/32	1/16	3/64	1/3 of length

WGR

Yankee Screw Driver

Drive in screw with a Yankee Screw Driver

ELEMENTARY TIME FOR TOOL HANDLING

PACKARD MOTOR CAR CO.

Total Handling Time for Driving one Screw with Yankee Screw Driver

Time in this section is to be taken when driving in a screw with Yankee Screw Driver

	Length of screw											
	1/8"	5/8"	3/4"	1"	1-1/8"	1-1/4"	1-3/8"	2"	2-1/4"	2-3/4"	2-3/4"	3"
Time	.07	.075	.08	.085	.097	.11	.122	.135	.146	.158	.170	.182

Moves to next hole .01

JTBk 5-9-18

(165)

Fig. 2—Elementary Time for Tool Handling on a Yankee Screw Driver WGR

50F—BJA

3316
3316
3317
3351
3272 OLIVER SAWS

ELEMENTARY TIME FOR CUT OFF OR TRIM ON AN OLIVER SAW ----Set Up Time taken from Sheet #1 .30 hrs. PACKARD MOTOR CAR CO.

Column No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Size of work 2-inch stock of different widths.	2x2x30 to 2x2x30	2x2x60 to 2x2x72	2x3x30 to 2x3x40	2x3x40 to 2x3x72	2x4x30 to 2x4x30	2x4x30 to 2x4x60	2x4x60 to 2x4x72	2x5x30 to 2x5x34	2x5x34 to 2x5x48	2x5x48 to 2x5x72	2x6x30 to 2x6x30	2x6x30 to 2x6x40	2x6x40 to 2x6x60	2x6x60 to 2x6x72	2x7x18 to 2x7x18	2x7x18 to 2x7x36	2x7x36 to 2x7x54	2x7x54 to 2x7x72	2x7x72 to 2x8x18	2x8x18 to 2x8x30	2x8x30 to 2x8x48	2x8x48 to 2x8x60	2x8x60 to 2x8x72	2x8x72 to 2x9x18
Std. Sheet No.	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Mach. Time in mins.	.06	.06	.08	.08	.12	.12	.12	.14	.14	.14	.16	.16	.16	.16	.20	.20	.20	.20	.22	.22	.22	.22	.22	.26
Handling Time in mins.	.24	.30	.24	.28	.20	.28	.30	.20	.28	.32	.20	.26	.32	.34	.20	.22	.26	.30	.20	.22	.28	.30	.34	.20
Total actual Time in mins.	.30	.36	.32	.36	.32	.40	.42	.34	.42	.46	.36	.42	.48	.50	.40	.42	.46	.50	.42	.44	.50	.52	.56	.46
Std. Time in hrs.	.0067	.0082	.0067	.0083	.0067	.0082	.0100	.0083	.0100	.0100	.0083	.0100	.010	.0117	.0083	.0100	.010	.0117	.0100	.0100	.0117	.0117	.0133	.010

Column No.	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Size of work 2-inch stock of different widths.	2x9x18 to 2x9x24	2x9x24 to 2x9x42	2x9x42 to 2x9x54	2x9x54 to 2x9x72	2x10x0 to 2x10x12	2x10x18 to 2x10x24	2x10x24 to 2x10x36	2x10x36 to 2x10x48	2x10x48 to 2x10x60	2x10x60 to 2x10x72	2x11x0 to 2x11x11	2x11x11 to 2x11x22	2x11x22 to 2x11x33	2x11x33 to 2x11x44	2x11x44 to 2x11x66	2x11x66 to 2x11x66	2x11x66 to 2x11x72	2x12x0 to 2x12x10	2x12x10 to 2x12x30	2x12x30 to 2x12x51	2x12x51 to 2x12x61	2x12x61 to 2x12x61	2x12x61 to 2x12x82	2x12x82 to 2x12x72
Std. Sheet No.	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Mach. Time in mins.	.26	.26	.26	.26	.28	.28	.28	.28	.28	.28	.30	.30	.30	.30	.30	.30	.30	.34	.34	.34	.34	.34	.34	.34
Handling Time in mins.	.22	.28	.30	.32	.20	.22	.24	.30	.24	.36	.20	.22	.24	.30	.34	.36	.38	.20	.22	.24	.24	.30	.36	.28
Total Actual Time in mins.	.48	.54	.56	.58	.48	.50	.52	.58	.52	.64	.50	.52	.54	.60	.64	.66	.68	.54	.56	.58	.58	.64	.70	.62
Std. Time in hrs.	.010	.0117	.0133	.0133	.010	.0117	.0117	.0133	.0133	.0150	.0117	.0117	.0117	.0133	.0150	.0150	.0150	.0117	.0133	.0133	.0133	.0150	.0150	.0167

Fig. 6—Elementary Sheet for Machine Elements on a Bentley Dado Machine

Elementary Sheet for Machine Elements on a Bentley Dado Machine

Careful study of the Elementary Sheet on the opposite page will show how we divide each major operation into its component parts.

The total time for each group of operations is shown at the upper part of each section.

In the first section, "time taken when setting head on machine" is 7.65 min., which total is derived from a tabulation of the elemental times for that section. The reason for this separation into the various sections, and the sections into component parts, and showing a total of each section, is so that when a question arises as to the correctness of the time which has been set, the questioner may easily understand upon what basis the time was received. The whole operation is graphically analyzed.

Each section to the right of the sheet explains the basis for the division of the times, or when the time is to be taken. For example, time for the first section is taken "when setting head on machine" and is likewise indicated for the other sections.

7" cutter figured from 5 diametrical pitch - 35 teeth
8" cutter figured from 4-1/2 diametrical pitch - 36 teeth
9" cutter figured from 3-1/3 diametrical pitch - 30 teeth

MACHINING - RCSS STRADDLE MILLS

ELEMENTARY TIME FOR

PACKARD MOTOR CAR CO.

The speed is based on 35 ft. and feed is based on .00377 per tooth on High Speed Straddle Mills machining #23 Steel Forgings.

7" Cutters

RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feed per rev.	RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.
27	.132	38	.071	49	.046	60	.032						
28	.125	39	.069	50	.044	61	.031						
29	.118	40	.066	51	.0425	62	.030						
30	.110	41	.062	52	.041	63	.029						
31	.102	42	.060	53	.039	64	.028						
32	.096	43	.057	54	.0375	65	.027						
33	.090	44	.054	56	.0365	66	.025						
34	.086	45	.052	56	.0355	67	.0255						
35	.082	46	.051	57	.034	68	.025						
36	.078	47	.049	58	.0335	69							
37	.074	48	.0475	59	.0325	70							

8" Cutters

RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feed per rev.	RPM	Feedper rev.
		32	.080	43	.047	54	.0315						
		33	.075	44	.045	55	.030						
		34	.071	45	.043	56	.0295						
24	.1357	35	.068	46	.042	57	.0285						
25	.125	36	.064	47	.041	58	.0275						
26	.118	37	.061	48	.039	59	.027						
27	.110	38	.059	49	.0375	60	.0265						
28	.102	39	.056	50	.036	61	.0255						
29	.096	40	.054	51	.035	62	.0245						
30	.092	41	.051	52	.0335	63							
31	.088	42	.049	53	.0325	64							

9" Cutters

RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.	RPM	Feedper rev.
		28	.074	39	.041	50	.026						
		29	.070	40	.039	51	.025						
		30	.065	41	.0365	52	.024						
		31	.061	42	.035	53							
		32	.057	43	.0325	54							
22	.1151	33	.053	44	.032	55							
23	.106	34	.051	45	.031	56							
24	.096	35	.048	46	.030	57							
25	.090	36	.046	47	.029	58							
26	.084	37	.044	48	.028	59							
27	.079	38	.042	49	.026	60							

(164)

Fig. 4—Straddle Mills RCSS—Showing Speed and Feeds for Different Size Cutters

Straddle Mills, Showing Speed and Feeds for Cutters of Various Sizes

It is, of course, generally known that the speed of a machine is inversely proportioned to the feed, i.e., if we increase the speed of the machine, the feed rate will be decreased.

For example: No. 7 cutter with a speed rate of 27 R.P.M. should have a speed rate of .132 per revolution on a No. 23 steel forging, and a cutter having a rate of 54 R.P.M. should have a feed rate of .0375 per revolution. Thus, we have increased the speed by 100%, but the feed rate has been decreased by 65%. Therefore, by increasing the speed of the machine 100% it will require 44.6% longer to do a certain operation. For, in the first instance, the cutter travels a distance of 3.655 inches per minute and, in the second instance, the cutter travels a distance of only 2.025 inches per minute which is 44.6% less than the first distance.

It will be noted that the speed in this calculation is based on a distance of 35 feet and that the feed is based on .0037 per tooth on a high-speed Straddle Mill machining No. 23 steel forgings.

Time Study

Dept. LM Mach. No. 3315-3316-3317-3351-3272
Date 1-22-19 Mach. Name 60F-BJA
Name of Piece
Description of Operation Standard Set Up #1 Trimming

Piece No. #1
Oper. Code
Material

No. Ins.	Description of Sub-Operations	Sketch of Set-ups	Tools Used	Speed	Feed	Time per piece	Time for Preparation
1	Change assignment slip	L-148				2.10	
3	Push loaded LTC truck to machine (Average distance 30 ft.)	L-114				.68	
6	Oil machine	L-41				1.39	
8	Put cut off saw on machine	L-41				1.40	
10	Put front slide gauge on machine	L-147				1.47	
12	Set stop clamps on gauge for proper length	L-146				3.66	
16	Dismantle machine						
18	Stop machine to dead stop	L-147				.37	
20	Remove clamp from gauge	LE-10				.06	
22	Remove front slide gauge	L-149				.21	
24	Take off saw	L-41				1.14	
26	Push loaded truck from machine	L-114				.68	
33	15 mins. Misc.						
35	25% Allowance						
		TOTALS				13.15	

Set-up Time .30 hrs. Standard Time
Remarks

Observer Dept. Foreman J.T.B.R.

Fig. 7 Standard Setup No. 1 — Instruction Sheet for Trimming on Oliver Saw

Time Study

Dept. LH
Date 1-23-19
Mach. No. 3318-3316-3317-3381-3273
Mach. Name 502-BJA
Name of Piece
Description of Operation Cut off both ends on Oliver Saw Standard #8

Piece No. #8
Oper. Code
Material

No. Sub.	Description of Sub-Operations	Sketch of Set-ups	No.	Tools Used	Speed	Feed	Time per piece	Time for Piece (Rotation)
1			1					
2	Set Machine See Standard set up #1		2					
3			3					
4			4					
5			5					
6			6					
7			7					
8			8					
9	Walk to truck .004 x distance (5 ft.)		9				.02	
10			10					
11	Reach down & select piece See Curve A-1		11				.01	
12	from 0 to 5 lbs.		12					
13			13					
14	Walk back to machine .004 x distance (5 ft.)		14				.02	
15			15					
16	Place piece to stop		16				.02	
17			17					
18	Push piece to saw (8") & cut off one end,		18					
19	also pull piece back from the saw		19					
20			20					
21	Turn hinge stop down 2nd end & place piece		21				.02	
22	to stop		22				.02	
23			23					
24	Push piece to saw (8") & cut off 2nd end,		24					
25	also pull piece back from saw		25					
26			26					
27	Turn hinge stop back up for next piece and		27				.02	
28	pick up piece from table of machine See Curve		28				.02	
29	A-1.		29					
30			30					
31	Walk to truck .004 x distance (5 ft.)		31				.02	
32			32					
33	Remove piece to truck See Curve A-2 From 0		33				.01	
34	to 5 lbs.		34					
35			35					
36	Walk back to front of machine .004 x distance		36				.02	
37			37					
38			38					
39			39					
40			40					
41	NOTE: For each 5 lbs. add .01x2-.02 mins.		41					
42			42					
43	Add .04 min. to time for work from 40 to 50"		43					
44	in length		44					
45			45					
46	Add .06 min. to time for work from 50" to 72"		46					
47	in length.		47					
48			48					
49			49					
50			50					
51			51					
				TOTALS				.20

Set-up Time
Standard Time
Remarks

Observer
Dept. Foreman J.H.B.K.

Fig. 8—Instruction Sheet—Standard Instruction Sheet for Cutting Off Both Sides of Piece on Oliver Cut-Off Saws, Showing Elementary Time

50E—BFA

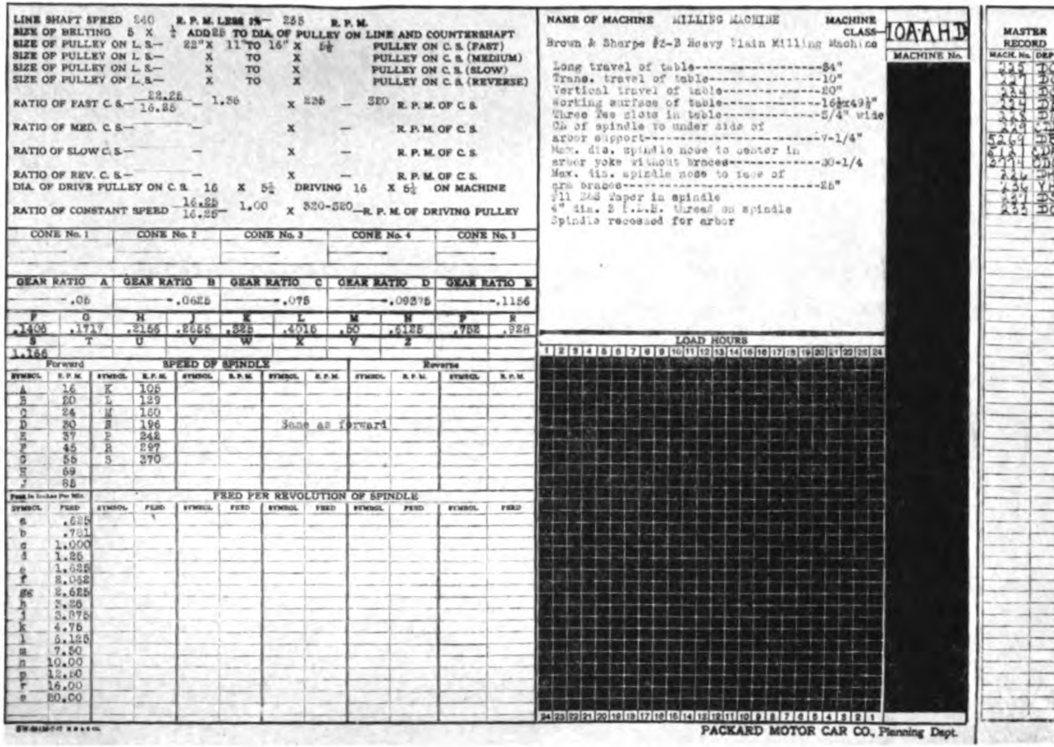
1770

Bentley Dado Machine

ELEMENTARY TIME FOR HANDLING MACHINE ELEMENTS		PACKARD MOTOR CAR CO.
Total time for setting a dado head	7.65	Time in this section is to be taken when setting head on machi
Walk to bench (5 ft.) - .004 x distance	.02	
Get wrench out of drawer	.05	
Walk back to machine (5 ft.) - .004 x distance	.02	
Loosen nut on spindle	.29	
Run nut off with fingers	.18	
Lay wrench down	.02	
Remove saws and knives from spindle	.69	
Walk to knife rack (20 ft.) - .004 x distance	.08	
Select set of knives and saws	1.58	
Walk back to machine (20 ft.) - .004 x distance	.08	
Set saws and knives on spindle	3.86	
Pick up nut	.02	
Run nut on spindle with fingers as far as possible	.23	
Pick up wrench	.03	
Tighten nut on spindle	.45	
Walk to bench (5 ft.) .004 x distance	.02	
Remove wrench to drawer	.02	
Walk back to machine (5 ft.) - .004 x distance	.02	
Time for starting machine	.28	Time in this section is to be taken when necessary to start or stop machine.
Time for stopping machine	.42	
Total time for oiling machine	2.75	Time in this section is to be used when oiling machine. Twice daily.
Total time for taking a set of knives to Grinding room	2.00	Time in this section is to be used when taking a set of knives to grinding room.
Walk to grinding room (100 ft.) - .004 x distance	.40	
Lay set of knives on bench	.20	
Get set of knives from foreman of grinding room	1.00	
Walk back to machine (100 ft.) - .004 x distance	.40	

JTRR 8-26-18

Fig. 3—Elementary Table of Various Sizes of Wood to Cut Off or Trim on Oliver Saws



LINE SHAFT SPEED 240 R. P. M. LESS 2% — 235 R. P. M.
SIZE OF BELTING 5 X ½ ADD 25 TO DIA. OF PULLEY ON LINE AND COUNTERSHAFT
SIZE OF PULLEY ON L. S.— 22" X 11" TO 16" X 5½ PULLEY ON C. S. (FAST)
SIZE OF PULLEY ON L. S.— X TO X PULLEY ON C. S. (MEDIUM)
SIZE OF PULLEY ON L. S.— X TO X PULLEY ON C. S. (SLOW)
SIZE OF PULLEY ON L. S.— X TO X PULLEY ON C. S. (REVERSE)

RATIO OF FAST C. S.— 22.25 / 16.25 — 1.36 X 235 — 320 R. P. M. OF C. S.

RATIO OF MED. C. S.— — X — R. P. M. OF C. S.

RATIO OF SLOW C. S.— — X — R. P. M. OF C. S.

RATIO OF REV. C. S.— — X — R. P. M. OF C. S.
DIA. OF DRIVE PULLEY ON C. S. 16 X 5½ DRIVING 16 X 5½ ON MACHINE
RATIO OF CONSTANT SPEED 16.25 / 16.25 — 1.00 X 320-320 — R. P. M. OF DRIVING PULLEY

CONE No. 1	CONE No. 2	CONE No. 3	CONE No. 4	CONE No. 5
—	—	—	—	—

GEAR RATIO A	GEAR RATIO B	GEAR RATIO C	GEAR RATIO D	GEAR RATIO E
.05	.0625	.075	.09375	.1156

F	G	H	J	K	L	M	N	P	R
.1406	.1717	.2156	.2555	.325	.4016	.50	.6125	.752	.928
S	T	U	V	W	X	Y	Z		
1.166									

SPEED OF SPINDLE

Forward SYMBOL	R.P.M.	SYMBOL	R.P.M.	SYMBOL	R.P.M.	SYMBOL	R.P.M.	Reverse SYMBOL	R.P.M.	SYMBOL	R.P.M.
A	16	K	105								
B	20	L	129								
C	24	M	160								
D	30	N	196			Same as forward					
E	37	P	242								
F	45	R	297								
G	55	S	370								
H	69										
J	85										

FEED PER REVOLUTION OF SPINDLE

Feed in Inches Per Min. SYMBOL	FEED	SYMBOL	FEED	SYMBOL	FEED	SYMBOL	FEED	SYMBOL	FEED	SYMBOL	FEED
a	.625										
b	.781										
c	1.000										
d	1.25										
e	1.625										
f	2.062										
g	2.625										
h	3.25										
j	3.875										
k	4.75										
l	6.125										
m	7.50										
n	10.00										
p	12.50										
r	16.00										
s	20.00										

NAME OF MACHINE MILLING MACHINE MACHINE CLASS— 10A-AHD

MACHINE No.

Brown & Sharpe #2-B Heavy Plain Milling Machine

Long travel of table——————34"
Trans. travel of table——————10"
Vertical travel of table——————20"
Working surface of table——————16⅛x49½"
Three Tee slots in table——————5/4" wide
CL of spindle to under side of
arbor support——————7-1/4"
Max. dia. spindle nose to center in
arbor yoke without braces——————30-1/4
Max. dia. spindle nose to face of
arm braces——————25"
#11 B&S Taper in spindle
4" dia. 2 T.P.E. thread on spindle
Spindle recessed for arbor

LOAD HOURS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

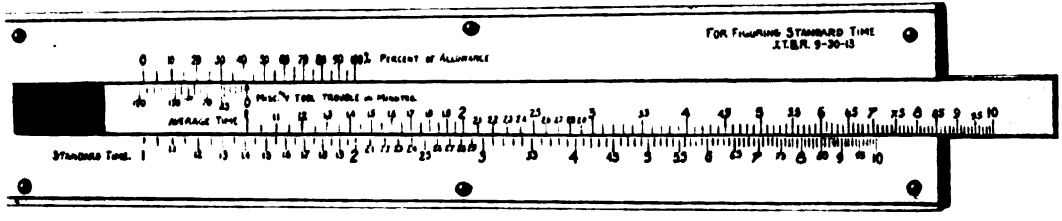
24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

MASTER RECORD

MACH. No.	DEPT.
225	DC
227	DC
224	DC
224	DB
228	DB
229	CDB
5269	DB
6121	CDA
2774	CDC
226	DH
234	YH
231	DS
233	DO

PACKARD MOTOR CAR CO., Planning Dept.

Figure 6—Machine Standardization Sheet 10A-AHD showing: 1. Pulley dimensions, ratio and R.P.M. 2. Cone sizes and ratio. 3. Gear ratio. 4. Spindle speed in R.P.M. 5. Feed per revolution. 6. Machine capacities. 7. Load hours. 8. Master record of inventory numbers and departments



Slide Rule or "Slip Stick" for figuring standard times, making allowances for miscellaneous and tool trouble, also per cent of allowances

Seventh Session

Subject: ROUTINE SYSTEM

Speaker: MR. A. G. DIEM, *Clerical Department*

The subject which I have been asked to discuss with you is rather a difficult one to present for two reasons: First, because it is necessary to overcome certain false impressions which prevail in the factory that system is burdensome and does not serve any useful purpose; and, second, because a great many members of the organization who believe in some small degree that system is needed do not fully appreciate its importance.

This lack of appreciation of the importance of clerical work is not confined to Packard alone. On the contrary, it is true of every large establishment. In our own Factory many people have been heard to say that they are interested only in production and that nothing else matters. The impression one gets from such remarks is that those people really

believe "production" and "routine" are absolutely unrelated, that there is no connection between the two. But I shall endeavor during the course of my discussion to build up evidence to show there *is* a close relation between these two things, and that routine is indispensable to efficient production. I believe I may say at the outset that the routine is a matter of real importance, for it can truthfully be considered a factor in production.

Whenever I look at our Instruction Book I am reminded of the fact that it has frequently been called the "Packard Bible". I once thought this name was applied to the book because of its black cover and its size, but I have since learned that the reason it is called the "Packard Bible" is because, like the Bible, very few of us ever look at it! Of course, this is probably an extreme view of our shortcomings with respect to our neglect of the Instruction Book. Nevertheless, the fact remains that the book is not used nearly as much as it should be.

Origin of Packard Instruction Book

As an introduction to our discussion of the Routine System in detail, I will read to you Instruction No. 1 which outlines in a general way the purpose of the book. I presume you are all more or less familiar with this instruction, but you may not have grasped its real significance, viz, that it is the basis upon which the routine is founded.

The first paragraph is entitled "Inception" and deals with the appointment of the System Commiteee:

"*Inception*"—Letter of Alvan Macauley, General Manager, dated December 19, 1911, appointing a System Committee:

Chairman—J. J. MARKS

Members —F. L. JANDRON, *rep. Admin. Dept.*
P. P. VERNER, *rep. Mfg. Dept.*
G. H. BRODIE, *rep. Engin. Dept.*

The next paragraph refers to the "Scope" of the Committee, and the control it exercises over the System:

"*Scope*—The institution of proper General

System, controlling the relations between the various departments of all Divisions."

The third paragraph is headed "Action" and explains briefly how the Committee originates a plan:

"*Action*—No recommendation involving the institution of new systems, or the changing of existing systems, will be made by the Committee until after consultation with Heads of Divisions or Departments affected."

(Keep that sentence firmly fixed in your minds because it is an important one, and brings up a matter which I shall discuss later in detail).

"Any plan of action deemed to be advisable by the System Committee after investigation and consultation will be submitted to the Management for approval; and, if the Manufacturing Department is affected, to the Vice-President of Manufacturing; and, if the Engineering Department is affected, to the Vice-President of Engineering."

"*Operation*" is the title of the fourth paragraph, and refers to the ways in which the

need for new systems or changes in existing ones may be brought before the Committee for consideration:

"*Operation*—Subjects for discussion and decision may come before the Committee in several ways:

a. Suggestions regarding 'System' may be submitted by anyone to the Committee, and should preferably be in writing.

b. Investigation of other Systems or our own System by the Committee may result in suggestions by the Committee.

c. Changes in Manufacturing, Engineering or Accounting conditions may make changes in System necessary."

"*Decisions*" is the subject taken up in the fifth and last paragraph. This paragraph explains the method by which a system once determined upon is put into operation:

"*Decisions*—After proper approval is secured by the Committee on any proposed plan, Instruction sheets, covering in detail the operation of the plan, will be sent to all Departments affected."

"No instructions involving the System or General Plan of conducting the business of the Company shall be considered authoritative unless sent out on Official Instruction Blanks provided for the purpose."

Purpose of Instruction Book

The purpose of the Routine Book is something which should be apparent to all of us. In a small plant in which the work is confined to a small space, and where all the men are within hearing distance of each other, instructions are called across the room, and obviously no book is necessary. But you can easily imagine what would happen in a large organization like this if there were no book that recorded the right way of handling routine transactions. I believe it is no exaggeration to say that it would take

weeks to straighten out the confusion which would result if the clerical work were handled for only a day without some well-defined plan.

To go back to the small plant where each man gets his orders personally, do not overlook the fact that our instructions are meant to be just as personal, and you are expected to carry them out just as faithfully, as if they were given to you verbally. In this vast organization the Management cannot reach each one of us individually, so they reach us collectively through the medium of these instructions. The Instruction Book might well be called the voice of the Management through which they inform us of the manner in which the work of the Factory is to be carried out.

That is why I have said that you are obligated to carry out these instructions as faithfully as if they were given to you verbally by an officer of the Company. There appears to be a regrettable tendency in some instances to interpret some of these instructions to suit one's own personal convenience, and in some

cases even to purposely violate and ignore them. I earnestly advise you not to do this. If an instruction requires changing, you can be sure it will be reported to the Management and the instruction *will be* changed. It is quite evident that in a growing organization like this an instruction will occasionally need revision in order to meet new conditions. But until the routine *is* changed, I am sure you will find it the safest plan to carry out the instruction as it appears in the book.

And, above all things, you should remember that the mere possession of an Instruction Book will not eliminate confusion, for if you never look at it, it is worthless. You have got to consult it continually. And you cannot consult it continually and you will not consult it frequently if you keep it locked up as some of our Factory people do. The farther away from the location of your work that you keep the book, the less inclination you will have to look at it.

Inasmuch as the clerks and Jobsetters should

know the routine we should also make it easy for them to consult the book as occasion requires. It is all right, of course, to lock the book away in a desk at the end of the day if you choose, but while you are at work the book should be close at hand.

Lack of Understanding

It has often occurred to me that possibly one of the reasons why some of our Factory people do not pay close attention to the routine is because they lack understanding of the care which is used in preparing Packard Instructions. In going through the shop one often hears Factory people, Foremen included, in discussing an instruction, make some such remark as this: "Who got that up, and what does *he* know about it?"

One great mistake many of our Foremen make is in thinking that these instructions are made up by one person, and that they represent *his* individual idea of the way the routine work should be handled. *That* is the lack of

understanding of which I have just spoken. That is also what I had in mind when I asked you to make a special note of that paragraph in Instruction No. 1 which is deserving of repetition:

"*Action*—No recommendation involving the institution of new systems, or the changing of existing systems, will be made by the Committee until *after* consultation with Heads of Divisions or Departments affected."

You can plainly see what I am aiming to impress upon you. One of the objects of my discussion is to endeavor to arouse in all of our Foremen a genuine interest in the routine, and a real desire to see that it is properly carried out.

Method of Preparing Instructions

In order to further your interest in the routine, and to secure your co-operation in efficiently carrying it out, I will outline to you the methods followed in preparing an instruction:

First of all, when it becomes necessary to

install a new system or to make a change in an existing one, the matter is reported to the Clerical Superintendent, who represents the Manufacturing Department on the System Committee.

A detailed investigation is then made, and all the conditions are laid before the System Committee for consideration. A preliminary plan—*mark* that word "Preliminary"—is then determined upon and copies are distributed to various members of the organization interested in or affected by the proposed plan. Can you not see that it is nothing short of ridiculous to think that these instructions are prepared by one man, when in reality they contain the suggestions of perhaps a dozen men in the different branches of the business—Accounting, Engineering, Manufacturing—whose ideas are woven into the best all-around plan that can be devised?

When the people to whom a copy of the preliminary plan is sent have had an opportunity to comment upon it, the final instruction is pre-

pared, put on regular instruction sheets and copies sent to all those who have Instruction Books.

The preliminary plan frequently brings suggestions with reference to changes in the method proposed. Such suggestions are given careful consideration and whenever practical they are adopted. When occasion requires, differences of opinion as to the proper method to be followed in handling clerical work are reconciled by the System Committee. In view of the great care taken in the preparation of an instruction it is not incorrect to say that when the instruction is finally issued it presents a sound workable plan which should have your hearty co-operation.

I have endeavored to clearly explain to you just how these Instructions are prepared, for if you have been negligent of this part of your work because of lack of understanding there is no reason now why you should not give your best efforts in carrying out the shop routine.

Instructions Must Meet Needs of Whole Organization

You will undoubtedly realize from what I have just told you that in writing these instructions we must determine what will be most advantageous for the organization as a whole. You have probably often felt that the cost of doing certain work in your department could be reduced if you could change an instruction to suit yourself. And possibly the cost would be reduced in *your* department, but it is more than likely that it would be increased in another department. For example, we will suppose that it costs $5.00 to handle a certain piece in your department, and that by changing an instruction the cost would be reduced to $4.00. Now it is highly probable that the cost in the other departments through which the piece is routed would be greater because of the change in your department, and as a result the total cost to the Company would be increased. Therefore, it should be borne in mind that we have to take the broad

viewpoint and adopt the plan which will best serve the interests of the Company, even though that plan may cause some slight inconvenience in one department.

Routine Book Should Be Consulted Frequently

One very important matter often overlooked is the need for consulting the Routine Book more often. Do not misunderstand me with reference to this point. I do not believe it is necessary, and I am not suggesting that you refer to the Book every time you handle some routine transaction. There are any number of cases that arise every day with which you are entirely familiar and it would be a waste of time to look them up in the Book. But I am quite sure that the book *should* be consulted whenever you are in doubt. And the Book should be consulted frequently after you receive a new or a changed instruction pertaining to your work until you become entirely familiar with it.

It is far better to spend a little time looking up a doubtful case than it is to trust to luck, make an error and spend a whole lot of time getting the blunder straightened out. There have been many instances where Foremen did not consult the Book when they should have done so, and it took hours to straighten out the confusion which resulted on account of mistakes. An hour here and an hour there spent in such wasteful work costs the Company considerable money in the course of a year, to say nothing of the reflection which such occurrences cast on your ability as a Factory executive.

Foremen Should Know the Routine

The most important point in our discussion concerns the duty of the Foreman with reference to the routine. He should know the routine and so should his assistants. It is an absolute fact that a good Foreman usually knows the routine. We proved that on a certain occasion several months ago. We held an

examination on the Instruction Book—some of you may remember it—and it is a significant fact that the Foremen who received the highest marks were those who are rated highly in the other work connected with a Foreman's job. You could scarcely ask for better proof than that. Moreover, the department clerks and Jobsetters under a good Foreman usually know the routine system, because he realizes that one of his responsibilities as a Foreman and Factory executive is to see that they do, and he also realizes that if they do not it reflects discredit on him.

Some Foremen attempt to excuse their unfamiliarity with the routine on the ground that they are busy with production and cannot be bothered with records. That sounds like a good excuse, but there is plenty of reason to suspect that those Foremen have not time for routine because their work is not properly organized. If they would take time to become familiar with the routine, and would efficiently plan their work, they would soon

find that a knowledge of the routine helps, rather than hinders, production.

Importance of Accurate Records

Accurate records are no less important than the production itself—in fact, you could no more do without them than you could do without the tools you work with. Yet the attitude of some Foremen seems to be that records are a curse—something you just have to put up with. Clerical mistakes often cost the Company money—for example, mistakes that cause the over-production of a piece. When you realize, too, that production is sometimes held up for lack of stock because of some error in the records you can appreciate the significance of my earlier statement that production and routine are closely related.

There is another phase of the situation you should consider, and that is if we did not need routine we would not have it, because the Company would not spend the money to maintain it. It is well to bear in mind that inas-

much as the Company spends considerable money to maintain system, it must be regarded as an essential thing.

Let me impress upon you very earnestly that the Management expects its Factory executives to know the system and rates them partly on their knowledge of it. For no other reason would we go to the trouble of conducting an examination on the Instruction Book.

The examination papers were looked over very carefully by the Management and some of the papers produced impressions which were decidedly unfavorable. Believe me when I say that they are watching this part of your job as closely as any other.

Instruction Book Should Be Kept Up-to-Date

It should be borne in mind that Foremen also have the responsibility of keeping the Instruction Book up-to-date.

The first thing you should do when you receive a new or a revised instruction, particularly one affecting your own work, is to

read it over carefully. Become familiar with the new routine. Then you should turn the instruction over to your clerks and Jobsetters so that they may become familiar with the instruction. I have already stated that the clerks and Jobsetters under a good Foreman usually know the routine, and a good way to help bring such a satisfactory condition about is to let them read the instructions.

After your assistants have read an instruction, if there are any questions pertaining to the work of your department they should be able to come to you, confident that you can set them straight.

Foreman's Familiarity with Routine Increases His Prestige

In this connection I wish to point out that one of the best reasons why Foremen should know the routine part of their work is because it will enable them to intelligently answer the questions of their assistants.

Your assistants will have increased respect

for you when they note your familiarity with the various work connected with your job. Of course you cannot memorize the whole book—you are not expected to—but you should be familiar with that part of it which covers your own work. The very least you should know is where to look for a particular routine.

There are some relations with other departments that you cannot always look after yourself. You cannot personally handle every bit of detail in connection with your job. When you have your assistants take care of something for you, they may make themselves look ridiculous in the eyes of some of the other departments with whom you have relations who are more familiar with the routine than your assistants are. Such conditions tend to detract from the reputation of the Foreman.

Before proceeding further, let me make clear that it is far from the purpose of my talk to suggest that you should personally handle

clerical work. I should very much regret it if you have received that impression from anything I have said. You have assistants to relieve you of the clerical work. But the distinction is that, while they do the work, you should know how it is done, and should see that it is handled properly.

Care of Instruction Book

Foremen are expected to take good care of the Instruction Books. When we called in the Books at the time of the examination we found some of them were in very bad shape. In many of the books instructions were filed out of place—a condition which is difficult to understand because you cannot conceive of anything easier than filing these instructions properly. Inasmuch as they are numbered, there can be no doubt about where they belong; they can only be filed in one place.

Some of you may say "*that* is a trivial matter". But when you stop to consider you realize it is not a trivial matter, because it

involves the saving of time and the most important factor in life is time. The eternal problem of life is how to save time. As an illustration, if the instructions in your book are not filed properly and you wish to look up some particular routine, the chances are you will not find it quickly. You can readily see that you should file the instructions properly, not merely because that is the right thing to do, but because it helps you in your work. It saves your time, and you must make the most of all your time in the course of a day. You can ill afford to waste any of it looking for instructions that are filed out of place.

When you receive a revised instruction, the old one should be removed and destroyed. Take the old instruction out of the book and, after comparing it with the new one to see what the changes are, throw it away. To keep it only clutters up the book, and it is getting big enough without filling it up with instructions that are out of date.

Besides, in keeping old instructions in your book, there is the possibility that you may unknowingly give instructions on the basis of an old routine, and confusion will result.

You have undoubtedly noticed that the instructions now being issued are typed on both sides of the sheet. This should help materially in keeping the size of the book within reasonable limits.

It was also found in examining the Instruction Books that some of the Notices which are issued from time to time with reference to changes in the "List of Departments" were filed in the Instruction Book. This should not be done. Instead, you should make the changes on the typewritten "List of Departments" in the front of your Book, and then destroy the notice. This is not only a more convenient arrangement, but it keeps the books tidy.

There were other books into which papers of various kinds were placed that do not belong there. Permit me to call your attention to the

paster on the inside front cover, which states that the book is to be used only for the purpose intended and that means for authorized Company instructions and for nothing else. One book in particular contained some personal papers, and I am sure you will agree this is putting the book to improper use.

Perhaps you will be interested to know that we keep a record of the condition of your book so there is plenty of incentive for you to take the proper care of it.

Importance of Instruction Book Examination

I have dwelt at length on the Instruction Book examination in order to impress its importance upon you. Unfortunately, too many of our Factory people regarded the examination lightly and low marks were the result. Now that the importance of the matter is clearly understood, I am sure we have every reason to expect high marks on the occasion of another examination.

Conclusion

If this discussion has served only to awaken you to the fact that the Management lays great stress on the necessity of your knowing the routine, I shall feel that something worth while has been accomplished. If you are keen you will realize that, inasmuch as the routine is considered a necessary part of a Foreman's job, it is very much to your interest to be thoroughly familiar with it. It is not too much to say that a complete knowledge of the routine presents to you an opportunity to become more valuable to the Company and to yourself. Whether you grasp that opportunity or reject it will be determined from the manner in which the clerical work of your department is carried out in the future.

In concluding my talk, I want to emphasize three important points:

First—That the least you should know about the system is that part of it pertaining to the work of your own department.

Second—That you have a definite responsibility to see that your assistants know the routine.

Third—That you are charged with keeping the book up-to-date and in good condition.

Eighth Session

Subject: STOCK

Speaker: MR. J. M. HAINES, *Supervisor of Stores*

The subject of our discussion this morning is "Stock" and, inasmuch as the Stock Department alone of this Plant may be said to be analogous to a bank with nearly fifteen million dollars ($15,000,000) in deposits, it occurs to me that the subject of the proper handling of stock is a particularly important one to discuss. As the Supervisor of Stores, responsible for the proper care of this stock, I consider it a privilege to be able to talk to the Foremen of the various departments concerning:

1. The General Functions and Routine of Stock Department.
2. The Relation of the Department Foremen to Stockkeeping.
3. Wasteful practices frequently used in the handling of Stock.

4. Recent measures adopted to correct expensive methods of caring for Stock.

How the Stock Department Operates

Briefly, the duty of the Stock Department is the custody of the Stock in the Plant from the time it comes into the Receiving Department until it is taken across the Shipping Dock in the form of the finished product. The Stock Department is responsible for it whether it is in an assembly room, machine shop, stock room, inspection room or in transit between departments or divisions. I have not time in which to discuss in detail the various functions of the Stock Department; therefore, I shall outline them to you in a general way, and I trust that I shall be able to create in your minds a clearer conception of them in the course of my remarks upon the major topics. These functions may be briefly outlined as follows:

a. Operation of Rough and Finished Stock Rooms.

b. Operation of Receiving Rooms.
c. Supervision of Internal Trucking.
d. Maintenance of Industrial Trucks.
e. Storing and supplying of all Stock containers, i. e., tote pans, steel boxes, racks, etc.
f. Segregating, classifying and shipping all scrap, i. e., car parts, turnings, borings, etc.
g. Ordering and storing of all miscellaneous shop supplies, oils, chemicals, etc.
h. Supervision of inter-divisional shipping.
i. Keeping stock records.

In performing our duties it is necessary that we have a well-defined and definite plan or routine for conducting the department. This we have, and for a few moments we will discuss briefly the general system in operation in our Stock Department.

The Packard System of Caring for Stock

The Stock Department is first given direct recognition in our production system when the

Ordering Division of the Production Department makes out the regular purchase requisition. This purchase requisition is sent to the Purchasing Department where the purchase order is made out. A copy of this purchase order is sent to the Stock Department where it is filed in the Receiving Room preparatory to receiving the stock. If a part is to be machined in our factory, the Ordering Division sends out a copy of the Factory order to the Stock Department where it is filed in the Rough Stock Room preparatory to delivering the stock for machining. We then await the receipt of the material.

Stock is received in the Receiving Department located in the various divisions; loads are checked, stock unloaded, opened, counted, recorded against the proper purchase order, and receiving records are made out and forwarded to the Purchasing and Production Departments. The stock is then removed to Inspection, after which it is transferred to the proper Stock Room, rough and semi-finished

stock to the Rough Stock Rooms, and finished stock to the Finished Stock Rooms.

With the stock in the respective stores, the problem of the proper storing and recording is now before us. Rough stock should be entered in our Stock ledgers, proper location cards made out and the stock stored in accordance with the location indicated thereon. Extreme care must be taken in the proper handling of the various parts, particularly of castings, for, if they are carelessly or improperly handled, serious loss is incurred through breakages. Large quantities of rough stock may be stored in the yards, whereas, certain other stock must be kept inside. In the Finished Stores stock must be properly greased to prevent rust. Stock having finished surfaces must be protected by being placed in proper containers. The stock must be so arranged in the Stock Room that it is easily accessible and that it may be controlled by ledger records and bin location cards.

The Foreman's Responsibility in Properly Disbursing Stock

The next step is the disbursing of the stock, and it is my opinion that it is in this that the Stock Department Foremen and the Manufacturing Department Foremen must work in close unison. Our system gives the Foremen control of the ordering of rough stock into a department. It is important that it always be ordered in quantities consistent with our Manufacturing Program; it is important for various reasons, viz., to avoid congestion, to assist in the proper assignment of material, to reduce liability of damage, etc. After the stock is ordered it is the duty of the Foreman also to see to it that he gets exactly the quantity of stock that he has ordered. I believe that it is just as important to do this as it is to make sure that the bank where you cash your check pays you the exact amount of money for which your check is drawn, for the stock for which you place your requisition is a form of money. The Stock Department

uses every possible precaution to make sure that requisitions are filled with the correct amount and with the proper kind of stock, but this should be verified by the Department receiving the stock. The Foreman should be careful to properly record the stock in his department and make sure that it is processed so that either the correct number of finished pieces is made from the quantity of stock drawn or that its equivalent in scrap is properly recorded.

This is necessary in order to insure proper stock control, for we order on the basis of the amount of stock sent to the Production Departments, and our scrap and service shrinkage is not covered in our Stock Ordering Division until the receipt of the defective stock tags and Service requisitions. Consequently, all shortages occurring in processing departments which are not properly recorded inevitably result in a shortage of available stock with the consequent delays in production and the expense entailed by the necessity of

ordering the stock in small quantities to cover the shortages. Therefore, I believe it is the Foreman's responsibility to see to it that he gets exactly the quantity of stock which he orders, that it is properly recorded and processed, and that the returns from the stock in the form of the finished product are also properly recorded. This gives us perfect control of our stock, but we must go farther. We must make sure that the stock is properly handled while in a process department; when it is finished, that it is put in the proper containers; that it is transferred properly, and that it is finally moved from the department without delay.

I realize that the proper delivery, recording, trucking and transferring of stock is the work of the Stock Department; nevertheless, there is a definite responsibility resting here on every Department Foreman, and it is because of this responsibility that the work of two departments must be co-ordinated. It is highly important that all of these functions

be performed promptly and properly, for, without the proper control of stock, we could not meet our manufacturing requirements; and unless we severally unite our efforts to prevent unnecessary delays in production our work will be very unsuccessful.

The work of your departments and that of ours is very closely related, and I believe we should do everything possible to co-ordinate that work; in fact, co-ordination is absolutely necessary if we are to properly attend to the business of keeping stock.

If our records indicate stock available, it should be available. On the other hand, if we have stock available, it must be properly recorded in order that it may be identified on our stock ledger sheets.

I trust that you will agree with me in this that the carrying out of this method and the successful operation of the Stock Department requires the close co-operation of your assistants and those employed in the Stock Department, and I wish to emphasize the fact that,

when any of the stockkeepers manifest any unwillingness to co-operate, they are not representing the attitude of this department; they are misrepresenting it; and if you Foremen will report instances of this kind to my office, I will be glad to see to it that our people are instructed in the proper attitude in which to work. It is to be expected that there will be occasions when misunderstandings will arise. Perhaps some of the stockkeepers will show an indifference to their work. That has happened and will happen again, and we must all do our utmost to teach such offenders to assume a better attitude toward their work. I trust that I have clearly defined to you the Foreman's responsibility relative to aiding us in our efforts to prevent excessive stock losses.

Is Disregard of Established Method Justified?

There are occasions when it is thought to be expedient to avoid the regular method in order to gain some anticipated advantage in

getting our standard production. This practice is never expedient and it should be discontinued. It invariably leads to a confusion of records which it is simply impossible for us to adjust, and, later in the season or at the end of the season, this over-stepping of the system creates either a shortage or a surplus which costs the Company a great deal of money.

It is evident to me that the system is simple enough to be followed in all cases, and it is my experience that, when the supposedly-easier method is followed, the condition resulting is invariably worse than that which would have resulted had we strictly followed the established routine.

Prevalent Improper Methods to Be Eliminated

Another common practice which should be avoided is the irregular accumulation of stock in the various assembly rooms, in containers, under work benches, around machines, in the

corners of assignment rooms and even being frequently thrown into waste cans. A few parts disposed of in this way every day soon causes serious shortages in our stock. It also makes the department in which the condition exists appear unsightly and it is an inexcusable waste, inasmuch as every piece of stock handled represents money. A nut or bolt thrown away by a workman does not appear to him to constitute a serious loss; and in itself it is not, but it is the accumulation of what is thrown away by the thousands of workmen in our Plant that makes it a serious condition.

The loss of stock in this way creates a very serious problem in our ordering, because this loss is not recorded, i. e., no defective stock tags covering this loss go through to the Ordering Division.

Therefore, whatever is lost is not covered in our orders and sooner or later we are sure to experience a delay because of no stock, in spite of the fact that the stock has been provided

in accordance with the number of units to be built. Very often, when the various assembly lines are 'down' because some of the parts are not in stock, the delay is a result of this same practice referred to; the stock has been wasted in manufacturing, has not been properly recorded and the penalty therefor is no production until a new order is made up and new stock is received. These practices must be discontinued and we are calling upon the Foremen to exercise closer supervision over their workmen and thus aid us in our campaign against excessive and unnecessary stock shortages.

Wasteful Methods Being Corrected

This has come to the attention of the Management, and it has been requested that these practices be discontinued. It is safe to state that hundreds of thousands of dollars have been lost in this way, and our department is now engaged in an intensive campaign to establish the proper methods of handling

stock. We desire to obtain the proper containers for all finished parts in order that they may be moved without danger of being damaged. We wish to educate all of our Stockkeepers in the proper method of loading and unloading trucks, of placing the stock away in bins or on assembly room floors in such a manner that it will not be subject to damage. Every Foreman knows the proper way in which to handle stock and I believe that each one of you should consider it your duty to see to it at all times that all workmen, regardless of whom they may be working for, handle stock as it should be handled. The Inspection Department now reports to my office all cases of careless or thoughtless handling of stock. All of the Stock Department employees are especially charged with this responsibility. Many instances of carelessness have come to our attention in the past few weeks. They have resulted in meetings of our truckers and stock handlers, and a careful inquiry among our employees in the

shop leads us to believe that we are making some progress in the right direction.

The matter of the reckless driving of electric trucks has also been given attention. You all realize that it is impossible to have enough Foremen in each department so as to enable them to constantly keep truck drivers under their direct supervision. The result is that we frequently find some irresponsible driver racing his truck at breakneck speed through the shop to the danger of life and limb. We have numbered all the trucks and we register them each morning by this number, so that we are always able to tell who is in charge of each truck, and I desire that each Foreman shall consider it his duty to report to my office all cases of careless or reckless driving of trucks.

Location of Stock According to Its Function

The present policy of the Stock Department is to so arrange their work as to give the very

best possible service to the Manufacturing Department. We realize to the fullest extent that it is only by giving such service that we may reasonably expect to make the Stock Department an efficient factor in our organization, and in order to render this service we must conduct our work in a definite and systematic manner.

In reorganizing our stock rooms in both the Main and Truck Divisions we have purposed to locate the stock in sections, segregating all the stock of each unit in separate sections; i. e., in the clutch assembly, all parts going in to this assembly will be stored in one section, the transmission assembly in another section, and likewise with all assemblies in this particular stock room; or, where we serve assembly lines in kits, all of kit No. 1 Stock is placed in a separate section, kit No. 2 Stock in another section, etc. Parts which are common to more than one assembly will have a location in each assembly. 'Chicken Feed' or 4-digit parts which are common to all

assemblies will be located in the common stock section, where they will be conveniently situated.

Upon each section of the bins we have placed a board containing a sample of each of the parts contained in the section. These parts are properly identified as to their piece name, piece number, quantity used per unit and bin location. By the use of this method it is expected that our Stockkeepers will thus be able to visualize their stock and to classify it by its function in the assembly instead of by number alone, although we have no intention of discontinuing the use of the regular piece numbers. By so doing we will not deviate radically from the regular established system and we hope thereby to eliminate errors in storing and identifying stock; for, if the Stockkeepers are familiar with the stock number only, there is nothing to prevent them from storing a gear when it should be a bearing and vice versa. By knowing their stock by name and its function, a 'gear' is a

'gear' and a 'bearing' is a 'bearing'. We also purpose to have one definite bin location for each car part, carry a certain specified amount of car parts in our current stock and all surplus stock in the Surplus Stock bins. This method will keep our working bins balanced, will minimize the liability of error in reporting "No Stock", will assure us of more accurate shortage lists, and in general will increase the efficiency of our stock rooms, thus making the work therein of much more service to the Manufacturing Departments.

In outlining this policy we, of course, realize that we can carry it out only to the extent of the ability of our employees to do work according to our instructions. For their benefit we have in operation a school for Stockkeepers where we have been teaching them our plans, methods and policies. Men in charge of our sub-stock rooms have already received this instruction and we believe that they are now qualified to properly supervise the stock rooms to which they have been assigned.

We have also reorganized each stock room by placing each section in charge of a Stockkeeper who reports to the Foreman. In this way we trust we have properly organized our employees in our stock rooms. However, we can achieve the desired success only in direct ratio to the degree of strength and weakness of human nature. If our people properly put into operation the policies of our department and carry out our plans as outlined, we will be successful in our efforts. It is entirely rational, however, to expect that some of our Stockkeepers will occasionally fail to follow this policy. We all, including Stockkeepers, have our "off days"; and there will be times when you will not get the kind of service which you expect, but this will not necessarily indicate a change in our policy. It will merely be a result of the mental condition of the men with whom you are dealing. This occurs in your departments as well as in our department and I believe that we who supervise the job ought to overlook these occasional lapses as far as is

consistent with our success. I shall always be glad to hear of serious occurrences of this nature in order that I may change the attitude of the offender, which, I am sure, can be changed. Therefore, you will perceive that here, as elsewhere, our success depends upon our willingness and ability to co-ordinate our efforts.

Our aim, then, is to develop this Stores Organization into the best in Packard history, and in order to do so we must develop an almost perfect organization. With your co-operation in all phases of our work I trust that we will be able to achieve the desired success.

Photographs of Some Past Stock Conditions

In concluding my remarks I desire to call your attention to a number of photographs. These illustrate actual conditions which I discovered in our Main Division Stock Building, on the fourth floor of Building No. 5. These are not displayed here merely for effect,

but because an inspection of them will aid you to get a concrete conception of conditions which were actually found in the course of a day's visit to the stock rooms.

When I discovered these conditions it occurred to me that the use of photographs would probably be one of the best ways in which to overcome such undesirable conditions, and the photographs were taken. These have been used at meetings of Stock Department employees from time to time, and I am sure it would be impossible for anyone to find such conditions existing in our stock rooms today. However, I desire to show them to you to illustrate the necessity for teaching all of our workmen the proper way of handling stock.

It is through the medium of these photographs that we hope to teach our people proper methods of handling stock; and, if seeing these pictures has convinced you of the necessity for making sure that all those under your supervision are thoroughly familiar with

the proper methods of handling stock, I am glad to have had the opportunity of showing them to you, for I am sure that if your workmen, together with those in the Stock Department, all understand how to properly handle stock, it will result in the saving of thousands of dollars.

Constructive Criticism Solicited

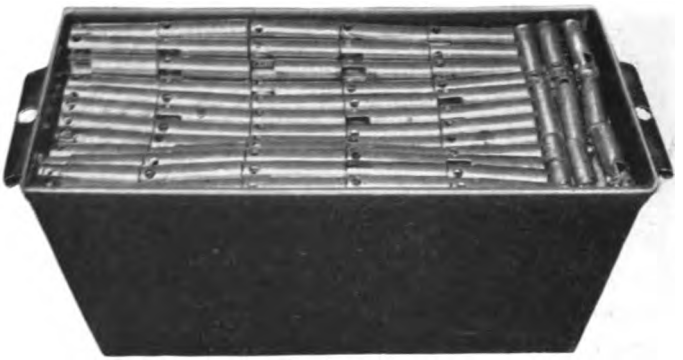
I do not wish to lose this opportunity to invite criticism of our stock rooms; by this I mean constructive criticism. I do not mean that we desire to have you find fault with what we are trying to do, because that will not help the situation, but, if any of you men believe that we are overlooking any detail, we would like to know it. If you perceive that there is any particular part of our organization which we can strengthen, we wish to have the benefit of your observation. If you are convinced there is a better method than ours, we would like to take advantage of your idea. We highly desire to learn of your ideas relative

to the proper methods of keeping stock. We may not be able to incorporate all of them into our plan, but we have already received a number of valuable suggestions which have greatly helped us, and we will welcome additional suggestions in the future.

1-A

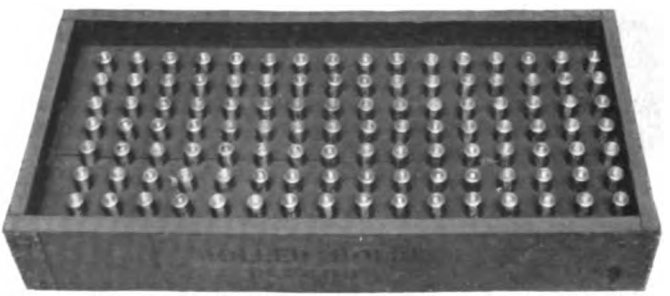
This is a picture of Valve Roller Holder (Insert 1-A), showing the condition in which we found them in the stock room, a condition which is obviously bad.

The second picture (Insert 1-B) illustrates how the same parts were placed in a tote pan upon the initiative of the Stock handler, which, while not being obviously wrong, to the experienced Stockkeeper it appears to be just as bad a method as



1-B

that shown in the first picture, since the stock is not protected, even though it does appear to be in a great deal better condition.

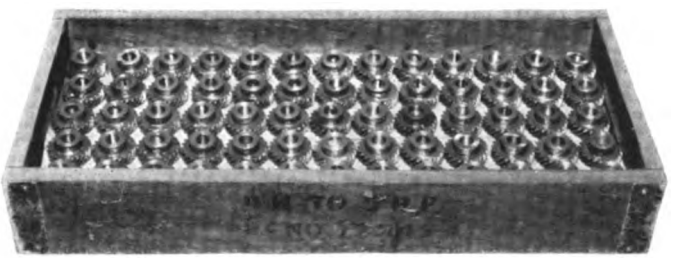


1-C

The third picture (Insert 1-C) shows the proper method of storing this part, the one which we taught to all of our Stock Room workmen and which is now being used.

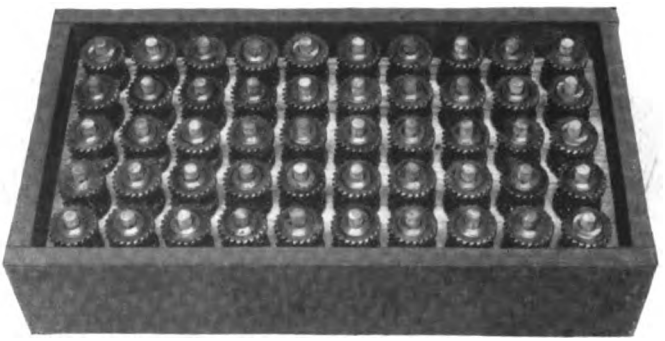
2-A

A box of gears is here pictured (Insert 2-A). You will readily perceive the damage inevitably done to gears thrown into a box in this way.



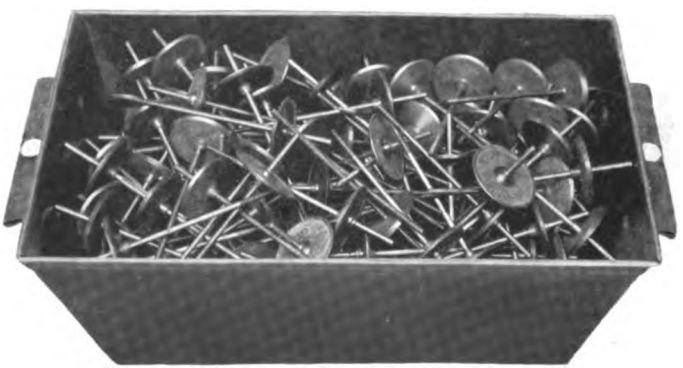
2-B

We asked the stock man to pack them as they should be packed, which he did, as pictured (Insert 2-B). Here again the method does not at first appear to be a bad one. Nevertheless, the gears packed by this method are not afforded any better protection except when the box is stationary.



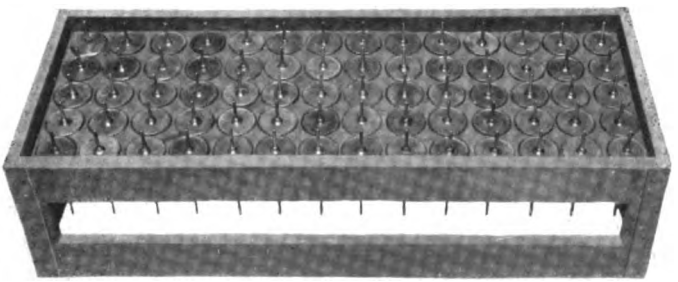
2-C

The third picture (Insert 2-C) shows the proper method of handling the gears; each gear is placed on a pin which holds it stationary in the box, thereby protecting the face of the gear.



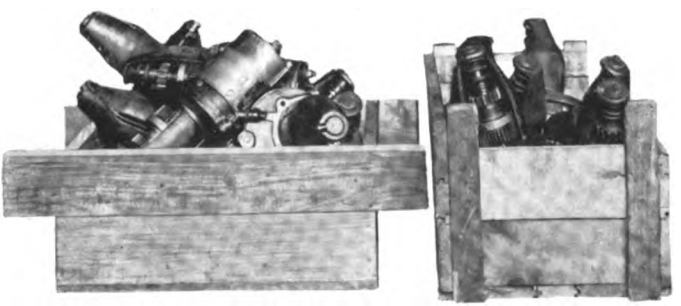
3-A

The next picture (Insert 3-A) shows Carburetor Air Valves thrown into a tote pan with the probable result that all are made unfit for use.



3-B

This picture (Insert 3-B) shows how these valves should be stored.



4-A

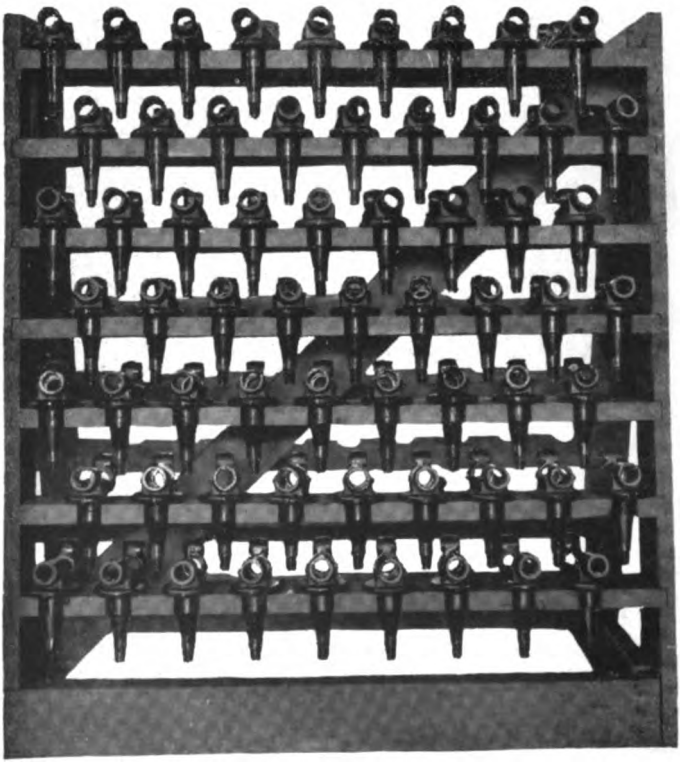
The stock shown in the next picture (Insert 4-A) shows Starting Motors. At first it appears that these are a couple of boxes of rough stock instead of expensive starting motors; strange as it may appear, not one of these was injured in any way.

4-B

The Stockman responsible for filling these boxes realized that they should be handled carefully, and he laid them carefully in the boxes, but he did not manifest the ability to pack them, as shown in this picture (Insert 4-B), which is the **proper way.**

5-A

The next picture is one of a box of Steering Knuckles (Insert 5-A). These finished Knuckles were carelessly thrown into these boxes and a great many were scrapped in so doing.

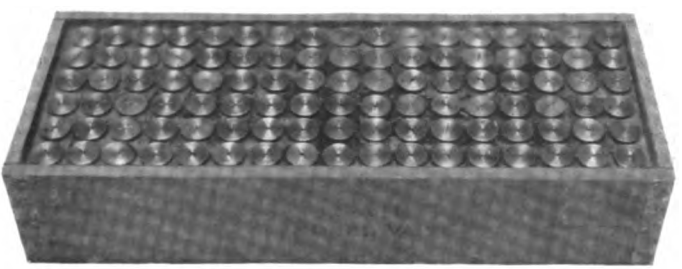


5-B

The proper method of handling them is shown in this picture (Insert 5-B).

6-A

We have another example, this one being of Valves (Insert 6-A) which were thrown carelessly into a tote pan, resulting in considerable damage to them.



6-B

The proper way in which to handle them is shown in this picture (Insert 6-B).

This photograph shows the arrangement of our Stock according to the Assembly unit. The Banners suspended from the ceiling indicate the Unit and the Section numbers. The Sections are shown to the extreme right with the Sample Boards on which each part is shown, properly labeled as to Piece Number, Piece Name, Car Usage, and Bin Location.

The same system as that shown in the above illustration is carried out in this Stock Room where the Stock is dispensed in Kits.

Instead of Banners showing the Unit, they show the Kit number. Each Section is also shown, together with the Sample Boards.

This photograph shows the same idea carried into effect in the Rough Stock Room. Sections are indicated by Banners suspended from the ceiling and the Sample Boards may be seen at the end of each Section.

Ninth Session

Subject: PRODUCTION

Speaker: MR. C. F. TOLLZIEN
Manager of Production

Quantity and Quality Production

In discussing the subject of production our minds naturally turn first to the two kinds of production which are well known to all—(1) quantity production and (2) quality production. It is generally known that the emphasis in the Packard Plant has always been placed upon quality. We often hear it stated: "Why, Packard has the highest quality car there is made." Without attempting to either prove or refute this statement, I wish to present to you the question: What does it mean to have a high quality car? What is quality? It can be answered with exactness: 'quality' is another word for 'accuracy'. If it is true that Packard has the highest quality car, then it means, purely and simply, that we have the

highest standard of accuracy to be maintained.

The Panoramic View

I am sure it is unnecessary to state that it is a highly complicated problem to produce the various models of Packard Trucks and Touring Cars, all with a high standard of accuracy. It is not my purpose to attempt to present this problem to you in detail. Anyway, it would be an impossible task to accomplish in the time allotted for our discussion, for it is a complex, many-sided problem. But I do wish to discuss with you the problem by and large, give you a panoramic view of it, so to speak. I trust you will agree with me on the fundamental points of my discussion and that we may arrive at definite conclusions as to why some of our problems of production are as yet unsolved.

Three Fundamental Questions

The Manufacturing Division of this Company, of which the Production Department is a part, has before it continuously three fundamental questions. The first is: what to do;

the second: when to do it; and the third: how and where to do it.

The first question is answered by the Company's policy as established, dependent upon the conditions existing from time to time. The third question is answered by our Factory Manager's Mechanical Department. The second is answered by the Production Department, and it is that question with which we have to deal here, viz: when to do it.

In order to really do a thing when it is decided to do it we must all work along one definite line of action. You and I and every one of the hundreds of men in this Plant concerned with production must each be of the same mind, with reference to our work, and each know as well as the other what we are to do. To make this possible the Production Department is put to a great deal of expense and employs a number of people to tabulate figures which are dispensed to the proper points of contact throughout the shop, stating what we are to do; we also employ an equal number

of people at a great expense to maintain a record of our accomplishment in accordance with that plan, which record is made throughout the shop from day to day.

Resume of Manufacturing Program

When the Management of the Company makes a decision to build a certain number of vehicles, the Production Department formulates a manufacturing program, showing when the stock should be purchased and delivered in; when it should be machined; when the minor and major unit assemblies should be made; when the chassis should be erected; and when the completed vehicle should be finally ready for shipment. The time allowed between the various stages of this manufacturing program has been calculated upon a scientific basis by the heads of our Manufacturing Department, and it is based upon the equipment and the productive capacity of each department of the Plant. Therefore, there is no guess work about it, although it has many

times been questioned by some of our Superintendents and Foremen and others. It has been found to be absolutely correct and reliable, and therefore it should be accepted and adhered to by all who are engaged in the productive processes.

This manufacturing program is the foundation upon which every order is placed, every shipment accepted, every invoice paid, every factory order placed, and every departmental schedule worked out. You will perceive, therefore, that we can consistently only have one plan, and if each and every department in the Plant would work entirely according to the plan or schedule furnished to it by the Production Department there would never be any danger of failure in delivering finished vehicles in strict accordance with our manufacturing program.

How Schedules Enable Us to Determine the Efficiency of a Department

To be successful, you as Foremen must deal more with the departmental production sched-

ule than anything else, and we urge you to deal with these schedules more and more every day. We are willing to stand absolutely upon the accuracy of those schedules. We know they are questioned continually, and we are willing at all times to investigate any item upon which the accuracy of the schedule is questioned, and when any mistake is found it will be immediately corrected. We have a force of men doing nothing else but continually checking the schedules, and there is little likelihood of their becoming inaccurate. The more these schedules are used by you, the more accurate they will be; it is only an unused record that becomes inaccurate, becoming so through your continued disregard of it.

These departmental schedules indicate the total amount of the order or the requirement, the regular requirement for finished vehicles according to the manufacturing program being shown as a separate item; the service and shrinkage withdrawals for the previous months are also shown on a separate item, the grand

total appearing as a third item. Departmental schedules are made up anew each month, and the service and the shrinkage withdrawals adjusted each month. Next, any shortage on production prevailing at the end of the preceding month is also shown, so that at a glance any Foreman may see how far he is behind the schedule for the previous month, and what he is to produce for the present month, which gives him a total production required for the current month; and in addition to this, for his convenience, we calculate for him and post on the schedule the daily average production required of each and every item for each working day of the month. Against these figures the production is posted three times a week, and at the end of each week the total production is shown and is indicated by a plus or minus sign whether or not his department's production is ahead of or behind the schedule.

These department schedules, gentlemen, are a work of art and science combined. We have

been very highly complimented on them by many of our Foremen and Superintendents. We have been told by well-posted men that there is no factory in the country which has more complete or more comprehensive departmental schedules than the Packard Motor Car Company. We urge you to use them and to gauge your production entirely by them, and then we will surely meet our manufacturing requirements without any serious confusion or loss of time. (On page 266 is a sample schedule as outlined by the Production Department of the Packard Motor Car Co.).

For your further convenience, every Friday we tabulate from each and every departmental schedule a list showing the items which are delinquent on this schedule—in other words, the items on which the production is not up to the requirements of the schedule. This is done to condense on a separate report the items on which you are behind the manufacturing program and to which you must give special attention in order to catch up with the schedule.

Why Keep Up the Schedule?

At this point I wish to impress upon you the importance of your jobs in keeping your production of each and every part up to schedule, for this accepted manufacturing program is the only basis upon which the Company can produce finished vehicles, its finished product for sale to our customers. The effect of our manufacturing program is far-reaching; the Management of the Company accepts it without cavil, once it is established, and it proceeds to finance the Company to carry out that program; the expenditures of the Company for material are based upon this program; the force throughout the factory is adjusted on the basis of this program; the estimate of the expenses to meet the semi-monthly pay rolls is made in accordance with this program. In fact, the value of every dollar that the Company has and the productive capacity of every man whom the Company employs is staked upon this program. It must, therefore, be a program which is definite

and accurate to begin with, and which is subsequently carried out to the letter.

Failure To Be Prompt Spells Disaster

Our Sales Department allots vehicles to our branches and to our dealers upon the basis of the program; the branches and the dealers finance themselves on the same basis; they employ their salesmen and they instruct their salesmen to go out and sell, and promise deliveries on the basis of the program; the customer buys upon that promise and he expects to get the delivery of his vehicle according to the promise of the salesman. He gauges his own business upon that promise; he signs contracts; he invests his own money; he places himself under obligation upon his expectation that he will have transportation facilities at hand at the time promised by the Packard Motor Car Company with which to carry on his business. Therefore, we cannot afford to establish a program which is accepted in good faith by our Company, our branches

and dealers, our distributing points and our customers, and we ourselves fail to live up to it.

We all know that a Packard car or a Packard truck requires the requisite number of each and every piece. We all may remember occasions when delay in a simple screw machine job has held up the assembling of cars and trucks. Each little piece is just as important to the complete vehicle as the big pieces. Therefore, we must not be satisfied in selecting out the larger parts on our schedule and gauging our productive success on our ability to maintain scheduled production on those parts alone. We have found too many times that this tendency does not bring results. We must be ever watchful of each detail, each part, big and little; and that is the reason why our departmental schedules cover each and every part—just so they may be watched. It is the degree of care and the watchfulness exercised by each Foreman on each part in his department, and the production of it according to the schedule, which determines the

likelihood of our making the shipment at the proper time. Therefore, we urge you to watch them all continually. Watch yourselves, your machines, your tools, your men, all the conditions affecting the work in your department. Careful watching, coupled with good common sense, will bring the job through with an one hundred per cent efficiency record.

Disregard of Schedule Deplorable

This explanation, I trust, gives you a clearer and broader understanding of the great importance of the departmental schedules which are furnished to you and to the departments over which you have jurisdiction, and it is regrettable that in many cases we have found that the Division Superintendents and Department Foremen have not attached the importance to these schedules which they must receive if we are to succeed in carrying out our manufacturing program.

The inclination displayed by many Foremen to watch the requirements of the unit assem-

bly and chassis assembly line, and the attempt to gauge the production of individual pieces in the departments on what they *think* are the requirements of the assembling line, is wrong in principle and will never bring good results. Such practices might be followed in very small shops, but there is not one of you who is capable of successfully controlling the production of pieces in the smallest department of this Plant on that basis, because not one of you is in the position to know what are the production requirements in your departments, and what is needed not only to meet the manufacturing program with finished vehicles, but what must be added thereto to cover the daily occurring shrinkages and the withdrawals for the Service Division.

There is only one way in which this account may be kept straight, and that is by accurate records and by the figures as shown on the schedule, and we must insist upon the production of every department of this Plant being controlled entirely by the schedules, because

only in this way can the production in each department be gauged and the various pieces brought through at the proper rate and proportion to come down through the line and meet at the proper place, and thus provide the requirements of the chassis assembling line at the right time; only by so doing will we be able to produce the finished vehicle on an economical basis.

Grasp the Big Idea and Forget What "Bill" Wants

You must get the broad picture of this situation. We are too big and too unwieldy and manufacture too many thousands of parts to depend upon the personal opinion of any one man or even of several men as to what must be done in the way of making parts and when to make them. Guesswork is not suitable for the requirements of the Packard Motor Car Company. You would be surprised, gentlemen, to know how often, when I have personally called the attention of a Foreman to an

item on the schedule on which the production is far behind the schedule, to have him assure me not to worry about it, that everything was all right and that there was no doubt that he could easily take care of all that "Bill Dietzel" or "Tom Carley" wanted; but we cannot operate on that basis. We cannot gauge our production on what "Bill" tells "Tom". "Bill" tells "Tom" today that he wants forty-five pieces for tomorrow, and "Tom" says: "Sure, Bill, I will get it for you." But this arrangement cannot go on day after day. Some day "Tom" is going to run a-muck; he is going to break something; he does not get his production and the next day "Bill" cannot get out the cars and trucks.

But if "Tom" will forget all about what "Bill" *thinks* he needs and will see to it that each and every item goes out of his department according to the schedule, he will then be assured that "Bill" will have no cause to worry over any delay of parts coming from his department; and not only will he take care of

"*Bill's*" needs, but he will have taken care of *all* the needs for the assembling lines and for the *shrinkages* and for the *Service*. He will have taken care of our needs here in Detroit and for all our dealers and branches all over the world. That must be the way upon which your business is conducted, and if you are not operating your department according to this principle I would advise you to begin to do so today. Make the Schedule your Bible—live up to it to the letter.

Schedule the Big Packard Centralizing Agent

This should be done because, as I have stated, we as an organization are too big and unwieldy and manufacture too many thousands of parts to depend upon any single individual's opinion. Without substantial records for controlling the production of the thousands of pieces passing through our Plant every hour we would soon find ourselves bound on every hand by an endless series of complications and entanglements.

Now, what does this bring us to? It proves conclusively that our organization and the system laid down for handling and controlling our work is established along the one line of action. As I stated in the beginning, we must all be of the same mind, and because there are so many thousands of us we can only be of the same mind by following in detail the schedule or the program which directs our work along a definite line of action.

I have explained to you the origin of the manufacturing program. I have explained to you that, according to that one established program, the Company has been financed; the Plant has been equipped; the stock and materials have been purchased; deliveries from the outside have been followed in; after receipt, the stock has been followed through all the departments; the machining schedules have been established on the same program; each department has been shown in writing what it must do; each minor assembly and each major assembly has

been scheduled; and, if all the various operations through the whole Plant are accomplished according to schedule, the finished product goes out of the Shipping Room door to our dealers on the date it was promised to them.

Packard Success and Our Success Inseparable

Weeks after the original plan was laid and our money has been spent to carry out the plan, each shipment is billed, the money due us is collected; it is put in the bank to our credit, and the complete cycle has been completed. The result is that the Company is successful. Each of us individually can only be successful in proportion to the success of the Company. Let me drive the fact home once and for all. Our task is a big and complicated one; from its beginning to its end it involves the individual effort of thousands of men; thousands of mechanical and physical operations. Therefore, nothing but a definite plan, worked out

in detail, and precisely adhered to throughout the Plant, can be successful.

Now, what I have said is not entirely my own personal ideas or opinions. I have expressed in the foregoing discussion the best thoughts along this line of all the heads of divisions in the Production Department. What I have said is not theory. I have tried to cover the events which are actually occurring every day. Now, what central fact are we aiming to definitely establish? It may be illustrated by comparing our large organization, employing about 12,000 men, to a ship. We are the sailors and we must keep our ship floating on an even keel; we must not load up one side out of proportion to the other. Just as soon as we do it, the ship settles with a decided list; and just as we lose our bearings we run upon the rocks. We must, therefore, steer our ship according to the chart, and that guide in our Plant is the schedules and the system laid down for the proper conduct of our business. Any deviation on our part from that

chart, from that schedule, from that system, is sure to bring disaster in one form or another.

Follow Schedule and Co-operation Is Inevitable

Now, this calls for co-operation, and the amount of co-operation shown is a sure indication of the interest which you and I have and which all the men in this Plant have in their jobs, focused on a single standard achievement; and if each of us does focus his undivided interest on the accomplishment of our schedule work in the most efficient and economical manner, then, without consciously trying to co-operate, we will be working in the very closest co-operation and we will be helping each other each and every day in the best way possible.

How Packard Guards Against Loss of Stock

Therefore, gentlemen, it behooves you to be careful. Carelessness in the handling of tools,

machinery, stock and men can only result detrimentally to your own welfare and that of the Company. Be honest, particularly to yourselves. Do not carry the impression that neglect and failure to live up to the plan today can be smoothed over tomorrow. It is bound to reveal itself later in the form of a machine that is down, a man who is gone, or a shortage that has occurred. Make every day complete in itself. If you are not up to schedule tonight, the effect of that will be apparent at the Shipping Room door; it may be four weeks or it may be eight weeks from the date of your failure to comply with the routine or schedule, but it will surely become apparent. There are many ways in which you can co-operate with the Production Department, but the greatest of these is in the assistance you can give in the control of the stock. We are all guardians of the Company's property, and at this time over fifteen millions of dollars ($15,000,000) of the Company's money stands on the books as stock—inventory.

It is a part of the Production Department's job to provide the stock to the factory from which to manufacture the parts. In the past few years (during the war period) this has been no small task. But the Production Department maintains a force of experienced stock tracers, divided into outside and inside groups. The outside stock tracers have only to do with outside manufacturers from whom we purchase our materials. Based upon the same manufacturing program upon which each of your departmental schedules is based is a schedule for the delivery to us of all outside material; and these schedules are furnished to the outside manufacturers from whom we obtain material and are made up on the same basis as are the schedules for each department on the inside; the outside stock tracer daily watches these schedules with the outside manufacturers, and follows the stock in every way possible to assure the manufacture and the delivery of that stock into this Plant according to the schedule.

After the outside stock is received and passes through our Receiving Room it immediately becomes inside stock and it is then transferred from the outside stock tracing group to the inside stock tracing group. The inside stock tracer then has control of that stock and it is his duty to bring it through the Receiving Rooms, inspection, preliminary processing and into the Stock Rooms, from which place it is distributed to the departments in accordance with the machining operation sheets. Not only does the duty of the inside stock tracer rest with delivering the stock to the department of first operation, but it is his duty to watch it through the departments of subsequent operations, to check the condition of each and every item with the departmental schedules, to act as a prompter to the Foremen, to call the Foreman's attention to the items which are not going through according to schedule, and which are needed by departments of subsequent operations or by assembly departments.

Therefore, you perceive that there should be

no possibility of oversight, no possibility of any single item being lost.

Careless Handling of Stock Inexcusable

Let us compare our Stock Department with the bank in which you do your business. As you walk into that bank you will see the cages of the various receiving and paying tellers all fenced up and locked in, and in each cage you will see piles or stacks of greenbacks, silver dollars and gold pieces. Why are they fenced in and locked up? Every night before each teller goes home, why is he required to balance his accounts and know to the cent that he can accurately account for every transaction, for every dollar that came in and every dollar that went out during the day? It is only because the bank deals in dollars—dollars is the only commodity which they handle. You do your business with that bank because you have confidence in it. If you are not satisfied in your own minds that that bank did accurately account for every cent every day, you would

not deposit a dollar in that bank. Then, since you require that confidence in the bank in which you deposit your savings, why do you not demand the same confidence in the business institution in which you work every day and which pays you for your time and your ability and maintains you and your family? Why do you insist upon your bank accounting for each detail and still permit employees under your jurisdiction to handle the stock (which is only another form of money and which belongs to this Company) in a careless manner?

You know that we are required to account for every cent's worth of stock in this institution, and you know that there is only one way in which this accounting can be done accurately. Then, why do you permit employees under your jurisdiction to carry stock from one department to another without satisfying yourself that the proper record is made? Why do you permit employees under your jurisdiction to draw out more stock at a time than they need? Why do you permit

employees under your jurisdiction to carelessly arrange and pile the stock in departments where it is damaged in handling and in trucking; where it is lost because the departments have not the facilities and do not need the facilities for storing it; where it is allowed to accumulate without any good reason; and where it is lost sight of in many ways?

You would not think well of a bank if, upon entering it, you found money lying all over the floor; but I can take each one of you down the assembling lines in this Plant today and show you parts, usually termed 'chicken feed'—bolts, nuts, cotter pins, gaskets, studs, etc.—lying on the floor, to be swept up by the sweeper later in the day, and without a chance of its being salvaged. How can we properly cover the shrinkage and properly keep you supplied with a stock of such parts unless we are able to account for them?

I dare say that you could not find bunches of money stowed away under the desks or in the dark corners of our banks, but in practi-

cally every department of this Plant which is running at full capacity you can find stock stowed away in just that manner. There is no good reason why stock should be piled under the benches and kept in drawers or hid away in other places, such as we find from time to time.

Foremen Responsible for Stock Losses

The cure for this wasteful practice rests entirely with you. Stock is distributed to the departments out of the stock rooms on requisitions signed by the Foreman of the department. Won't you, therefore, count this stock as you would money, and make sure that you approve the withdrawals of stock in your department only in such quantities as are consistent with the needs of your manufacturing schedules? Then, after you get the stock, take good care of it and see to it that all of the men in your department handle that stock as its value warrants. We continually observe too many instances of finely-finished and valuable stock carelessly handled and piled around the factory

like cordwood. The damage on this account in a year amounts to an enormous sum, and it is the efficiency displayed in your departments which will immediately effect this saving to the Company.

When you go into the bank to cash a check for $20.00 you are careful to satisfy yourself that the teller hands you the $20.00 before you go out; you count the money over to make sure the amount is correct. You should use equal care in assuring yourselves that your clerk, who makes out the original requisition, gets the stock according to the requisition. If, for any reason, he does not, then the requisition should be changed so that the records will be accurate. And, by the same token, as a judicious expenditure of the $20.00 which you have drawn from the bank obtains for you the proper return, you should satisfy yourself that you get the proper return from the stock you have drawn. In this manner your stock losses rapidly decline and the efficiency of your department mounts higher with corresponding rapidity.

Need For Concerted Action

We must keep everything in uniformity; we must get in our stock according to the chart. Just as soon as we get in too much at one time and not enough at another we are unbalanced, and we can carry that condition to the point where it will actually capsize the institution. If we expend money for labor and processing our stock with an inexcusable disregard of the chart, we are inducing the same dangerous condition. It will ultimately result in nothing short of failure. It cannot be successful; we are thereby spending our money needlessly and in advance and using up our working capital, which we need from day to day; we will demolish our production standards because we will surely find that, instead of following our schedules and bringing everything through in a uniform, well-controlled manner, we are away overloaded on some parts and actually "stuck" for others. So much for the manufacturing programs, care of Stock, and the Manufacturing schedules.

Follow the System Implicitly

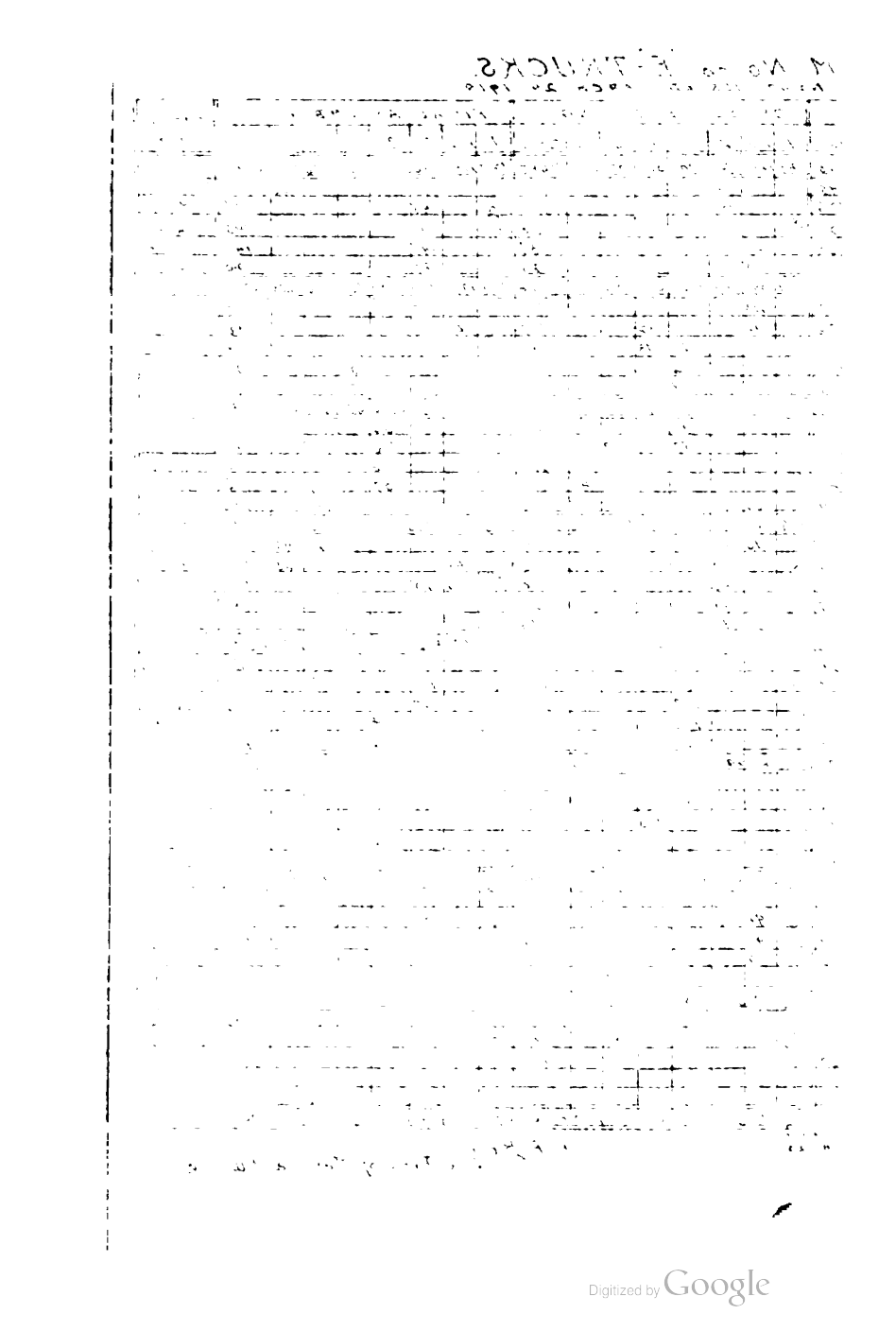
Equally disastrous is failure to follow the established system or routine. Each one of you has been furnished with the Instruction Book of this Company, and it is kept strictly up-to-date. How many of you know the system and follow it? If you do not follow the system, if you do not account for every item of stock, if you fail to record each stock transaction properly, or if you attempt by any short-cut methods of your own (usually because of some anticipated advantage) you are directly interfering with the proper record of the stock and of the investment of this Company. You are trying to go into the bank and draw out your $20.00 and "bluff" the teller that you will give him a check for it the next day. This action never will produce good results in either instance.

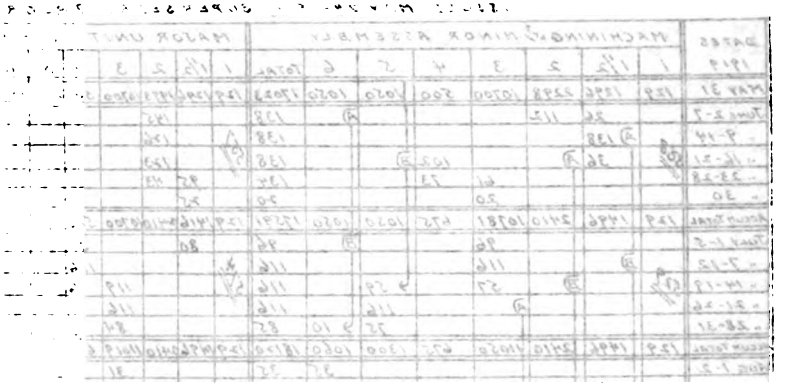
Let me say to you that no official of this Company, regardless of how extensive is his authority, ever issued an order to cover an emergency condition with the intention of

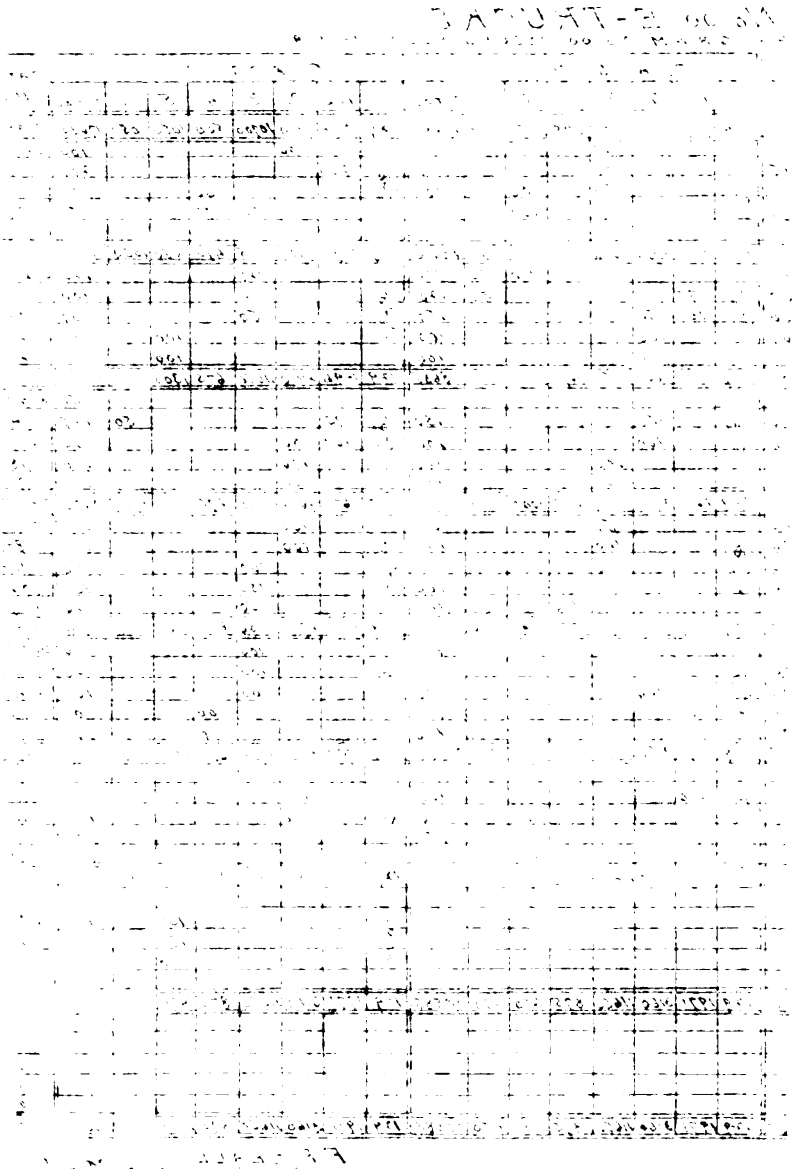
avoiding or over-riding the routine laid down for the proper handling of that transaction. The routine and the system must be followed by every member of the organization, and at all times.

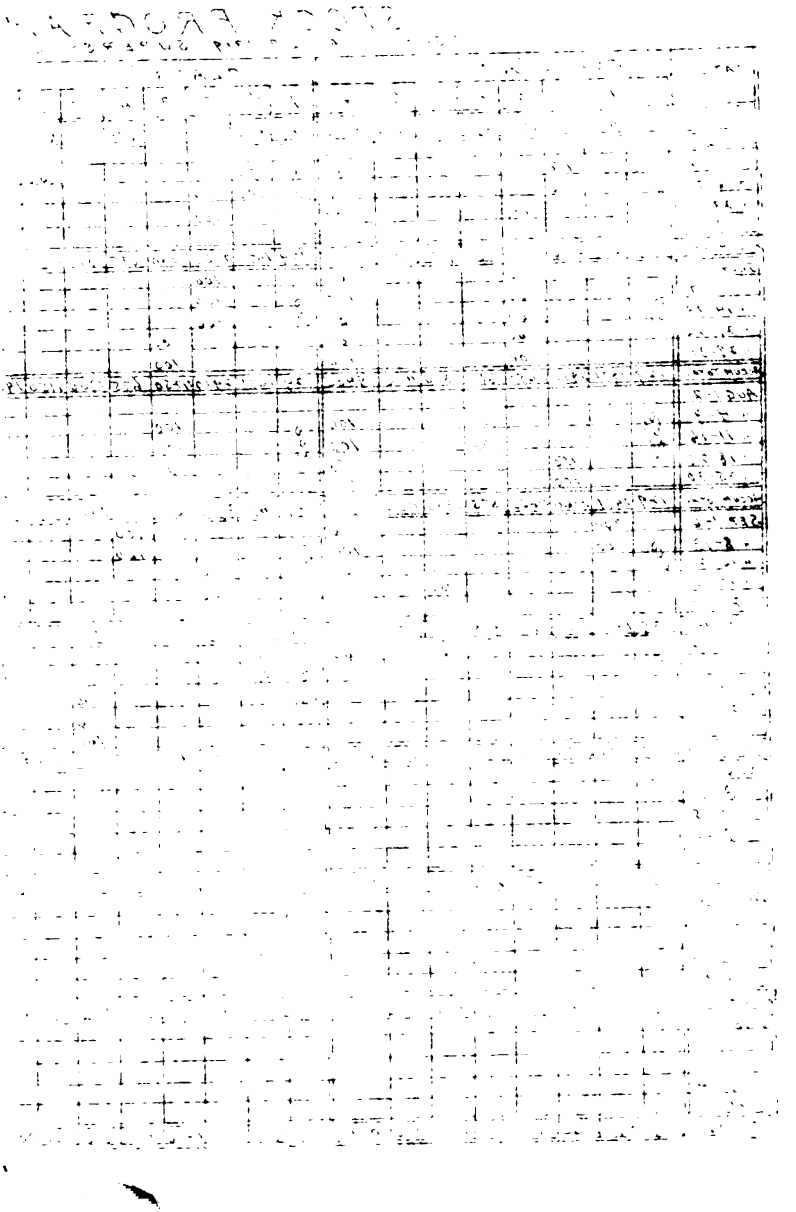
Do It At Time the Schedule Orders It Done

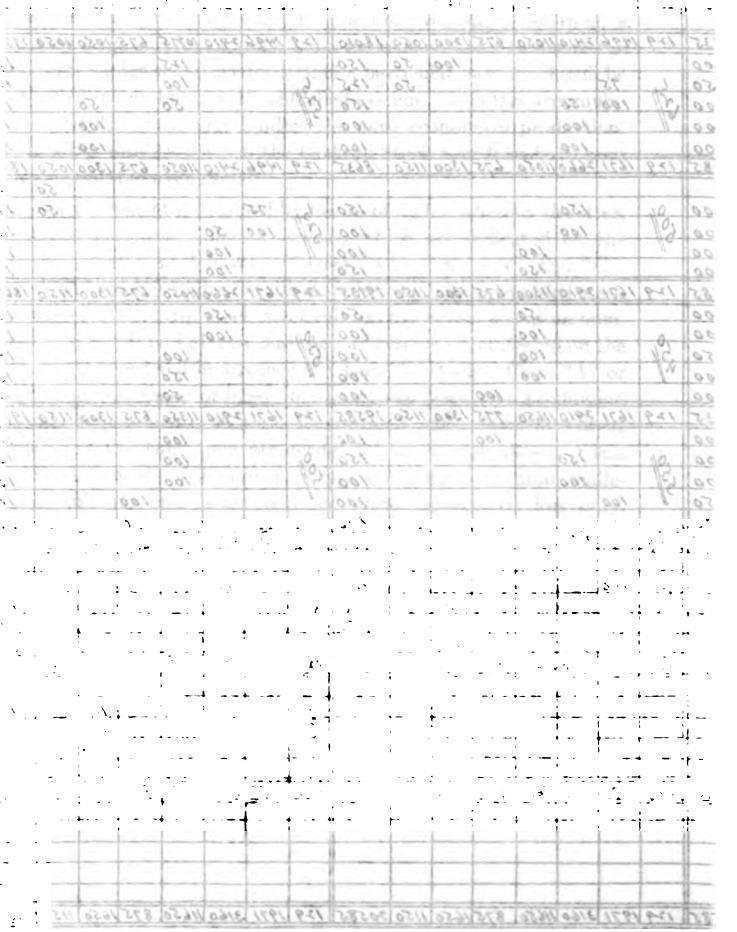
What was the question which I said we were going to answer? Oh, yes, "when to do it". The answer is: *Do it according to the schedule and do not forget to do it right.*

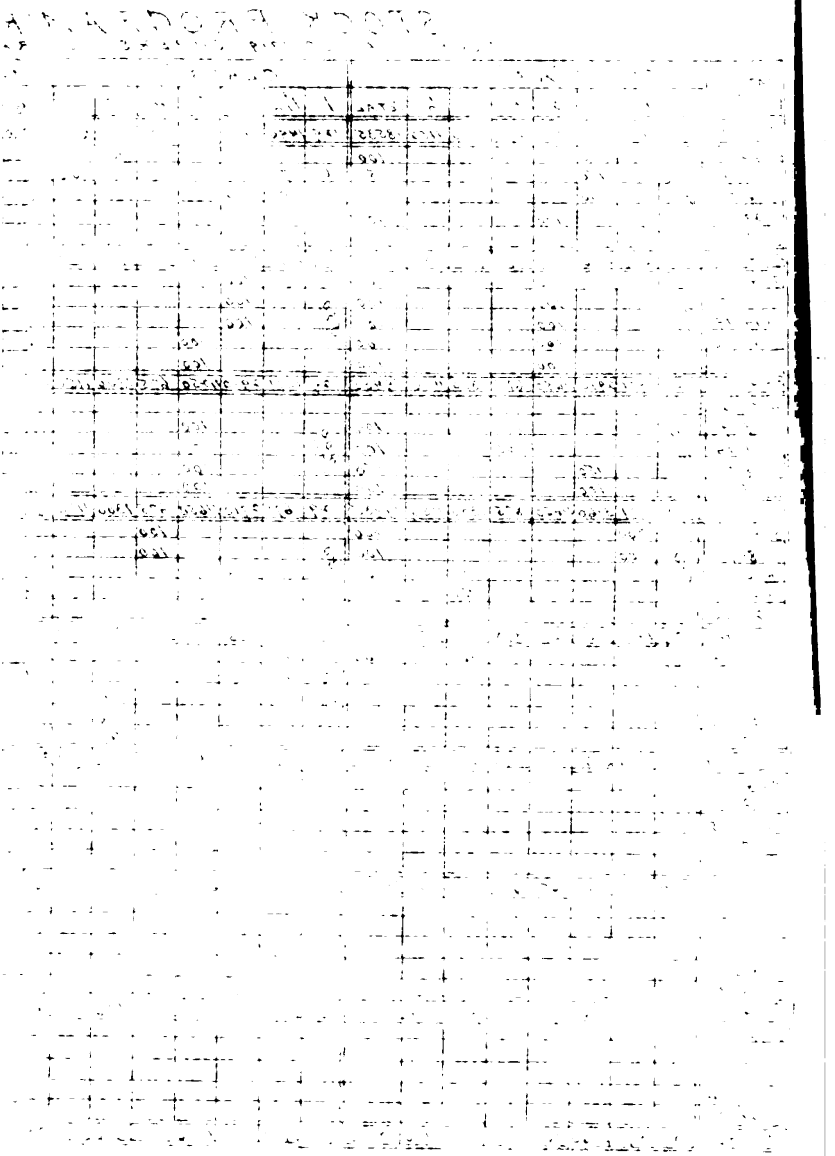


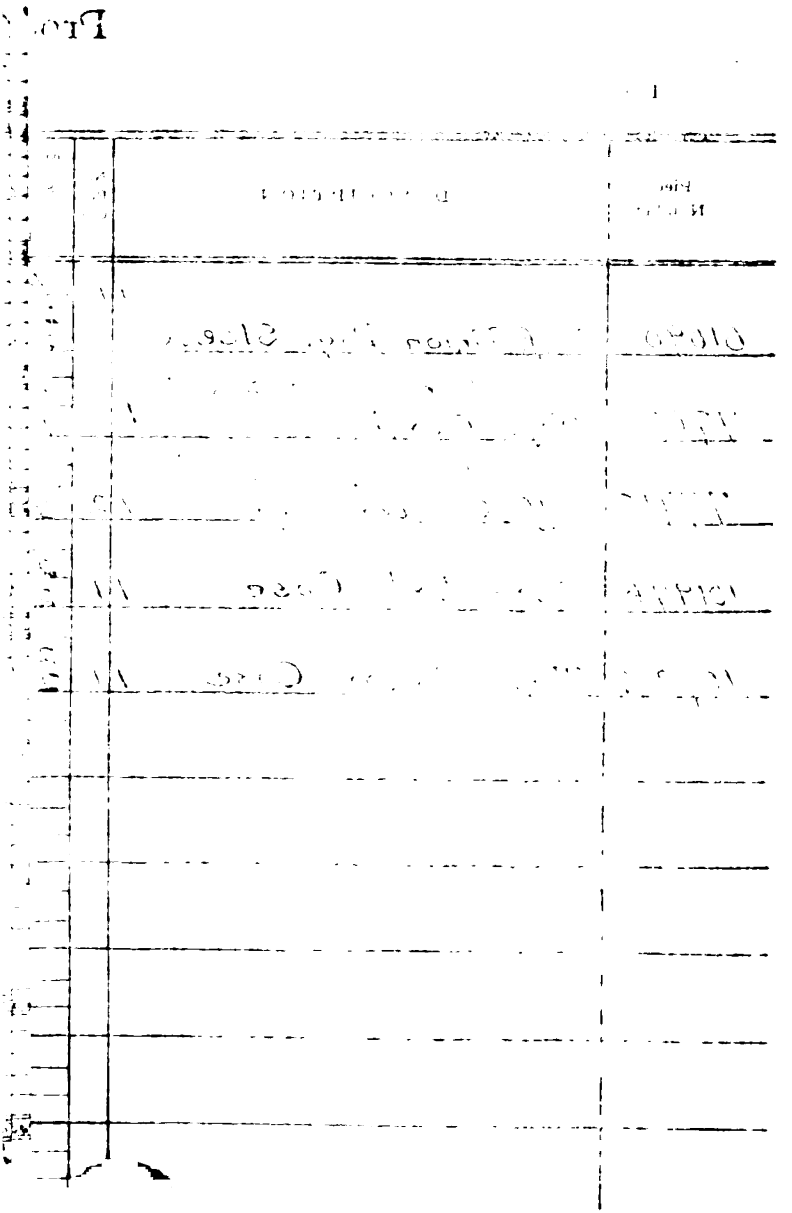












Tenth Session

Subject: CARE OF MACHINERY

Speaker: MR. E. E. MEAD, *Superintendent Advanced Training*

This morning I wish to discuss with you the subject of the "Care of Machinery". I realize that there are many of you here who are in charge of departments where machinery is used very little, but, inasmuch as my discussion is based upon principles which are fundamental, and which are peculiar to the Packard organization as a whole, they are applicable in a general way to every department in our Plant. I recognize that the standard of workmanship in our machining departments is essentially a Packard standard, one of superior grade; and it is because this standard is the one we desire to be maintained and even constantly improved upon in every department of the Plant that I am led to believe that my remarks will be either directly

or indirectly of interest to each executive here.

You have already listened to the lecture on "Tools" from which you gleaned much information as to how tools were made, how they were designed, and about the routine that must be followed in order to perfect tools for a new model.

The above facts being firmly established in your minds, I wish to confine my discussion broadly to the following topics:

1. The cash investment represented by our Machinery and Tool equipment.
2. The proper care of and means of protecting this machinery.
3. Prevalent radical abuses of machinery and tools.
4. The enormous expense to which the Packard Motor Car Company is being put for the very highest quality Machinery and Tool Equipment in order to produce an increasingly superior product.

I desire first to call your attention to the enormous amount of machinery in the Packard Plant, this machinery being distributed over all parts of the Plant. If the machinery were all on one floor and the machines were set closely together it alone would cover about ten acres of floor space. Can you picture in your minds a plot of about ten acres in size, all compactly filled with machinery? That is the amount which we have to take care of in our Plant.

Cash Investment in Packard Tools and Machines

At the time of our last inventory the Packard machinery alone was inventoried at two million, nine hundred and seventy-five thousand dollars ($2,975,000) and the tools were inventoried at four million dollars ($4,000,000).

This last item does not include perishable tools; these are recorded on a separate account. But we have approximately four million dol-

lars ($4,000,000) worth of tools—jigs, fixtures, special reamers, represented by the big tools. The perishable tools' item alone amounted to one million, two hundred and fifty thousand dollars ($1,250,000). Of course, that does not appear to us now as a very large amount; it does not seem nearly as large to us Americans as it would have appeared two years ago. The newspapers have been so full of billions and millions and you hear everybody talking in those terms every day until those figures have become as a by-word. You hear the children on the streets and the people in the street cars talking glibly about millions and billions, as though they were trifles.

But let us consider these figures for a few minutes; we may itemize them as follows:

Machinery worth about three million dollars.

Tools worth nearly four million dollars.

Perishable tools valued at one and a quarter millions of dollars.

Depreciation In Value

That totals as an immense amount of money to have invested in just the tools and machinery. The $2,975,000 at which the machinery was inventoried does not, however, give you the actual cost of the machinery; that figure represents the inventory price. It is decreased every year by approximately ten per cent, some times a little more and some times a little less, but ten per cent is the approximate depreciation figure. That depreciation is to cover the ordinary "wear and tear" on the machine.

The depreciation on our machinery last year was four hundred and sixteen thousand dollars ($416,000), just a little more than ten per cent. The depreciation on the tools amounted to a little more than 42½ per cent last year. That is because there is more "wear and tear" on tools. Also, some of them become out of date almost before the season is over. This 42½ per cent depreciation on tools represents a one million, seven hundred

thousand dollar ($1,700,000) total. The item covering the depreciation on perishable tools represents a total of one million, two hundred and fifty thousand dollars ($1,250,000). This includes what is known as small tools, all standard reamers, unnumbered tools and tools of a perishable nature. They are used up and "struck off" the book. They depreciate so rapidly that it does not profit the Company to keep them. Thus will you perceive that these figures prove that a larger amount of money is invested each year in tools.

On machinery the depreciation is also larger than the ten per cent referred to, because the depreciation on machinery increases every year; if a machine is one year old, ten per cent is deducted from the original value; if it is two years old, another ten per cent is deducted and so on for the 'life' of the ordinary machine which is calculated to be approximately ten years.

I do not wish to be misunderstood on that statement. I do not mean that the machine

at the end of ten years is worn out and of no further use; but taking an estimate of machinery as a whole, it is calculated that, at the end of ten years, machinery has depreciated enough to amount to as much as the repairs put on it during that period, because the value of the machine and the cost of the repairs very nearly balance. Therefore, they are 'struck off' the books at that time. Of course, a number of machines get to that stage long before they are ten years old. Some of you can probably picture in your own minds now some machine which has not lasted even as long as that. On the other hand, you have probably had some other machine that is still 'jogging' along at the same old pace at which it was operating when you came here; these cases are the exceptions to the rule.

Why Machinery and Tools Are Responsible for Packard Quality

The care of machinery in this factory is very important, not only to the machine, not only

to the Stockholders of the Company, but to the operators as well. Unless it is in good running order a machine cannot turn out good work, work that is up to the Packard Standard. This probably means more to this Company than anything else, *Proper Packard Standard.* This organization has been built up, not by the number of cars they turn out, but by the quality of those cars. It is known all over the world, as far as the Packard name has reached, to be a quality product. I do not believe you can go anywhere and get into very much of an argument when you claim that the Packard is a quality car. I have heard that question discussed in hotels, in the street cars and on passenger trains, by people who did not know that a Packard employee was anywhere near. I have frequently sat in the smoking compartment of a Pullman with nothing about my person to indicate that I lived in Detroit or that I worked for the Packard Motor Car Company, and I have repeatedly heard men agree that the Packard Company had pro-

duced a car which stood as the acme of perfection.

Now, if our machines are not kept up to the proper standard, we cannot turn out work of the established Packard quality. Therefore, you will perceive that it is very much more important than it would be if the workman were working on a machine in a boiler shop where he merely punches holes through steel plates. It is the reputation of our Plant which we must maintain and this cannot be done with the use of defective tools and poor machinery.

Oil the Big Factor in Preserving Machinery

I shall now state a fundamental, vital machine shop principle, viz: "The most essential thing to machinery is oil." I will state a few homely facts along this line, facts which you all know, but some of which are often apparently forgotten throughout our Plant. You know, as well as I do, that every machine

should be properly oiled. It must be oiled at the proper time and in the proper place. It does not do any good to treat a machine as you and I have seen a workman do, probably hundreds of times, by taking a nice full oil can and putting oil enough into one bearing so that it runs all over the outside of the machine, and then skipping the next bearing and not putting any oil at all in it. A whole lot of oil in any one place poured over the machine with the hope that it may run into the oil holes does not benefit the machine at all. Neither does proper oiling consist in putting forth spasmodic efforts, as is too often the case with those who do a thorough oiling one day and then forget it for a week or even a month. This practice is similar to an attempt to feed a man all he can hold one day and then failing to feed him again for a week; such methods are an equal failure in either case. I do not believe there is a man alive who is able to eat enough at one meal to last him for the remainder of the week. The same thing is true of machinery. You

cannot oil machinery one day and then forget it. You must be as systematic in oiling machinery as you are regular with your meals.

Oil Molecules Are Minute Spherical Bearings

Different machines require different treatment. Some need a great deal of heavy oil; some need spindle oil. That is, of course, a question which is to be determined by the type of the machine. But, regardless of what kind of oil is used, or whether or not the machine has an oil reservoir, it cannot be oiled sufficiently at one time to last it indefinitely. There are some machines in which the reservoirs are so made that the oil goes all over the machine; but, regardless of how fine a system a machine may have, it should have constant attention. Also, in some of the machines, the oil is carried to the bearings by a pump system and is kept going over and over again.

But oil wears out as does everything else. If it did not you men in the machining depart-

ment would not need to reach down into a machine and rub the oil between your fingers to see whether it is 'alive' or not. If you should look at oil through a very powerful magnifying glass you would find that it is made up of molecules, perfectly round, fine particles. I have seen oil in machines in which, instead of these molecules being round, they were all sorts of shapes. The machinery rolls along on these little ball bearings of oil. But just imagine trying to roll them along on these bearings when some were round, some hexagonal and some square. Just imagine it! The exactly similar effect occurs as that which results from the use of non-spherical metal bearings.

Also in some instances you find that oil is as thick as molasses. As long as the machine does not stick, we often continue using it. But this is absolutely the wrong way to do, for such oil is wholly unfit for use. We should take care of our machines in a better way than that. I do not recognize anyone from the

repair shop here, but if I did I am sure they would bear me out in my statements.

Beware of Over-Confidence

I presume every one here is thinking: "Well, my oiling is being done all right. Some others may have trouble, but I don't." That is a very natural thought, and in this connection I wish to tell you of a recent experience which I had as I was passing through the machining department. This occurrence took place while Mr. Hartline was in the department. I walked up to Mr. Hartline and said: "What have you that has gone out of existence for the want of oil?" He did not have to reach very far for a machine part in answer to my question. He handed me a bearing to a countershaft. The countershaft had worn down into that bearing through a cast iron box 1¼ inches by actual measurement. The bearing was a two-inch bearing and was worn down into that box 1¼ inches. It does not at first appear possible that anybody could have worked on a machine

with the bearing squeaking and squealing as that one must have done, but you perceive for yourselves that it did occur as I have described. Therefore, I wish to warn you of the danger of over-confidence. Usually the Foreman who is *absolutely* sure that nothing of this kind could be found in his department is the very one who is overlooking conditions similar to that which I have just described.

After your machine is taken care of so far as oil is concerned, the next important factor in the proper care of machinery is the adjustment of the bearings. There is one class of men in the shop to whom I do not need to say anything about the bearings, and that is composed of the men working on the grinders. That is the first thing they have to do, to keep their bearings in good condition. If they do not, they are unable to do good work. For, when the machine bearings become loose, your troubles begin. If it is a milling machine, or a machine of that nature, the cutter soon begins to chatter. We have all learned to call

it "Chatter" in the shop. In reality it is a "Pound". The only reason why we call it "Chatter" is because one cannot strike two pieces of metal without some result and the result in the case of a loose bearing is that it will hammer itself out of shape. I repeat that a workman cannot do good work unless his machine is properly adjusted. You know this to be true just as well as I do, and, knowing it as well as you do, I cannot understand why a Foreman will allow his machines to get into such a condition that a man walking through the department can hear them squeaking, chattering and creating a general din of noise.

I myself went into a department a short time ago and found a machine in operation that was doing most all kinds of dances. I asked the operator if he had any objection to my tightening up the bearing. He said "No" and that he did not care what I did. I merely tightened up the front bearing on his milling machine and the noise ceased. In all prob-

ability the bearing on the other end should also have been tightened. I presume, too, that the carriage ought to have been tightened; and I requested that, when the Jobsetter came around, the operator should tell him what I had done. I went into that department a few days later and I heard no chatter on that machine. I recognize that this flagrant oversight was not made because the Foreman did not know his job. He did know his job just as well or better than I do. The mistake was made because he had so much on his mind that he did not think of it. He was concentrating his attention on production. We have for years directed our Foremen to do this, but it was not intended that they should disregard the important factors in their work to which I have referred.

As I have intimated, when your machine bearings begin to chatter, they begin to wear. That is nothing less than a hammer action. The pounding begins and it soon wears out the shape of the machine; it is only a short time

until that machine is unfit for use. You can do rough work on it, but presently finer work is sent to the workman and he will say to you: "Well, that machine isn't any good; I guess I will take it over here on this machine." Probably the machine to which you send him is a little better machine simply because the operator has kept it in a better condition.

Belt Adjustment

If a machine is properly oiled and properly adjusted, the next matter to attend to is that of keeping the belts in proper condition. The belt question has been dealt with a great deal by mathematicians, but I think good "horse sense" is the best asset in the handling of belt adjustments. If it is so tight that your bearings begin to heat very rapidly, and there is any danger of burning them out, you may be sure that the belts must be loosened. And when it begins to slip around the pulley it is an indication that the belt is too loose. Whether or not the happy medium between the two conditions

shall be established depends upon yourselves, upon the quality of the product which you wish to produce, and in this you must exercise your own judgment.

The machine is now practically ready for use. You have it perfectly oiled; the bearings are in good condition; the belts are properly adjusted; and you are ready to work.

The Abomination of the Hammer

The next condition to which I wish to call your attention is one of the most abominable practices in the factory, that is, the use of the machinist's hammer in the hands of an unskilled workman. I will correct that statement slightly; not always is the hammer an abomination in the hands of an *unskilled* workman, but often it is found to be so in the hands of a man who *thinks* he is a mechanic. Anyone in the Shop may observe the situation to which I refer all about him. Of course it is much easier to look into the other fellow's department than to our own; but, as you pass

through the shop, look for instances of this wasteful practice. Do not take my word for it, but see for yourselves the damage being done to tools and machinery every day in this factory by workmen using hard hammers. It would almost appear to be a mania with some people to be constantly pounding everything within reach.

Perhaps when they were young their first toys were a hammer and a looking glass, a combination which enabled them to get results; and they are apparently still children, still getting results. If it is necessary for men to use a hammer in their work and it is possible for them to use a soft hammer, get them one. They can do the work just as well, will get better results and will not be continually injuring the machines. If they must use hard hammers, take a little time and teach them how to use hard hammers. I know that all who ever served an apprenticeship were taught to use a hard hammer properly. I can yet distinctly remember the raps I got over the

knuckles whenever I did not use it right. Teach your men how to use a soft hammer, and, if possible, provide them with one. I presume you are thinking: "It is easy for him to stand up there and talk about soft hammers, etc., but let him get a job and see what occurs." I recognize your difficulties in this matter; I know how hard it is to get a soft hammer. I fought for them a good many years. If it were easy to get them, more workmen would have them. However, just because a soft hammer is difficult to get, you should not desist in your determination to procure that kind of a hammer which you recognize as clearly as I do to be the least destructive to the machinery.

What Does It Cost?

And when you see a workman using a hard hammer, a chunk of steel, or an old file on a machine, just pause to consider the effect of such practices. A few years ago a six-inch Bardon & Oliver Screw Machine without any equipment cost six thousand dollars ($6,000).

What does six thousand dollars represent to you? With it, one can buy a lot with a house on it; a very nice, although unpretentious, home. If you hired a man to work around that home, carry out your ashes, etc., and you should find him with a hammer, pounding up the corners of the house or knocking out the windows, you would fly into a rage. You would not only have a fit, but you would fight; and he would probably not need to do more than fifty cents' worth of damage before you would take the hammer away from him and kick him off the premises, even though he damaged but a little of your six-thousand-dollar house. Why do you get angry over a "little thing" like that? There are many homes and lots here in Detroit which may be purchased for six thousand dollars, but your idea is that he is damaging *your* property, and it does not make any great difference as to whether he has done fifty cents' worth of damage or fifty dollars' worth; you are in either case incensed over the lawless destruction of your property.

And why, then, will you stand right here in the shop and permit a workman to pound and destroy a machine worth a good deal more than your home? Why will you allow a machine to run without being oiled, with the bearings squeaking and grinding, and walk right down the aisle just as complacently as may be, thinking nothing about it? When these conditions prevail in all of the departments, some of them in this one and some of them in that one, the loss thus caused on an investment of one million dollars in tools totals as a great deal of money.

Let one of you go out to Grosse Pointe and begin hammering and pounding one of those homes and you will soon find yourself in jail and for a long period; and yet men come in here and knock up a few thousand dollars' worth of machinery and think nothing of it. But, is the moral right essentially different in either case?

Warfare Against the Use of the Monkey Wrench

I wish now to discuss a situation with you, one which is equally as bad as that created by

the prevalent improper use of the hammer. I refer to the use of the common monkey wrench. I believe that *is* the abomination of any factory. It is not only used as a wrench, but also as a hammer. I myself have used it. It serves one's purposes all right at first; it lands somewhere, but it does not often land where you want it to, and then you will strike again and again until a good part of the machine has been hammered in the process of adjusting one piece.

Often a workman will wish to tighten a bolt and will adjust the monkey wrench to what he thinks will fit and then he tries it on and he tightens up on it and, if it seems to hold, all well and good. He then puts his weight against it and away goes the corner of his burr. He probably takes three or four pieces of the skin from his knuckles and proceeds to drop enough profanity around the room to patch up the boulevard pavement. Presently he looks about him for the proper kind of wrench, but not until after the damage has been done.

I am sure of my correctness on this point, because I myself have had the same experience. I have been up against it, so to speak, on that same proposition. Therefore, if it is possible on your job to get solid wrenches, you should get them by all means. It is not always possible; that, I will admit. In such cases one must use a monkey wrench; that is the best he can do.

Improper Use of the File a Common Abuse

Another practice, which is prevalent in the departments in which machinery is used, and which should be prohibited, is the use of the tang or an old file for removing such tools as drills, reamers, etc., from the spindle of the drill press or machine. When a workman desires to remove a counterbore from the spindle, the too-common procedure is to pick up an old file, insert the tang in the spindle and then look for something with which to drive it. In most cases it will be the same old ten-inch monkey wrench which I have been talking

about; or it may be a piece of gas pipe; it may be a shank of tool; it may be a hard hammer; but, in nine cases out of ten, it will be something hard.

After he has something with which to drive the file into the spindle he proceeds to rap it, but this does not get him the desired result: first, because the file, tang or shank is not of the right taper; and, second, because it is not the correct width to fit the spindle and it is absolutely necessary to jam it into place. This means that he must hit it two or three times. If he is lucky, the piece that flies off the file when he hits it with the hard piece of steel or hammer will go over his head, but if he is unlucky it will strike him, perhaps lodging in his eye. While an apprentice boy I was taught my lesson in a similar experience. I "got mine" in the face. If it had gone another inch higher I would probably have lost an eye; but I was lucky, it struck below my eye. But to proceed with our description: when the workman gets the tool out of the

spindle he finds that he has burred the shank of the tool to quite an extent. He takes the tool to the emery wheel for the purpose of shaping it, brings it back, inserts it in the spindle, drives it in place with the result that, in all probability, the burring which he has raised will make the tool run out. He then proceeds to straighten it. This he will probably do also with the same wrench or tool shank that he used on the file. This bends the tool so that it will run comparatively true.

But when this tool is taken out again, if it is not placed back into the spindle in the same way that it was before, he will find that it runs out twice as badly as it did when he took it out. Then he proceeds to straighten it by bending it in the same old way. He may succeed in straightening the tool, and proceeds with his job, but he is altogether liable, in his endeavor to straighten it, to break it off. Then it becomes scrap and another ten-dollar bill of Packard Money has been carelessly wasted.

These are some of the common abuses to which machinery and tools are subjected throughout the Shop. I regret that they are so prevalent that many Foremen, Jobsetters and other executives of the factory give little or no attention to them. It is a fact to be deplored that these minor abuses have come to be looked upon by many as ordinary and inevitable conditions which we cannot avoid. But it is largely because of this erroneous opinion that these small practices still remain with us.

The Danger of Getting Too Near to or Too Far Removed from the Job

Just pause and look about the shop and you will see these abuses being all too commonly practiced. Perhaps you can see these conditions more readily in someone's else department than you can in your own department. But it is a fact that practices of this kind have become so common that you would be surprised if you were to become aware of the number of practices of this particular nature

that are occurring before your own eyes. As has been told you in the lecture on "Production", one could get a dime so close to his eye as to shut out the light of the sun. And I urge you to take the dime away from your eye and let the sunlight in on these practices and abuses, so prevalent in our Plant (although probably no more prevalent here than elsewhere), which, when brought to your realization, should impress upon you a conviction of the necessity for taking steps to discontinue these wasteful practices. These conditions must be fully overcome if we are to fully realize our aim, viz: to merit the reputation of having the very best regulated shop in the country, and continue to outstrip our competitors in the race for the production of a quality car which will have no peer on the market.

It is a well-known fact that a stranger can see a number of details out of the ordinary in a department, details which escape the observation of the man who is as close to the job as is the Foreman. I have in mind an

incident that occurred in one of the departments of the factory not long ago. As I was passing through this department I saw one of the workmen operating a drill press, drilling a number of holes in a piece held by a jig which had a hinged cover or leaf.

A Typical Deplorable Occurrence

This leaf was held down by a cam screw which had to be tightened down every time a piece was put into the jig. This was originally intended to be tightened by hand, but, evidently, through the use or abuse of the jig, it had become difficult to operate, and the operator was using an old ten-inch monkey wrench. To loosen the cam he would strike it on the corner of the thumb piece. Then, instead of lifting the leaf back with his hand, he drove it back with the monkey wrench, removed the finished piece and inserted a new piece. He then closed the leaf with a blow from the same wrench and tightened the screw cam in the same manner in which he loosened

it. This resulted in at least a half dozen blows of the monkey wrench on the jig, and you can readily perceive what was the effect of this procedure upon the jig.

As I stood there, the Foreman of the department came up and began a conversation with me. During the conversation I asked him what he would do if he discovered that one of his operators was pounding a drill jig with a monkey wrench. His answer was: "I would fire him." But he did not believe that any of the men in his department would do anything of that kind.

After getting this Foreman to promise that, if I would show him a situation of this kind, he would not discharge the man, nor even reprimand him, I directed his attention to the operator only four machines away from where we stood. After looking, the Foreman said he was sorry he had promised me that he would not discharge the workman, because he believed that any workman who was found pounding a jig in that manner should be discharged and

he would like to do it. But he finally agreed with me that it was not the operator's fault since he had probably never been thoroughly instructed in the care and proper use of the tools. I told the Foreman that I had no objection to his talking to the Jobsetter, as it was very evident that this Jobsetter did not know his business; or, if he did, he had neglected to instruct the men on the job. I also left the impression with the Foreman that he himself was not entirely exempt from blame in this matter, as one of the duties of the Foreman in any department is to use his eyes and see what is going on about him.

I found by inquiry that this was not an unusual occurrence in this department; that had been the usual manner in which a number of the tools had been used for some time. Therefore, I advise that you try to put yourselves mentally in the position of a stranger who comes into your department and sees these unusual occurrences. You must take a broad view of your duties. You must see the

things that your operator and your Jobsetter do not see. Briefly, you must be the eyes and brains of your department.

The "Repair Point"

In the "life" of most fixtures and tools, especially those made here in the Packard Plant, you will find that there is a point which may well be called the "repair point" of the tool. This is the point at which tools cannot again be repaired to advantage. Up to the point, tools can be put back into practically as good condition as they were when new; but, if they are allowed to go beyond that point, very extensive repairs must be made, which in many cases may be actually as expensive as to build new jigs or tools.

Machines Built to Facilitate Repair

You will notice that in all of the drill jigs there is inserted a hardened steel bushing through which the drills or reamers operate. These bushings are put in simply and in order

that they may be easily removed and replaced with new bushings when worn. You will notice, also, that on jigs and fixtures which have covers or leaves the hinges appear to be unusually heavy. They are so made that, when the hinge pin wears, it can be taken out, the hinge hole re-reamed and a larger pin inserted, making the jig or fixture practically as good as new. It is a well-known fact that hand reamers which have been worn can be brought up to size a number of times if they are not allowed to wear too much. Certain forms of cutting tools can also be saved and put into condition to do a great deal of work if repaired at the proper time. It is well, therefore, to be careful not to allow a machine to become worn beyond the "repair point".

In concluding my discussion of this subject, I shall not reflect upon your intelligence by dwelling long upon the condition in which cutting tools should be kept. It is, I trust, needless for me to state that cutting tools should be kept sharp, as dull tools can-

not do good work, and if left too long they will turn out nothing but scrap. This deprives the Company of the output, the man of his premium, and has a very detrimental effect upon your bonus if you are in a machine department.

The Department An Index of the Foreman's Ability

The condition of the machinery and tools in a department is a sure indication of the mechanical ability of the Foreman in charge of the job. Usually the greater the care with which tools and machinery are handled, the better mechanic there is at the head of the department. The quality and quantity of work done in a particular department and the condition of the equipment therein will readily indicate whether or not the Foreman is a mechanic and a "live wire".

By this I wish also to be understood to mean that you should not fail to use your machinery and tools to a maximum capacity. Today our

machinery and tools are so designed and made as to turn out a certain amount of work. They have been built for a definite purpose and so designed as to do more work than the machines and tools which were formerly built. Our machines are now made to be heavier and with a greater range of speeds and feeds, all for the purpose of making possible the production of a very high quality article of manufacture.

Packard Machines and Tools the Very Best Obtainable

Packard tools are being made of the best and most expensive material. Until but a few years ago tools were made of carbon steel. This carbon steel was worth approximately sixteen cents a pound. Today our cutting tools in this Plant are being made out of a high-speed steel and stellite costing approximately three dollars a pound. The Packard Management has purchased the very best machinery obtainable from the market, sometimes at exorbitant prices. They have also

contracted for the best steel to be had regardless of price. They employ the best toolmakers anywhere available and paying them good wages. In fact, the Management is doing everything that can possibly be done to increase the quality and production of the Packard factory. Why should not we all do our part in promoting these worthy aims?

You have, then, in your charge a great many thousands of dollars' worth of the best machinery and tools that the Company can procure. In the face of these facts, why should you allow a workman to drill into the table of a drill press or run his milling cutter into the bed of a milling machine? If it were your own machine, I dare say you would not allow anyone to use it in that ruinous fashion. Therefore, I urge you to take a personal interest and pride in your department. You should be conscious of too high a sense of duty to allow harmful maltreatment of the Company's equipment. Use the machinery in your department as you would if it belonged to you

and as though you were the one who had to sign the check that paid for it. I am sure that if each of you will give this matter careful attention that much of the prevalent ill-treatment of machinery will be prevented in the future.

Value of Constructive Criticism

To those who do not have the supervision of machine departments I wish to state that we need your co-operation and constructive criticism, criticism of a kind that will help to build up our organization. You can help along this line by the use of your eyes; as you have opportunity to observe the various departments, you may see some condition that should not exist and which has escaped the notice of the Foreman. By notifying him of same in a friendly way you will assist materially in raising the standard of our Plant to a still higher plane.

Finally, I have only one basic principle to leave with you before dismissing the assembly:

Take care of your machinery and tools, give them good treatment, and *work them to the limit for quality and production.*

Eleventh Session

Subject: EMPLOYMENT

Speaker: MR. E. A. DRYDEN
Employment Manager

I have been asked to discuss with you the subject of "Employment". What I shall say may be only along lines with which you are already familiar. I am unable to present myself to you as an employment man with years of experience. I can only tell you of the elements of the problem which I believe are essential and which we should all understand in common. I am, like each one of you, a shop man. I believe I know your troubles and fully realize how difficult it has been for you during the past year to accomplish the remarkable results of which we, as Packard executives, are justly proud. We may well congratulate ourselves that we were able all during the year to justly claim to be the leading organization with respect to quality and quan-

tity production as compared with representative establishments doing similar work for our Government, and we are particularly pleased with our achievements since it was brought about with an inferior class of workmen. In filling your labor requisitions little consideration was given either as to what the qualifications of the workman were or what they should have been; we merely employed all applicants who could pass citizenship and physical examinations and you were required to accept them, to train them for their work and get results. The outstanding results strongly testify to your success in the face of these obstacles.

The New Employment Department and Its Task

One year ago a new organization took over the work of the Employment Department. Not one of us being thoroughly trained in the work, it surely was a big task, particularly so as we were just passing through one of the

most critical periods in the history of the Industrial World. Increased production on the most extensive scale was demanded even in the face of the loss of the best men in our country, who had enlisted or who were drafted into the Army. But this only made the job all the more worth while.

This new employment group passed through one year without criticism of a severe nature; not that we performed all the duties which we were called upon to do in a manner which was beyond criticism. We surely did not do our work so completely and successfully as to be immune from all criticism. And I wish now to emphatically state that the reason for the success which we did attain was chiefly that you, as Foremen, were co-operating with us. The co-operation and patience which you constantly manifested in your dealings with me were factors in my task which I shall always remember with a deep sense of appreciation.

When I was approached by the Management and asked if I would consider an offer of

this position, which I now hold, I told them that I was not an employment man; however, they were willing to assume the risk. I was fully conscious of the fact that, in dealing with laboring men, the employer has but one chance in passing upon any decision. If his decision is wrong, the mistake can never be corrected without admitting that poor judgment had been exercised, with the result that the Foremen have lost, to a certain degree, the confidence which they formerly had in the Employment Official.

But when I did finally agree to accept this work I was secretly sure that I had the job "half licked" to begin with, because I was conceited enough to say to myself: "I can 'bank' on co-operation from the Foremen throughout the Plant." Having you with me, I was sure I could "get by"—without you, I would fail. Now, men, I was not mistaken in what I "banked on"; you were with me to a man and I "got by" and am at a loss for appropriate words with which to express my appreciation for the assistance rendered by you during the year.

Some Problems of the Employment Department

Some of the duties devolving upon the Employment Department are as follows:

1. Supplying the Plant with capable men.
2. Transferring workmen to various departments in an effort to decrease labor turnover.
3. Making recommendations for pay increases.
4. Providing individual efficiency records of all workmen.

The Packard Method of Determining Applicant's Qualifications

In order to properly perform the duty of sending capable men to the shop we should know as best we may the requirements of the job on which the workman is needed. Your requisitions properly filled out will greatly help us to accomplish this task.

Having the requisition thus properly filled out and filed in the Employment Department, the man applies and he is interviewed; in our judgment he qualifies for the job. However, we may later discover that he is poorly qualified or perhaps wholly unfamiliar with his work. You, in times past, have hired your own help and you will agree with me that you were sometimes mistaken in your estimate of a man's qualifications; and you later discharged him or placed him on another job. The same thing occurs with us daily.

Some people in the Employment work affirm that they are able to talk to a man, look at his hands, thumbs, eyes, feel the bumps on his head, and then say that he is a good machine hand, or that he is a good clerk, or that he would become, after careful training, a capable executive, or only a common laborer. This may be true, but I do not believe it and neither do you. After all the interviewing is carefully done, the proof of the quality of the pudding, as the old adage states, "is in the eating of it".

In order to improve the present method of employing workmen and be able to send a better grade of labor to the shop, we are now taking every employee, both men and women, through the training school connected with this department, and there we are finding out whether or not the employee has the qualifications which he has represented himself as having. This is the ideal method. We have been working according to this plan for a period of a few months and we have had a few singular experiences. Some men were employed who had no objection to this preliminary course, since, if they were capable men, they could prove so in less than one day; others would object, because, if they were not qualified, they would quickly "show themselves up".

There is no doubt in my mind that if these workmen had not been required to pass this trial course, you Foremen would be experiencing many difficulties with them today. Thus has one big step been taken in the direction of supplying our shop with a better grade of operators.

Sixty Per Cent of Labor Turnover Prevented

Assuming, now, that we may expect a better grade of men, that we will have all workmen pass through preliminary training, our next problem is what is to be done to keep them, thereby reducing labor turnover, the most serious problem confronting employers today. A former speaker at one of these meetings stated that the possible production from our equipment was reduced twenty-five per cent, due to labor turnover. Just think of it, men, if the per cent of labor turnover and absenteeism could be reduced to zero, the Packard Motor Car Company would save twenty-five per cent of their investment in machine equipment. The zero point, of course, cannot be reached, but all is not done that can be done in reducing this loss. The Employment Department has, however, been able during the past year to retain sixty per cent of the men who have been actually cleared from your departments and rarely has it been necessary to give them an increased rate. The Foremen could not have

prevented all of these men from leaving because, in a great many instances, men desire a change of work in order that they may gain more experience. This we discover when we interview them on their way out, and then we make an effort to place them on the desired job.

Human Element Important in Breaking in New Workman

I believe one big factor in this problem of labor turnover is the amount and the right kind of attention which you give the workman when he enters your department. At that time he should be interviewed by the Foreman; do not be too hasty in turning him over to an assistant or a Jobsetter and then forget him. Arrange details of production in your department so that you are able to give more time to personnel problems. Look more closely to the individual interest of each of your men. Check him carefully on absenteeism; he may be absent because he is in serious trouble; you may be of assistance to him. Your interest in

him will be appreciated and he thus becomes a loyal worker for you. This will reduce labor turnover; in fact, it will bring your turnover and absenteeism down to the lowest possible point and a great many of your difficulties of production will be automatically solved.

Employment Department to Recommend Pay Increases

A third and very important duty which falls upon the Employment Department and one which, to a very great extent, has been neglected in the past is that of keeping an individual efficiency record of all employees. Until recently, according to the method employed in our Plant, all recommendations for increases in rate originated with the Foremen. For you to carry this work through systematically and with justice to all of your men it would require that you give a large portion of your time to this duty. This method, because of the heavy responsibilities now placed upon you, is wrong in principle. Also, there are some Foremen in

this Plant who follow the policy expressed in the frequently repeated statement that "if an advance in rate is not worth asking for, the man should not get it". I have often heard this statement made, but it surely does not meet with the approval of the Management. And I trust that it is the policy of only a few Foremen. However, the Foreman who does follow this erroneous policy and who believes that he is giving this important matter the right kind of attention frequently overlooks deserving employees to whom rate increases are due.

Busily occupied as you all are with the responsibilities connected with meeting schedule requirements of production, I am sure that only a few are able to satisfactorily handle this part of employment work. Unless the Foreman has come to the conclusion that the personnel of his department is of highest importance to him, having learned that proper attention given to this matter will to a great extent solve his production problems, he

should not be entrusted with the task of independently deciding upon increases in wage rates. It is only the above-mentioned type of Foreman who is able to assume this responsibility in a satisfactory manner.

Individual Efficiency Records in Employment Office

Since we have in our office the individual efficiency record of all employees, we can greatly aid you in seeing to it that all employees are given just consideration with respect to increases in their wage rates.

I have appointed a capable man in our office to carefully check over the accomplishment of all workmen for the purpose of eliminating the undesirable ones, such as habitual absentees, men continually late or tardy and unsatisfactory operators. He is given the duty of making sure that our deserving employees are properly taken care of. Some of you men, no doubt, are aware that this work is being carried on as you have been called to our

office and questioned regarding various individuals.

Between pay periods your departments are to be carefully checked and recommendations listed so that when you come to our office to have your recommendations for increases checked with our efficiency cards we will be able to call your attention to deserving employees whom you have overlooked. I am glad to state that our efforts along this line have thus far met with the approval of all Foremen with whom we have had dealings relative to increases in rates. I am sure that employees in general will have little complaint to make in the future with reference to fair treatment in our decision relative to their wage rates.

It has long been my conviction that a small increase coming unsolicited is just as gratifying to the workman, if not more so, than is double the increase which he had to fight for. Employees will soon become aware of the fact that they are not lost sight of in the Plant. Even

though his work may be performed in an isolated corner of a department, he goes after his job in an earnest manner, for he feels certain that he is being watched and that, if he is regular in attendance and produces the desired quantity and quality of work, he will be well cared for. When this fact becomes generally known among our employees the responsibilities of the Foreman will become perceptibly decreased.

Relation of Employment Department to the Shop

I desire at this time also to explain to you the relation of the Employment Department to the Shop as I construe it.

Since the Employment Department is a service department, we stand in the same relation to the shop as that in which the Packard Service Station stands in its relationship to Packard customers. If the Packard Service Station delivers an unsatisfactory article to a Packard customer, the article is

returned with the reason briefly stated as to why the article is being returned. The same procedure should be adopted by you. If the Employment Department sends you an undesirable or an inferior grade of men, you are to return these men to the department, stating upon their record cards your reason for so doing. In the event that the men thus returned to us are recommended for discharge, they will be carefully interviewed. We will be careful to get his opinion regarding the circumstances of his situation. If it becomes our conviction that he should be given further consideration, our course of action, as the most of you already know, is to endeavor to bring about a reconciliation between yourselves and the workman and return him to your department. If this should not be the practical thing to do, you and the Employment Department usually agree that the man shall be transferred elsewhere.

Your co-operation along this line during the past year has been very gratifying to me, and I am sure that our combined efforts have

proven very profitable to the Packard Motor Car Company for the reason that a man need work only a short time with us before we believe that we have a considerable amount of money invested in him; and it is only using good business sense to attempt to realize from that investment by keeping the man in our employ. Because of your assistance, our success in retaining and satisfying our men has, I am sure, justified the efforts of the Employment Department in this direction and we earnestly solicit your continued co-operation.

Twelfth Session

Subject: TIMEKEEPING

Speaker: MR. W. A. KUMEROW
Chief Timekeeper

I have been requested to discuss with you the work of the Time and Pay Roll Department and I shall make my remarks in as brief and explicit a manner as will be consistent with the subject matter of the discussion.

Millions of dollars in wages pass through this department each year, making it a department of great responsibility and one that should have the entire co-operation of all the executives in our Plant.

I shall give you a brief outline of the routine of this department, and before beginning a detailed discussion of the various subjects I shall endeavor to convey to you an understanding of just how the Time Office does its work, together with some of the disadvantages under which it works, due to the fact that some of the Foremen do not thoroughly understand our system as it applies to the work of the Time and Pay Roll Department.

Routine

We have on the factory Pay Roll approximately 185 departments from which we receive, when the Factory is running full force, from 110,000 to 120,000 time slips each pay period. Our Time Office Departments are so divided that the Time Office Clerks have an equal amount of work. Time Slips are received by the Time Slip Dispatcher from the Shop, which are sorted according to the departments and delivered to the Time Office Supervisors, who in turn deliver them to the clerks under their supervision.

Time Slips must be computed for the amount earned and the amount entered on the Accounting Department's and workman's copies thereof. The Accounting Department copy is posted to the employee's Pay Ledger sheet and the workman's copy is filed by departments and in numerical order.

At the end of the pay period, Pay Ledger sheets are totaled and the elapsed hours balanced with the hours as registered on the clock

card. If this time does not balance, the entries on the Pay Ledger sheet are checked to determine if an error has been made in posting or if the factory clerk has failed to send in all of the time slips, and then the necessary corrections are made, if possible before the Pay Roll is closed.

Pay Ledger sheets are then turned over to the Elliott Fisher operators who copy to the Pay Roll with the aid of this machine; all information as noted on Pay Ledger sheets is copied. From the Pay Ledger sheets, Pay vouchers and Pay envelopes are then made out. The Pay envelopes are checked against the Pay Roll to insure that the roll number and the amount are correct, after which they are sent to the Paymaster.

Clock Cards

I wish to call your attention to the fact that each pay day we receive a great many "Notice of Error in Pay" slips for workmen who claim they were shortpaid, and upon checking their

clock cards we find that they came in late and did not understand that they would be penalized therefor.

The Foreman of each department should see to it that each new employee is properly instructed as to how to properly register his clock card; also as to the penalties for being late and for failure to record time on the clock card. We will thus be able to avoid a great many of the usual controversies over the amount of pay to which the workman is entitled.

We require each employee to record his own time. If there is anything about the record which the employee makes on his own clock card and which is obscure, it is the duty of the Time Office to adjust it; this necessitates delay and possibly it results in a serious error. We are liable to either over-pay or short-pay him.

Let us suppose an employee works the full day and that all registrations on his clock card up to 12:30 P. M. are correct, but that he fails to register out at 5:00 P. M. and the Foreman

has failed to approve the clock card for the 5:00 P. M. registration. What is the Time Office to do? How do we know that the employee worked until 5:00 P. M.? There is only one thing we can do and that is to allow time for the morning registration only. On Pay Day we receive a "Notice of Error in Pay", and upon checking we find that we did not allow time for the afternoon because the clock card was not registered and that the Foreman had not so approved it as to give the Time Office authority to allow time. In cases of this kind it is essential that the Foreman approves the correction on the card and places his signature thereon.

There is a similar irregularity of practice in approving clock cards and one which occurs quite frequently, viz: the Foremen fail to approve clock cards of workmen who work straight thru after the regular closing hour. This causes a mistake in the workman's pay similar to that which I have described.

Workmen should also be instructed as to

how to keep their clock cards. We provide racks for the safekeeping of clock cards, yet a great many workmen carry their clock cards in their pockets. This results in clock cards becoming soiled and crumpled. A soiled clock card is difficult to read and when it becomes crumpled it is difficult to insert it in the clock card receiver for registration, all of which is a cause of illegible registrations with the resulting inconvenience and delay in computing the amount of the workman's pay.

Time Slips

In computing Time Slips the clerk counts off all Time Slips of the lowest roll numbers, consults his rate card for the rate of that roll number, computes the pay value of each Time Slip at that rate per hour, using the Premium Wage Table if the Time Slips cover a premium job.

He then enters the amount of the pay upon the original time slip and upon the manilla or workman's copy attached thereto; separates

the original from the duplicate and turns them down in separate piles; repeats the process for each Slip in turn until all Slips are computed.

Having computed a bundle of Slips as described, the Time Clerk proceeds to count off all Time Slips for the lowest roll number. Under "Current Credits" for that roll number on the Pay Ledger sheet he then enters the hours and money as indicated on each Time Slip. Completing each roll number, he turns to the next and repeats the process until all Slips are posted. The clerk then rebundles the Slips and duplicates, marks the top Slips of the bundles with a large letter (E) to indicate that the lot is entered and delivers the bundle to the Supervisor of his group, who examines them and delivers them to the Outbound Dispatcher. The Outbound Dispatcher examines each bundle of Slips to make sure that no Slips get into the wrong department; and, when a reasonable number have accumulated, he delivers the original Slips to the

Tabulating Department, and places the duplicates in files where they accumulate until the close of the pay period.

Badge and Check Lists

Our instructions state that the names of all employees who have not worked two full days or nights must be listed on the Badge and Check list, which is provided by the Department Clerk and approved by his Foreman, a copy being sent to the Time Office. Upon receipt of these lists we in the Time Office retain Pay Vouchers for those listed which are only given out on a Pay Voucher release. It is very important that these lists be carefully made out. We have discovered that frequently the names of workmen who were working full time had not been taken off these lists. Again we have frequently discovered that the names of workmen who have put in no time after the close of the pay period have been carelessly omitted from the Badge and Check list.

To avoid the danger of making this mistake you should observe the following procedure: When the Pay Voucher is held in the Time Office on account of no time put in after the close of the pay period and you wish the workman to get his money, *you should fill out a Pay Voucher Release*, sign it and send it with the workman to the Time Office, where he will be given all but $5.00 of his pay, which latter amount is held to cover the cost of his badge and his checks. If a workman has worked two full days after the Badge and Check list has been sent to the Time Office, fill out a Pay Voucher Release and instruct the workman to take the Release to the Time Office together with his clock card, and he will receive the amount of money as indicated on the Pay Voucher.

I am emphasizing this because a great many workmen come to the Time Office with their Pay Voucher Release incorrectly filled out. These men have to be sent back to their departments to have the correction made,

which gives the workman a reason for dissatisfaction with our system. That is why you men should make sure that all Pay Voucher Releases are correct before the workman leaves your department.

Clearance Slips

The first notice that the Time Office receives when a workman is leaving the employ of the Packard Motor Car Company is in the form of a Clearance Slip. Clearance Slips are brought directly to the Time Office from the Employment Office by the workman and as soon as received they are listed on a Tally sheet and then delivered to the various Supervisors who in turn assign them to the clerks having charge of those departments. The clerk immediately writes out a Pay Voucher Warrant and takes it to the Cash Register Clerk who rings up the amount of the Pay Voucher. The Cash Register, besides carrying a daily total of all vouchers issued, prints on the Pay Voucher Warrant the amount of

money to be paid. The Pay Voucher Warrant is then approved by the Cash Register Clerk and it becomes a Pay Voucher. The Pay Voucher is then delivered to the Pay window where it is checked off the Tally sheet and given to the workman in exchange for his identification card, which was given him at the Employment Office.

The Time Office is prevented in a great many instances from promptly issuing Pay Offs, due to the fact that there are not enough Time Slips in the Time Office to furnish a sufficient basis upon which to figure the pay. It may be that the workman has some Time Slips in his pocket and we frequently find this to be the case; also, the clerk of the department may have failed to send through all slips; or, it may be that the Time Slips are in the mail. There is a way in which to guard against this delay. *You should insist that all Time Slips for the party to be paid off be placed into an envelope with the Clearance Slip and make sure that none remain in your depart-*

ment. It is to your interest, gentlemen, to see that each man receives his pay with the least possible delay, and without your assistance it cannot be done. You can in this way do a great deal towards sending a workman away as a "Packard Booster" instead of a "Packard Knocker".

On March 31st of this year we received a Clearance Slip on a certain employee. In making up his time we found that we were 18.9 hours short. The Supervisor in charge 'phoned the RSR Department, located in the Truck Division, and asked for the time to cover the shortage. The clerk of the department, evidently without making a search for the original Slip, issued a duplicate which we accepted as being correct and upon the bonus of which we paid the workman $13.88 due to the high premium. That same afternoon we received the original Slip through the mail which, when computed, amounted to only $8.78. An over-pay of $5.10 had thus been made through no fault of the Time Office Clerk. The

piece number, the job number and the operation were different on each Slip. And besides making an over-pay, it was only with much effort that our own records were adjusted. Therefore, do not issue a shortage Time Slip until you are absolutely sure that the job number is correct, and I am sure it is perfectly plain to you that the mistakes made in the above-mentioned incident should not be repeated.

Transfers

The regular Clearance Slip must be used when making a Transfer. A workman should be cleared with the same procedure as though he were being paid off and the Clearance Slip sent to the Employment Office with the clock card and the Time Slips. The Employment Office notes on the Clearance Slip the department and roll number to which the workman has been transferred and all of his original papers are forwarded to the Time Office. The Time Office, upon receipt of the Transfer Notice, lists on a Transfer Record sheet

the old department symbol and roll number, together with the name and the new department symbol and roll number. The Time Office then pulls employment cards, notes transfers upon them and files them with the cards of the department to which the workman has been transferred. The Pay Ledger sheet of the department from which the workman has been transferred is marked accordingly and the various accounts made up. A new Pay Ledger sheet is then prepared showing department, roll number, date of pay period, rate and department transferred from; and this sheet is placed in a binder ready for posting the time. Transfer Record sheets are then filed and the transfer is complete.

Unclaimed Pay Vouchers

All unclaimed Pay Vouchers which are not called for the morning after pay day must be delivered (not mailed) by the Foreman to the Time Office not later than noon of the latter

day. When returning unclaimed Pay Vouchers you should place the Voucher in an envelope, simply address "Time Office" upon the envelope, but do not address them to any particular individual. Some of our Foremen do not realize the importance of getting Unclaimed Pay Vouchers back into the Time Office within the time allowed, but will hold them for a week or even for a period of ten days. This causes confusion in our records and the extra efforts which we of the Time Office must exert to adjust the records after the delayed voucher finally reaches us is entirely out of proportion to the effort required on the part of each Foreman in order to deliver the Pay Voucher promptly. I desire, therefore, to emphasize the fact that all Foremen should acquire the habit of promptly returning all Unclaimed Pay Vouchers.

Advance of Wages

I desire now to discuss the routine which we follow in issuing Advances of Pay. As you

are aware, workmen sometimes find themselves in need of money before the regular pay day and desire an advance of wages. Foremen should at all times be sure that the reason for the advance merits consideration, and, if he thinks the workman is entitled to an advance, the Foreman should issue a Request for Advance of Wages due, sign, and attach to the workman's clock card. The workman then takes the Request and clock card to the Employment Office where he is again questioned as to its necessity, and, if the request is approved by the Employment Manager, he is sent to the Time Office, where the Advance Pay Voucher is issued. Some of our workmen owe the Packard Motor Car Company various sums of money, such as loans, charges, etc. For this reason the Time Office reserves the right to refuse doubtful requests in those cases in which the workman has not sufficient wages due to cover the amount requested in advance.

Notice of Error in Pay

As you are aware, many workmen complain at each pay day period that they have been short-paid and they are often found to be in the right in making this claim. Therefore, I desire to discuss how we may avoid this danger of over-paying or short-paying the workmen. I have already referred to this matter in connection with the issuing of Time Slips when a workman is being cleared from the department. We are equally desirous of avoiding a mistake in calculating the amount of pay due our regular workmen.

When a workman receives his Pay Voucher and the amount thereon does not agree with what he thinks he has earned, he should immediately report the matter to his clerk. The clerk should check over the workman's copies of the Time Slips and if there is an error he should fill out in triplicate a "Notice of Error in Pay" Form, and send all three copies to the RSR Department. The RSR Department will again check the Time Slips and ascertain

if there is an error in the Voucher. If it is found there is, two of the copies of the "Notice of Error in Pay" are then sent to the Time Office. The first copy is retained by the Checker and the second copy is delivered to the Time Clerk having charge of the department accounts in which the error is claimed.

All claims are thoroughly investigated and if an error has been made a Shortage Slip is put through and the error on the Pay Slip is indicated accordingly. If the error is over one dollar, a Pay Voucher is issued; if less than one dollar, it is included in the next pay period. We receive a great many claims at each pay period and upon investigating them we find that in many instances no error has been made. The checking of these takes up the same amount of time as when an error is made. It is, therefore, very much desired that the Foreman attempt to ascertain the correctness of the amount on the Pay Voucher without resorting to the Time Office.

Receipt of New Employment Cards

The Employment Department daily sends to the Time Office an employment card for each new employee and a list of the names and roll numbers of the respective cards. The cards are received by a special clerk who checks them against his own list, sorts them into bundles by departments, and delivers them to the various Supervisors, each to the Supervisor whose duties affect employees whose time is handled by that group. The list is then delivered to the Supervisor of the Addressograph Room to be used as a guide in cutting stencils for the new names.

Changes in Rate

On the 14th and 29th of each month the Employment Department delivers to the Special Clerk of the Time Office the book containing the approved Changes in Rate taking effect on the next pay period. The Special Clerk stamps each notice and its stub with the

date of receipt at the Time Office, detaches each notice from the stub and delivers the notices to the various Supervisors.

Each Time Clerk receives his notice of Changes in Rates from his Supervisor, and he revises the rate entries on the Employment Card to conform to the changes. When finished he returns the Change of Rate Notices to the Transfer Clerk, who files them.

Rate Card

Each Time Clerk is provided with a set of rate cards upon which are listed for convenient reference the roll numbers and rates of all employees whose time he computes. After the close of each pay period each Time Clerk revises his rate cards by checking them with his Employment Card Files, entering all new or revised rates and erasing all cancelled rates.

Patriotic Fund

Each Time Clerk obtains from the Patriotic Fund Clerk the Patriotic Fund Installment

Cards and after carefully noting that the roll numbers and names correspond with those on the Pay Ledger sheets he enters thereon the amount to be deducted for the Patriotic Fund Subscription. He also enters the amount thus deducted on the Patriotic Fund Installment Cards.

Liberty Loan Deductions

On the 1st and 16th of each month the Liberty Loan Office furnishes the Time Office with a list of all Liberty Loan subscribers who are *four payments or more in arrears.* The Time Office, immediately upon receipt of these lists, enters on the various Pay Ledger sheets amounts to be deducted, and deducts the amount from wages which the workman otherwise would have drawn.

Workmen who have had Liberty Loan deductions made against their wages may have the amount deducted entered on their Liberty Loan Installment Card, upon taking it to the Liberty Loan Office.

Merchandise Debits

If a deduction is to be made from an employee's pay for merchandise purchased, a Special Clerk receives a charge slip, properly approved, which shows the kind and value of the merchandise. After debiting the kind and value of the merchandise on the Pay Ledger sheet, the Special Clerk delivers the change slip to the Shop Cashier to be credited.

Clock Service

In order that the Management may have reason to expect that the various duties of the Timekeeping Department shall be performed with a minimum amount of delay and error, they have provided a very complete Timekeeping equipment throughout the Plant. This equipment represents an investment of thirty thousand dollars ($30,000). It may also be of interest to you to know that we have ninety "In and Out" Recorders, four Cost Keepers and one hundred and one Hand Stamps. This equipment if properly used is

sufficient to insure us against serious delays or mistakes in the Time Office.

This equipment is kept in good condition by our Clock Service Department which is maintained for the purpose of repairing and installing all our timekeeping apparatus.

Getting Pay Roll Out on Time

Let us dwell for a moment upon the subject of the necessity of always promptly completing our Pay Roll.

We will suppose for the purpose of making a contrast that the Truck Division had been scheduled to build 700 trucks for the month of April, and, when the month was closed, because the Truck Division could not get material or because of delay in the delivery of the machinery, the Division had turned out only 350 trucks or 50% of their quota. They have a perfectly good alibi; they could not get material.

Or, we will suppose that the Sales Department has established for itself a sales schedule

of 500 trucks for the month of April and they finish up the month with a total of 300 trucks sold, which results in a serious condition of our bank balance, perhaps; yet they have a recourse, a chance to "make good" on the following month.

Let us also suppose that the Engineering Department should undertake to bring through a new model to be ready for production when the current production program was completed; and, when the drawings were nearly ready to release for production, certain changes were made by the Management. As a result, there is a serious break in production, yet no one can rightly blame the Engineering Department.

In other words, there appears to be an excuse for or an opportunity to compensate for a deficiency in the results accomplished in every department except that of the Time Office. The Time Office must produce 100% of its scheduled work on the minute and at intervals of twice each month. It does not

excuse us from this requirement if it occurs that one-half of the Time Office force is absent or if either my assistant or myself is disabled; the pay envelopes must be in the Pay Booths strictly on the 10th and 25th day of each month. If they are not, we could scarcely more than imagine the seriousness of the commotion which an habitual delay would give rise to.

I desire to impress upon you the fact that each one of us should establish in his own mind his responsibility for following the Time-keeping routine. I realize it is easy to overstep this routine, since neither the Time Office nor the Foremen have jurisdiction over the Department Time Clerk. Each of us has, however, a vital interest in the quality of his work. But each Foreman does have indirect supervision over him and his (the Foreman's) interest in the efficiency of the Department should be as pronounced as is that of the people in the Time Office. Everyone of you desires that your workmen be satisfied with their

employer and their work in general. You know that poor time records mean errors in pay, and that these errors cause dissatisfaction among your men. We all desire to receive our right pay and our desire cannot be realized until all of our executives completely understand our entire system of computing pay and are willing to co-operate in a united effort to achieve the desired result.

However, the Factory Clerical Department must be responsible for the actual recording of the time in the Plant, and the Time and Pay Roll Department for the translating of hours worked into money.

In concluding our discussion I will again repeat, gentlemen, that you will help us a great deal if you will insist upon Time Slips being sent to the RSR Department as soon as they are completed in your departments.

If there are any present who wish to ask any questions relative to the routine of the Time Office I shall be glad to answer them to the best of my ability.

Question:

If a workman is a new employee here and forgets to ring his card, is he penalized?

Answer:

No, he is not; allowances are always made on the first day for each workman, provided his card receives the O. K. of his Foreman, together with the latter's initials.

Question:

When the clock is fast, and all cards ring red before the bell rings, what action should be taken?

Answer:

The Foreman of the Department should immediately communicate with the Time Office, and the clock cards will be adjusted without delay.

Question:

What is to be done when a workman who is being transferred is unable to ring his card at the proper time?

Answer:

This should never occur. All transfers

should be made between the hours of 11:30-12:30 or after five o'clock P. M.

Question:

When a new workman comes in the first morning at the proper time, and the Foreman, busy with more important matters, is unable to take care of him, what action is taken relative to his time?

Answer:

You say a Foreman may be busy with *more important* business. I can scarcely conceive of anything being more important than attending to his men. But, if such a situation ever did occur, the new workman should be sent out with the Office boy or clerk who will direct him to ring in, and wait with him until the Foreman is disengaged.

Question:

When a man works one-half hour overtime at noon, does he get paid for it?

Answer:

Certainly, he is paid for all overtime work. The Foreman should in this case be very care-

ful to indicate the overtime at the proper place on the card, and sign the card with his *name* as the proper O. K.

Question:

If a workman is on piece work and comes in two minutes late, but gets his full production out, is he penalized?

Answer:

He is penalized one-half hour. This ruling is obviously essential; otherwise, piece workers, as you designate them, could arrive at 9:00 or any other time and the Management would have no recourse, no way in which to keep the machines busy during the time the workman is absent.

Question:

If the clock is right, but registers a red 7:00 o'clock on the card, is the workman penalized?

Answer:

Yes, he is on a *red* 7:00 o'clock. He should be in his department and ready to work by 7:00 o'clock.

Thirteenth Session

Subject: SAFETY AND SANITATION

Speaker: MR. J. H. MARKS, *Superintendent of Construction and Maintenance*

It is the intention of this discussion to describe the organization and method for the prevention of accidents and the maintenance of proper sanitary conditions in our factory. It will be of interest to point out the results of our efforts along these lines for several years past so that our past experience may serve as a guide for more effective future work. It is also our desire to secure the co-operation of as many individuals in the factory as possible, if not all, to the end that our factory may be the safest, cleanest and most wholesome place in America in which to work.

The Safety Movement and Modern Advancement

During the past several years we have come to the point at which the Safety First Move-

ment is no longer considered a fad. When the Safety Movement first had its inception, which time was within the past ten years, it was decidedly a fad, and many of those who were most enthusiastic then in advertising the Safety Idea have failed to become the leaders in this Movement because of their inability to continue their enthusiasm in the face of the hard work and close attention to details which time has taught is necessary to ultimately achieve success in this work.

The Safety Movement is, then, no longer a fad, but is only a part of the trend of modern affairs toward the end of making the world a better place in which to live. It is interesting to observe some of the parallel movements which are in line with modern ideas of progress and advancement. Detailed study will disclose many, but it is only necessary for our purpose to point out three of these movements.

First, we have a parallel in the movement for the prevention of disease. Formerly the

activities of all physicians were directed toward the cure of disease, they waiting until the patient was suffering for the lack of the services of a physician before any aid whatever was given. Nowadays at least half of the time and efforts of medical men are given to the education of their patients and the public in the prevention of disease.

Second, we have a parallel in the activities of the fire insurance companies, city fire department organizations, and national fire protection associations, all organized for the prevention of fire.

Third, we have the activities of social workers, police, and other public officials directed toward the prevention of crime.

The Safety Movement, therefore, should not be considered as a fad or something distinct and apart from the other routine activities in a factory, and the carrying on of this activity should be considered one of the very necessary functions to the successful operation of every industrial organization.

Organization of the Central Committee on Safety and Sanitation

In the Plant of the Packard Motor Car Company the Safety Movement is centered in the Central Committee on Safety and Sanitation. This Committee consists of Division Superintendents and Department heads, representing every branch of the Factory organization, and meets in regular session once every month. Each member is a representative of a large number of Safety Inspectors. There are regularly appointed Safety Inspectors with whom each member of the Committee confers, but it is the earnest effort of the Committee to encourage every employee to act as a Safety Inspector and take an active, personal interest in the prevention of accidents.

At the meeting of the Committee there is presented the monthly classification of accidents, divided by Divisions so that it is apparent in what Divisions of the factory the most accidents are occurring; also, according to nature of the injuries, so that it is apparent

what kinds of accidents are occurring most frequently. They are also classified on the basis of time lost by departments, so that it is apparent in what departments the most serious accidents are occurring. The accidents are classified, finally, according to the location of the injuries.

Reports are also submitted relative to serious and semi-serious accidents, so that the Committee may consider means for their future prevention. All of this data is considered and discussed by the Committee, and, since the Plant physician is an important member of the Committee, particularly valuable suggestions come from him.

The secretary of the Safety Committee is also the Safety Engineer of the Factory. It is his business to investigate accidents, design machine guards and other protective devices, supervise the collection of data for the consideration of the Committee, direct the educational activities thereof, and see to it that the desires of the Committee are put into effect.

History of Our Accomplishment in the Prevention of Accidents

That the efforts of the Committee have been successful is evidenced by the fact that there has been a reduction in the per cent of accidents from 24% to 10% in two years. This is perhaps best shown by the chart on page 371. The horizontal divisions represent the time elapsed by months from September, 1914, to June, 1919, the reports of successive years being super-imposed upon each other. The vertical spaces represent the per cent of accidents per month. This per cent is obtained by dividing the total number of accidents occurring in the factory during the month by the average daily attendance during the month.

Referring to the chart it will be perceived that the per cent of accidents in September, 1914, was 24% and that during the succeeding months it declined to about 20% in December and January. During the next year, 1915, it increased again to over 24% in June and July. During the succeeding months it again de-

clined to approximately 17% in the months of December and January, rising again in the year of 1916 to over 24% during the months of June and July, again falling during the following months to the lowest point up to that time, i.e., 13%. It rose rapidly again during the Summer months of 1917 and it passed 18%. The line takes a characteristic slope downward during the Fall and Winter months until it reaches the point of 11%, which was two per cent lower than the minimum of the previous year As usual, the per cent of accidents rose again in 1918 to slightly over 14% in the month of August and then declined in the usual way until, in February, 1919, the curve drops below 10%. It has failed to have its usual Summer rise in 1919 and has stayed close to 10% until the present time. This chart not only shows quite graphically the results of the efforts of the Central Committee on Safety and Sanitation, but also reveals some other facts which have an important bearing on successful safety propaganda in our factory.

Majority of Accidents Due to Carelessness or Ignorance

One of the most significant points is the marked lowering of the curve after the year 1916 which was the result of the adoption by the Committee of the policy of education for the prevention of accidents instead of merely following the policy of constructing machine guards and other safety devices. In the Fall of 1916 an analysis of the statistics for the preceding years revealed the fact that a large majority of the accidents were not preventable by mechanical devices, since they were obviously due to a lack of understanding on the part of the individual employee of the things which were liable to cause him to suffer an injury. The Committee decided at this time to start a campaign of education, and by means of bulletins, circulars, and discussions the idea of individual safety was spread and the results of the campaign are plainly shown on the chart.

Another fact of interest, and one which also

teaches us a lesson, is the characteristic rise and fall in the number of accidents during the Summer and Winter months respectively. Those who have studied accident statistics believe that the reason for this variation is that conditions of mentality and vitality are more favorable in cold weather than in warm weather, and consequently the workmen's ability to give close attention to their work is increased. The figures show that when close attention is given there are less accidents. The reasons for this are easily understood, because it is well known that the cold weather air is more invigorating, people's habits are more regular in the Winter than in the Summer and the heat of the Summer causes everyone's vigor to be at a low ebb during the hot Summer months.

It used to be that the most important work in the prevention of accidents was the designing of machine guards and other protective devices. There was, no doubt, a good reason for this, because no attention whatever had

formerly been given by machine and tool designers to the safety of their apparatus. Protective devices are very important and very necessary and there should be no hesitation in using them, but it is generally conceded that 95% of all accidents are not preventable by safety or so-called "protective devices".

Our Factory a Safe Place in Which to Work

The efforts of the Safety Committee have made the Packard Plant one of the safest in the country. Insofar as we are able to determine from data collected at the annual meeting of the National Safety Council, we have the safest Plant of all those engaged in a similar line of work, i. e., light manufacturing.

Last year we did not have a single fatal accident. In fact, it is now a year and eight months since we had one. We had an average of approximately only one accident per week of a sufficiently serious nature to keep the injured person away from his work more than

two weeks. We had an average of approximately one accident per week which was sufficiently serious to keep the injured person away from his work more than one and less than two weeks. However, we did have during the last fiscal year 15,894 minor accidents. When one considers the fact that 15,894 people crossed the threshold of the hospital in one year for treatment of minor injuries it appears to be a very large number. However, these injuries did not, in 90% of the cases, keep the injured workman away from his work more than one week and in many of the cases only a few hours. When we further consider the fact that 95% of those accidents are due to carelessness and ignorance on the part of the person injured it is apparent that there is a great deal yet to be done in the campaign of education to prevent accidents.

Approximately 25% of these minor accidents were caused by the lodging of solid particles in the eye. Such accidents are easily preventable by the wearing of goggles. The

best goggles that can be bought are freely provided by the Management for the use of every employee thus endangered, so that there is no excuse for 90% of this class of injuries.

Approximately 15% of the minor injuries are due to improper use of the tools. These, also, are properly classified as accidents due to ignorance or carelessness. Another 15% of the minor accidents are the result of injuries from handling material, such as the cutting of fingers in the handling of rough stock, pieces falling upon the feet, and other careless and unnecessary occurrences which result in a large number of accidents.

It has been proven that over one-half of the minor accidents directly result from carelessness or ignorance on the part of the employee injured. However, a more complete analysis will prove that this per cent is more nearly correct when placed at 95%.

It is needless to argue that anyone wants to get hurt or that any of these accidents would occur if either the man injured or his

fellow employees have sufficient warning that it was likely to occur. As they are all minor accidents and are all preventable by education, it is apparent that there is still a great deal to be done along this line.

Further Education of New Employee Necessary For Best Results

For still further proof that a large majority of accidents are the result of ignorance, statistics have been collected on the length of the periods of employment. These figures, which are computed on the basis of the 30-day period, indicate that 33% of the workmen who are injured have worked for the Company less than one month, and that only 7% of our workmen are injured who have worked for our Company more than one and less than three months.

In order, then, to make a still further reduction in the number of minor accidents it is only necessary to teach the new man how to keep from getting hurt.

Everything possible is being done to educate the new employee along this line, but the education which will have the most effect is that which he may get from his fellow workmen, who are working with him or near him. If, when a new employee starts to work, or an old employee starts on a new job, he were told of the things which have caused injury to those who have previously worked on this job, a great reduction in the number of accidents would result. A few words of warning and instruction applying to the particular job, given first hand before the man starts to work, constitute the best kind of safety education that we can have.

The principal motive for the prevention of accidents is a humanitarian one, since none of us desire to see a fellow employee injured, particularly if we can do anything to prevent the occurrence of the accident But there are also reasons why it is to everyone's financial interest to assist in the prevention of accidents. For when a workman is injured

he not only loses the premium he might have earned during the time he is in the hospital, but he also is unable to earn as much premium with his fingers wrapped up or with an eye covered as he would if his members were not thus injured. At the same time the Foremen and other executives responsible for the man's work lose on account of decreased production; and, for the same reason, the Company loses on account of the idleness or at least the curtailed use of the machines, tools, or other facilities provided for the man's work.

It has been proven in this discussion that the Safety Movement is a permanent part of our industrial organization. Effective means have been provided for the Central Safety Committee to carry on this work, and it has been shown that the work of this Committee has been effective in reducing the accidents in our Plant over 100% in two years. It has been proven that the great majority of accidents are preventable and they are the result of carelessness, improper instruction, or ignorance

on the part of the employee, and that, while a great deal has been done, there is yet much to be accomplished in making our factory a safer and more pleasant place in which to work. The attention of every Foreman should be directed toward the achievement of this desirable result, because a good safety record of our Plant gives confidence to every employee, results in his greater contentment, and consequently aids in the production of a better quality product and a greater amount of it.

Standards of Sanitation and Their Attainment

The maintaining of proper conditions of sanitation in our Factory is also supervised by the Central Committee on Safety and Sanitation. At their meeting there is presented for discussion questions bearing upon proper standards of Sanitation and how they may best be maintained. A report is compiled showing the standing of each department in the factory as shown by the daily inspection.

These figures indicate the departments in which poor results in the attainment of Sanitation Standards are accomplished, and means are discussed for bringing these departments up to the proper standard as well as for raising the standard generally throughout the factory.

It is necessary to have a common understanding of the meaning of sanitation. In the sense in which we use the term it includes the proper maintenance of buildings and equipment, the collection and removal of refuse and the cleaning of windows, electric lights, floors, machines, benches, and tools, and the keeping of the factory in a neat and orderly condition.

We may define our standard for our Plant by saying that we desire to maintain our factory in such a condition that it is clean, light, wholesome, healthful, and a pleasant place in which to work. As in the case of accident prevention, it is necessary that the initial step in establishing proper Sanitary Standards be taken by the Management, who

provide a sufficient force to collect and remove refuse, attend to the sanitary facilities in general, such as waste cans and cuspidors and to properly maintain the buildings and equipment. After this has been done it is necessary for every individual to do his part in properly using this sanitary equipment if the desired result is to be accomplished.

A daily inspection is made throughout the Plant in order to discover the need of repairs and for the purpose of maintaining buildings and equipment in good condition. The inspector also points out those things which are necessary in each department to keep it neat, orderly, and tidy. As a result of these inspections, the necessary repairs are made, the floors are kept scrubbed and swept, and the refuse and rubbish are removed, and the Foremen are notified of those things which are necessary for them to do in order to maintain the same standard in their department as is being maintained throughout the factory.

It is the duty of every Foreman to instruct

his assistants and employees as to what is expected of them in this connection, and as to how these sanitation requirements may best be followed by each individual. Some of the things which it is necessary for the Foremen to do are: to see that the machines and benches are kept clean from oil and dirt; that tools, jigs and fixtures are kept in their proper places; that tool stands, benches and various equipment are kept free from litter and rubbish; that coats and hats and unnecessary articles are not allowed to hang on the walls; that no one indulges in the practice of spitting on the floor or in the compound in the machines; that racks and stock boxes are kept in straight lines and in neat piles; and, finally, to see to it there is a place for everything and that everything is in its place.

In this, as in accident prevention, our greatest success is dependent upon individual efforts. That the encouragement of this effort is worth while is proven by the fact that our employees will thereby become better

satisfied and turn out more and better production in the factory, all as a result of its being a clean, neat, tidy, wholesome and pleasant place in which to work.

Fourteenth Session

Subject: WHAT MAKES AN EXECUTIVE

Speaker: MR. D. G. STANBROUGH
General Superintendent

In my discussion of the subject, "What Makes An Executive," I shall principally deal with fundamental facts. All business, all the affairs of life are based on certain fundamental principles. If our conception of these basic principles is correct, the work we do will be done right. If the foundation upon which any structure is to be built is properly laid, the structure will fulfill the purpose for which it was conceived.

All Subjects Based On Fundamental Principles

All life, then, is made up of certain fundamental conceptions. Therefore, in rightly reviewing a situation, in studying a subject, or in obtaining any kind of knowledge whatever,

our thoughts must penetrate to fundamental principles. After obtaining a firm grasp of those basic facts, our business is to apply them to the problem in hand. At school you were taught the fundamentals. All you can do throughout your life is to broaden your knowledge and application of those basic facts. Years ago Solomon said that there was nothing new under the sun. The fact has not been changed through the ages. Human effort has consisted in merely making constantly new applications of those fundamental facts which then existed and which have existed since the beginning of the world. All that we know today is confined solely to a knowledge of varied application of those universal and basic laws.

Everything in creation operates according to established rules. Nothing ever "just happens". It is brought about according to the immutable law of nature. And now I have arrived at the first principle of our discussion, viz: Executives do not "just hap-

pen". They grow and develop in accordance to certain well-defined principles.

Decision

Therefore, I shall confine my discussion for the present to my conception of the fundamental qualities that are necessary in the making of a successful executive. The first essential quality is that of decision. Before a man can get anywhere in this world, before he can do anything worthy of consideration, he must be able to arrive at a decision. He must be able to line up in his mind the various facts that relate to his business and then make a proper decision.

Initiative

A great many people believe (and naturally the idea once appealed to me) that the first quality necessary for a good executive to possess is initiative. But it is not the first quality; initiative is based upon decision and is of secondary consideration. After a

man has arrived at a decision, the decision is useless without the initiative to carry out a line of action in accordance with the decision. The first move must be made to carry out a decision, and unless it is made the decision is as useless as the average New Year's resolution.

Ability To Plan

After the decision is made, and the first step is taken towards carrying it into action, it is then necessary that we have a definite plan by which to guide our activity. A distinct line of action must be wisely adopted, and then firmly and resolutely followed. Often in the shop you will approach a man and ask him to do a certain job. He readily promises to do as you request, but you are not quite satisfied, and you ask: "How are you going to do this?" You ask for his plan. If he tells you that he does not know, that he will do it some way, you are not satisfied. The man in whom you are interested is the one who, when any work is placed before him to be done, sits down and form-

ulates a rational plan according to which he will perform the work. The third essential quality in a good executive is, then, the ability to plan.

Concentration

An executive must also be able to concentrate his attention. In our production process we follow a certain schedule. It usually occurs that 90% of the parts are produced in conformity with the requirements of the schedule; that 90% does not cause us any delay. But there are always a number of given parts that require special efforts to produce according to the schedule. In the making of these parts the executive must exercise his powers of concentration. He must so concentrate his mind upon his work as to be able to survey the field of work that lies ahead of him, and pick out the places upon which his effort must be concentrated to bring about the desired result. The degree to which he can focus his mental powers upon the weak spots in his work will greatly determine his standing as an executive.

We have, then, named decision, initiative, the ability to plan, and concentration as the four fundamental characteristics of a good executive. These qualities must be developed in the man whom you select from among those in your departments to clothe with authority. Of course, a man may be weak in his possession of some of these qualities, but he must have all of them to some degree to start with and it is our business to so train him that he will more fully acquire the less prominent characteristics.

Authority and Responsibility Inseparable

After we have selected a man whom we believe has the fundamental qualities of a good executive, in order to enable him to do anything we must clothe him with what we call "authority". We must say to him: "We are going to make you a Jobsetter or an Assistant Foreman," etc. We must let him know that he has authority. But he may not know just what constitutes authority. It will be well then for each one of you to learn the best

explanation of "authority" that I ever read. It is: "The *authority* to issue an order carries with it the *responsibility* to see that it is executed." Therefore, authority is responsibility. I desire that you ponder the full meaning of that definition. It is complete and expresses the right conception of authority. I desire that you get that conception so firmly fixed in your minds that you will never forget it. In the last analysis we estimate the ability of every executive by the amount of responsibility which he assumes in seeing to it that his orders are carried out.

Ability To Get Results

Of course, we judge every executive in a practical way by his ability to get results; if he is in a production department, by his ability to get finished pieces. We do not estimate the Foreman's ability so much by the number of pieces that are drawn out of stock, but rather by the number of pieces which his department produces. This, as I have said,

is largely determined by his powers of concentration, his ability to look ahead and see where he is likely to be delayed and so lay his plans as to prevent the delay. To do this requires the ability to concentrate his attention closely upon his work. Nothing so raises a Foreman in our estimation as does his success in getting out finished parts. To order and assign the stock and so supervise it that the line is not held up, and deliver all of the finished pieces to the Assembly Room on schedule time—these are achievements that distinguish any Foreman.

Personality a Big Factor in Success

Thus far in our discussion we have dwelt only upon the fundamental characteristics of an executive. There is another side to this question which forces itself upon our attention, viz: the matter of personality. We can never leave the element of personality out of any problem. Personality is the most potent single element in existence. All things

that exist are the expression of personality, whether we are speaking of the human race, of a nation, of an industrial organization, or of an individual.

Personal Appearance

And the first thing we look at in determining a man's personality is his personal appearance, his dress, and the general neatness of his person. In looking over your department for a prospective executive, the man whom you select must look like an executive. He appeals to you because he comes to work looking neat, wears a clean suit of overalls. His general appearance shows that he takes an interest in himself, proves that he takes a degree of pride in himself, that he has self-respect, which is a very essential factor in the making of the right kind of personality.

I believe that one of the finest sights in the world is a crew of Bluejackets marching on shore in dress parade. The sight appeals to any real American. In their immaculate

uniforms and perfectly-formed ranks they reflect the character of their individual selves and the American Navy. Their general appearance is but a reflection of their effectiveness when they are brought into action.

And the same principle applies to your departments. If the Foreman looks neat and clean he will be able to inspire his men to be clean and the general appearance of the department will directly reflect the appearance of the men in it. Workmen will not then wear dirty, greasy overalls to the shop, week after week. In the Eastern Mills such a man would be discharged, and when a man continually comes to work looking dirty and unkempt you Foremen should encourage him to take more of an interest in himself, and at least have his clothing washed. We do not want dirty, slothful people in our Plant. And you Foremen can do a great deal towards educating our employees to improve their general appearance, and you should never be found

to fail to set a good example by your own appearance.

The Personality of a Leader

There is the intangible, unseen element in a man's personality, something unseen, but we are always conscious of it. To explain what I mean, I will recall to your minds what I said about giving a man authority. In one sense we cannot give a man authority. He acquires it. How? By sheer force of his personality. It is that hidden indefinable element in a real leader which we all instinctively sense and invariably respect. Such a man is generally full of life, magnetic. He has the above-mentioned qualities of an executive; he knows his work; he is a manly man and he inspires our confidence. Also he dresses like a man. Heaven deliver us from those effeminate creatures who dress and act like a woman! That kind of a man never will either acquire or be given authority. He is the opposite of this leader whose personality attracts men to

him. But this attraction is nothing more than a result of the real leader's interest in men, an interest which is born of an understanding of human nature. This type of a man has mixed with many different classes of people. Therefore, he understands people; he has a deep, not a pretended, interest in the men who are working for him. He can place himself in the other fellow's position, grasp the other man's point of view. It is these qualifications that go to make up personality, that possession which is indispensable to an executive.

Dignity

In this connection we must not forget to mention the element of dignity. Lack of dignity in an executive is inexcusable. A lack of it is quickly perceived by people who visit our Plant. I would like to see a manifestation of more dignity on the part of our executives, a dignity which is born of self-respect, and a respect for and interest in other people.

The Value of a Smile

And I would not have you forget the value of a smile. If you do not know how to smile, you should cultivate the habit. I realize that we all have many hard times. We have worked long hours and carried heavy responsibilities, and it is pretty difficult to always be ready to smile, but the wisemen have told us that we can catch more flies with molasses than with vinegar and this principle should teach us the value of a smile.

Tact

Another characteristic of a good executive is that of being tactful. This quality may only be cultivated by a man's watching himself when he is prompted to be sarcastic or to speak with derision. It requires patience and self-control if a man is to be tactful; but the cultivation of more tact on the part of everyone would result in a better record of accomplishment for all of us; and I recommend that every executive practice

being more tactful in the performance of his duties.

Co-operation

I also desire to discuss with you the matter of co-operation. To be a good executive a man must be willing to co-operate with his associates. It is not always easy to do so, but it is always the gauge of a man's open-mindedness. Co-operation is essential if a man is to advance anywhere. A knocker will never advance. No one person is able alone to completely control the sphere in which he lives; and, hence, all progress is a result of co-operation. In our Plant the Tool Department co-operates with the Production Department, the Production Department with the Inspection Department for the best results, and so on down through the entire organization. We must all learn to help the other fellow, even though we go out of our way to do so. It is generally known that the busiest man is the one who is usually the most willing to help, and he is the one who will be picked

for a better job. The principle of co-operation should be prominent in the moral and business platform of every executive.

A Positive Disposition

Another qualification an executive should possess is a positive disposition. You men were selected to be executives in our Plant because you have a positive disposition. Without that quality you never would have been advanced to your present positions. The man who succeeds is the man who does not use the "wishy-washy" method. He has positive ideas and is not afraid to express them. He has positive likes and dislikes, positive conceptions of the things in which he is interested. You should cultivate the habit of having an opinion of affairs in general, so that, when a particular subject is brought up, you will be able to express a worth-while opinion upon the subject, thereby showing people the trend of your disposition.

You should know your own mind, have an

opinion and show backbone enough to express yourselves. And never take half-way measures. When you have a matter to settle, settle it once and for all time; know what orders to give and always give them right and you will never need to apologize. For an executive to apologize is to flagrantly disregard all the laws of the executive effort.

Self-Control

One of the important facts to remember in your cultivation of executive qualities is that an executive must always be self-possessed. It has been written in the Book of Proverbs that a man who conquers himself is greater than he who conquers a city. To attain the highest success, then, we must all practice self-control. Every organization is composed of a number of differently-constituted people, all having opposite ideas on a great many subjects, and in order to get the best results the various operations of the organization must be so co-ordinated that they will be in har-

mony and not confused. This can only be brought about by the practice of self-control on the part of those in the executive positions. It is impossible for us all to have everything done as we wish, and the degree of control that each man can manifest when attempting to correct any wrong condition will largely determine the degree of his success. It requires the exercise of a great deal of self-repression to remain quiet and listen to the other man, but it never does any harm to hear him through, and the longer one listens the better able he is to formulate his own ideas and plans. The men who generally have the most to say are the men who have the least to say at first.

In this connection I wish to warn you against harboring false imaginations of people's aims and purposes. Those imaginations are usually the result of an overwrought emotionalism, which always creates poor sense, fear, and ends in failure. Every man should have a philosophy to help him avoid these

false conceptions. He was created to be higher than the animal, and he should exercise his powers and elevate himself to a plane of self-direction and self-poise that will overcome his animal-like tendencies. This he can do by having a practical philosophy, a healthy outlook on life in general.

Executive Should be a Sportsman

In the game of life, unless a man is self-controlled he will often lose, purely and simply because he was afraid to win. In engaging in athletic sports, or competitions of any kind, I have, time after time, seen a man repeatedly beaten merely because he had lost so often that he was afraid to win. This was due to his lack of poise, the absence of a sufficient amount of self-possession. Were it not for this fear it would be as easy to walk on a twelve-inch plank over Niagara Falls as when it is lying on the pavement. To win, to overcome the fear, a man must be a sportsman. I advise each of you to engage in athletic sports

of some kind and get into the habit of both winning and losing. Learn how to be a good winner or a good loser in these activities and you will make a better man in business.

"Pep" a Requisite Quality for Success

I now wish to discuss the place that "pep" —energy—has in your work. The Department which you supervise is always an absolute reflection of your own energy and ability. If the work in general is brought through with a great deal of energy and "pep", it reflects much credit upon the Foreman, because it is in reality the Foreman's work. Unless the Foreman has "pep", he cannot enthuse his workmen. No institution, whether a department in a factory or whatnot, is any more successful than the men at the head of it are efficient. What they themselves are, and what they stand for, that the institution will be. Everything in life is the expression of the individuality of human beings. Therefore, if your department is inefficient, you have no

one to blame but yourself. The right man, one with lots of "pep", can take any bad situation in hand and straighten it out. But, remember, he cannot do it unless he has "pep".

Every Man a Salesman

We now come to the subject of "Salesmanship". There never was a human being who was not a salesman. We are all salesmen. There is no higher qualification than that of being a good salesman. You never talk to a person without attempting to "sell" what you have in mind. Life itself is a matter of salesmanship. There is no situation in life where we do not try to sell ourselves, our personality, our ideas, or whatnot. We sell ourselves to our children. If they do rightly, it indicates that they have been "sold" on what their parents have told them. Our very success in life depends fundamentally upon our ability to sell ourselves to our fellows. And every man who desires to attain a higher success should study the science of salesmanship. You

must learn how to sell your ideas to the other fellow. But first be sure that your ideas are quality stuff, that they are right; then, if you know how to sell them, your highest success will be assured.

Progressiveness

An executive is a leader, and, being a leader, he must be progressive. It is not always easy to keep our place in the van of progress, because we are all creatures of habit. We all form certain habits, both good and bad, by which our activities are regulated, and we do not enjoy the experience of overcoming a habit, particularly if it is a bad one.

If we have been sitting in the dining room at home in a chair facing a certain way and someone completely changes the chairs around so that we are sitting on the opposite side of the table and facing a different direction, we immediately object. If anyone comes into your department and suggests a change, you oppose the idea, not always because the idea

is not a good one, but largely because you have a habit of doing things in a certain way and, like the average mortal, you are the slave of a habit. We do not like anything which disturbs "the even tenure of our ways", however impractical those ways may be. That Oriental attitude manifests a lack of progressiveness. That attitude is always holding the world back. If we are ever to better our condition we must give the fellow with a new idea a chance to prove he is right. All of us can remember when the first automobiles were made. Nearly everyone said they were "no good". There was a great deal of opposition to them, merely because they were "new-fangled contraptions". As was the case then, so now, people even go so far as to attempt to stop progress by enacting laws against the use of new devices and means of bettering human conditions. Progressive institutions must always meet and overcome this kind of opposition.

But it may not be altogether wrong that

this opposition exists. Conservatism may help to keep us from adopting impracticable and destructive inventions. There is a good rule for us to follow, expressed by Alexander Pope when he said:

"Be not the first by which the new is tried,
Nor yet the last to lay the old aside."

That rule, rightly applied, will give us the right degree of progressiveness.

Under the subject of "personality", then, we have concluded that the principal elements which go to make up a good personality are:

(1) Dress and general appearance.
(2) Dignity.
(3) Ability to smile.
(4) Tact.
(5) Co-operation.
(6) A positive disposition.
(7) Self-control.
(8) "Pep".
(9) Salesmanship.
(10) Progressiveness.

All the points that I have thus far discussed

have been fundamental conceptions of an executive. They apply to any group of executives at any time and in any place. They are the fundamental facts of our discussion.

The Packard Plant
A Reflection of the Men in It

I wish now to discuss the application of these principles in a general way to some of our problems here in the Packard Plant. As I have stated, no organization is better than the men who compose it. You and your workmen absolutely determine the character and consequent reputation of our organization.

The impression that a man gets of our Plant when he visits it is the one that the men here give him. If we are to improve the impression that people get of the Packard organization, we have got to get in close touch with the men who work with us. It is necessary first to start right with each new workman. When a man is selected by the Employment Department and is sent to your

department, the duty rests with each of you individually to see that the man is properly put on a job. It is a serious experience in a man's life—coming to work on a new job. We have all had the experience. And we gave particular attention to the man who placed us on the job. We can all remember the exact impression, good or bad, that the Foreman made upon our minds.

The Foreman's Relation to the Employees

And, therefore, I do not want any of the clerks putting men to work. That is the Foreman's job, and his alone. I desire to see the Foreman take an interest in his men, get acquainted with them, learn of the things that will interest them outside of the factory; treat him as something more than a tool that is only a minor part of a big machine. Make him feel that you think of him as a man with the same ambitions, ideas, and feelings that you yourselves have. One of the main reasons for our labor turnover is that we have not

taken enough of a personal interest in our men. When we compile figures of our turnover it certainly shows that in some way we have a lack of the right understanding of how to employ and hold our men. This must be corrected. The Employment Department merely selects the man and sends him to you, and you are then responsible for him. Whether or not he remains with our Company rests with you. You are the ones to take care of him, to put him to work and to make him feel that he has a place in your department. If the man is not the kind that you need, the right thing to do is to send him back to the Employment Department before he goes on your roll and notify the department that the man is undesirable. This will reduce your labor turnover.

A Foreman's success is gauged largely by his per cent of labor turnover. It is for this reason that every Foreman should study his personnel problems more closely. If you keep the personnel problem solved in your depart-

ment, many other things will take care of themselves. And remember that this is one duty that you cannot pass on to your assistants. It is your business and it must be attended to if we are to reduce our loss from scrap. We produce scrap because the men are not here long enough to do good work. Our success in solving this vital problem of scrap will be determined largely by your individual success in so handling your men to reduce labor turnover.

"Let George Do It"

Under the subject of "Let George Do It" I wish to say that an executive is a man who obtains results through the efforts of others. Your job is, then, in a sense, to "let George do it". Every once in a while something goes wrong and some fellow will come to me and say, "If I am to get that thing done right I have got to do it myself." That idea is contrary to the principles of executive work. When a man gets an idea that, in order to

get something done right, he has to do it himself, he is a long way off the road leading to his success as an executive.

Your principal business is to so control the work of others as to get equally as good results as you would if you yourselves were doing the work. That is why we employ you as executives, because we believe you have the ability to get work out of others, the ability to "let George do it".

How to Become a "Blind Wall" Executive

Of course, an executive can carry that too far and let "George" do everything and not do anything himself. And, on the other hand, he may go to the other extreme; he can do all the work himself, attend to every detail, and allow the fellow who is supposed to assist him do absolutely nothing. As executives, you should bear this in mind: that we employ executives who are able to get results from the efforts of other people. A man's first efforts in

life are confined to producing results from the work of his own hands or with his own brains. His next step is to become a leader and accomplish things through the efforts of other people. He is then taken off his job and made a subforeman. He then has ten or fifteen men working for him. He controls their efforts by passing from one to the other and advising each one separately. He secures good results, not by doing the actual work himself, but by showing others how to do it. The next step in authority is taken when he becomes assistant foreman. He then controls much of the work which he does not see and soon he may advance to the position of Foreman. He then issues his orders from information which he largely obtained from reports; he becomes a "blind wall" executive. He controls the efforts of the others, although he is entirely removed from the actual work. The next step in his advancement is taken when he becomes a general foreman or chief foreman, and has an office outside of the building in which the

work he is supervising is being done. He is then even more removed from the actual sphere of activity, and he is entirely dependent upon reports for his information. He must be able to read and analyze reports, and have a wide knowledge of his work. He must make sure that the work is done, without actually seeing the work in operation.

The Government of Great Britain is a good illustration of the executive ability about which I am speaking. The officials of that government are controlling vast industrial, marine, and agricultural operations all over the world, activities which are thousands of miles removed from the little island of Britain. This represents the highest type of executive ability. But that is the goal toward which every executive should strive, to be able to control a job a thousand miles removed from his own place of work. And the executive in our Plant who can run his department with the least necessity of actually seeing every operation, who can do his work on the basis

of reports of his assistants, is obviously the best executive. The man who is ambitious to advance must learn how to handle his job by the use of reports, learn how to "check George up" on the basis of the reports and thus carry out his responsibility to see to it that his orders are executed. It is more than a matter of "letting George do it". He must *make sure* that "George" *does it*, and in accordance with his orders.

There is one executive responsibility which must never be passed on to someone else. I refer to the Foreman's authority to reprimand. That is the Foreman's duty and his alone. I do not want to see any of the Jobsetters attempting to assume this responsibility. If a workman has done something that requires a sharp reproof it should be given by the man who knows how to reprimand, one who knows something of the responsibility attached to "calling a man down". I want this distinctly understood that matters of discipline are to be attended to solely by the Foreman or by the

Assistant Foreman. The Jobsetter is a Jobsetter and nothing more.

Foreman Should Promptly Promote Deserving Employees

I wish also that you would be careful to see to it that the workmen are more promptly promoted when they are deserving of it. This matter should not be overlooked. In our study of the subject of labor turnover we find that there are two distinct breaks in the curve. We find that the greatest turnover is with the men who have been with us less than a month. We find that if a man remains with us through the first month he will in nine cases out of ten remain for four or five months. In order to take care of the fellow who leaves the first month every workman is now being given a test to determine whether or not the statements he makes are true. He is temporarily stationed in the Training School building before he is sent to your department. This will aid in reducing our labor turnover.

After the man has been here for a month or more and shows that he intends to stay we find that the next big turnover occurs with men who have been here between five and six months. There is a reason for this. The Foreman takes an interest in his new man, gives him some attention. The man is interested and satisfied. But after a while the newness is worn off, and the workman soon realizes that he is not getting the attention he once received. Something goes wrong; he is dissatisfied; he leaves the department, and perhaps he leaves our employ. This should not occur so frequently. When a workman has been with us six months his Foreman should send for him and have a talk with him; if he is deserving of it, and he usually will be, he should be given a small raise, at least. This is only fair to the man and it will reduce our turnover. The Employment Department, as our Employment Manager has told you, is taking steps to make sure that all of our deserving employees are justly promoted. I

am sure that if each one of you will make a special effort to get in touch with the men personally in regard to this matter, after they have been here six months, that the conditions arising from our labor turnover will be improved. A great many men just "drift off", simply because they do not get that desired recognition and I strongly advise you to give this matter your careful attention.

Loyalty vs. Bolshevism

In concluding our discussion I wish to bring to your attention the matter of Loyalty, and in this connection the first fact I want you to get is that most executives have the wrong conception of those things upon which their success depends. They believe that their advancement depends upon the opinion of the men in the higher positions of authority. That idea is wrong. Your success depends far more upon the opinion which the men who are under your supervision have formed of you. They are the ones who have the first-

hand knowledge of your ability; and if you can "sell" yourselves to them, make them loyal to you, and willing to follow your direction, then your success is assured. And, in order to inspire loyalty in others, you yourselves must be loyal. The easiest thing to do in the world is to knock. The boarding house is never without its knockers. On board a ship, no matter how good the food is, a part of some of the sailors' regular job is to knock the "grub". It is a habit with some people to always be knocking something. They have formed the habit of constantly indulging in destructive criticism of something. These people are useless to themselves and everybody else. No executive should allow this custom of knocking something or someone to become a habit with him. It is always easy to criticize the other fellow, and it invariably breeds disloyalty in the organization. The executive who is really successful is the one who has the loyal support of his men first and who gives this kind of loyalty to those above

him. Elbert Hubbard said: "If you are going to work for a man, work for him, and, if you want to knock him, give up the job and get out and then do the knocking." Nothing is more harmful, nothing retards progress in an organization as does disloyalty. And disloyalty anywhere can only be overcome by the conscientious efforts of all clear-thinking men.

That is one of the purposes of these Assemblies, to give you a better conception of what we are trying to accomplish in our organization, so that you will have reason to give increased loyalty to the organization and to your associates. We are making these Assemblies as informal as possible so that we, as executives, may be able to work in closer unison hereafter. The Management desires that you keep in close touch with the men in your department. Do everything that is just and right to keep the men loyal to our Company. Associate with your men as much as possible and do all you can to improve

their condition in general. Try to help them to "make good". That is the best way in which to suppress radicalism and disloyalty. We want men in our Plant who know the value of teamwork and who realize the foolhardiness and inconsistency of all Bolshevistic ideas. We desire the men here to know that we are all working together for the common interests of each other, and we expect them to give their loyal support to that end. But the first achievement for each Foreman in this respect is to secure the loyalty of his men to himself. That is the surest way of securing their loyalty to the Packard Motor Car Company. I wish, finally, to extend an invitation to any of you, who desire to talk over any of these matters with me, to call at my office any time you see fit to do so.