DELCO-REMY
SERVICE BULLETIN

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File Under:
M-CRANKING MOTORS

CRANKING MOTORS USING BENDIX DRIVES

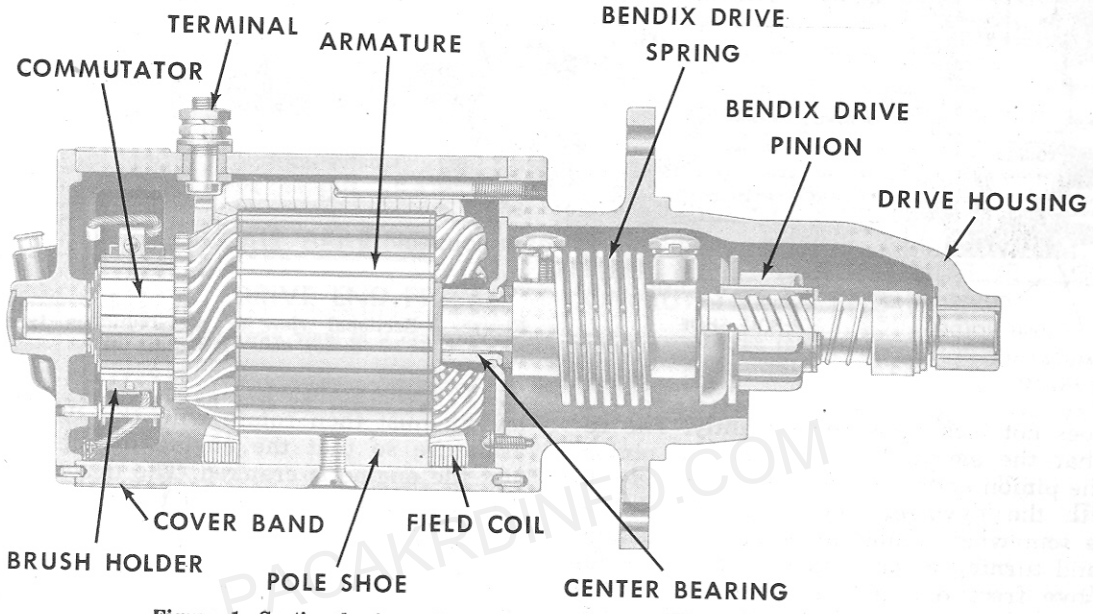

Figure 1—Sectional view of a standard Bendix drive type cranking motor.

The operating principles of cranking motors and the need for and discussions of various types of cranking motor drive are contained in Bulletin 1M-100. This bulletin describes some of the various types of Bendix drive used on Delco-Remy cranking motors and illustrates some of the various types of cranking motor construction using Bendix drives. Some of these cranking motors are used in conjunction with magnetic switches (Bulletin 1S-120). Bulletin 1M-150 pertains to servicing and maintenance of cranking motors.

STANDARD BENDIX DRIVES

Figure 1 illustrates a standard Bendix drive cranking motor while Figure 2 illustrates an exploded view of the Bendix drive used in this unit. The Bendix drive provides an automatic means of engaging the drive pinion with the engine flywheel ring gear for cranking the engine and for disengaging the drive pinion from the flywheel ring gear after the engine starts.

The drive pinion is mounted on a threaded sleeve or hollow shaft which has spiral threads that match internal threads in the drive pinion. The sleeve is a loose fit on the cranking motor armature shaft. One end of the sleeve is bolted to the Bendix drive spring; the other end of the drive spring is keyed and bolted to the armature shaft through the drive head.

When the cranking motor is not operating, the pinion is in the position shown in Figure 1; that is, it is demeshed from the engine flywheel ring gear. As soon as the cranking motor switch is closed, the cranking motor armature begins to rotate, picking up speed very rapidly. The threaded drive sleeve picks up speed with the armature inasmuch as it is driven through the drive spring. However, the drive pinion, being a loose fit on the

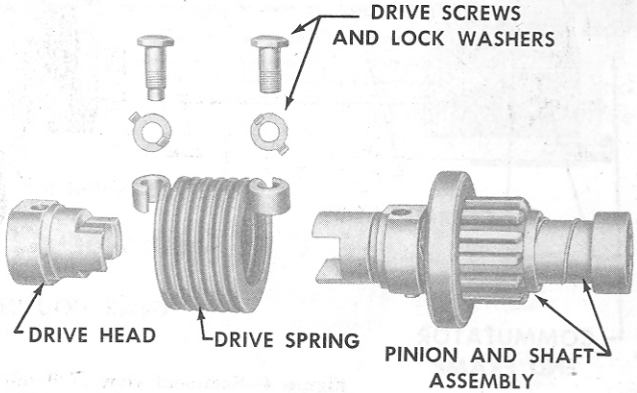

Figure 2—Disassembled view of the Bendix drive used in cranking motor illustrated in Figure 1.

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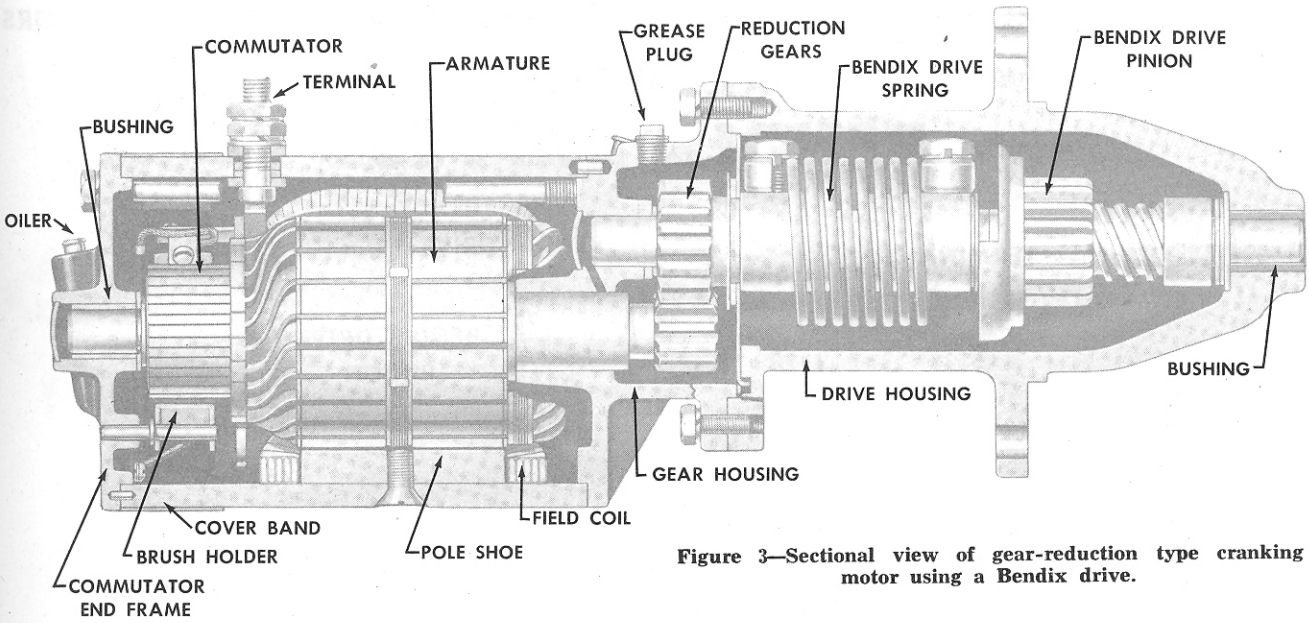

Figure 3—Sectional view of gear-reduction type cranking motor using a Bendix drive.

sleeve, does not pick up speed instantly. The result is that the sleeve turns within the pinion, forcing the pinion endwise along the shaft and into mesh with the flywheel ring gear. This action would be somewhat similar to holding a nut stationary and turning a screw in it so that the nut would move from one to the other end of the screw. As the drive pinion reaches the pinion stop on the end of the sleeve, it can move out no further and it must then rotate with the sleeve and the armature so that the engine flywheel is turned and the engine is cranked. The drive spring compresses slightly to take up the shock of engagement.

After the engine has started, the flywheel spins the drive pinion more rapidly than the armature and threaded sleeve are turning, with the result

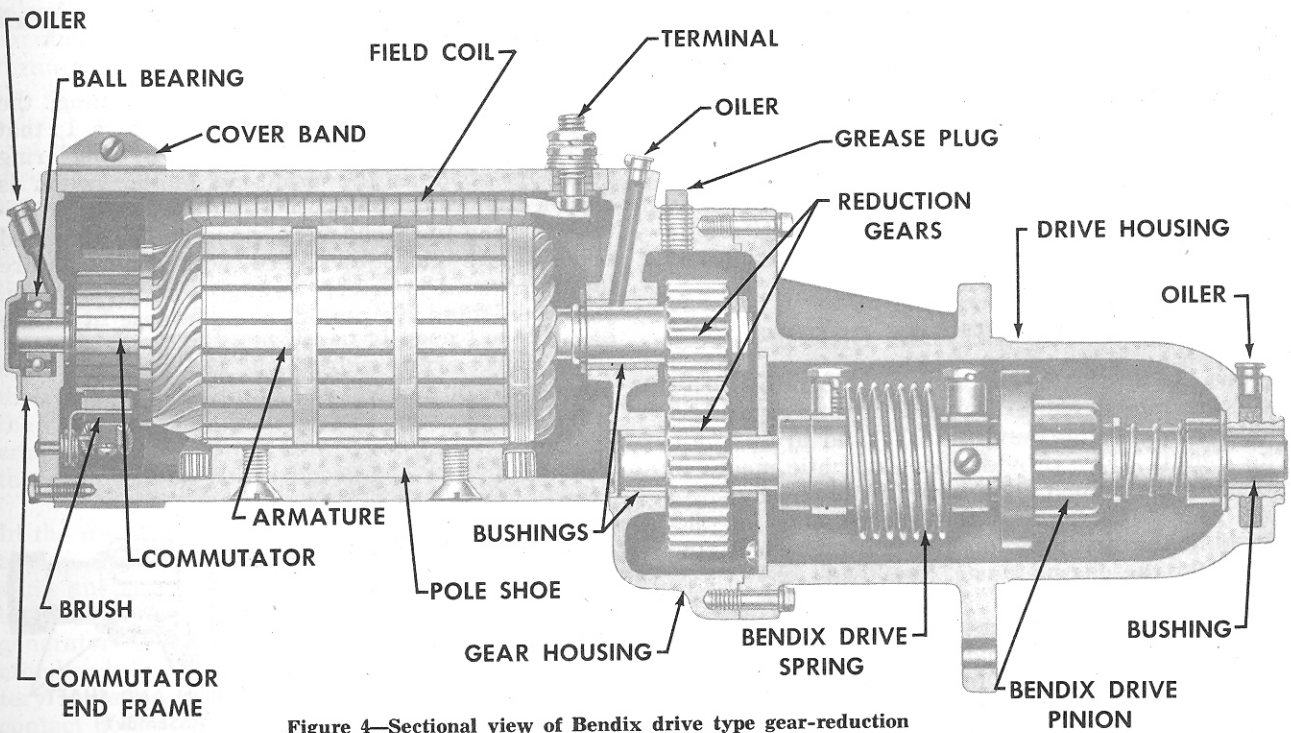

Figure 4—Sectional view of Bendix drive type gear-reduction cranking motor. On this unit the gear is removable from the armature shaft.

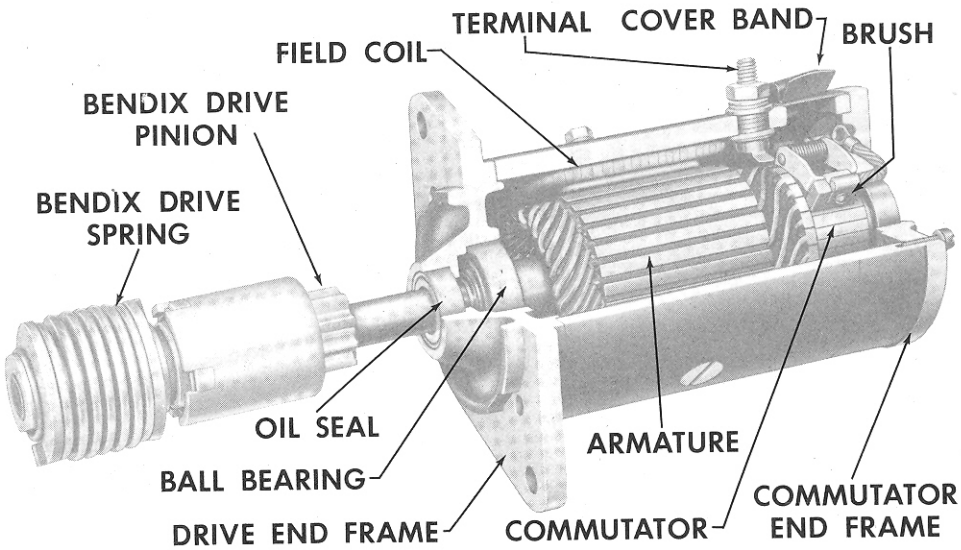

Figure 5—Cut-away view of a cranking motor using a barrel type inboard Bendix drive.

that the pinion is backed out of mesh from the flywheel ring gear.

Some Bendix drives have a small antidrift spring between the drive pinion and the pinion stop which prevents the pinion from drifting into mesh when the engine is running. Others use a small antidrift pin and spring inside the pinion which provides enough friction to keep the pinion from drifting into mesh.

Figure 3 illustrates a gear reduction cranking motor using a Bendix drive. The gear reduction permits a higher gear ratio between the armature and the engine crankshaft by interposing a pair of reduction gears in the cranking motor gear housing. The Bendix drive itself is very similar to the one illustrated in Figures 1 and 2.

Figure 4 is another type of gear reduction cranking motor using a Bendix drive. The difference between this unit and the one shown in Figure 3 is that the gear on the armature shaft in the unit shown in Figure 3 is part of the shaft itself whereas in Figure 4 it is detachable from the shaft and in the assembly is keyed to the shaft and held in place by a pair of lock nuts.

BARREL TYPE BENDIX DRIVE

Figure 5 illustrates a cranking motor using a barrel type Bendix drive while Figure 6 is an exploded view of this type of drive. The drive pinion, as it meshes, moves toward the cranking motor. For this reason, it is called an "inboard" drive. The barrel, which is integral with the drive pinion, is assembled on the spiral sleeve of the shaft assembly. The end of the spiral sleeve is fastened to the inner end of the drive spring by an anchor plate. The other end of the spring is attached to the armature shaft through the end of the drive shaft assembly. The action of this drive is very similar to the one described above. As the armature begins to rotate, the drive spring and sleeve pick up speed with the armature. The barrel and drive pinion assembly do not, however, pick up speed instantly with the result that the pinion moves into mesh with the flywheel ring gear. After the engine starts, it spins the pinion back out of mesh.

COMPRESSION SPRING TYPE BENDIX DRIVE

Figure 7 illustrates a cranking motor using a compression spring type inboard Bendix drive while

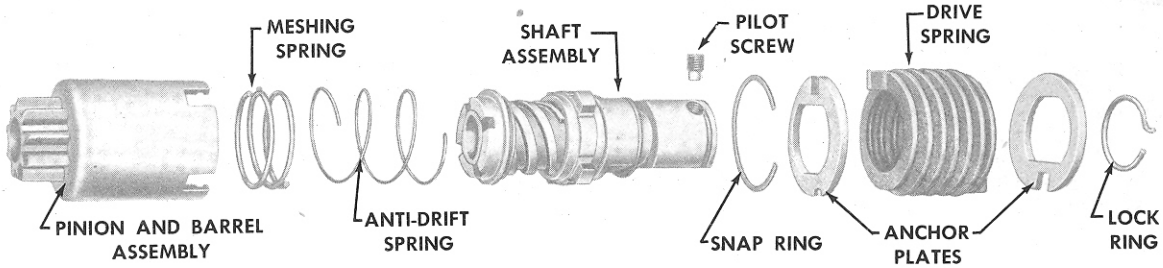

Figure 6—Exploded view of a barrel type Bendix drive such as is used on the cranking motor illustrated in Figure 5.

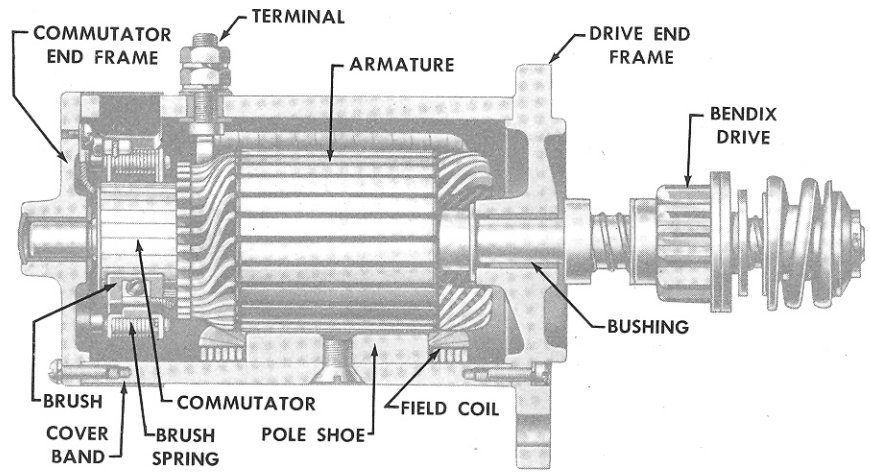

Figure 7—Sectional view of a cranking motor using a compressing-spring type inboard Bendix drive.

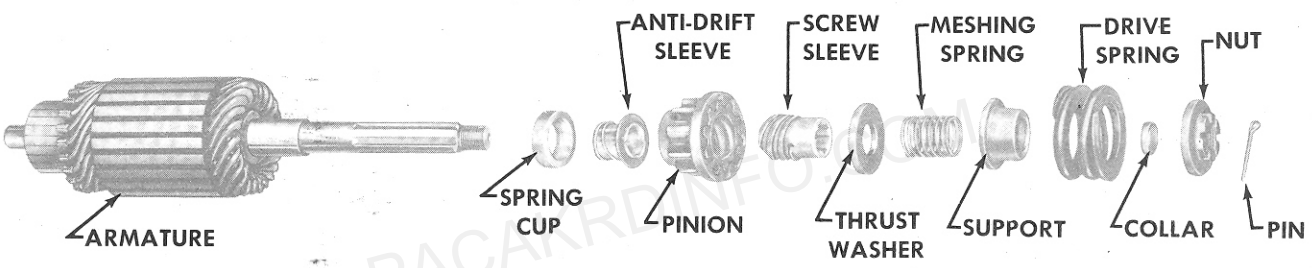

Figure 8—Exploded view of a compression-spring type Bendix drive such as is used on the cranking motor illustrated in Figure 7.

Figure 8 is an exploded view of the Bendix drive parts in their proper relationship. This drive works in a somewhat different manner since meshing of the drive pinion forces the screw sleeve back against the drive spring through the thrust washer and support so that the drive spring is compressed to take up the shock of engagement.

FRICTION CLUTCH TYPE BENDIX DRIVE

Figure 9 illustrates a heavy-duty cranking motor employing a friction clutch type Bendix drive. This type of drive functions in much the same manner as other Bendix drives excepting that it uses a series of spring-loaded clutch plates which slip momentarily during the shock of engagement to relieve the shock and prevent it from being transmitted back through the cranking motor. This slipping is momentary and slipping stops as engagement is completed so that cranking torque is transmitted from the cranking motor armature through the drive pinion to the engine flywheel.

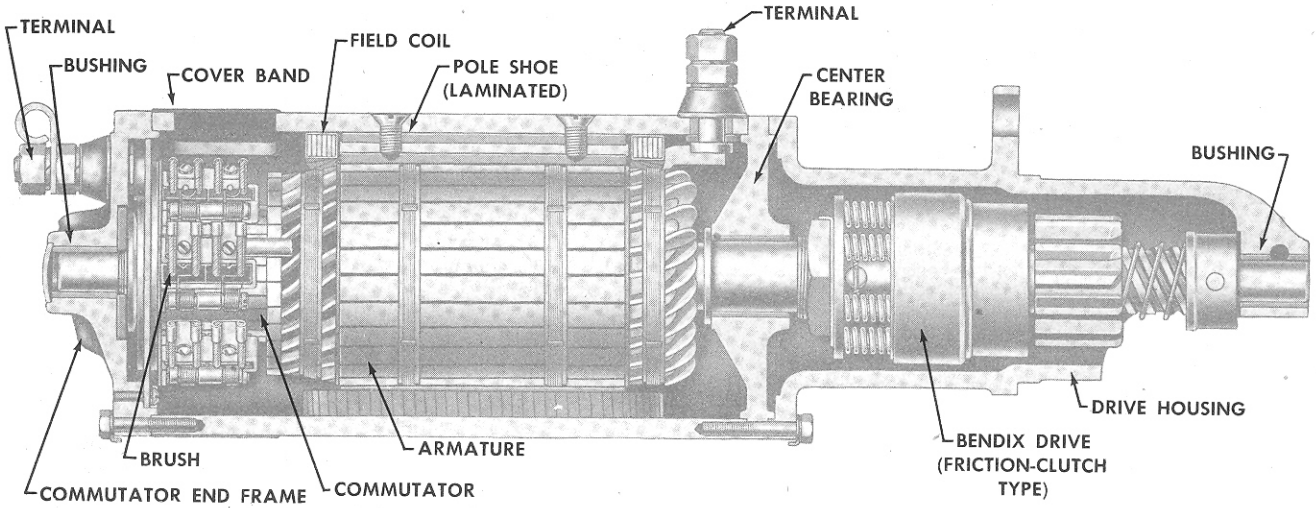

Figure 9—Heavy-duty cranking motor using a friction-clutch type Bendix drive.