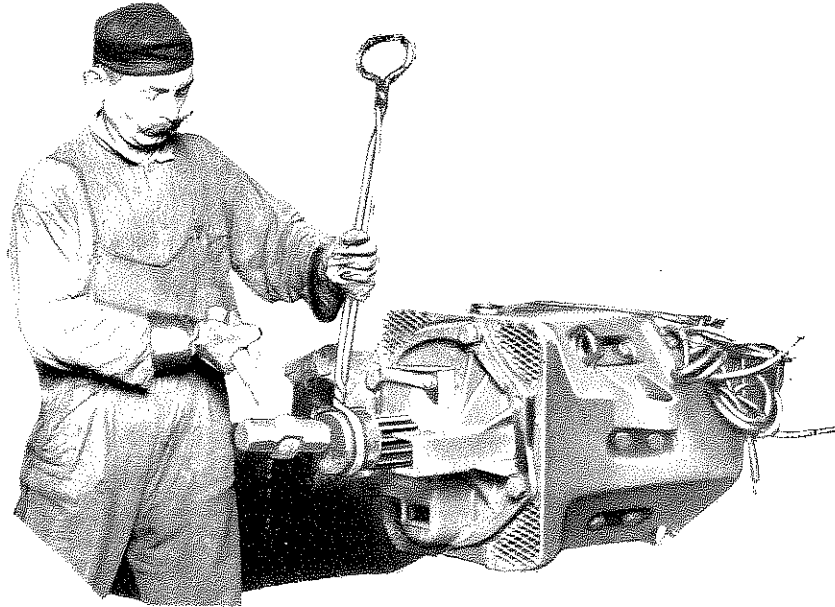




# Proper Method of Mounting and Dismounting Railway Motor Pinions



Seating a Small Pinion with a Four-pound Hammer and Metal Shield

## *Mounting*

Before a pinion is mounted all burrs and foreign matter must be removed from its bore and keyway as well as from the shaft and pinion key. The sharp corners at the top of the key should be rounded to radii of approximately  $\frac{1}{64}$  in.

The fit of the pinion bore on the taper of the shaft must be carefully checked, by removing the pinion key and seating the cold pinion on the taper by hand. It is important that the pinion bears evenly all around the shaft and no pinion should be used that does not show at least 75 per cent of contact between its bore and the tapered surface of the shaft. This can be easily checked by rubbing Prussian blue or red lead and oil on the pinion bore before placing it on the shaft.

If the pinion meets this condition, the pinion key should be properly seated; care being taken to see that the shaft is not swelled at the sides of the key. This is liable to happen if a too tightly fitting key is driven into the keyway.

The same cold pinion with its bore wiped clean should again be firmly seated by hand. When in this position its motor side should be within  $\frac{1}{16}$  in. of its final position and the clearance over the top of the key should be sufficient to allow a 0.015 in. thick gauge to slide free for a distance equal to the length of the key.

After making certain that the foregoing conditions are met the pinion should be wiped clean and placed in boiling water until thoroughly heated. This will require from three-quarters of an hour to an hour depending on the size of the pinion. To prevent rusting and insure a clean bore, washing soda should be added to the water in the proportion of  $\frac{1}{4}$  lb. of soda to each five gallons of water.

When hot, the pinion should immediately be placed on the shaft and firmly seated by hand, after which it should be given one blow with a four-pound, short handle sledge. The handle of the sledge should not be over 16 in. long. The blow should not be delivered directly on the pinion but on a heavy, round, cup-shaped metal block held firmly against it. The block should be placed over and surround the nut and threaded end of the shaft.

The nut should be tightened while the pinion is still hot, care being taken to see that the lock washer is properly seated to hold the nut. The pinion should then be hit a second blow and the nut again tightened with a wrench not over two feet long.

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A portion of the pinion washer which projects beyond the nut should now be bent out and firmly seated against a flat side of the nut.

The whole operation should be performed as quickly as possible, before the pinion has had time to heat up the shaft.

The blows with the sledge should only be sufficient to firmly seat the pinion and compensate for the loss expansion due to the pinion cooling. The intensity of the blows should be in proportion to the size of the pinion.

Caution must be exercised in mounting small size pinions not to overstress the metal between the bore and the teeth. These pinions require only a light blow, squarely struck, to insure proper mounting.

The foregoing method of mounting pinions applies to all pinions which have a thickness of metal between the bottom of the teeth and the top of the keyway of less than  $\frac{3}{4}$  in. as measured at the large end of the bore. Pinions having a section of metal of more than  $\frac{3}{4}$  in. between the bottom of the teeth and the top of the keyway may be mounted by using heavier blows delivered with the 4 lb. short handle sledge.

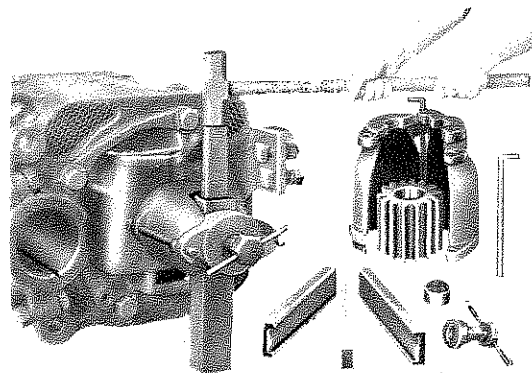
While it is highly desirable to have pinions mounted tight on the shaft it is necessary that excessive radial pressure be avoided. High radial pressure has been the cause of many pinion failures as indicated by the tell-tale convex shape of the break. With a well fitted pinion set home the shrink fit of the pinion should be sufficient to insure its proper seating. Extreme caution must be exercised not to overstress the core by heavy blows with a sledge.

### *Dismounting*

Many operators use methods in removing pinions which injure other parts of the equipment.

Among these is the practice of driving wedges between the bearing housing and the pinion. This procedure not only damages the bearing housing and the ends of the armature linings, but springs the armature shaft and subjects the ends of one or more teeth which bear against the wedge to injurious shocks.

Another injurious method is the practice of heating the pinion by means of a flame with the idea of producing an expansion in the metal. While the desired expansion is, in all probability, accomplished it should not be forgotten that the heat has greatly affected the hardness of the pinion. Unless it is intended to scrap the pinion the heating process should never be employed.



Pinion Puller Assembled and Mounted  
(Right Pinion Puller Disassembled)

The ideal pinion puller is one in which the pulling member grips all the teeth firmly and evenly. The details of such a puller are shown in the above illustration. Its component parts include a puller ring, jack screw with bushing, wedge box, wedge, and in some cases a pressure cap. This cap is used on the smaller motors to prevent possible damage to the threads on the shaft and on larger motors using pinions with a deep counterbore to act as extension of the shaft, thus preventing the wedge box, when in position, from bearing against the pinion.

In applying this puller to a pinion, open it by removing one pin and using the other as hinge. Place the pressure cap over the threaded end of the shaft. Close the two halves of puller ring around the pinion, being sure to insert the square sided bushing, containing the jack screw, in the cored recess at the small end of the puller ring. The pin which was removed from the puller ring should now be inserted.

Turn the puller ring until its cored openings are in a vertical position and insert the wedge box (with small opening down) through them to the floor. Tighten the jack screw until the wedge box is held firmly between it and the end of the shaft or pressure cap. Oil or grease the wedge and drop it into the tapered opening of the wedge box and strike it a few forceful blows with a sledge having a handle three or four feet long.

This should be sufficient force to remove any pinion that has been properly mounted. A pinion which clings very tightly on the shaft may require a few additional blows with the sledge.

All oil or grease should be removed from the wedge and wedge guides after using to prevent caking or the formation of hard spots on the tapered surfaces.