G. W. DUNLAP

PINION PULLER

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1,318,137. Patented Oct. 7, 1919.

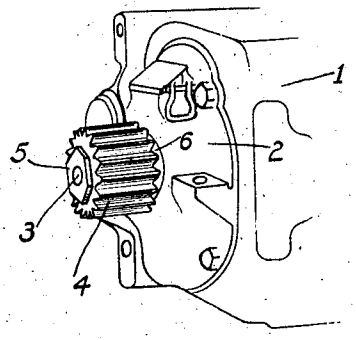


Fig. 1

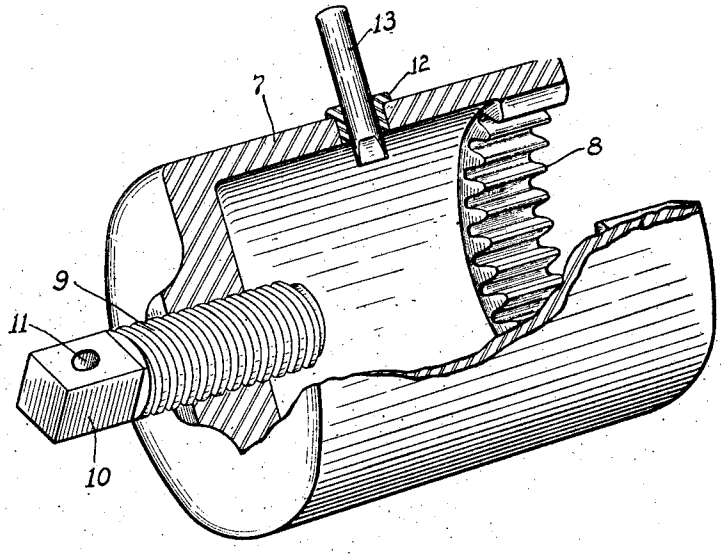


Fig. 2

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PINION-PULLER.

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To all whom it may concern:

Be it known that I, GEORGE W. DUNLAP, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Pinion-Pullers, of which the following is a specification.

This invention relates to pinion pullers.

More particularly the invention pertains to an improved pinion puller for removing the armature shaft pinion from the shaft of a box frame type railway motor.

Railway motors are in general of two types, split frame motors and box frame motors. The former type, which has been quite extensively used, is provided with a magnet frame cast in two pieces, hinged and bolted together longitudinally of the motor. This type permitted the removal of the motor pinion from the end of the armature shaft without necessitating the employment of special tools, by simply opening the magnet frame and driving the pinion from the shaft. With the very general adoption of the box frame motor, however, the removal of the pinion became a much more difficult operation. The magnet frame of this type of motor is cast in a single piece. The pinion end of the shaft extends only a short distance beyond the frame head, so that a very small space is available between the pinion and frame head in which to apply a tool to drive the pinion from the shaft. It has been attempted to drive the pinion from the shaft by wedges inserted between the pinion and the frame head, but such methods are apt to break the frame head or split or mutilate the pinion. Special tools have been devised, but those employed heretofore have been complicated, cumbersome devices, difficult of operation and liable to injure the pinion or frame.

The embodiment of the invention herein described is especially adapted to remove the pinion from the shaft of a box frame railway motor, although it is obvious that the invention is not limited to this use but may be employed in various forms to remove a gear from its shaft in many other types of machinery.

An object of the invention is to provide a simple gear remover which may be easily applied and operated.

Another object of the invention is to provide an improved gear remover which will not injure the gear or adjacent parts of the machine.

Another object is to provide an improved pinion puller which will operate in the limited space provided between the pinion and frame of a box type railway motor.

Another object is to provide an improved gear remover in which the strain is equally distributed over the gear and in which there is a minimum liability to split the gear or mutilate the gear teeth.

The accompanying drawing illustrates one embodiment of the invention.

Figure 1 illustrates the pinion end of a box frame railway motor.

Fig. 2 is a perspective, partially in section, of the pinion puller.

Fig. 1 shows a railway motor having a magnet frame 1, cast in a single piece, so as to completely house the armature. The frame has a one-piece frame head 2, suitably bolted to the end of the frame. The armature shaft 3 projects through the frame head and carries at its end the usual motor pinion 4. A lock nut 5 on the end of the shaft, prevents the pinion working off the shaft. In practice, the clearance 6, between the pinion and the frame, is very small, with the result that it is difficult to introduce a tool to remove the pinion from the shaft. After the motor has been in service, it requires considerable force to remove the pinion.

The improved pinion puller illustrated in Fig. 2, has a cup or barrel 7, of a depth and diameter sufficient to completely inclose the gear or pinion which is to be removed. The barrel 7 is open at one end, and adjacent the open end the barrel is provided with internal teeth 8 corresponding in number and arrangement to the teeth on the pinion 4. The teeth 8 are preferably flush with the end of the barrel and extend inwardly along the barrel for a distance not greater than the width of the space 6, between the pinion and the frame head. The opposite end of the barrel is closed except for a central opening which is screw-threaded to receive a jack-screw 9, which is somewhat longer than the thickness of the end of the barrel, and is provided on its outer end with a square, or other shaped head 10, to receive a wrench. The head may be provided with a transverse opening 11, for the reception of a bar, in place of a wrench, for turning

the screw. At one point in the side of the barrel is an opening which is in alinement with one of the spaces between the gear teeth 8. This opening is preferably provided with a bushing 12, through which slides a key-pin 13. The key-pin extends within the barrel and its inner end is beveled to fit between the teeth of the pinion 4.

In operation, the jack-screw 9 is turned back until its inner end does not project within the barrel and the key-pin 13 is likewise drawn out of the barrel. The lock-nut 5 is then removed and the barrel is slipped over the pinion, the pinion teeth passing between the teeth 8 of the barrel. The barrel is forced over the pinion until the inner end of the pinion teeth clear the teeth 8, when the barrel is rotated sufficiently to bring the teeth 8 in alinement with the pinion teeth. The key-pin 13 is then driven in until its beveled end is firmly seated between the teeth of the pinion, thus preventing relative rotation of the barrel and pinion and insuring that the teeth of the pinion and the corresponding teeth 8 will remain in alinement. The jack-screw 9 is then turned by the application of a wrench, or other tool, so that its inner end thrusts against the end of the shaft 3. The thrust of the screw is exerted inward against the shaft and outward against the inner ends of the pinion teeth, and the pinion is readily forced off the shaft.

The key-pin holds the barrel in position, so that the thrust of the screw is transmitted equally to all parts of the pinion, and as the strain is exerted longitudinally of the pinion teeth, there is a minimum tendency to shear the teeth or split the pinion. No portion of the strain is transmitted to the motor frame or bearings, so that there is no liability to injury to the parts of the motor.

Obviously, the pinion puller may be made in any desired sizes to operate on any pinion, and the number of teeth 8 may be varied to correspond to the teeth on the gear to be removed. The device is comparatively small and light and may be transported and operated by one person, but is capable of exerting a very great force to safely and expeditiously remove pinions or gears, however tight the fit.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A gear remover having means exerting a thrust against the end of the gear, said means including an engaging member for each tooth of the gear wheel, said members being simultaneously operated to exert an equal thrust longitudinally on each gear tooth, whereby an equal distribution of the strain around the periphery of the gear is insured.

2. A gear remover having means corresponding in number and location with the teeth of the gear to be operated upon for exerting a thrust against the ends of the gear teeth, longitudinally of the gear axis, said means being simultaneously operated to insure an equal distribution of the strain on all of the teeth simultaneously.

3. A gear remover having means for exerting a thrust against the end of a gear shaft, and means for transmitting said thrust to the gear in an opposite direction, said last mentioned means including thrust-transmitting members corresponding in number and location to the teeth of the gear to be operated upon, whereby the strain will be equally distributed among the gear teeth and the thrust will be applied longitudinally against the ends of the gear teeth.

4. A gear remover having means for exerting a thrust against the end of a gear shaft, means for transmitting said thrust to the gear in an opposite direction, said means equally distributing the strain around the periphery of the gear and applying the thrust longitudinally against the ends of the gear teeth, and means for insuring the application of the thrust accurately in alinement with the gear teeth.

5. A pinion puller having a barrel for inclosing a pinion, and means for exerting a thrust against the end of the pinion shaft, said barrel having means having thrust-transmitting members corresponding in number and location to the teeth of the gear to be operated upon for transmitting said thrust in an opposite direction to said pinion and distributing the strain equally about the periphery of the pinion.

6. A pinion puller having a barrel for inclosing a pinion, one end of the barrel being open and provided with internal gear teeth and the opposite end having means for exerting a thrust against the end of the pinion shaft.

7. A pinion puller including a screw for exerting a thrust against the end of a pinion shaft, and a concentric thrust-transmitting member carried thereby, said member being rotatable on its axis into pinion-engaging position.

8. A pinion puller including a barrel adapted to inclose a pinion, said barrel having an open end provided with internal gear teeth corresponding in number and arrangement to the teeth of said pinion, and means for exerting a thrust against the end of the pinion shaft and transmitting said thrust through said internal gear teeth to the ends of the corresponding pinion teeth.

9. A pinion puller including a cylindrical barrel having a closed end and an open end, internal gear teeth in said barrel, and a jack-screw extending through the closed end thereof, said barrel being concentric with respect to said jack-screw and rotatable on its axis into pinion-engaging position.

10. A pinion puller having a barrel adapted to surround a pinion and shaft end, said barrel having an open end provided with internal gear teeth, means for positioning said internal gear teeth in alinement with corresponding teeth of the pinion, and means for exerting a thrust between the shaft end and the barrel in a direction to cause said internal gear teeth to force said pinion from its shaft.

11. A pinion puller including a cylindrical barrel having a closed end and an open end, internal gear teeth within said barrel, a jack-screw extending through the closed end thereof, said barrel being concentrically mounted with respect to said jack-screw and rotatable on its axis into pinion-engaging position, and means for locking said barrel in its rotated pinion-engaging position.

12. A pinion puller including a cylindrical barrel having a closed end and an open end, the open end having internal gear teeth, and a jack-screw extending through the closed end.

13. A pinion puller including a cylindrical barrel having a closed end and an open end, said open end having internal teeth, a key-pin extending through a wall of the barrel to lock the barrel against rotation, and means for applying a thrust internally against the closed end of the barrel.

In witness whereof I have hereunto subscribed my name.

GEORGE WM. DUNLAP.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."