Feb. 24, 1953 J. J. BYRNES 2,629,167

FAN PULLER FOR OIL BURNERS

Filed June 14, 1950

Fig. 1

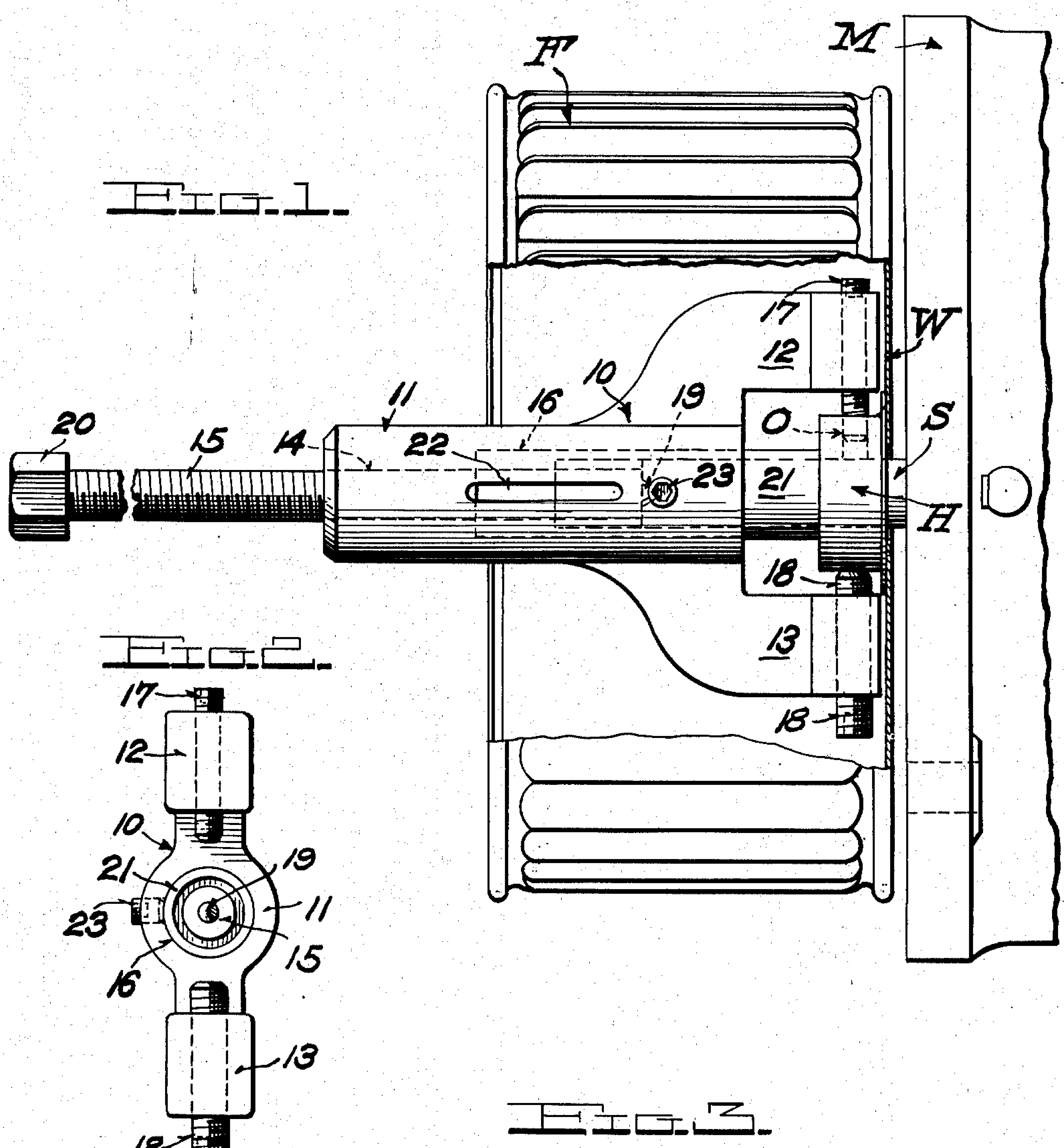


Fig. 3

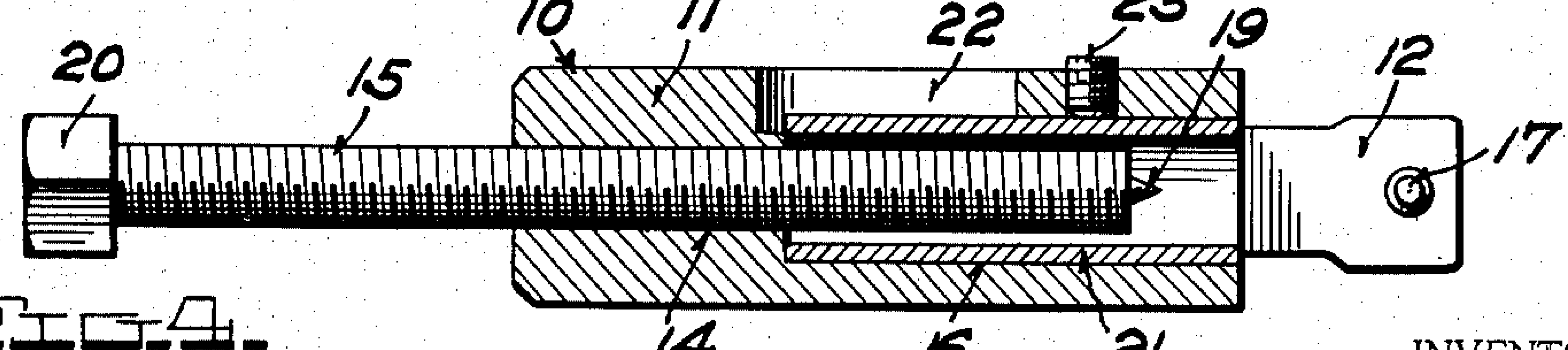
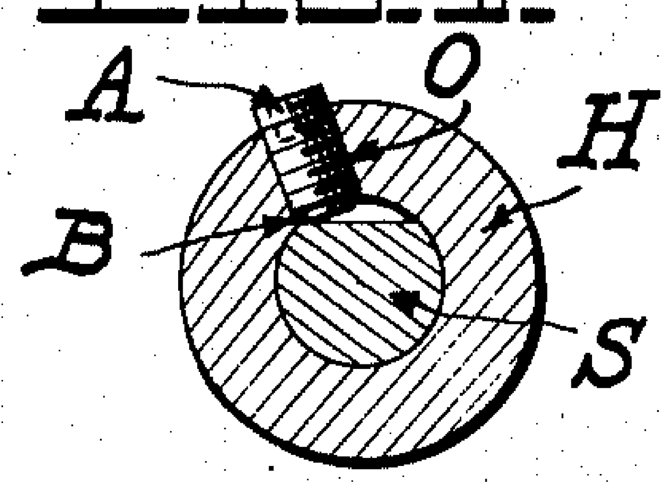


Fig. 4



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FAN PULLER FOR OIL BURNERS

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1 Claim. (Cl. 29—259)

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My invention is a tool to be used by oil burner service men for removing the fan or blower wheel from the shaft of an electric motor forming a part of an oil burner installation.

Such fans or blower wheels are of frail construction and usually comprise a sheet metal body with a hub to fit on the motor shaft and secured by an Allen screw that engages a flat on the shaft. Usually they are attached to the motor shaft in such a manner as to leave little space between the end of the motor and the back of the fan wheel, and hence, in field work it is very difficult for the service man to remove them without damage, especially when they become frozen or jammed on the motor shafts. Further, different oil burners have blower wheel hubs of different diameters and lengths, and the motor shaft ends on which the wheels are secure project different distances from the ends of the motor casings. In most of the domestic burner installations the motor shafts have diameters of either ½″ or ⅝″. While various pullers for removing wheel hubs, gears, cones and the like from shafts have been proposed, I know of none that can be used by the oil burner service man on the various installations he must service, even if the parts of such pullers are properly dimentioned.

It is therefore an object of the invention to provide a simple and practical device of this character which the service man may use on practically all the burners he must service, and which will enable him to quickly and easily remove the blower wheels without danger of injuring them.

Another object of the invention is to provide a pulling device of this character in which the pull will be in a straight line parallel with the shaft axis without regard to the diameter of the motor shaft or the extent to which it projects beyond the fan hub.

With the above and other objects and advantages in view, as will hereinafter appear, the invention resides in the novel combinations and arrangements of parts and in the novel features of construction described and claimed in the following specification, and shown in the accompanying drawings in which:

Fig. 1 is a side view of the improved puller shown in applied position with parts of the fan or blower wheel in section and parts broken away and omitted for clearness;

Fig. 2 is an end view of the tool;

Fig. 3 is a longitudinal section; and

Fig. 4 is a detail section through a motor shaft and a fan hub thereon.

Referring more in detail to the drawings the

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letter M denotes an end portion of the electric motor casing of an oil burner installation, S the motor shaft, and F a well known type of fan or blower wheel. The open cylindrical body of the latter has an end wall W to the center of which is fixed a cylindrical hub H. The latter has a bore to fit the shaft and a radial screw threaded opening O to receive an Allen screw A which is screwed against a flat on the shaft. As shown in Fig. 4, if the set screw becomes loose it frequently causes a burr B on the shaft making it difficult to pull the hub off of the shaft. In probably 90% of the domestic oil burner installations the motor shaft is of ½″ diameter and the fan hub is tapped for a $\frac{3}{16}$″ diameter Allen screw, while in the remainder of such installations the shaft is of ⅝″ diameter and the hub is tapped for a ¼″ diameter set screw. However some smaller fan hubs are tapped for the larger Allen screws and vice versa. The fan hubs vary in both length and outside diameter, and in some motors the shaft projects from the casing to a somewhat greater extent than in others.

My improved fan puller is generally indicated by the numeral 10 and its construction is such that it may be effectively used on practically all of the above indicated variations in oil burner installations. The tool 10 has a generally Y-shaped body with an elongated cylindrical portion 11 from the rear end of which project diametrically arranged, angular arms 12, 13. The cylindrical body portion 11, which serves as a handle, is formed with a two-diameter through bore, as seen in Fig. 3, the smaller diameter portion 14 being screw threaded for reception of a thrust screw bolt 15 which is coaxial with the larger diameter bore portion 16. The cylindrical bore 16 opens into the throat or space between the opposed arms 12, 13. This throat has a width and depth sufficient to receive the largest size hubs or fan wheels, since the arms 12 and 13 carry hub-engaging screws 17 and 18 respectively. These opposed and axially alined screws are preferably Allen screws, the screw 17 having a $\frac{3}{16}$″ diameter so that its inner end may be threaded into the screw hole of a fan hub for a ½″ shaft after the hub clamping screw has been removed from such hole, while the screw 18 has a ¼″ diameter to permit it to be threaded in the hole of a fan hub for a ⅝″ diameter shaft. When one of the screws 17 or 18 is threaded in the hole (of either diameter) of a fan hub, the other may be screwed into non-clamping contact with the opposite side of the hub to assist in obtaining a straight line pull when the tool is used.

The thrust or hub pulling screw 15 is preferably formed at its inner or front end with a 60° cone point 19 to enter the usual center drill socket in the end of the motor shaft; and while the front or outer end of the screw may be provided with any suitable means for rotating it, it is preferable to form on it a hexagonal or other flat faced head 20 with which a wrench or other turning tool may be engaged. But in order to prevent any canting or cocking of the tool and insure a straight line pull of the hub along the shaft, I provide the tube with means for sliding engagement of it with the end of the shaft that projects beyond the fan hub. The larger bore portion 16 of the body of the tool may be of a diameter to slidably receive the projecting end of the shaft and to accommodate shafts of smaller diameters one or more concentric telescoping sleeves may be arranged in the bore 16. As shown a single sleeve 21 is preferably used, the bore 16 having a ⅝" diameter to slidably receive a ⅝" motor shaft and the sleeve 21 having a ½" internal diameter to slidably receive a ½" motor shaft. Of course when the tool is used on a ⅝" shaft the sleeve 21 is removed, and to facilitate its removal from the bore, I provide in the body 11 a radial slot 22 which extends longitudinally and in which a suitable tool may be inserted to engage the inner end of the sleeve. The cylindrical sleeve 21 has the same length as the bore 16 but one end of the slot extends beyond the shoulder formed by the inner end of the bore, as seen in Fig. 3, so that an inserted tool may be readily engaged with the sleeve end. A set screw 23 of the Allen type is provided in the body to engage the sleeve and fix it in an adjusted position. The sleeve is adjusted outwardly of the bore according to the length of the projecting portion of the motor shaft S, but it is preferable to shift it outwardly or rearwardly to bring its end in contact with the hub H as shown in Fig. 1. Since the sleeve is held in axial alinement with the body of the tool and the sleeve cannot cant because of its sliding contact with the motor shaft, there will be a straight line pull on the hub when the screw rod 15 is rotated in the proper direction to pull the hub along the shaft.

Aside from the threaded engagement of either screw 17 or 18 with the threaded set screw hole in the hub H and the slidable guiding engagement of the sleeve 21 or other portion of the body of the tool one end of the shaft S projecting beyond the hub, the use of the tool is the same as the known pullers for removing gears, wheel hubs and the like from shafts. It is therefore believed the operation of the tool will be apparent from the foregoing and from what is shown in Fig. 1. The invention enables the oil burner service man to dispense with the carrying of pulling tools of different sizes and kinds, since the one improved tool will permit him to easily and safely remove practically all of the different sizes and kinds of blower wheels he will encounter in his service work on oil burners.

From the foregoing, taken in connection with the accompanying drawings, it will be seen that novel and advantageous provisions have been made for carrying out the objects of the invention, and while preferences have been disclosed, attention is invited to the possibility of making variations within the scope of the invention as claimed.

I claim:

In a tool for removing a hub from a shaft which has an end projecting beyond the hub, and the latter has a radial screw threaded hole for a set screw which normally fastens the hub to the shaft; an elongated body, an axially-arranged shaft-engaging thrust screw threaded in the front end of said body, means projecting rearwardly from the rear end of said body to fasten a hub to the tool, said means including diametrically-arranged hub-engaging screws threaded into extensions which project rearwardly from and laterally off-set from said body to provide an open throat of a size to receive hubs of different lengths and diameters, one of said hub-engaging screws being of a size to screw into a set-screw hole in the hub and the other hub-engaging screw being engageable with the exterior of the hub diametrically opposite its set-screw hole, the rear portion of said body having a cylindrical axial bore of a diameter to slidably receive the end of a shaft of large diameter, a cylindrical sleeve slidably arranged in said bore and having an internal diameter of a size to slidably receive a shaft of small diameter, said sleeve being projectable in a rearward direction beyond the rear end of said body into engagement with the hub on the shaft within said sleeve, and a radially disposed set screw in the rear portion of said body and engageable with said sleeve to lock it in an adjusted position, whereby the tool will be maintained in coaxial alignment with the shaft during the removal of the hub.

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