Feb. 15, 1955 J. H. STAAK 2,702,098

SHAFT LOCKING ARRANGEMENT

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Fig. 1.

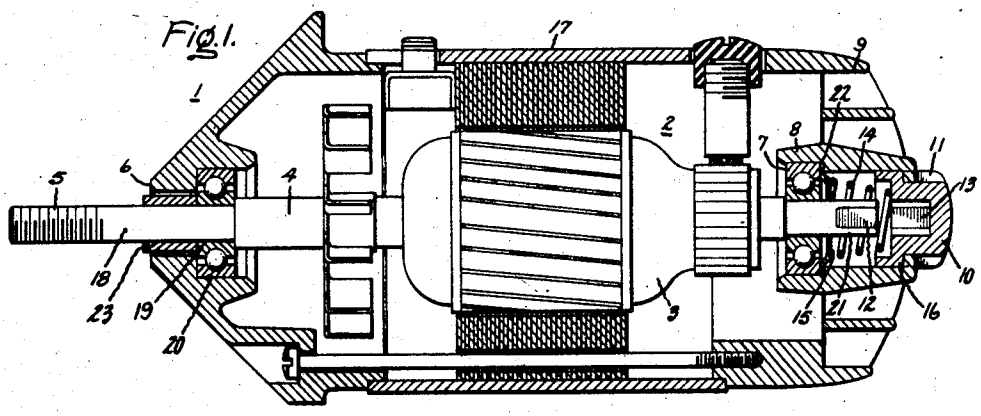


Fig. 2.

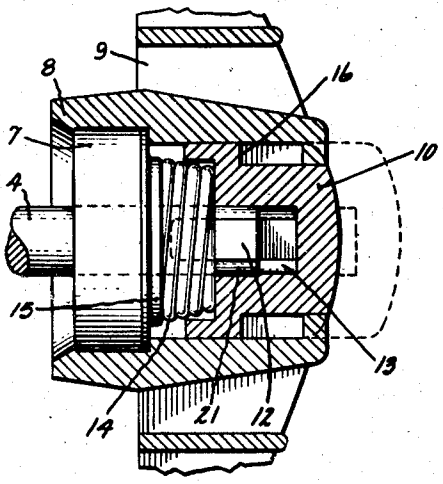
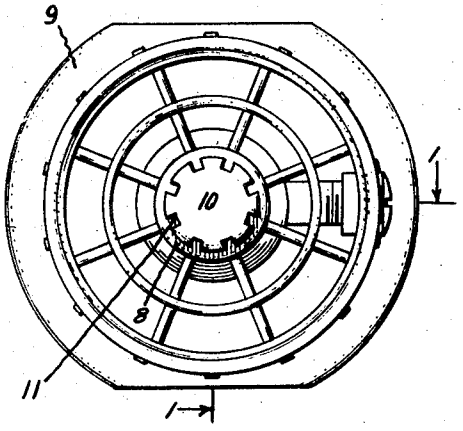


Fig. 3.



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SHAFT LOCKING ARRANGEMENT

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5 Claims. (Cl. 188—69)

This invention relates to locking arrangements and more particularly to an improved locking construction for the shaft of a manually operated electrical device, such as a hand shaper.

Hand shapers are generally designed to accommodate several different tools at the end of a motor-driven rotatable shaft. This is usually achieved by threading the end of the shaft, slipping a tool over the shaft against a collar in the housing, placing a stop collar against the tool, and then tightening a nut on the threaded portion of the shaft to hold the tool and the stop collar in place. To change tools the nut is taken off, the tool and stop collar are removed, another tool and the stop collar are replaced on the shaft, and the nut is tightened again. To perform this operation it is necessary that the shaft be prevented from rotation and, where the nut has been tightened at all excessively, that the shaper be held firmly; since an operator must use one hand to hold the shaper and the other hand to manipulate a tool to remove the nut it is desirable that there be some simple means of locking the shaft against rotation which will require no attention from the operator.

An object of this invention is therefore to provide a lock for a shaft which will not require manual operation by the operator.

Another object of this invention is to provide improved locking means for a shaft which will operate automatically when the device is placed on end on a hard surface with the motor at rest.

Further objects and advantages of this invention will become apparent and the invention will be better understood by reference to the following description and the accompanying drawing. The features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

The objects of my invention may be realized, in one embodiment, through the provision of a member, projecting from the end of a hand shaper opposite from the tool end, which may move axially of the shaft but which cannot rotate. This member is provided with a non-circular opening facing the shaft and the end of the shaft is given the same shape as the opening. When the shaper is placed on end the member slides inwardly, the opening in the end of the member slides over the projecting end of the shaft, and the shaft is thereby prevented from rotating. Removal of the shaper from its last mentioned position releases the pressure forcing the member inwardly. Biasing means are provided to cause the member to then return to its original projecting position and the shaft is again free to rotate since the formed end of the shaft no longer fits in the opening in the member.

In the drawing:

Fig. 1 is a side view, partly in cross-section on the line 1—1 of Fig. 3, of a hand shaper embodying the novel locking means of this invention;

Fig. 2 is a side view, partly in cross-section, of the novel locking means of this invention in operative position; and

Fig. 3 is an end view of that end of the shaper at which the novel locking means of this invention is located.

Referring now to Fig. 1 of the drawing there is shown a hand shaper generally indicated at 1. An electric motor 2 is mounted within shell 17 and has its rotor 3 mounted on a shaft 4 which has an extension 18 for mounting a tool (not shown). Shaft extension 18 is supported by

bearing 19 in recess 20 of housing 17 and threads 5 are provided on the end thereof. After the desired tool is slipped over threads 5 to rest against a collar 23, which projects very slightly beyond housing front 6 to permit rotation without interference from the housing, a collar (not shown) is placed against the tool, and a nut (not shown) is tightened on the threads to maintain the tool and the collar securely in place. Shaft 4 also has another extension 21 on the other side of motor 2. Shaft extension 21 is rotatably supported by a bearing 7 fixed to a stationary flange 8 which forms part of the end flange 9 of housing 17. A button-like member 10, preferably having a longitudinal axis coincident with the longitudinal axis of shaft extension 21, as shown, is keyed at 11 to flange 8. As is shown in Fig. 3 keyways may extend around the entire circumference of button 10, but fewer keyways will be equally advantageous.

The shaft extension 21 has one or more flat surfaces 12 formed thereon. An opening 13 inside button 10 is given the same form as shaft extension 21 with flat surface (or surfaces) 12. A spring 14, bearing against button 10 at one end, and against a flat member 15 held in recess 22 by bearing 7 at the other end, normally biases button 10 to its outward position; the outermost position of the button 10 is determined by flange 16 on the button.

Referring now to Fig. 2 the normal biased position of button 10 is shown in outline. When pressure is applied to button 10, as by standing shaper 1 on its end on a hard surface so that extension 18 of shaft 4 is uppermost, the button is depressed to the position shown, against the action of spring 14. Opening 13 then slides over shaft extension 21. Since button 13 cannot rotate because of keyways 11 (best seen in Fig. 3) shaft 4 is also prevented from rotating by the mating action of shaft extension 21 and of opening 13 in button 10. Thus, however tightly a nut may be screwed on to threads 5, the operator can be assured of a locked shaft merely by holding shaper 1 vertically on a relatively hard surface with one hand and manipulating the nut with the other. As soon as button 10 is released spring 14 will force it to its outer position, the travel of button 10 being limited by the location of flange 16. Shaft 4 is then free to be rotated again by motor 2.

It is now clear that this invention provides an improved shaft locking arrangement which will lock the shaft 4 of hand shaper 1 without any effort or attention on the part of the operator, and that this will occur with the shaper in a convenient position both for holding it and for manipulating a nut on threads 5. While the locking arrangement of this invention has been described in connection with a hand shaper, it may be used to equal advantage in any other comparable portable device where it is desirable for any reason to affirmatively maintain stationary a normally rotatable shaft.

While the invention has been explained by describing a particular embodiment thereof it will be apparent that improvements and modifications may be made without departing from the scope of the invention as defined in the appended claims.

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

1. In combination with a device having a stationary housing and a shaft rotatably mounted therein, improved means for locking said shaft against rotation comprising a member projecting through said housing and slidably keyed thereto, said member having a non-circular opening formed opposite an end of said shaft, said shaft end having a shape substantially similar to said opening, said member and said shaft being so arranged that an application of external force on said member will force the same over said shaft end to cause said shaft end and said opening to mate whereby said shaft is prevented from rotating, and means biasing said member away from said shaft end.

2. A hand tool comprising a substantially cylindrical housing, a motor mounted in said housing, a shaft extending from both sides of said motor and adapted to be rotated thereby, said shaft having an end extending outside one end of said housing, said shaft end being adapted to receive a tool, a button in said housing extending past the

end thereof which is opposite to said tool receiving shaft end, said button being slidably keyed to said housing to prevent rotation, said shaft and said button having a common longitudinal axis, said button having formed therein opposite the other end of said shaft a non-circular opening, said other shaft end having a shape substantially similar to said opening, said button and said other end of said shaft being arranged so that an application of force on said button from a source external to said housing will force said button over said other end of said shaft to cause the same and said opening to mate whereby said shaft is prevented from rotating, and spring means biasing said button away from said other shaft end.

3. In combination with a device having a stationary housing and a shaft rotatably mounted therein, improved means for locking said shaft against rotation comprising an axially slidable button extending through said housing and having a longitudinal axis coincident with the longitudinal axis of said shaft, a flange on said housing surrounding said button, said button being keyed to said flange thereby to prevent rotation of said button, said button having a non-circular opening formed opposite an end of said shaft, said shaft end having a shape substantially similar to said opening whereby an application of external force along the longitudinal axis of said button will force the same over said shaft end to cause said shaft end and said opening to mate whereby said shaft is prevented from rotating, and spring means biasing said button away from said shaft.

4. In combination with a device having a stationary housing and a shaft rotatably mounted therein, improved means for locking said shaft against rotation comprising an axially slidable button extending through said housing and having a longitudinal axis coincident with the longitudinal axis of said shaft, a flange on said housing surrounding said button, said button being keyed to said flange around its entire circumference thereby to prevent rotation of said button, said button having a partly circular opening formed opposite an end of said shaft, said shaft end having a shape substantially similar to said opening,

said button and said shaft end being so arranged that an application of external force along the longitudinal axis of said button will cause said button to slide toward said shaft to cause said shaft end and said opening to mate whereby said shaft is prevented from rotating, and coil spring means biasing said member away from said shaft.

5. In combination with an electrically driven hand tool having a stationary housing and a shaft rotatably mounted therein, improved means for locking said shaft against rotation comprising an axially slidable button normally projecting through and beyond the outside of said housing, a flange on said housing surrounding said button, said button being keyed to said flange around its entire circumference thereby affirmatively to prevent rotation of said button, said button having an opening whose cross-section comprises at least one flat surface opposite an end of said shaft, said shaft end having a shape substantially similar to said opening, said button and said shaft end being so arranged that an application of external force along the longitudinal axis of said button will cause said button to slide toward said shaft to cause said shaft end and said opening to mate whereby said shaft is affirmatively prevented from rotating, a bearing adjacent said shaft end rotatably supporting said shaft, a flat member secured to said bearing and facing said button, and a coil spring between said member and said button adapted to bias said button away from said shaft.

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