July 28, 1931. J. B. KIRBY 1,816,591

SCREW RETAINER

Filed Nov. 16, 1929

Fig. 1

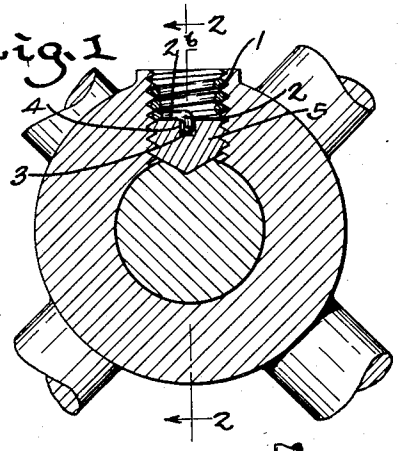


Fig. 2

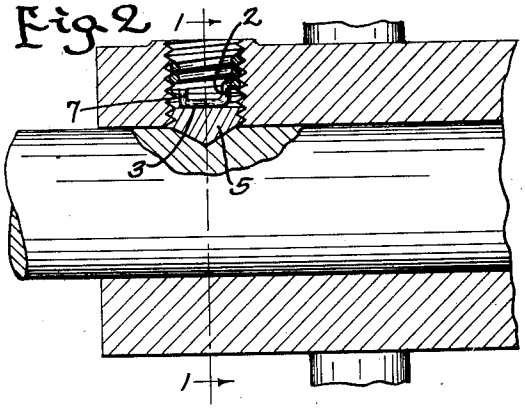




Fig. 3

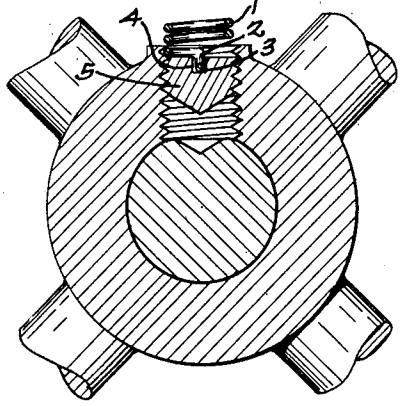


Fig. 5

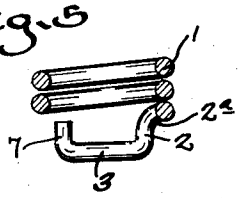


Fig. 4

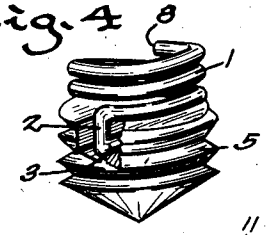


Fig. 6

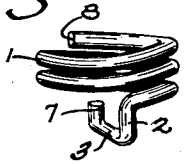


Fig. 7

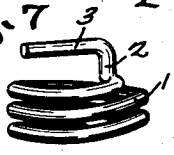


Fig. 10

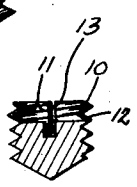


Fig. 9

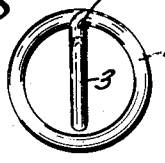


Fig. 8

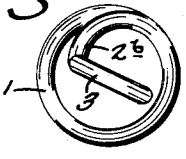
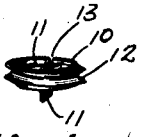


Fig. 11



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UNITED STATES PATENT OFFICE

JAMES B. KIRBY, OF WEST RICHFIELD, OHIO

SCREW RETAINER

Application filed November 16, 1929. Serial No. 407,634.

This invention relates to a retainer or locking device for screws and is herein shown and described in connection with a set-screw although not necessarily limited thereto as will be apparent to those skilled in the art. The objects of the invention are the provision of a very simple and inexpensive device capable of being applied to ordinary slotted screws to prevent their accidental loosening.

In the drawings accompanying and forming a part of this application I have shown an illustrative embodiment of my improvements. Figs. 1 and 2 are sectional views at right angles to each other of a shaft and pulley held together by a set-screw and containing my improvements; Fig. 3 is a sectional view similar to Fig. 1 showing the mode of applying my improved set-screw retainer; Fig. 4 is perspective view of the retainer applied to the set-screw in its operative relation, a part of the set-screw being broken away; Fig. 5 is a longitudinal sectional view through one of the retainers by itself; Fig. 6 is a perspective view of the retainer; Fig. 7 is a perspective view of a slight modification; Figs. 8 and 9 show alternative modes of starting the cross bar; and Figs. 10 and 11 are, respectively, a sectional view and a perspective view of a modification.

My improved screw-retainer comprises a helical metal element which may be either of wire or of sheet metal, preferably of somewhat springy or resilient nature although almost any common steel wire or strip metal will serve without special attention being paid to composition or temper. The wire or strip is formed so as to correspond to the direction of twist.

In Figs. 1 to 9 inclusive I have shown the device as made of wire twisted into the form of a helix. The wire at one end of the coil is bent, first in a direction parallel to the axis of the helix as shown at 2, and then diametrically across the axis of the helix as shown at 3 so as to rest in the bottom of the slot 4 with which the set-screw 5 is provided. The diameter of the wire is such that there is still room in the slot 4 for the blade 6 of a screw-driver after this retainer is in place. In Figs. 2, 5, and 6 I have shown the end of the wire as formed with a short return bend 7 opposite to and symmetrically located with respect to the bend 2, the better to guide the device during its application. In Fig. 7 this is omitted. The opposite end of the wire is cut off square as shown at 8 and it is desirable, though not necessary, that there should be a slight burr at this point. The outside diameter of the helix is such that the wire coil fits snugly into the threads.

In Figs. 10 and 11 I have shown a retainer made of sheet- or strip-metal, having a circular side-wall 10 and a diametral bar-portion 11 integral therewith. The exterior of the circular portion is formed with threads 12 and the end of the part 10 is spaced from the bar 11 to define a slot 13 which may subtend anywhere from about 1° to about 180°. In this form of the invention the bar 11 not only fills the slot of the screw but projects above it and a slotted tool (not shown) is employed to turn the screw and retainer. This device is made a trifle oversize so that it has to be contracted to introduce it into the socket.

It is essential when my improved screw retainer is used that the screw and the retainer be both received within the threaded aperture or socket; that is to say the slotted end of the screw is turned below the level of the end of the receiving threads. In practice the screw is first caused to enter the receiving thread until its slotted end is about level therewith as shown in Fig. 3, after which the retainer is inserted and the screw driver (or other tool) applied so as to advance the screw and retainer together to the bottom of the hole as shown in Figs. 1 and 2. When this retainer fits tightly in the threads as it should, the advancing movement of the screw is not noticeably impeded since the twisting of the helix contracts its diameter so that its turns follow smoothly along the receiving threads, but unscrewing is impeded by the fact that the friction of the wire or strip, aided by the engagement of the burr with the threads (when such

burr exists) causes the entire helix to expand in size and lock itself ever more tightly against the socket. Indeed when a device of the proper size is employed it is always difficult and sometimes impossible to remove the screw until the wire retainer is first forcibly pried out of the hole.

I do not limit myself to the use of any fixed number of turns of the thread; I prefer to use from one to four turns since this number affords easy asembling without taking up undue space, but less or more can be employed. The device is perfectly operative with a smaller number of turns although it becomes somewhat more difficult to install properly, and it is equally operative with a larger number of turns, the only disadvantage being that it may necessitate using either an uncomfortably short screwdriver or an uncomfortably deep socket.

When made of wire the portion 2 of the device is preferably displaced slightly inwardly from the cylindrical surface defined by the exterior of the helix, either by being bent abruptly inwardly as shown at 2^a in Figs. 5 and 9 or more slowly as shown at 2^b in Figs. 1 and 8. It will be understood that other slight changes can be made within the scope of my invention and I do not limit myself in any wise except as specifically set forth in my several claims which I desire may be construed broadly each independently of limitations contained in other claims.

Having thus described my invention what I claim is:

1. A screw-retainer consisting of a wire helix screwed into the socket above the screw and having a part located in the screw slot.

2. A screw-retainer consisting of an expansive and collapsible metal member having threads adapted to fit tightly the same threads which the screw fits and having a cross-piece projecting beyond said threads at one end and adapted to fit in the screw-slot.

3. A device for locking a screw in a threaded opening characterized by the device following and locking itself into the same threads which receive the screw.

4. A device for locking a set-screw consisting of an expansible element adapted to follow the screw into the same threads which the screw itself occupies, and by expansion to grip said threads frictionally and oppose the unscrewing of said screw.

5. A device for locking a screw in a threaded hole consisting of a part which fits the end of the screw and is rotated along with the screw, and a second expansible part integral therewith which enters the hole after the screw and frictionally grips the same threads which the screw passed in its entrance.

6. The combination of a screw having tool-engaging provisions, and a threaded socket in which said screw is introduced to a point below the top of the socket, of an expansive metal member screwed into the same threads outside of said screw and interlocked with said tool-engaging provisions.

7. The combination of a screw having a slot and a threaded socket in which said screw is seated, of an expansive metal member screwed into said socket outside of said screw and having a part engaging said slot.

8. The combination of a screw having a slot of an expansive friction member having a part adapted to enter said slot and a spiral portion adapted to be turned into the same threads as the screw.

In testimony whereof I hereunto affix my signature.

JAMES B. KIRBY.