Feb. 7, 1933. G. C. TROTTER 1,896,650

LOCK WASHER

Filed July 20, 1931

FIG. 1.

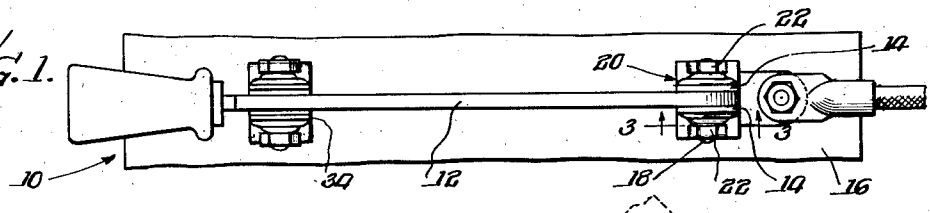


FIG. 2.

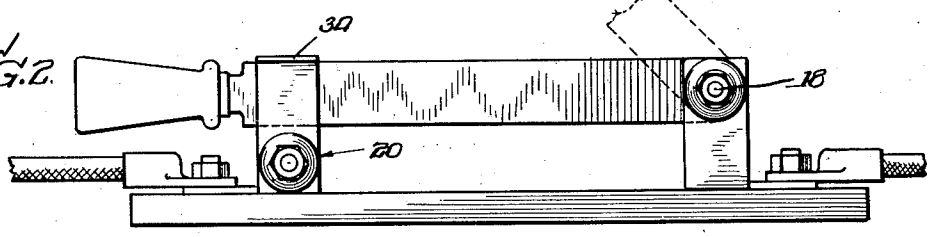


FIG. 3

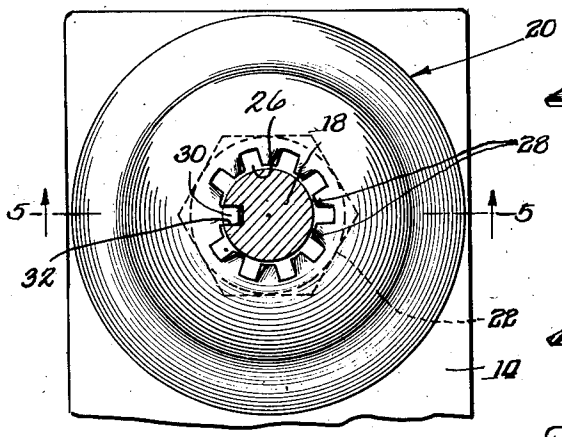


FIG. 4.

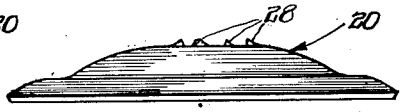


FIG. 5.

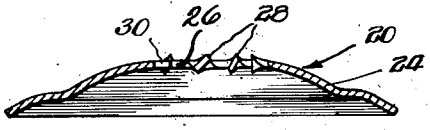


FIG. 6.

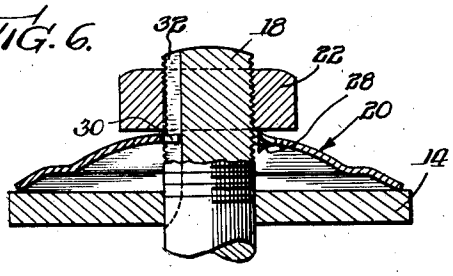


FIG. 8.

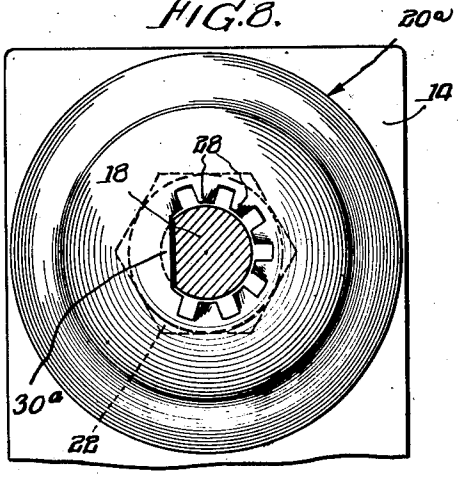
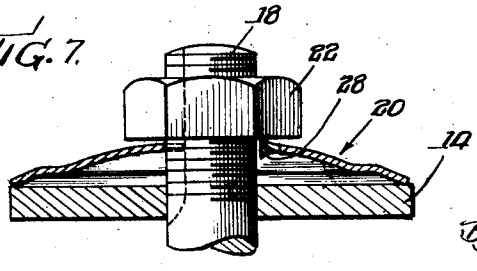


FIG. 7.



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Attys.

Patented Feb. 7, 1933

1,896,650

UNITED STATES PATENT OFFICE

GEORGE C. TROTTER, OF CHICAGO, ILLINOIS, ASSIGNOR TO SHAKEPROOF LOCK WASHER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE

LOCK WASHER

Application filed July 20, 1931. Serial No. 551,907.

My invention relates generally to lock washers and particularly to lock washers adapted for use with knife switches and the like.

One of the primary objects of my present invention is to provide a washer which is particularly adaptable for use in connection with pivoted devices such as knife switches and the like. In such devices it is common practice to employ a knife switch member which is pivotally mounted at one end between a pair of oppositely disposed plates or supports. A bolt extends through these supports and the pivotal switch member, and a nut is mounted on each end of the bolt for clamping the plates or supports against the sides of the switch member. In view of the continual shifting of the switch member within the side plates, said parts are subjected to wear, and hence, unless some provision is made to compensate for this wear, the switch will not be clamped in position between the plates. Underwriters' specifications usually require that the switch knife be capable of sustaining more than its own weight against the force of gravity when shifted out of contact with the clip on the switch. In other words, the knife must be capable of sustaining its own weight when occupying an open position so as to positively preclude the inadvertent closing of the switch.

My invention contemplates the provision of a washer which is particularly adaptable for use in securing switch elements or other devices of like nature in any position to which it may be shifted, and to this end I propose to provide a dished washer having a plurality of locking teeth or prongs positioned along the inner margin thereof for securing a nut against relative rotation with respect to said washer, and also having means for interlocking with the bolt upon which the nut is mounted for positively securing relative movement between the washer and bolt.

The foregoing and other objects and advantages will be more apparent from the following detailed description when considered in connection with the accompanying drawing, wherein—

Figure 1 is a plan view of a knife switch which is equipped with a washer constructed in accordance with the teachings of my invention;

Figure 2 is a side elevational view of the switch disclosed in Figure 1;

Figure 3 is an enlarged transverse sectional view taken substantially along the line 3—3 of Figure 1;

Figure 4 is a side elevational view of the washer disclosed in Figure 3;

Figure 5 is a central transverse sectional view taken substantially along the line 5—5 of Figure 3, disclosing the washer detached from the bolt;

Figure 6 is a transverse sectional view disclosing the washer in readiness to be clamped against the plate of the knife switch;

Figure 7 is a view similar to Figure 6 disclosing the washer after it has been clamped against the switch member; and

Figure 8 is a view similar to Figure 3 disclosing a washer having a slightly modified arrangement for securing said washer against relative rotation with respect to the bolt.

Referring now to the drawing more in detail wherein like numerals have been employed throughout the various figures for disclosing like elements, it will be seen that for the purpose of illustrating one practical application of my invention, I have disclosed the same in operative association with a knife switch designated generally by the numeral 10. This switch includes the usual knife element 12 which is pivotally mounted between a pair of resilient plates or supports 14, said supports being mounted upon a switch panel 16. The element 12 is adapted to be shifted between the closed position shown by the solid lines in Figures 1 and 2 and the dotted position shown in Figure 2.

Extending through the oppositely disposed plates or supports 14 and through the switch element 12 is a bolt 18 which is threaded at its opposite ends. Each end of this bolt extends through a lock washer designated generally by the numeral 20, and a suitable nut 22 is adapted to be clamped against said washer.

The lock washer 20 is formed from suitable spring stock and includes a dished annular

body portion 24 having a central aperture 26 which is surrounded by a plurality of prongs 28. These prongs 28 are warped out of the plane of the washer stock so as to present sharp work engaging edges or corners to lockingly engage the clamping surface of the companion nut 22.

The washer 20 is also provided with an inwardly extending tongue or key 30 which is adapted to be received by a companion recess or key-way 32 provided in the bolt 18. As the nut 22 is clamped against the sharp teeth of the prongs 28, relative rotation between the washer and the bolt is prevented by the tongue 30. The clamping of the nut against the washer causes same to be somewhat flattened so that the outer margins of the washer resiliently bear against the outer surface of the plate or support 14. The nut 22 are tightened until the required amount of clamping force is exerted by the plates 14 against the sides of the pivoted switch element 12, and under these circumstances the washer assumes the position shown in Figure 7. Should the continual pivoting of the switch member 12 have a tendency to effect rotation of the bolt 18 or cause wear between the contact surfaces of the switch member and plates, the washer 20 serves, in the first place, to prevent rotation of the bolt, and, in the second place, serves to take up any wear to which the parts may be subjected. Thus the washer not only serves to positively prevent relative rotation between the bolt and the nuts, but also serves to continually force the plates 14 into frictional engagement with the knife switch element 12.

In a co-pending application of Carl G. Olson, Serial No. 467,649, filed July 14, 1930, a washer is disclosed which is constructed somewhat along the line of the washer disclosed in the present application. My improved washer, however, has certain structural advantages not shown in the co-pending application. For example, the washer 20 disclosed herein is positively prevented from rotating with respect to the bolt, and this construction serves to prevent loosening of the nut when the nut is clamped against the washer teeth. Furthermore, the outer margin of my washer is not formed with sharp work engaging prongs, and therefore lends itself for use in instances where the nature of the switch is such that grooves or notches should not be cut into the surface against which the lock washer is to be clamped. By employing a washer of my improved design, the pivoted switch element may be successively shifted to its open position without subjecting said switch element to the potential hazard of inadvertently closing as a result of wear or loosening at its pivotal mounting. The washer is not limited for use at the pivotal mounting of the switch element, but may also be used to secure the opposite sides or walls of the resilient clip member 34 which receives the switch element 12 when it is closed. In other words, the washer of my improved design may be used in any instance where the parts which it secures, are subjected to vibration, wear, or relative shifting.

In Figure 8 I have disclosed a washer indicated generally by the numeral 20*a*. This washer is similar to the washer 20, the only difference in structure being that the tongue or key 30 is eliminated and in its place a section 30*a* is provided along the inner margin of the body portion to engage the flat surface provided on the bolt.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A lock washer formed from spring stock including an annular dished body portion, the outer margin of which is adapted to clampingly engage a work piece, a plurality of radial prongs spaced along the internal margin of said body portion, said prongs being warped so as to present sharp work engaging teeth out of the plane of said body portion for lockingly engaging the clamping surface of a rotary tightening element such as a nut, and means provided on the washer for interlocking with an element adapted to extend through the washer and receive said nut, whereby to prevent relative rotation between said parts.

2. A lock washer formed from spring stock including an annular dished body portion, the outer margin of which is adapted to clampingly engage a work piece, a plurality of radial prongs spaced along the internal margin of said body portion, said prongs being warped so as to present sharp work engaging teeth out of the plane of said body portion for lockingly engaging the clamping surface of a rotary tightening element such as a nut, and means positioned along the internal margin of the body portion for interlocking with an element adapted to extend through the washer and receive said nut, whereby to prevent relative rotation between said parts, the portion of said outer margin which engages the work piece being free from serrations or teeth, whereby to avoid disfigurement of the surface against which the washer is clamped.

In witness whereof, I have hereunto subscribed my name.

GEORGE C. TROTTER.