

J. D. PRINCE.
 LOCKING WASHER FOR NUTS AND BOLTS.
 APPLICATION FILED DEC. 23, 1911.

1,043,721.

Patented Nov. 5, 1912.

Fig. 1.

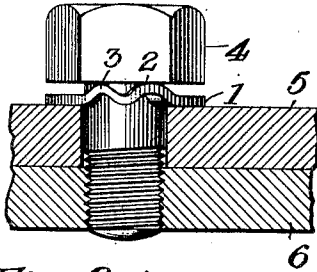


Fig. 5.

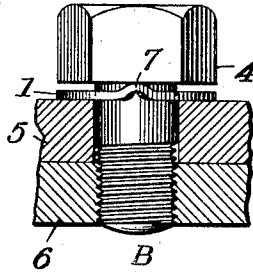


Fig. 9.

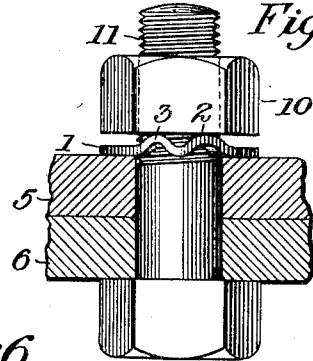


Fig. 2.

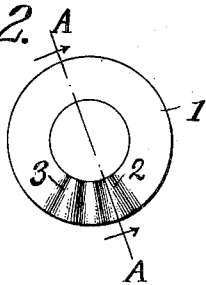


Fig. 6.

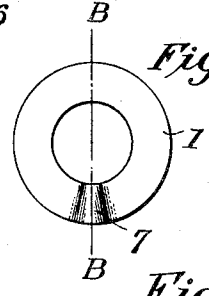


Fig. 10.

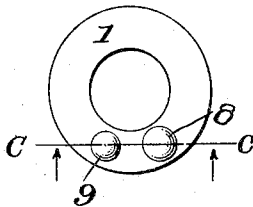


Fig. 3.



Fig. 7.



Fig. 11.



Fig. 4.



Fig. 8.



Fig. 12.



Fig. 13.

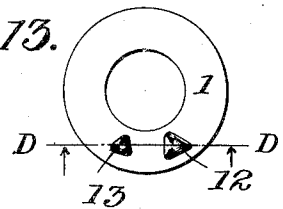


Fig. 16.

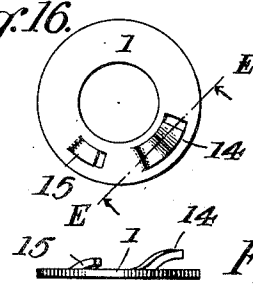


Fig. 14.



Fig. 17.

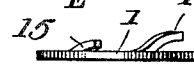


Fig. 15.

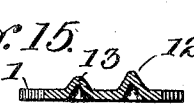


Fig. 18.



Witnesses.

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LOCKING-WASHER FOR NUTS AND BOLTS.

1,043,721.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN D. PRINCE, a citizen of the United States, and resident of the borough of Manhattan, in the city and State of New York, have invented a new and useful Improvement in Locking-Washers for Nuts and Bolts, of which the following is a specification.

This invention relates to a locking washer for nuts and bolts, and has for some of its objects to provide an article of this kind which will be very cheap and easy to manufacture, which will be adapted for use in connection with any known form of nut or bolt without requiring any change whatever in them, which will be light, and which will be for all practical purposes an absolute lock.

Other objects are to provide the particular form and structure herein shown and described whereby the above named objects may be effectively carried out.

Practical embodiments of my invention are shown in the accompanying drawings, in which—

Figure 1 represents a side elevation of the preferred form in locking position on a screw bolt, Fig. 2 represents a plan view of the locking washer, Fig. 3 represents a side view of the same, Fig. 4 represents a section taken in the plane of the line A—A of Fig. 2, looking in the direction of the arrows, Fig. 5 represents a side elevation of a modified form in locking position on a screw bolt, Fig. 6 represents a plan view of this form, Fig. 7 represents a side view of the same, Fig. 8 represents a section taken in the plane of the line B—B of Fig. 6, Fig. 9 represents a side elevation of another modified form in locking position on a bolt and nut, Fig. 10 represents a plan view of this form, Fig. 11 represents a side view of the same, Fig. 12 represents a section taken in the plane of the line C—C of Fig. 10, looking in the direction of the arrows, Fig. 13 represents a plan view of another form, Fig. 14 represents a side view of the same, Fig. 15 represents a section taken in the plane of the line D—D of Fig. 13, looking in the direction of the arrows, Fig. 16 represents a plan view of another form, Fig. 17 represents a side view of the same, and Fig. 18 represents a section taken in the plane of the line E—E of Fig. 16, looking in the direction of the arrows.

Referring to the form shown in Figs. 1

to 4, inclusive, the locking washer is denoted by 1, and is, in general, similar to an ordinary washer; that is, for the greater part it is a substantially flat ring intended to be composed of suitable metal such as steel, iron, brass, etc. One side of the washer is, however, bent up so as to form a plurality of corrugations, grooves, or ridges. These corrugations are denoted by 2 and 3 and it will be seen that the corrugation 2 is higher than, or in other words is bent more out of the plane of the remainder of the washer, than is the case with regard to the corrugation 3. The corrugation 2 is also greater in width than the corrugation 3. The part of the washer which is formed in these corrugations is composed of a springy material for the purpose of giving locking efficiency to the article, as will be hereinafter fully described. It will be noted that these corrugations 2, 3, are both contained within one-half of the washer considered as a circle or ring, and that they thus render the effective thickness or height of the washer on this side much greater than its effective thickness or height on the other side. In the figures referred to, the corrugations are shown as being adjacent to each other, but this is not essential to the invention so long as the corrugations are within the same half of the washer as above mentioned. The washer is shown, in Fig. 1, in locking engagement with a screw bolt 4 which passes through a pair of pieces of material 5, 6, for the purpose of securing them together, and the operation of this form may be well explained in connection with the showing of this figure.

In using the locking washer, it is placed about the shank of the bolt, in the same manner that ordinary washers are positioned and the bolt then tightened down until it engages the highest corrugation 2 of the washer. After this engagement is reached, the further screwing down of the bolt will depress this corrugation 2, causing it to act as a spring resisting the further inner movement of the bolt and also tending to lock it against unscrewing. As the corrugation 2 is depressed, it will tend to distort the washer as a whole, by tending to force the material of the washer endwise or lengthwise with respect to the circumference of the same. This tendency will also cause the lower corrugation 3 to rise somewhat. Thus, as the bolt is screwed down it will be en-

gaged first by the higher corrugation 2 and if forced down hard enough will subsequently engage the lower corrugation 3. The effect of the engagement of the bolt head with one or both of these corruga-
 5 tions, will be to cause the latter to act as a spring lock, forcing the sides of the threads of the bolt against the sides of the grooves in the material receiving said
 10 threads and thus locking the bolt against unscrewing. A further and contemporaneous action of the washer will be to tend to tilt the bolt and thus cramp its threads in the grooves in the material which receive said threads, this action also tending
 15 to hold the bolt against unscrewing.

For light work it may be found sufficient to screw the bolt down far enough to lightly engage the higher corrugation 2. For
 20 heavier work it may be desirable to screw the bolt down still farther, even until it engages the lower corrugation 3 and forces the latter somewhat out of its normal shape. When forced down to the last mentioned
 25 point the locking action of the washer, due to its spring character, and also to its cramping character, owing to the fact that its effective thickness is greater on the side containing the corrugations than on its op-
 30 posite side, will be sufficiently strong to positively prevent the unscrewing of a bolt or nut used in any character of work.

The form shown in Figs. 5 to 8 inclusive, is the same in every respect as the form just
 35 described except that it has only one corrugation 7. This form of locking washer will have the spring action referred to and also the wedging and cramping action referred to, but it would not have the auxiliary action
 40 of the second corrugation shown in the previously described form. This form of washer would, other things being equal, be used for a lighter class of work than the form shown in Figs. 1 to 4 inclusive.

Referring to the form shown in Figs. 9 to 12 inclusive, the washer is similar in every
 45 respect to the washer shown in Figs. 1 to 4 inclusive, except that, instead of having a pair of corrugations of unequal height, it has a pair of hollow hemispherical projec-
 50 tions 8, 9, of unequal height and diameter. The action of this form of washer would be exactly the same as that shown in Figs. 1 to 4 inclusive. It is shown in Fig. 9 in lock-
 55 ing engagement with a nut 10 screwed onto a bolt 11, which passes through a pair of pieces of material similar to those already described for the purpose of illustrating the operation of the device.

Referring to the form shown in Figs. 13 to 15 inclusive, its operation is the same in
 60 every respect as that shown in Figs. 1 to 4 inclusive, except that, instead of the corrugations referred to, it has a pair of hollow
 65 projections 12, 13, substantially triangular

in cross section, and unequal in height and cross section.

Referring to the form shown in Figs. 16 to 18 inclusive, the washer operates in the
 same manner as that shown in Figs. 1 to 4 inclusive, except that instead of being
 70 provided with the corrugations referred to, it has a pair of upwardly extending tongues 14, 15, unequal in length and width.

Referring to all of the figures, the upper
 75 projections, whether they be corrugations or of other form, are composed of spring material so as to function in the manner described with regard to the preferred form shown in Figs. 1 to 4 inclusive.

It will be seen that this locking washer is extremely simple to manufacture; inasmuch
 as it may be stamped from a blank at one operation: that it is light and easy to be
 80 used, being applied in the same manner as an ordinary washer: and that it is applicable for use in any position in which an ordinary washer may be used.

Being adapted for application beneath the
 nut instead of above it or after it, this lock-
 90 ing device may be used under circumstances where the bolt does not project through the nut. This enables it to be adapted readily in connection with locking the bolts of fish
 95 plates on railroad rails; whereas a locking device which follows a nut will be inapplicable because it is a custom to make the bolts so short that they do not project
 through the nuts, in order to economize metal. This locking device further has the
 100 characteristic which is almost essential to great success, viz; that it does not require any change in the form or construction, or any particular kind of bolt or nut.

It will be understood that various changes
 105 may be made in the form and structure of this locking device without departing from the spirit and scope of the invention; hence I do not wish to be limited to the forms particularly shown and described.

What I claim is:—

1. An article of the character described comprising a continuous ring having a por-
 110 tion of its circumference bent out of the plane of the remainder, the said bent portion being encompassed within one half of the circumference and composed of springy material, and the effective thickness of the ring being greater at the bent portion than
 115 throughout the remainder of its circumference.

2. An article of the character described comprising a ring having a plurality of por-
 120 tions of its circumference composed of springy material and bent out of the plane of the remainder, one of said portions being bent out of the plane of the remainder of the ring to a greater extent than the other
 125 portion.

3. An article of the character described 130

comprising a ring having a plurality of portions of its circumference composed of springy material and bent out of the plane of the remainder, the effective thickness of the ring being greater at the bent portions than throughout the remainder of its circumference, and the effective thickness being greater at one of the bent portions than at the other.

- 10 4. An article of the character described comprising a ring having a portion of its circumference bent out of the plane of the remainder in a plurality of places, the said bent portions being encompassed within one
15 half of the circumference and composed of springy material, and one of them being bent out of the plane of the ring to a greater extent than the other, the portion of the

ring including the bends being of a greater effective thickness than the remainder.

5. An article of the character described comprising a ring having a plurality of portions of its circumference composed of springy material and bent out of the plane of the remainder, one of said portions having a greater springy resistance than the other.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this nineteenth day of December 1911.

JOHN D. PRINCE.

Witnesses:

F. GEORGE BARRY,
HENRY C. THIEME.