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SPRING WASHER.

APPLICATION FILED FEB. 20, 1911.

1,010,391. Patented Nov. 28, 1911.

Fig. 1.

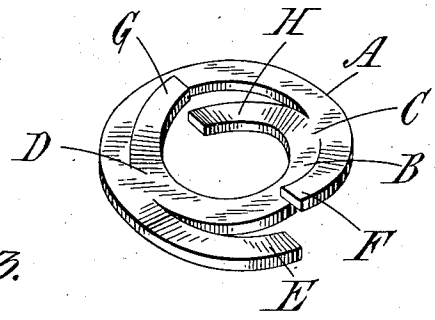


Fig. 3.

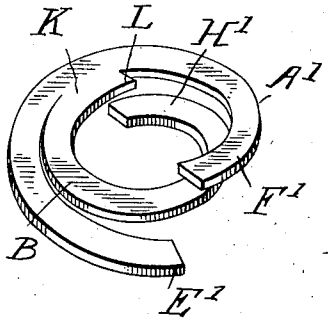
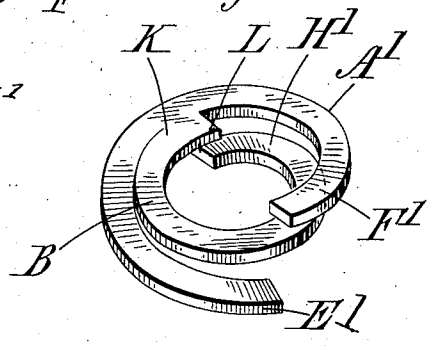


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SPRING-WASHER.

1,010,391. Specification of Letters Patent. Patented Nov. 28, 1911.

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To all whom it may concern:

Be it known that we, JOHN McIVOR LAMBIE, CHARLES ROBERT WRIGLEY, and JOHN LAMBIE, subjects of the King of England, residing at London, England, have invented certain new and useful Improvements in Spring-Washers, of which the following is a specification.

This invention relates to spring washers and has for its object to provide an improved washer which is efficient in operation and at the same time cheap to manufacture.

We are aware that resilient circular tongues of different radii are not in themselves new.

According to this present invention the washer has resilient tongues situated at different distances from its center and bent out of the plane of the blank from which it is formed, and so disposed around the axis of the machine that the action of any tongue tending to tilt it is counterbalanced by the action of the other tongues. The tongues are portions of annuli of different radii concentric with one another and the washer, the ends of the tongues being forced out of the original plane of the blank. Further the spring washer preferably consists of two concentric severed annuli with their ends forced out of the original plane of the blank and with an integral connection of the companion rings one with the other which is constituted by an unbent portion of the blank and situated at one or at more than one place on the circle of said blank.

In the accompanying drawings:—Figure 1 is a perspective view of one form of washer according to this invention, and Fig. 2 is a perspective view of a modification. Fig. 3 is a perspective view of another modification.

Referring to Fig. 1 the washer is constructed out of a flat blank of metal or other suitable material by stamping or otherwise, and consists of two concentric rings A and B. These rings A and B are severed by means of cuts of substantially circular form but not extending completely around the washer, the rings remaining connected together at two places C and D, which preferably lie on a diameter. On a diameter substantially at right angles to that on which the points C and D lie the rings A and B are cut by means of radial cuts. Thus on the ring A two tongues E and F are produced, and on the ring B two tongues G and H are produced. These tongues are bent in opposite directions out of the plane of the blank, in this case the tongue E being bent downward, tongue F upward, and the tongues G and H being bent upward and downward respectively. The tongues thus formed serve as springs.

Referring to Fig. 2, the outer ring A^1 and the inner ring B^1 are joined together at one point only K, there being a cut of circular form extending almost completely around the washer. The outer ring is severed at a point opposite K, thus forming two tongues E^1 and F^1, and the inner ring is severed at a point close to K, only one tongue H^1 being formed. The three tongues E^1, F^1 and H^1 are bent out of the plane of the blank in a similar way to that which is adopted in the washer illustrated in Fig. 1. At the point of severance of the inner ring in Fig. 3 the angular portion L^1, instead of being flat as in Fig. 2 can be bent out of the plane of the blank, so as to serve as an additional tongue.

It is obvious that various modifications may be made in the method of carrying this invention into effect, for example the washer may comprise more than two annular portions, and the tongues may be arranged and formed in any other fashion equivalent to that illustrated in the drawings.

What we claim as our invention and desire to secure by Letters Patent is:—

1. A spring washer comprising a resilient blank having a bolt opening and provided with substantially circular concentric slits and radial slits intersecting the respective circular slits, the blank portions between the respective slits constituting spring tongues of different radii, there being an integral blank portion connecting adjacent ends of the spring tongues.

2. A spring washer comprising a resilient blank having substantially circular tongues of different radii consisting of two substantially concentric severed rings with their ends forced out of the original plane of the blank and with an integral connection of the companion rings one with another (such for example as at C or L) at one or more than one place in the circle of the blank.

3. A spring washer comprising a resilient blank provided with a bolt opening, an arcuate slit substantially concentric with the bolt

opening, and a substantially radial slit extending from the arcuate slit to the bolt opening, the portions of the washer between the slit and the bolt opening being bent outwardly in opposite directions at opposite sides of the radial slit to form spring tongues.

4. A spring washer comprising a resilient blank having a bolt opening, a substantially concentric slit and a substantially radial slit extending from the concentric slit through the outer periphery of the blank, the material of the blank at opposite sides of the radial slit being bent laterally outward in opposite directions to form spring tongues.

5. A spring washer comprising a resilient blank provided with a bolt opening, an arcuate slit substantially concentric with the bolt opening and a substantially radial slit intersecting the arcuate slit, a portion of the blank at one side of the radial slit being bent outwardly to form a spring tongue.

6. A spring washer comprising a resilient blank having a bolt opening, diametrically opposite arcuate slits substantially concentric with the bolt opening, a substantially radial slit intersecting one of the slits and the bolt opening, and another substantially radial slit intersecting the other arcuate slit and the outer periphery of the blank, the portions of the blank at opposite sides of the radial slits being bent laterally in opposite directions to form spring tongues.

7. A spring washer comprising a blank having a bolt opening, a substantially circular slit surrounding the bolt opening, a radial slit extending from the arcuate slit to the bolt opening, the blank portion between the bolt opening, the arcuate slit and the substantially radial slit being bent laterally outwardly to form a spring tongue, and a substantially radial slit extending from the arcuate slit through the outer periphery of the blank, the blank portions at the opposite sides of the last mentioned radial slit being bent laterally outward in opposite directions to form spring tongues.

8. A spring washer comprising a resilient blank having a bolt opening, a substantially circular slit surrounding the bolt opening, and a substantially radial slit intersecting the bolt opening and the substantially circular slit, the blank portion between the bolt opening and the slits forming a spring tongue having its free end bent to one side of the blank and its opposite end bent to the opposite side of the blank.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN McIVOR LAMBIE.
CHARLES ROBERT WRIGLEY.
JOHN LAMBIE.

Witnesses:
HARRY G. BRIDGE,
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