May 9, 1939. L. A. YOUNG 2,157,516

WASHER

Filed Oct. 18, 1937

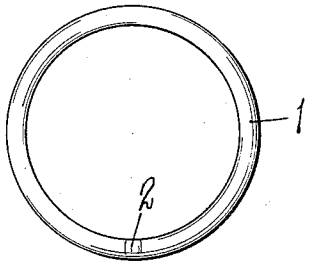


Fig. 1.

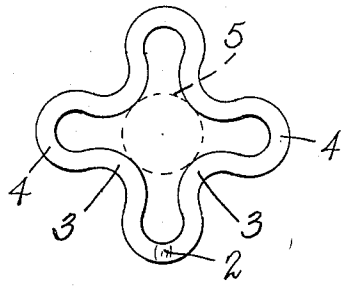


Fig. 2.

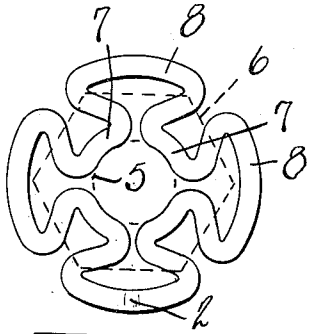


Fig. 3.

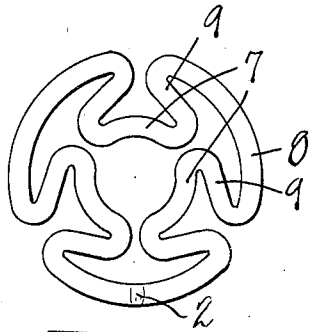


Fig. 4.

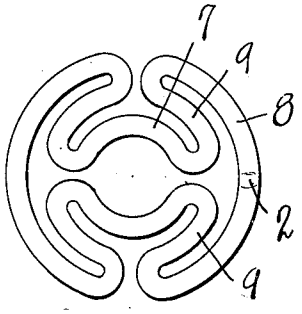


Fig. 5.

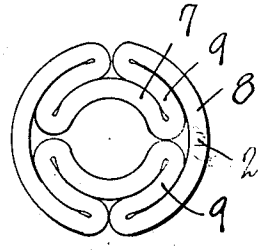


Fig. 6.

INVENTOR.

BY Leonard A. Young

Earl T. Chappell

ATTORNEYS

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WASHER

Leonard A. Young, Detroit, Mich.

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4 Claims. (Cl. 85—50)

This invention relates to improvements in washers.

The main objects of this invention are:

First, to provide an improved article of manufacture in the form of a washer which is effective for the purpose intended and formed entirely of wire stock.

Second, to provide a washer which may be manufactured without any waste of stock.

Third, to provide a washer which is efficient for the purpose and at the same time is relatively light in weight.

Fourth, to provide a novel and improved method of forming washers of wire or rod stock to minimize the weight thereof and eliminate wastage.

Objects relating to details and economies of the invention will appear from the description to follow.

The invention is defined and pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a plan view of an annular blank from which the washer is formed and illustrating one step in the manufacture thereof.

Fig. 2 is a plan view illustrating a second step in the manufacture.

Fig. 3 is a plan view of a completed washer, a bolt and nut being indicated by dotted lines in relation thereto.

Fig. 4 is a plan view of a slightly modified form or embodiment of the invention.

Fig. 5 is a plan view of a still further modification or adaptation of a washer embodying the invention.

Fig. 6 is a modification of the embodiment shown in Fig. 5.

In the manufacture of the commonly used type of machine washers now on the market it is the common practice to stamp them from the sheet stock which results in a large amount of waste in the stock and also finishing operations are commonly required such as tumbling to remove the burr incident to the cutting.

I am also aware that it has been proposed to make lock washers by coiling flat strips edgewise on mandrels. This commonly requires further treatment as the coiling on edge is likely to set up distortion stresses so that so far as I have observed, the product is not uniform without additional steps being performed thereon.

By my method, the improved washers may be produced very economically from wire stock without any waste and by very simple machinery and result in a very uniform product. Further, material is not only saved in manufacture but the resulting washers are light which is a desirable feature in many relations—for example, automobiles, and the stock of the washer is so disposed that it effectively supports the nut and has a substantially increased gripping action as compared to a flat washer.

In the accompanying drawing, 1 illustrates the first step in the method of manufacture of my improved washer—namely, forming a piece of wire into a ring and welding the ends at 2 to form a continuous ring or annulus. The means for forming the ring are not illustrated as they form no part of this invention.

The ring or annular blank 1 is then formed into convolutions by insetting segments 3 thereof, as shown in Fig. 2, providing outwardly facing curved portions joined at their ends to the inwardly facing segments or curved portions 4.

As shown in Fig. 2, I indicate a mandrel 5 which is of a diameter corresponding to the bolt or slightly larger than the bolt on which the washer is to be used.

At 6 I indicate a nut to show the relation of the washer to a bolt and nut.

The next step is to upset the convolutions by radial pressure thereon and in a suitably formed die or support, resulting in the forming of a plurality of inwardly curved segmental inner reaches 7 providing a bolt opening and a plurality of segmental outer reaches 8 overlapping the inner reaches angularly, the ends of the reaches being joined by the arms 9. The inner reaches form the eye for the bolt or an opening to receive the bolt while the inner and outer reaches are disposed concentrically of the opening or eye and with the arms constitute the body of the washer and an effective support for the nut.

In the embodiment shown in Fig. 4, there are three of the inner and outer reaches 7 and 8 as compared to the four shown in Fig. 3; otherwise the structure is the same, the rings of course being lengthened.

In the embodiment shown in Fig. 5, there are only two of the inner and outer reaches.

In Fig. 6, the outer reaches of Fig. 5 are compressed until the arms 9 are completely collapsed and contact both the inner and outer reaches or segments.

The washer of all these embodiments is effective for the purpose intended. The washers

are light. There is no waste in the manufacture thereof.

I have illustrated and described my improvements in embodiments which I consider very practical. I have not attempted to illustrate or describe other modifications or adaptations as it is believed that this disclosure will enable those skilled in the art to embody or adapt my improvements as may be desired.

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

1. A washer formed of an annular wire element conformed to provide a plurality of segmental annularly disposed inner reaches having adjacent portions in concentric and closely adjacent angular relation to provide a substantially continuous bolt receiving opening, and a plurality of segmental annularly disposed outer reaches of substantially greater radius and arc than said inner reaches and generally concentric therewith, the ends of the outer reaches overlapping angularly the adjacent ends of the inner reaches, said inner and outer reaches being integrally connected at their ends by outwardly converging arm-like reaches, said outer reaches having their adjacent ends in close concentric and angular relation to provide a substantially continuous external periphery for the washer, the ends of the wire element being integrally joined.

2. A washer formed of an endless wire element conformed to provide a plurality of separate segmental annularly disposed inner reaches having adjacent portions in close angular relation to provide a substantially continuous bolt receiving opening, and a plurality of segmental annularly disposed outer reaches of greater radius and arc than said inner reaches and generally concentric therewith, said inner and outer reaches being integrally connected at their ends, and the outer reaches having adjacent portions in close angular relation to provide a substantially continuous periphery for the washer.

3. A washer formed of wire stock and comprising an inner and an outer series of complementary annularly disposed outwardly curved segmental reaches, the inner reaches providing a bolt receiving opening, the reaches of each series being symmetrically disposed relative to each other and the reaches of the inner and outer series being symmetrically disposed in alternating relation and with the ends of the inner and outer reaches in overlapping relation, the ends of the reaches of the inner and outer series being joined by similarly shaped and similarly disposed outwardly converging reaches, the said several reaches being continuous one with another.

4. A washer formed of wire and comprising an inner and an outer series of complementary annularly disposed outwardly curved segmental reaches, the inner reaches providing a bolt receiving opening, the reaches of each series being symmetrically disposed relative to each other and the reaches of the inner and outer series being symmetrically disposed in alternating relation and with the ends of the inner and outer reaches in overlapping relation, the ends of the reaches of the inner and outer series being joined by similarly shaped and similarly disposed reaches.

LEONARD A. YOUNG.