

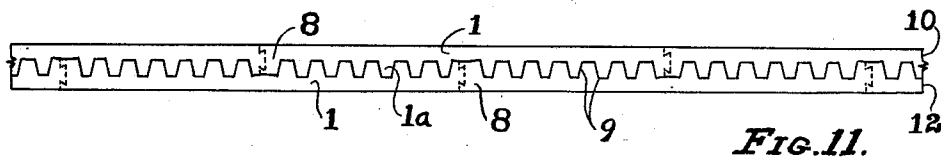
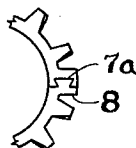
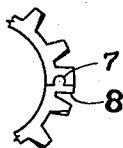
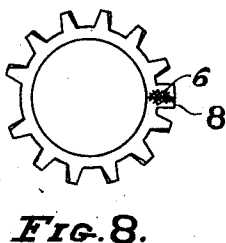
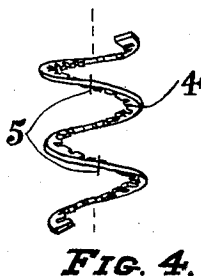
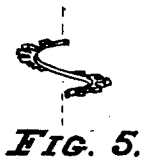
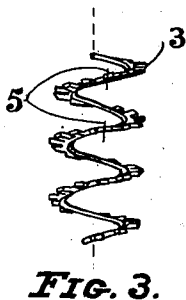
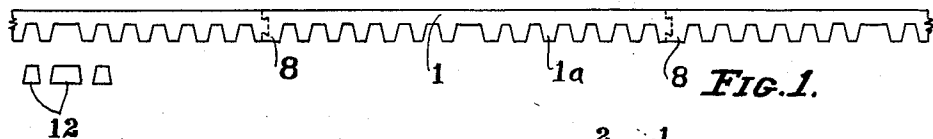
Feb. 16, 1932.

R. T. HOSKING

1,845,272

METHOD OF MAKING LOCK WASHERS

Filed Dec. 16, 1927



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UNITED STATES PATENT OFFICE

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METHOD OF MAKING LOCK WASHERS

Application filed December 16, 1927. Serial No. 240,392.

This invention relates to a new method of producing lock washers of the twisted tooth type, for example that shown in my Patent No. 1,419,564 of June 13, 1922.

5 Heretofore such washers have been made by punching from thin flat stock an annular blank having external or internal prongs, and twisting the prongs to project out from the plane of the blank. Considerable scrap
10 material was discarded.

The object of the present invention is to provide a method whereby washers, having either external or internal prongs, are produced rapidly and with little or no waste.

15 The method, considered in its broader aspect, comprises a series of acts performed upon a long ribbon, or strip or band of sheet metal. The important thing in this application is the method of procedure, not the particular means by which the method shall be produced.

The claimed method is capable of being performed by hand and I first demonstrated it that way. However, the several operations
25 that characterize it have been individually conceived and coordinated so that by the employment of suitable mechanical means a single feed of ribbon metal is made to yield as many as one million washers per day. The
30 means of operating will be described as a manual means.

Fig. 1 is a plan view of a stock strip with serrated edges forming regular prongs, showing also the small punchings therefrom.

35 Fig. 2 is an edge view of the strip with certain of its prongs twisted out of the plane of the strip.

Fig. 3 is a side view of a strip formed into helical shape, with external prongs.

40 Fig. 4 is a similar view of a helical strip having internal prongs.

Figs. 5 and 6 are side views of individual helical washer members having external and
45 internal prongs respectively.

Fig. 7 shows in edge view the washer members of Figs. 5 and 6 after they have been compressed into substantially flat circular form.

50 Fig. 8 shows the way in which the contiguous edges of a circular washer member may be fastened together by welding.

Fig. 9 shows how joint members are formed in the ends of the annular body of a washer member and united by interlocking engage-
55 ment.

Fig. 10 is a detail of an interlocked joint of modified construction formed in a wide prong.

Fig. 11 is a plan view of a piece of parallel-
60 edged ribbon metal, showing how it may be punched to form two stock strips having complementary edges serrated and forming relatively narrow prongs, the portion used for each washer having a relatively wider prong
65 shaped to provide an interlocking joint.

Primarily the method consists in taking a stock strip 1, formed with a serrated edge characterized by regular prongs 1a, twisting all of the prongs, or certain of them, as
70 the case may be, axially out of the plane of the strip, as at 2 in Fig. 2. Washers with all their teeth twisted are used when permanent locking is desired.

Twisting part of them produces a washer
75 that has enough biting teeth to effectively lock a nut against unscrewing in all conditions of ordinary use, yet it can be easily unscrewed by a hand-operated wrench.

After the teeth are twisted the strips are
80 bent into helical shape, the prongs directed outwardly from the imaginary axis of the helix 3 for producing external toothed washers, or directed radially inward, as at 4, Fig. 4, for internal toothed washers. The helical
85 strip is then severed at the end 5 of each convolution. Individual washer members of helical form, shown in Figs. 5 and 6 are thus produced. Such helical members are conceivably capable of being used in their exist-
90 ing condition as lock washers, because their shape will be automatically converted from helical to annular when the nut to be locked is screwed down.

However, the method is in practice pref-
95 erably carried forward to include pressing the helical washer member into annular form so as to bring its severed ends together, Figs. 8 and 9. The method may also include uniting the severed ends in various ways, with-
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out departing from the claimed invention, for example, the contiguous ends may be fused together by spot welding or butt welding, as at 6, or they may be mechanically interlocked by means of joints of dovetail or equivalent construction, as at 7 or 7a.

To provide ample metal area for such dovetail joints, one prong 8 of each washer is preferably wider than the others. The ultimate location of the severed joints is indicated in Figs. 1 and 11 by dotted lines.

In each instance the base material employed in carrying out this method is a strip 1 that has been formed with a serrated edge presenting regular prongs 1a. Such base material strip is transformed into lock washers by the acts of tooth-twisting, helical bending, severing, flattening and end jointing.

A roll or coil of parallel edged ribbon metal, say, several hundred feet long can be speedily converted by punching along the zigzag line 9, Fig. 11, into twice that number of linear feet of stock strips 1. Either one of the two resulting stock strips, 10, 12 can at will be made into either external or internal toothed washers. The same method is then followed with another length of ribbon metal and the operation is practically continuous.

There is only a slight amount of waste when narrow ribbon metal is punched along one edge, as in Fig. 1, to produce a base material stock strip, since the punchings 12 are not a loss, being wanted for other practical uses. There is no waste whatsoever when parallel-edged ribbon metal, Fig. 11, is used to form the base material strip, 10 and 12.

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

1. The method of making a lock washer having radially directed, axially twisted locking teeth, which comprises severing a strip of ribbon metal lengthwise on an irregular line producing two stock strips having teeth projecting outwardly from an edge thereof in the plane of the strip, twisting said teeth about their axes, bending the so-formed twisted tooth strip into helical form, while maintaining the teeth in a substantially radial direction, severing the helix to produce individual helical sections and simultaneously forming in the severed ends complementary locking members, and finally flattening the helix into circular form and interlocking said members together, for the purposes set forth.

2. The method of making a lock washer having radially directed, axially twisted locking teeth, which comprises severing a strip of ribbon metal lengthwise on an irregular line producing two stock strips having regular teeth projecting outwardly from an edge thereof in the plane of the strip, twisting said teeth about their axes, bending

the so-formed twisted tooth strip into helical form, severing the helix to produce individual helical sections, and finally flattening the helix into circular form, without flattening the twisted teeth, for the purposes set forth.

In testimony whereof, I affix my signature.

RICHARD T. HOSKING.

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