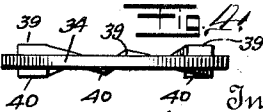
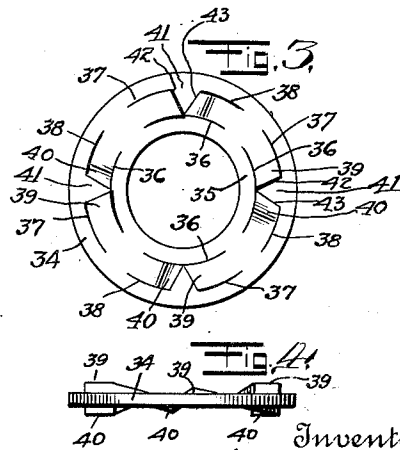
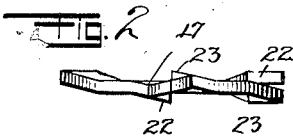
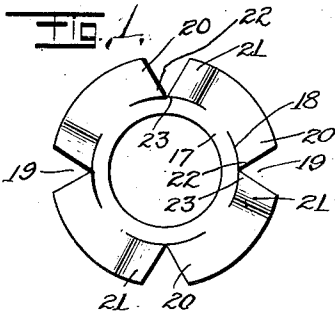
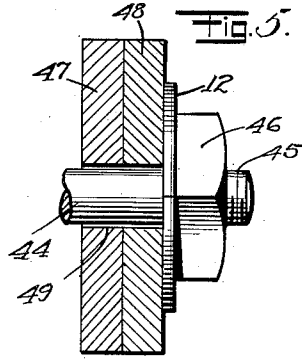


H. J. CARMODY.
 LOCK WASHER.
 APPLICATION FILED JAN. 19, 1920.

1,368,604.

Patented Feb. 15, 1921.



Inventor
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LOCK-WASHER.

1,368,604.

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To all whom it may concern:

Be it known that I, HAROLD J. CARMODY, a citizen of the United States, residing in Brooklyn Manor, in the county of Queens and State of New York, have invented certain new and useful Improvements in Lock-Washers, of which the following is a full, clear, and concise description.

My invention relates to lock washers, of the type used for preventing nuts and bolt heads from turning backwardly, after once being jammed in position.

More particularly stated, I seek to produce a lock washer simple in form and adapted to be manufactured easily and cheaply, yet having great strength and durability, coupled with the quality of obtaining and holding a very tenacious grip. I also seek to give the lock washer a suitable form to adapt it for preventing the escape of oil used for lubricating the lock washer and parts adjacent thereto.

Reference is made to the accompanying drawing forming a part of this specification, and in which like reference characters indicate like parts throughout the several figures.

Figure 1 is a plan view of a form of my improved lock washer.

Fig. 2 is a side elevation of the same.

Fig. 3 is a plan view of still another form of my device.

Fig. 4 is a side elevation of the same.

Fig. 5 is a section indicating the manner in which my improved lock washer is used.

In each of the several different forms of my invention, I construct the lock washer of a single, integral member of hard and tough metal, preferably steel, and in so doing I provide the lock washer with an unbroken annulus, or supporting portion of ring-like form, which carries the other part of the washer. The annulus is not provided with any slot crossing it, or in other words, is not severed or otherwise mutilated in such manner as to render it anything else than a complete and unbroken ring. It thus has a maximum of mechanical strength, and is moreover adapted to prevent the escape of lubricating oil, as hereinafter described. In some instances I use more than one annulus, as hereinafter described.

In the form shown in Figs. 1 and 2 the annulus appears at 17 and is bounded in part by slots 18, each of arcuate form.

Integral with the annulus 17 are a number of spring pawls 20, 21, provided with sharp points 22, 23, each spring pawl 20 being separated from a spring pawl 21 immediately adjacent, by a V-slot 19 as shown more particularly in Fig. 1. The spring pawls 20, 21 have such angular formation that the points 22 and 23, which are bounded by the arcuate slots 18 and the V-slots 19, have a tendency to bite incisively into the nut or other surface immediately associated with the washer. These points 22 and 23 have each, by virtue of its form, a marked tendency to spring slightly inward or toward the geometrical center of the lock washer, when the point is taking its bite in the surface of the member with which the lock washer is in engagement. This is because the chisel-like point tends to drift spirally inward to a slight extent while it is making its cut. This improves the locking action of the device, and prevents the defect, commonly found in lock washers, of the spring pawl moving outwardly from the center.

In the form of my device shown in Figs. 3 and 4 the outer annulus appears at 34 and an inner annulus is shown at 35. The washer is provided with a number of radially disposed slots 36, each of arcuate form and partially bounding the annulus 35. The washer is further provided with relatively short slots 37, 38, each of arcuate form and partially bounding the annulus 34. The number of slots 37, 38 is double the number of slots 36, but the number of slots 36 may be varied, the number of slots 37, 38 being also varied accordingly. The washer is provided with spring pawls 39, 40, having such formation as to cause them to bend inwardly in biting, as above described with reference to the spring pawls 20, 21 shown in Figs. 1 and 2.

The annulus 34 is provided with a number of V-shaped members 41 extending radially inward as shown in Fig. 3. Each V-shaped portion 41 is separated from the end portions of the spring pawls 39, 40 immediately adjacent, by a pair of slots 42, 43.

A bolt is shown at 44, in Fig. 5, and is provided with a threaded portion 45. Revolverly fitted upon this bolt is a nut 46. This bolt extends through my improved lock washer 12, and also through a pair of plates 47, 48 or other metallic members to be clamped and held by aid of the bolt. The

bolt 44 is encircled by a cylindrical passage 49 through the members 47, 48—or in other words the bolt extends loosely through a hole in these members.

5 This cylindrical passage 49 may be utilized, if desired, for the purpose of holding a lubricant for the bolt, lock washer and nut.

In this connection I call attention to the fact that no matter which form of my lock washer be employed it has a tendency to prevent the escape of the lubricant used as just described. This is because in any given form of my lock washer there is at least one annulus completely encircling the bolt 44, and having no hole, slot, passage or mutilation of any kind acting as an open doorway through which the lubricant can make its escape. Hence the lubricant lasts a long time, and has a tendency to leave the parts fairly well lubricated after almost any length of time.

The operation of my device may be readily understood from the foregoing description. The bolt 44 and plates or other members 47, 48 being arranged as shown in Fig. 5 or in any other conventional manner, the locking washer is slipped over the threaded portion 45 of the bolt, and the nut 46 is fitted upon this threaded portion of the bolt and turned until it jams tightly against the lock washer, and jams the lock washer tightly against the adjacent plate 48. This done the lock washer is unable to turn backwardly in relation to the plate 48, and the nut 46 cannot readily be turned backwardly in relation to the lock washer.

With any particular form of my lock washer there is always one annulus, and in some instances more than one annulus, used for bracing and strengthening the spring pawls, and also for preventing the escape of the lubricant if a lubricant be employed. Each annulus thus used has a maximum of strength, as above pointed out, because of the fact that the annulus is unbroken in the general direction in which it extends.

Moreover in the form of my device shown in Figs. 1 and 2 and in Figs. 3 and 4 the chisel-like points of the spring pawls, in biting into the surface of the nut and other member to be engaged thereby have a slight tendency to bend inwardly or toward the geometrical center of the washer as above described, to the small extent permitted by the bracing action of the single annulus if a single annulus be used, or of the two annuli, if such be employed.

My improved lock washer is well adapted for use in connection with bolts employed

for holding together the two halves of crank casings used upon automobile engines. When thus used my device prevents the lubricating oil in the crank casing from making its escape.

My improved lock washer has a useful function in preventing the bolts with which it is associated from being forced sidewise when screwed tight relatively to the nuts associated with such bolts. That is to say, my lock washer is balanced in the sense that it carries a plurality of pawls which in practice are distributed all around the bolt, so that any tendency of any particular pawl to bend the bolt out of its normal position is offset by a contrary tendency of some other pawl.

I do not limit myself to the precise construction shown, as variations may be made therefrom without departing from my invention, the scope of which is coextensive with my claims.

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

1. A lock washer comprising an annulus which is unbroken in the general circular direction in which it extends, said annulus having a plurality of spring pawls integral with it, each spring pawl being provided with a cutting edge which is inclined inwardly in relation to the adjacent peripheral edge of the annulus, so as to give the end of the spring pawl the form of a comparatively sharp point.

2. A lock washer comprising an inner annulus and an outer annulus, and a plurality of spring pawls integral with said inner annulus and said outer annulus, each of said spring pawls being provided with a cutting edge extending in a direction oblique to the portion of the inner annulus immediately adjacent thereto, in order to form a cutting member having a relatively sharp point.

3. A lock washer comprising an inner annulus which is unbroken in the general circular direction in which it extends, an outer annulus which is also unbroken in the general direction in which it extends, and a plurality of spring pawls integral with said inner annulus and with said outer annulus and integral therewith, each spring pawl being provided with a cutting edge extending in a direction oblique to the portion of the inner annulus immediately adjacent thereto, in order to form a cutting member having a relatively sharp point.

HAROLD J. CARMODY.