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R. T. WOODINGS

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SPRING WASHER

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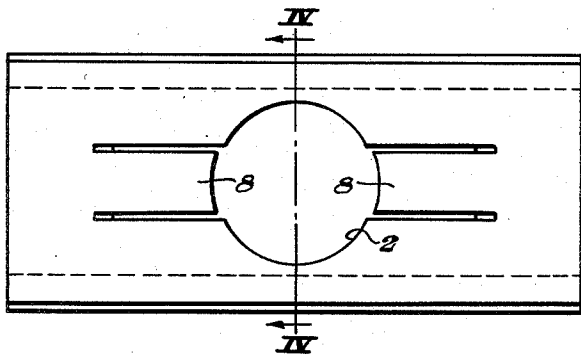


Fig. 1

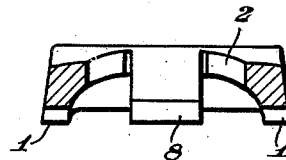


Fig. 4

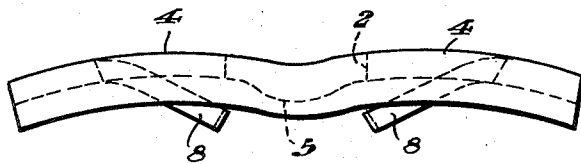


Fig. 2

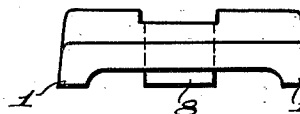


Fig. 3

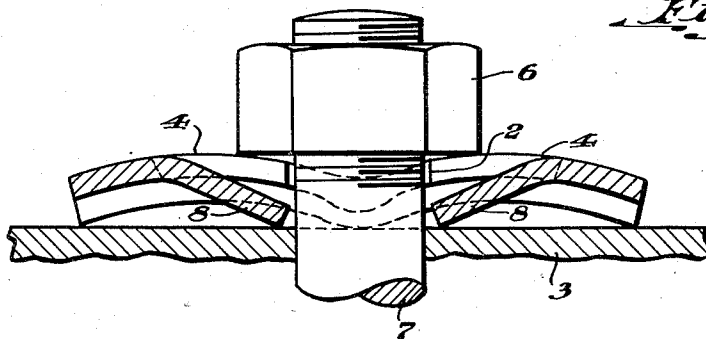


Fig. 5

WITNESSES:

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UNITED STATES PATENT OFFICE

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SPRING WASHER

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5 Claims. (Cl. 85—50)

This invention relates to compression springs adapted to maintain a constant tension on bolts and the like. Particularly the invention is adapted to be applied to rail joints in track construction.

It is among the objects of this invention to provide an arched compression spring adapted to seat under a nut or bolt head and to be compressed against a base member thereby, the spring being so formed as to further increase the resistance of the spring to flattening out and to thereby increase the tension exerted by it on the bolt.

Accordingly, a compression spring is formed from a piece of bar spring steel arched longitudinally and having a central bolt-receiving opening. The spring is provided with outstruck integral tongues on opposite sides of this opening relative to which they are bent inwardly of the arch. Preferably, there are two tongues extending longitudinally of the spring with their free ends struck from the wall of the opening. These tongues are of material aid in preventing the spring from being drawn up so tightly against a base member as to produce a permanent set in the spring, and the tongues also thereby aid in increasing the tension that the spring exerts on the bolt.

The preferred embodiment of the invention is illustrated in the accompanying drawing in which Fig. 1 is a plan view of my compression spring; Fig. 2 is a side view thereof; Fig. 3 is an end view; Fig. 4 is a transverse section taken on the line IV—IV of Fig. 1; and Fig. 5 is a longitudinal section, taken on the line V—V of Fig. 1, showing the spring partly compressed by a bolt and nut against a base member.

In making up springs according to this invention, bars of suitable spring steel are preferably rolled to a cross-sectional shape such as that shown in Figs. 3 and 4. It will be observed that the bars are rolled with thickened edges 1 and that these edges are turned down to form a channel or transversely arched bar. This stiffens or strengthens the spring longitudinally and permits the use of a minimum of metal. The bar stock is cut to length, perforated to provide a central bolt-receiving opening 2, and forged to a longitudinal shape such as that shown in Fig. 2. The spring is adapted to contact only at its edges with the work or base member against which it is seated, the intermediate portion of the transverse section being raised or arched

with respect to such seating surfaces as is clear from Figs. 3 and 4.

The spring illustrated is arched longitudinally to give it resiliency, its corners being adapted to seat against a base member 3, such as a railroad track splice bar, and its body preferably being provided with two longitudinally arched portions 4 spaced apart by an intermediate inwardly curved longitudinal portion 5. The innermost or lowest point of this intermediate portion normally lies outside or above the plane in which the corners of the spring lie, as shown in Fig. 2. When a nut 6 is turned down on the bolt 7 to draw the various parts together the spring first contacts at the four corners thereof with the base member, it being in its normal shape shown in Fig. 2. As the nut is tightened the spring is compressed and its intermediate portion is drawn inwardly toward the base member until it engages the base member, as shown in Fig. 5.

It is a feature of this invention that the resistance of intermediate portion 5 of the spring to being flexed inwardly against the base member is materially increased, whereby the spring applies more tension to the bolt and therefore decreases the likelihood of the bolt working loose. Accordingly, the spring is preferably provided on opposite sides of its bolt-receiving opening with a pair of integral tongues 8 struck out of the body of the spring and extending longitudinally thereof. The free or inner ends of these tongues are struck from the wall of the opening, and are bent inwardly of the arch of the spring and preferably into the plane of its four seating corners. When pressure is applied to the spring these tongues form resilient supports for the otherwise unsupported portion of the spring between its ends, and thereby add considerable resistance to that offered by the spring arches to compression of the spring. It therefore requires considerably more pressure than heretofore to draw the edges of intermediate portion 5 against the base member and to flatten adjoining arched portions 4, because the tongues serve as additional compression springs between the base member and the arched spring. Nevertheless the size of the spring and the amount of metal therein are not increased, nor are any separate parts added to it.

In Fig. 5 the spring is shown only partially compressed. Intermediate portion 5 bears against base member 3, and tongues 8 have therefore been sprung outwardly to some extent.

If nut 6 is tightened further, the tongues will be distorted still more and arched portions 4 will start to flatten, whereby the tension on the bolt will be further increased.

5 As the spring has a plurality of arched portions which are adapted to be distorted or flattened seriatim, and as the tension of the spring corresponds to the degree of this distortion which never reaches a completely flat condition, observation readily shows the amount of tension that is being exerted on a bolt from which the observer can tell whether additional tightening is necessary.

10 According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A compression spring comprising a piece of 25 bar spring steel arched longitudinally and having a central bolt-receiving opening, the spring being provided on opposite sides of said opening with a pair of outstruck integral tongues bent inwardly of the arch.

30 2. A compression spring comprising a piece of bar spring steel arched longitudinally and having a central bolt-receiving opening, the spring being provided on opposite sides of said opening with a pair of outstruck integral tongues extending longitudinally of the spring with their free ends bent inwardly of the arch into the plane of the seating ends of the spring.

3. A compression spring comprising a piece of bar spring steel arched longitudinally and also arched transversely to provide corner seating portions and having a central bolt-receiving opening, the spring being provided on opposite sides of said opening with a pair of outstruck integral tongues extending longitudinally of the spring with their free ends struck from the wall of said opening and bent toward the plane in which said corner seating portions lie. 5 10

4. A compression spring comprising a piece of bar spring steel arched longitudinally to provide two raised individual arches and an intermediate depending portion having a bolt-receiving opening, the spring being adapted to seat against a base member at its ends, the lowermost part of said depending portion being normally above the plane of the end seats, and the spring being provided on opposite sides of said opening with a pair of outstruck integral tongues extending longitudinally of the spring with their free ends struck from the wall of said opening and bent downwardly substantially into said plane. 15 20

5. A compression spring comprising a piece of bar spring steel arched longitudinally to provide two raised individual arches and an intermediate depending portion having a bolt-receiving opening, the spring also being arched transversely to provide corner seating portions, the lowermost part of said depending portion being normally spaced from the plane of said corners, and the spring being provided on opposite sides of said opening with a pair of outstruck integral tongues extending longitudinally of the spring with their free ends struck from the wall of said opening and bent downwardly. 25 30 35

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