Nov. 1, 1949 A. F. O'CONNOR 2,487,028

CUSHIONING DEVICE

Filed Sept. 13, 1945

Fig. 1

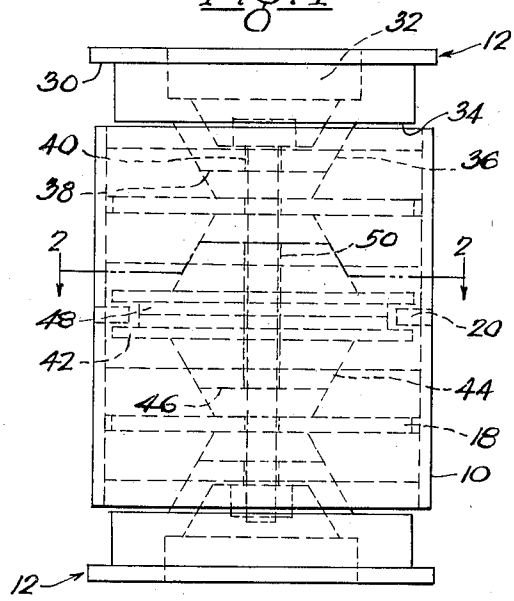
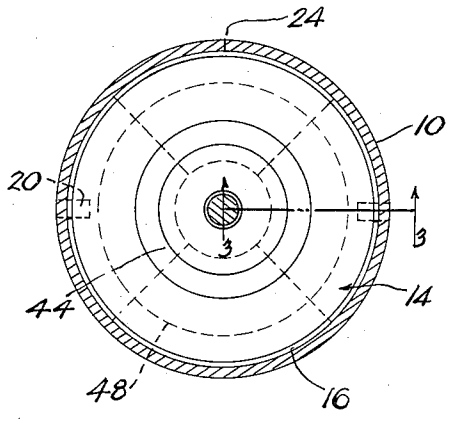


Fig. 2



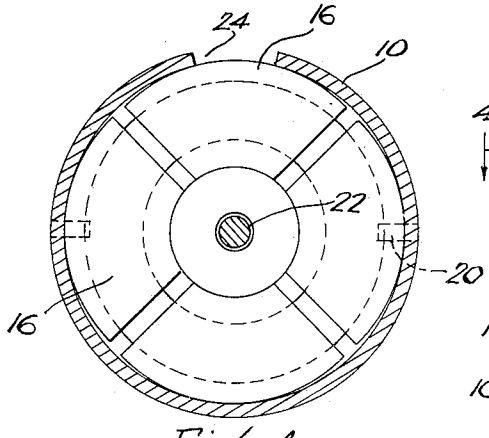


Fig. 4

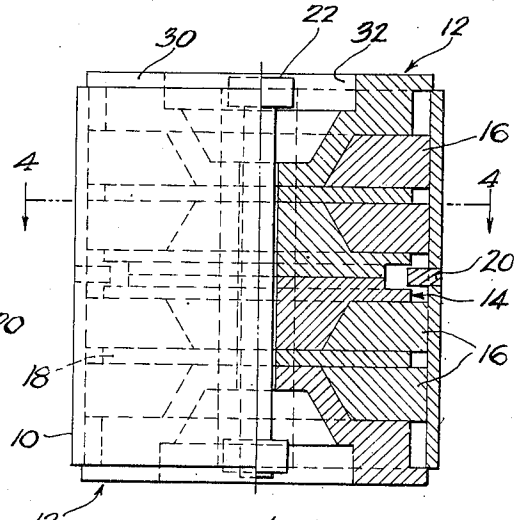
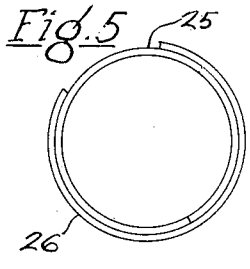


Fig. 3

Fig. 5



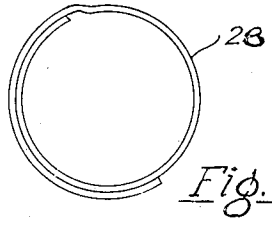


Fig. 6

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Patented Nov. 1, 1949

2,487,028

UNITED STATES PATENT OFFICE

2,487,028

CUSHIONING DEVICE

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Application September 13, 1945, Serial No. 616,129

4 Claims. (Cl. 267—9)

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The invention relates to cushioning or shock-absorbing devices and is particularly adapted for use as a draft gear for railway cars and as a snubber for use with the conventional truck springs of railway cars and like vehicles.

The invention is an improvement of my United States Letters Patent No. 2,239,113 of April 22, 1941.

An object is to provide a cushioning device having friction elements providing a large total friction or wearing area, as against the prior art devices of the kind which have a relatively small total wearing area, resulting in necessity for frequent renewal of the worn parts and frequent renewal of the entire devices.

A further object is to provide an improved cushioning device capable of many variations in capacity and resistance to compression, with slight modifications in the parts.

Another object is the provision of a new and novel device of its kind which may be inexpensively manufactured of readily available materials.

A further object is to provide new and novel means for securing the device in assembled position.

Other objects, advantages and capabilities of the invention will become apparent from the following description, which, with the accompanying drawings, discloses a preferred embodiment of the invention.

Referring to the drawings:

Fig. 1 is an elevational view of the device, in normal uncompressed position.

Fig. 2 is a sectional view, taken along line 2—2 of Fig. 1.

Fig. 3 is an elevational view of the device, in compressed position; one half of the view being shown in section along line 3—3 of Fig. 2.

Fig. 4 is a sectional view, taken along line 4—4 of Fig. 3.

Figures 5 and 6 show alternate types of housings which may be used with the device, in place of the housing shown in Figs. 1 to 5, inclusive.

In the drawings, the reference numeral 10 indicates an expandable tubular housing for substantially enclosing the parts of the device and maintaining them in assembled relation. A follower 12 is shown adjacent each end of the housing 10. Substantially midway between the opposed followers 12 is shown a pair of wedge members 14, in back-to-back relation and, intermediate each follower 12 and the adjacent wedge member 14, is shown two layers of segmental friction plates 16 separated by a disc 18. The housing 10 may be provided with any suitable number of dowels 20 projecting inwardly from the housing wall adapted for interlocking relation with the inner parts of the device, for the purpose of maintaining the housing 10 and said inner parts in predetermined relationship. After the component parts have been assembled a bolt 22, with suitable nut, may be used as shown to unify the assembly.

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The housing 10 may comprise a resilient metallic tubular member, preferably made of spring steel, with a slit or opening 24 traversing one of the longitudinal walls of the housing. The opening 24 may extend perpendicular to the planes of the opposed ends of the housing or may extend diagonally thereto. While I have shown the dowels 20 as comprising round pins, I contemplate the use of any suitable shapes which may serve the purpose. The dowels 20 may comprise pins screwed into suitable holes in the housing wall, pins drive-fitted into suitable holes in the housing wall or pins extending thru suitable holes and peened over or welded to the outer surface of the housing walls. I contemplate the use of the alternate design of housing shown in Fig. 5, as a means of increasing the capacity of the device shown in Figs. 1 to 4, inclusive. The housing 25 of Fig. 5 may comprise a split tubular member similar to housing 10 and may be embraced by a closely fitting outer split tubular member 26; the split sides of the members 25 and 26 being preferably opposite each other. I also contemplate the use of alternate housing 28 comprising an expandable tubular member having a cross-sectional configuration substantially approximating a spirally wound member having double walls throughout a portion thereof. Where the housings of Figs. 5 and 6 are used, I contemplate utilizing the frictional advantages of the double walls of the housings during compression and release of the cushioning device, as well as the additional resistance to compression,

as in the case where a device of high load capacity is required. The housings of Figs. 5 and 6 may be provided with dowels or similar detent members as may be used with housing 10.

The follower 12 may comprise a cupped member provided with a substantially flat base portion on one side provided with a laterally disposed annular flange 30 adapted to abut the adjacent end portion of the housing 10 when the device is fully compressed. The base portion may be provided with an inwardly extending central cavity 32 adapted to accommodate and receive the centering boss on the conventional spring plate, when the device is used as a snubber on a railway car truck. A flat annular portion 34 may be provided in parallel, spaced relation with the base flange 30 and a central outwardly extending tapered portion 36 terminating in a circular flat end portion 38. An aperture 40 may extend axially through the flat end portion 38 providing communication with the cavity 32.

The wedge member 14 may comprise a circular disc-like portion 42 provided on one side with a centrally and outwardly disposed tapered portion 44 terminating in a circular flat end portion 46, and may be provided on the other side with an integral disc-like portion 48, of smaller diameter than the disc-like portion 42. A central aperture 50 may extend through the wedge member 14.

The disc 18 may comprise a flat circular plate having a central aperture therethrough.

The friction plates 16 may best be described by stating that one layer thereof may be made by providing a central tapered hole through a circular flat plate and then cutting said plate into four or more segments; each of the resulting segments forming a friction plate 16. As best shown in Fig. 2, I have shown the outer arcuate edges of the friction plates 16 as coinciding with the inner surface of the unexpanded housing 10.

Inasmuch as the arcuate edge portions of the friction plates 16 (as best shown in Fig. 2) coincide with the inner surface of the unexpanded housing 10, these edge portions will not register closely with the inner surface of the expanded housing 10. I contemplate making the said arcuate edge portions of any radii intermediate the radii of the expanded and unexpanded housing. I also contemplate the use of any desired number of friction plates 16 in each layer in excess of the four segments per layer illustrated in the drawings.

The device is equally adaptable as a draft gear or as a snubber for railway cars, the illustrated embodiment of the invention being a snubber. It is particularly pointed out that one of the important objects is the provision of a friction device having relatively large total friction area. It will be seen (as best shown in Fig. 3) that the friction plates 16 will be in frictional engagement with the housing 10 during compression and release of the device. The tapered surfaces of the friction plates 16 and the adjacent tapered portions of the followers 12 and wedge members 14 will be in frictional relation during compression and release of the device. The surfaces of the friction plates 16 which contact the discs 18 will be in frictional engagement therewith during closing and opening of the device. Where the alternate housings of Figs. 5 and 6 are used additional friction will occur between the inner and outer portions of these housings.

The load capacity of the invention may be greatly varied by the selective use of the housings shown in the drawings and by modifying the degree of taper in the several parts.

The housings illustrated in the drawings serve the purpose of resisting compression of the device, provide friction to absorb shock and work and also act to return the integral device to a predetermined position upon release of compressive force.

An important object is to provide a new and novel friction cushioning device wherein the frictional wear on the several parts thereof is widely distributed as against prior art devices wherein the friction and frictional wear is concentrated at a few concentrated points, requiring frequent renewal of the worn parts.

It is to be understood that the invention is not limited to the particular shape or number of elements shown in the drawings. The number of layers of friction plates 16 may be more or less than shown in the drawings. While I have shown and described a preferred embodiment of the invention, the same is merely illustrative and I contemplate all changes and modifications which come within the scope of the appended claims.

While I have shown the housing 10 as being made of metal, I contemplate the use of any hard material, such as fiber board or plastics; in fact any hard material having the required resiliency to permit the expansion of the housing and its unaided return to unexpanded position.

I claim:

1. A cushioning device comprising a tubular resilient body formed for resilient radial expansion, a conical wedge member mounted in the body, means in the body for limiting movement of said wedge member in one direction, a complementary conical wedge member movable axially into the body, a series of segments around each of the wedge members and engaging the body and the wedge members respectively, and a disc lying between the sets of segments and engaging the adjacent faces thereof.

2. A cushioning device comprising a tubular resilient body formed for resilient radial expansion, a pair of conical wedge members lying base to base centrally in the tube, a pair of complementary conical wedge members movable axially into the ends of the body, a series of segments around each of the wedge members engaging the body and the respective wedge members and movable axially and radially when the last named wedge members are moved.

3. A cushioning device comprising a tubular resilient body formed for resilient radial expansion, a pair of conical wedge members lying base to base centrally in the tube, a pair of complementary conical wedge members movable axially into the ends of the body, a series of segments around each of the wedge members engaging the body and the respective wedge members and movable axially and radially when the last named wedge members are moved, and discs between the adjacent series of segments.

4. A cushioning device comprising a tubular resilient body formed for resilient radial expansion, a pair of conical wedge members lying base to base centrally in the tube, a pair of complementary conical wedge members movable axially into the ends of the body, a series of segments around each of the wedge members engaging the body and the respective wedge members and movable axially and radially when the last named wedge members are moved, and a tension fastening extending centrally through the wedge mem-

bers and engaging the complementary wedge members to limit axial separation thereof.

ARTHUR F. O'CONNOR.

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