G. C. MURRAY.

SHOCK ABSORBER.

APPLICATION FILED SEPT. 24, 1908.

999,243. Patented Aug. 1, 1911.

Fig. 1.

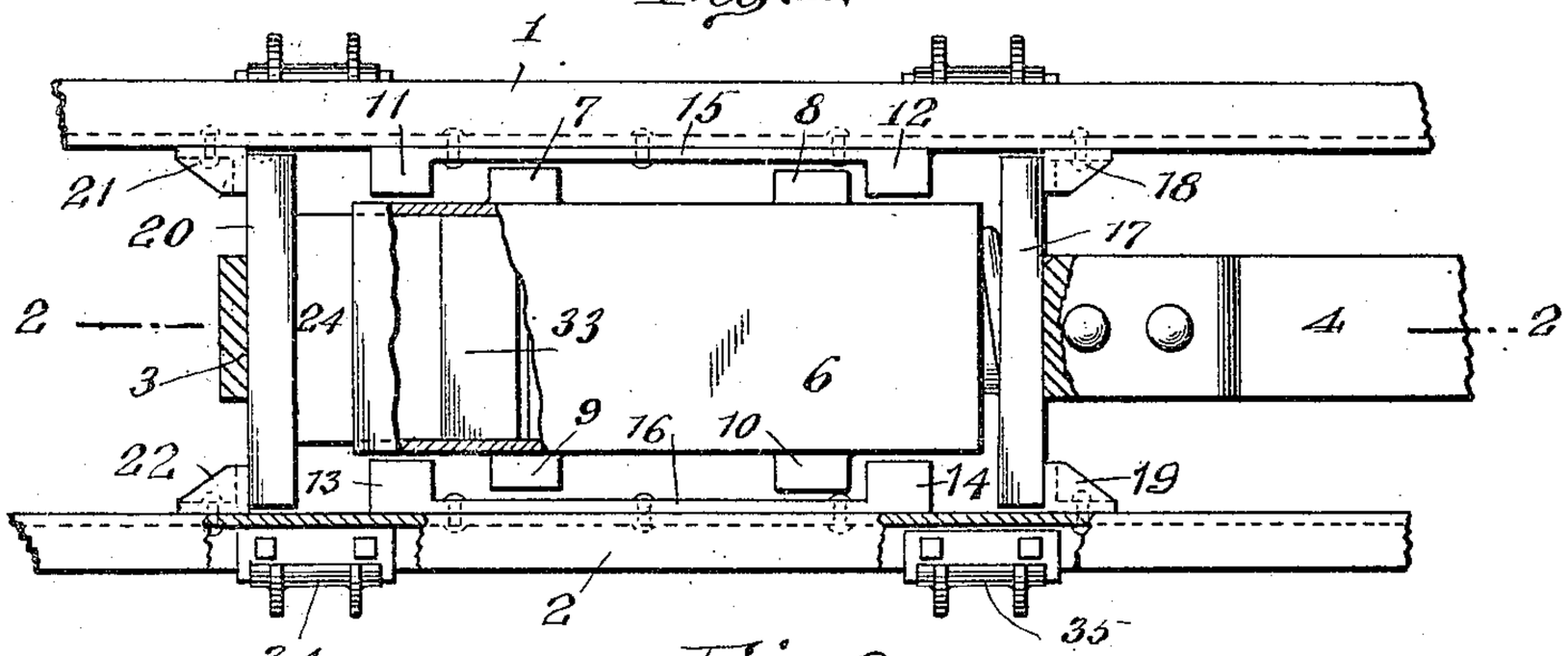
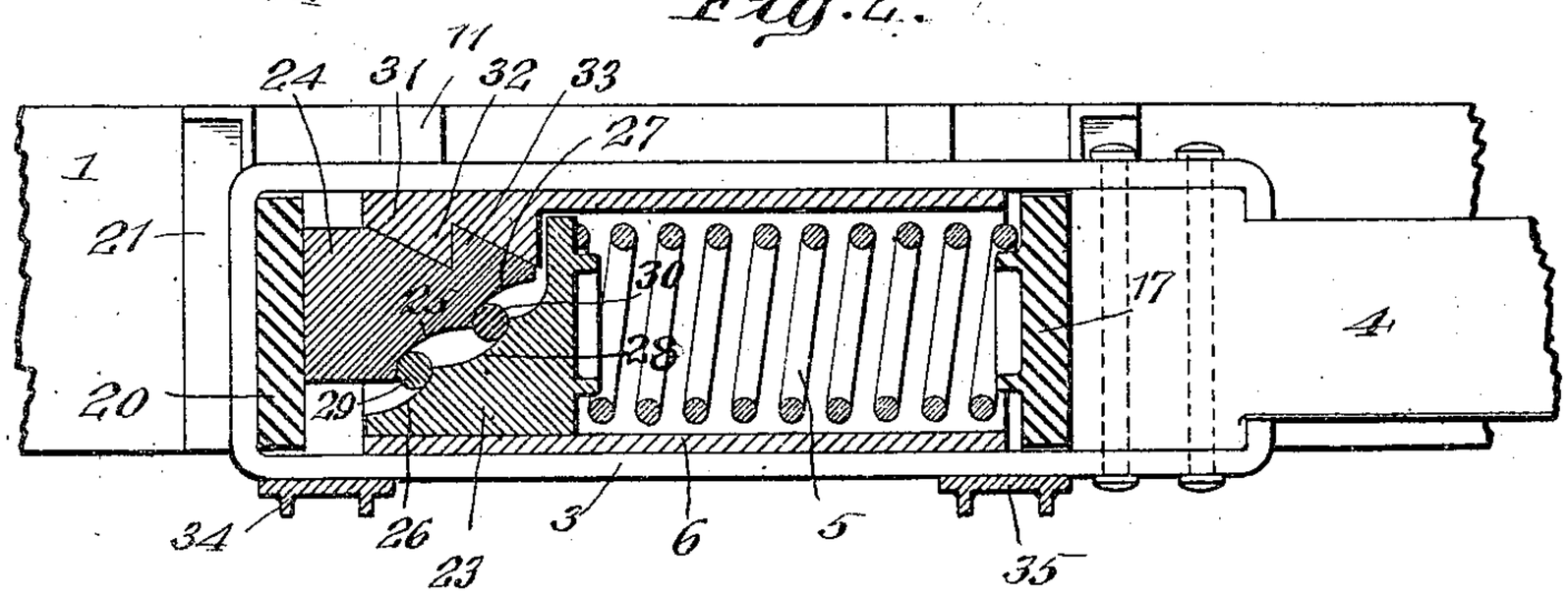


Fig. 2.



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SHOCK-ABSORBER.

999,243. Specification of Letters Patent. Patented Aug. 1, 1911.

Application filed September 24, 1908. Serial No. 454,559.

To all whom it may concern:

Be it known that I, GEORGE C. MURRAY, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Shock-Absorbers, of which the following is a specification.

This invention relates to shock absorbers and more particularly to such as are adapted and designed for use in connection with draft-rigging apparatus for railways. The invention, however, is not restricted to this particular use but may also be used for other purposes.

The invention seeks to provide an improved construction and arrangement of parts which shall provide a high degree of efficiency combined with compactness and simplicity of arrangement.

One part of the invention relates more particularly to a novel arrangement of resistance means interposed between a yielding resistance member, such as a spring, and a force applying member, whereby as the latter moves it meets with a gradually increasing resistance.

Other parts of the invention relate more particularly to certain structural details.

In the accompanying drawings forming part of this specification, and in which like reference numerals designate corresponding parts,—Figure 1 is a plan view of one embodiment of the invention, parts being broken away; and Fig. 2 is a sectional elevation on the line 2—2 of Fig. 1.

Referring now more particularly to the specific embodiment of the invention shown in the drawings, 1 and 2 are the usual car sills made of channel iron.

3 is the yoke of a draft rigging riveted to the draw-bar 4 which latter constitutes the force applying member of the apparatus.

5 is a coiled spring which constitutes the yielding resistance member of the apparatus.

6 is a box or casing open at both ends and surrounding the spring 5. It is preferably provided with projections 7, 8, 9 and 10 arranged to be engaged by inner stops 11, 12, 13 and 14 secured to the sills and operating to limit the movement of the box in both directions. The stops 11 and 12 are preferably formed integrally with a connecting plate 15 riveted to the sill 1 as shown. The stops 13 and 14 are preferably formed integrally with a connecting plate 16 riveted to the sill 2, as shown.

17 is a follower located between the spring 5 and draw-bar 4 and working between the outer stops 18 and 19 secured to the sills and the stops 12 and 14. 20 is a similar follower at the opposite end of the device and working between the stops 11 and 13 and the outer stops 21 and 22 secured to the sills.

Within the casing 6 and bearing against the spring is an inner longitudinal thrust member 23 which coöperates with the intermediate transverse thrust member 24 bearing against the follower 20. These two thrust members are provided with a plurality of recesses between their opposing faces, each of said recesses having its walls oppositely concaved. 25 and 27 are the concaved walls of the thrust member 24, and 26 and 28 are the concaved walls of the thrust member 23. 29 and 30 are two movable members, preferably in the form of rollers, working in said recesses. The parts of the draft rigging are preferably so formed and arranged that the axes of the rollers are horizontal, and the space between the intermediate thrust member 24 and the inner thrust member 23, in which the rollers lie, is inclined to both the longitudinal and transverse axes of the draft-rigging. The intermediate thrust member 24 also coöperates with an outer longitudinal thrust member 31, these members having coöperating cam friction faces and engaging abutments 32 and 33. The outer thrust member 31 may be, and preferably is, formed integral with the casing 6. The draft rigging is supported in position between the sills by means of two carrier irons 34 and 35 bolted to the sills.

Referring now to the operation of the draft rigging, when the coupler moves backward under a buffing strain, it carries the follower 17 against the front end of the box and then carries the box rearward to the limit of its movement. This movement is stopped by the follower 17 coming against the stops 12 and 14, by the projections 7 and 9 coming against the stops 11 and 13 and by the rear end of the box coming against the follower 20. The spring 5 alone receives substantially the entire thrust of the follower 17 until the latter reaches the box. Thereafter, as the box moves rearward, the outer thrust member 31, which it carries, causes the thrust member 24 to exert its

thrust against the rollers 29 and 30 and thereby causes the thrust member 23 to compress the spring. It will be observed that during the operation described, the thrust member 24 moves downward across the face of the follower 20 thereby generating a frictional resistance. It will also be understood that a frictional resistance is generated between the cam friction faces of the thrust member 24 and the thrust member 31 along their cam friction faces. When the rigging is subjected to a pulling strain, the yoke carries forward the follower 20 and with it the thrust member 24. This forward movement of the parts is stopped when the follower 20 meets the stops 11 and 13 at which time the projections 8 and 10 meet the stops 12 and 14 and the forward end of the casing meets the follower 17. During this movement, the thrust member 24 moves forward into the box until the follower 20 meets the rear end of the casing 6, the outer thrust member 31 acting as before upon the intermediate thrust member 24 which in turn acts as before upon the rollers and the inner thrust member 23 to compress the spring. In this operation the friction faces also operate as heretofore described. In the closing movement of the rigging the resistance to the coupler thrust increases slowly during the first part of the coupler's travel, and then increases rapidly, at an increased ratio, up to its maximum. Upon reference to Fig. 2 it will be apparent that upon the buffing stress the intermediate thrust member 24 will be given a movement transverse of the axis of the draft rigging. At the beginning of this movement a comparatively small component thereof will be transmitted to the inner longitudinal thrust member 23, by reason of the fact that in the normal position of the apparatus the parts of the concave surfaces with which the rollers 29—30 coact are almost parallel to the transverse axis of the draft rigging, thus permitting the transverse movement of the intermediate thrust member 24 to take place without imparting a large amount of movement to the inner thrust member 23. At this time the buffing force acts almost entirely upon the spring 5, that is, the buffing force at first encounters a comparatively small resistance. As the intermediate thrust member 24 continues its transverse movement the rollers 29—30 coact with parts of the concave surfaces having greater inclination to the transverse axis of the draft rigging. This has the effect of accelerating the compression of the spring, that is, a given amount of inward movement of the coupler causes a progressively increasing relative amount of movement of the inner thrust member 23 and a correspondingly increased amount of compression of the spring 5. By varying the contour of the concave surfaces upon the intermediate thrust member 24 and inner thrust member 23, the degree of acceleration of compression of the spring 5 to the movement of the coupler can be varied to any desired extent. These surfaces can be so formed that any given resistance will be encountered upon a given amount of movement of the coupler. After the compression of the draft rigging and release of the force causing such compression, the spring 5 restores the parts to normal position. When the spring begins to expand after compression a comparatively small amount of its movement is transmitted to the intermediate thrust member 24 by reason of the fact that the parts of the concave surfaces with which the rollers contact when the rigging is compressed are almost parallel to the longitudinal axis of the draft rigging. During the first part of the expansion of the spring therefore its force is absorbed in the frictional resistance of the coacting parts of the draft rigging without producing a considerable amount of movement. After the spring has expanded to a considerable extent the parts of the concave surfaces which coact with the rollers are of such inclination as to transmit a larger relative amount of movement to the intermediate thrust member 24. At the time when this larger amount of relative movement is being transmitted to the intermediate thrust member and other parts of the draft rigging the force of the spring has become largely exhausted and hence the parts reach their normal position with the minimum of shock.

In the foregoing description I have referred to the member 23 as the inner and to the member 31 as the outer thrust member, the terms inner and outer being used rather for the purpose of defining these members when referred to in the claims than as limiting them to any particular position relative to the car body or remainder of the apparatus.

It will be obvious that the draw-bar 4, as shown in Fig. 2, might be applied to the opposite end of the yoke without in any wise changing the mode of operation of the parts. When the parts are disposed as shown in Fig. 2 a buffing strain imparts only a transverse movement to the intermediate thrust member 24, that is, a movement at a right angle to the longitudinal axis of the draft rigging, the longitudinal movement necessary to effect the transverse movement of the member 24 being given to the casing 6 with its attached thrust member 31. Upon a pulling stress, however, the intermediate member 24 not only has the transverse movement referred to, but also a longitudinal movement.

Among the advantages of employing a plurality of recesses with their movable members or rollers may be mentioned compactness, durability, simplicity of arrange-

ment, reliable balance of the thrust members containing the recesses in their movement, and a distribution of the strain upon the rollers.

In my Patent No. 927,810 I have shown several forms of a shock absorber containing a single concaved recess and a single roller between two thrust members. It will be understood that the plurality of recesses or rollers described in the present application may be readily adapted to the various forms shown and described in my previous application.

What I claim and desire to secure by Letters Patent is:

1. In a device of the class described, two longitudinally movable thrust members, an intermediate transversely movable thrust member, a spring impelling one of said longitudinal thrust members toward said intermediate thrust member, said intermediate and spring impelled longitudinal thrust members having a plurality of pairs of coacting concave surfaces, rollers between said concave surfaces, coacting inclined surfaces upon the other longitudinal thrust member and the said intermediate thrust member, and draft means for applying the force of buffing to said last named longitudinal thrust member and for applying the force of draft to said intermediate thrust member.

2. In a device of the class described, draft sills, a draw-bar and yoke secured thereto, longitudinally movable outer and inner thrust members, a transversely movable intermediate thrust member, said outer and intermediate thrust members being provided with a plurality of pairs of coacting inclined surfaces, said inner and intermediate thrust members being provided with a plurality of pairs of coacting concave surfaces, rollers between said concave surfaces, and a spring interposed between said inner thrust member and draw-bar.

3. In a device of the class described, draft sills, inner and outer stops on said draft sills, a casing open at the ends and coacting with said inner stops, a draw-bar and yoke, outer and inner followers, an outer longitudinal thrust member rigid with said casing, an inner longitudinal thrust member, an intermediate transverse thrust member, a spring between said inner thrust member and outer follower, said outer and intermediate thrust members being provided with a plurality of pairs of coacting inclined surfaces, said intermediate and inner thrust members having a plurality of pairs of coacting concave surfaces, and rollers between said concave surfaces.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE C. MURRAY.

Witnesses:
BEATRICE MIRVIS,
IDA G. GILMORE.