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MECHANISM FOR YIELDINGLY RESISTING RELATIVE MOVEMENT OF BODIES.

APPLICATION FILED NOV. 27, 1909.

978,873. Patented Dec. 20, 1910.

3 SHEETS—SHEET 1.

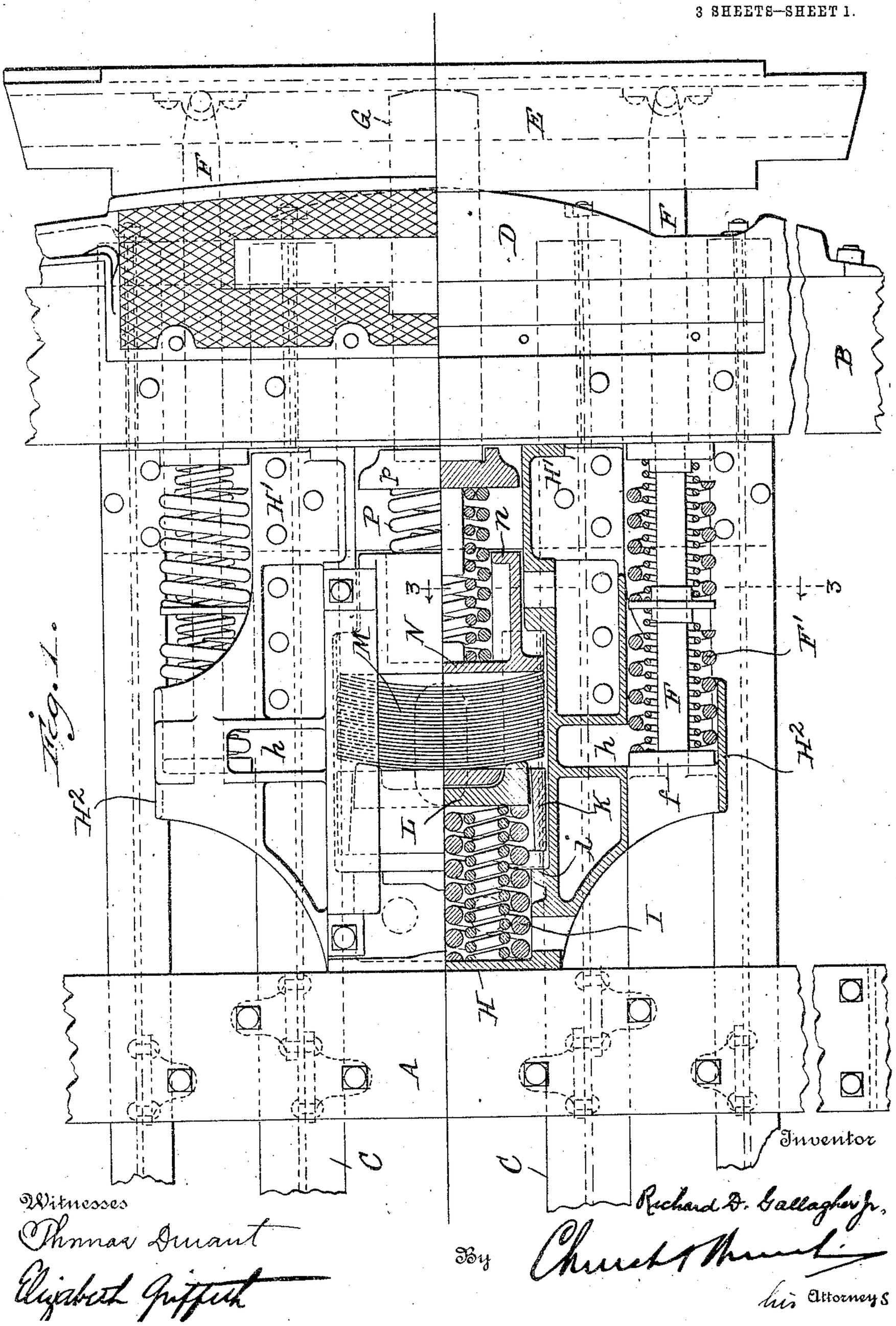

Fig. 1.

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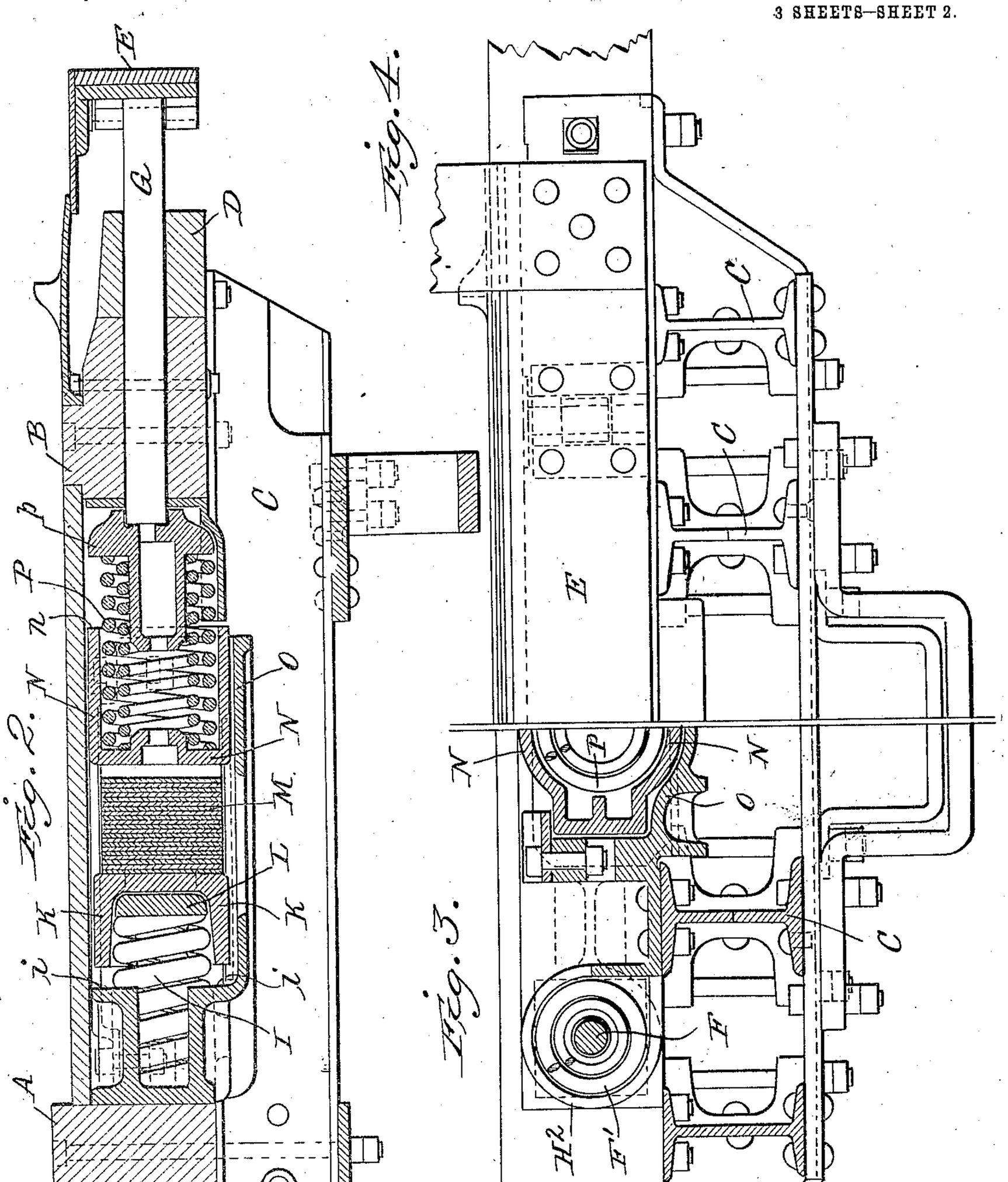

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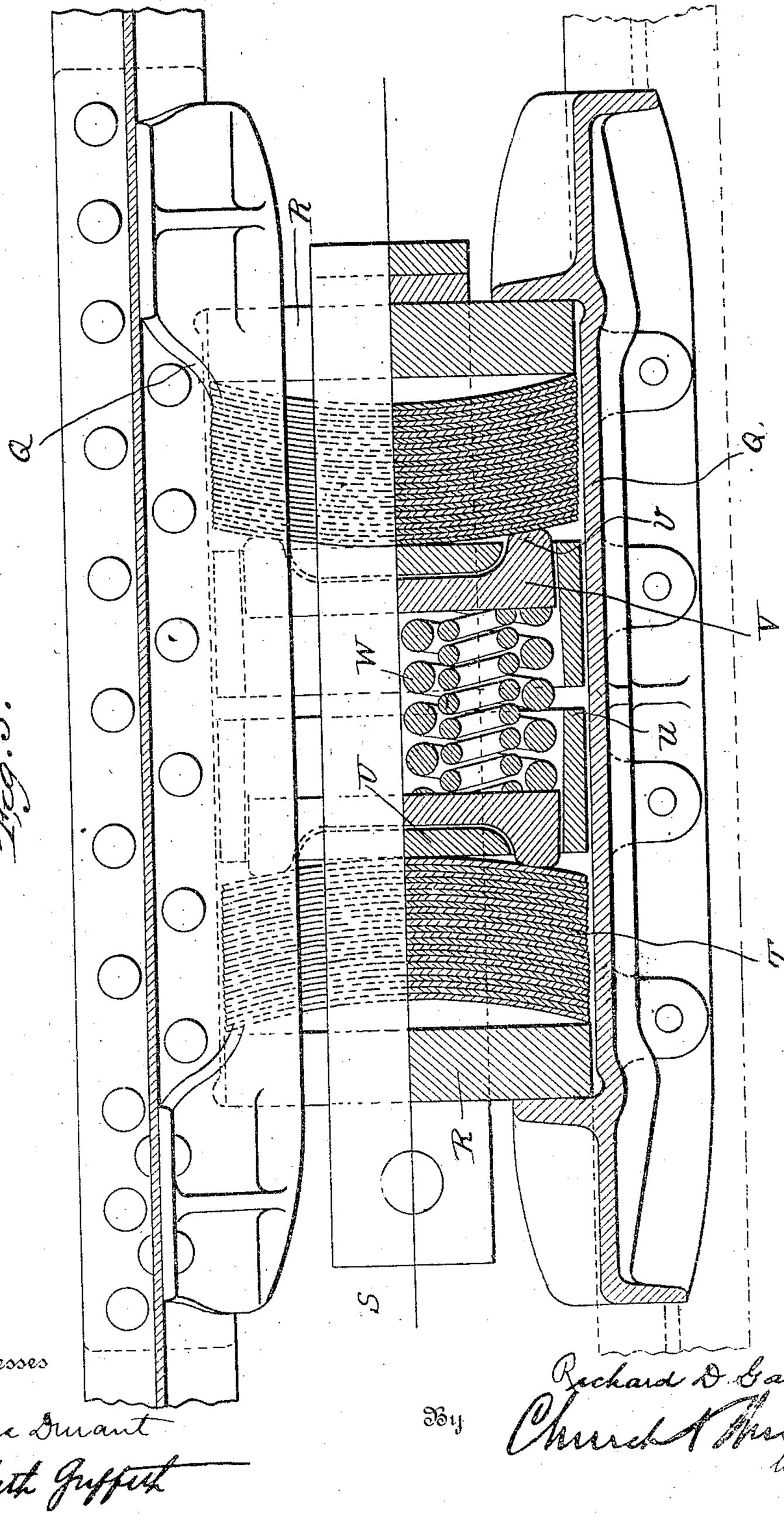

Fig. 5.

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR YIELDINGLY RESISTING RELATIVE MOVEMENT OF BODIES.

978,873. Specification of Letters Patent. **Patented Dec. 20, 1910.**

Application filed November 27, 1909. Serial No. 530,263.

To all whom it may concern:

Be it known that I, RICHARD D. GALLAGHER, Jr., a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Mechanism for Yieldingly Resisting Relative Movement of Bodies; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

The present invention relates to mechanism designed for absorbing the relative movement between bodies by dissipating the energy in overcoming the elastic resistance of yielding members and, at the same time, providing a means whereby injurious recoil is, to a large extent, eliminated.

The invention is more especially applicable to buffing gear and draft rigging of railway cars and has been designed with especial reference to this class of devices.

Broadly stated, the invention consists in a mechanism of the character indicated embodying a series of elastic plates arranged in intimate frictional contact with each other to form a yielding resistance member and means whereby said plates may be flexed intermediate their ends, the frictional contact between the plates being maintained and increased by a supplemental yielding follower member adapted to be moved against its spring resistance by the flexing of the plates in absorbing the movement of the parts.

The invention further consists in certain novel details of construction and combination and arrangements of parts, all as will be hereinafter described and pointed out particularly in the appended claims.

Referring to the accompanying drawings which show the invention as applied to buffing mechanism and draft rigging of railway cars—Figure 1 is a top plan, one half in horizontal section of a portion of one end of a railway car with the flooring removed. Fig. 2 is a longitudinal section in a central vertical plane of the parts illustrated in Fig. 1. Fig. 3 is a section in a vertical plane on the line 3—3 of Fig. 1. Fig. 4 is an end elevation of one half of the structure shown in Fig. 1. Fig. 5 is a top plan view, one-half in section, of a draft gear embodying the present improvements.

Like letters of reference in the several figures indicate the same parts.

While the invention of the present application may be embodied in many different mechanisms and particularly may be embodied in many different arrangements of draft and buffing rigging for railway cars, I have adopted for illustrative purposes a type of buffing mechanism which is particularly well adapted for use on passenger cars and similar railway equipment.

In Figs. 1 to 4, the letter A indicates the end sill of a car; B the buffer beam, and C longitudinal sills suspended beneath or upon which the end sill and buffer beam are mounted. The buffer beam is provided with a buffer beam extension D and the buffer E, which projects in front of the buffer beam, is supported on side stems F and a center stem G, all of which stems extend back through the buffer beam extension and buffer beam in the ordinary way. The center stem is illustrated as of great width in proportion to its thickness in a vertical plane, whereby additional strength and rigidity is secured to resist the heavy buffing strains to which it may be subjected when used in connection with the present invention. Between the buffer beam and end sill of the car there is interposed a housing for the operating parts of the mechanism and, while this housing in the particular form illustrated, corresponds closely to that illustrated in my prior application, Serial No. 519,552, and is preferably employed in connection with the present invention for buffing mechanism, it will be understood that any suitable supporting devices or framing may be substituted therefor without departing from the invention. The said housing is preferably an integral casting which, at its rear end H abuts squarely against the end sill and it is provided with forwardly extending sides H′ adapted to abut squarely against the inner face of the buffer beam. It is further provided with lateral extensions H^2 forming brackets for the support of the inner ends of the side stems F and side stem springs F′. For convenience, the rear ends of the side stems F bear in rear side stem followers *f* and the latter are held in chambers in brackets H^2, being adapted for removal therefrom through apertures *h*, best seen in Fig. 1 of the draw-

ing. The rear portion of the casting preferably forms a housing for the rear ends of secondary center stem springs I and is further provided with stops or shoulders *i* against which a rear follower K is adapted to come to rest. The rear follower K is normally held advanced by the rear springs I acting through a supplemental follower L, to be presently described. Immediately forward of the rear follower is a yielding body, formed of a series of elastic plates M, in intinate frictional contact with each other confined between the rear follower K and a front follower N, and said followers, as well as the elastic plates, being supported in the casting by a bottom web O, shown clearly in Figs. 2 and 3, so as to be capable of a longitudinal movement. Between the front follower N and the inner end of the center stem G there is interposed a preliminary spring or springs P and an inner stem follower *p* which may serve to position the front end of the spring and is adapted to seat against the forwardly extending flange *n* of the front follower N when the preliminary spring is compressed.

Obviously, the form of the proximate faces of the front and rear followers and of the elastic plates may be varied, inasmuch as the object is to provide an enormous yielding resistance to any relative movement of said followers and this is secured by flexing the plates. In the preferred arrangement, the plates are normally curved and nested, one within the other, so as to form a body which is concavo-convex, the convex face resting at its center against one follower and the concave face resting at its ends against the other follower, the followers themselves being provided with substantially plane faces. The elastic resistance of a body of plates in intimate frictional contact with each other, it is well known may be made very great where intended to overcome or absorb a relatively short movement and, in the present invention, not only is this resistance augmented but the friction between the plates is increased and maintained during the entire bending movements of the plates by the supplemental follower L, before referred to. This supplemental follower is supported by the rear springs I and its ends *l* contact with the elastic plates in proximity to their ends. In the particular embodiment illustrated, the ends *l* of the supplemental follower engage the convex face of the body of plates slightly within or nearer the axial line of the device than are the contacting points between the opposite face of the body of plates and the forward follower. This particular arrangement is not essential but is preferable, because rearward movement of the front follower resisted by the supplemental rear follower alone will tend, in a slight degree, to flex the plates or bend them back into a more nearly straight position. The rear follower, on the other hand, which contacts with the body of plates at the center, will serve as the main abutment against which the plates may be flexed by the movement of the forward follower, but throughout the movement or bending of the plates in both directions, the supplemental follower will hold them in intimate frictional contact, especially near the ends and, as a result of the arrangement, injurious recoil is, to a large extent, eliminated.

The operation of the embodiment of the device thus far described will, under heavy buffing strains, be as follows:—The buffer being pushed inwardly forces the center and side stems in, the movement of the side stems being resisted by the side stem springs, and the movement of the center stem being preliminarily resisted by the preliminary spring P. The preliminary spring P is a relatively light spring, and, when it is compressed and the center stem follower seated against the forward follower, the body of plates will be moved rearwardly. During the intermediate portion of the total movement the flexible plates will be flexed only slightly, if at all, such portion of the movement being resisted by the rear springs I but, upon the movement of the rear follower K being arrested by contact with the stops *i*, further inward movement of the buffer is yieldingly resisted by the body of elastic plates and also by the rear springs acting through the supplemental follower L.

In the embodiment of the invention illustrated in Fig. 5 showing the application of the invention to a draft gear, the letter Q indicates side plates such as are ordinarily secured on the proximate faces of the draft timbers and R R indicates followers confined between the stops on said plates. S indicates the strap and T T bodies of flexible plates corresponding to the plates M of Figs. 1 to 4. In this embodiment, the bodies of plates F are concavo-convex with the convex faces toward each other, or toward the center of the device. Oppositely disposed intermediate followers U contact with the convex faces of the plates, said followers being provided with flanges *u* adapted to contact with each other to arrest the relative movement of the intermediate followers. Supplemental followers V are located within the intermediate followers U and their ends *v* project through the intermediate followers and into contact with the bodies of flexible plates in proximity to the ends of the latter. Intermediate springs W are interposed between the supplemental followers and serve to normally hold said followers, together with the followers U, against the proximate faces of the plates. In operation and acting under either draft or buff-

ing strain, one of the end followers R will be moved inwardly, thereby compressing the intermediate springs W until the intermediate followers U contact with each other. Further movement will result in a flexing of the bodies of plates in the manner heretofore described and the supplemental followers being acted upon by the intermediate springs will resist the flexing of the plates and, at the same time, hold said plates in intimate frictional contact. Obviously, the preliminary movement may be made of any desired length by separating the intermediate followers more or less and, in fact, it is entirely practicable to dispense entirely with one of the sets of plates, together with its intermediate and supplemental followers.

With all of the embodiments illustrated and, in fact, with the present invention embodied in any structure for absorbing relative movement of bodies, it is obvious that the elastic resistance to final movements may be made as great as desired, without permitting the parts to come up solid, and at the same time the size of the device may be kept within practicable limits. It will be further noted that with the present invention a relative long run or movement may be provided for and the resistance in proportion to the movement may be increased in almost any desired ratio; for instance, the preliminary movement may be almost entirely confined to the preliminary springs without appreciable operating movement of the plates and the final movements alone operate to cause a deflection or flexing of the plates themselves.

Having thus described my invention—what I claim as new and desire to secure by Letters Patent of the United States—is—

1. In a mechanism for yieldingly resisting relative movement of railway cars, the combination with a series of elastic plates in frictional contact with each other, and followers between which the plates are flexed to form a yielding resistance member, of a supplemental yieldingly held follower engaging the body of plates in proximity to their ends whereby frictional contact between the plates is maintained and recoil reduced.

2. In a mechanism for yieldingly resisting relative movement of railway cars, the combination with a series of elastic plates in intimate frictional contact with each other, and movable followers between which the plates are flexed, of a supplemental spring pressed follower moved by the flexing of said plates whereby the friction between the plates is increased.

3. The combination with oppositely disposed followers movable different distances in the same direction, a series of elastic plates interposed between said followers and curved to contact centrally with one follower and to contact in proximity to their ends with the other follower, whereby the body of plates will be flexed by relative movement of the followers, of a supplemental spring pressed follower engaging the convex side of the plates in proximity to their ends whereby flexing of the plates is resisted.

4. The combination with oppositely disposed followers, a series of elastic plates in contact with each other and contacting with said followers in different longitudinal planes whereby movement of the followers toward each other will flex the plates, of a spring pressed supplemental follower engaging said plates on opposite sides of the center and operating to resist the flexing of the plates.

5. The combination with the oppositely disposed main followers movable in the same direction, stops for limiting the movement of one of said followers and a spring pressed supplemental follower having projections extending beyond the face of one of the main followers and adapted when advanced by its spring to move said main follower away from its stops, of a yielding body formed of a plurality of flexible plates interposed between said followers.

6. The combination with the oppositely disposed main followers movable in the same direction, stops for limiting the movement of one of said followers and a spring pressed supplemental follower engaging one of the main followers to move the same away from its stops when advanced by its spring and having projections extending beyond the face of the follower, of a yielding body formed of a plurality of curved flexible plates interposed between said followers the convex sides of said body of plates being in engagement with the supplemental follower and main follower with which the supplemental follower coöperates, and the ends of the concave face of the said body of plates being in engagement with the opposite main follower.

7. The combination with a spring pressed supplemental follower having end projections, a main follower having apertures through which said projections extend and stops for arresting the movement of the main follower, of a second main follower disposed in opposition to the first mentioned followers and an elastic body interposed between said followers and formed of a series of elastic plates in frictional contact with each other, said plates engaging the main followers in different longitudinal planes.

8. The combination with oppositely disposed main followers, springs for advancing said followers toward each other and stops for limiting the movement of one of said followers, of a supplemental follower located within and having projections ex-

tending beyond the face of one of said main followers and an elastic body formed of superposed curved plates interposed between the main followers and in position for the projections of the supplemental follower to engage the convex face of the elastic body.

9. In a buffing mechanism for railway cars, the combination with the center stem, a preliminary spring for holding said center stem advanced and a forward follower for supporting said preliminary spring with stops between said follower and center stem for limiting the compression of the preliminary spring, of an elastic body of plates in rear of said follower, a rear follower against which said plates rest, stops for limiting the rearward movement of the rear follower, a supplemental rear follower having projections extending beyond the face of the rear follower in position to engage the elastic body of plates, and rear springs coöperating with said rear, main and supplemental followers for holding the same normally advanced.

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