

R. D. GALLAGHER, JR.
 SPRING.
 APPLICATION FILED NOV. 29, 1910.

990,857.

Patented May 2, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

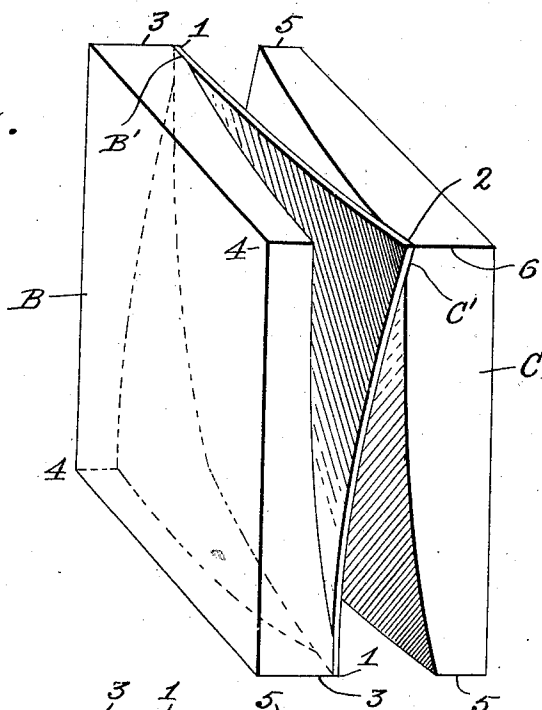
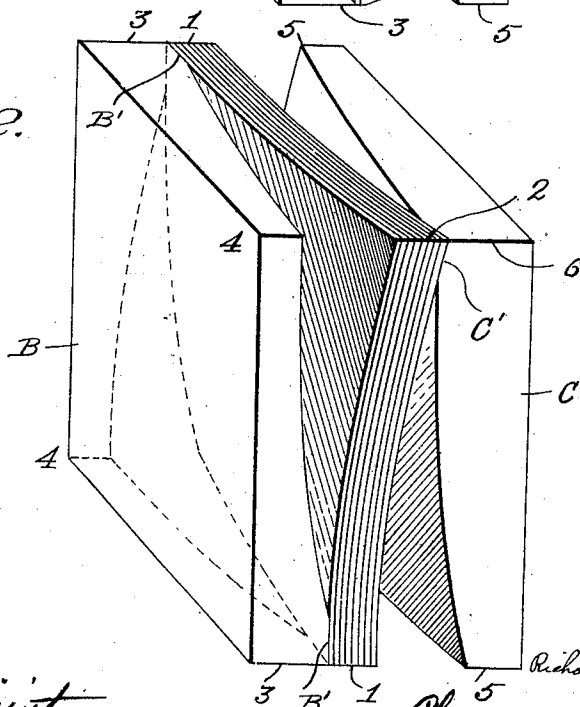


Fig. 2.



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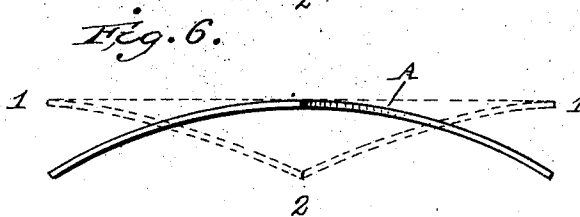
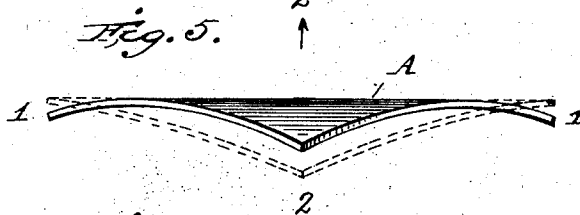
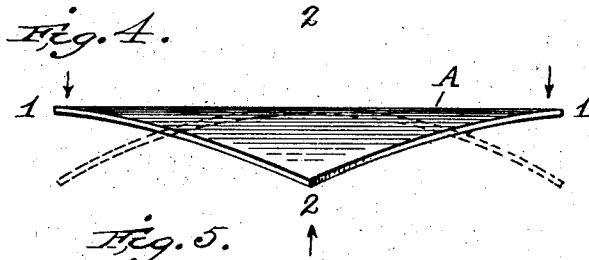
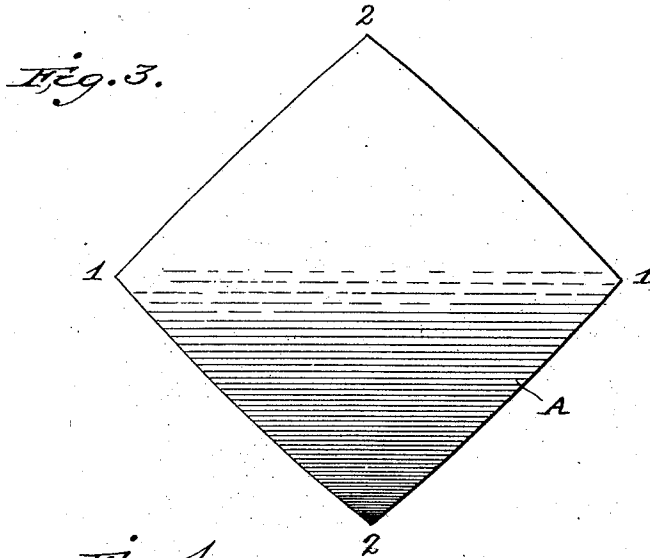
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SPRING.

990,857.

Specification of Letters Patent.

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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 Springs; 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.

This invention relates to improvements in apparatus or devices for yieldingly resisting the movement of bodies with relation to each other, and is in the nature of a spring member adapted to be interposed in any situation where a movement is to be yieldingly resisted.

The objects of the invention are to provide a means whereby the range of movement of a yielding member in the form of a resilient plate, for instance, may be increased without exceeding the elastic limit of the metal.

Resilient plates employed as springs have a wide range of usefulness, particularly in connection with draft and buffing gear of railway cars, car and vehicle springs, etc., because of the high ultimate resistance which such plates will afford, but a serious difficulty encountered in their use as heretofore constructed lies in their limited range of resilient movement and their liability to become set when the elastic limit of the metal is approached or exceeded.

In accordance with the present invention it becomes possible to practically double the range of movement of a spring plate without imposing greater tensional stress in any portion of the metal than heretofore imposed where the plate is bent or flexed from a normal curved condition to a plane, or vice versa, and in accomplishing this result the range of resilient movement is increased by transferring the curve in the metal from one plane to a plane transverse thereto during the flexing of the plate to the maximum.

In carrying the invention into practice a spring or resilient plate or body of plates superposed or arranged one against the other is given a normal curvature which is substantially cylindrical and in the flexing of the plate, initial movement reduces the curve and final movement imposes a curvature in the plate which is substantially cylindrical but about an axis which is transverse to the

axis of the normal cylindrical curve of the plate.

Referring to the accompanying drawings which are diagrammatic representations— Figure 1 is a perspective view of a single resilient plate and a pair of pressure transmitting members for coöperation therewith, embodying the present improvements. Fig. 2 is a similar view showing a plurality of resilient plates nested one within the other. Fig. 3 is a plan view of a rectangular plate having a normal cylindrical curvature contemplated by the present invention. Fig. 4 is an elevation looking at one corner of the plate in its normal condition in full lines and in dotted lines in the position assumed by it when fully flexed. Fig. 5 is a similar view but with the plate in full lines partially flexed and in dotted lines in its normal position. Fig. 6 is a view similar to Fig. 3, but with the plate fully flexed in full lines, and in dotted lines in its normal position.

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

The plate adopted for illustrating the invention is rectangular, as shown in Fig. 3, but it will be understood that the plate may be round, oblong, or of other appropriate shape. Said plate is given an initial or normal cylindrical curvature about an axis which, as shown in the drawings, is parallel with diagonally opposite corners of the plate; for instance, as shown in Figs. 3, 4, 5 and 6, the plate A is curved cylindrically about an axis which is substantially parallel with a line connecting the diagonally opposite corners 1—1. With the resilient plate thus constructed, if pressure be applied to the corners 1—1 toward the concave side of the plate and to the corners 2—2 in an opposite direction, as indicated by the arrows in Fig. 4, the initial movement due to such pressure on the diagonally opposite corners will cause the plate to be flexed to the position shown in full lines in Fig. 5; that is to say, the normal curvature of the plate will be reduced and the corners 1—1 will be slightly flexed toward the concave side of the plate. A continued movement or increased pressure in the same direction will cause the plate to assume the position shown in Fig. 6; that is to say, the normal cylindrical curvature of the plate will be eliminated and the plate will be given a cylindrical curvature about an axis which is substantially at right angles or transverse

to the axis about which the plate was initially curved. With this construction of plate a view looking at either of the ends 1—1 of Fig. 4 would correspond to the full lines of Fig. 6, and a view looking at either of the ends 1—1 of Fig. 6 would correspond to the full lines of Fig. 4.

In the practical utilization of a spring or resilient plate of this character, especially where it is desired that the parts shall come solid when the plates have been flexed to the desired limit, the pressure transmitting members, or the members which cooperate with the plates preferably have their active or operative faces formed to conform to the shape of the face of the plates when fully flexed. Thus, as shown in Figs. 1 and 2, the pressure transmitting members B and C, have their faces concave and convex, respectively, the curvatures being cylindrical. Member B is concave from the corners 3—3 while a line from the corners 4—4 is substantially straight or parallel with the axis of a cylinder of which the surface is a segment. The pressure transmitting member C is convex between the corners 5—5, the curvature being cylindrical and consequently the intermediate corner 6 would be connected by a straight line parallel with the axis about which the surface is formed.

In assembling the plates and pressure transmitting members, as shown in Fig. 1, or in Fig. 2, the axes of the cylinders on which the plates are formed is at right angles to the axes of the cylinders on which the pressure transmitting members are formed and as a result the plates contact with the pressure transmitting members at diagonally opposite corners. If pressure be now applied tending to move the pressure transmitting members toward each other, the plates will be flexed as heretofore described in connection with Figs. 4, 5, and 6, and when the parts come solid the plates will be clamped between the pressure transmitting members. The plates take their initial bearing on the pressure transmitting members at two points only, one pressure transmitting member bearing at separated points parallel with the axis about which the plate is formed and the other pressure transmitting member taking its bearings on the plate at separated points in a line transverse to the axis about which the plates are formed. In this connection it will be understood that while, as illustrated in the drawings, the pressure transmitting members may have their active faces in the form of cylindrical surfaces parallel with each other, nevertheless, the central or intermediate portions of the pressure transmitting members may be omitted and the said members at all times be only adapted to engage the plates, one member at points parallel with the axis of the cylinder on which the plate is formed and the other

member at points transverse to and on opposite sides of the center line of the plate.

The pressure transmitting members in the form of apparatus illustrated preferably have their corners cut away, flattened, or formed on a curve, as at B' C' to give a more extended bearing on the corners of the spring plates.

With a yielding pressure resisting member, such as described, it will be seen that the range of movement possible without exceeding the elastic limit of the metal at any point is practically doubled.

Obviously the plates may be of any desired shape, such as square, round or oblong, and the axis of the curvature may be transverse to or parallel with the greatest diameter or at any desired angle with relation thereto. It is also obvious that the ultimate curve may be toward the opposite side of the plate from the normal curvature, but about an axis transverse to the axis of the normal curve of the plate.

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

1. A yielding pressure resisting member embodying a curved plate spring, and means whereby said plate is flexed in planes transverse to axes at substantially right angles to each other.

2. A yielding pressure resisting member embodying a resilient plate member having a normal substantially cylindrical curvature and means for flexing said member into a curve transverse to its normal curve, whereby stresses are set up in planes at an angle to each other and the range of flexibility within the elastic limit of the metal is increased.

3. A yielding pressure resisting member embodying a resilient plate member having a normal substantially cylindrical curvature and means for flexing said member into a curve transverse of and toward the same side of the plate as its normal curve, whereby reverse bending is avoided, and the range of movement within the elastic limit of the metal is increased.

4. A yielding pressure resisting member embodying a resilient plate member having a normal substantially cylindrical curvature and cooperating pressure transmitting members movable toward and from each other and between which the plate is flexed, said pressure transmitting members having projecting portions alternately disposed, the projecting portions on one member engaging the concave side of the plate at points transverse to the axis of its normal curvature and the projecting portions on the other member engaging the convex side at points substantially parallel with the axis of normal curvature whereby movement of the pressure transmitting members toward each

other will lessen the normal curvature of the plate and curve the plate about an axis transverse to the axis of its normal curvature.

5 5. A yielding pressure resisting member embodying a resilient plate member having a normal substantially cylindrical curvature and cooperating pressure transmitting members movable toward and from each other
10 and between which the plate is flexed, one of said pressure transmitting members engaging the concave side of the plate only at diametrically opposite points transverse to the axis of normal curvature and the other
15 pressure transmitting member engaging the convex side of the plate only at diametrically opposite points parallel to the axis of normal curvature of the plate whereby the plate may be flexed in curves having
20 axes transverse to each other.

6. A yielding pressure resisting member embodying a resilient plate member having a normal substantially cylindrical curvature and pressure transmitting members between
25 which the plate is confined having plate engaging faces formed on curves having their axes transverse to the axis of the normal curve of the plate.

7. A yielding pressure resisting member
30 embodying a plurality of resilient plate members each having a normal substantially cylindrical curvature, and means for simultaneously flexing all of said plate members into curves transverse with relation to the
35 normal curve and toward the concave side of the plates.

8. A yielding pressure resisting member

embodying a plurality of resilient plate members all having a normal substantially cylindrical curvature in the same direction 40 and pressure transmitting members between which the plates are confined having operative faces formed on curves having axes transverse to the axis of the plates.

9. A yielding pressure resisting member 45 embodying a substantially rectangular resilient plate having a normal substantially cylindrical curvature on an axis substantially parallel with a straight line intersecting diagonally opposite corners of the plate, and 50 pressure transmitting members between which the plate is confined having operative faces substantially conforming to a cylindrical curve having an axis transverse with relation to the axis of the cylindrical curve 55 of the plate.

10. A yielding pressure resisting member embodying a plurality of substantially rectangular plates each having a normal substantially cylindrical curvature on an axis 60 substantially parallel with a straight line intersecting diagonally opposite corners of the plate, said plates being nested one within the other, and pressure transmitting members between which the body of plates are 65 confined having operative faces substantially conforming to a cylindrical curve having an axis transverse with relation to the axis of the cylindrical curve of the plates.

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