No. 743,689. PATENTED NOV. 10, 1903.

C. P. BYRNES.

SPRING CUSHIONING DEVICE.

APPLICATION FILED JULY 8, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

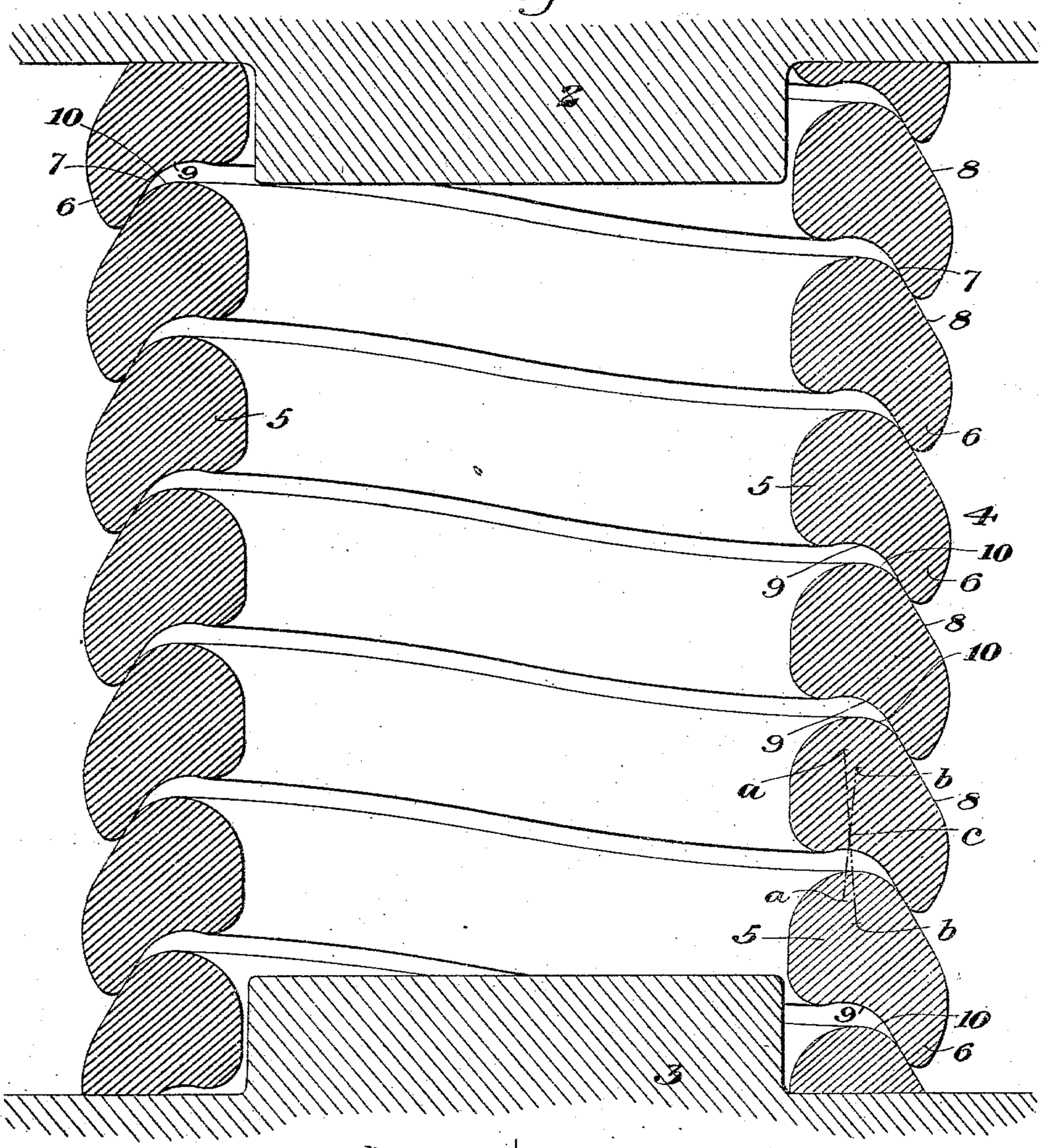

Fig. 2.

WITNESSES

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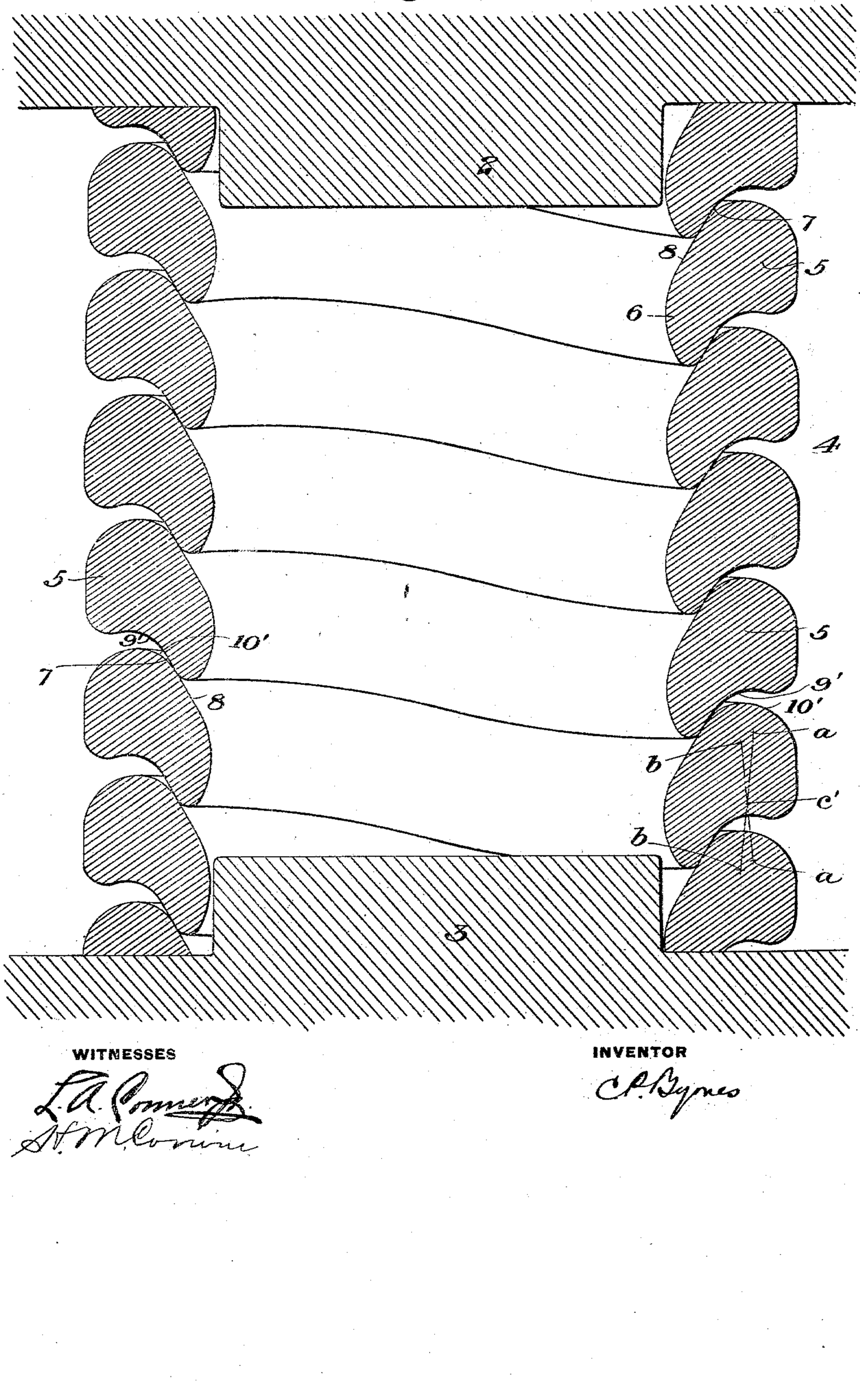
NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.

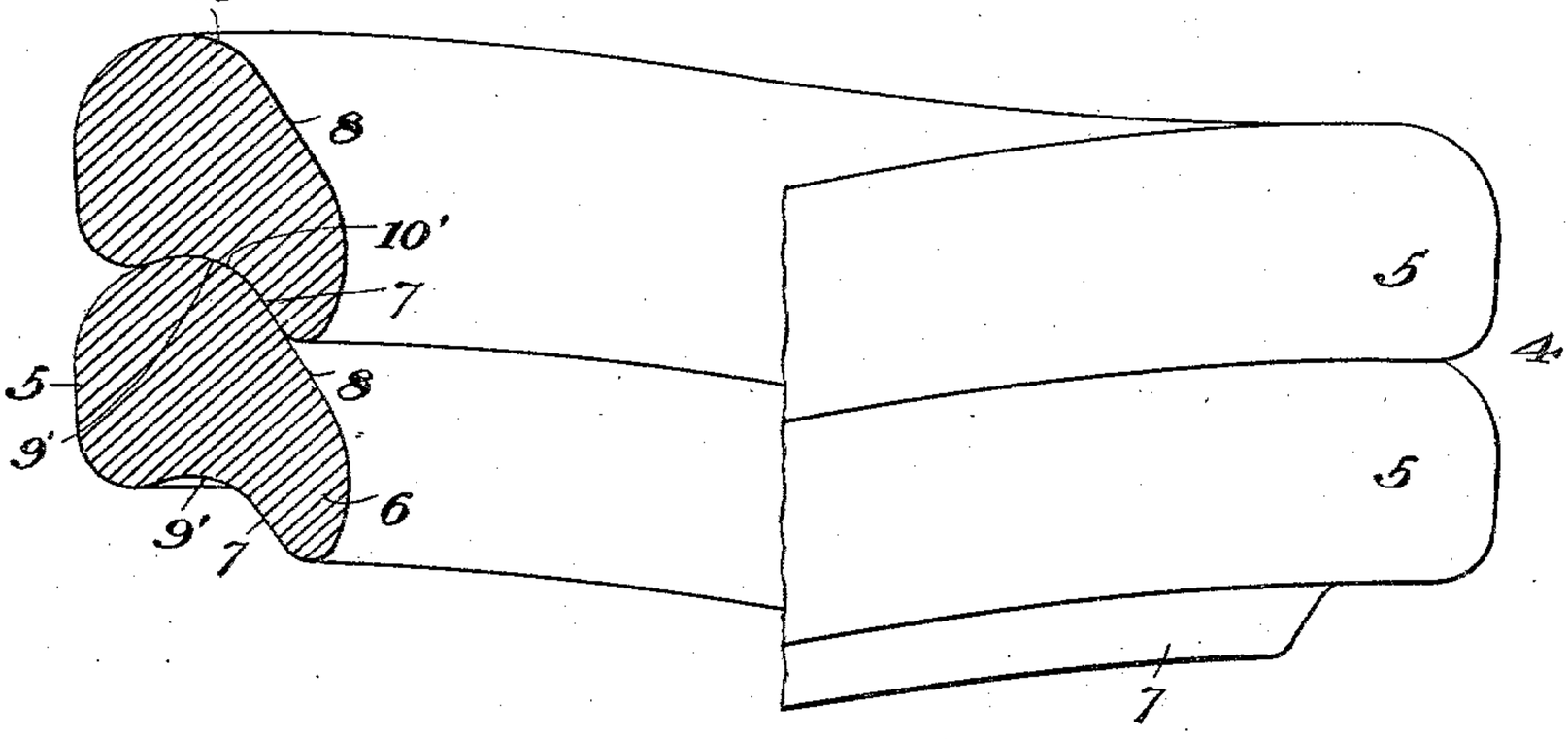
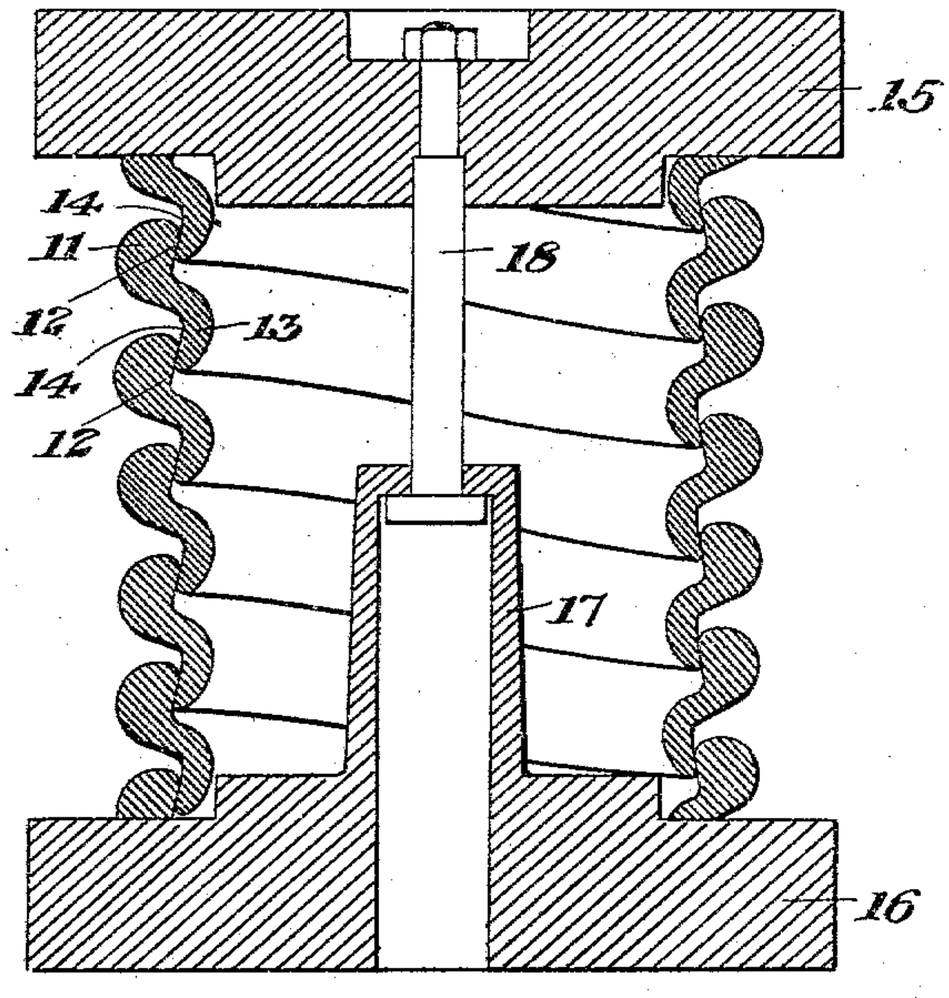


Fig. 5.



WITNESSES:

INVENTOR

C. P. Byrnes

No. 743,689. Patented November 10, 1903.

UNITED STATES PATENT OFFICE.

CLARENCE P. BYRNES, OF SEWICKLEY, PENNSYLVANIA.

SPRING-CUSHIONING DEVICE.

SPECIFICATION forming part of Letters Patent No. 743,689, dated November 10, 1903.

Application filed July 8, 1903. Serial No. 164,630. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE P. BYRNES, of Sewickley, Allegheny county, Pennsylvania, have invented a new and useful Spring-Cushioning Device, of which the following is full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical section showing one form of the invention. Fig. 2 is a partial detail showing two of the coils in closed position. Fig. 3 is a view similar to Fig. 1, showing another form of the invention. Fig. 4 is a partial side elevation with one-half broken away, showing the coils of Fig. 3 in closed position; and Fig. 5 is a vertical section showing a further form of the invention.

My invention relates to the class of spring-cushions, especially those used for car-springs, car-buffers, draft-riggings, &c., and is designed to increase the resisting power of the spring and also to dampen the recoil.

Heretofore in the use of car-springs additional friction devices have been used to dampen the recoil of the ordinary helical springs, and in car-buffers and draft-gears frictional devices have been added to the springs to increase the resistance and dampen the recoil.

My invention is designed to make the helical spring itself a friction device and to increase its resistance by coacting engaging faces of the coils, which will also dampen the recoil. It is also designed to increase the resistance of a spiral spring by causing the successive coils to exert a torsional action upon each other during the closing stroke and, further, to cause a change in the diameter of the spring from the action of the successive coils.

In the drawings, referring to the form of Figs. 1 and 2, in which the invention is shown applied to a car-spring, 2 represents the top cap, 3 the bottom cap, and 4 a helical spring having superimposed coils. The body 5 of each coil of the spring is provided with an outwardly and downwardly projecting lip or flange 6. This flange has an inner inclined face 7 and an outer inclined face 8, and the inner face of one coil or turn engages the outer face of the next lower coil or turn as the spring is closed. These surfaces are preferably always in contact with each other, as in the form shown, though they may be arranged so that they will separate when the spring is opened. The lower portion of the body of this coil is preferably recessed upwardly, as shown at 9, to form a seat for the rounded surface 10 of the next coil beneath it, when the spring is completely closed, thus preventing distortion of the springs beyond a predetermined amount. During the closing stroke of this spring each coil will rotate slightly on its axis by reason of its lip moving over the next coil. The curve of the seat portion 9 is preferably on the arc of a circle having the same radius as that of the circle on which the arc of the top portion 10 of these coils is struck; but the centers of these circles do not coincide, and as the inclined faces or flanges are each preferably tangent to its circle the coils will rock until they assume an intermediate position. Thus in Fig. 1 the point *a* indicates the center of the circle on which the curve 9 is struck, while the point *b* indicates the center of the circle on which the curve 10 is struck. During the closing stroke the point *a*, being the center of the arc 9, will move outwardly, while the point *b* will move inwardly until the two coincide in a vertical plane passing through the point *c* at the intersection of the line joining the circle-centers, as shown in Fig. 1. This closed position is illustrated in Fig. 2, wherein the arcs 9 and 10 are seated against each other through the rocking of the coils. This torsional action and twisting of the successive coils introduces a large additional resistance to closing of the spring in addition to the friction of the inclined surfaces and the resistance of the spring to the change in diameter which is effected. On the springs being released the coils return to their normal position, the return stroke being dampened somewhat by the flange-faces sliding over each other.

In Figs. 3 and 4 I show a form similar to that of Figs. 1 and 2, except that the continuous flange or lip of the helix is on the inside of the coil instead of upon the outside, as in Fig. 1. The parts of this figure similar to those of Fig. 1 are marked with the same numerals with the prime-mark applied. In this form the point *a*, being the center of the circle on which the seat 9′ is struck, is outside the point *b*, on which the surface 10′ is struck, and in this form these centers will be carried

into a vertical plane passing through the intersection c' as the spring is closed. This spring will therefore be decreased in diameter slightly during closing, whereas the spring of Fig. 1 will be slightly increased in diameter during the closing stroke.

In cases where it is desired to obtain a more efficient dampening action during the recoil the flanges or lips may be arranged to give an increasing dampening resistance during the recoil or opening stroke of the spring. Thus in Fig. 5 I show a spring-body 11 as having an inclined inner face 12 and provided with a depending inner flange 13, having a flat inclined outer face 14. The faces 12 and 14 are inclined upwardly. The inner face 12 of each coil engages the face 14 of the flange of the next coil above it. In this case as the spring opens when the strain is released the resistance of the inclined faces will increase as one coil tends to rock the other. On the closing stroke the dampening resistance will decrease correspondingly. In this form the upper and lower followers or caps 15 and 16 may be tied together by the telescopic connection consisting of a tubular boss 17 and bolt 18 to limit the opening movement of the spring.

The faces 12 and 14 may be substantially vertical, and the spring may be wound so as to bind these faces together and rock each coil out of its normal position slightly during the winding, so that a constant or continuous dampening action or resistance may be produced during each stroke.

The advantgages of my invention result from the largely-increased resistance afforded, since to the ordinary resistance of the spring are added the resistance to torsion or twisting of the coils, the frictional resistance, and the resistance to the change of diameter of the helix.

The spring may be used in car-springs, buffers, draft-gear, &c., the angular flange may project upwardly, and the shape and arrangement of the superimposed coils to increase resistance may be varied without departing from my invention.

I claim—

1. A helical spring having superimposed coils, the coils having coacting faces arranged to give an increased resistance during at least one stroke; substantially as described.

2. A helical spring having superimposed coils with coacting flanges or cam-faces arranged to increase the resistance.

3. A cylindrical helical spring having superimposed coils with coacting friction-faces between the successive coils; substantially as described.

4. A spiral spring having superimposed coils with a continuous angular flange engaging the successive turns and arranged to increase resistance during the stroke; substantially as described.

5. A spiral spring having superimposed coils having substantially the same diameters with interfitting surfaces arranged to cause a torsion or turning of the successive coils during the stroke; substantially as described.

6. A helical spring having superimposed coils of substantially the same diameter, its successive coils being provided with coacting faces arranged to change the diameter of the spring during the stroke; substantially as described.

7. A helical spring having superimposed coils with a continuous angular lip engaging the successive coils and arranged to cause torsion and change of diameter of the coils; substantially as described.

8. A spiral spring having its successive coils provided with coacting resistance-faces, the coils having stops or seats arranged to prevent excessive distortion; substantially as described.

9. A helical spring having superimposed coils, the body of the spring having a continuous angular flange arranged to engage the successive coils and increase the resistance during the stroke; substantially as described.

10. A spiral spring having coils provided with interfitting surfaces around the different parts of each coil and arranged to cause a torsion upon all parts of each coil during stroke; substantially as described.

11. A spiral spring having a continuous annular flange projecting from the body and arranged to engage the successive coils and increase resistance during stroke, the said flange being in engaging position at all times; substantially as described.

12. A cylindrical helical spring having superimposed coils, the coils having projections extending around their circumference arranged to engage the successive coils and increase the resistance during stroke; substantially as described.

In testimony whereof I have hereunto set my hand.

CLARENCE P. BYRNES.

Witnesses:
GEO. B. BLEMING,
JOHN MILLER.