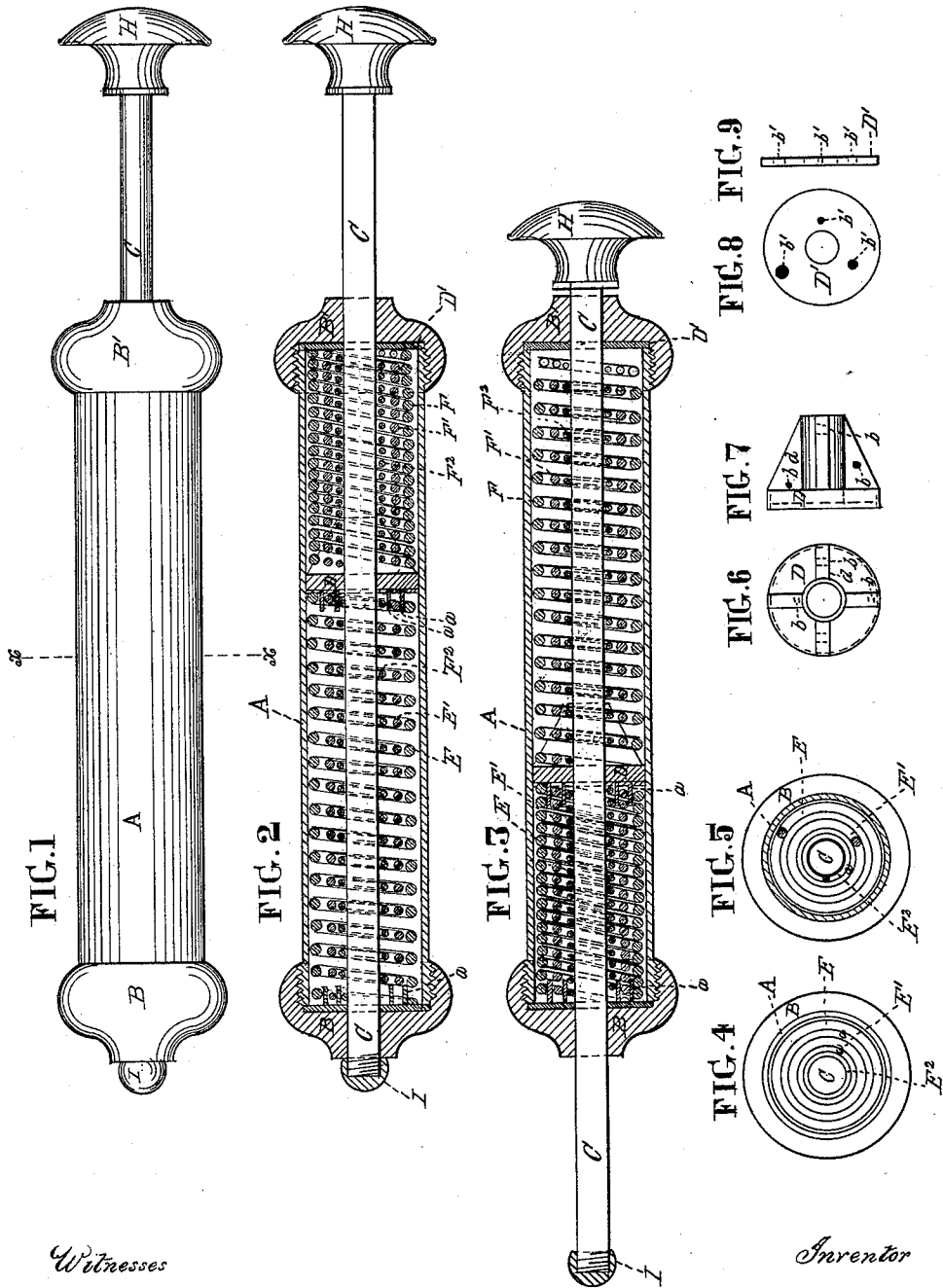


J. HAYDEN.
CAR BUMPER SPRING.

No. 176,134.

Patented April 18, 1876.



Witnesses

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IMPROVEMENT IN CAR-BUMPER SPRINGS.

Specification forming part of Letters Patent No. **176,134**, dated April 18, 1876; application filed March 2, 1876

To all whom it may concern:

Be it known that I, JAMES HAYDEN, of the city and county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Combined Spiral Springs for Car-Bumpers, &c., which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

My invention consists of the following particulars: On a piston-rod which slides in the ends of a cylinder there is a piston which fits the interior of the cylinder, so as to slide freely therein. To one side of said piston I confine one end of a series of spiral springs, which are so arranged, one within another, as to fill the space between the piston-rod and the inner surface of the cylinder, leaving merely sufficient room for the springs to pass each other in their expansion and contraction without rubbing against each other. The other ends of said springs are confined to a reacting stationary collar, so that, as the piston moves in the opposite direction from the collar, the tension force of the springs is exerted upon it. In the opposite end of said cylinder I arrange a series of compressing-springs, with their inner ends resting against the contiguous face of the piston and the contiguous head of the cylinder reacting against the outer ends.

The slight space left between the outer circumference of one spring and the inner circumference of the next is filled up by a ferrule, to prevent the folds of one spring rubbing against those of the next. The head of one end of the cylinder is screwed on, and when the springs and piston-rod are arranged within the cylinder the head of the other end of the cylinder is screwed up to its place, so as to come against the reacting collar above mentioned. The piston-rod at this end of the cylinder projects as far outside of the cylinder as is desired to compress the springs at the opposite end of the same. Then, as the piston-rod is forced forward, the piston compresses the springs in the opposite end of the cylinder and draws the tension-springs to any desired extent, not greater than the space between the cylinder-head and the head of the piston-rod, and thus the whole length of the cylinder is filled up by the springs in the forward motion of the rod.

This is the case also in the back movement of the rod, for when it is relieved of the pressure the springs exert their whole force upon the piston and draw the rod back to its former position.

I usually make the compressing-springs of double the length of the tension-springs, and then as the tension-springs are drawn out the others are compressed to the previous length of the tension-springs. I thereby get a double pressure, and the cylinder is filled up at all times by the springs throughout its whole length.

In the accompanying drawings, Figure 1 is a side view of my combined spring. Fig. 2 is a longitudinal section of the same, ready for action. Fig. 3 is a like view, with the compressing-springs compressed and the tension-springs drawn out. Fig. 4 is an end view of the combined spring with the cylinder-head removed, the springs E, E¹, and E² and ferrules *a* between them. Fig. 5 is a cross-section at the line *xx* of Fig. 1. Figs. 6 and 7 are face and edge views of the piston D. Figs. 8 and 9 are like views of the reacting collar D'.

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

A is a stationary cylinder, which has heads, B and B', confined by means of screw-threads. C is a piston-rod, which has a reciprocating movement in the heads of the cylinder, which has appropriate bearings for the same. It has a piston, D. Between the piston and the head B of the cylinder are placed the compression-springs E, E¹, and E², one within the other, filling up the annular space between the piston-rod and the inner surface of the cylinder. To prevent the folds of the springs rubbing against each other during the reciprocating movement of the piston, there are ferrules *a* between the springs at their ends. Like ferrules may be placed at the middle of these springs. Between the piston D and the reacting collar D', through the central opening of which the piston-rod moves freely, I arrange the tension-springs F, F¹, and F², the ends of which have a positive connection with the piston-head and the collar D'. One end of each spring is passed through a hole, *b*, of the projection *d* of the piston-head, the bend

of the spring holding it firmly, and the other is passed through a hole, *b'*, of the collar *D'* and secured by means of a nut; or the fastening may be made in any other convenient manner. Before the pressure is applied to the combined spring the compressing-springs have assumed their free open position. When the pressure is applied to the resisting head *H* of the piston-rod it is forced forward in the direction of the arrow, the piston resting against the compressing-springs *E*, *E*¹, and *E*², and at the same time exerting a drawing force upon the tension-springs *F*, *F*¹, and *F*², so as to close the former and open the latter, as seen in Fig. 3, the whole length of the cylinder being at all times filled with the springs. *I* is a stop-button on the end of the piston-rod. As the expansion of the tension-springs is equal to the contraction of the compressing-springs, and vice versa, I make the former, in their natural and contracted state, of the length the latter assume when compressed.

I have represented a nest of springs in each end of the cylinder, but it will be understood that the invention will apply to a single spring at each end, as for some purposes one would be sufficient; and a single spring or nest of

either compression or tension springs may be used alone, in connection with the piston and rod, in the same manner; and I have represented the piston-rod having a reciprocating movement in the cylinder. It may be stationary and the cylinder have a reciprocating movement over it. When such arrangement is desired, a like effect of the springs will be produced.

I claim as my invention—

1. The combination of one or more compressing-springs and one or more tension-springs with the piston *D* and cylinder *A*, substantially in the manner and for the purpose set forth.

2. A combined spring, having a cylinder, *A*, piston-rod *C*, provided with a piston, *D*, a reacting collar, *D'*, one or more tension-springs, and one or more compressing-springs, constructed and arranged in relation to each other substantially in the manner and for the purpose set forth.

JAMES HAYDEN.

Witnesses:

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