(No Model.) 2 Sheets—Sheet 1.

J. W. CLOUD.

SPRING.

No. 442,721. Patented Dec. 16, 1890.

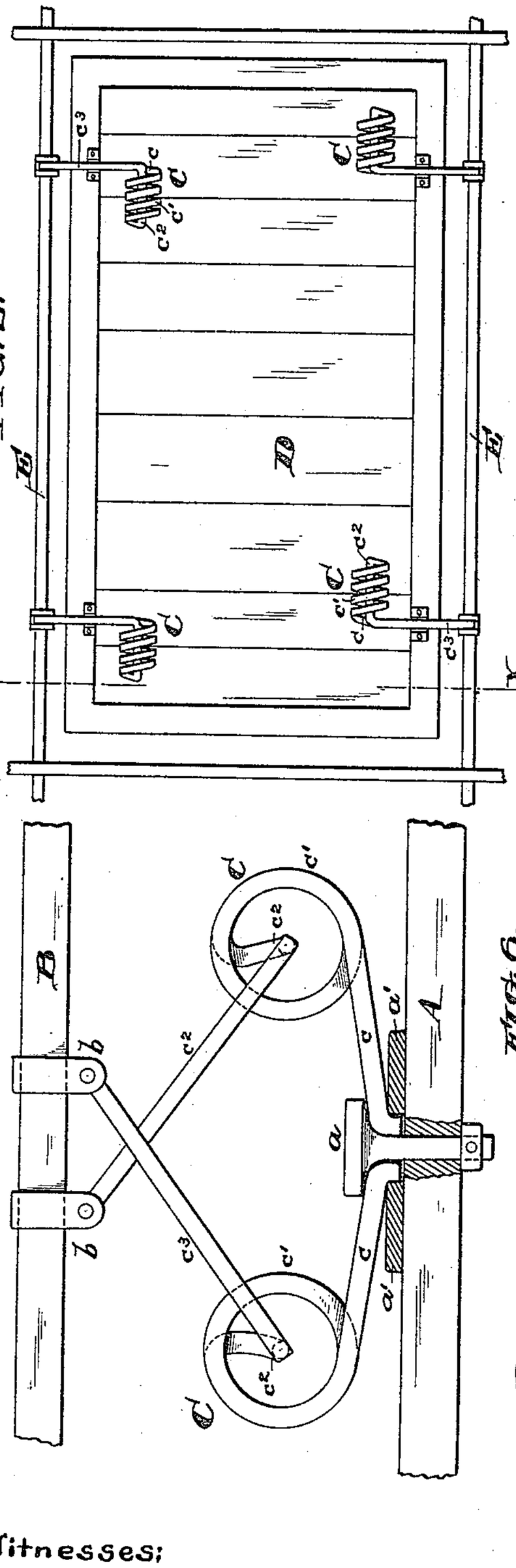


FIG. 2.

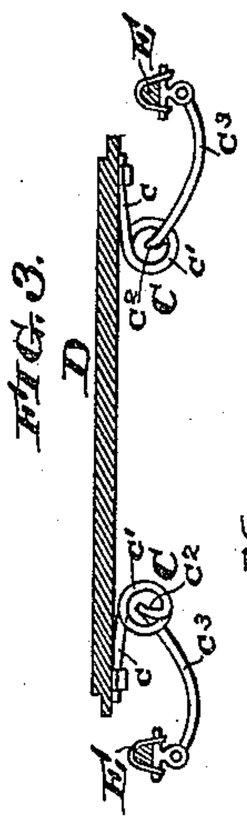
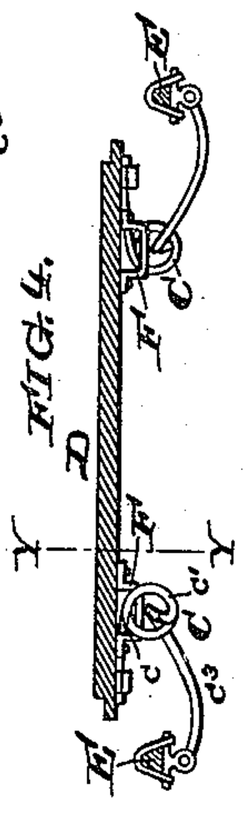


FIG. 3.



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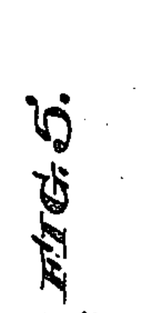

FIG. 5.

FIG. 1.

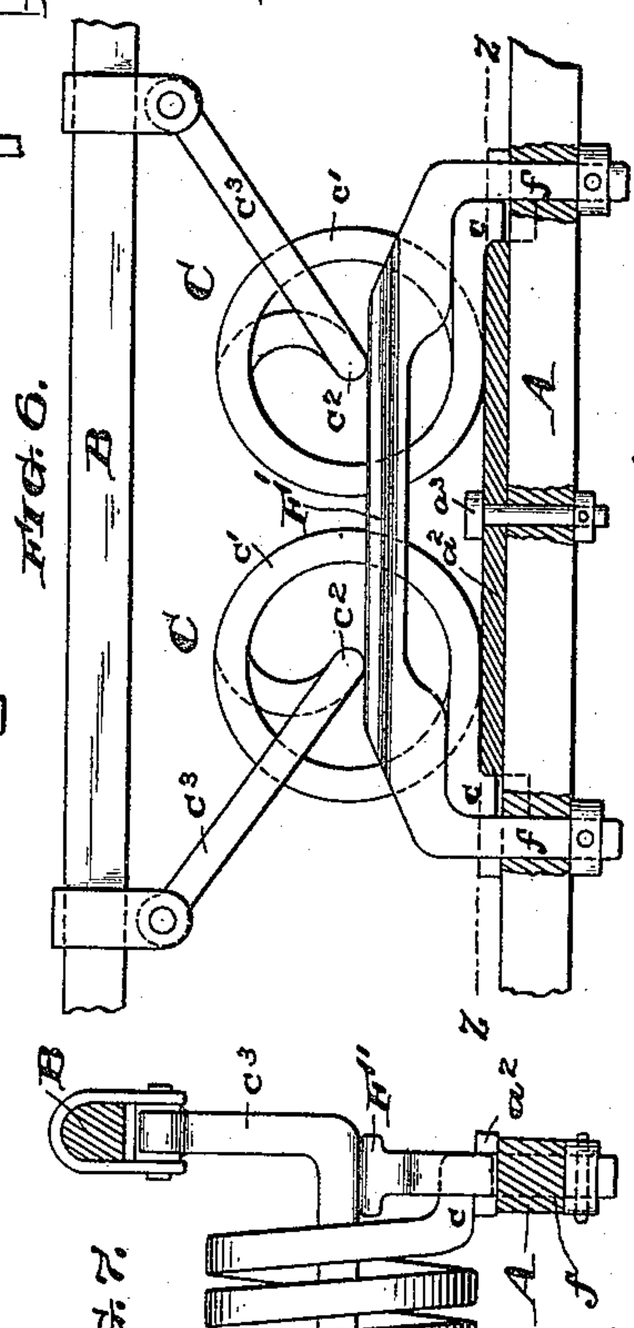

FIG. 6.

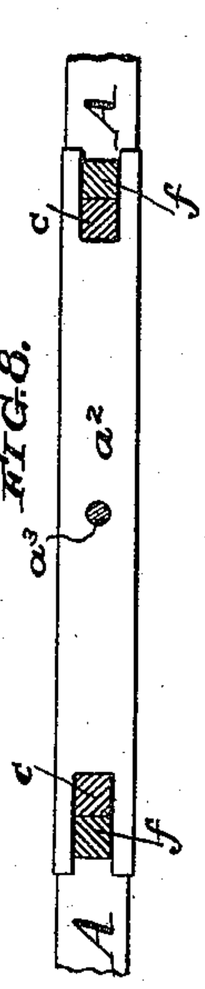

FIG. 8.

FIG. 7.

Witnesses;
Henry Bruce
Walter Famariss

Inventor;
John W. Cloud
by his attorney
Francis T. Chambers

(No Model.) 2 Sheets—Sheet 2.

J. W. CLOUD.

SPRING.

No. 442,721. Patented Dec. 16, 1890.

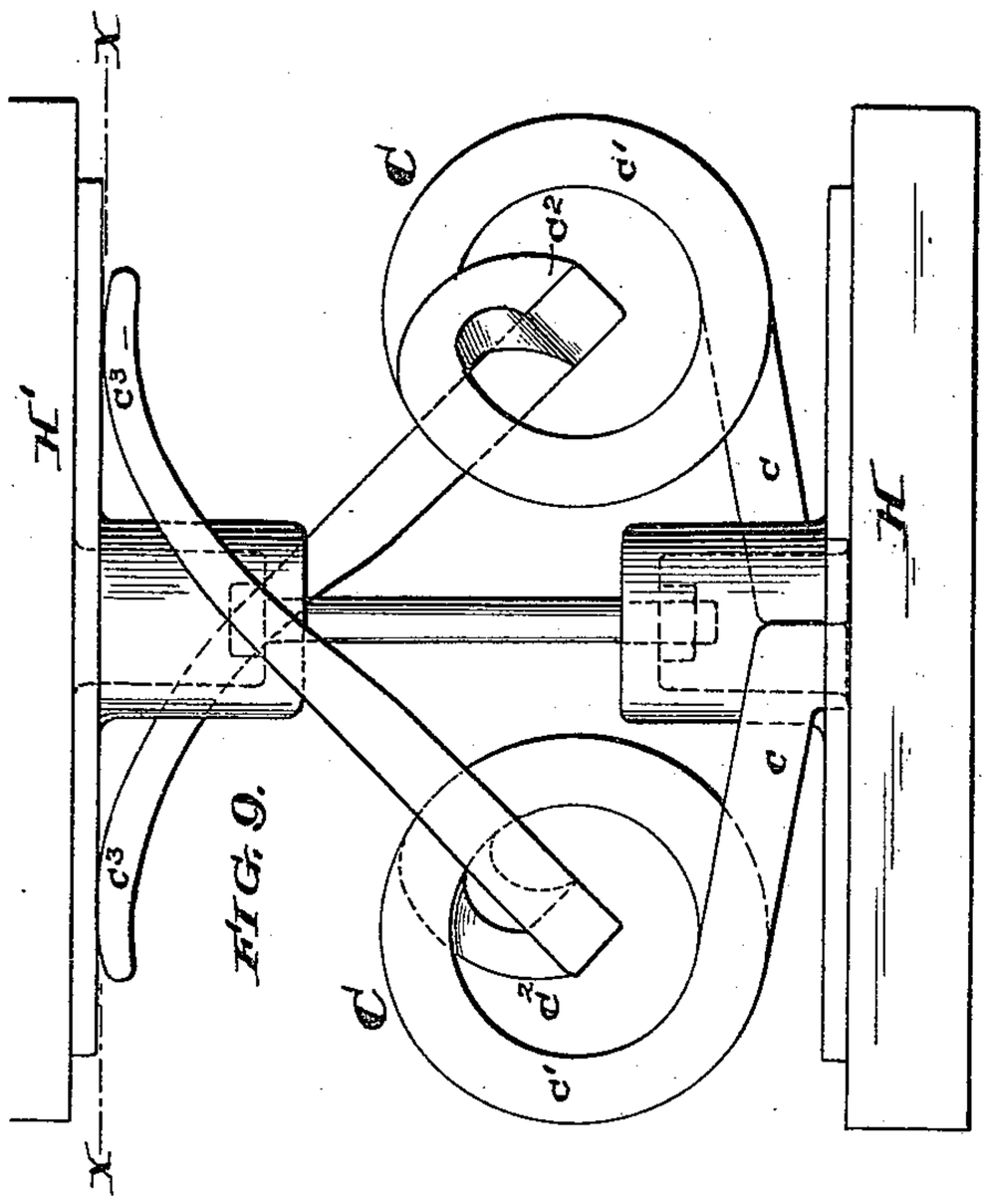

FIG. 9. FIG. 10.

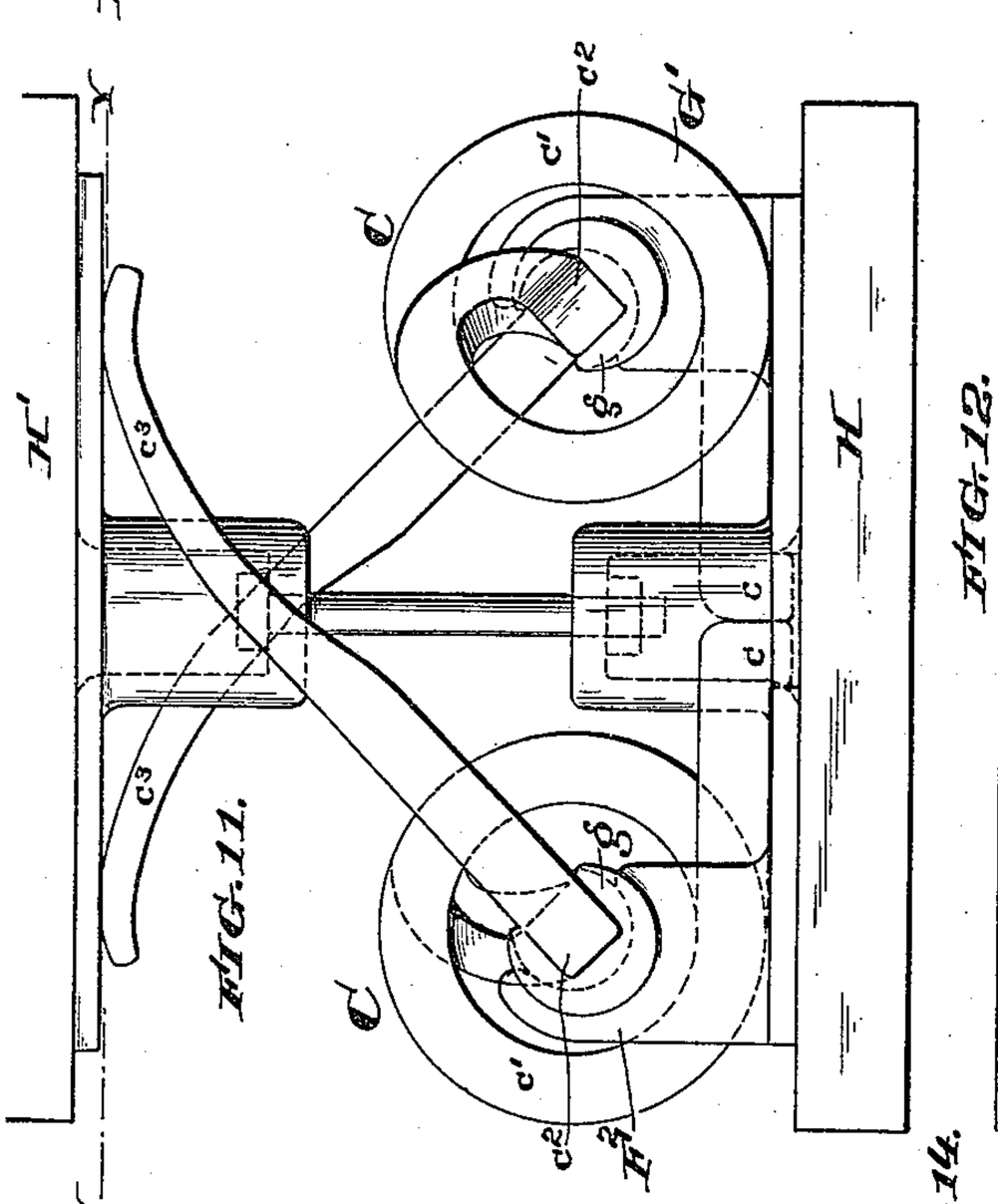

FIG. 11. FIG. 12.

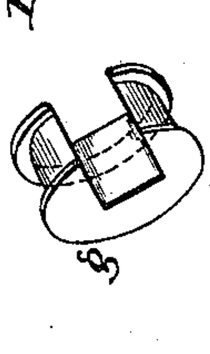

FIG. 13.

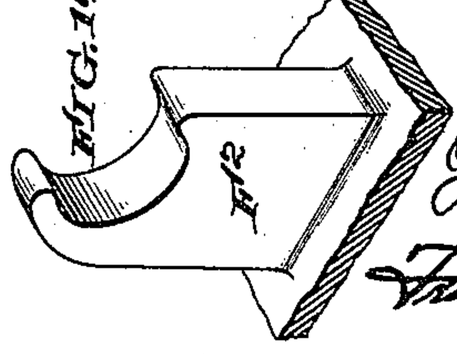

FIG. 14.

Witnesses:
Henry Drury
Walter Famariss

Inventor:
John W. Cloud
by his attorney
Francis J. Chambers

UNITED STATES PATENT OFFICE.

JOHN W. CLOUD, OF BUFFALO, NEW YORK.

SPRING.

SPECIFICATION forming part of Letters Patent No. 442,721, dated December 16, 1890.

Application filed July 24, 1890. Serial No. 359,773. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. CLOUD, of Buffalo, county of Erie, State of New York, have invented a certain new and useful Improvement in Springs, of which the following is a true and accurate description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to the construction and application of coiled springs, and has for its object to provide a spring which will at once be easy to manufacture and at the same time possess the maximum strength and elasticity.

The nature of my invention is best understood as described in connection with the drawings in which it is illustrated, and the novel features which I desire to protect by Letters Patent are hereinafter clearly pointed out in the claims, reference being had to the drawings, in which—

Figure 1 represents my improved spring as attached at one end to the axle and at the other to the body of a wagon. Fig. 2 represents my improved spring applied to a side-bar buggy, Fig. 3 being a cross-section on the line X X of Fig. 1; Fig. 4, a similar cross-section showing a modification in the way of applying my springs; Fig. 5, a view of one of my springs, taken through the section-line Y Y of Fig. 4. Fig. 6 represents another way of applying my improved springs between the axle and body of a wagon, Fig. 7 being a side view of the same, and Fig. 8 a view taken on the line Z Z of Fig. 6. Fig. 9 represents my improved spring applied between the upper and lower bolster of a railway-car, the said figure being an elevation. Fig. 10 represents the same device in plan. Fig. 11 is an elevation, showing a similar application of my springs, together with a modification, Fig. 12 being a plan view of the device shown in Fig. 11, and Figs. 13 and 14 perspective views of devices used in connection with the arrangements shown in Figs. 11 and 12.

A, Figs. 1, 6, 7, and 8, represents the axle of a wagon, and B a bar attached to the body of the wagon.

C in all of the figures indicates my improved spring, which is made of a single bar of iron of rectangular or round section coiled as indicated at c', having one end continued out tangentially from the coil, as indicated at c, to form a bearing-arm and having the other end turned inward and back through the center of the coil, as indicated at c^2, the extremity of the said end c^2 being formed into or connected with an outwardly-projecting bearing-arm c^3, as shown in the drawings. This bearing-arm c^3 is formed of an extension of the end c^2; but obviously it could be formed separate from the arm and attached to it in any convenient way. It is preferable, however, to form it of the same metal, so as to take advantage of its elasticity as well as that of the part of the metal formed into the coil. Preferably I extend the arms c and c^3 out from the coil in the same direction, because, among other reasons, the spring is thus better balanced—that is, the force exerted on the two bearing-arms is all taken up.

In bending the metal of the spring there is little or no tendency to disconnect the ends of the arms from the points to which they are attached, the arms simply moving to and from each other. Another important advantage gained by constructing the spring with its bearing-arms extending out both to the same side is that the coil is free to move laterally as the arms approach and recede from each other, thus relieving the spring from the strains to which it would be subjected if no provision was made for permitting this lateral movement, which is equal in extent to the versed sine of the angle through which the arms move.

Referring again to the drawings, D is the body of a side-bar wagon, and E the side bars, the mode of attaching my improved springs to wagons of this kind being clearly shown in Figs. 2, 3, 4, and 5. In order to keep the end c^2 of the bar which passes through the coil approximately in the center thereof, I have found it advisable in some cases to provide a chair such as is indicated at F in Figs. 4 and 5 and at F′ in Figs. 6, 7, and 8. The end of the part c^2 of the bar which extends out beyond the coil c' rests upon this bar or chair F or F′, which when used with springs, the bearing-arms of which are attached to the bearing-surfaces above and below, should be

made in the form of a somewhat elongated bar, as shown, so that the end c^2 of the spring-bar can move laterally along it, while being at all times sustained in its central position by it. The bearing-arms of the springs can be attached to the surfaces on which they are supported or which they support in any convenient way. Thus in Fig. 1 the arms c of the springs are secured between a bolt a, passing through the axle A, and projections a' a', secured on top of the axle. In the plans shown in Figs. 6, 7, and 8 the ends c of the springs are secured between a plate a^2, held in position on the axle by a bolt a^3, and the downwardly-projecting arms f f of the chair F'.

Referring now to Figs. 9 to 14, H represents the lower bolster, and H' the upper bolster, of a car-truck. The ends c of the springs are secured to the lower bolster, as shown, while the bearing-arms c^3 are convexly curved and rest against a plate on the lower side of the upper bolster H', but are not attached to it.

In the modification illustrated in Figs. 11 and 12 the end c^2 of the spring-bar is supported on a chair F^2. The square bar of which the spring is represented as made is made to turn readily in the chair by being passed through a bearing g, having a cylindrical form, so that it will turn readily in the curved face of the chair F^2. It is not necessary in this modification to provide for any lateral movement of the bar in the chair, as all lateral movement is taken on the curved arm c^3.

Where heavy loads are carried, and to a greater or less degree in all cases, it is desirable that the leverage through which the load acts upon the spring should dimish as the spring yields beneath the load. By giving the bearing-arms a convex curvature, as is best shown in Figs. 9 and 11, this shortening of the leverage is easily effected, as the bearing-surface to which the spring is attached or connected changes its point of contact with the bearing-arm as the spring yields, the point of contact constantly moving toward the coil, and thus shortening the leverage. The same effect, in substance, can be secured by forming the bearing-surfaces so that as the bearing-arms move together they will come in contact with the points on or attached to the bearing-surfaces at points between the normal attachment and the coil of the spring. Thus in Fig. 1 as the spring yields the bearing-arms c are pressed down upon the cross-bar a', thus shortening the leverage by which the load acts upon the spring. In the construction illustrated in Fig. 9 also the bearing-arms c will, as they assume a horizontal position, rest against the lower bolster at a point or points intermediate between their normal points of attachment and the coil of the spring.

Having now described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. A spring consisting of a single coil having one end turned back through its center, and a bearing-arm extending from the extremity of said end outside the coil to form a second bearing-arm, said arms being adapted to support the load, as described, in combination with a chair or support arranged to lie beneath that end of the coiled bar which extends through the coil and support it when the spring is loaded.

2. A spring consisting of a single coil having one end turned back through its center, and a bearing-arm extending from the extremity of said end outside the coil and having its other end extending out tangentially from the coil to form a second bearing-arm, and one or both of said bearing-arms being convexly curved, as described, so as to come in contact with the bearing-surface to which they are connected as the spring yields under a load, and thus diminish the leverage through which the load acts upon the spring.

3. A spring consisting of a single coil having one end turned back through its center, and a bearing-arm extending from the extremity of said end outside the coil and having its other end extending out tangentially from the coil to form a second bearing-arm, in combination with bearing-surfaces resting against the two bearing-arms of the spring and so formed as to come in contact with one or both the bearing-arms at one or more points between their normal point of contact and the coil as the spring yields under the load, thus decreasing the leverage of the said load.

JOHN W. CLOUD.

Witnesses:
ALBERT LEVART,
A. E. FORREST.