

(No Model.)

2 Sheets—Sheet 1.

W. W. GRIER & E. F. BENGLER.

VEHICLE SPRING.

No. 354,633.

Patented Dec. 21, 1886.

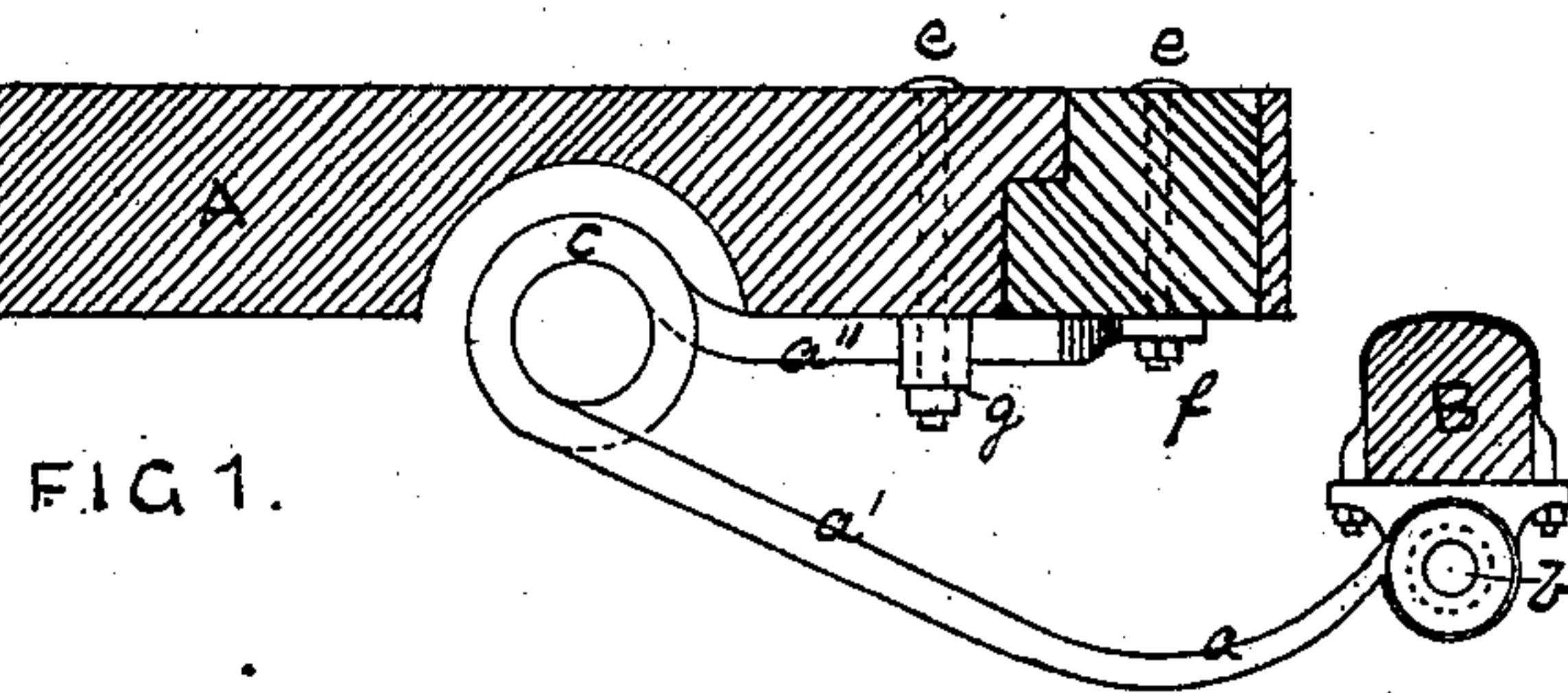


FIG 1.

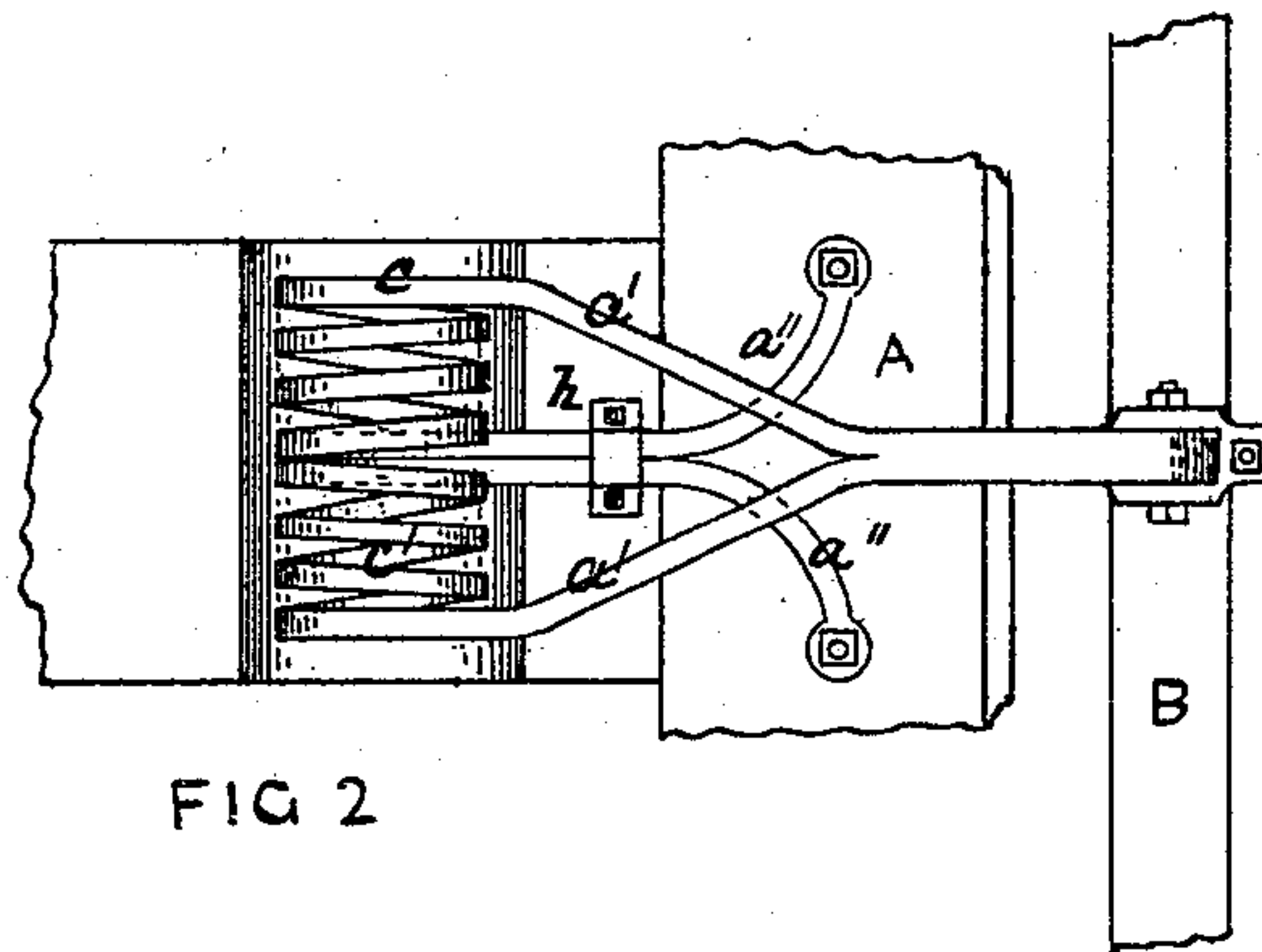


FIG 2

Witnesses.

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(No Model.)

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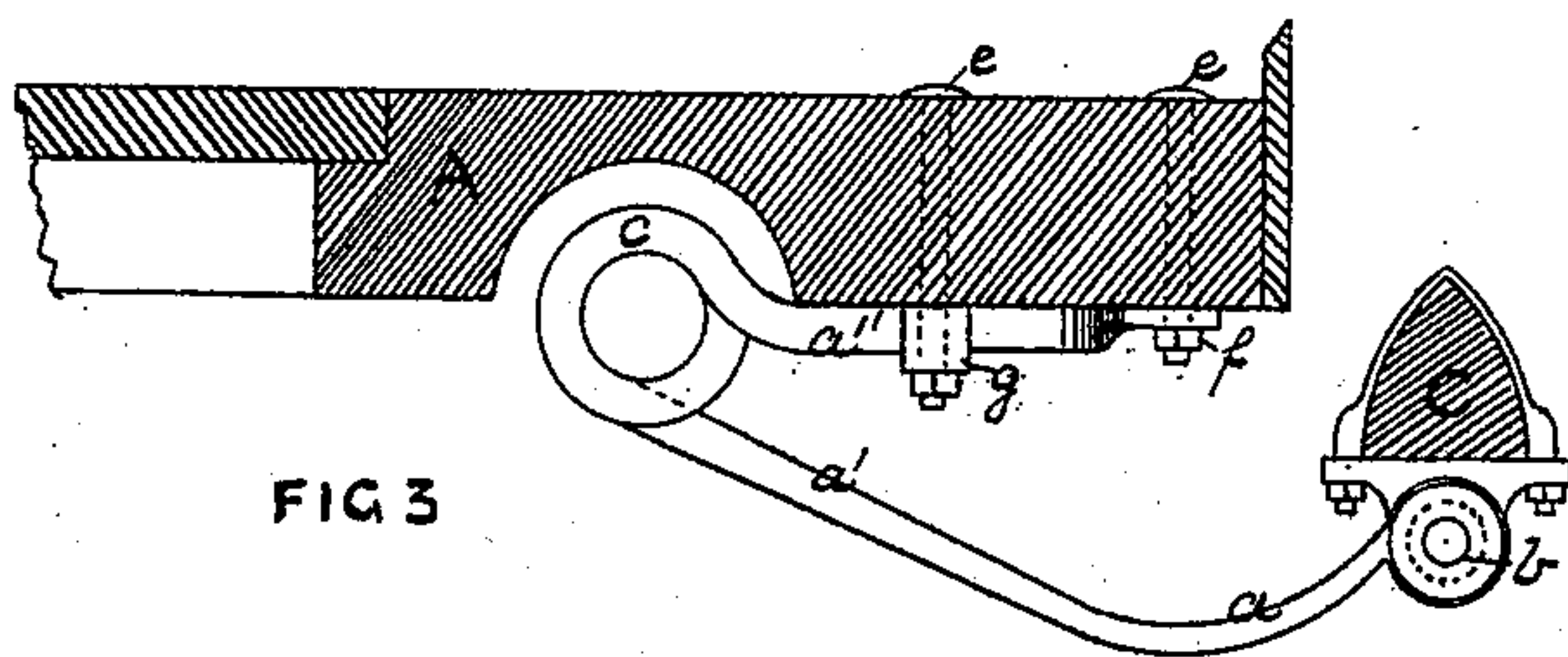


FIG 3

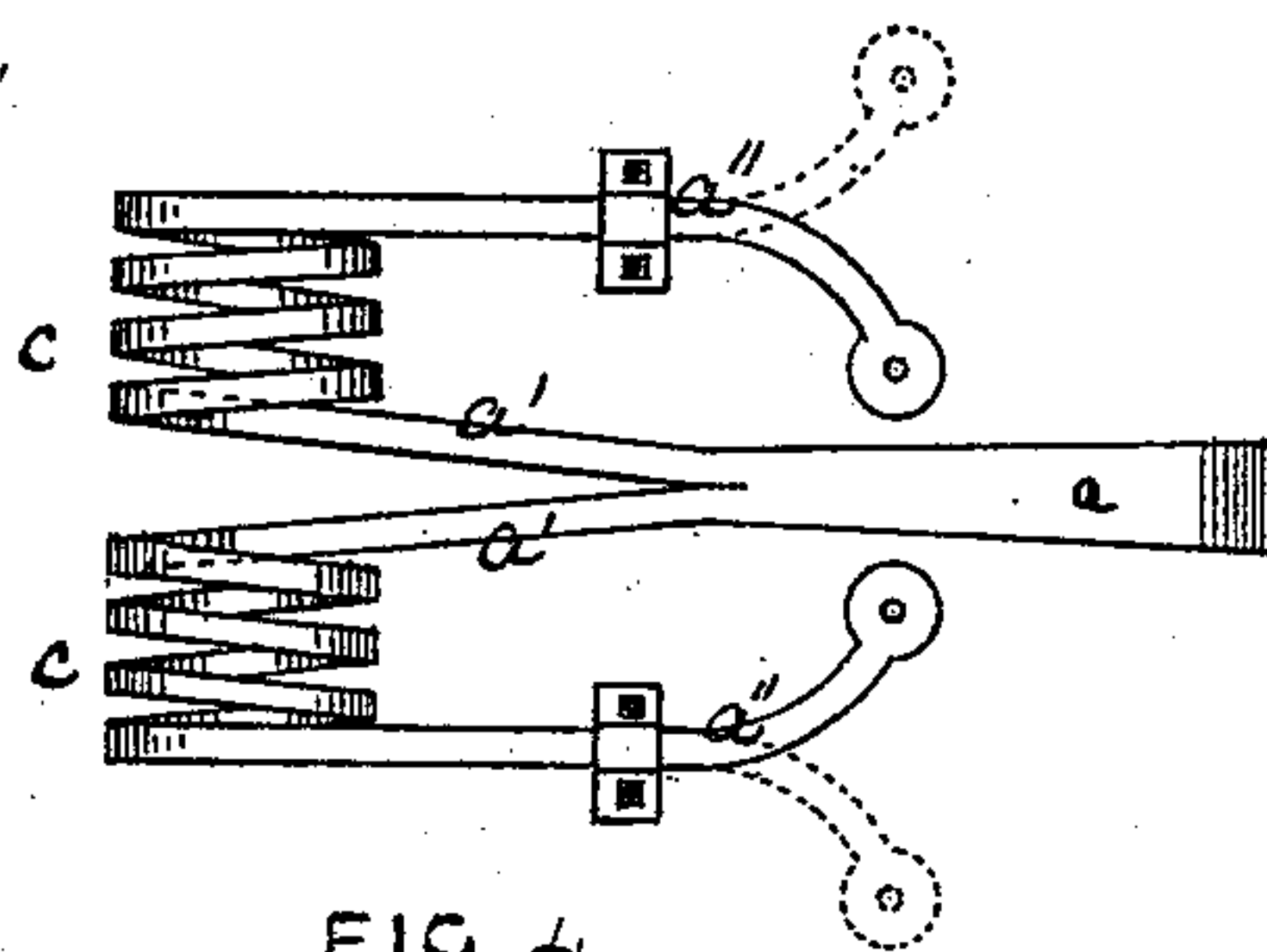


FIG 4



FIG 5

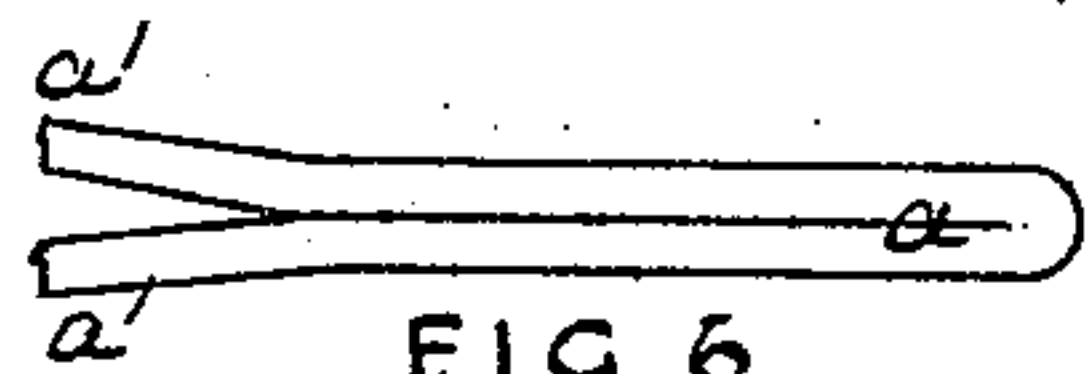


FIG 6

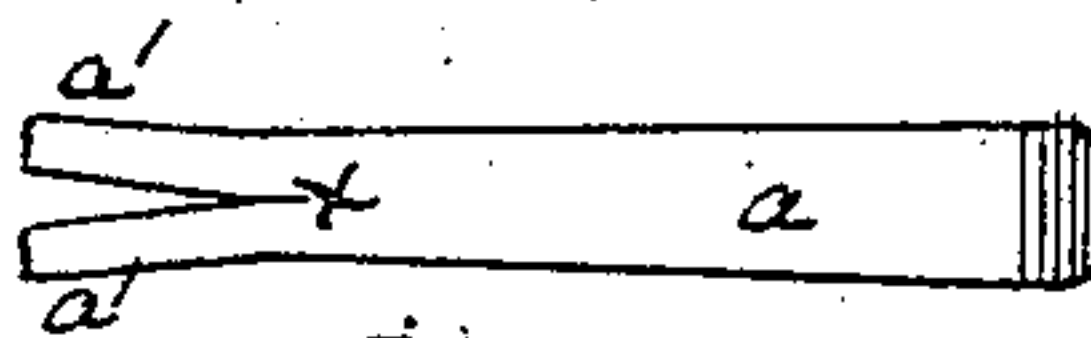


FIG 7

Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM W. GRIER AND EDWIN F. BENGLER, OF HULTON, PENNSYLVANIA; SAID BENGLER ASSIGNOR TO SAID GRIER.

VEHICLE-SPRING.

SPECIFICATION forming part of Letters Patent No. 354,633, dated December 21, 1886.

Application filed July 26, 1884. Serial No. 138,853. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM W. GRIER and EDWIN F. BENGLER, of Hulton, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Vehicle-Springs; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a side view of our improved spring as applied to a buggy having side bars. Fig. 2 is a plan view of the same viewed from the under side. Fig. 3 is a side view of a modification of an improved spring as applied to a buggy having a perch and no side bars. Fig. 4 is a plan view of the spring shown in Fig. 3. Fig. 5 is a side view of the outer end of the spring-bar, showing how it is bent round to form a loop for the shackle-bar. Fig. 6 shows the outer end of the spring-bar, illustrating the way in which it is doubled. Fig. 7 shows the outer end of the spring-bar after being doubled and soldered or welded and rolled into shape.

In the several figures like letters of reference refer to similar parts.

Our invention consists in an improvement in that class of vehicle-springs in which a bar of steel is bent into U shape, so as to form a coil or coils at the bend, and is placed with the legs of the U horizontally one above the other, the upper leg being attached to the vehicle-body and the lower leg to the running-gear. An example of such spring is found in Letters Patent to John J. Cobb, No. 212,791, of March 4, 1879. Such springs have been used in pairs, two such U-shaped coiled springs being placed side by side, with the upper leg of each spring connected to the buggy-body, and the lower legs of the two springs placed side by side, and either connected directly to the running-gear of the vehicle or to a single arm or bar which is so connected. The use of these U-shaped coiled springs in pairs—four such pairs being placed at or near the four corners of the buggy-body—has its advantages in giving increased strength of spring without unduly increasing the thickness of the steel bar from which it is formed, and thus producing a clumsy device; but it is attended with the disadvantage that the two springs of

each pair may not be tempered alike, and that it is difficult to connect them together so as to secure uniformity of action. These springs are also liable to the objection, especially when applied to side-bar buggies, of raising the body of the vehicle too high above the running-gear. These disadvantages are obviated by our improvement, and other advantages are secured.

In the drawings, Figs. 1 and 2, our improvement is shown as applied to a side-bar buggy; but it is equally applicable to buggies with or without side bars, in which the springs are attached at the forward end of the front sill of the body and to the head-block of the running-gear, and at the rear end to the hind sill of the body and to the hind end of the axle, as shown in Figs. 3 and 4. These figures represent equally well the mode of attachment to the side bars or to the axle or head-block of the running-gear of the part marked B in Figs. 1 and 2; and the part marked C in Fig. 3 is supposed to represent either the side bar or the axle or head-block of a buggy, as the case may be.

To enable others skilled in the art to construct and use our improvement, we will proceed to describe it in detail.

In the drawings, A represents one of the sills of the vehicle-body, B in Figs. 1 and 2 the side bar of the running-gear, and C in Fig. 3 the hind axle, or the head-block over the front axle when the springs are attached to a buggy not having side bars.

Our improved spring (of which it is designed to apply four to each vehicle) is made of a single bar of steel of suitable length, width, and thickness. It may be made of any desired shape in cross-section—as rectangular, cylindrical, or oval—or it may be partly rectangular and partly cylindrical, as may be preferred. This bar of steel is first bent in the middle, the two legs thus formed being brought closely in contact with each other for a short distance from the point of bending, (see Fig. 6,) which point we shall, for convenience of description, call the "outer end" of the spring. The parts thus brought together by the bending (for about half the distance, more or less, from the outer end of the spring to the coiled portion) are then united by soldering or weld-

ing in any well-known and convenient manner, so as practically to form a single piece from the outer end of the spring to the point of bifurcation, as shown in Fig. 7. The bent bar
 5 may be rolled, so as to decrease the thickness and increase the width of the doubled bar at the front end, as shown in Fig. 7. The outer end of the spring is then bent round, as shown in Fig. 5, so as to form a loop, *b*, through
 10 which the shackle-bar passes, by which it is rigidly-attached by a clip to the side bar, *B*, of the running-gear, as in Figs. 1 and 2, or to the hind axle, *C*, or head-block, as in Fig. 3.

From the point *x* the two arms or branches *a' a'*
 15 of the bent bar *a* are bifurcated or spread apart more or less, as may be desired, for a length equal to about half the distance from the center of the coiled part to the center of the loop *b*. Each of the arms or branches *a' a'* of the
 20 steel bar is then coiled, as at *c*, as many times as may be desired, so as to give greater or less motion to the spring, the number of coils being increased as greater degree of spring motion is required—three or four coils being usu-
 25 ally found sufficient, though more or less may be employed.

If desired, the thickness of the steel bar may be increased or diminished in those parts which are thus coiled, a variation in this respect al-
 30 lowing of a considerable corresponding variation in the stiffness of the springs.

From the points in the branches *a' a'* of the spring-bar *a* where the coil terminates to the inner end of the spring the branches *a'' a''*
 35 extend in a substantially horizontal plane, but are curved laterally, as shown in Figs. 2 and 4, in either direction that may be preferred, as shown by full lines and dotted line in Fig. 4, but preferably outward. The inner ends of
 40 the spring do not extend out as far from the coiled parts *c* as the outer end of the spring, the difference in length being equal to the distance between the point of attachment of the outer end of the spring to the running-gear
 45 and of its inner end to the body of the vehicle, as shown in Fig. 3.

It will be noticed that the inner end of each of the branches *a'' a''* of the spring beyond the coils *c* starts from the coil at a point below the
 50 top of the coil, and near to and preferably at or below its center. This is an important feature of our improvement, as it enables us to set the body of the vehicle much lower relatively to the running-gear, especially in side-
 55 bar vehicles, than could be done if the inner arms were at a tangent to the upper part of their respective coils *c*. This feature is illustrated in Figs. 1, 2, and 3, which show the sill *A* of the vehicle-body cut away sufficiently to
 60 give room for the upwardly-projecting coils *c* of the spring. Near the inner extremity of each of the short arms of the spring (as at *f*) is a hole or eye for the passage of a bolt, *e*, by which the inner extremities of the spring are
 65 attached to the body of the vehicle. A clip, *g*, is also used for more rigid attachment of the spring to the vehicle.

Fig. 4 exhibits a modified construction of our spring from that shown in Fig. 2. In Fig. 2 the branches *a' a'* of the spring-bar are more
 70 widely spread apart from the point *x* of bifurcation, and extend to the outside of the coils *c c'*, so that the inner ends of the branches (marked *a'' a''*) beyond the coils meet at the termination of each coil, and then extend out-
 75 wardly for a short distance side by side, and thence branch outwardly. A clip, *h*, embracing both branches *a'' a''* near their point of bifurcation, secures them more firmly to the body of the vehicle. 80

In Fig. 4 the branches *a' a'* of the steel bar are not separated so widely from the point *x* of bifurcation, and extend to the inner end of the coils *c c'*, so that the branches *a'' a''* be-
 85 yond the coils *c c'*, though parallel, do not come together, but are separated by the length of the coils. The construction shown in Fig. 2 gives somewhat greater firmness and stability to the spring.

We have described our spring as being made
 90 from a single bar of steel doubled and then soldered or welded together part way; but as it is important that the two branches of the spring should be firmly united at their outer end, the spring may be made from a piece of
 95 steel without doubling by splitting it from the point of bifurcation *x*.

The special advantages of our invention result from the following peculiarities of construction: The making the double-coiled
 100 spring of a single piece of steel, as described, secures a uniformity of temper in the steel and of spring action, which it is very difficult to attain where two springs made of different pieces of steel and probably at different times
 105 are brought together under a vehicle. The rigid union of the two springs at their outer end, effected by making the device of a single piece of steel, secures a consonance of action of the two branches of the spring which cannot be equally well secured by the use of two
 110 separate springs fastened together by a clip or band. The bifurcation of the two branches of the spring from a point about midway between its outer end and the coiled portions
 115 gives a wider bearing to the springs and a more uniform spring action. The projection of the inner ends of the spring from a point near to the center of the coils enables the body of the vehicle to be set very low on the
 120 running-gear; and, finally, the horizontal curving of the inner ends or terminals of the springs permits of a greater or less bearing of the spring on the body of the vehicle, according to the degree of flare of spread given to
 125 the points of attachment of the spring to the vehicle. In addition to the advantages of construction and operation thus secured, a spring can be constructed more cheaply when made of a single piece than when separate springs
 130 are attached together.

Having thus described our improvement, what we claim as our invention, and desire to secure by Letters Patent, is—

1. A vehicle-spring composed of two reverse coils, each having a horizontal free bearing-leg, said coils united to an intermediate bearing-leg common to both coils by converging arms which unite at a point about equidistant from the center of the coil and the end of the intermediate bearing-leg, the coil, converging arms, and legs being integral, substantially as and for the purposes specified.

2. The combination, with the body or bed having a coil-recess, of a coiled spring the body leg or branch of which extends from the coil at a point below the top of the coil, whereby the coil of the spring is partially concealed within the recess of the bed or body, substantially as and for the purposes specified.

3. The vehicle-spring hereinbefore described, consisting of two similar parts, each having a coiled portion, with two arms or branches of unequal length extending in the same direction from opposite ends of the coil, the shorter

branch from each coil extending from the inner ends of the coil at a point below the top of the coil, and thence branching outward in an opposite direction from the other branch, to form two termini for attachment to the vehicle-body, and the longer branch from each coil extending from the bottom and outer end of the coil, and then converging until both of the longer branches meet, where they unite to form a single terminus of the spring for attachment to the running-gear, the whole spring being formed of a single piece of steel, substantially as described.

In testimony whereof we have hereunto set our hands this 23d day of July, A. D. 1884.

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Witnesses:

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