

(No Model.)

2 Sheets—Sheet 1.

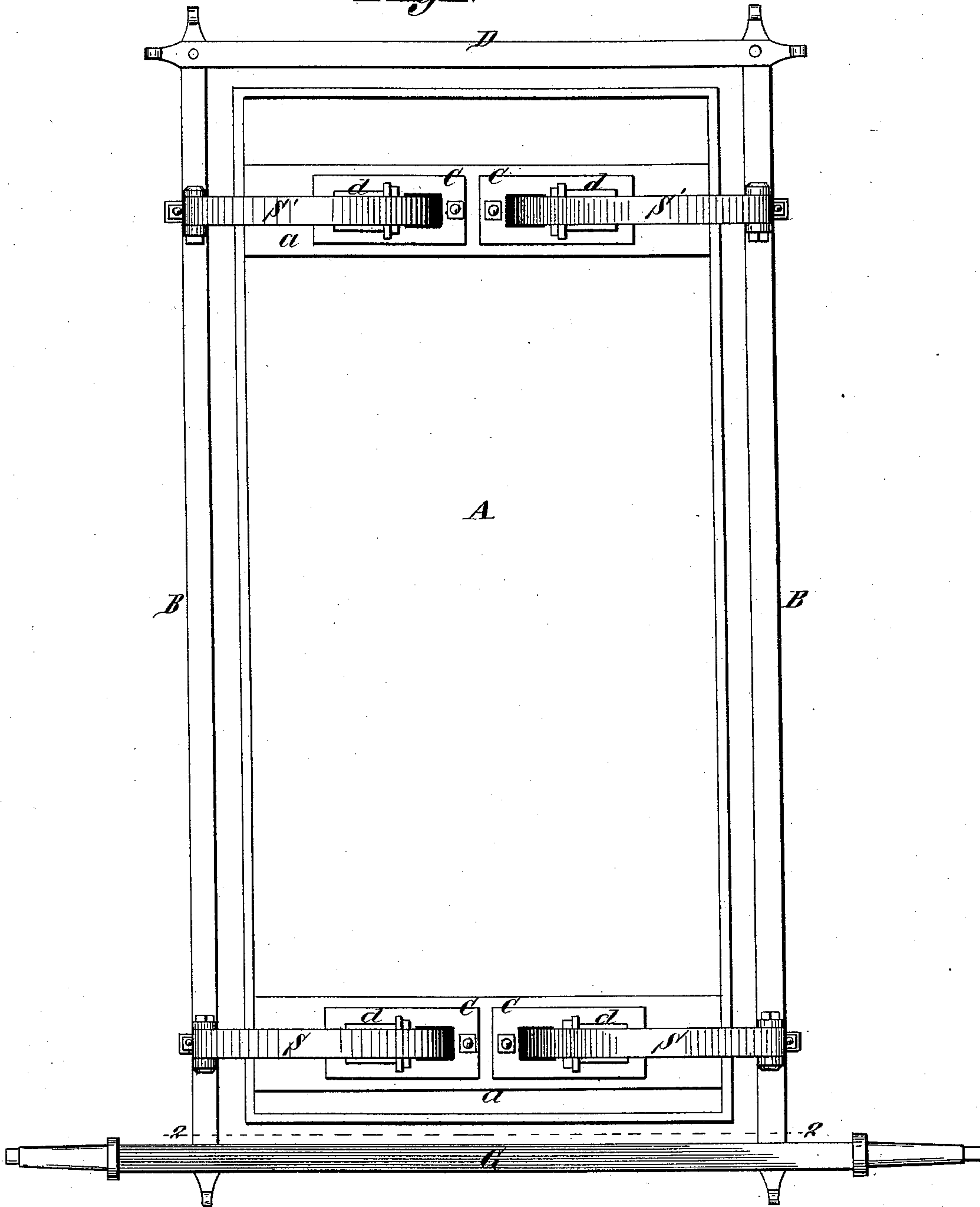
W. M. ECCLES.

VEHICLE SPRING.

No. 387,677.

Patented Aug. 14, 1888.

Fig. 1.



Attest:
Charles Pickles.
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Fig. 2.

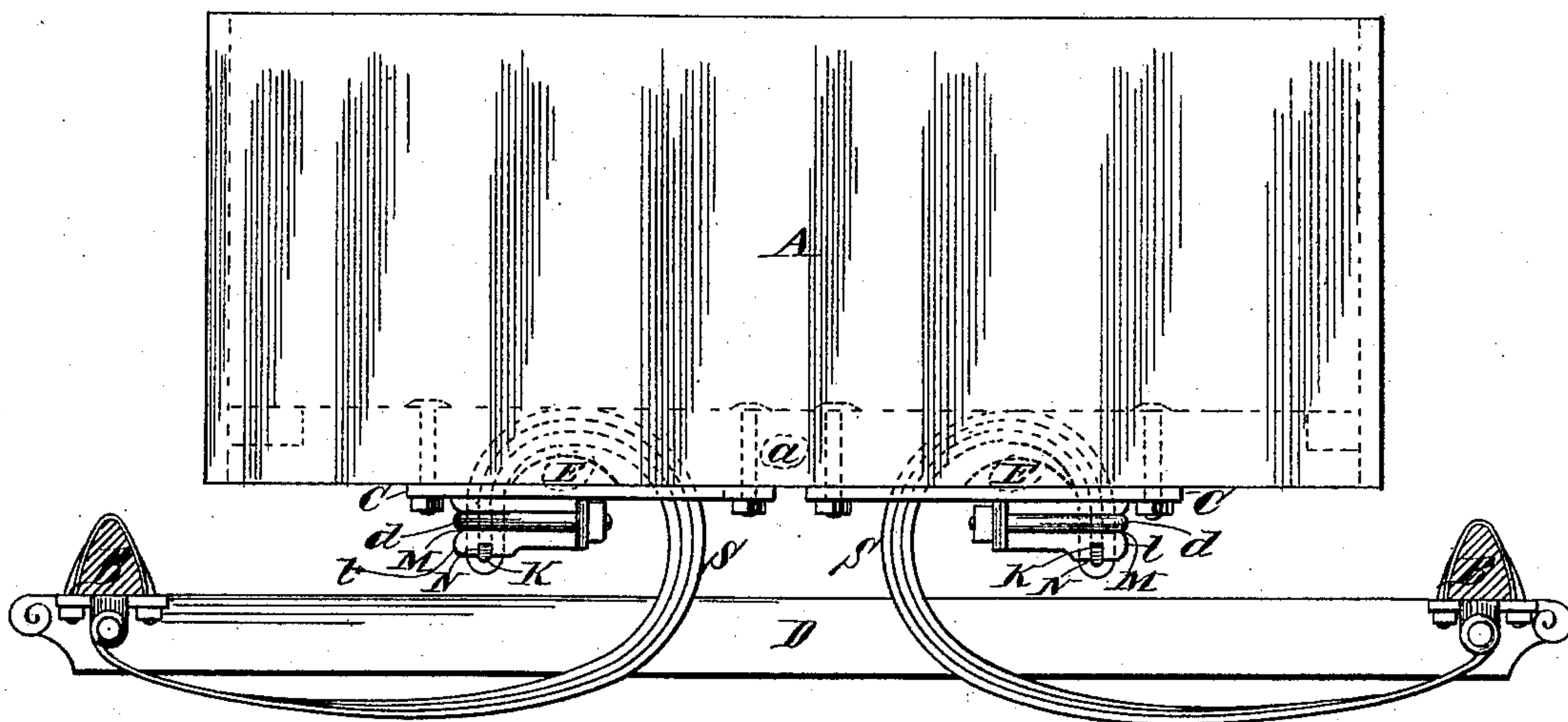


Fig. 3.

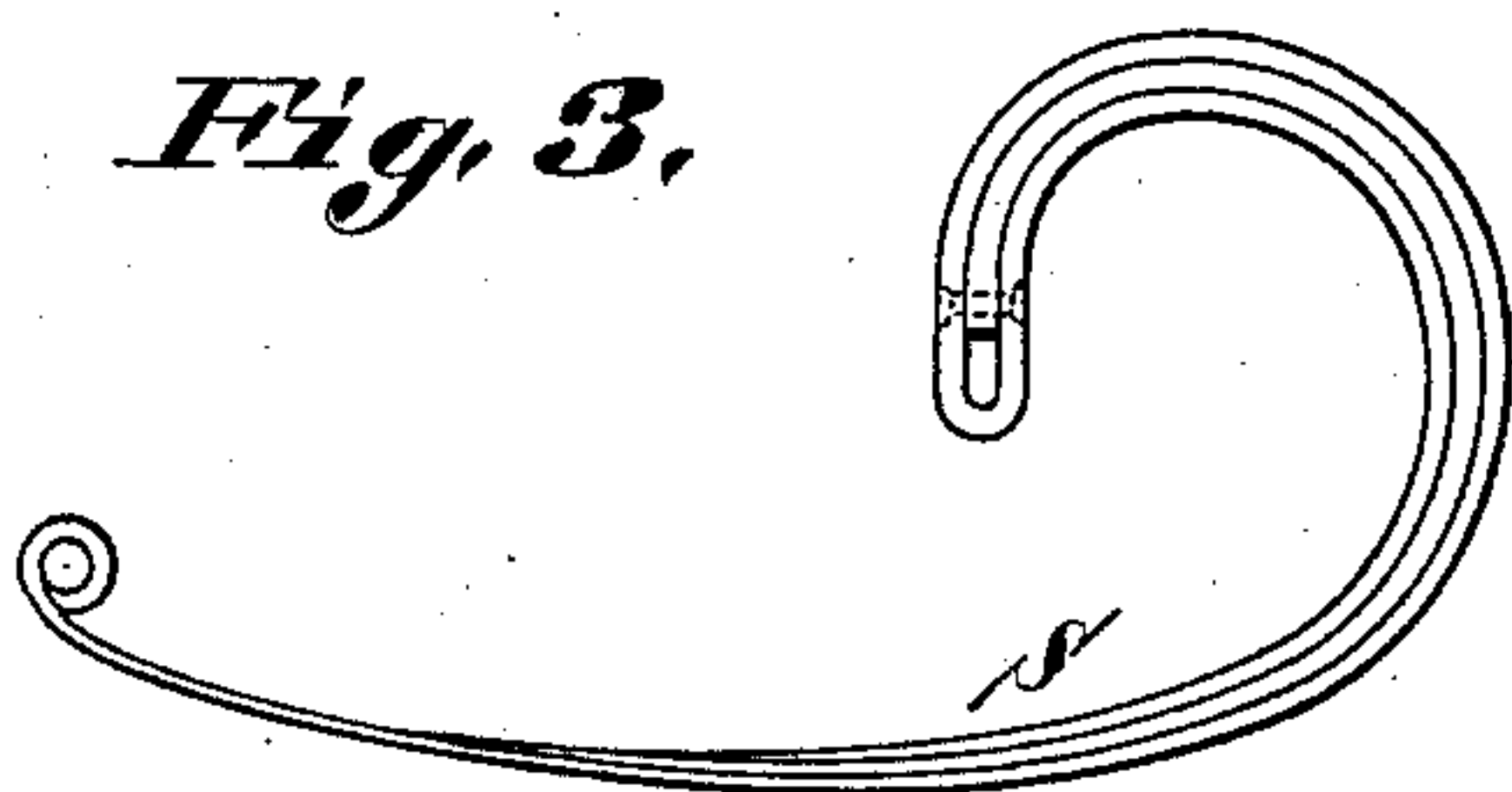


Fig. 6.

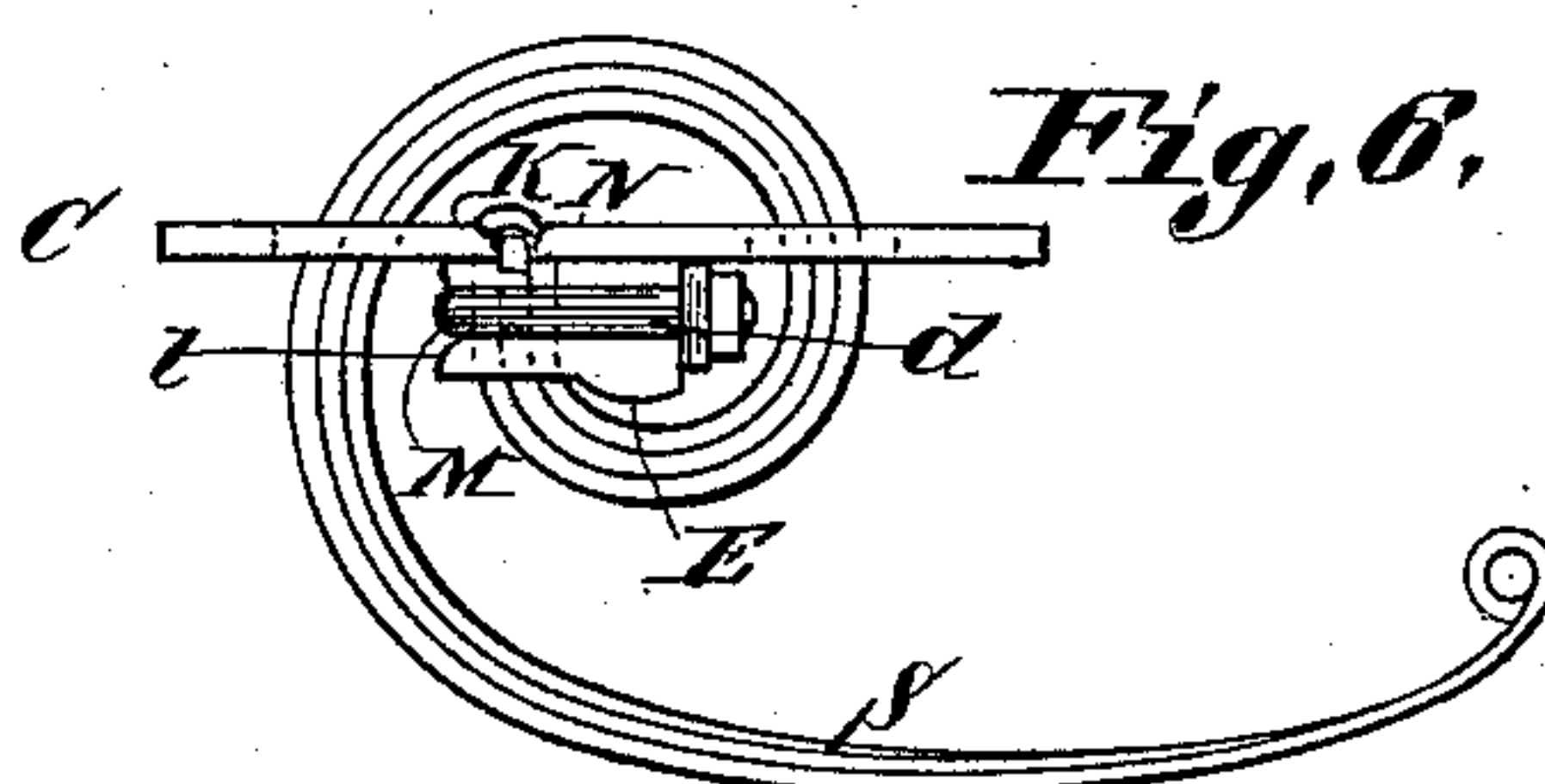


Fig. 4.

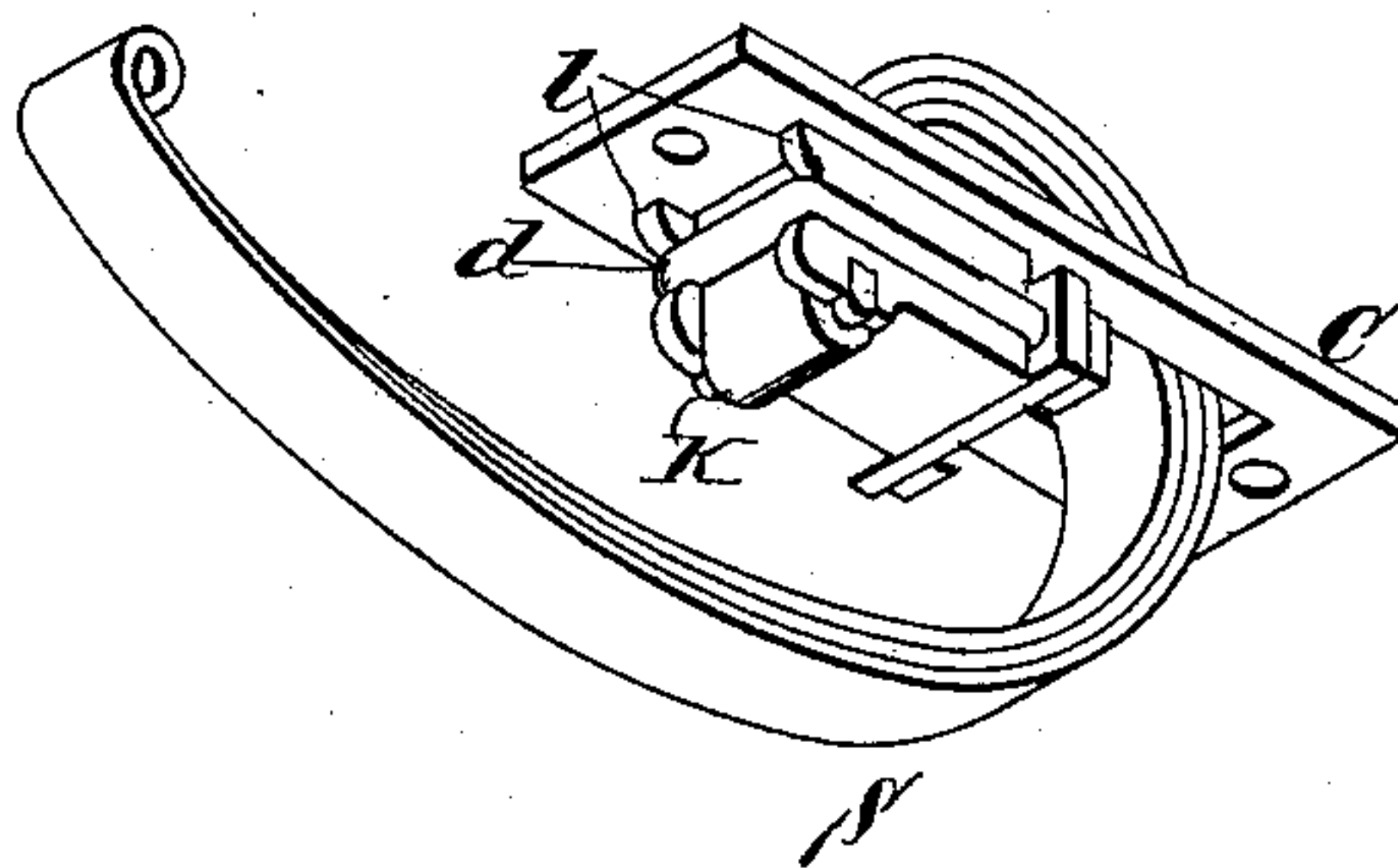
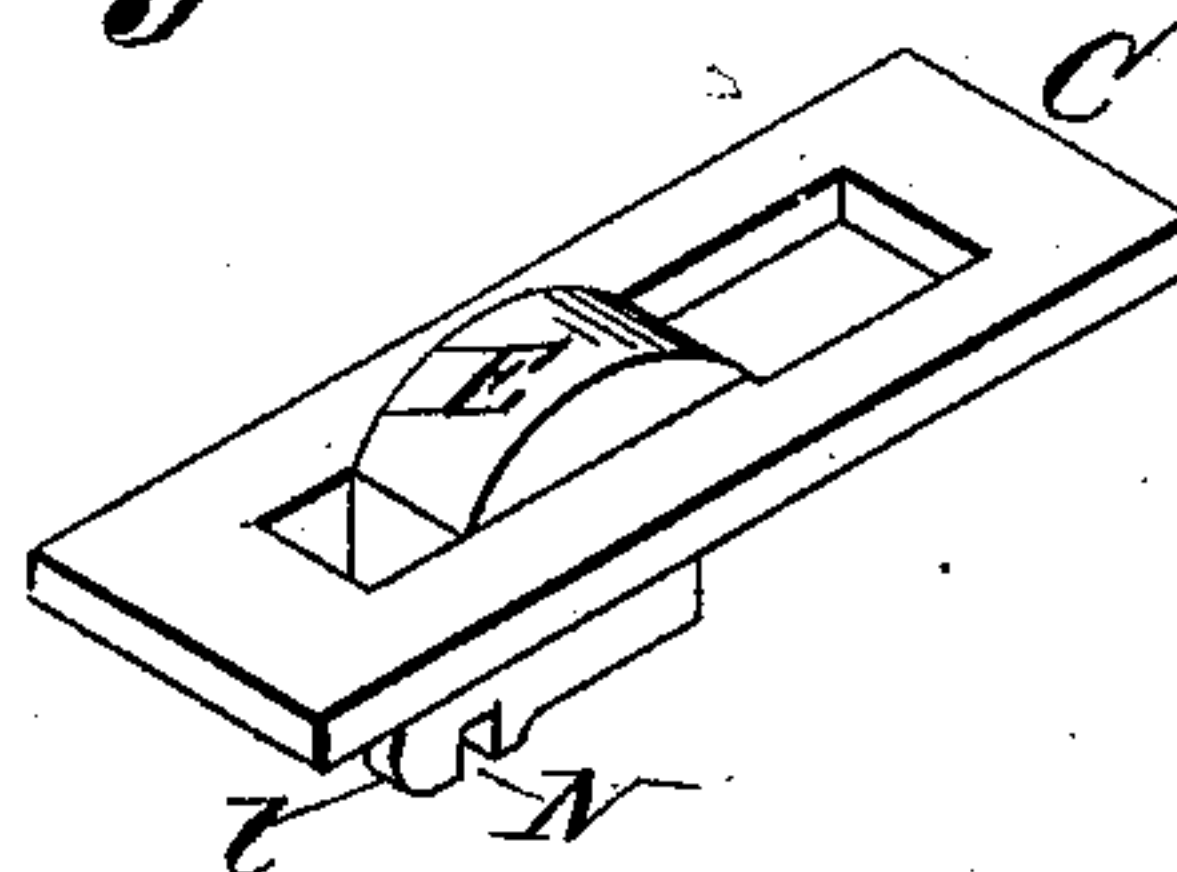


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM M. ECCLES, OF ST. LOUIS, MISSOURI.

VEHICLE-SPRING.

SPECIFICATION forming part of Letters Patent No. 387,677, dated August 14, 1888.

Application filed December 8, 1887. Serial No. 257,360. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. ECCLES, a citizen of the United States, residing in the city of St. Louis, in the State of Missouri, have invented a new and useful Improvement in Vehicle-Springs, of which the following is a specification, reference being had to the annexed drawings and letters of reference marked thereon.

My invention relates to side-bar vehicles.

My invention consists in the construction and combination of parts herein described and claimed.

The objects of my invention are to secure length of spring action and elasticity of movement in the springs in as small a space as possible, and at the same time increase their tension from the eye toward the heel without loss of elasticity, and also retain the increase of tension as the load increases.

My object is also to prevent the rocking motion of the body and keep it in an upright position between the side bars as it moves up and down.

My object is also to overcome the rebound of the springs when the vehicle is passing over rough roads.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a bottom view of my springs attached to a body and rigid side bars. Fig. 2 is an elevation end view of the same and a transverse section of the side bars, drawn on the line 2 2, Fig. 1, with a part of the springs concealed in the body, as shown by dotted lines. Fig. 3 is a detached view of one spring. Fig. 4 is an isometrical view of one spring and clamping device as seen from the eye end of the spring and underneath the body of the vehicle. Fig. 5 is an isometrical view of the clamping device detached from the spring and body and being without the clevis which clamps the spring to the clamping device and the key for the end of the spring. Fig. 6 is an elevation view of the spring and clamping device detached from the body and running-gear, showing the spring bent, coiled, or rolled more at its heel end than is shown in Figs. 2, 3, and 4.

Similar letters refer to similar parts throughout the several views.

Letter A represents the body of a vehicle having ordinary spring-bars in the bottom—one in front and one in the rear—and adapted to receive the spring attachments. They are represented by the letter *a*.

S S are two springs attached by their heel ends to the spring-bar or bottom of the body and by their eye ends to the side bars at the hind end of the vehicle. S' S' are the same springs attached at the front end of the vehicle. These springs are each made of one main leaf running the whole length of the spring, and have one or more re-enforcing leaves placed on the top of this main leaf, the first re-enforcing leaf commencing at or near the heel end of the main leaf and running along the top of the main leaf and stopping somewhat short of the eye of the spring, and each succeeding re-enforcing leaf commencing at the same place and running along on the top of this last leaf and stopping somewhat shorter than the preceding leaf, or the one lying under it, and all these leaves being coiled, rolled, or bent together from the heel over the top of the spring toward the eye, and impinging on each other throughout their entire lengths, all thus bent constituting one spring. The coiled, rolled, or bent end of the spring is attached to the spring-bar *a* or to the bottom of the body by a clamping attachment around the end of the spring, and not by a square or many-sided pin passing through a square or many-sided socket in the end of the spring, as the spring at its heel end is composed of two or more leaves, and not of a single leaf, and must be held together by a clamping device and likewise secured to the body or the spring-bar. These springs from the point where they leave for the side bar bend slightly or run nearly straight to the side bar, and are pivotally connected therewith by a hinged or pivoted clip. Being thus formed and composed of two or more leaves as the heel end of the spring is approached, the tension of the spring is increased as the heel end is approached, and being composed of a number of leaves, instead of one piece of steel, as is usually the case with the coiled spring, all of the elasticity of the common elliptic spring is retained; also, by being made weaker at its eye end and having greater strength as the heel end is approached, and also by reason of the heel end being coiled

or bent, as above described, there is but a single sweep in the spring, and, not being arched between the two rigid side bars, but curved always in the same direction, there is no necessity for an opposite curve or a double sweep being introduced into the spring to take up the spread of the spring caused by the arch of the spring in those springs which bear away from the bottom of the body, instead of bearing to it, (as mine does,) as the spring approaches the side bar. The spring then, being constructed with but a single sweep in it, has no rebound in its action; but, being made of more leaves at its heel end than at its eye end, it begins to bend, when loaded and in action, at its eye end first, the elasticity or spring action gradually decreasing in magnitude as the heel end is approached, thus differing entirely in its action from a common coiled spring of one plate of equal thickness throughout, which always commences to spring first at the center of the coil. In this way the spring is enabled to increase its tension as the load increases or the body moves down, and prevents the rebound of the spring by it gradually decreasing in tension as it moves up or the load is decreased.

By this construction of spring I have a different spring action from the common coiled spring, commencing to spring from its outer end instead of from its inner end first, and I overcome all arching between the rigid side bars and avoid the necessity of a double sweep in the spring; and it enables me to attach the body to rigid side bars by a set of these springs and get a long spring attached, respectively, to the body and side bar in close proximity, and thus avoid the rocking motion, and also to increase the tension of the spring by introducing leaves as the heel end is approached, which are coiled on each other and thus adapted to a heavy load, and prevent the rebound of the spring and retain all the elasticity of a common leaf-spring.

B B are ordinary side bars of a vehicle and rest on the front bolster, D, and hind axle, G.

C is the clamping device with which the springs are connected to the bottom of the body or to the spring-bar. It is provided on its lower surface with lips or flanges *ll*, adapted to inclose the heel ends of the plates of the spring and assist in holding the plates in position in relation to each other and in relation to the spring-bar. These lips are recessed at M to embrace the end of the clevis *d* and prevent it from slipping on the lips by the strain of the spring. This clamping device C is also provided with or is partly composed of a bearing, E, which receives and supports the inner coil or bend of the spring as it coils or bends in from pressure at the end of the spring in its action. The device C is also provided with a slot or oblong hole to permit the passage of the spring through it and allow it to move freely in its action. It has a flat surface on its top adapted to rest on the under surface of the bottom of the body or spring-bar, and is provided with bolt-holes, with which it can be

secured to the body of the vehicle. These flanges or lips *ll* are also recessed at N to receive the key K, which is an ordinary key placed in a hole or loop in the end of the spring, and its only function is to prevent any liability of the heel of the spring from working out from between the bearing of the clamping device and the clevis, and it may be made round or oblong, and does not in any way prevent the heel from turning on its center or the spring from rotating on the key. Neither do the recesses N prevent the key from rotating in them, as they are mere recesses, and not holes, their only function being to embed the key and make a neater-appearing job than if the under side of the flange or lip was straight, and also to allow the lip to run farther down on the edge of the leaves of the spring and give it that much more bearing on the spring.

d is an ordinary clevis surrounding the spring at its heel end, and also the lips or flanges *ll*, and serves when screwed up to firmly clamp and securely hold the leaves to each other and the end of the spring fast to the clamping device C against the end of the bearing E and between the lips *ll*, and the key K, being inserted in the hole or loop in the end of the spring, prevents the spring from working out of the clamping device C. The same thing can be prevented, however, by bending the ends of the leaves around to the right and left of the bottom of the clamping device, and thus entirely dispense with the key K.

I do not lay claim to a spring of two or more leaves bent in the shape of the letter U and having one end clipped to the bottom of the body of the vehicle and the other end attached to the running gear of the vehicle or the side bars, as shown and claimed in patent to W. S. Law, being No. 245,181, and dated the 2d day of August, 1881, or in patent to E. W. Pate, being No. 82,343, dated September 22, 1868. Neither do I claim a common spiral spring, that is common and will not give increased tension as the spring is depressed. My invention operates differently from either of these. It has increased tension, caused by the added leaves, and starts to bend from a point some distance from the center of a circle prescribed by its outside end, and it much more rapidly recedes from its point of attachment on the inside to its outside attachment, so that its tension can be made to increase much more rapidly in proportion to the distance of its thrust than the common spiral spring, and differs from either of the springs referred to in the above patents, for it is a spring bent so that its curvature decreases and its course diverges gradually as it recedes from its place of attachment to the body, thus forming a gradual receding curve from the place of attachment to the body or its heel end to the place of attachment to the side bar or its eye end, and it has its heel end permanently attached in about a perpendicular position, or at about a right angle to the bottom of the body, instead of at a horizontal position, so that the elastic portion of

the spring next the heel when it bends will bend from a perpendicular instead of from a horizontal, and the whole spring will recede from the side bar in about the same ratio as the eye end of the spring will advance toward the side bar by the spring action in that portion of the spring. Consequently the eye end of the spring, or rather the eye itself, will move on its upward thrust in about a straight perpendicular line when the spring is in action for the first half of the sweep of the spring, and by the time the eye of the spring has passed through the first half of its entire thrust the left side will bend toward the side bar and compensate for the contraction or radial curve of the eye end of the spring, and thus at all points of the thrust of the spring the eye of the spring passes in a perpendicular line or tangent of the circle that would be formed by any other spring known to the art. Thus by the bend in the spring and by its manner of attachment the body of the vehicle will move up and down between rigid side bars without moving the side bars in and out, or without straining the springs or the shackles with which the springs are attached to the side bars. Thus my spring, having a gradual receding curve from its place of attachment to its place of attachment to the side bar, which might be called a "double parabolic curve," will in itself take up the spread and contraction of the spring by its own spring action, and always bend toward its concave surface, instead of away from it, whereby by the increased tension caused by the adding of leaves I get gradual increased spring-tension as the spring is depressed, which does not occur in a spiral or in the springs referred to.

It is plain to be seen that the U-shaped springs referred to do not bend always in the same direction as mine does, but that the flexion portion nearest to the point of attachment must necessarily bend in an opposite direction from the portion at the bend or apex of the U—that is, in the action of the spring the one part of the spring bends toward the convex surface and the other part bends toward the concave surface, or if it is so attached as to always bend in action toward the concave surface, then the lower arm of the spring would

thrust out against the side bar, and, having no counter-bend to take up the outward thrust, would not work between rigid side bars, but would be stiff and unyielding.

Having thus fully described my invention and pointed out the difference between it and what is old, now what I claim as new, and for which I ask Letters Patent of the United States, is—

1. In a vehicle, a spring composed of two or more leaves each shorter than its preceding one, whereby the spring increases in tension from its eye end toward its heel end, and bent from its heel end over its back toward its eye end in a gradually-receding curve for more than half a circle, and having the flexion of the heel end starting from about a perpendicular when the spring is attached to the body and running-gear, in combination with the body and rigid side bars of a vehicle, substantially as set forth.

2. In a vehicle-spring, a clamping device consisting of a plate of iron adapted to be securely fastened to a spring-bar or to the bottom of the body of a vehicle, and having on its sides two parallel lips embracing the end of the spring, and having a bearing against which the end of the spring rests, and having a clevis surrounding the end of the spring and the bearing and securely holding it between the lips and against the bearing, all operating to securely hold the heel end of the spring fast and permanently connect it to the spring-bar or to the bottom of the body.

3. In a vehicle-spring, a key inserted in the end of the spring through an ordinary loop formed therein and resting with its ends on the edges of the lips of the clamping device C, in combination with said clamping device, substantially as described, and operating to prevent the spring from working out of the clamping device.

In witness whereof I have hereunto set my hand, on this 1st day of December, 1887, at St. Louis, Missouri.

WILLIAM M. ECCLES.

Attest:

O. ROEDLER,
LEONA M. ESTERLEY.