(No Model.)

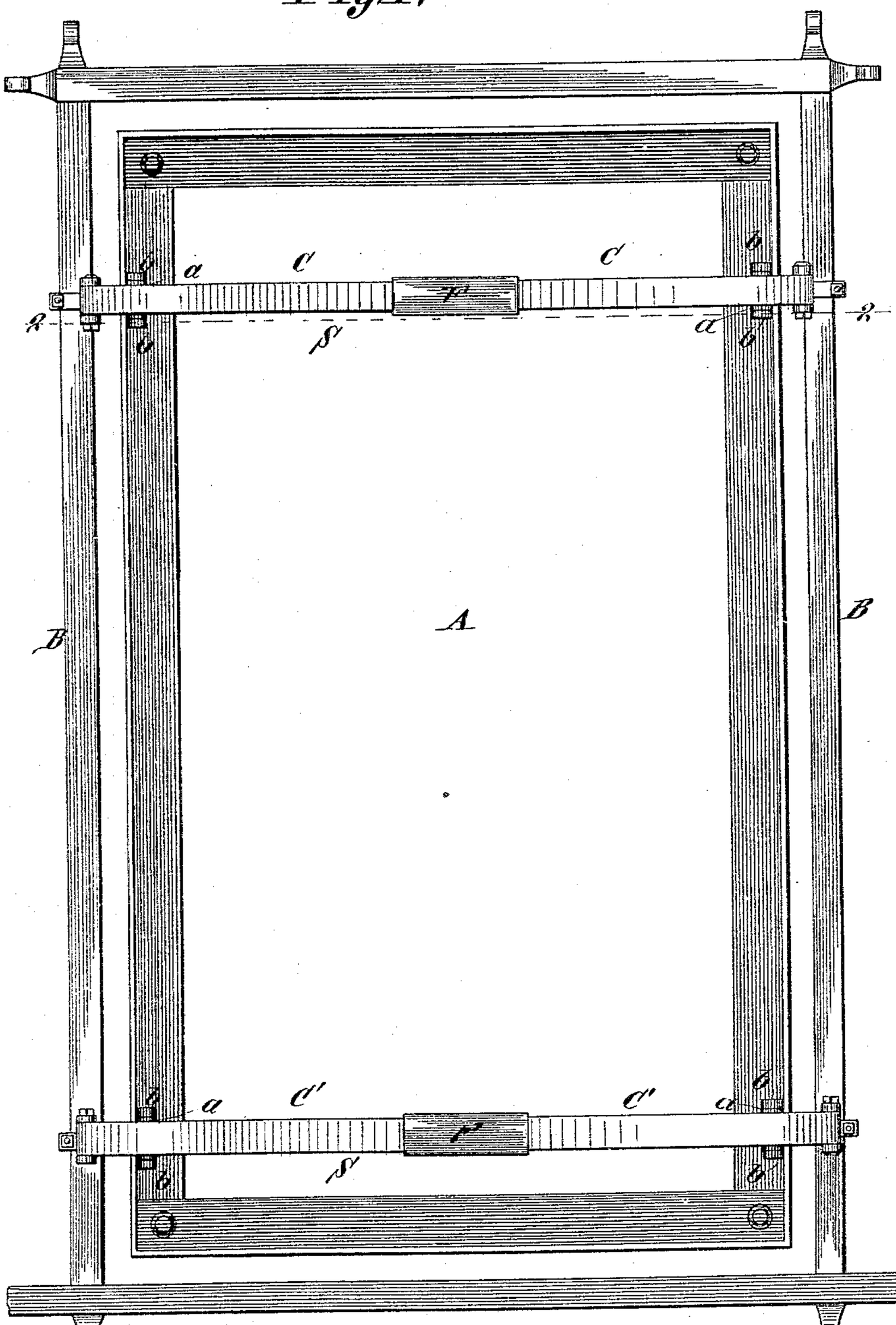
2 Sheets—Sheet 1.

W. M. ECCLES.

VEHICLE SPRING.

No. 388,769. Patented Aug. 28, 1888.

Fig. 1.



Attest;
Charles Pickles.
John H. Collins.

Inventor;
William M. Eccles.

(No Model.) 2 Sheets—Sheet 2.

W. M. ECCLES.

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Fig. 2.

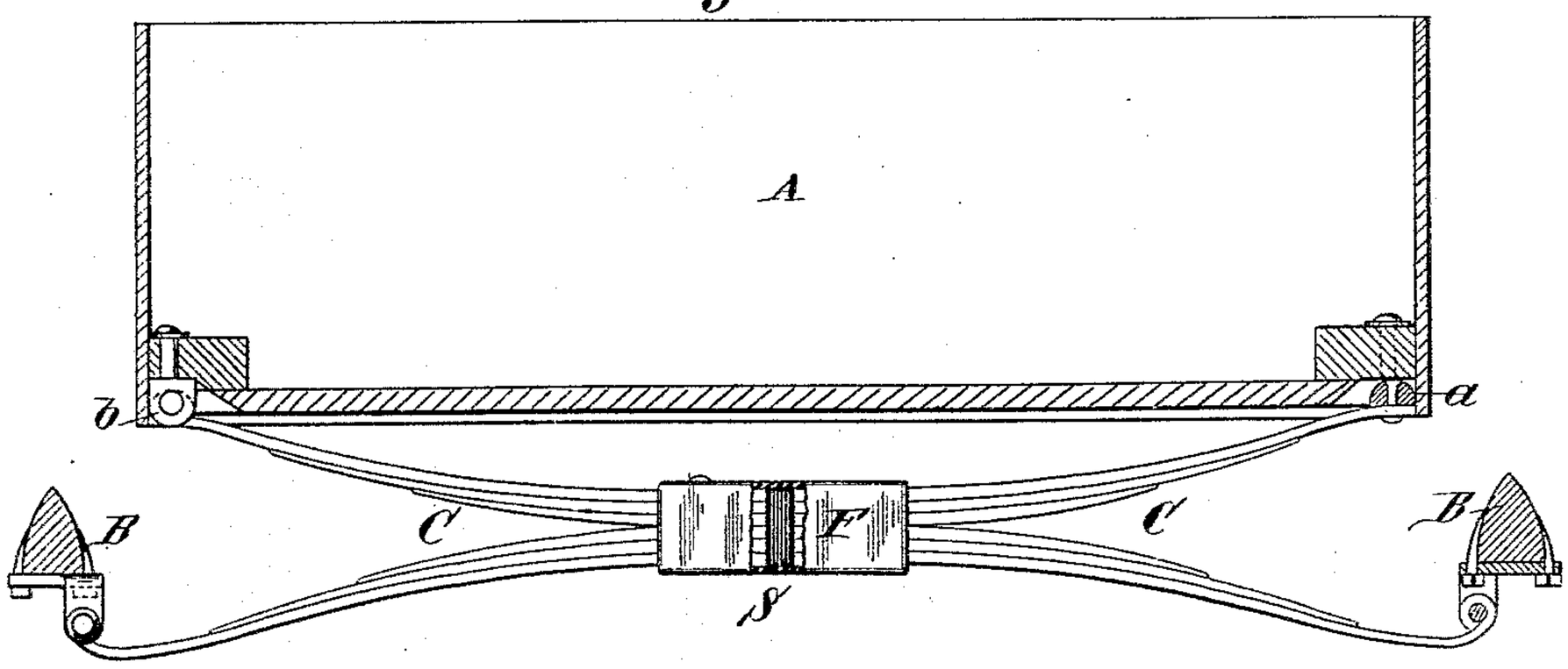


Fig. 3.

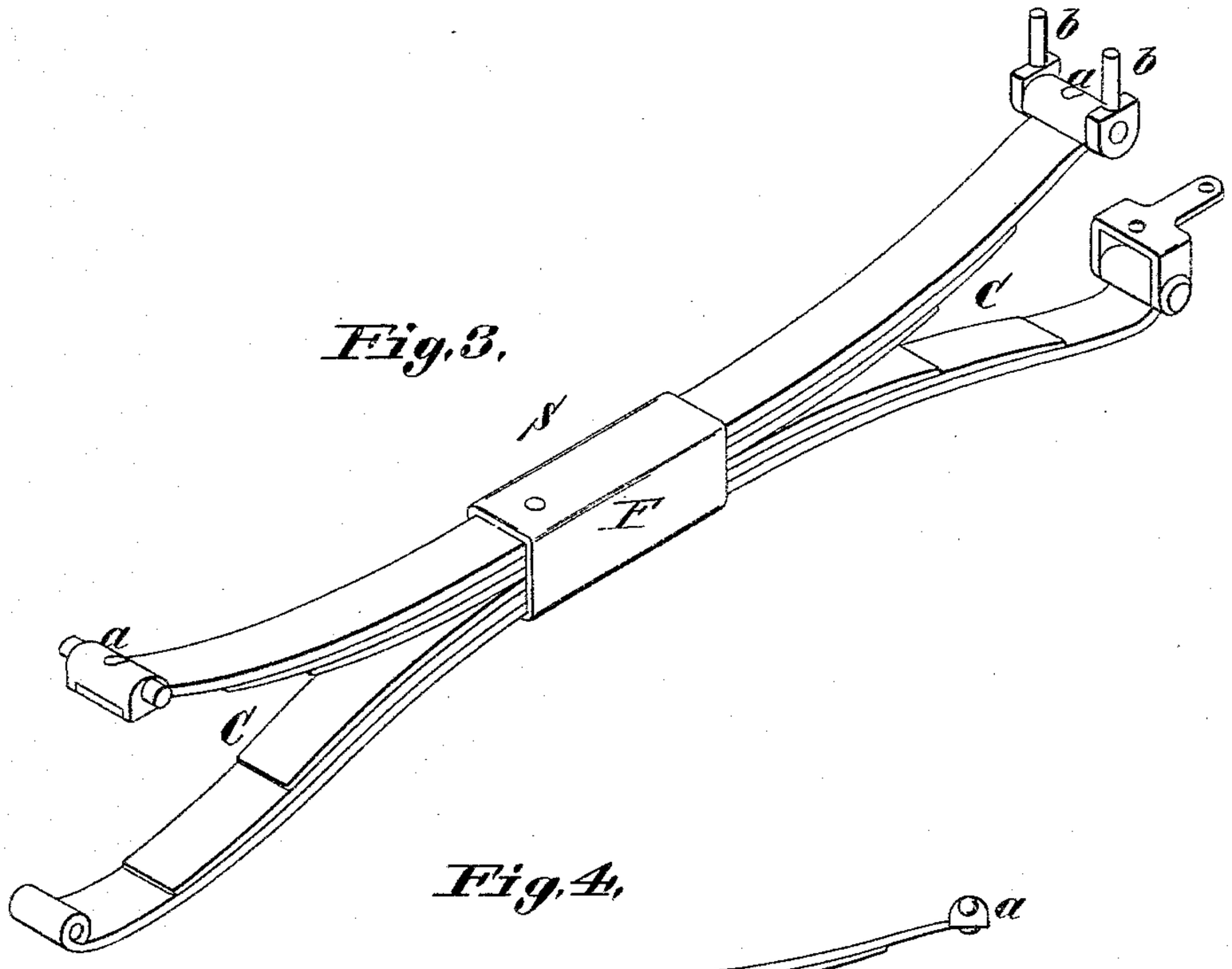
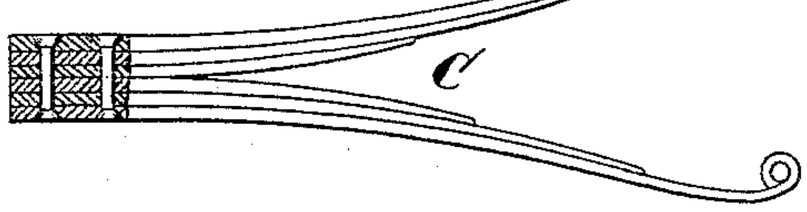


Fig. 4.



Attest;
Charles Pickles.
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Inventor;
William M. Eccles.

UNITED STATES PATENT OFFICE.

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

VEHICLE-SPRING.

SPECIFICATION forming part of Letters Patent No. 388,769, dated August 28, 1888.

Application filed December 27, 1887. Serial No. 259,177. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. ECCLES, a citizen of the United States, residing at 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.

My invention relates to sectional springs usually adapted to side-bar vehicles.

The objects of my invention are, first, to transfer the spread and contraction of the spring from the small ends to the heavy or heel end of the spring, and thus dispense with the curve movement in the small end of the spring, and thereby get rid of the rigid action and rebound of the spring so prevalent in present sectional springs; second, to retain all the length of spring and smoothness and elasticity of spring action common to the elliptic spring, and at the same time adapt the spring to side-bar vehicles and enable the body to be set low and the springs to be attached to different widths of body and side-bar vehicles known to the trade without altering the length of the springs; third, to overcome all the rocking motion of the body by bringing the points of attachment of the spring to the body and running-gear close together to the side of the vehicle and by making the heel ends of the sections of the spring mutually support each other laterally by inclosing them in a common sleeve or supplying them with other appropriate mechanism which will prevent lateral motion on each other and at the same time allow the heel ends to be free to move in and out and take up the spread and contraction of the spring as the body moves up and down; fourth, to prevent the body from moving sidewise or endwise, and at the same time to remove all end strain or double spring action from the springs and retain only a free up-and-down movement in them; fifth, to secure all the advantages of a single spring in a spring made of two sections, as far as pertains to lateral movement of the sections, and at the same time leave the sections of which it is composed free to move endwise and thus take up the spread and contraction of the spring without straining the spring or its connections or in any way interfering with its elastic movement; sixth, to secure as near as possible an equal increased tension from the small end of each arm toward the united heel ends, as well as an equal elastic movement in each arm, so that in action the arms of each section will approach each other with about equal rapidity and increased tension, and so that one arm will not have an opposite thrust caused by the action of the other arm or a counter movement, but a like movement.

My invention consists, first, in overcoming all end strain or double action in the spring, and in converting the movement caused by the contraction and spread of the spring from the bending of the spring itself to the in-and-out movement of the heel or heavy end of the spring.

It consists, secondly, in a spring made of two sections, each section made of two arms, which arms are united at their heel or heavy ends, and diverging about equally from each other and having about the same curve and tension, have about the same resistance at their respective points of attachment to the body and running-gear, or varying in tension in proportion to the distance of their respective points of attachment from their common heel. When the arms are pressed together, the increased tension of the longer arm will compensate for its increased leverage over the shorter arm, and thus the strain on each member will be as nearly equal as possible, and the united heel ends of the arms will always remain in about the same relative distance from the bottom of the body and the plane of the side bars, or the bolster and hind axle when operating, as when the springs are at rest.

It consists, thirdly, in uniting the heel ends with a sleeve or other appropriate mechanism which will operate to make a rigid spring of the two sections from end to end, so that there will be no lateral movement of the two sections on each other, but will mutually support each other and at the same time allow them to approach and recede from each other in about the same plane as the body moves up and down, and thus take up the spread and contraction of the spring and assist these ends to always remain at about the same relative distance from the bottom of the body, and the plane passing through the side bars horizontally when the spring is in action as well as

when it rests, thus enabling the arms to be both pivotally connected to the body and running-gear, respectively, if desired.

It further consists, fourthly, in attaching the running-gear and the body of a vehicle together by a spring having great length of spring action, smoothness of action and elasticity, and at the same time dispensing with the spring-curve in the end of the spring in vehicles where the points of attachment of the spring are fixed, and in setting the body low and in adapting the springs to be attached to different widths of body and different distances between the side bars without changing the spring.

It further consists, fifthly, in making the two flexion-arms of two or more leaves at their heel ends and equalizing their increasing tension as you approach the heel uniformly in proportion to the distances their respective points of attachment are from their united heel, so that when the flexion-arms are mutually compressed they will be about equally straightened, and when compressed to their full extent they will both lie about straight back to back, and will increase in tension gradually as they are gradually compressed, and decrease gradually in tension as they are gradually relieved of pressure.

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

Figure 1 is a bottom view of the springs, the body, axle, head-block, and side bars of the vehicle with my springs attached, in cross-sections. Fig. 2 is a transverse elevation of the springs and sleeve connecting their heel ends, the body, side bars, and spring attachments, drawn on line 2 2 in Fig. 1, showing the body in section, the springs in elevation, the spring attachments on the right-hand side in section and on the left-hand side in elevation, the side bars in section, and the sleeve partly in elevation and cut away and partly in section. Fig. 3 is an isometrical figure of the springs and sleeve detached from the body and running-gear, having the attachments at the right-hand and removed at the left-hand end. Fig. 4 is an elevation of one section of the spring detached, and showing the common heel end in section.

Letter A is the body of a vehicle.

B B are the side bars attached to a front bolster or head-block and hind axle.

C C are each a section of the spring, and the two, taken together, constitute one spring, S. There are two sets of these, C C and C′ C′. One set, C C, supports the front part of the body, and the other set, C′ C′, supports the hind part of the body.

F is a sleeve, of metal, made to fit the heel ends of the sections C C, and inclose both of the heel ends of the sections tight enough to prevent them from moving laterally, and at the same time loose enough to allow at least one of the heel ends to move in and out in the sleeve and take up the spread and contraction of the spring in its action. This sleeve is driven tightly on the heel end of one section, and in the drawings is shown as held there by a small rivet. This sleeve serves to hold the heel ends of the sections in line with each other and in a common plane, and thus serves to assist the heel ends of the sections to support each other in the movement of the spring, and thus prevents any side motion of the body by keeping the heel ends of the two sections in line with each other.

The heel ends of the sections do not meet in the sleeve; but there is always sufficient space left between their heel ends to furnish room for the spread and contraction of the spring as the body rises and descends. This sleeve is made long enough to allow the sections of the springs to be adjusted to different widths of side bar and body without cutting or in any way altering the springs. This sleeve, by holding the heels of the sections in line with each other, makes them, as far as relates to lateral strain, as one spring, and thus takes off all twisting or lateral strain from the connections to the body and running-gear, and permits the springs to be connected pivotally to both the body and running-gear, if desired, which will give much more freedom of spring action than where one or both connections are rigidly made.

The letter S represents the entire spring. It is composed of the two sections C C, which are connected by the sleeve F, or which may be connected by any other slip-joint or appropriate connection that will allow the free action of the heels endwise, and at the same time hold them in about the same relative position to each other. Each section of this spring S is composed of two flexion-arms diverging about equally from a common point of connection, and each having an increased tension from the small ends toward the heel in about the same proportion as the respective points of attachment to the body and running-gear are from the common heel, so that when these arms are mutably compressed from these points of attachment they will approach each other with about the same rapidity and degree of flexion, and when fully compressed will make a spring about straight from end to end, thus furnishing all the spring possible in two flexion-arms. These arms may be pivotally connected to the side-bar by a common side-bar clip, and also to the bottom of the body by an elongated pivot-connection, or they may be connected by rigid connections at one or both connections, for no provision need be made in either of these connections for the spread or contraction of the spring. The upper flexion-arms, as seen in the drawings, are attached by a long pivotal connection to the bottom of the body, close to the side, which connection is an elongated piece of metal provided with pivots at each end and having a recess on its under side large enough to receive the end of the upper flexion-arm, and to which it is riveted or otherwise permanently secured, and

is fitted to and moves in bearings *b b*, which are common bolts with a hole in their ends, and which pass up through the sill or bottom of the body. This elongated pivot is designated by the letter *a*, and it not only connects the spring to the body; but, by reason of its being elongated somewhat, serves the better to assist in preventing any lateral movement of the spring. When these arms are thus pivotally connected, or constructed as nearly as possible with equal tension, and the two sections thus formed connected at their heel ends by a sleeve or any appropriate mechanism which will prevent lateral motion and permit end motion of the heel ends of the spring-sections, a spring is secured which has all the elasticity and smoothness of spring action of the old elliptic spring, and it is adapted to side-bar vehicles and can readily be attached to side-bar vehicles having all the different widths of body and different distances between the side bars known to the trade in the art, and it is a spring which dispenses with all rebound and stiffness of action in the spring by dispensing with the spring-curve in the end of the spring and makes a spring which will prevent all rocking or side motion of the body, and which dispenses with all unnecessary strain on the connections, and one in which the tension of the spring increases as it is compressed, and a spring which dispenses with all double sweep in the spring and has but one movement in its action—that is, a direct thrust up and down. Its further advantages and the functions of its parts are obvious.

I claim—

1. A spring composed of two sections which are connected together at their heel ends by a connection which holds the sections in the same relative position, but which permits them to move in and out, substantially as described.

2. The combination of a spring composed of two sections which have their central portions placed in or almost in contact with each other, with a connection which unites the central portions of the sections together so as to retain them in the same relative position, but which connection allows the sections a free in-and-out play, substantially as described.

3. The combination of a spring composed of two sections with a connection which is secured to one section and through which the other section passes, but which is not secured thereto, so as to allow the sections an in-and-out movement, substantially as set forth.

4. A vehicle-spring composed of two or more sections, each section having two or more flexion-arms and having their heel ends inclosed in a common sleeve operating to hold the ends of the sections in the same relative position to each other, and at the same time permit them to approach and recede from each other in action.

5. A vehicle-spring composed of two sections united at their heel ends by a sleeve, in combination with a body and running-gear of a vehicle, for the purpose set forth.

In witness whereof I have hereunto set my hand, on this 21st day of December, 1887, at St. Louis Missouri.

WILLIAM M. ECCLES.

Attest:

JOHN W. COLLINS,

A. A. PAXSON.