(No Model.) 2 Sheets—Sheet 1.

G. NORWOOD & J. J. ROSE.

SPRING CONNECTION FOR VEHICLES.

No. 444,526. Patented Jan. 13, 1891.

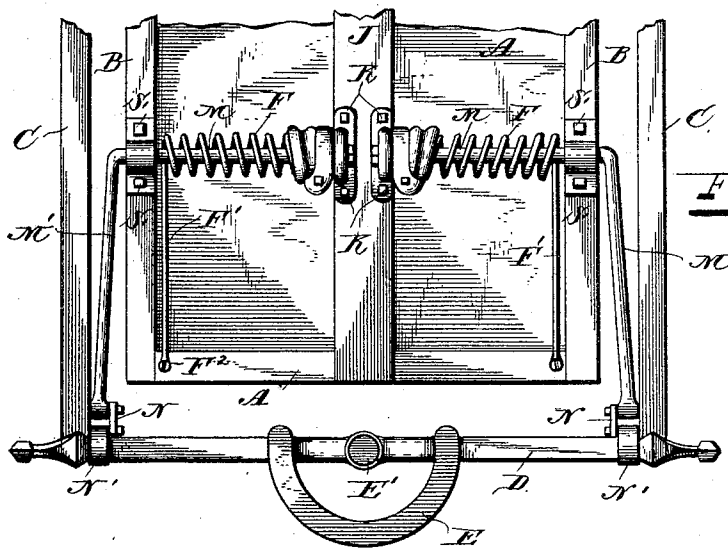


Fig. 1.

Fig. 2.

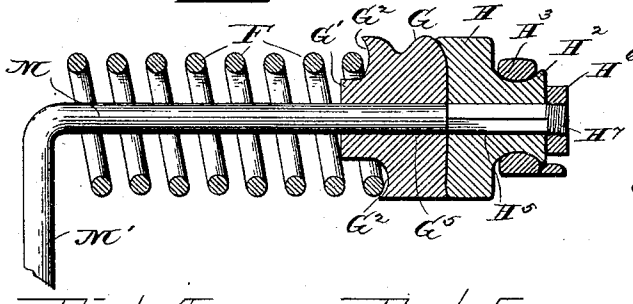


Fig. 3.

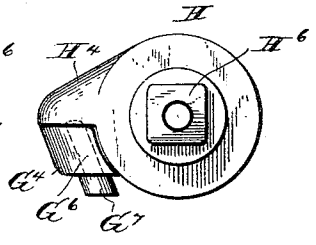


Fig. 4.

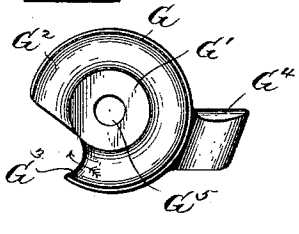


Fig. 5.

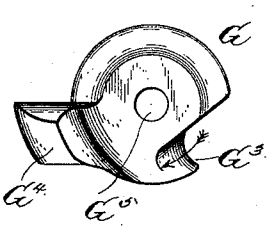
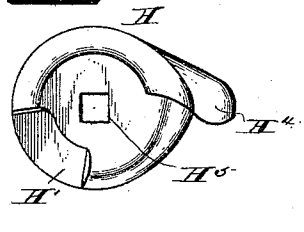


Fig. 6.



Witnesses.
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(No Model.)

2 Sheets—Sheet 2.

G. NORWOOD & J. J. ROSE.

SPRING CONNECTION FOR VEHICLES.

No. 444,526. Patented Jan. 13, 1891.

Fig. 7.

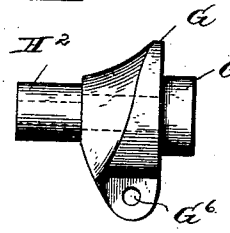


Fig. 8.

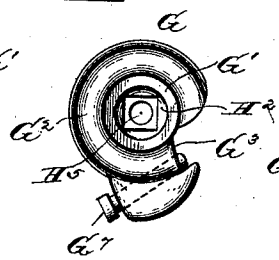


Fig. 9.

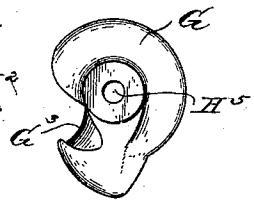


Fig. 10.

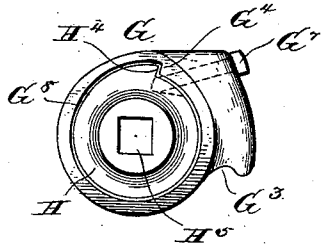


Fig. 11.

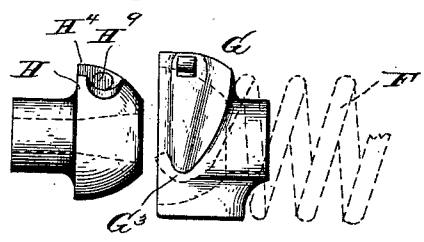


Fig. 12.

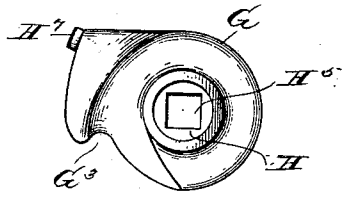
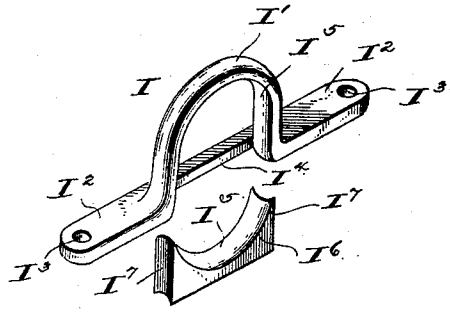


Fig. 13.



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UNITED STATES PATENT OFFICE.

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SPRING-CONNECTION FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 444,526, dated January 13, 1891.

Application filed September 4, 1890. Serial No. 363,908. (No model.)

To all whom it may concern:

Be it known that we, GEORGE NORWOOD, a citizen of the United States, and a resident of the city of Boston, in the county of Suffolk and State of Massachusetts, and JOSEPH J. ROSE, a citizen of the United States, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Springs and their Connections, of which the following is a specification.

The several features of our invention and the various advantages resulting from their use, conjointly or otherwise, will be apparent from the following description and claims.

In the accompanying drawings, making a part of this specification, and to which reference is hereby made, Figure 1 is a bottom view of the forward end of a side-bar road-vehicle, showing our invention applied thereto, the front axle and wheels being omitted from this view, as their presence is unnecessary for the proper understanding of our invention. Fig. 2 is a vertical central section in the line of the axis of the rod, whereby the spring is operated, and showing the spring and its adjacent end parts in section, while the aforementioned operating-rod is shown in elevation. Fig. 3 is an elevation of the right-hand end of the devices shown in Fig. 2. Fig. 4 is an elevation of one side of the lever which is next to the coiled spring, and which operates to directly act upon the said spring. That side of this lever which is at the left hand in Fig. 2 is shown in this Fig. 4. Fig. 5 is a view of the opposite side of this lever—viz., that side of it which is at the right hand in Fig. 2 and next to the end lever, whereby the first-named lever is operated. Fig. 6 is an elevation of that side of the end lever which is next to the lever which operates the spring. The other side of the lever shown in Fig. 6 is shown in Fig. 3 in connection with the adjacent side of the projection of the lever shown in Fig. 5. Fig. 7 is an elevation of a portion of the peripheral surface of a modified form of the lever shown in Figs. 4 and 5. Fig. 8 is a view of the right-hand end of the devices shown in Fig. 7. Fig. 9 is a view of the left-hand end of the lever shown in Fig. 7. Fig. 10 is a view on one side of a modified form of the levers shown in Figs. 4, 5, 6, and 3. In Fig. 11 the left-hand figure is a peripheral elevation of the inner lever shown in Fig. 10, while the right-hand figure in Fig. 11 is a peripheral elevation of that lever which is the exterior one in Fig. 10. The mode in which the spring is attached to the right-hand lever in Fig. 11 is illustrated by dotted lines. The mode in which the operating-shaft for turning the lever fits the said lever is shown in said left-hand figure of Fig. 11 by dotted lines. Fig. 12 is a view of the opposite side of the last-named levers when united, which is opposite to that shown in Fig. 10. Fig. 13 is a view of the preferred form of device for holding the end lever in place upon the body of the vehicle.

A indicates the vehicle-body. The usual side sills B B are shown in the drawings.

A indicates the usual front end sill of the body.

C C are the customary and well-known side bars.

D is the head-block, to which the side bars are connected in any suitable manner.

E indicates one of the many forms of fifth-wheel which may be employed.

E′ indicates the place where the king-bolt is located.

F indicates the coiled spring. The thickness of the rod of which this spring is composed and the number of convolutions of which the spring is composed will be varied according to the description of vehicle to which our invention is applied and the amount of weight which the body is designed to support. One end of this coiled spring F is connected to and is preferably integral with a rod, as F′. This rod extends from the bottom of the vehicle at right angles to the axis of the spring, and is suitably attached at a convenient point. In the present instance the free end of this rod F′ is attached at F^2 to the end sill A. The free end of this spring F is supported by and engages a lever G as follows: The lever G is of an annular form, and on the side next to the screw it is pro-

vided with a projection G′, which extends a short distance within the space present within and formed by the convolutions of the spring. Around this projection G′ is a recess G^2, and in this recess a portion of the last convolution of the spring is located. The end of the spring passes on and around the end of the shoulder G^3, formed by the cutting away of an outer portion of the lever G, as shown in Figs. 4 and 5. The direction in which the end of the spring extends around the said shoulder G^3 is shown by the arrows in Figs. 4 and 5. A lug or arm G^4, rigidly attached to the lever G and preferably integral therewith, projects from the periphery of the said lug and engages a corresponding lug or arm H^4 on the end lever H, substantially as shown in Fig. 3. This lever H is preferably provided with a recess H′, so that the end of the spring which embraces the shoulder G^3 shall thus be prevented from touching and interfering with the independent rotation of the levers G H. Thus, if the said end of the spring shall project somewhat beyond that side of the lever G which is at the right hand in Fig. 2, which projection may occur when the spring is subjected to a severe twist or a torsional strain, it will not come in contact with the lever H, and consequently cannot impede the rotation of the latter. That side of this lever H which is at the right hand in Fig. 2 is provided with a projection whereby the axial extension H^2 and the periphery of the hub is provided with an annular groove H^3 for the reception of the device, which secures the hub in position and prevents the lever from slipping laterally. The preferred form of device for thus holding the lever H in position is denominated in general by the letter I, (see Fig. 13,) and consists as follows: The arch I′ is provided at each end with an extension piece or lug I^2. At one side of the arch these lugs are united by the cross-brace I^4. Each lug is provided with a suitable opening, as I^3, for the reception of the securing bolt or screw. The inner edge I^5 of the arch I′ is in cross-section substantially of a convex semicircular shape. The inner edge of the locking-piece I^6 is in cross-section substantially of a convex semicircular form. The bottom of the locking-piece is preferably flat, and thus the better adapted to rest upon a portion of the bottom of the vehicle-body. The ends I^7 I^7 of the locking-piece are concavely curved in cross-section. When the locking-piece is introduced into the lower portion of the spaces occupied by the arch, each concavely-curved end of the locking-piece will closely fit the convexly-curved adjacent inner surface of the arch.

In applying the holding device I the extension H^2 of the lever H is first introduced within the arch I and raised up until the inner surface of the arch I′ enters and occupies the upper half of the recess H^3 of the said extension I^2. The locking-piece I^6 is now introduced into the lower or open end of the arch and elevated until its concave inner surface I^5 enters the lower portion of the annular recess H^3 of the extension H^2 of the lever H, the ends of this locking device at the same time interlocking with the respective adjacent lower portions of the arch. The holding device I thus combined with the lever H is now located upon the bottom of the vehicle-body, so that the bottom of the lugs shall rest upon a suitable portion of the bottom of the vehicle-body. In practice the lug is preferably located upon the body-bottom brace J, which may extend parallel to the length of the body or transversely to the length, as desired. The lugs I^2 of the holding device are now secured to the body A or brace J of the body by means of suitable bolts or screws K.

The rod M is provided at one end with the arm M′, whose length is substantially at right angles to the length of the axis of the rod M. The free end of the arm M′ or of the rod M is connected to the frame C D by a shackle N, of any of the appropriate well-known forms and in any of the well-known ways. One description of such attachment is illustrated in the drawings, and consists of the clip N′, united to the frame and pivotally connected to one pivot-bolt of the shackle N, the other pivot-bolt of the shackle being connected to the free end of the arm M′. A portion of the rod M, near to the arm M′, is journaled in a suitable bearing S, attached to the body of the vehicle by suitable screws or bolts, as S′ S′. That end of the rod M which is opposite to where the arm M′ is connected passes through an opening G^5 in the lever G and also through an opening H^5 in the lever H. The opening G^5 in lever G is circular in cross-section and of a diameter slightly larger than the diameter of the rod M, thereby enabling the rod M to turn easily within the lever G and without tapering the said lever when it (the said rod M) is rotated. That portion of the rod M which is located within the opening H^5 of the lever H, is of an angular shape in cross-section, and the opening H^3 is of a like angular shape, and the rod M closely fits the opening H^5 in lever H. In this way the rotary motion imparted to the rod M through the agency of the arm M′ as the body A rises and falls is communicated to the lever H. Thus the rod M and the lever H are in operation substantially one and operate as if integral. The said rod M and said lever H might, indeed, be integral were it not that economy in their manufacture compel them to be made in separate pieces. The rod M is prevented from slipping out of the lever H in that direction which is toward the arm M′ by means of a nut H^6 or equivalent suitable device. One form of such device is shown, and consists of the nut H^6, screwed upon a screw-thread H^7, located on the adjacent end of the rod M. Devices similar to those just described are located on the other side of the wagon-body, and a similar number of these devices are located at that por-

tion of the vehicle-body which is opposite to where the first-named number of devices are located. Thus the body is everywhere equally supported in an elastic manner.

In operation, as the weight is placed upon the body, the body descends, and that end of the arm M′ which is connected to the torsion-rod M is lower in relation to that end of the said arm M′ which is connected to the shackle N. The rod M is partially rotated. This partial rotation of the rod M operates to rotate the lever H. As the lever H rotates, its projection H^4, impinging against the projection G^4 of lever G, rotates the lever G. This last-named lever G, by means of its shoulder G^3 bearing against the adjacent interlocking end of the spring F, rotates the spring F, and as the free end of the spring F is prevented from rotating by means of the arm F′, secured to the vehicle-body, the spring F is twisted, and thus its elasticity is developed. In this way the spring-power of the spring F is brought into action, and the body A rides easily and elastically by reason of the spring devices aforementioned. The degree of elasticity obtained from the spring F may be varied by an adjustment, as follows: In the arm G^4 of the lever G an interiorly-screw-threaded opening G^6 is formed, and a screw G^7 engages the screw-thread of the opening G^6, (see Fig. 7,) and as this screw G^7 is screwed forward its inner end will impinge against the arm H^4 of the lever H, and thus separate the arms H^4 and G^4, the inner end of the screw G^7 thus being an extension of the arm G^4. The farther the screw G^7 is made to project beyond that face of the arm G^4 which is next to the arm H^4 the more severe will be the twist imparted to the spring F as the body descends a given distance. By retracting the screw G^7 the torsional rotation of the spring F is diminished, and its resilient power will be correspondingly lessened.

In Figs. 7, 8, and 9 there is shown a single lever in which the essential features of both levers G and H are combined. In that side of the lever which is at the right-hand side in Fig. 7 the groove G^2 for the reception of the end of the coiled spring is present. The shoulder G^3, around which the free end of the coiled spring is bent, is also present. The extension G′, which fits in the space formed by the convolutions of the spring, is also present, affixed to the right-hand end of the lever, as shown in Fig. 7. The axial extension H^2, which is supported by the holding device I or other suitable device, is affixed to that side of the lever G which is at the left hand in Fig. 7. An adjusting-screw G^7, located in the outer peripheral extension of the lever, is present, and its inner end bears against that end of the spring which is bent across the shoulder G^3. By advancing the screw G^7 the torsional resistance of the spring F is increased, as hereinbefore mentioned, it being understood that the end of the rod M passes through the lever G, and is provided with angular faces which engage corresponding angular faces on the inner surface of the opening H^5 through the lever. That end of the opening H^5 which is in the extension H^2 may, when preferred, be made of a round shape in cross-section. On that part H^7 of the end of the rod M which projects beyond the free end of the extension H^2 is screwed a nut H^6, as already before mentioned.

In Figs. 10, 11, and 12 the lever G is united to the adjacent end of the spring F. (Shown in dotted lines, substantially as it is shown united in Figs. 1, 2, 3, 4, 5, and 6.) That side of the lever G which is next to the lever H is recessed out, forming a recess G^8, and the arm or abutment G^4, which in Fig. 3 projects beyond the periphery of the lever, here is found present at the edge of the recess G^8, and the edges of that side of the lever H which is adjacent to the lever G are beveled away, thus enabling the lever H to enter and be located within the recess H^8 of the lever H. The abutment or arm H^4 on the periphery of the lever H will thus engage the abutment G^4 of the lever G as the vehicle-body descends and the arm M is rotated. In this illustrative instance the adjusting-screw G^7 passes through the arm G^4 and bears against the abutments H^4 of the lever H, and for the better enabling of the adjusting-screw to perform this function in a confined space the lever H is provided directly in front of the abutment G^4 with a recess H^9. This recess receives one side of the end of the adjusting-screw G^7. That end of the torsion-rod M which engages with the lever H may be made to taper for a part of the way through the lever H. The opening in the lever H will be similarly formed, as is indicated by dotted lines in Fig. 11. While in the present illustrative instance we have shown our invention as applied to a side-bar vehicle, we do not wish the application of our invention to be confined to this particular class of vehicles, but wish it understood that our invention is to be applied to any other class or kind of vehicles to which it may be applicable.

While the various features of our invention are preferably employed together, one or more of the said features may be employed without the remainder, and in so far as applicable one or more of the said features may be used in connection with spring devices of a description other than the one herein specifically set forth.

What we claim as new and of our invention, and desire to secure by Letters Patent, is—

1. In combination with a vehicle-gear, the spring F, secured at one end of the vehicle-body and at the other end to the lever G, having the shoulder G^3, across which the terminal end of the spring is bent, and the rod M, journaled in bearings S, provided with the lever-arm M′, the rod M, passing through spring F and fixed to the device for rotating the

lever G as the arm M is rotated, the lever being provided with screw G^7, arranged, substantially as described, for increasing or diminishing the torsional resistance of the spring F, substantially as and for the purposes specified.

2. In combination with a vehicle-gear, the spring F, secured at one end of the vehicle-body and at the other end to the lever G, having the shoulder G^3, across which the terminal end of the spring is bent, and the rod M, journaled in bearing S and provided with the lever-arm M′, the rod M passing through the spring F and fixed to the device for rotating the lever G as the arm M is rotated, and the holding device I, consisting of the arch I′, provided with lugs I^2, and the locking-piece I^6, whose ends are arranged to engage with the inner wall or surface of the arch, the holding device I being adapted to engage the extension H^2 of the lever device at the end of the spring, substantially as and for the purposes specified.

3. The spiral spring F, at one end secured to the vehicle-body, substantially as described, and at the other end engaging a lever G, this lever being provided with the extension G′, entering the space formed by the convolutions of the spring, and being also provided with the annular recess G^2, into which the adjacent end of the spring enters, the lever being provided with the shoulder G^3, across which the adjacent terminal portion of the spring is bent, arm G^4, rigidly attached to the lever G, lever H, provided with arm H^4, arranged to engage the arm G^4 of the lever G, and the rod M, journaled in bearing S, passing loosely through the opening G^5 of lever G and being rigidly fixed to the lever H, substantially as and for the purposes specified.

4. The spiral spring F, at one end secured to the vehicle-body, substantially as described, and at the other end engaging a lever G, this lever being provided with the extension G′, entering the space formed by the convolutions of the spring, and being also provided with the annular recess G^2, into which the adjacent end of the spring enters, the lever being provided with the shoulder G^3, across which the adjacent terminal portion of the spring is bent, arm G^4, rigidly attached to the lever G, lever H, provided with arm H^4, arranged to engage the arm G^4 of the lever G, the rod M, journaled in bearing S, passing loosely through the opening G^5 of lever G and being rigidly fixed to the lever H, the lever H being provided with the extension H^2, having the recess H^3, and the holding device I, having arch I′, securing-lugs I^2 I^2, and locking-piece I^6, whose ends are arranged to respectively engage the respective adjacent sides of the arch I′, substantially as and for the purposes specified.

5. The spiral spring F, at one end secured to the vehicle-body, substantially as described, and at the other end engaging a lever G, this lever being provided with the extension G′, entering the space formed by the convolutions of the spring, and being also provided with the annular recess G^2, into which the adjacent end of the spring enters, the lever being provided with the shoulder G^3, across which the adjacent terminal portion of the spring is bent, arm G^4, rigidly attached to the lever G, lever H, provided with arm H^4, arranged to engage the arm G^4 of the lever G, the rod M, journaled in bearing S, passing loosely through the opening G^5 of lever G and being rigidly fixed to the lever H, the lever H being provided with extension H^2, having recess H^3, and the holding device I, having arch I′, securing-lugs I^2 I^2, locking-piece I^6, whose ends are arranged to respectively engage the respective adjacent sides of the arch I′, and nut H^6, secured upon the end H^7 of the rod M, substantially as and for the purposes specified.

6. The spiral spring F, at one end secured to the vehicle-body, substantially as described, and at the other end engaging a lever G, this lever being provided with the extension G′, entering the space formed by the convolutions of the spring, and being also provided with the annular recess G^2, into which the adjacent end of the spring enters, the lever being provided with the shoulder G^3, across which the adjacent terminal portion of the spring is bent, arm G^4, rigidly attached to the lever G, lever H, provided with the arm H^4, arranged to engage the arm G^4 of the lever G, the rod M, journaled in bearing S, passing loosely through the opening G^5 of the lever G and being rigidly fixed to the lever H, the lever H being provided with the extension H^2, having the recess H^3, and the holding device I, having arch I′, securing-lugs I^2 I^2, locking-piece I^6, whose ends are arranged to respectively engage the respective adjacent sides of the arch I′, and the adjusting-screw G^7, screwed through the arm G^4 of the lever G, substantially as and for the purposes specified.

7. In combination with a device for twisting the spiral spring and the end bearing for upholding the same, the device I for upholding the said bearing, consisting of the arch I′, lugs I^2, and locking-piece I^6, having its ends arranged to respectively engage the respective adjacent walls of the arch, the aforementioned bearing being received between the arch I′ and the locking-piece I^6, substantially as and for the purposes specified.

8. In combination with a vehicle-gear, the spring F, secured at one end to the vehicle-body and at the other end to the disk G, the latter being provided with groove in its side and shoulder on its periphery, the adjacent coil of the spring lying in the groove, and the adjacent terminal end of the spring being bent across the said peripheral shoulder, and the rod M, journaled in bearing S and provided with the lever-arm M′, the rod M passing through the spring F and fixed to the disk G, substantially as and for the purposes specified.

9. The four separate and independent levers, located, respectively, at their respective corners of the vehicle, and each consisting of a rod M, having a lever-arm M′, the free end of the latter being connected to the vehicle gear-frame, the rod M, journaled in bearings fixed to the vehicle-body, each rod being provided with a coiled spring embracing the said rod and secured at one end to the vehicle-body and at the other end to a discal piece G, having a peripheral shoulder, around which the adjacent terminal end of the spring is bent, the rod M passing through the discal piece and provided with device for rotating the discal piece, substantially as and for the purposes specified.

GEORGE NORWOOD.
JOS. J. ROSE.

Attest:
BEN B. DALE,
R. SMITH.