L. SGAL & J. SCHWANDA.

SPRING FOR VEHICLES.

APPLICATION FILED MAR. 30, 1906.

947,653.

Patented Jan. 25, 1910.

3 SHEETS—SHEET 1.

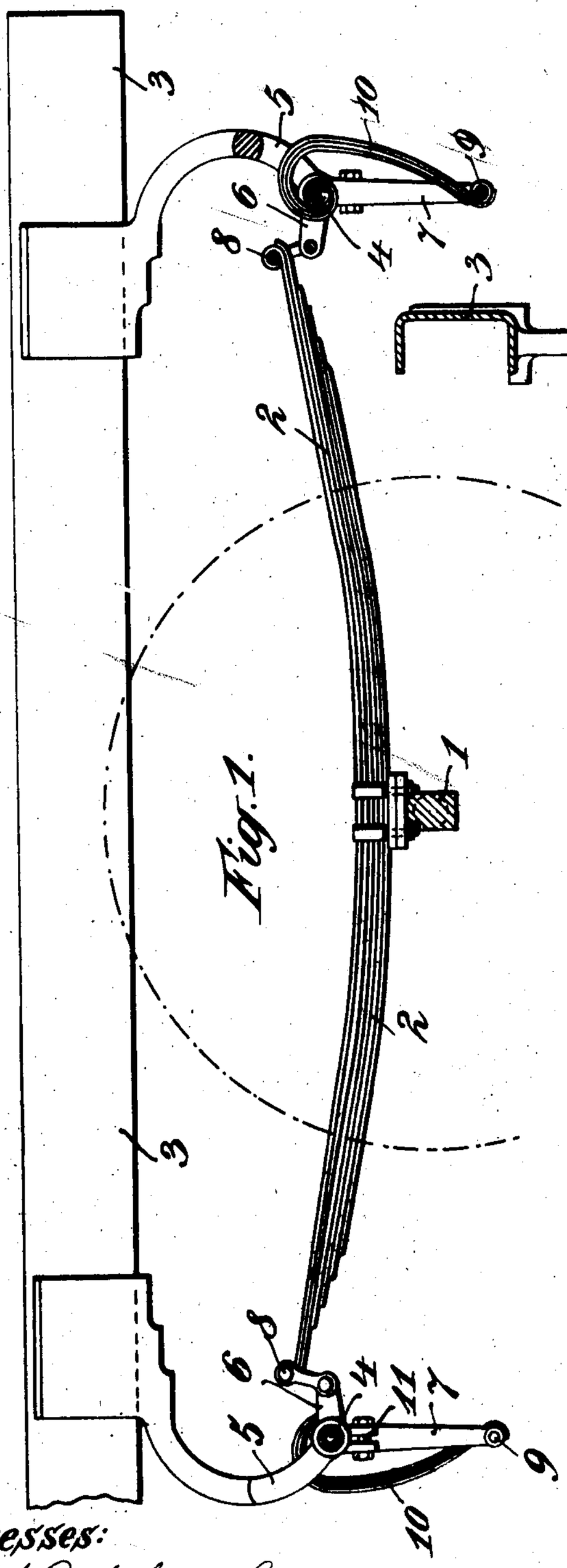

Fig. 1.

Fig. 2.

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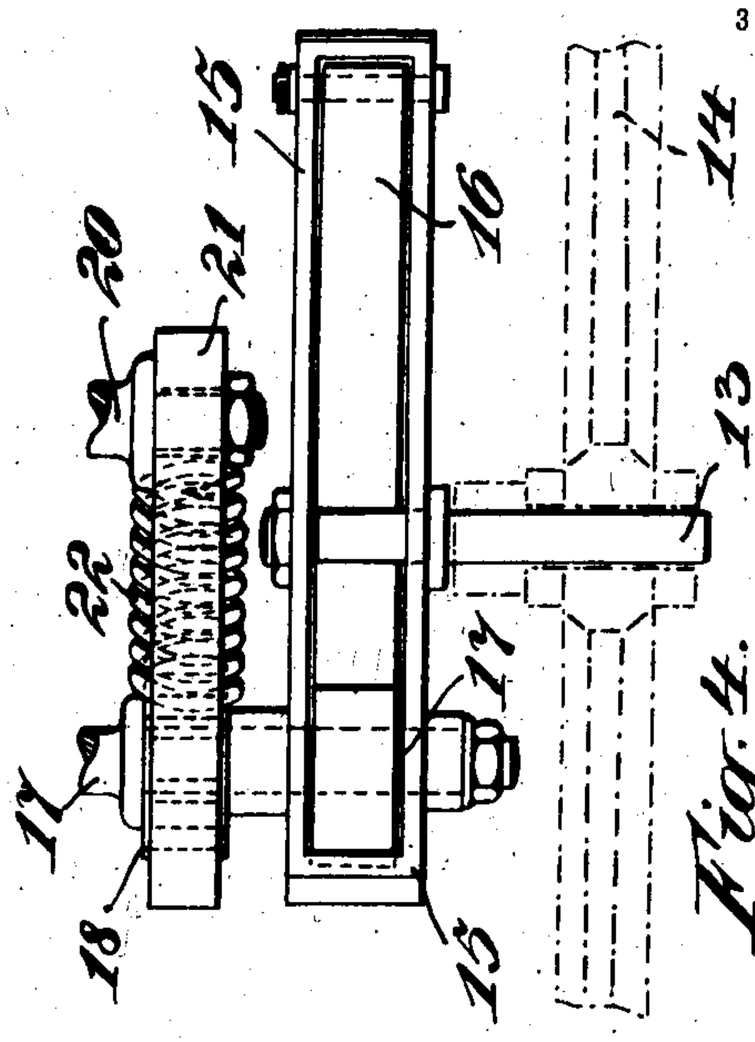

Fig. 4.

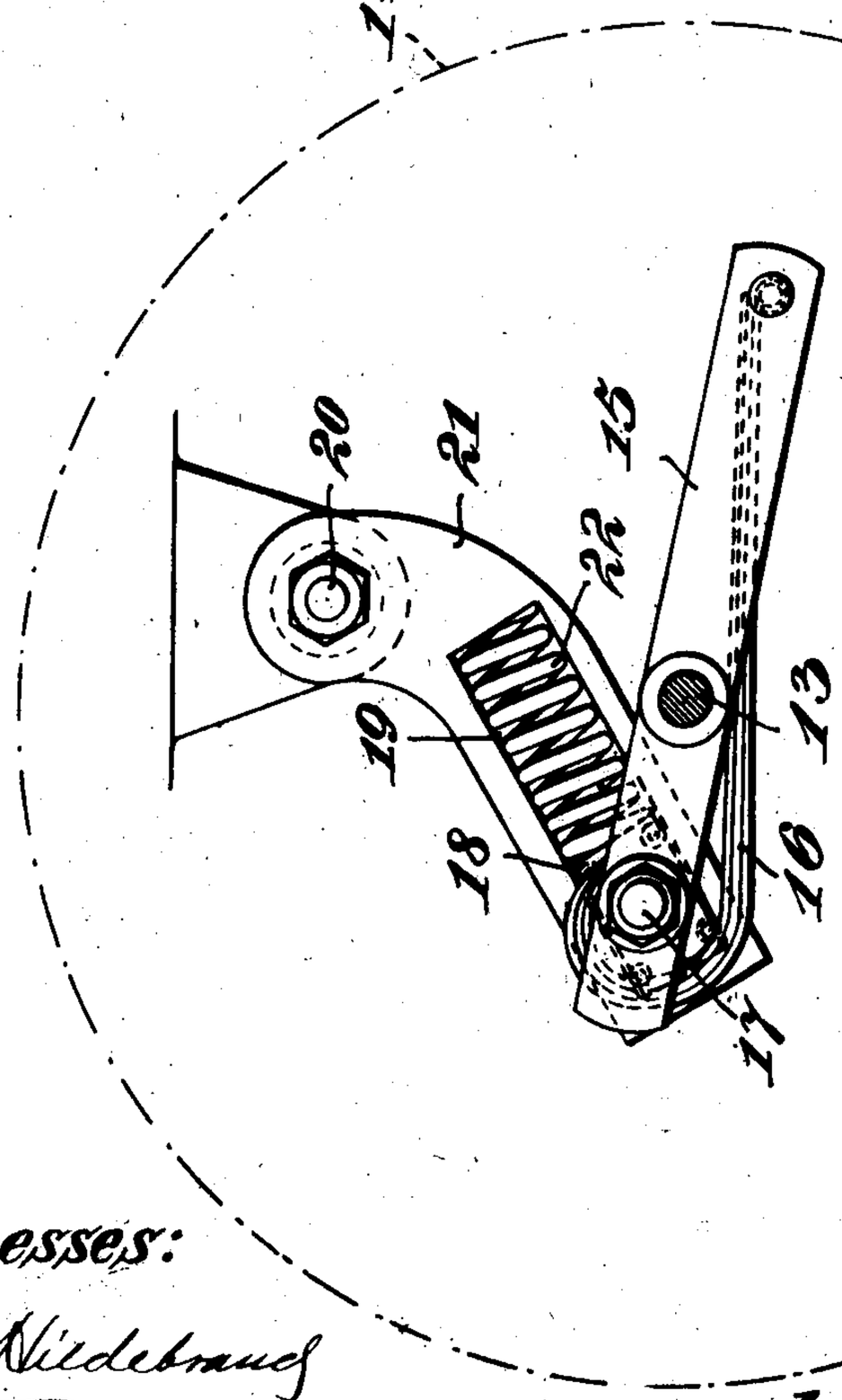

Fig. 3.

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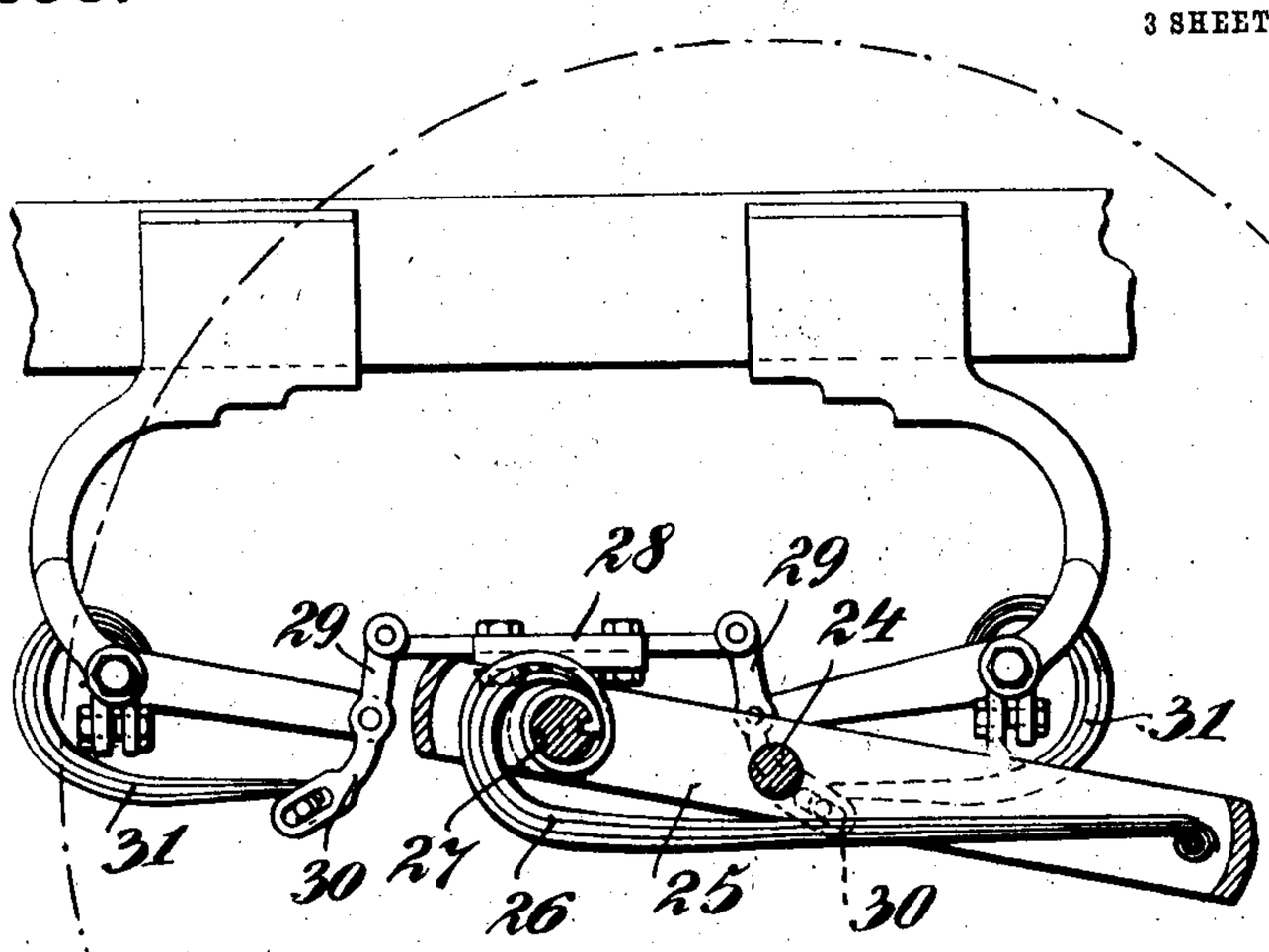
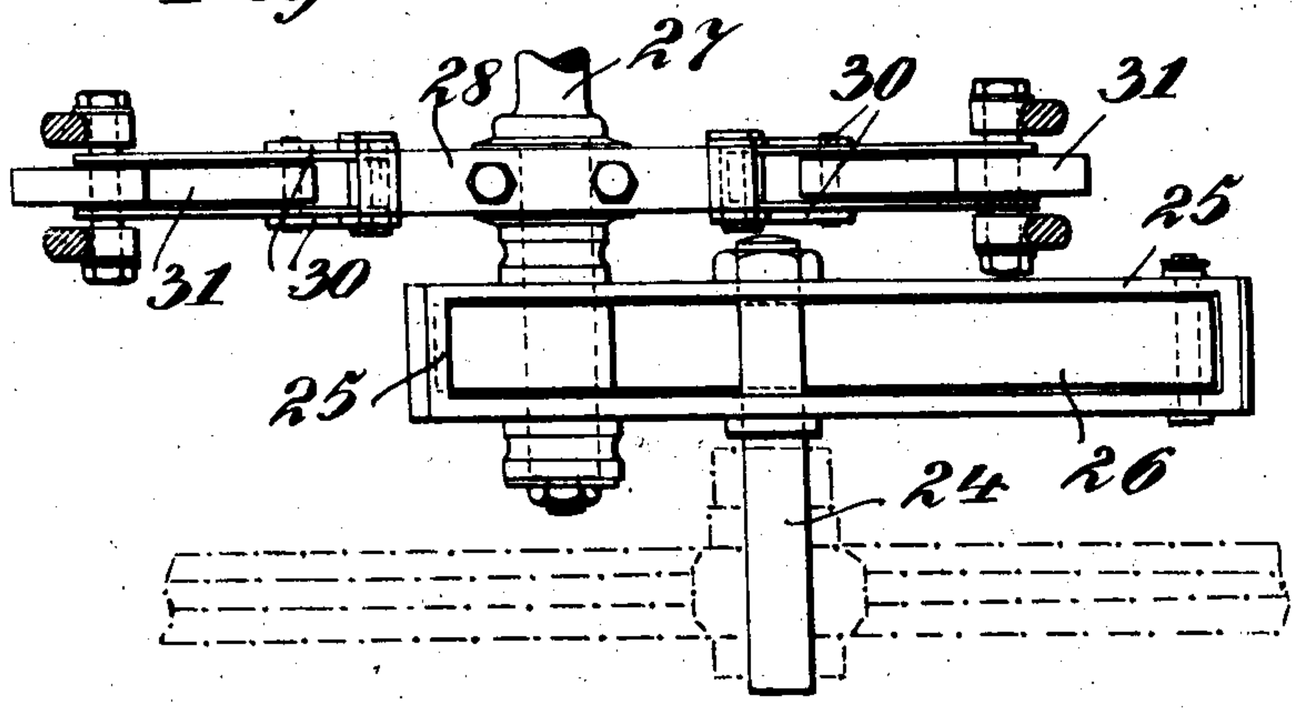


Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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SPRING FOR VEHICLES.

947,653. Specification of Letters Patent. Patented Jan. 25, 1910.

Application filed March 30, 1906. Serial No. 308,887.

To all whom it may concern:

Be it known that we, LUDWIG SGAL and JOSEF SCHWANDA, citizens of the Empire of Austria-Hungary, residing at Vienna, Austria-Hungary, have invented certain new and useful Improvements in Springs for Vehicles and the Like; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The subject of our invention is a spring device for moved loads which are exposed in their motion to shocks in various directions. The device is, therefore, particularly applicable to vehicles of all descriptions. Unlike prior devices for the same purpose, which are designed solely to equalize shocks in substantially vertical direction, the new contrivance serves to take up and equalize the shocks affecting the load in the direction of motion and also the back-vibrations of the loads. For this purpose some suitable system of springs arranged in such manner that it can equalize especially vertical shocks, and a second system of springs of some suitable kind, so disposed that it is enabled to take up especially horizontally acting shocks, are combined in such way that both systems together take up every kind of shock without suffering distortion. It is not sufficient, for instance, to provide a carriage-body with coiled springs below and at the side, since lateral shocks distort the lower springs, and vertical shocks the lateral ones. Both systems must, therefore, be so connected that each equalizes the shocks in one direction, while by coöperation they equalize the whole of the shocks which in direction lie between the others.

For the present purpose the ordinary flat spiral spring is particularly suitable, since—unlike, for instance, the sweep spring, (single or double) which only acts in one direction—it can, without distortion, take up and weaken all shocks acting in its plane.

In the constructional forms of the invention described below and illustrated in the accompanying drawings, such spiral springs either alone, or in conjunction with springs of other form, are applied.

The drawings illustrate three different modes of applying the invention to a vehicle.

Figure 1 is a side elevation, and Fig. 2 a rear view of a device consisting of single sweep springs and spiral springs. Fig. 3 is a side elevation, and Fig. 4 a plan of a device consisting of coiled springs and spiral springs. Figs. 5 and 6 are like views of a device in which spiral springs alone are used.

In the form of construction shown in Figs. 1 and 2, the axle 1 supports the ordinary single sweep springs 2, to the ends of which, however, the bed 3 of the vehicle is not directly connected as ordinarily, but indirectly, by means of spring controlled bell-levers, fulcrumed to the bed 3. In the example illustrated two pairs of such levers are provided, turning on pins 4 carried by the forked arms 5 secured to the bed 3. The ends of the horizontal and of the vertical lever-arms 6, 7 respectively of two such levers are connected with each other, so that a lever-frame is formed. The horizontal arms 6 are secured to the ends of the springs 2 by links 8 in well-known manner. Around the bolt 9 which connects the vertical arms 7, there grips the free end of a spiral spring 10, the inner end of which is secured to the pin 4 which is secured in the fork 5, and which forms the fulcrum for the lever having the arms 6 and 7.

The action of this device can be best explained by means of the following simple examples. A shock which is directed substantially vertically—such, for instance, as acts on the wheel from below when the vehicle is driven from the side-walk over the curbstone onto the roadway—is taken up especially by the spring 2, in well-known manner. On the other hand, a shock which is directed substantially horizontally—such, for instance, as occurs when a vehicle is driven from the roadway onto the sidewalk, owing to the wheel colliding with the curbstone—will be transmitted by the springs 2 in horizontal direction to the bell-levers connected to them, without distortion of the springs; and since the levers swing on the pins 4, the spiral springs 10 will be wound up or unwound as the case may be, so that the shock is very considerably weakened. The vertical back-vibrations of the bed 3 are taken up at the same time by the spiral springs 10 and the springs 2; the horizontal vibrations, again, by the spiral springs. The tension of the latter springs can be altered by the pin 4, after loosening the nuts of the bolts 11, being turned in the fork 5 and then fixed

again in the new position by re-tightening the bolt-nuts. So far, only the action of vertical and horizontal shocks on the spring-system and vehicle have been explained. It is clear, however, that shocks in all other intermediate directions can also be taken up by the coöperating springs, which themselves divide the direction of action into a horizontal and a vertical part. Furthermore, the spiral springs, as already mentioned, take up all shocks running in their plane. In consequence, the shocks transmitted to the bed of the vehicle are exceedingly small.

In the modifications shown in Figs. 3–6, each wheel of the vehicle is in resilient connection with the carriage-axle.

In the device shown in Figs. 3 and 4, the short axle 13 of the wheel 14 is mounted in a frame 15, which swings on a rod 17 against the action of the horizontally disposed spiral spring 16. The rod 17 is mounted in blocks 18 sliding in inclined guideways 19, provided in arms 21 at each end of the carriage-axle 20. Between the slides 18 and the upper end of the guideways 19 coiled springs 22 are located, which limit the motion of the slides 18. The spiral springs 16 take up essentially the vertical shocks, while horizontal shocks cause the blocks 18 to slide upward in their guideways against the action of the coiled springs 22. All intermediate shocks are equalized in like manner by the coöperation of the two systems of springs.

In the third modification, shown in Figs. 5 and 6 the wheel-axle 24 is mounted in the same manner as in the second modification in a frame 25, which likewise turns on an axis 27 against the action of a spiral spring 26, which axis, however, is in this case identical with the carriage-axle. On the axis 27 is a bridge 28, the extremities of which are jointed to upper limbs 29 of double-armed levers, fulcrumed to the carriage-frame and whose lower limbs 30 are under the action of spiral springs 31 likewise secured to the carriage-frame. In this modification the vertical shocks are taken up, as before, both by the spiral spring 26 and the lateral springs 31; while the horizontal shocks are taken up principally only by the latter, a horizontal shock, for example, against the wheel-axle 24, and the carriage-axle 27 causing swinging of the levers 29, 30 on their fulcrums and rolling up or unrolling of the lateral springs 31.

It will be noted that in the construction represented in Figs. 1 and 2, as well as in that represented in Figs. 5 and 6, the short spiral springs which are interposed between the frame and the levers 6 and 7 and 29 and 30, respectively, lie substantially in the planes of movement of said levers.

The three examples given by no means exhaust all the possible modifications of the invention. Also combinations of sweep springs vibrating in vertical and horizontal planes, with the ends jointed together by bell-levers may be employed according to this invention. In place of spiral springs, straight flat springs may in certain cases be used.

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

1. The combination, with a vehicle frame and its axle, of a lever fulcrumed to the frame, a leaf-spring arranged between said lever and the axle, a spiral spring inserted between the frame and the lever and secured to the frame substantially at the fulcrum point of the lever.

2. The combination with a vehicle frame and its axle, of a pair of spiral springs affixed to the frame, a pair of two arm levers fulcrumed to the frame and engaging with one arm the free ends of the spiral springs, and a connection between the other arm of the levers and the axle.

3. The combination with a vehicle frame and its axle, a pair of spiral springs affixed to the frame, bell crank levers engaging with one arm the free end of the spiral springs, a leaf spring bearing in its medial portion upon the axle, and a connection between the ends of the leaf spring and the other arm of the bell crank lever.

4. The combination with a vehicle frame and its axle, a pair of spiral springs affixed to the frame, bell crank levers fulcrumed to the frame and engaging with one arm the free end of the spiral springs, a leaf spring bearing in its medial portion upon the axle, and a link connection between the ends of the leaf spring and the other arm of the bell crank lever.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

LUDWIG SGAL.
JOSEF SCHWANDA.

Witnesses:
ALVESTO S. HOGUE,
AUGUST FUGGER.