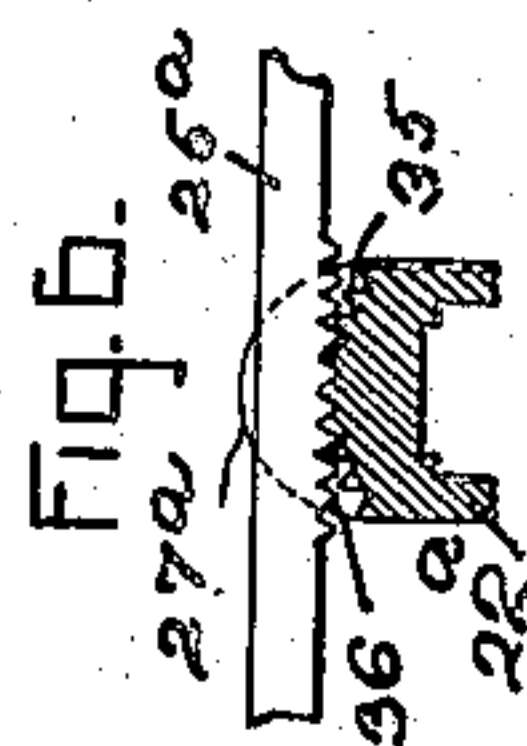
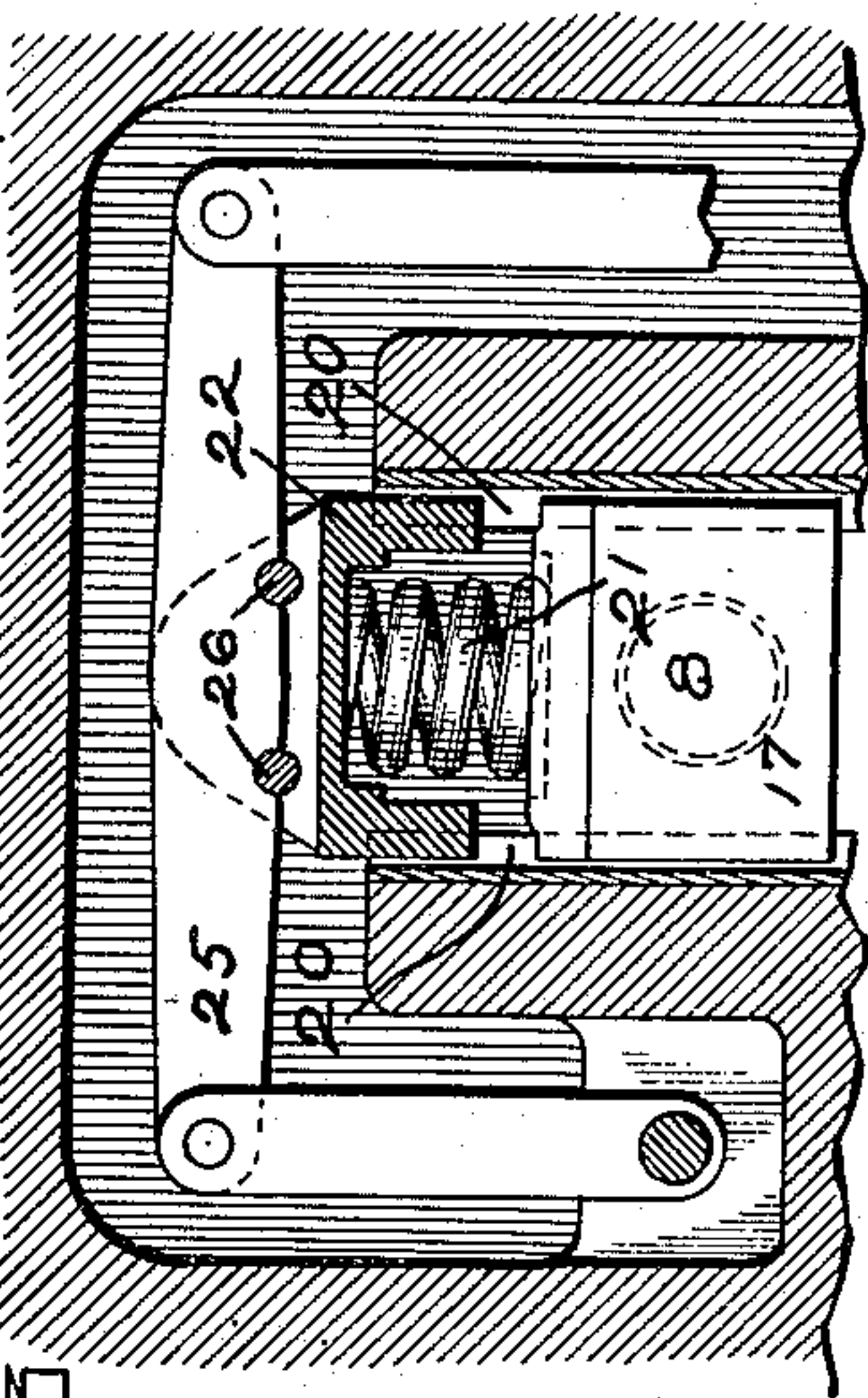
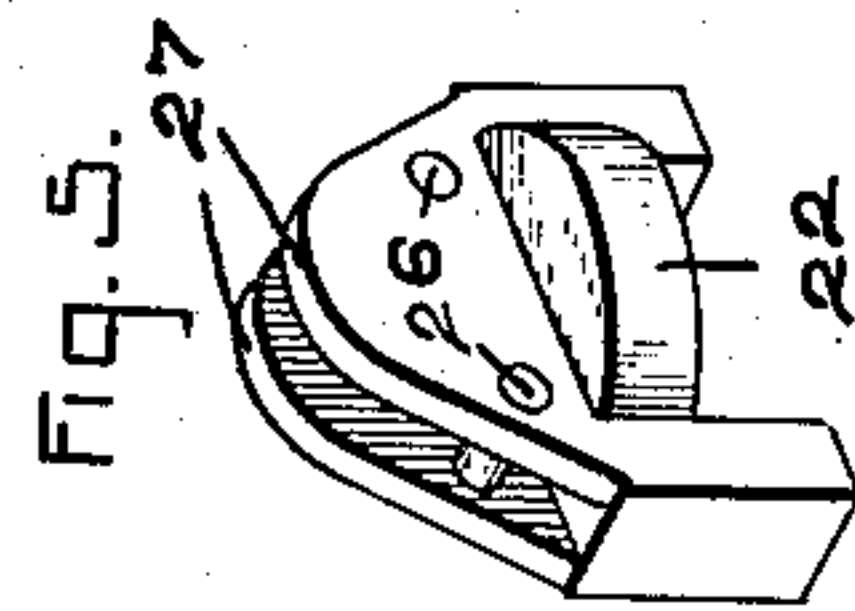
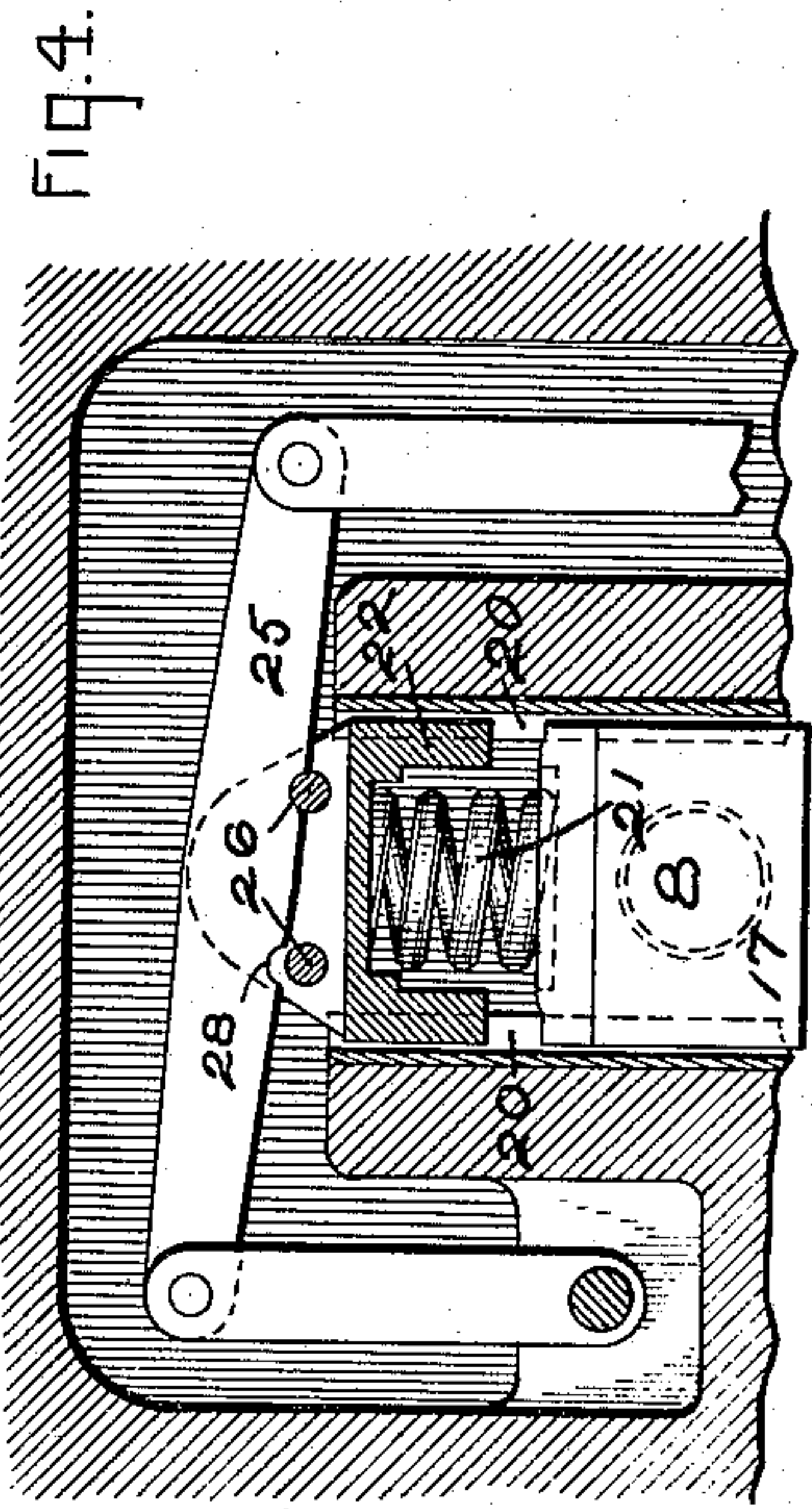
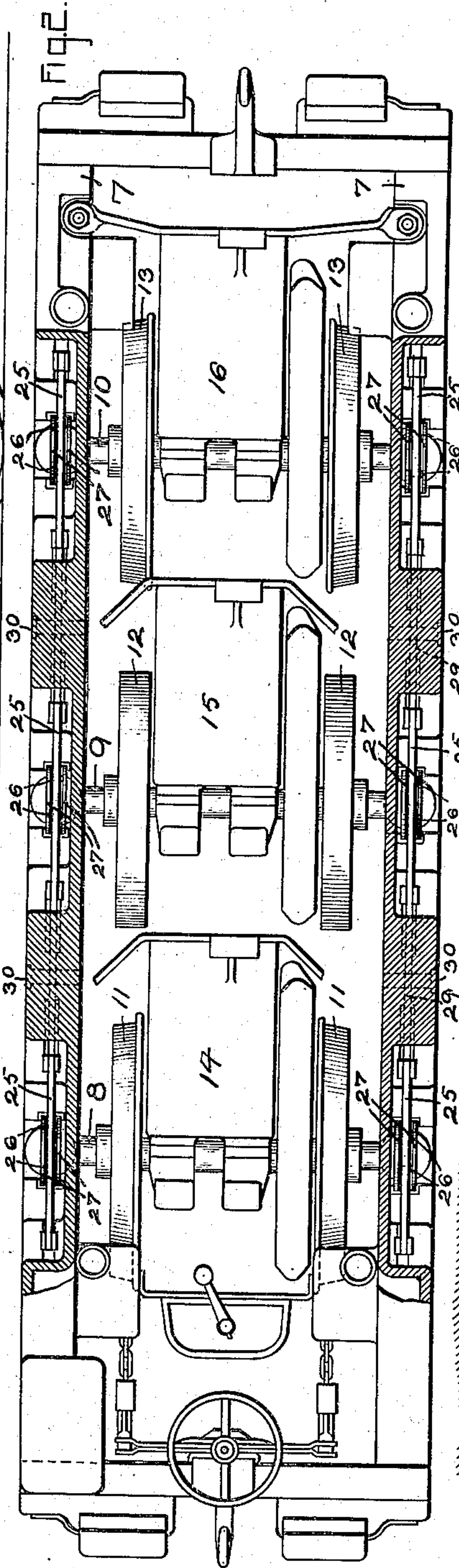
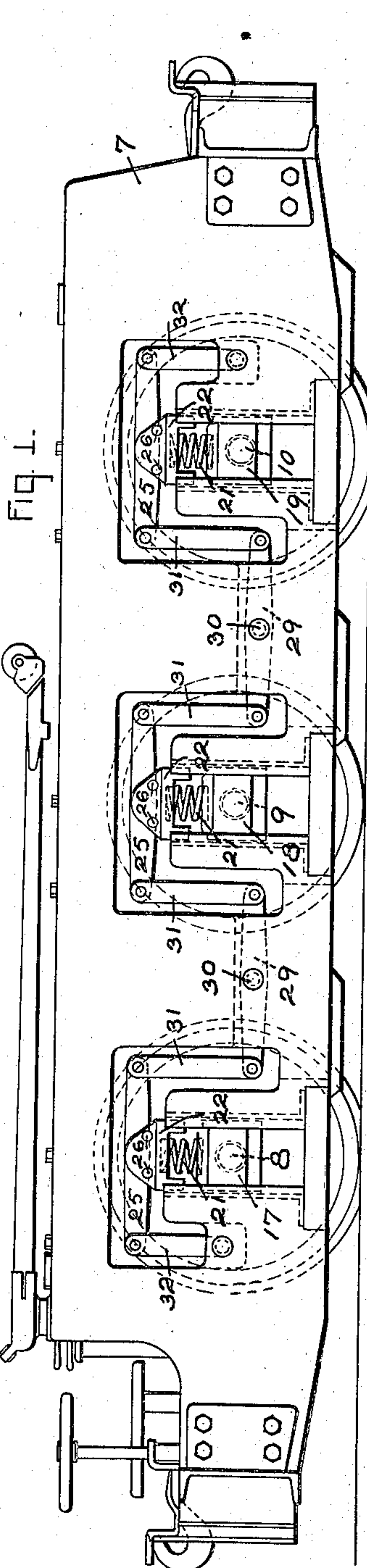


C. W. LARSON.
SYSTEM OF VEHICLE SUSPENSION.
APPLICATION FILED AUG. 24, 1907.

907,822.

Patented Dec. 29, 1908.



WITNESSES
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SYSTEM OF VEHICLE SUSPENSION.

No. 907,822.

Specification of Letters Patent.

Patented Dec. 29, 1908.

Application filed August 24, 1907. Serial No. 390,030.

To all whom it may concern:

Be it known that I, CARL W. LARSON, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Systems of Vehicle Suspension, of which the following is a specification.

My invention relates to vehicles and particularly to locomotives, railway cars and the like, and the means whereby the weight of such vehicles is applied to the axles of the supporting wheels.

The object of my invention is to provide means between the frame of the vehicle and the wheel axles whereby the weight of the frame and the parts carried thereby will be evenly distributed on the axles, while the latter are at the same time allowed to move relatively to the frame when the wheels strike uneven places in the track.

My invention has for its special object to provide a system of levers between the frame and the journal-boxes of the axles which will be in stable equilibrium only when the wheels are resting on the same plane, said lever system being unbalanced and having a tendency to return the frame to its normal position with reference to the axles when the wheels are not in the same plane. In other words, by my invention I provide a system of suspension for vehicles such that when the frame is disturbed, by unevenness in the track, from its normal position with reference to the axles, there will be a tendency for it to return to its normal position.

My invention will be understood from the following description taken in connection with the accompanying drawing, in which the preferred embodiment is set forth.

While I have shown my invention as applied to a three-axle mining locomotive, it is evident that it is in no way limited thereto, but may be applied to a locomotive of any number of axles or to a car truck, or in fact to any vehicle.

In the drawing, Figure 1 is a side elevation of a mining locomotive with my invention applied thereto; Fig. 2 is a plan view thereof, the frame being shown in section and certain parts broken away for the sake of clearness; Fig. 3 is a cross sectional elevation through part of the frame around a journal-box show-

ing part of the lever and link connections with the supporting fulcrums; Fig. 4 is a view similar to Fig. 3 but with the journal-box lowered from its normal position in the frame; Fig. 5 is a perspective view of the fulcrum block used with each journal-box; and Fig. 6 illustrates a modified form of fulcrum block and co-acting lever.

Referring to Figs. 1 to 5, the frame of the locomotive is indicated at 7, the trolley, brake handle, controller, etc., being shown in outline. In the locomotive illustrated there are three axles, 8, 9 and 10, upon which are wheels 11, 12 and 13, motors 14, 15 and 16 being arranged to drive these axles and being supported from the axles and from the frame in any suitable and well known manner which need not be described in detail, as it forms no part of my invention. The axles 8, 9 and 10 are mounted respectively, in journal-boxes 17, 18 and 19 arranged for sliding movement in grooves 20 in the frame 7. Above each journal-box, 17, 18 and 19, is a coiled spring 21 which supports a fulcrum block 22 of the form clearly shown in Fig. 5, this block being arranged to slide in the grooves 20. The frame of the locomotive is carried on these blocks 22 and therefore, through springs 21, by the axles 8, 9 and 10, by means of a connecting system of levers and links arranged as clearly shown in Fig. 1. This lever system comprises levers 25, one above each axle, resting upon two pins 26, passing through ears 27 on each block 22, between which ears the levers 25 pass. Notches 28 in the bottom of levers 25, best shown in Fig. 4, engage with the pins 26 and prevent displacement of the levers. Other levers 29 pivoted at 30 in the frame are connected to the levers 25 by the links 31, as shown in Fig. 1. Other links 32 at each end of the suspension system connect the links 25 at those points with the frame. The whole lever system is located in recesses in the frame as shown.

With this system of suspension it is evident that when the axles are in their normal position with relation to the frame, or as shown in Fig. 1, the levers balance one another and the system will be in equilibrium. If, however, through unevenness of the track, the axle 8, for example, takes a

position in the frame lower than normal, the lever 25 above that axle will take the position shown in Fig. 4. In this figure the lever 25 is shown as lowered at its right end and, therefore, fulcrumed on the right hand pin 26. This, of course, will cause the link 31, connected to said lever 25, to force down the end of its cooperating lever 29 which in turn acts through the link 31 at its other end to raise the left end of the link 25 above the axle 9, to a position similar to that occupied by the lever 25 above the axle 8, this movement being transmitted on through the other levers and links. In this displaced position of the levers 25, it is obvious that the whole system will be unbalanced, since the fulcrum of each lever 25 is shifted to the right of its central point. This will be clear when it is considered that although the downward pulls on the ends of the levers 25 are constant, yet when in the displaced position just described, they will on the left ends of said levers be acting at a greater radius, and at the right ends at a less radius than formerly. When, therefore, the axles are displaced from their normal position there is a strong tendency, due to the unbalanced condition of the suspension system, for them to return to their normal location with reference to the frame. As soon, therefore, as the wheels are again resting on the same plane the frame will be returned to its normal position with reference to the axles.

In Fig. 6 I have shown a modified form of fulcrum block 22^a and a co-acting lever 25^a, corresponding to the parts 22 and 25, respectively, in the other figures. In this construction instead of using two pins 26, the bottom of the block 22^a, between the ears 27^a, is made curved or crown shaped and is covered with teeth 35 which engage with teeth 36 in the bottom of the lever 25^a. This prevents displacement between the lever and the fulcrum block. It is obvious that the lever 25^a will rock upon the curved surface of the block 22^a thereby shifting the fulcrum to one side or the other of its middle point, exactly as the levers 25 rock on the pins 26 in the form shown in Figs. 1 to 5.

While I have shown certain forms in which my invention may be embodied, I wish it understood that I do not intend to limit myself to these but in the following claims aim to cover such modifications as will occur to one skilled in this art.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In a vehicle, a plurality of axles having wheels thereon, journal-boxes for said axles, a frame in which said journal-boxes are arranged to slide, and connections between said journal-boxes and said frame comprising a system of levers balanced only when the wheels are all resting on the same plane.

2. In a vehicle, a plurality of axles having

wheels thereon, journal-boxes for said axles, a frame in which said journal-boxes are arranged to slide, and connections between said journal-boxes and said frame comprising a system of levers which tends to restore the axles and frame to normal position with reference to one another when they have been moved out of such normal position.

3. In a vehicle, a plurality of axles having wheels thereon, journal-boxes for said axles, a frame in which said journal-boxes are arranged to slide, and connections between said journal-boxes and said frame comprising levers having a plurality of fulcrums about which they oscillate as the position of an axle relative to the frame changes.

4. In a vehicle, a plurality of axles having wheels thereon, journal-boxes for said axles, a frame in which said journal-boxes are arranged to slide, and connections between said journal-boxes and said frame comprising levers, each fulcrumed at a plurality of points and supported by a journal-box, and links and levers for connecting the ends of said first-mentioned levers to the frame and to one another.

5. In a vehicle, a plurality of axles having wheels thereon, journal-boxes for said axles, a frame in which said journal-boxes are arranged to slide, and connections between said journal-boxes and said frame comprising a fulcrum block supported by each journal-box, a lever supported by each fulcrum block and fulcrumed thereon at a plurality of points, and links and levers for connecting the ends of said first-mentioned levers to the frame and to one another.

6. In a vehicle, a plurality of axles having wheels thereon, journal-boxes for said axles, a frame in which said journal-boxes are arranged to slide, a fulcrum block supported by each journal-box, a lever mounted upon each fulcrum block and arranged to rock thereon about different points as fulcrums, a lever pivoted on said frame between each pair of journal boxes, links for connecting the adjacent ends of said first-mentioned and last-mentioned levers, and links for connecting the outside ends of the foremost and rearmost of said first-mentioned levers to the frame.

7. In a vehicle, a plurality of axles having wheels thereon, journal-boxes for said axles, a frame in which said journal-boxes are arranged to slide, a sliding block arranged above each journal-box and a spring for supporting it thereon, a lever supported on each of said blocks and arranged to rock on a plurality of fulcrums, levers pivoted on said frame between each pair of axles, links for connecting the adjacent ends of said first-mentioned and last-mentioned levers, and links for connecting the outside ends of the foremost and rearmost levers to said frame.

8. In a vehicle, a plurality of axles having

wheels thereon, journal-boxes for said axles,
a frame in which said journal-boxes are ar-
ranged to slide, blocks also slidable in said
frame, springs for supporting said blocks on
5 said journal-boxes, a lever supported on each
of said blocks at a plurality of points and ar-
ranged to rock thereabout, and links and le-
vers for connecting the ends of said first-

mentioned levers to the frame and to one
another. 10

In witness whereof, I have hereunto set
my hand this 22nd day of August, 1907.

CARL W. LARSON.

Witnesses:

HELEN ORFORD,

HEWLETT SCUDDER, Jr.