No. 676,696. Patented June 18, 1901.

# A. J. PITKIN & J. E. SAGUE.

## LOCOMOTIVE.

(Application filed Feb. 25, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

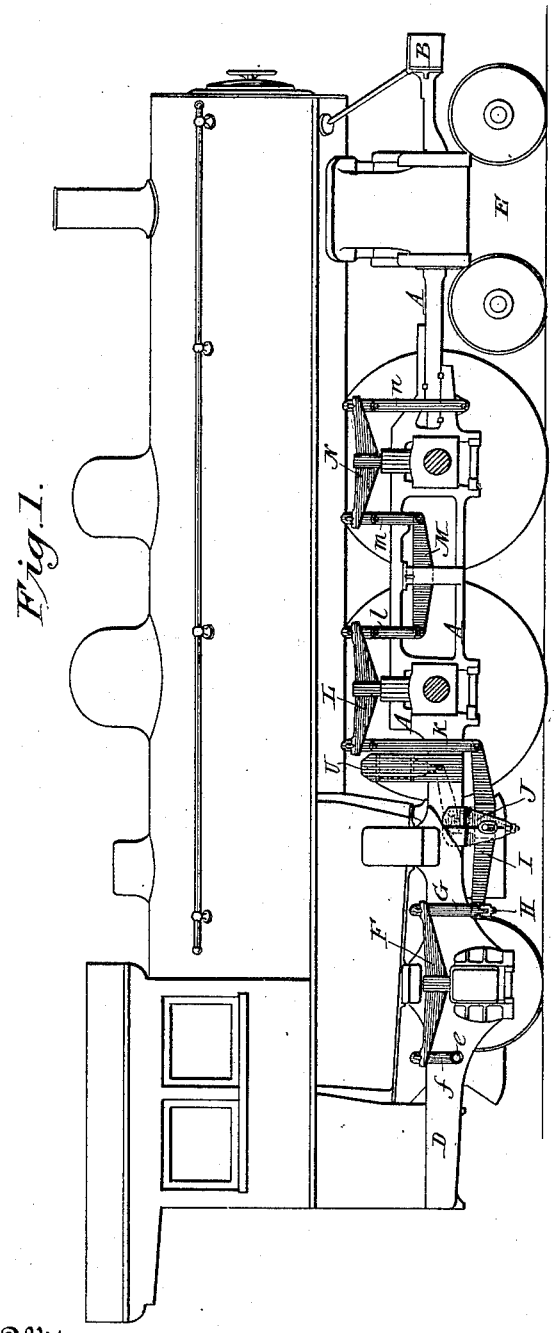
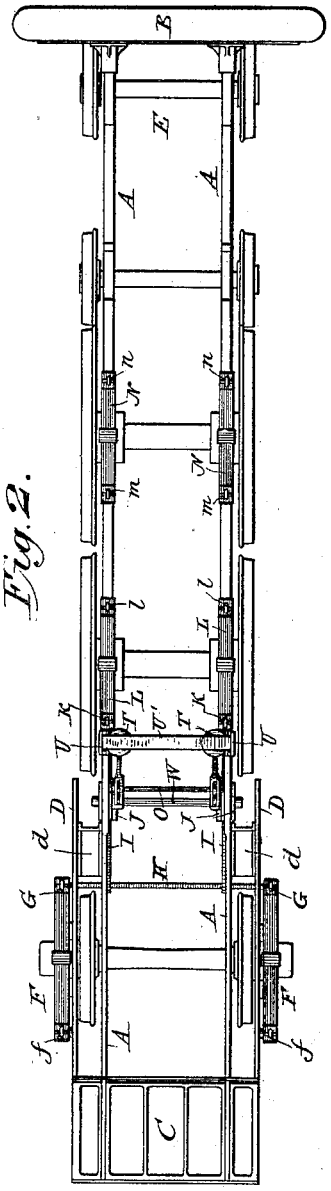



Fig. 2.




Witnesses
E. A. Balloch.
A. M. Parkins.

Inventors
Albert J. Pitkin,
James E. Sague,
by their attorneys
Baldwin Davidson & Wright

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Fig. 3.

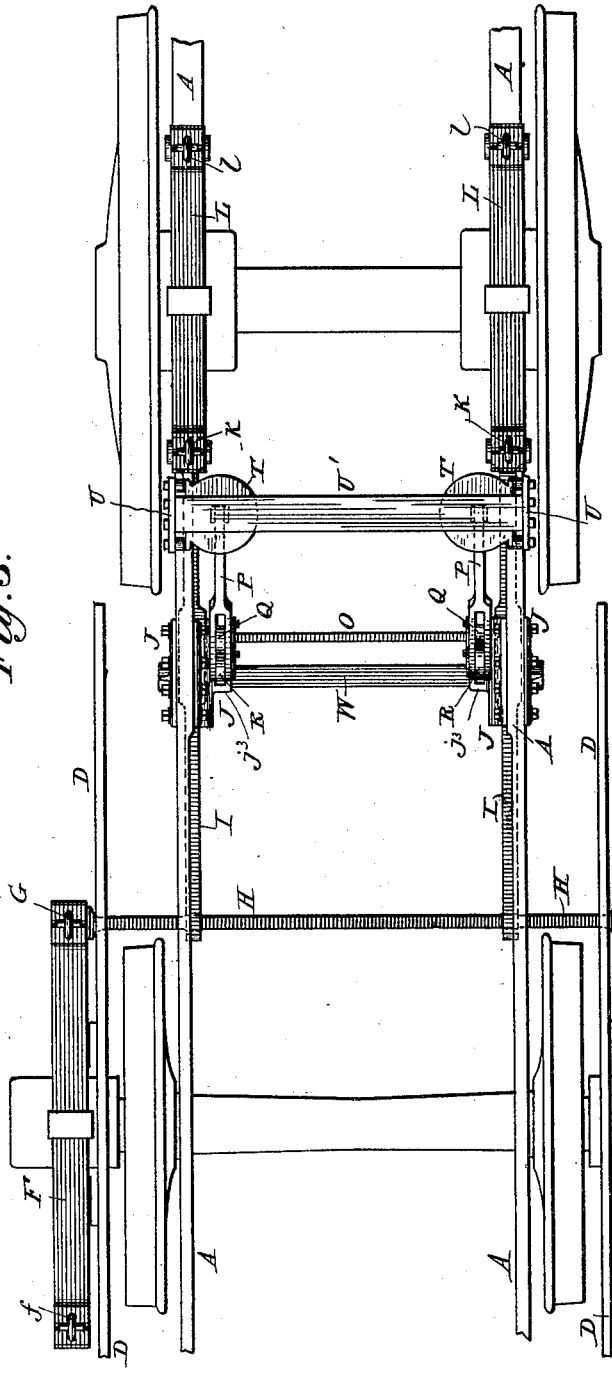
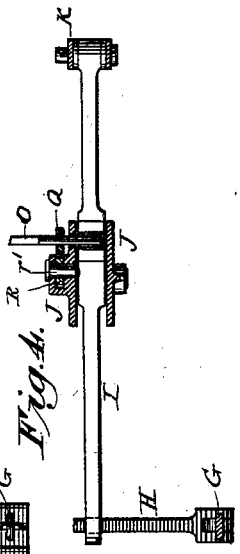


Fig. 4.



Witnesses
E. A. Bullock.
A. M. Parkins.

Inventors
Albert J. Pitkin,
James E. Sague,
by their attorneys
Baldwin, Davidson & Wright.

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Fig. 6.

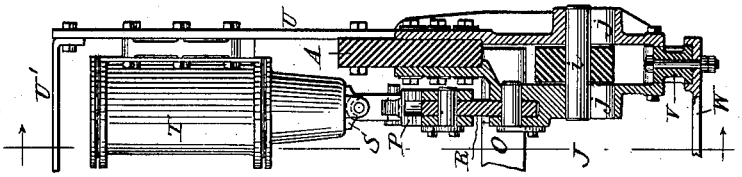

Fig. 5.

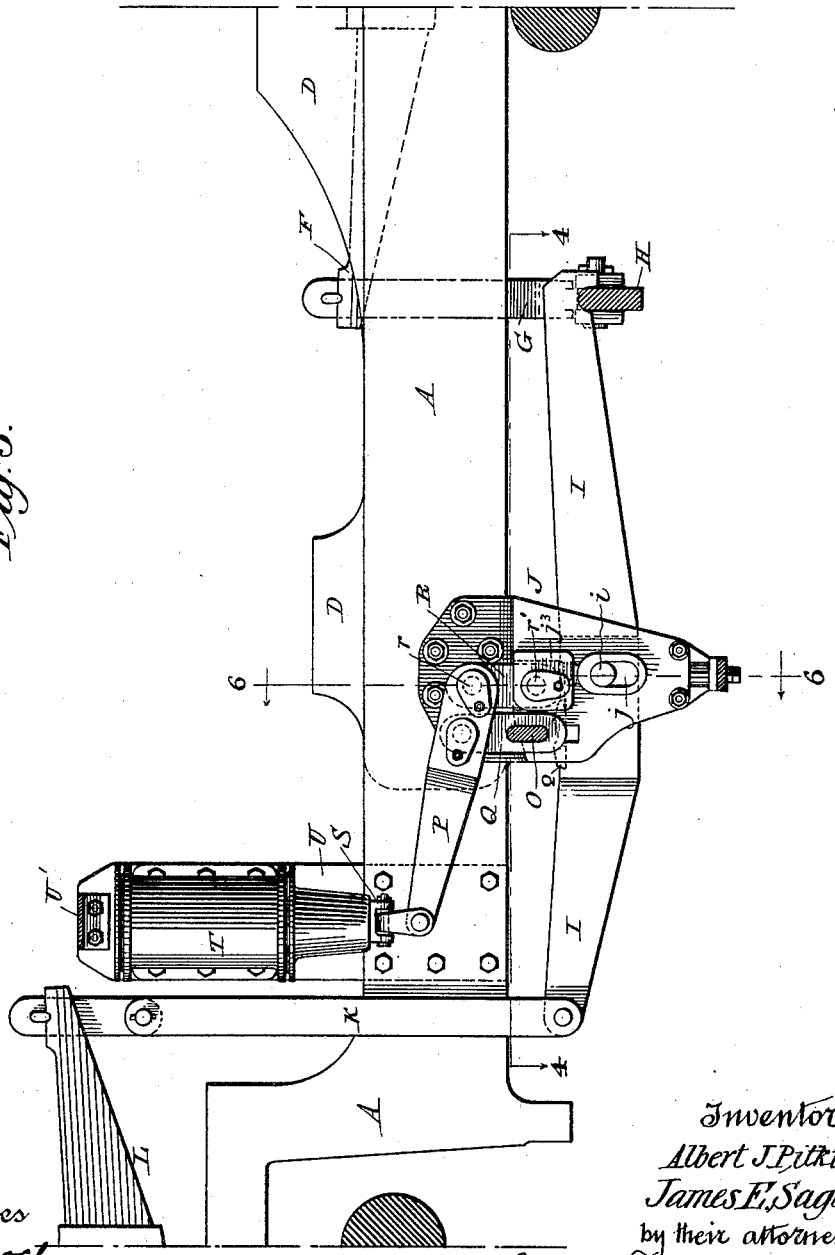

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Fig. 7.

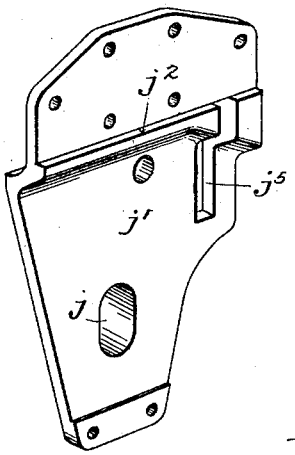



Fig. 8.

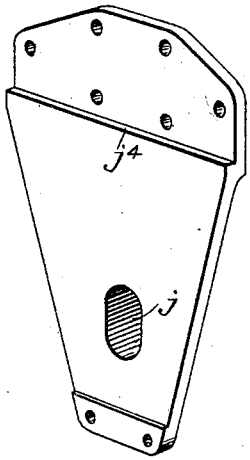



Fig. 11.

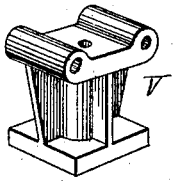



Fig. 9.

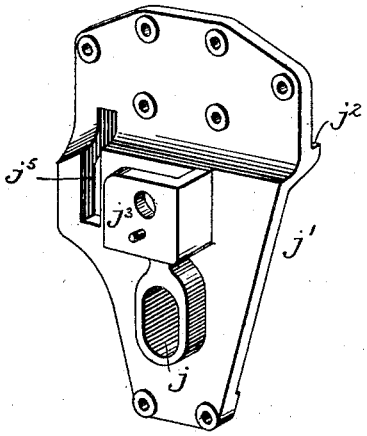
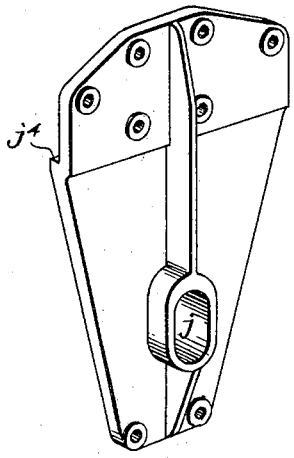



Fig. 10.




Witnesses
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A. M. Parkins.

Inventors
Albert J. Pitkin,
James E. Sague,
by their attorneys
Baldwin, Davidson & Wright

# UNITED STATES PATENT OFFICE.

ALBERT J. PITKIN AND JAMES E. SAGUE, OF SCHENECTADY, NEW YORK.

## LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 676,696, dated June 18, 1901.

Application filed February 25, 1901. Serial No. 48,692. (No model.)

*To all whom it may concern:*

Be it known that we, ALBERT J. PITKIN and JAMES E. SAGUE, citizens of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Locomotives, of which the following is a specification.

Our invention relates particularly to that class of locomotives in which trailing wheels are used in connection with relatively large driving-wheels; and the object of our invention is to provide improved mechanism for at times shifting a part of the weight of the engine from the trailing wheels and the forward truck to the driving-wheels.

In carrying out our invention we connect the springs of the trailing wheels and the springs of the driving-wheels on each side of the locomotive by a system of links and levers and also connect the system of levers on one side of the engine with those on the opposite side by a cross-bar. The main equalizing-levers are provided with pivots or fulcrums arranged in hangers secured to the main frame, and these pivots are arranged to normally bear against seats in the hangers and to turn in these seats in such manner as to properly distribute the weight to the trailing wheels and the driving-wheels and also to the forward truck for normal running. In order that the pivots or fulcrums may be shifted in such manner as to transfer a part of the weight of the locomotive from the trailing wheels and the forward truck to the driving-wheels when starting or when climbing a heavy grade and while the engine is running at slow speed, we provide means for moving the before-mentioned pivots out of their seats and for bringing into play other pivots, which are adapted to seat themselves on the main equalizing-levers in such manner as to change the leverage and shift a portion of the weight of the locomotive from the trailing wheels and the forward truck to the drivers, thereby increasing the traction or adhesion of the latter. The mechanism for thus shifting the fulcrums preferably consists in levers operated by a compressed-air engine or other suitable engine, which are connected with a bar arranged normally above the main equalizing-levers, but adapted to be forced down upon them in such manner as to cause the pivot-pins of the levers to be displaced from their seats and to seat themselves in bearings on the levers in advance of the main pivots. The engine for operating the shifting mechanism may be under the control of the engineer in his cab.

The details of construction will be hereinafter more fully described.

In the accompanying drawings, Figure 1 is a side elevation of a locomotive with our improvements applied, so much only of the usual mechanism of the locomotive as is necessary to illustrate our invention being indicated. The front portion of one of the outside frame-pieces is partly broken away in order to show mechanism in rear thereof. Fig. 2 is a plan view of the locomotive-frame and carrying-wheels with our improvements applied. Fig. 3 is a view on an enlarged scale and in plan, showing more clearly the manner of applying our improvements. Fig. 4 is a detail view in section on the line 4 4 of Fig. 5. Fig. 5 is a view on an enlarged scale, showing our improved mechanism for shifting the fulcrums of the equalizing-levers, the view being taken from the inside of the locomotive-frame. Fig. 6 shows a transverse section on the line 6 6 of Fig. 5 looking in the direction of the arrows. Figs. 7 to 10, inclusive, are perspective views of the castings constituting the hangers for the equalizing-levers. Fig. 7 is a view of the inner side of the inside casting. Fig. 8 is a view of the inner side of the outside casting. Fig. 9 is a view of the outer side of the inside casting. Fig. 10 is a view of the outer side of the outside casting. Fig. 11 is a perspective view of a filling-piece for spacing the castings at their lower ends.

The main frame of the locomotive is similar to that shown in Patent No. 667,340, of February 5, 1901, granted to James E. Sague. The inside frame-pieces A are secured at their front ends to the buffer B and extend back under the fire-box and are connected at their rear ends to the foot-plate C. The outside frame-pieces D are secured at their rear ends to the foot-plate and at their front ends, in rear of the drivers and in front of the fire-box, are secured to spacing-plates *d*, in turn secured to the frame-pieces A. The axle-boxes

of the driving-wheels are arranged inside the wheels and move vertically in pedestals formed in the frame-pieces A, while the axle-boxes of the trailing wheels are arranged outside the wheels and move vertically in pedestals formed in the outside frame-pieces D. The forward truck E may be connected by a center bearing with the frame of the locomotive in any usual way.

We will here state that our invention is not limited to a locomotive having a frame of this particular design nor to the precise arrangement of the wheels. We have selected this form of locomotive-frame in illustrating our invention as the most convenient and as serving to show the best way now known to us of applying our improvements.

Springs F are mounted on the axle-boxes of the trailing wheels. The rear ends of these springs are attached by links *f* to the outside frame-pieces D at *e*, while the front ends of the springs are connected by means of links G to a cross equalizing-bar H. The main equalizing-levers I are pivoted in hangers J, secured to and dependent from the main frame-pieces A, and at their rear ends these levers I rest on the cross equalizing-bar H. At their front ends the levers I are connected by links K to the rear ends of springs L, mounted on the axle-boxes of the rear driving-wheels. The front ends of the springs L are connected by means of links *l* to the rear ends of centrally-pivoted levers M, the front ends of which levers are connected by links *m* with the rear ends of springs N, mounted on the axle-boxes of the front driving-wheels. The front ends of the springs N are connected by links *n* to the main frame-pieces A. The arrangement of springs and levers above mentioned is substantially the same as that shown in Patent No. 667,340, of February 5, 1901. Our present invention is not limited to this precise arrangement of springs and levers or equalizing mechanism, but is shown as applied to such mechanism for the sake of illustration.

The pivot-pins *i* of the main equalizing-levers I project through elongated openings *j* in the hangers J, as indicated in Figs. 5 and 6. Normally the pivot-pins *i* are seated at the upper ends of the slots *j*, as shown in Figs. 5 and 6, and the weight is transmitted through the pins *i* to the levers I. This is the arrangement for normal running, a certain proportion of the weight of the locomotive being carried by the driving-wheels, the remainder being distributed between the wheels of the forward truck and the trailing wheels. In order to increase the traction or adhesion of the driving-wheels when starting or when climbing a heavy grade, we provide mechanism for moving the pins *i* out of their seats and providing new pivots or fulcrums for the equalizing-levers I in advance of the pivots *i*. On the upper sides of the equalizing-levers I in advance of the pin *i* are secured bearing-blocks *o*. Above these blocks is arranged a cross-bar O, which, as indicated in Fig. 3, extends from one side of the truck to the other and is adapted to bear on both equalizing-levers I at the same time. Normally the bar O is in a plane above the bearing-blocks *o*; but when it is desired to shift the pivotal points of the levers the bar O is forced down upon the bearing-blocks *o* and the levers I are forced downward until the pins *i* are displaced from their seats. The bar O then takes the place of the pivots *i* and the fulcrums for the levers I are advanced, thereby shifting the weight. The mechanism employed for operating the bar O may be of various kinds; but an efficient form of apparatus for doing the work will now be described.

The bar O is suspended from the operating-levers P by links Q. The levers P are pivotally connected at *r* to links R, which are in turn pivoted at *r'* to the hangers J. The levers P are bifurcated at their rear ends, and the links Q are arranged between the arms of the bifurcations. The front ends of the levers P are connected with the piston-rods S of the engines T, which operate them. We may employ compressed-air engines or other suitable engines for operating the levers. The cylinders are attached to frames U, secured to the main frame-pieces A, the frames U being connected together by a cross-frame U'. Each hanger is made up of three separate pieces. The inside piece *j'* is of the form indicated in Figs. 7 and 9. It is shouldered at $j^2$ to fit the under side of the frame-piece A, as indicated in Fig. 6, and it is formed with a housing $j^3$ to receive the lower end of the link R. It is also slotted at $j^5$ to guide the end of the bar O. The outside casting (shown in Figs. 8 and 10) is provided with a shoulder $j^4$, adapted to fit the frame-piece A, as indicated in Fig. 6, and both castings are provided with elongated openings *j* for the pivot-pin *i*. The equalizing-lever I is free to move vertically between the lower portions of the castings, which latter are spaced by spacing-blocks V, (shown in perspective in Fig. 11,) which are bolted to the hanger-castings at their lower ends. The spacing-blocks project below the lower ends of the castings and are connected on opposite sides of the locomotive by a cross-piece W.

It will be of course understood that when the levers P are operated to force down the longitudinal equalizing-levers I the springs of the drivers and trailing wheels are put under tension. The pins *i* are, however, free to move vertically in the slots *j* at this time and while the levers I rock on their fulcrums at *o*. As soon as the levers P are raised the springs of the drivers and trailers cause the longitudinal equalizing-levers I to be returned to their normal position, the pins *i* resting in the seats at the upper ends of the slots *j*. By the mechanism shown a very considerable portion of the load may be taken from the

trailing wheels and forward trucks and added to the driving-wheels, the center of gravity of the locomotive remaining the same.

In a locomotive where the normal weight on the drivers is, say, ninety-five thousand pounds if the fulcrum is advanced four and one-fourth inches twelve thousand pounds would be added to the weight on the drivers, making the total weight thereon one hundred and seven thousand pounds. This would be the case in a locomotive of the type illustrated in Figs. 1 and 2 of the drawings and where the fulcrum-shifting mechanism is arranged to operate in the manner hereinbefore described.

It has heretofore been proposed to transfer weight from the trailing wheels of a locomotive to the driving-wheels; but in such prior construction there was no connection between the equalizing mechanism on one side of the locomotive with that on the opposite side, and, further, in the prior mechanism the fulcrum or bearing point was shifted bodily fore and aft, necessitating great power to overcome the great friction involved. In the mechanism which we employ this fore-and-aft movement of the pivot or bearing is done away with and the friction incident thereto avoided.

We claim as our invention—

1. Equalizing mechanism for locomotives, comprising an equalizing-lever and two fulcrums, on each side of the engine, which latter are located close together at the middle portion of the equalizing-lever, and mechanism for displacing one fulcrum on each side of the locomotive and bringing into operative position the other fulcrum.

2. The combination of the trailing wheels, two sets of driving-wheels, the springs for the trailers and driving-wheels, the equalizing-levers, connections between the equalizing-levers and the springs, two fulcrums on each side of the locomotive, which latter are located close together at the middle portion of each equalizing-lever on which they bear, and mechanism for displacing one fulcrum on each side of the locomotive, and bringing into operative position the other fulcrum.

3. Equalizing mechanism for locomotives, comprising two fulcrums on each side of the engine, and mechanism for displacing one fulcrum on each side and bringing into operative position the other fulcrum, whereby a portion, but not an excessive part, of the weight of the engine is shifted from one set of wheels to another set.

4. A locomotive, comprising driving-wheels, trailing wheels, and equalizing mechanism on opposite sides of the engine, and two fulcrums on each side, in combination with mechanism for displacing one fulcrum and bringing into operative position the other fulcrum, whereby a portion, but not an excessive part, of the weight of the engine is shifted from one set of wheels to another set.

5. Equalizing mechanism for locomotives, comprising an equalizing-lever on each side of the engine, provided with two fulcrums, and means for moving out of operative position one fulcrum of each lever and bringing into operative position the other fulcrum, whereby a portion, but not an excessive part, of the weight of the engine is shifted from one set of wheels to another set.

6. Equalizing mechanism for locomotives, having on each side an equalizing-lever, provided with a pivot for normal running, and mechanism for moving said pivot out of operative position, and bringing into operative position another pivot when it is desired to alter the fulcrum of said lever, whereby a portion, but not an excessive part, of the weight of the engine is shifted from one set of wheels to another set.

7. Equalizing mechanism for locomotives having on each side of the engine an equalizing-lever provided with a pivot for normal running, in combination with mechanism for moving said pivot downwardly to unseat it and for moving downwardly into position another pivot for said lever, whereby a portion, but not an excessive part, of the weight of the engine is shifted from one set of wheels to another set.

8. The combination of the locomotive-frame, hangers attached thereto, equalizing-levers pivoted in said hangers, a cross-bar arranged in a different vertical plane from the pivots before mentioned, and mechanism for forcing the cross-bar down upon said equalizing-levers to move the pivots thereof out of their seats and to alter the fulcrum-points thereof.

9. The combination of the locomotive-frame, the equalizing-levers, the hangers secured to the frame in which the levers are pivoted, the cross-bar guided in the hangers and means for forcing the cross-bar down upon the equalizing-levers to displace the before-mentioned pivots of the levers.

10. The combination of the locomotive-frame, the equalizing-levers, the hangers in which they are pivoted, the cross-bar guided by the hangers, the operating-levers, links by which they are pivotally connected with the hangers, and links connecting said operating-levers with the cross-bar.

11. The combination of the locomotive-frame, the hangers secured thereto, each comprising inside and outside castings, the upper portions of which are attached to the frame, spacing-pieces between the lower ends of the castings, a cross-bar connecting the spacing-pieces, a housing on each inner casting, equalizing-levers arranged between the castings of the hangers, pivot-pins for the levers arranged in vertically-elongated slots in the castings, a cross-bar arranged above the equalizing-levers and adapted to bear thereon, operating-levers, links connecting the operating-levers with the housings of the hangers, and links

connecting said operating-levers with the cross-bar which is arranged above the equalizing-levers.

12. The combination of the locomotive-frame, the equalizing-levers on opposite sides thereof, the trailing wheels, the driving-wheels, springs for the trailing wheels and the driving-wheels, links connecting the equalizing-levers with the springs of the driving-wheels and those of the trailing wheels, pivots for the equalizing-levers, a cross-bar arranged above the equalizing-levers, levers connected with said cross-bar for operating it, and an engine-supporting frame secured to the locomotive-frame, cross-connected as described.

In testimony whereof we have hereunto subscribed our names.

ALBERT J. PITKIN.
JAMES E. SAGUE.

Witnesses:
WILLIAM G. GILMOUR,
O. H. WERTENBERGER.