April 19, 1932. N. D. LEVIN 1,854,594

EQUALIZING MECHANISM

Filed May 29, 1930

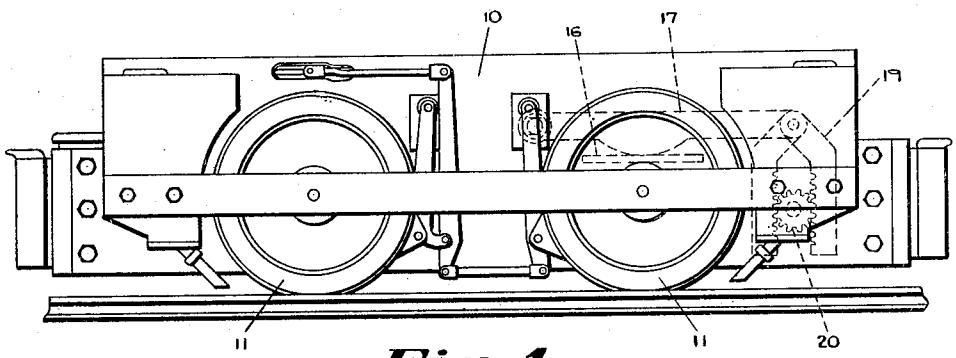


Fig. 1

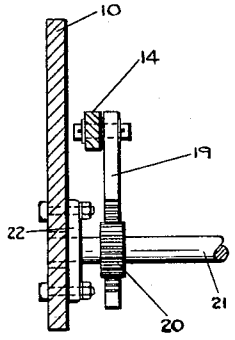


Fig. 3

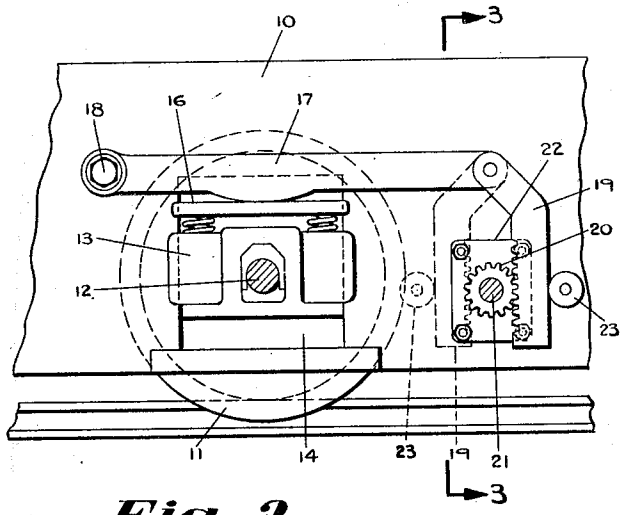


Fig. 2

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# UNITED STATES PATENT OFFICE

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## EQUALIZING MECHANISM

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The present invention relates to equalizing mechanism for vehicles, and is designed to maintain proper and uniform distribution of the load when such vehicle is moving over an uneven road bed or trackway.

It is here disclosed in connection with a mine locomotive of not unusual type, but this is illustrative only, and in no sense restrictive of the invention. This example is adopted to illustrate the invention, for the reason that mine trackways are notoriously uneven, and it becomes of primary importance to provide equalizing mechanism which will compensate for drop and lift, and relative movements between the load carrying frame and the supporting wheels and axles, on opposite sides of the vehicle.

The purpose of the present invention is to provide an equalizing mechanism in which the relative movements of the frame and wheel and axle of either side of the vehicle will be positively and effectively transmitted to the other side with compensating or equalizing effect, the arrangement being such that there is no backlash or lost motion by reason of the connections designed to produce the equalizing effect.

In the drawings herewith:—

Figure 1 is a view in side elevation of a mine locomotive,

Figure 2 is a view of a section of a side frame of a locomotive, showing the wheel and axle, the axle box and its associated parts, and the equalizing mechanism,

Figure 3 is a view substantially on the line 3—3 of Figure 2, looking in the direction of the arrows.

Referring to the drawings by numbers, like parts indicating like parts in the several views, 10 indicates a locomotive side frame which is supported upon the usual wheels 11 connected by axles 12.

It is usual to provide, in a four-wheeled vehicle of the type shown, equalizing mechanism for but one of the axles, it having been found that this is sufficient under usual conditions to effect proper distribution of the load.

The axle 12 is mounted in any suitable axle box 13 carried in a guideway 14 in the side frame 10 and capable of vertical movement in the guideway, the load being resiliently supported, as by springs 15, which engage an abutment 16 mounted above the axle box, as here shown, and being guided in the guideway 14, in which it may rise and fall. The abutment 16 engages a cam projection on the equalizing lever 17, pivotally connected with the side frame 10 on the inside of the frame, as at 18 shown in Figure 2. The equalizing lever 17 carries at its free end a thrust bar 19, which, as here shown, is pivotally connected to the lever 17 so as to be freely pendant, said thrust bar being provided with rack teeth designed to engage a pinion 20 mounted on a shaft 21 which is journalled on the side frame at 22 in any suitable manner. The thrust bar 19 has an abutment 23, here shown in the form of a roller, secured to the side frame so as to form anti-friction means for holding the rack of the thrust bar 19 always in engagement with the pinion 20 of the shaft 21.

The shaft 21 forms a torsion member between the two equalizing mechanisms, which, it will be understood, are disposed on opposite sides of the vehicle in the same relation to the axle box and the moving parts as shown in Figure 2, but with the transmitting parts disposed in opposite relation, as will be clear from Figure 2, where the thrust bar 19 on the opposite side of the vehicle is shown in dotted lines and in reverse position with respect to the torsion member or shaft 21 and the pinion.

The operation of the mechanism will be clear from the foregoing description. Relative movements between the axle box and frame, due to inequalities in the track, will be at once transmitted to the equalizing lever

17, and, by means of the thrust bar 19, positively imparted to the shaft or torsion member 21, through the pinion which engages the rack on the thrust bar. This will effect rotation of the shaft 21, and the pinion at the opposite end of the shaft will at once impart positive movements in an opposite direction to the thrust bar 19 at the other end of the axle, which opposite movement will be transmitted to the equalizing lever 17 and its associated parts so as to bring about a substantially uniform distribution of the load.

The advantage of this construction is that the action of the parts is positive, there being no flexible or loose connections which permit backlash or play, or which are likely to become stretched in use and require frequent take-ups.

Mechanical variations of the mechanism here shown may, of course, be made without departing from the range of my invention.

I claim:—

1. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a rotatable shaft disposed transversely of said frame, a pinion on said shaft, and means positively to engage said pinion and impart to said shaft relative movements of said frame and supporting means and transmit such movements to equalizing mechanism on the opposite side of the frame.

2. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a rotatable shaft disposed transversely of said frame, a pinion on said shaft, and means including a thrust bar positively to engage said pinion and impart relative movements of said frame and supporting means to said rotatable shaft and transmit them to equalizing mechanism on the other side of said frame.

3. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a rotatable shaft disposed transversely of said frame, a pinion on said shaft, and means including a pivotally mounted thrust bar positively to engage and impart relative movements of said frame and supporting means to said rotatable shaft and transmit them to equalizing mechanism on the other side of said frame.

4. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a rotatable shaft carried by said frame, an equalizing lever responsive to relative movements between said supporting means and said frame, and a thrust bar carried by said lever and having a gear connection with said rotatable shaft to transmit relative movements of said frame and supporting means to equalizing mechanism on the opposite side of the frame.

5. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a rotatable shaft carried by said frame, a pinion on said shaft, a thrust bar positively to engage said pinion, and a pivot lever responsive to relative movements of said frame and supporting means to actuate said thrust bar, rotate said pinion and shaft, and transmit movements to equalizing mechanism on the other side of said frame.

6. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a rotatable shaft carried by said frame, a pinion on said shaft, a thrust bar engaging said pinion, and a lever pivoted on said frame and responsive to relative movements of said frame and supporting means to actuate said thrust bar, rotate said shaft, and transmit movement to equalizing mechanism on the other side of said frame.

7. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means therefor, a rotatable shaft carried by said frame, a pinion on said shaft, a thrust bar engaging said pinion, and a lever responsive to relative movements of said frame and supporting means pivoted on said frame and pivotally connected with said thrust bar to actuate said thrust bar, rotate said shaft, and transmit movements to equalizing mechanism on the other side of said frame.

8. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means therefor, a rotatable shaft carried by said frame, a pinion on said shaft, a lever responsive to relative movements of said frame and supporting means, and a thrust bar depending from said lever and in engagement with said pinion to rotate said shaft and transmit movements to equalizing mechanism on the other side of said frame.

9. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means therefor, a rotatable shaft carried by said frame, a pinion on said shaft, a lever responsive to relative movements of said frame and supporting means, and a pivoted thrust bar depending from said lever and in engagement with said pinion to rotate said shaft and transmit movements to equalizing mechanism on the other side of said frame.

10. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means therefor, a rotatable shaft carried by said frame, a pinion on said shaft, a lever responsive to relative movements of said frame and supporting means, and a thrust bar pivotally mounted on said lever and in engagement with said pinion to rotate said shaft and transmit movements to equal-

izing mechanism on the other side of said frame.

11. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means therefor, a rotatable shaft carried by said frame, a pinion on said shaft, a lever responsive to relative movements of said frame and supporting means, a thrust bar depending from said lever and in engagement with said pinion to rotate said shaft and transmit movements to equalizing mechanism on the other side of said frame, and means to maintain said thrust bar always in engagement with said pinion.

12. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means therefor, a rotatable shaft carried by said frame, a pinion on said shaft, a lever responsive to relative movements of said frame and supporting means, a thrust bar depending from said lever and in engagement with said pinion to rotate said shaft and transmit movements to equalizing mechanism on the other side of said frame, and anti-friction means engaging said thrust bar to hold it always in engagement with said pinion.

13. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a torsion member mounted on said frame, and means including gearing connected with said member for actuating movement in both directions to impart to or receive from said member relative movements of said frame and supporting means and transmit them to or receive them from the opposite side of said frame.

14. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a torsion member disposed transversely of said frame, and means including gearing connected with said member for actuating movement in both directions to impart to said torsion member the relative movements of said frame and supporting means and transmit such movements to equalizing mechanism on the opposite side of the frame.

15. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a rotatable shaft disposed transversely of said frame and means including gearing connected with said shaft for actuating movement in both directions to impart to said shaft relative movements of said frame and supporting means and transmit such movements to equalizing mechanism on the opposite side of the frame.

16. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a torsion member mounted on said frame and means under tension connected with said member for actuating movement in both directions to impart to or receive from said member relative movements of said frame and supporting means and transmit them from the opposite side of said frame.

17. Equalizing mechanism comprising, in combination, a frame, relatively movable supporting means for said frame, a rotatable shaft disposed transversely of said frame and means under tension connected with said shaft for actuating movement in both directions to impart to said shaft relative movements of said frame and supporting means and transmit such movements to equalizing mechanism on the opposite side of the frame.

In testimony whereof I have hereunto set my hand.

NILS D. LEVIN.