March 20, 1928. 1,663,227

W. E. WOODARD

LOCOMOTIVE EQUALIZING MECHANISM

Filed Jan. 2, 1926 3 Sheets-Sheet 1

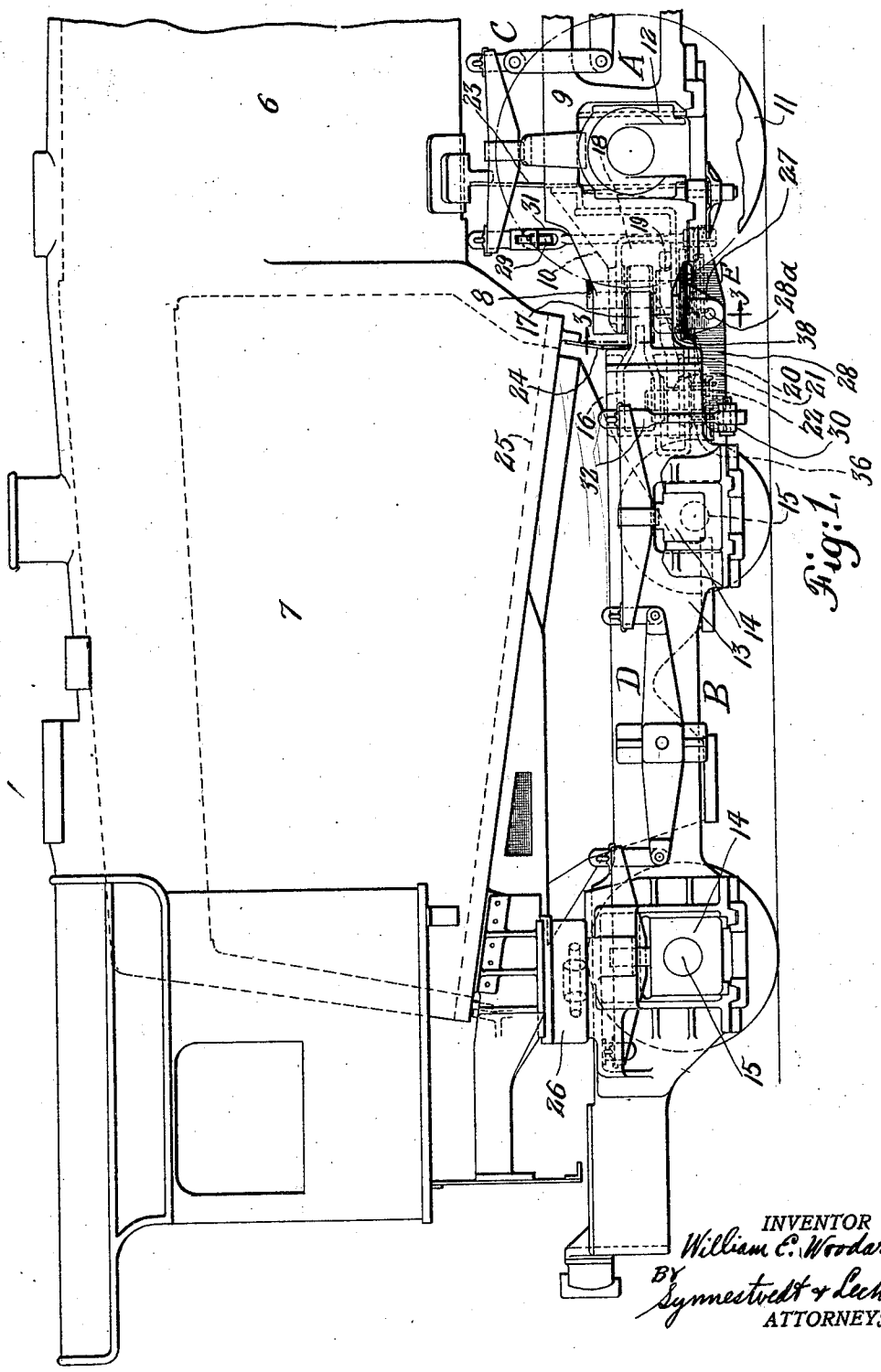

Fig. 1.

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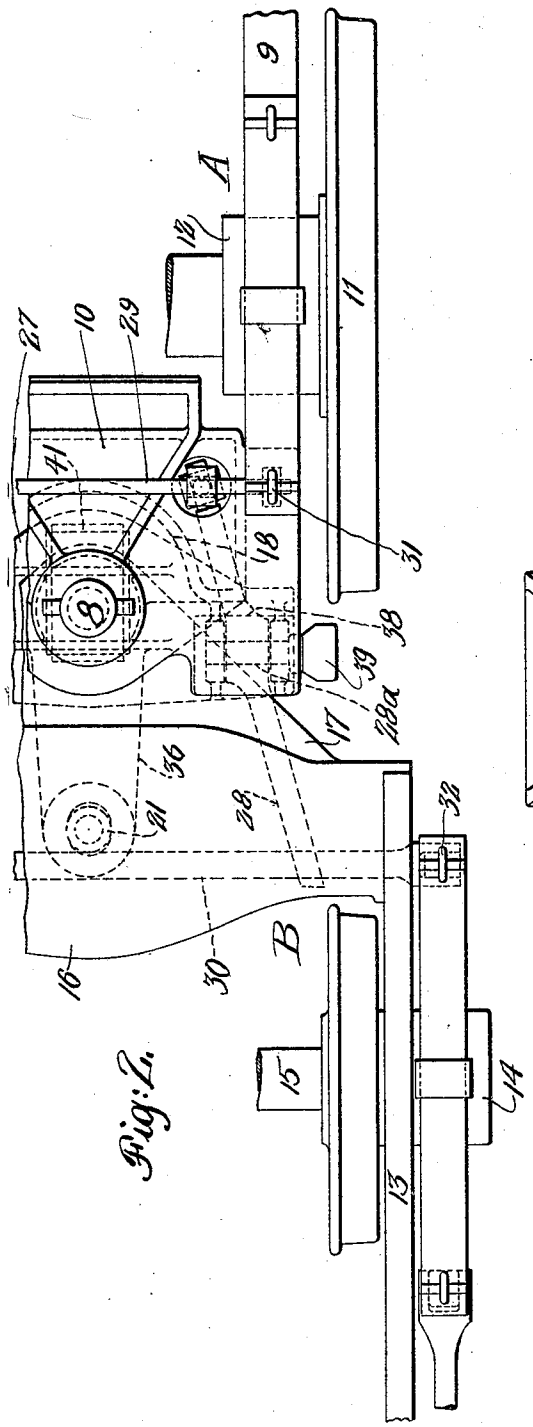

Fig: 2.

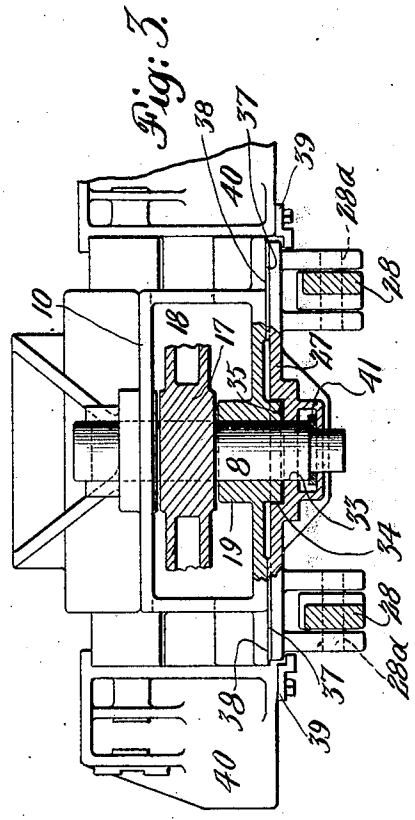

Fig: 3.

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Fig: 4.

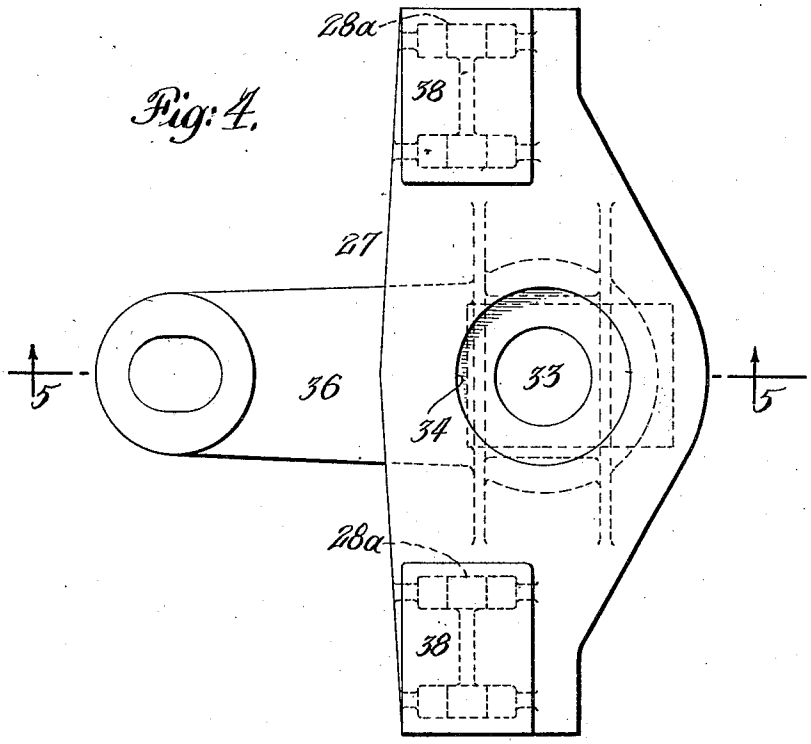
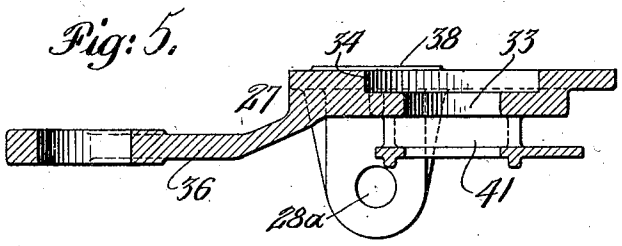


Fig: 5.



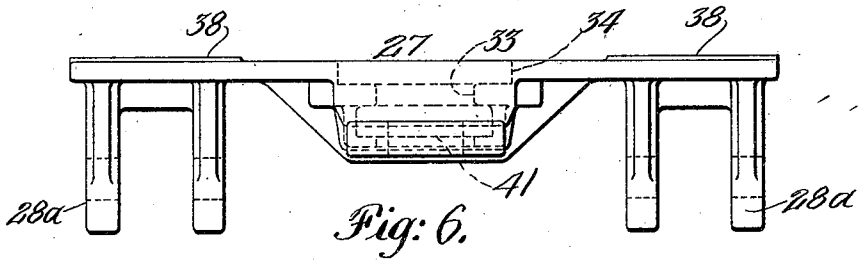


Fig: 6.

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Patented Mar. 20, 1928. 1,663,227

UNITED STATES PATENT OFFICE.

WILLIAM E. WOODARD, OF FOREST HILLS, NEW YORK.

LOCOMOTIVE EQUALIZING MECHANISM.

Application filed January 2, 1926. Serial No. 78,833.

This invention relates to locomotive equalizing mechanisms and is particularly useful in connection with locomotives having a main frame and a supplemental or truck frame equipped with multiple sets of wheels journalled therein.

It has been found that for the proper operation of the entire locomotive it is important to have the equalizing systems of the articulated frames connected together, and it is to a simple construction effectively accomplishing such end that this invention is directed.

It is, therefore, one of the primary objects of my invention to provide an improved equalizing mechanism for articulated frames of simple construction in which the equalizing system of one frame is effectively connected to the equalizing system of the other frame in all positions of articulation.

Another object of my invention is the provision of an equalizing connection between the equalizing system of a locomotive main frame and the equalizing system of a locomotive supplemental frame mounted to transmit the reacting thrusts of the connected equalizing systems to the main frame.

How the foregoing, together with such other objects and advantages as may hereinafter appear, or are incident to my invention, are realized, is illustrated in preferred form in the accompanying drawings, wherein—

Fig. 1 is a fragmentary side elevation of the rear portion of a locomotive illustrating the application of my improvements thereto;

Fig. 2 is a fragmentary one-half plan view of Fig. 1 with the fire box and boiler removed;

Fig. 3 is a section taken substantially on line 3—3 of Fig. 1 looking toward the right;

Fig. 4 is a plan view of the carrier or fulcrum member which I employ;

Fig. 5 is a section taken on the line 5—5 of Fig. 4.

Fig. 6 is an end view of Fig. 4.

Referring now to Fig. 1 it will be seen that I have shown a portion of the boiler 6 and the fire box 7 of a locomotive, both being of standard construction.

The frame of the locomotive is of divided construction and comprises a main frame portion A and a supplemental frame portion B, the former extending from a point approximately beneath the front end of the fire box forwardly underneath the boiler, and the latter extending from such point rearwardly underneath the fire box. The supplemental frame B is articulated at its forward end to the rear end of the main frame A, as by means of the pivotal or hinge pin connection 8 which permits the supplemental frame to swing laterally with respect to the main frame during curving. The main frame A is shown of standard construction comprising two side members 9, connected together by means of cross members, the rear cross member being designated by the numeral 10. The drivers 11 are journalled in pedestals in the main frame by means of the boxes 12.

The articulated supplemental frame B is provided with pedestals in the side members 13 for the journal boxes 14 of the pair of axles 15. The side members 13 are connected by cross members, the forward cross member 16 being provided with a tongue 17 which is apertured so as to receive the articulation pin 8.

The cross member 10 of the main frame is provided with a pocket 18 for receiving the tongue 17. The upper and lower walls of the pocket 18 are apertured to receive the pin 8 and the lower wall is provided with a boss 19 over which the forward eye of the safety bar 20 is fitted. The rear eye of the safety bar receives the safety bar pin 21, which pin is held in place in the cross member 16 of the supplemental frame by means of the keeper 22. The two eyes of the safety bar 20 have a loose fit over the boss 19 and pin 21 respectively so that the safety bar only functions upon failure of the driving connection at 8.

The main frame A is connected to the boiler in the usual manner by means of expansion bearers, the rear one 23 of which is

shown between the boiler and the cross member 10. The imposed weight is transmitted through the main frame spring equalizing system C.

Referring to Fig. 1 it will be seen that I interpose a pair of bearer supports 26, one at either side, between the fire box and the supplemental frame. The imposed weight of the fire box is transmitted through the supplemental frame equalizing system D.

The equalizing systems C and D are connected together as by the equalizing means indicated as a whole by the reference letter E now to be described in detail.

The equalizing means E comprises a movable carrier or fulcrum member 27, the construction of which will be clear on inspection of Figs. 4, 5 and 6, in which member the equalizer levers 28 are fulcrumed at 28^a. The equalizer levers 28 are connected at their free ends to the equalizing systems C and D of the main frame and supplemental frame respectively, the connection being made through the medium of the cross equalizers 29 and 30 and the hangers or links 31 and 32 of the equalizing systems C and D respectively.

The carrier or fulcrum member 27 is mounted for rotation in a horizontal plane about the axis of articulation of the supplemental frame to which end the said member is apertured at 33 to fit over the articulation pin 8 before mentioned, in addition to which the member is provided with a recess 34 concentric with the aperture 33 for interengagement with the boss 35 on the underside of the cross member 10 of the main frame, thus providing additional rotative support.

The rotative movement above referred to is imparted to the fulcrum member through the medium of an extension thereon engaging some convenient point on the trailer truck, in this instance being shown as a rearwardly extending arm 36 apertured to loosely fit over the safety bar pin 21 which is extended for this purpose. Thus it will be seen that as the supplemental frame or truck articulates in curving the fulcrum member moves therewith, thus maintaining the equalizers 28 in a predetermined relation with the supplemental frame equalizing system D, it being evident that the springs and equalizers on the supplemental frame follow the movements of the frame itself in whatever position it may assume under the fire box of the locomotive. It is pointed out that the slight rotative movement in a horizontal plane at the forward ends of the equalizers 28 is taken up by the relatively long links 31 which connect said forward ends to the cross equalizer 29 of the equalizer system C.

Referring now more particularly to Fig. 1 it will be seen that as the reaction of the hangers 31 and 32 connected to the equalizers is an upward thrust, the fulcrum member 27 will always be in contact with the cross member 10 of the main frame, the bottom of which is provided with machined surfaces 37 coacting with the machined surfaces 38 on the member 27 to form a seat on which the fulcrum member rotates. This arrangement is very advantageous in that the heavy upward thrust above mentioned is resisted by the main frame structure, which structure at this point is strongly connected to the boiler by the expansion bearer 23, and the expansion plate 24 which forms a connection between the mud ring 25 and the outboard bearings 40. These bearings 40 are attached to the main frame as indicated in Fig. 3.

For purposes of assembling before the spring hangers are all connected, I arrange clips 39 (see Figs. 2 and 3) on the castings or outboard bearings 40, which clips serve to hold the member 27 in place before spring connection is made. The clips also serve to catch the fulcrum member 27 and to keep it from falling away from the cross member 10 in the event of failure of the connections.

The fulcrum member also carries a safety device 41 which prevents the main pivot pin 8 from dropping out in case of a broken pin.

It is understood that I can arrange for one point of fulcrum for each of the equalizer levers 28, or for a series of points of fulcrum by providing a series of spaced holes in the fulcrum member 27 and in the lever so that a varied distribution can be secured by changing the fulcrum pin from one set of holes to another.

I claim:—

1. The combination with a main locomotive frame equalizing system and an articulated supplemental frame equalizing system, of equalizing means connecting said systems and including a movable carrier for said equalizing means operating to maintain said means in a predetermined relation to the supplemental frame equalizing system as the supplemental frame articulates, said carrier being mounted to transmit reacting thrusts of the equalizing systems to the main frame.

2. The combination with a main locomotive frame equalizing system and an articulated supplemental frame equalizing system, of means connecting said systems including equalizer levers having their free ends connected to the equalizing systems and a carrier for said levers rotatable about the axis of articulation and connected to the supplemental frame for movement therewith.

3. In a locomotive having two equalizing systems for articulated frames, the combination of equalizing means connecting said systems including equalizer levers having their free ends connected to the equalizing systems and a carrier for said levers rotatable about the axis of articulation and attached to one

of the articulated frames for movement therewith.

4. The combination with a main locomotive frame equalizing system and an articulated supplemental frame equalizing system, of equalizing means connecting said systems and including a movable carrier for said equalizing means operating to maintain said means in a predetermined relation to the supplemental frame equalizing system as the supplemental frame articulates, said carrier being held in operative position by the equalizer connections.

5. The combination with a main locomotive frame equalizing system and an articulated supplemental frame equalizing system, of equalizing means connecting said systems and including a movable carrier for said equalizing means operating to maintain said means in a predetermined relation to the supplemental frame equalizing system as the supplemental frame articulates, said carrier being held in operative position by the equalizer connections, and additional means independent of the equalizers adapted to support said carrier.

6. In a locomotive having two equalizing systems for articulated frames each including a cross equalizer, the combination of equalizing means connecting said systems including equalizer levers having their free ends connected to the aforesaid cross equalizers, and a carrier for said levers movable about the axis of articulation of the frames.

7. In a locomotive having articulated multiple axle trucks each provided with an equalizing system, the combination of equalizing means connecting said systems and including a fulcrum member rotatable about the axis of articulation of the trucks under the influence of articulation of the trucks.

8. In a locomotive having articulated multiple axle trucks each provided with an equalizing system, the combination of equalizing means connecting said systems and including a fulcrum member rotatable about the axis of articulation of the trucks under the influence of articulation of the trucks, and means preventing unintended displacement of said fulcrum member.

9. In a locomotive having articulated trucks and provided with a safety bar and pin, the combination of an equalizing system for each truck, and equalizing means connecting said equalizing systems, said means including a fulcrum member rotatable about the axis of articulation and having an arm connected to the aforesaid safety bar pin.

10. A connecting unit for equalizing systems of articulated trucks including equalizing levers connected at their opposite ends to said systems, a fulcrum for said levers rotatable about the articulation pin, and means carried by said fulcrum for preventing unintended displacement of said pin.

11. In combination, in a locomotive, a main frame having the usual side members and a cross member connecting the rear ends of the side members; a truck frame articulated to said cross member; an equalizing system for the main frame; an equalizing system for the truck frame; and equalizing means connecting said systems including equalizing levers, a fulcrum member for said levers rotatable about the axis of articulation of the main and truck frames, and interengaging means between said fulcrum member and the aforesaid cross member.

12. In combination, in a locomotive, a main frame having the usual side members and a cross member connecting the rear ends of the side members; a truck frame articulated to said cross member; an equalizing system for the main frame; an equalizing system for the truck frame; and equalizing means connecting said systems including equalizing levers, a fulcrum member for said levers rotatable about the axis of articulation of the main and truck frames; a finished bearing surface on the under surface of the main frame cross member; and a finished bearing surface on the upper surface of the fulcrum member arranged to abut when the various parts are operatively connected whereby to provide a seat on which the fulcrum member rotates.

13. In a locomotive having a main frame and a radial truck frame, equalizer means for the main frame, equalizer means for the truck frame, and equalizing means connecting said main and truck frame equalizer means including means for maintaining said connecting equalizing means in a fixed relation to the truck frame equalizer means.

14. In a locomotive having a main frame and a radial truck frame, equalizer means for the main frame, equalizer means for the truck frame, connecting equalizer means between the two, and a movable carrier on which said means is mounted, said carrier being pivoted around the axis of the truck frame and main frame pivot.

15. In a locomotive having a main frame and a radial truck frame, equalizer means for the main frame, equalizer means for the truck frame, connecting equalizer means between the two, and a movable carrier on which said means is mounted, said carrier being mounted on the main frame.

16. In a locomotive having a main frame and a radial truck frame, equalizer means for the main frame, equalizer means for the truck frame, connecting equalizer means between the two, and a carrier on which said means is mounted, said carrier being pivotally carried by the main frame and adapted to maintain said connecting equalizer means in a fixed relation to the truck frame equalizer means.

17. A movable carrier for locomotive

spring equalizing means, comprising a member having spaced equalizer mountings, pivot means intermediate such mountings, and an operating extension by which the carrier is moved on its pivot.

18. A movable carrier for locomotive spring equalizing means, comprising a member having spaced equalizer mountings, pivot means intermediate such mountings, an operating extension by which the carrier is moved, and locomotive weight bearer means.

In testimony whereof I have hereunto signed my name.

WILLIAM E. WOODARD.