Dec. 17, 1946. C. E. STOLTZ 2,412,657

MINE LOCOMOTIVE

Filed Jan. 21, 1944 3 Sheets-Sheet 1

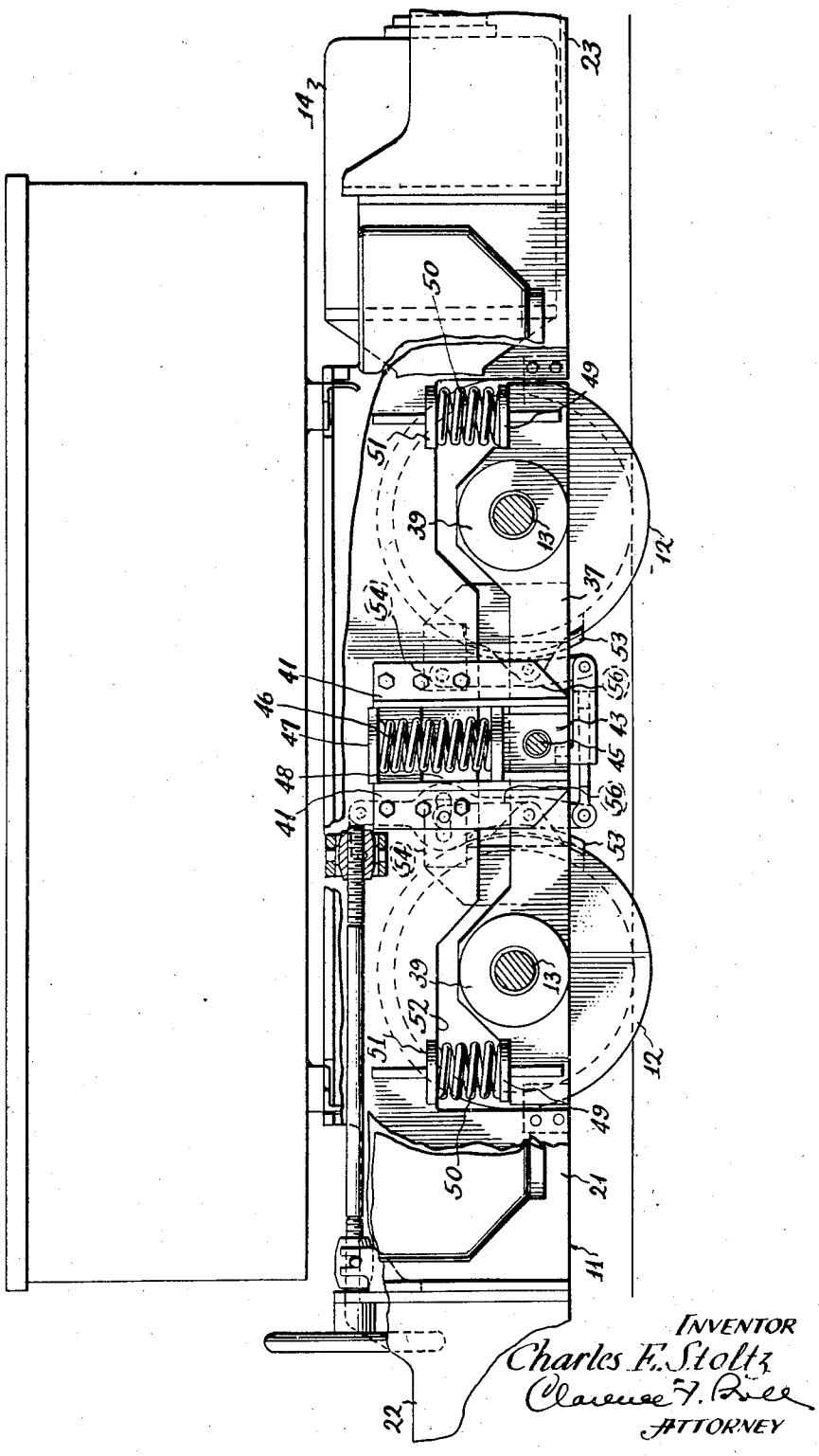


Fig. 1

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Filed Jan. 21, 1944 3 Sheets-Sheet 2

Fig. 2

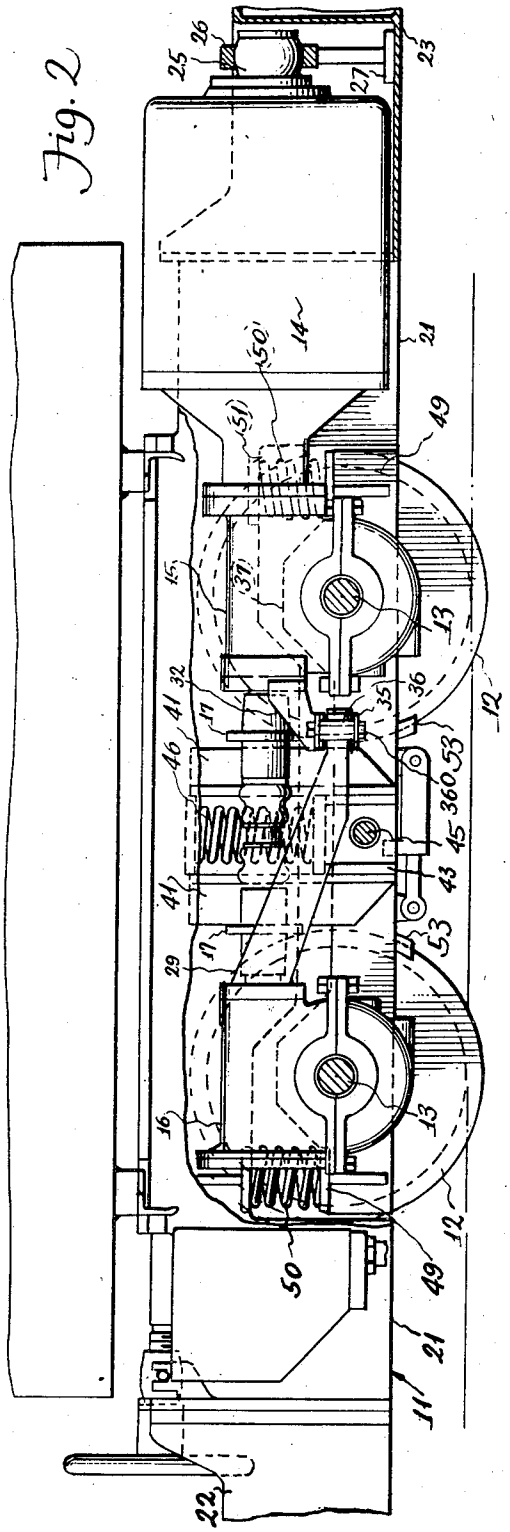


Fig. 7

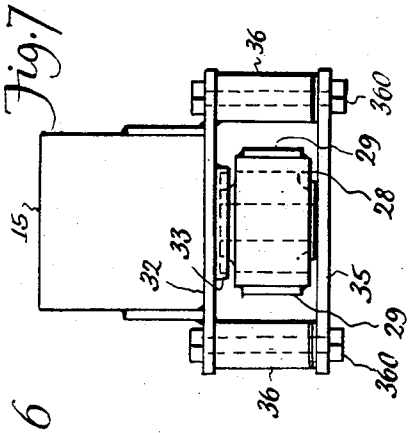
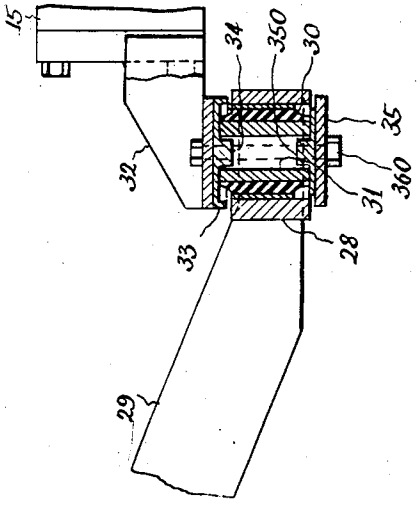


Fig. 6



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Filed Jan. 21, 1944 3 Sheets-Sheet 3

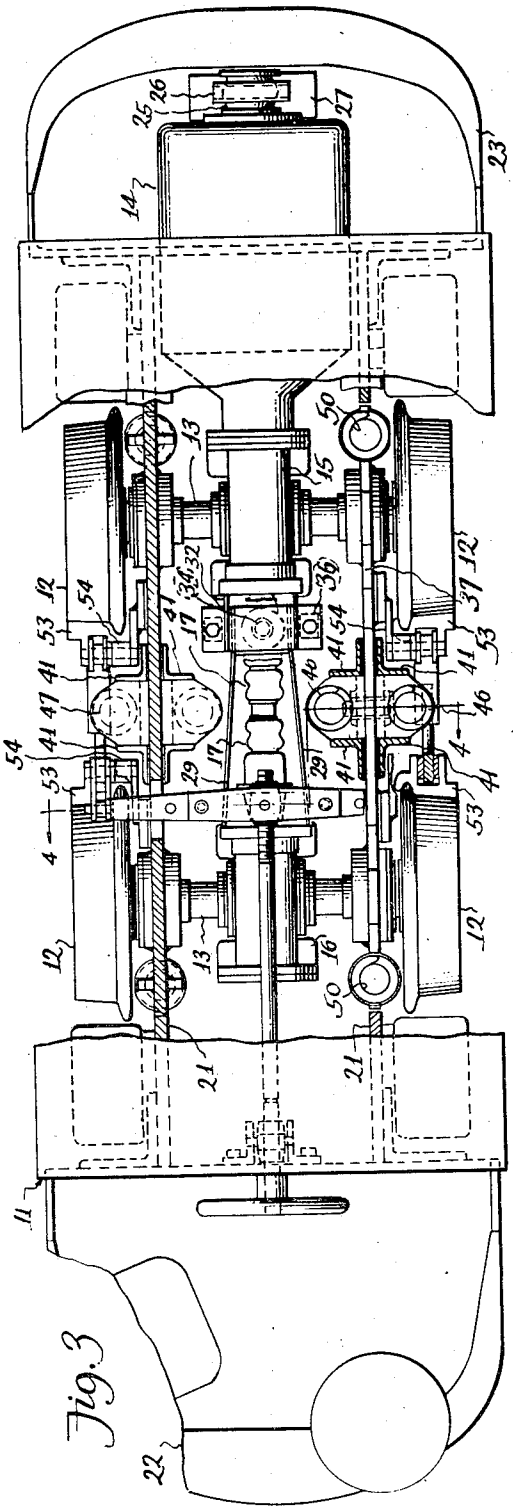


Fig. 3

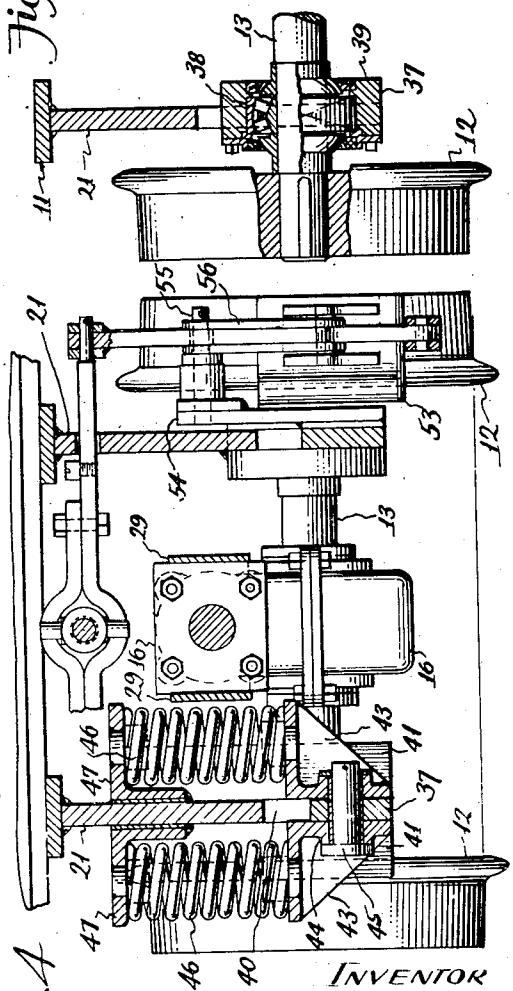


Fig. 4

Fig. 5

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MINE LOCOMOTIVE

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8 Claims. (Cl. 105—133)

1

This invention relates to improvements in mine locomotives.

The principal objects of my invention are to provide a mine locomotive having a new and improved equalizing means for the track wheels and mounting for the locomotive frame on the track axles, arranged to improve the riding qualities of the locomotive and the ability of the locomotive to travel along rough track.

Other objects of my invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

Figure 1 is a view in side elevation of a mine locomotive constructed in accordance with my invention, with certain parts broken away and certain other parts shown in longitudinal section;

Figure 2 is a view in side elevation of the locomotive shown in Figure 1, with certain other parts broken away and shown in section than in Figure 1, in order to illustrate certain details of my invention not shown in Figure 1;

Figure 3 is a plan view of the locomotive with certain parts broken away and certain other parts shown in horizontal section;

Figure 4 is a transverse sectional view taken substantially along line 4—4 of Figure 3;

Figure 5 is a detail fragmentary transverse sectional view illustrating certain details of the journal mounting for the locomotive axles;

Figure 6 is a fragmentary detail longitudinal sectional view showing certain details of the stabilizing means for the locomotive drive gearing; and

Figure 7 is a detail end view showing certain other details of the stabilizing means than are shown in Figure 6.

In the drawings a locomotive 10 is shown as including a main frame 11 mounted on track wheels 12, 12 and axles 13, 13. A motor 14 is provided to drive said axles and track wheels through suitable geared reduction drives which may be worm and worm gear reduction drives (not shown). One of said geared reduction drives is enclosed in a housing 15 pivotally mounted on said rear axle and directly connected to the casing of said motor, and the other of said drives is enclosed in a housing 16 pivotally mounted on said front axle. A pair of connected universal joints 17, 17 are provided to connect said geared reduction drives together, so said motor may drive all of the wheels of the locomotive (see Figures 2 and 3). Said geared reduction drives and the universal connections therebetween may be of any well known form and

2

are not herein shown or described in detail since they are no part of my present invention.

The main frame 11 consists of a pair of parallel spaced side plates 21, 21 connected at their forward ends to an end bumper 22, forming a compartment for the operator, and connected at their rear ends to an end bumper 23 having the rear end of the motor 14 supported thereon.

The motor 14 is provided with a semi-spherical boss 25 extending rearwardly from the rear end of its motor casing, which is journaled in a semi-spherical bearing 26, mounted on a plate 27 and projecting upwardly therefrom. Said plate is suitably mounted on the bottom plate of the end bumper 23. Said motor is thus supported on said bumper at its rear end, for universal pivotal movement with respect thereto about the semi-spherical bearing 26, to permit flexibility of movement of the rear track wheels 12, 12 during operation of the locomotive. The forward end of said motor is suitably secured to the rear end of the rear housing 15, enclosing the worm and worm gear drive for the rear track wheels 12, 12.

A stabilizing connection is provided between the housings 15 and 16, to permit flexible movement of said housings with respect to each other, but to yieldably limit the tendency of said housings to turn about the locomotive axles during operation of the locomotive, and thus to relieve the universal couplings from undue strains. Said connection, as herein shown, includes a pair of parallel spaced arms 29, 29 extending from the rear end plate of said front housing 16 towards the housing 15 and connected together at their free ends by means of a cross connecting member 28. Said cross connecting member has a vertical resilient bushing 30 mounted in its center. Said bushing may be made from a resilient material such as rubber, and has a metal sleeve 31 mounted in its center, so as to yieldably move with respect to said cross connecting member in an axial direction.

A bracket 32 is secured to and extends from opposite sides of the forward end plate of the rear gear housing 15 towards the cross connecting member 28. Said bracket terminates in vertical alignment with said cross connecting member. A plate 33 having a lug 34 depending from its center is secured to the underside of the central portion of said bracket 32, just above the center of the sleeve 31. Said lug is adapted to extend loosely within the upper end of said sleeve 31. A plate 35 is spaced beneath the plate 33 and has a lug 350 extending upwardly therefrom. Said lug is adapted to extend loosely within the lower end

of the sleeve 31. Said plate 35 is spaced vertically from the end of said bracket 32 by means of spacer sleeves 36, 36, and is connected thereto by means of nuts and bolts 360, 360 extending through said plates and sleeves. The longitudinal center of the resilient bushing 30, if extended, would intersect the extended longitudinal axis of the shaft of the motor 14, while the horizontal transverse center of said resilient bushing is herein shown as being intersected by a plane extending through the longitudinal axes of the locomotive axles, to cause universal pivotal movement of the arms 29, 29, with respect to the bracket 32, to be in the longitudinal center of the machine in the plane of the locomotive axles.

Referring now in particular to the equalizing support for the locomotive frame 11 on the track wheels 12, 12 and axles 13, 13, said axles are journaled in a pair of parallel spaced equalizing bars 37, 37, on spherical roller bearings 38, 38. Said equalizing bars are herein shown as being disposed just inside of the track wheels. Said spherical roller bearings are mounted in bearing bosses 39, 39 spaced inwardly from the ends of said equalizing bars, and are of a well known form and construction, arranged to permit pivotal movement of said axles with respect to said equalizing bars about axes extending transversely of said axles and intersecting the longitudinal axes of said equalizing bars.

Each side plate 21 is provided with a vertically extending opening 40 formed therein intermediate the axles 13, 13 and opening towards the ground. Angles 41, 41 are secured to the inner and outer sides of said side plates and extend along and below the lower margins of said openings, to form guides for a pair of laterally spaced guide members 43, 43 (see Figures 1 and 4). Said guide members, as herein shown, extend along opposite sides of the equalizing bar 37 and are pivotally connected thereto by means of a bearing 44 and pivotal pin 45, and form a vertically movable guide member for said equalizing bar along angles 41, 41. Said guide means also provides a means for transmitting power from the track wheels to the central portion of the locomotive frame, to overcome the tendency of said frame to tilt upwardly or downwardly during starting or stopping of the locomotive. Compression springs 46, 46 are interposed between the upper sides of said guide members and the undersides of horizontal legs of angles 47, 47, secured to the inner and outer sides of each side plate 21 and forming seats for the upper ends of said compression springs. Said springs thus yieldably support said frame on the central part of said equalizing bars, and limit vertical downward movement of said frame with respect to said bars.

The ends of the equalizing bars 37, 37 extend forwardly and rearwardly of the forward and rear track axles respectively, and have spring seats 49, 49 formed thereon, for the lower ends of the springs 50, 50, the upper ends of which springs are seated in seats 51, 51, formed adjacent opposite ends of an open portion 52 of the side plate 21. The construction just described forms a spring support for the locomotive frame on the equalizing bars 37, 37, which is longer than the wheelbase of the locomotive, and permits the entire frame to move vertically with respect to said equalizing bars, thus improving the riding qualities of the locomotive and maintaining the locomotive wheels in engagement with the rails on all track conditions.

The braking mechanism for the locomotive is

of a well known form of shoe type braking mechanism commonly used on locomotives of the class described, and includes a brake shoe 53 engageable with each track wheel 12. Said brake shoes are herein shown as being mounted on brackets 54, 54, secured to and projecting upwardly from the equalizing bars 37, 37 (see Figure 4). The support for each brake shoe includes a pivotal pin 55, projecting outwardly from said bracket and having a link 56 pivoted thereon and depending therefrom, which link has a brake shoe 53 pivoted to its lower end. The mechanism for operating said brakes may be of any well known form, but is not herein shown or described since it is no part of my present invention. The mounting for said brake shoes just described insures that said shoes will always be in the proper position with respect to the track wheels, for braking the locomotive regardless of the positions of the wheels of the locomotive with respect to each other and to the locomotive frame. Moreover, since the braking thrusts are taken on the equalizing bars rather than the locomotive frame, and since power is transmitted to the locomotive frame by the equalizing bars, at the central part of the locomotive frame, the tendency for said brakes to tilt the locomotive frame during the braking operation, is reduced to a minimum.

It may be seen from the foregoing that when the locomotive is traveling along a rough track and one track wheel rides over a rise in the track, that the tendency will be for the equalizing bars to depress the other track wheels and hold all of the track wheels in engagement with the track. It may further be seen that the spring suspension of the frame of the locomotive wheels is longer than the wheelbase of the locomotive and that the equalizing bars 37, 37 are guided in the guides formed by the spaced angles 41, 41, to guide the entire locomotive frame for vertical movement with respect to said equalizing bars, said movement being limited by the springs 46, 46, thus providing a stabilized and more flexible mounting for said locomotive frame on said equalizing bars than formerly, and enabling said equalizing bars to more efficiently perform their function of holding the locomotive wheels to the rails, while improving the riding qualities of the locomotive, and that power is transmitted from the equalizing bars to the locomotive frame, at the central part thereof, thus further improving the riding properties of the locomotive and reducing the tendency of said frame to tilt during starting or stopping of the locomotive to a minimum.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, I do not wish to be construed as limiting my invention to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. A locomotive having a main frame including two parallel spaced longitudinally extending side frame members, two longitudinally spaced axles having track wheels thereon, power means for driving said track wheels, and spring means for supporting said main frame on said axles including a pair of laterally spaced longitudinally extending equalizing bars having said axles journaled thereon, each of said side frame members having a vertically extending guide intermediate

said axles, one of said equalizing bars being guided in each of said guides, intermediate its ends, for vertical slidable movement therealong, said guides forming a means for transmitting power from said track wheels to opposite sides of said main frame, intermediate the ends thereof, and spring means supporting said frame on said bars, including spring means limiting downward movement of said frame with respect to said bars along said guides, and other spring means interposed between opposite ends of said bars and said frame.

2. A locomotive having a main frame including two parallel spaced longitudinally extending side frame members, two longitudinally spaced axles having track wheels thereon, a motor for driving said wheels, and spring means for supporting said main frame on said axles including a pair of laterally spaced longitudinally extending equalizing bars having said axles journaled thereon, each of said side frame members having a vertically extending guide intermediate said axles, one of said equalizing bars being guided in each of said guides, intermediate its ends, for vertical slidable movement therealong, said guides forming a means for transmitting power from said main frame to said wheels, intermediate the ends of said frame, spring means supporting said frame on said bars, including spring means limiting downward movement of said frame with respect to said bars along said guides, and other spring means interposed between opposite ends of said bars and said frame, braking means for said locomotive including a brake shoe engageable with each of said wheels, a link for supporting each of said brake shoes, said links being pivotally mounted on said equalizing bars, so said brake shoes will be in the proper relation with respect to their associated wheels in all positions of said wheels and equalizing bars with respect to said frame and the braking thrusts will be taken on said equalizing bars instead of the locomotive frame.

3. A locomotive having a main frame including two parallel spaced longitudinally extending side frame members, two longitudinally spaced axles having track wheels thereon, a motor disposed adjacent one end of said frame and extending longitudinally thereof between said side frame members, for driving said track wheels, gear housings pivotally mounted on each of said axles, a fixed connection between the forward end of the casing of said motor and one of said gear housings, a universal coupling connecting the gears of said gear housings together, a stabilizing connection between said gear housings, means for supporting said main frame on said axles including a pair of laterally spaced longitudinally extending equalizing bars having said axles journaled thereon, each of said side frame members having a vertically extending guide intermediate said axles, forming guides for said equalizing bars and a means for transmitting power from said wheels and equalizing bars to said main frame, spring means limiting downward movement of said frame with respect to said bars along said guides, spring means interposed between opposite ends of said bars and said frame, and a universal pivotal connection between the rear end of said motor and said frame.

4. A locomotive having a main frame including two parallel spaced longitudinally extending side frame members, two longitudinally spaced axles having track wheels thereon, a motor disposed adjacent one end of said frame and extending

longitudinally thereof, between said side frame members, for driving said track wheels, gear housings pivotally mounted on each of said axles, a fixed connection between the forward end of said motor and one of said gear housings, a universal coupling connecting the gears of said gear housings together, a stabilizing connection between said gear housings, a universal pivotal connection between the rear end of said motor and said frame, means for supporting said main frame on said axles including a pair of laterally spaced longitudinally extending equalizing bars, each of said side frame members having a vertically extending guide disposed intermediate said axles, means for mounting said equalizing bars in said guides for movement therealong and for pivotal movement with respect thereto about transverse axes, spring means limiting downward movement of said frame with respect to said bars, spring means interposed between opposite ends of said bars and said frame, and bearings for rotatably mounting said axles on said equalizing bars, said bearings being arranged to permit said axles to move about axes intersecting the longitudinal axes of said bars.

5. A locomotive having a main frame including two parallel spaced longitudinally extending side frame members, two longitudinally spaced axles having track wheels thereon, a motor disposed adjacent one end of said frame and extending longitudinally thereof, between said side frame members, for driving said track wheels, a universal pivotal connection between the rear end of said motor and said main frame, gear housings pivotally mounted on each of said axles, a fixed connection between the forward end of said motor and one of said gear housings, a universal coupling connecting the gears of said gear housings together, and a stabilizing connection from one of said gear housings to the other, to yieldably limit the tendency of said gear housings to turn about the locomotive axles during operation of the locomotive, including an arm extending from one housing towards the other, and a universally yieldable connection between the end of said arm and said other housing.

6. A locomotive having a main frame including two parallel spaced longitudinally extending side frame members, two longitudinally spaced axles having track wheels thereon, a motor disposed adjacent one end of said frame and extending longitudinally thereof, between said side frame members, for driving said track wheels, a universal pivotal connection between the rear end of said motor and said main frame, gear housings pivotally mounted on each of said axles, a fixed connection between the forward end of said motor and one of said gear housings, a universal coupling connecting the gears of said gear housings together, and a stabilizing connection from one of said gear housings to the other, to yieldably limit the tendency of said gear housings to turn about the locomotive axles during operation of the locomotive, including an arm extending from one housing towards the other, and a universally yieldable connection between said arm and said other housing disposed in the plane of the longitudinal axes of said axles.

7. A locomotive having a main frame including two parallel spaced longitudinally extending side frame members, two longitudinally spaced axles having track wheels thereon, a motor disposed adjacent one end of said frame and extending longitudinally thereof between said side frame members, for driving said track

wheels, a universal pivotal connection between the rear end of said motor and said main frame, gear housings pivotally mounted on each of said axles, a fixed connection between the forward end of said motor and one of said ge..r housings, a universal coupling connecting the gears of said gear housings together, and a stabilizing connection from one of said gear housings to the other, to yieldably limit the tendency of said gear housings to turn about the locomotive axles during operation of the locomotive and absorb the torque loads which would otherwise be transmitted to the universal connection between the rear end of said motor and said main frame, including a bracket extending longitudinally inwardly and downwardly from an upper portion of one of said housings and intersected by a plane extending through the centers of said axles, an arm extending from the upper portion of said other housing towards said bracket in a downwardly inclined direction, and a yieldable connection between said arm and said bracket intersected by a plane extending substantially through the centers of said axles, permitting yieldable universal pivotal movement between said arm and said housing, and tending to turn one housing in a direction opposite to which said other housing tends to turn to reduce the torque loads

on the universal support for said motor on said main frame.

8. A locomotive having a main frame including two parallel spaced longitudinally extending side frame members, two longitudinally spaced axles having track wheels thereon, a motor disposed adjacent one end of said frame and extending longitudinally thereof between said side frame members for driving said track wheels, a universal pivotal connection between the rear end of said motor and said main frame, gear housings pivotally mounted on each of said axles, a fixed connection between the forward end of said motor and one of said gear housings, a universal coupling connecting the gears of said gear housings together, and a stabilizing connection from one of said gear housings to the other, to yieldably limit the tendency of said gear housings to turn about the locomotive axles during operation of the locomotive, including a relatively long single arm extending from the housing spaced farthest from said motor towards the housing fixedly connected to said motor, and a universally yieldable connection between the end of said arm and said housing fixedly connected to said motor adjacent the latter housing.

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