March 31, 1953 H. F. FLOWERS 2,633,089

MINE CAR

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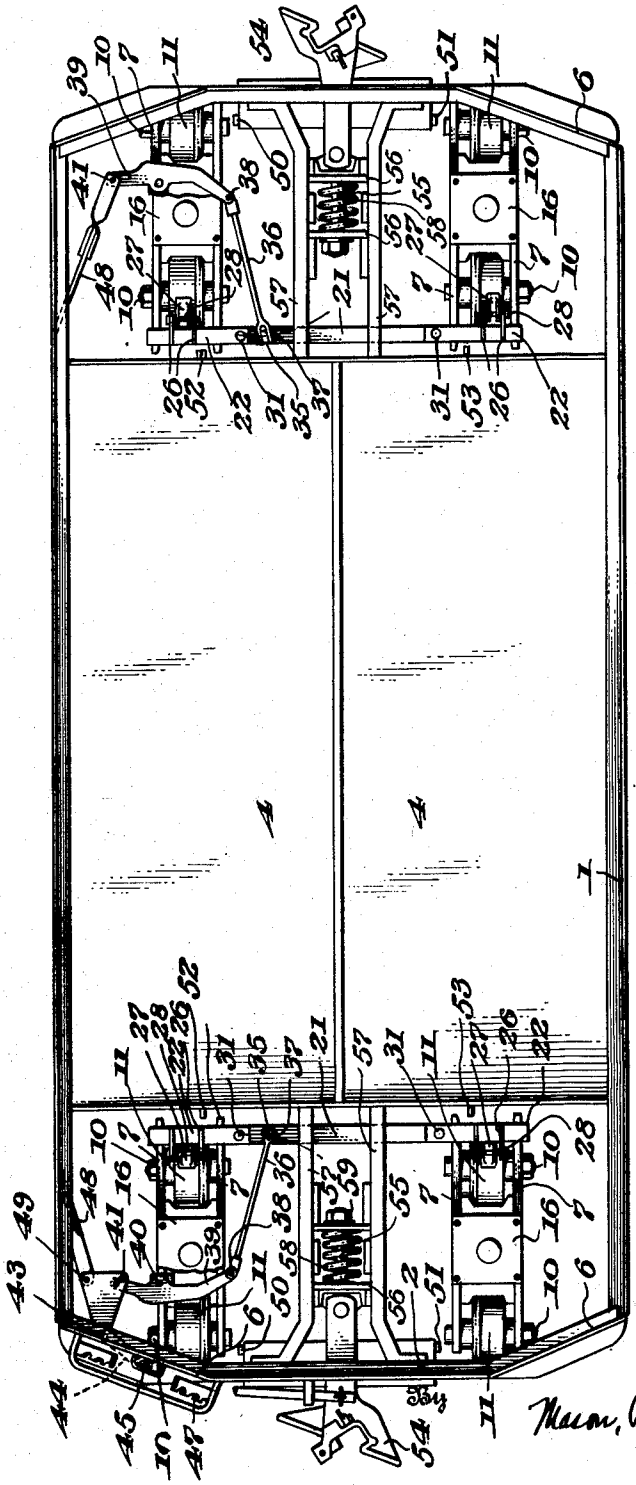


Fig. 1.

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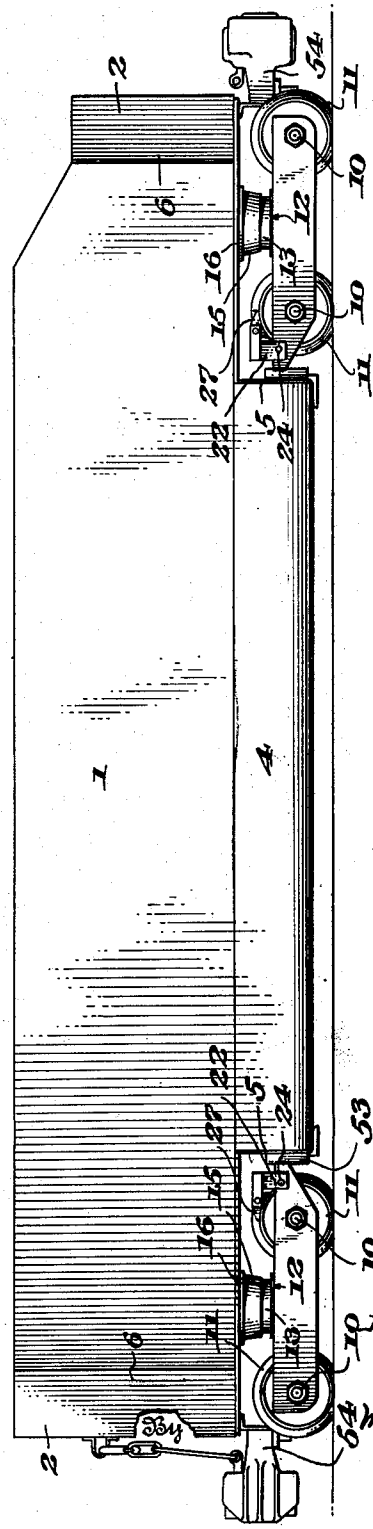
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MINE CAR

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Fig. 1a.



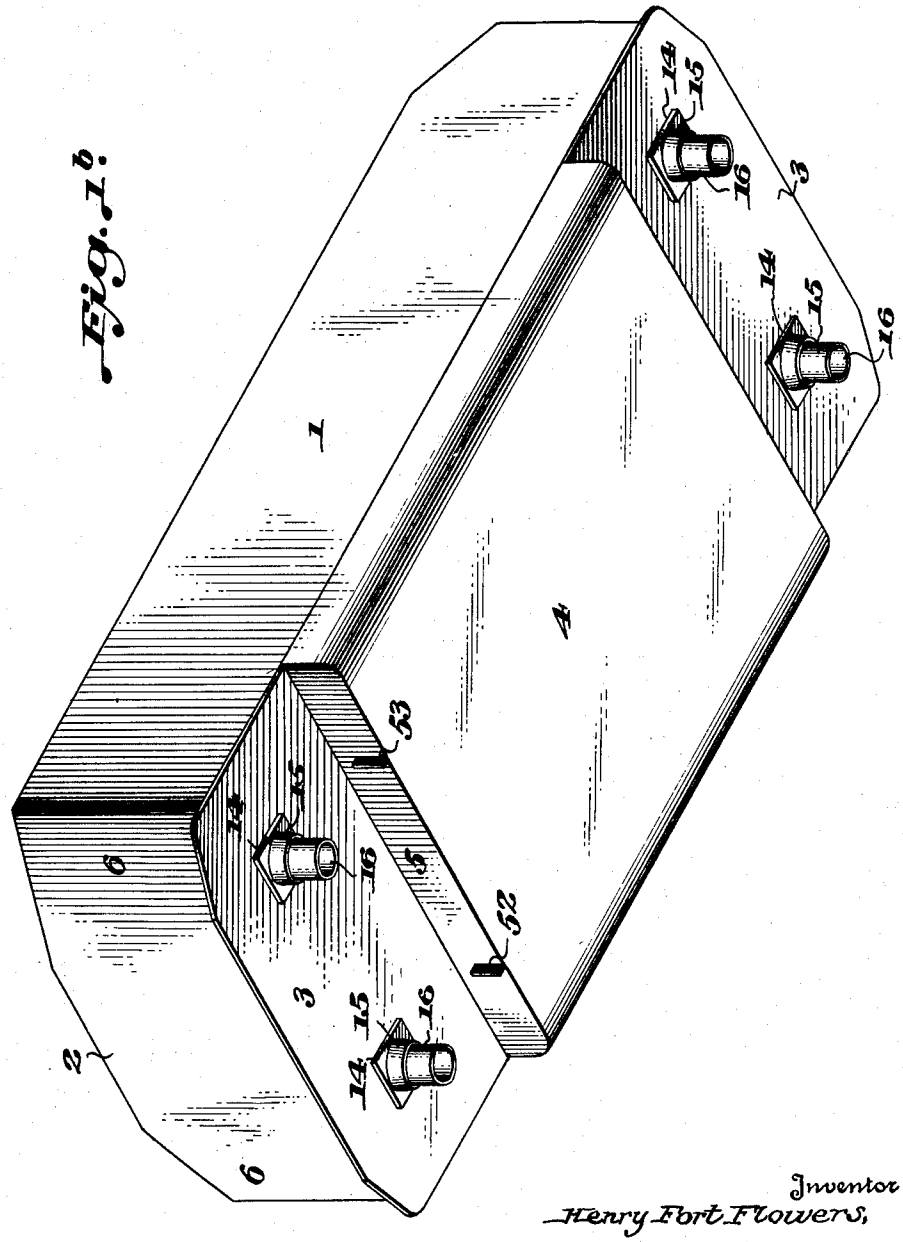
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Fig. 1b.



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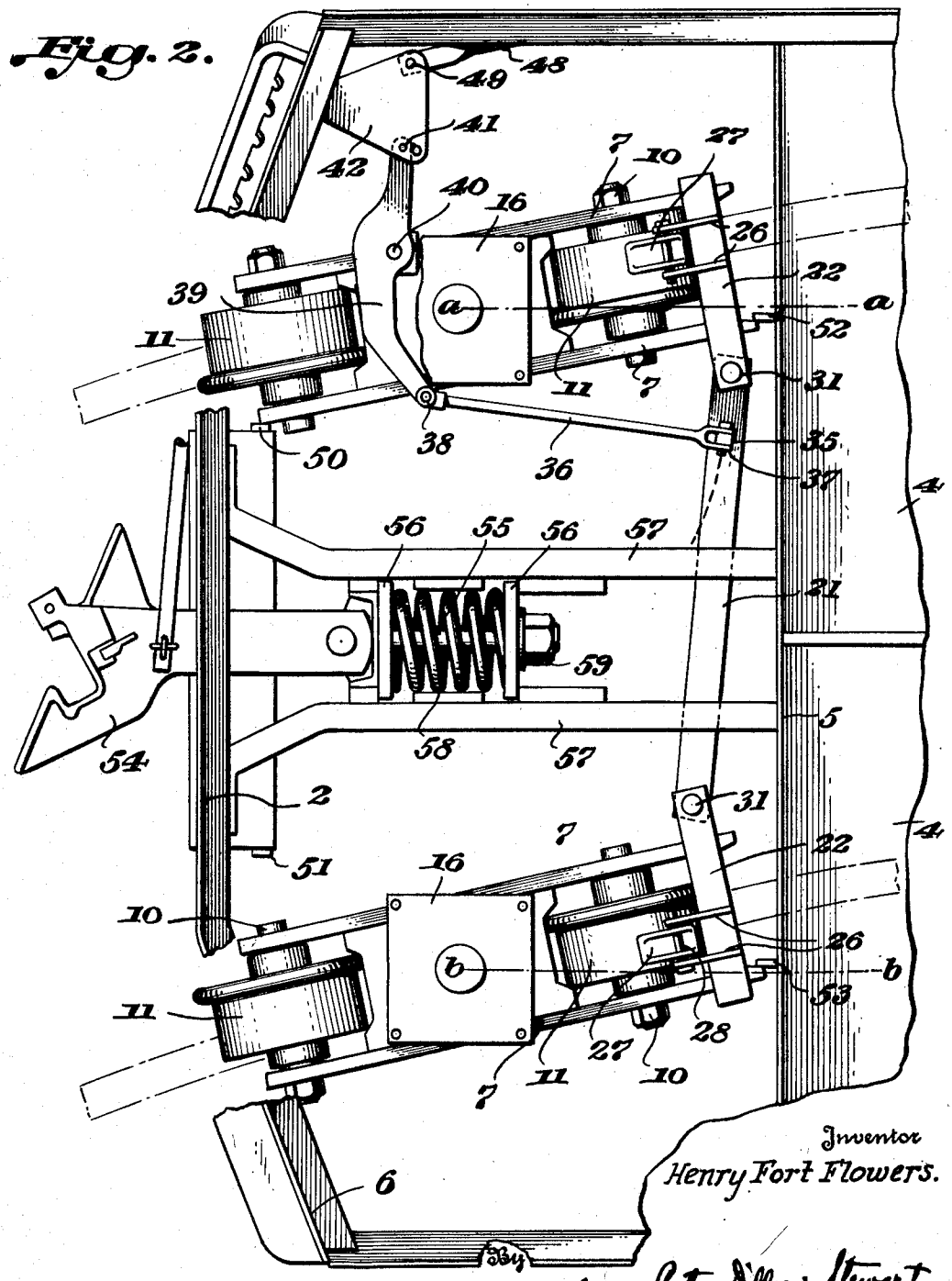
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MINE CAR

Filed Sept. 30, 1946 7 Sheets-Sheet 4

Fig. 2.



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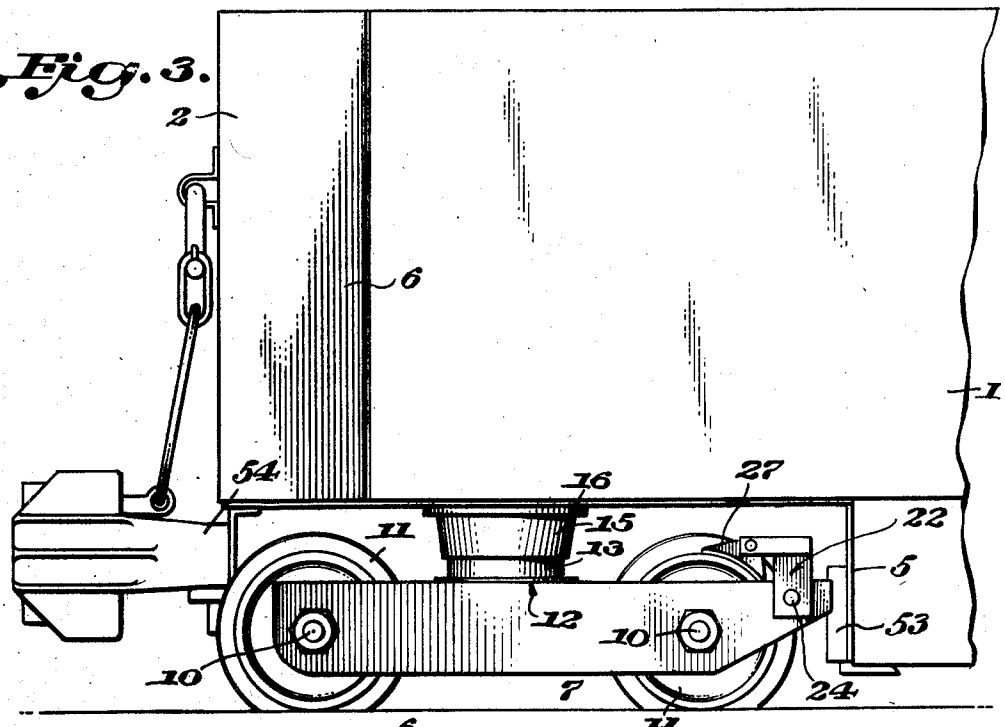
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Fig. 3.



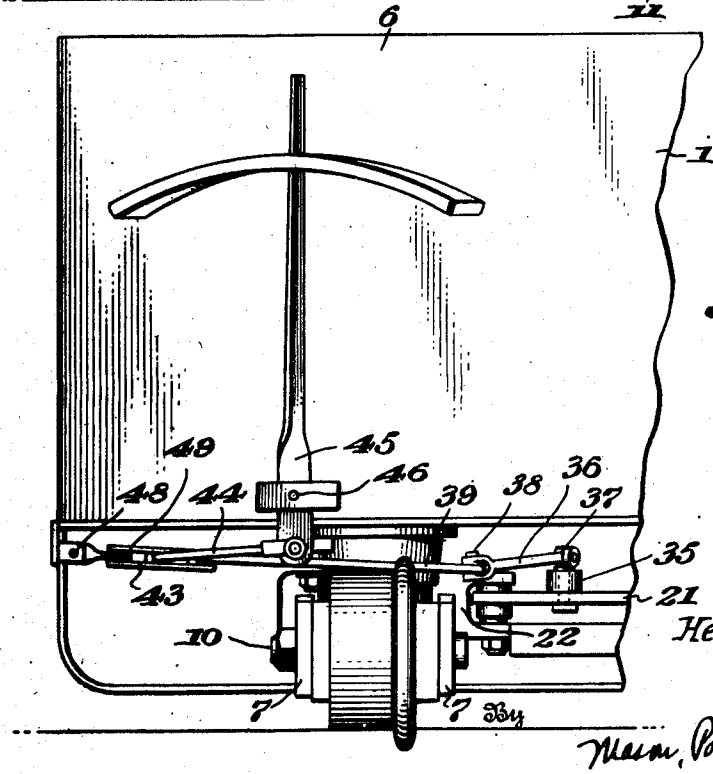


Fig. 4.

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MINE CAR

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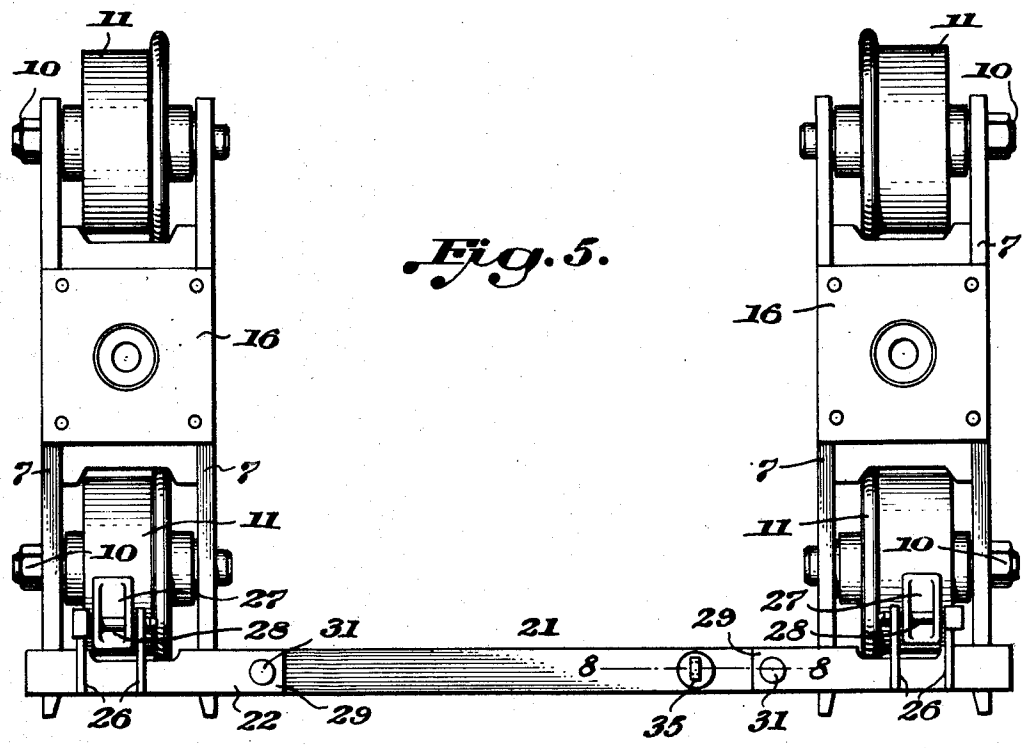


Fig. 5.

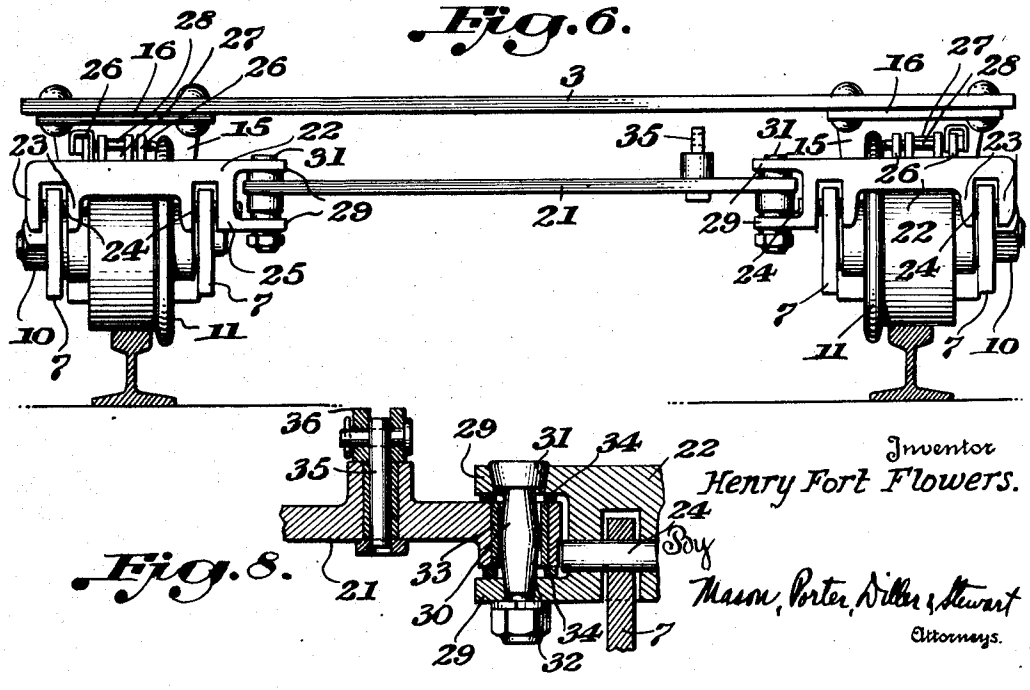


Fig. 6.

Fig. 8.

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MINE CAR

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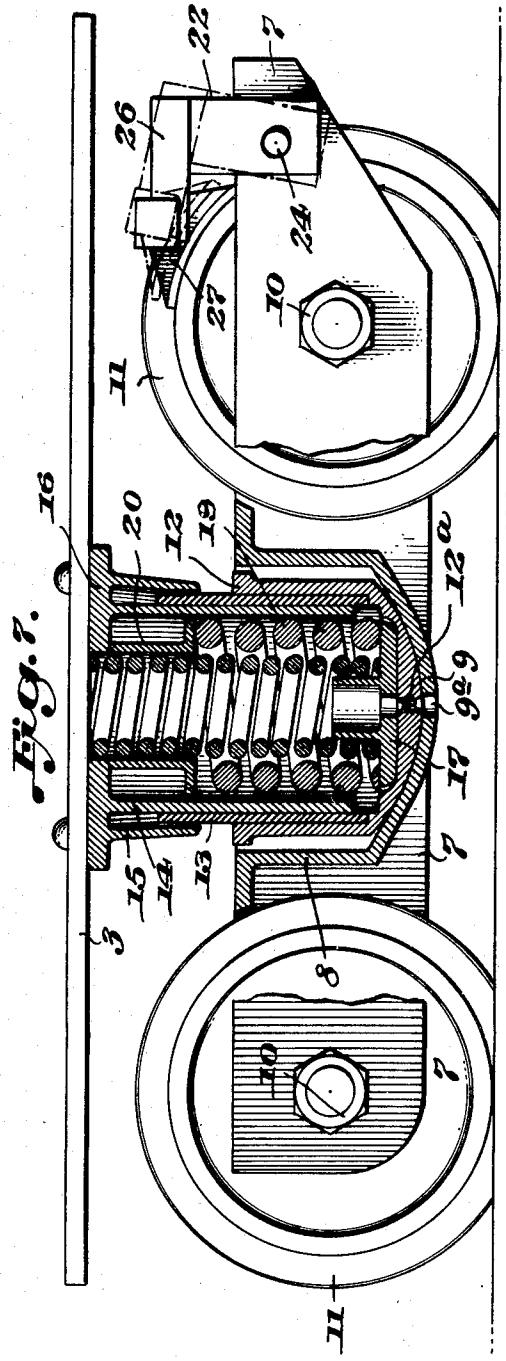


Fig. 7.

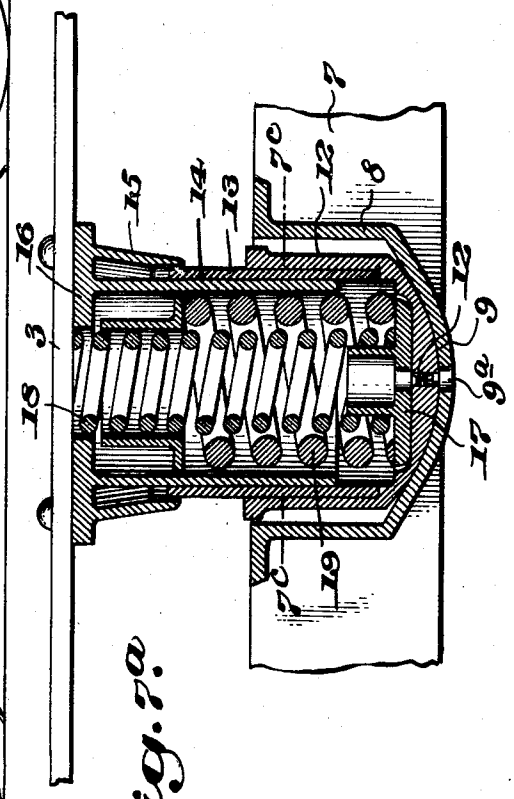


Fig. 7a.

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Patented Mar. 31, 1953 2,633,089

UNITED STATES PATENT OFFICE

2,633,089

MINE CAR

Henry Fort Flowers, Findlay, Ohio

Application September 30, 1946, Serial No. 700,316
In Great Britain November 7, 1945

6 Claims. (Cl. 105—180)

1

The invention relates to new and useful improvements in mine cars and has for a purpose to provide a mine car having a large capacity with limited overall dimensions which car is capable of negotiating sharp radius curves while traveling at comparatively high speed over mine tracks.

An object of the invention is to provide a mine car wherein the body is largely formed from steel plates of rectangular shape connected by welding and riveting so as to form a rigid structure having a central well to increase the carrying capacity for a car relatively low in height.

A further object of the invention is to provide a mine car of the above type wherein the body is mounted on independent tandem trucks having three motions, to swing about a vertical axis around curves, to oscillate in a longitudinal vertical plane when traveling over uneven tracks, and to move bodily vertically under spring control.

A further object of the invention is to utilize for a mounting for the trucks the heavy floor plates at the ends of the car, to which king posts are directly connected by welding and riveting.

A further object is to provide a single tie bar connecting opposed trucks, which is disposed adjacent the center of the car so as to provide space for the coupler and its draft gear.

A further object of the invention is to provide a mine car of the above type wherein the tie bar is relatively short and wherein stops are mounted on the body of the car and are so disposed as to limit the turning movements of the trucks about vertical axes.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings which show by way of illustration one embodiment of the invention,

Figure 1 is a plan view of a mine car embodying the improvements with the heavy end plates removed for the purposes of showing the trucks and associated king posts on which the body is mounted;

Figure 1*a* is a side view of the mine car;

Figure 1*b* is an isometric view of the mine car from below, with couplers, trucks, and brake rigging removed for the purpose of showing more clearly the general construction of the body of the car;

Figure 2 is a view similar to Figure 1 of the front trucks only and showing the trucks as turned on a vertical axis for following a curved track;

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Figure 3 is a side view of one end of the mine car;

Figure 4 is a partial end view of the mine car;

Figure 5 is a view of the opposed trucks at one end of the car on which the body is mounted and also showing the tie bar connecting the trucks and the brake mechanism;

Figure 6 is an end view of the trucks showing the brake cage and its mounting on the wheel truck frame and the tie bar connecting the same, and also showing the heavy floor plate on which the king posts are mounted;

Figure 7 is a view partially in side elevation and partially in vertical section through the body supporting means showing the condition of the springs supporting the body under a heavy load;

Figure 7*a* is a detail showing the condition of the springs supporting the body under a light load; and

Figure 8 is a sectional view on the line 8—8 of Figure 5 showing on an enlarged scale the connection between the tie bar and the brake supporting bracket and also showing the connection to the tie bar for twisting the same to operate the brakes.

The mine car includes a body which is constructed of plates of rectangular shape. These plates are connected by welding and riveting to provide a very rigid body structure. The body includes side plates 1, 1 and end plates 2, 2. There is a heavy end plate 3 extending from one side of the car to the other, beneath which are the supporting trucks for the body. There is a similar heavy end plate at the other end of the car. In between the end plates is a well. The side plates 1, 1 have straight lower edges extending from end to end of the body. The bottom well plates 4, 4 have their edges curved upward to form a round corner and extend upward to form the side plates of the well and connect to side plates 1, 1. These floor plates 4, 4 are joined to the heavy plates 3 by vertical plates 5. These vertical plates forming the ends of the well serve as transverse beams, having the effect of a Z-bar, with the end floor plate forming one leg of the Z-bar and the well floor plate forming the other leg of the Z-bar.

The meeting edges of the plates are connected by folding one of the plates and by welding or riveting the plates together. The end plates are flanged or bent to form beveled corners as indicated at 6, 6 so as to provide room at one side for a brake operating lever and to provide a step at each corner and clearance between cars when coupled on a curve. This provides a body which is very simple in construction and which is of

relatively large carrying capacity and at the same time is greatly limited in overall dimensions, with a minimum space required for trucks, draft springs, couplers, and brake mechanism.

The body is carried by wheel trucks. There are two independently mounted wheel trucks at each end of the car. They are similar in construction and the description of one will answer for the others. Each wheel truck includes side frames 7, 7 which are formed of heavy plates. These side plates are connected together by transverse angle plates 8, 8 and a semi-cylindrical gimbal supporting plate 9. These plates are welded together and to the side plates, thus making a very rigid wheel frame. There are wheel axles or spindles 10, 10 extending from one side of the frame to the other on which are mounted flanged wheels 11, 11. These wheel axles or spindles are rigidly connected to the side members and further aid in the forming of a rigid wheel frame structure.

Mounted on the gimbal supporting member 9 is a body supporting member or gimbal 12. Carried by this body supporting member is a hardened steel sleeve 13. A king post 14 of hardened steel fits operatively within the sleeve and the sleeve 13, together with the body supporting member and the truck, is free to oscillate on the king post about a vertical axis. The king post can move up and down in the sleeve 13. The king post is also provided with a dust guard 15 to seal the dirt away from the close fit between the king post and the gimbal or body supporting member. The king post 14 and the dust guard 15 are welded to a plate 16 which, in turn, is welded and riveted to the heavy end floor plate 3. The gimbal or body supporting member is curved to conform to the inner face of the gimbal supporting member 9 and the truck frame can shift on this body supporting member and thus oscillate in a longitudinal vertical plane when the wheels are traveling over uneven tracks. Mounted in the body supporting gimbal 12 is an abutment thrust pivot plate 17 provided with a central upstanding hub around which is disposed a coil spring 18.

Outside of the coil spring 18 is a heavy spring 19. The upper end of the light spring bears against the floor plate 3 and the upper end of the heavy spring bears against an abutment sleeve 20 which in turn bears against the plate 16. These springs are so dimensioned that under light load the body will be supported on the light spring and the heavy spring abutment sleeve will be out of engagement with the plate 16. When a heavy load is carried, then both springs function to support the body.

From the above it will be apparent that the body is so mounted on the wheel trucks that the trucks may have three motions. One, they may swing about a vertical axis when passing around curves; two, they may oscillate in a vertical plane when traveling over uneven tracks; and three, the body may move vertically under spring control relative to the trucks. As noted, the wheels are in tandem on each truck and are flanged so that the front wheel of the outside truck, when following a curved track leading to the left, will turn the truck about a vertical axis so that it will follow the curved track. The opposed trucks at each end of the car are connected by a tie bar 21 so that the turning movement of one truck about a vertical axis will be imparted to the opposed truck. The trucks and the body mounting above described are not claimed herein, per se, but are shown, described and claimed in my copending application Serial No. 660,990, filed April 10, 1946, now U. S. Patent No. 2,602,401.

Mounted on the side frames 7, 7 is a brake shoe supporting bracket 22. This bracket is provided with depending members 23, 23 at one end thereof which members are pivotally connected to the side member by a pivot pin 24. There are also depending members 24, 25 at the other end of the brake shoe bracket which are likewise pivoted to the other side member of the truck frame. The brake supporting bracket has parallel spaced arms 26, 26 rigidly attached thereto, which arms carry a brake shoe 27 which is mounted on a pivot bolt 28 extending through the arms 26, 26.

The brake shoe bracket 22 has laterally extending members 29, 29 and the tie bar is connected to the brake shoe bracket by means of a barrel-shaped pin 30 having tapered ends 31, 32 which fit the upper and lower members 29, 29 of the brake shoe bracket. This pin 30 is hardened and engages a bushing 33 which is mounted in the tie bar and a rubber seal 34 is provided at each end of the bushing to prevent water and dust from working into the connection between the pin and the bushing.

This universal connection between the tie bar and the brake shoe bracket enables the tie bar to move endwise and thus impart the movements of one truck to the other without interfering with the independent movements of the trucks in vertical planes. It also permits the tie bar to be oscillated or twisted for swinging the brake shoe bracket on its pivotal support, thus moving the brake shoes into and out of engagement with the wheels. As a means for twisting the tie bar a cantilever swivel pin 35 is located in the tie bar adjacent one end thereof. A link 36 is connected at 37 to the upper end of this swivel pin and is connected at 38 to a brake operating lever 39 fulcrumed at 40 on the floor plate 3. This lever 39 is pivoted at 41 to a triangular shaped plate 42. The triangular shaped plate 42 is connected at 43 to a link 44 which in turn is connected to a hand operated lever 45. This hand operated lever is pivoted at 46 and is adapted to engage a toothed rack 47 which holds the lever in a set position.

The braking mechanism applied to the truck at the rear end of the body is similar in construction to that which has been described above in connection with the trucks at the front end of the body and similar reference letters have been applied thereto. The lever 39 of the rear braking mechanism is connected to a rod 48 which extends along the side of the car and is pivoted at 49 to the plate 42. When the hand lever is operated for setting the brakes it will swing the plate 42 either on the pivot pin connection 41 to the brake lever 39 as a fulcrum, or on the pivot pin 49 connecting the plate 42 to the rod 48. One or the other of the brake shoes may be pressed against the rim of its associated wheel and this will become a fulcrum so that the other brake shoe will be pressed against the rim of its associated wheel. By this arrangement a uniform pressure of the brake shoes on the rims of the wheels can be obtained. It is noted that the pivot pins joining the brake shoe supporting bracket to the truck frame are so disposed that the center of gravity of the tie bar and the brake cage as a whole is toward the center of the car relative to this pivotal connection, and, therefore, the brake shoes tend to stand clear of the wheel by the action of gravity on the tie bar.

It is also noted that the tie bar is relatively short. As the trucks follow the curved track and the cantilever swivel pin **35** describes a definite approximately circular path and the center of curvature of this circular path determines the normal location of the connection between the link **36** and the lever **39**. In Figures 1 and 2 of the drawings this curved path is shown in dotted lines and the link **36** in Figure 1 is at the center of its lateral travel while in Figure 2 it is in one extreme of its lateral swing. The swinging of the trucks, therefore, does not in any way bring about a twisting movement of the tie bar.

The brake lever **45** is made of spring steel so that it will provide flexibility to the application of the brakes and permit the operator to tighten the brakes to the desired amount even when the notches in the plate **47** are spaced a limited distance from each other. This springing of the brake lever compensates for any slight errors which occur in the construction of the brake rigging and also for the effect of various movements of the truck frames. The trucks are free to travel from a tangent track to a curved track, and vice versa. They are also free to oscillate in a vertical plane without affecting the braking mechanism and at the same time the brakes may be applied equally efficiently when the car is traveling on a tangent track or on a curved track. The braking mechanism described above is not claimed herein per se but is shown, described and claimed in my Patent No. 2,461,263, granted February 8, 1949.

In order to limit the turning movements of the trucks on their vertical axes, stops **50** and **51** are provided on the tie bar guard on the under side of the body against which the inner side frame of the truck contacts for limiting the inward turning of the trucks. There are also stops **52** and **53** mounted on the body plate **5** which are engaged by the ends of the side members of the wheel frame which likewise limit the turning movements of the trucks about vertical axes. When the mine car is traveling around a curve to the left, as indicated in Figure 2, the flange of the forward wheel of the outside truck engages the outer rail and guides the car around the curve which may be of a very short radius. The wheel frame will be limited in its turning movement when it contacts with the stop **50**. The centrifugal force of the car body transmitted to the truck frame through the king post tends to force the flange of the rear wheel of the outside truck against the rail. However, the truck frame of the inside truck will engage a stop **53** and through the tie bar will limit the turning of the outside truck and likewise the stop **52** will engage the inside member of the truck frame and limit the outward swing of the outside truck. These stops **52** and **53** are positioned a short distance inside of lines *a*—*a* and *b*—*b* of Figure 2 which lines are parallel and pass through the axes of the trucks. Therefore the stops are a shorter distance apart than the axes of the trucks. The angularity of the tie bar on a curve pulls the tie bar ends of the truck closer together than the outer ends of the trucks and these stops are set in the manner stated so that on a curve both trucks will be stopped. It is of considerable advantage to have each one of the trucks positively stopped at the same time to reduce the shock on the tie bar. This will also have the effect of causing the truck to stay on the track in case the tie bar should break in two or be disconnected from the trucks.

The body stops at the end of the well serve the double purpose of engaging the side frame alternately when swinging in opposite directions and along with the heavy truck stops adjacent the end of the car, which transmit the extreme shocks from the rails to the flanges of the body on minimum radius curves, serve to limit the swinging of the trucks in case of derailment. These stops also hold the truck near enough parallel to the track to make it easy to rerail the car after it has been derailed.

It will be noted that the tie bar **21** is close to the cross wall **5** of the well and this leaves ample space between the well and the end of the car for the coupling and draw bar to which it is attached. The coupling **54**, Figure 2, is connected to a draw bar **55** on which are mounted cross members **56**, **56** extending between sill members **57**, **57**. Between cross members **56**, **56** is a spring **58** preloaded by tightening the nut **59** on the threaded end of draw bar **55**. Stops are provided on sill members **57**, **57** to limit maximum coupler longitudinal travel. This provides a very compact and efficient shock absorbing mounting for the coupling and draw bar associated therewith beneath the floor plate and between the trucks.

It is obvious that many changes in the details of construction may be made without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A mine car comprising a body formed of sheet steel plates secured together by welding or riveting, opposed independent tandem wheel trucks at each end thereof on which said body is supported, said body between the forward and rear trucks having depending walls providing a load carrying well for increasing the carrying capacity for a given overall length and height of car, and a single tie bar connecting said opposed trucks and disposed adjacent said well, each truck including a rigid wheel frame having spaced side members extending beyond the inner wheels and a stop for each truck mounted on the wall of the well and disposed between the extended side members for engagement therewith for limiting the turning movement of the trucks in either direction.

2. A mine car comprising a body formed of sheet steel plates secured together by welding or riveting, opposed independent tandem wheel trucks at each end thereof on which said body is supported, said body between the forward and rear trucks having depending walls providing a load carrying well for increasing the carrying capacity for a given overall length and height of car, each truck including a frame having spaced side members, a relatively short tie bar connecting said opposed trucks and disposed adjacent said well, a stop carried by the wall of the well and disposed between the side members of each truck for engagement alternately with said side members, said stops being spaced so that both trucks are limited in their turning movement in either direction by contact with the stops associated therewith.

3. A mine car comprising a body formed of steel plates secured together by welding or riveting, opposed independent tandem wheel trucks at each end thereof on which said body is supported, said body between the forward and rear trucks having depending walls providing a load carrying well for increasing the carrying capacity for a given overall length and height of car, the floor plates between the well and the

end of the car being of relatively heavy steel, depending king posts rigidly attached to said floor plates on which the trucks are mounted, and a single tie bar connecting said opposed trucks and disposed adjacent said well, each truck having a light coil spring for carrying light loads and a heavy coil spring of less length associated therewith for assisting said light springs when carrying heavy loads, said springs being disposed one within the other and centered longitudinally relative to the king posts with which they are associated.

4. A mine car comprising a body formed of sheet steel plates secured together by welding or riveting, opposed independent tandem wheel trucks at each end thereof on which said body is supported, said body between the forward and rear trucks having depending walls providing a load carrying well for increasing the carrying capacity for a given overall length and height of car, each truck including spaced side members and a body support on which the trucks turn about vertical axes, a single tie bar connecting opposed trucks and disposed adjacent said well, a stop carried by the front wall of the well and disposed between the side members of each truck, said stops being spaced a distance less than the distance between the pivotal centers of the truck whereby a side member of each truck will contact with a stop when the tie bar is turned to an angular position by the swinging of the trucks so as to relieve strain on the tie bar.

5. A mine car comprising a body formed of sheet steel plates secured together by welding or riveting, opposed independent tandem wheel trucks at each end thereof on which the body is supported, said body between the forward and rear trucks having depending walls providing a load carrying well, a tie bar connecting the opposed trucks and disposed adjacent said well, each truck including a frame having spaced side members, a stop carried by the frame adjacent the end of the car for limiting the inward swing of the outer truck when passing along a curved section of track, and a stop carried by the body for limiting the outward swing of said outer truck.

6. A mine car comprising a body formed of sheet steel plates secured together by welding or riveting, opposed independent tandem wheel trucks at each end thereof on which the body is supported, said body between the forward and rear trucks having depending walls providing a load carrying well, a tie bar connecting the opposed trucks and disposed adjacent said well, each truck including a frame having spaced side members, a stop carried by the frame adjacent the end of the car for limiting the inward swing of the outer truck when passing along a curved section of track, a stop carried by the body for limiting the outward swing of said outer truck, and a stop carried by said body and limiting the inward swing of the rear wheel of the opposed truck.

HENRY FORT FLOWERS.

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