

Jan. 25, 1966

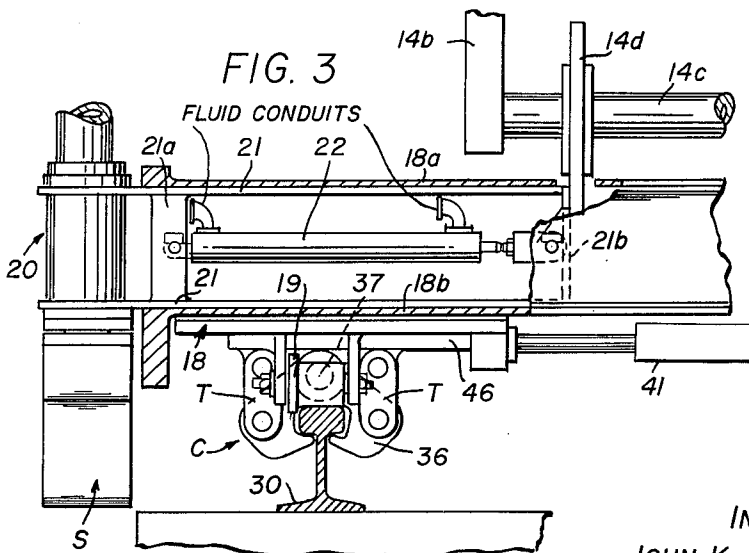
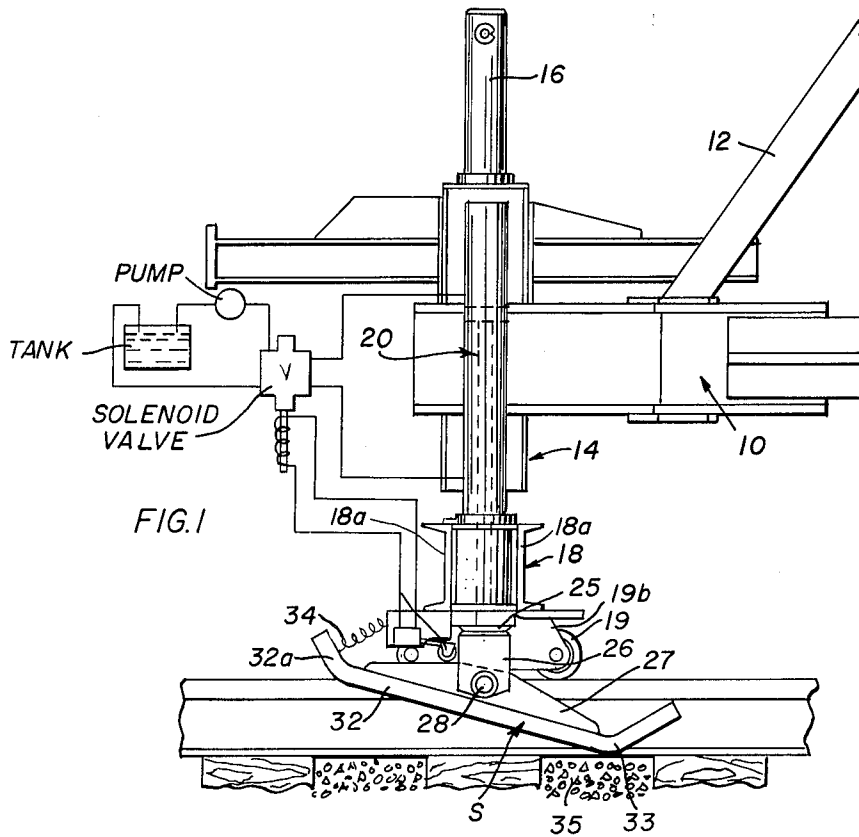
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3,230,895

EXTERNALLY ENGAGING LIFTING JACK FRAME

Filed May 20, 1963

3 Sheets-Sheet 1



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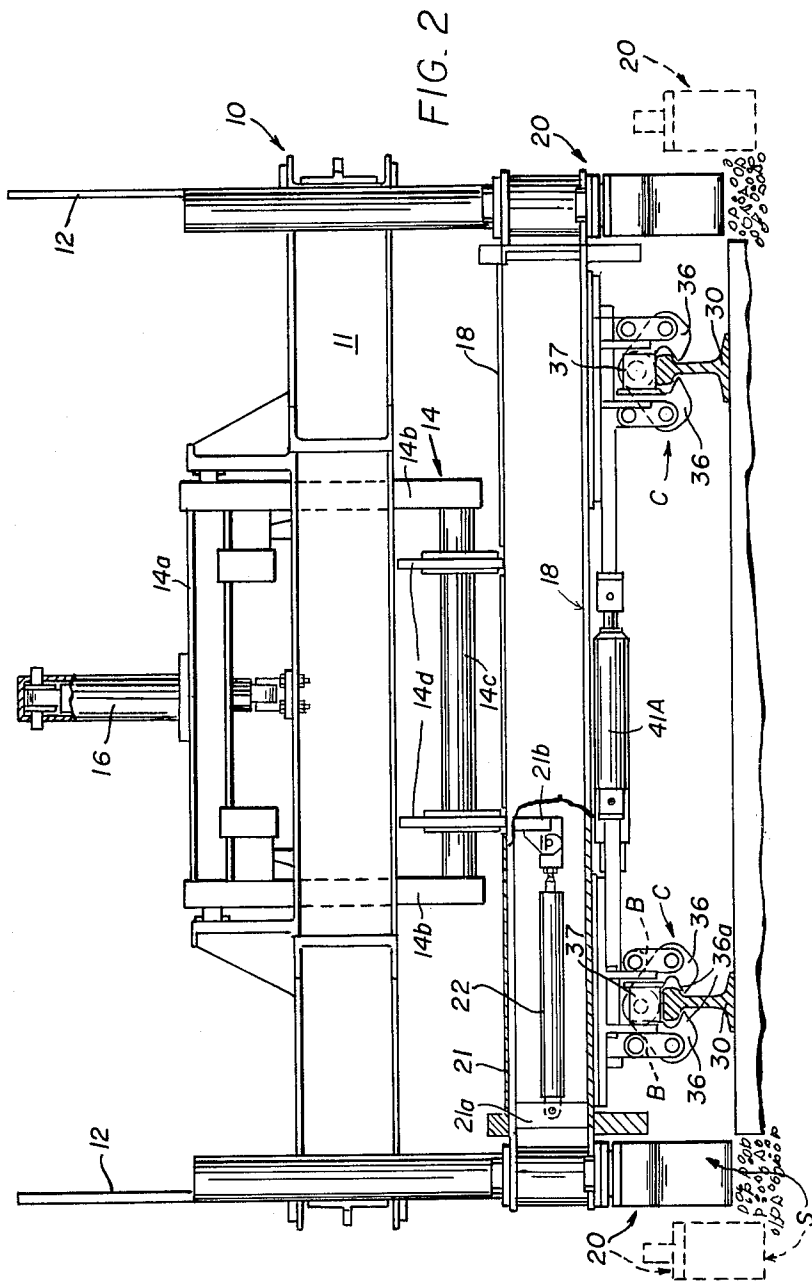
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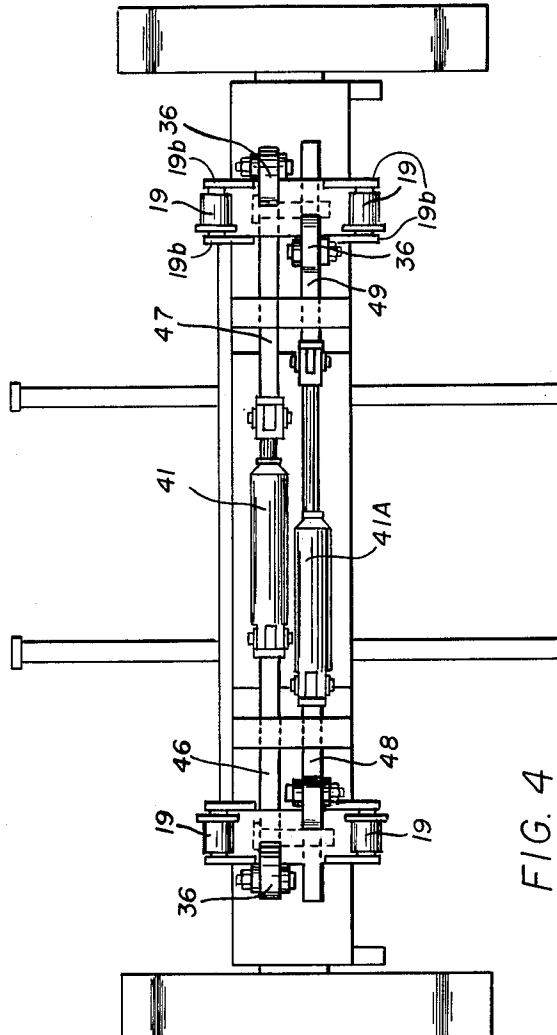


FIG. 4

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3,230,895
EXTERNALLY ENGAGING LIFTING JACK FRAME
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 Filed May 20, 1963, Ser. No. 281,656
 9 Claims. (Cl. 104-7)

This invention relates to jacking devices for railroad working vehicles and particularly to a railroad working vehicle of the type in which the jacking is performed on the ballast externally of the rails of the track.

In normal practice the lifting jacks are operated by fluid pressure, usually hydraulic pressure, to lower and raise the ballast engaging shoe into and out of engagement with the ballast and the speed of operation of the track working vehicle has to be geared to the speed of the jacking operation since the ballast engaging shoes have had to be lifted completely clear of the ballast before the vehicle can move along to the next spot on the track where a jacking operation is to be performed. In track working operations where it is desired to jack the rail at each tie this has been a serious curb to the rate at which the machines can be operated.

According to the present invention a railroad track lifting jack apparatus mounted on the frame of track working vehicle which is provided with rail engaging clamps, which lifting jack apparatus is adapted to engage the ballast externally on each side of the track rails, comprises a pair of transversely spaced jacks each having a ballast indicating ski member pivotally mounted on a pivot on a downwardly depending jack rod; a fluid pressure operated piston and cylinder arrangement for reciprocating the jack rod to lower and raise the ski member into and out of engagement with the ballast; said ski member being biased to adopt a first angular position in a vertical plane on its pivot relative to the jack when the ski member is out of jacking engagement with the ballast and to be moved, against the bias out of said first angular position by contact with the ballast; and switch means fixed relative to the frame for controlling the operation of the piston and cylinder arrangement and operable by the ski member when in a predetermined angular position on its pivot.

In this fashion, by utilizing the switch means to terminate the raising action of the piston and cylinder means and operating the switch by the angular movement of the ski under its biasing means as the ski substantially clears the ballast, the minimum amount of lifting stroke is utilized with the consequent benefit to the speed of operation of the vehicle.

Although in a preferred construction the ski member is eccentrically mounted on its pivot and the bias is provided by the unbalanced weight of the ski, a spring can be used to either act as a sole biasing means or to assist the bias of the unbalanced weight of the ski member.

According to a feature of the present invention the jacks are mounted on a telescopic sub frame and are provided with fluid pressure operated piston and cylinder means to move the jacks between a retracted transportation position closely adjacent the vehicle frame and a selected extended operating position.

According to a still further feature of the invention the rail engaging clamps for each rail comprises a pair of cooperating hook elements pivotally attached to the said frame, hydraulic means being provided to move the hook elements to open and close the clamps and a toggle link for each hooked element connected on the one hand to the hook element midway along its length and on the other hand to an operating element of the associated piston and cylinder means, and toggle link being adapted to lock vertically when the hook engages the ball of the rail.

The following is a description by way of example of

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one embodiment of the present invention reference being had to the accompanying drawings in which:

FIGURE 1 is a side elevation of a jack showing the ski member;

FIGURE 2 is a front view partly in section showing the jacks retracted inwardly into the transportation position and lifted out of engagement with the ballast;

FIGURE 3 is an enlarged detail looking in the same direction as in FIGURE 2; and

FIGURE 4 is an underneath plan view illustrating rail clamping means.

Turning now to the drawings:

The main vehicle frame 10 has a cross member 11 and is braced by bracing members 12 and carries a sub frame 14 mounted for up and down movement relative to the main frame 10 under the action of a hydraulic piston and cylinder jack 16. The sub frame 14 comprises a cross head 14a, side members 14b depending therefrom, support member 14c extending between the side members 14b, brackets 14d on the support member 14c and suspended from the support member, a main cross member 18 which rests on rail engaging wheels 19 mounted on bearing members 19b (see FIGURES 1 and 4) attached to the under side of member 18 when the sub frame is lowered. The main cross member 18 is of box-like construction formed of two side channels 18a and top and bottom plates 18b. The lifting jacks 20 are mounted on telescopic slides 21 slidable within the box-like construction of the member 18 under the action of hydraulic piston and cylinder means 22 connected on the one hand to bracket 21a of the slide and on the other hand to a fixed frame member 21b. The jacks 20 move between a retracted transportation position as seen in FIGURE 2 in full lines and a selected ballast engaging operating position as shown in the dotted lines in FIGURE 2. It will be appreciated that the degree to which the jacks 20 are moved outwardly of the rails 30 depends upon the nature of the ballast in which the vehicle is operating.

The jacks 20 each have jack rods 25 provided with clevises 26 which engage the web 27 of the ski members S and a pivot pin 28 pivotally mounts the ski member on the jack rod.

The ski member S has a plate-like ballast engaging shoe 32 and upturned leading and trailing shoe edges 32a and 33, respectively, the web 27 upstanding from the top of the shoe 32. The ski member S is shown in FIGURE 1 eccentrically mounted on its pivot pin 28, that is the leading edge 32 of the ski member is shorter than the trailing edge 33 and therefore the superior weight of the trailing edge 33 will cause the ski member to be biased in a clockwise direction, as viewed in FIGURE 1, about its pivot pin 28. Clearly this biasing could be arranged by weighting the trailing edge 33 or providing a spring 34 or some other suitable means which would insure that when the ski member is out of jacking engagement with the ballast 35 it should tend to move under its bias angularly about the pivot pin 28 in the vertical plane so that when there is no jacking pressure exerted on this ski and it is substantially clear of the ballast, the ski member swings until its web 27 or other part of the ski member will trip a micro-switch 40. This micro-switch 40, in well known manner, operates a solenoid operated valve to terminate the upward stroke of the jacks 20 and thereby stop the raising of the ski member. Thus, the ski member S can be lifted clear of the ballast to a minimum degree to permit the vehicle to move along the track. Because of the nature of the pivotal mounting of the ski member S to the clevises 26, should the trailing edge of the ski member S strike some raised obstruction while the vehicle is in movement, all that will happen is that the ski member S will be rocked about its pivot pin to clear the obstruction. Preferably a tension spring 34 is used in addition to the

eccentric mounting to provide as fast an operation of the micro-switch as possible.

Each clamping device C comprises a pair of hook members 36 pivotally mounted at pivot points 37 on the sub frame 13. Beneath the sub frame 13 there is provided a pair of floating hydraulic jacks 41 and 41A (see FIGURE 2) to the ends of which are attached slides 46, 47, 48, 49. When fluid pressure is admitted to the cylinder 40 and 41 through flexible conduits (not shown) both the piston and cylinders of the jacks move relative to each other, in the instance of the jack 41, towards each other to pull the outer hooks into engagement with the rails and in the instance of the jack 41A away from each other, to push the inner hooks into engagement with the rails. Toggles T, engage the hooks 36 near their mid points and are connected to the slides at their other ends. In the locked position the toggles T snap into a vertical position and bushing B bear against the back of the hooks to rigidly lock the hook tips 36a to the ball of the rail.

Thus it will be observed that for track transportation the jack 16 may be operated to raise the sub frame 13 up into the main frame 10, the clamping means of course being disengaged from the rails and the pistons 22 operated to retract the telescopic slides 21 thereby pulling the jack elements 20 close to the vehicle frame.

When the vehicle is to be operated, the jack 16 is operated to lower the sub frame 13 onto the rails 30 on its wheels 19 and the cylinders 22 are operated to extend the telescopic slides 21 and to move the jacks 20 out into operative position relative to the rails 30. The jacks 20 are operated, when a jacking operation is actually required and the ski members S move down into lifting engagement with the ballast whilst the cylinders 41 and 41A are operated to clamp the sub frame to the rails. When the operation has been completed the clamps are released and the jacks 20 operated to lift the ski member S out of jacking engagement with the ballast 35 sufficiently to enable the ski 28 to rotate about its pivot 28 and cause the switch 40 to be tripped to terminate the upward movement of the piston of the jack 20. The vehicle is then moved forward to the next place of jacking, the jack 20 is operated to lower the ski members S into the ballast whilst the cylinders 41 and 41A are operated, and the jacking sequence repeated.

What I claim as my invention is:

1. A railroad track lifting jack apparatus, mounted on the frame of a track working vehicle provided with rail engaging clamps, which lifting jack is adapted to engage the ballast externally and on each side of the track rails, comprising a pair of transversely spaced jacks each having a ballast engaging ski member pivotally mounted on a pivot on a downwardly depending rod; a fluid pressure operated piston and cylinder arrangement for reciprocating the jack rod to lower and raise the ski member into and out of engagement with the ballast; said ski member being biased to adopt a first angular position in a vertical plane on its pivot relative to the jack rod when the ski member is out of jacking engagement with the ballast and to be moved, against the bias, out of said first angular position by contact with the ballast; and switch means fixed relative to the frame for terminating raising action of the piston and cylinder arrangement and operable by the ski member when in a predetermined angular position on the pivot.

2. A railroad track lifting jack apparatus mounted on the frame of a track working vehicle formed with rail engaging clamps which lifting jack apparatus is adapted to engage the ballast externally and on each side of the track rails, comprising a pair of transversely spaced jacks each having a ballast engaging ski member pivotally mounted on a pivot on a downwardly depending rod; a fluid pressure operated piston and cylinder arrangement for reciprocating the jack rod to lower and raise the ski member into and out of engagement with the ballast;

said ski member being biased to adopt a first angular position in a vertical plane on its pivot relative to the jack rod when the ski member is out of jacking engagement with the ballast and to be moved, against the bias, out of said first angular position by contact with the ballast; and switch means fixed relative to the frame for terminating raising action of the piston and cylinder arrangement and operated by the ski member when it moves to the said first angular position under the action of its bias on jackingly disengaging the ballast.

3. Apparatus as claimed in claim 2 in which the ski member is eccentrically mounted on its pivot and the bias is proved by the unbalanced weight of the ski member.

4. Apparatus as claimed in claim 2 in which spring means are connected to the ski and to the jack rod whereby to provide a bias.

5. Apparatus as claimed in claim 1 in which the jacks are mounted on a telescopic sub frame and fluid pressure piston and cylinder means are located on the sub frame and adapted to move the jacks between a retracted transportation position closely adjacent the vehicle frame to a selected extended operating position.

6. Apparatus as claimed in claim 5 in which fluid operated piston and cylinder means are connected between the vehicle frame and the sub frame and are adapted to raise the sub frame for transportation along the track on the vehicle and to lower the sub frame to a lower operative position when track working is to be done.

7. Apparatus as claimed in claim 5 in which the rail engaging clamps for each rail comprises a pair of co-operating hook elements having tips, which hook elements are pivotally attached to a pivot point on the sub frame, fluid pressure operated piston and cylinder means for moving the hook elements to open and close the clamps and a toggle link for each hook element connected to the hook element at a point substantially midway between the pivot point and the hook tip and to an operating element of the associated piston and cylinder means, the toggle link being adapted to lock vertically when the hook engages the ball of the rail.

8. Railroad track lifting, jack apparatus mounted on the frame of a track-working vehicle provided with rail engaging clamps, which lifting jack is adapted to engage the ballast externally and on each side of the track rails, comprising a pair of transversely spaced jacks each having ballast engaging members pivotally mounted on a pivot connected to a downwardly depending jack rod; a fluid pressure operated piston and cylinder arrangement for reciprocating the jack rod, to raise and lower the ballast engaging member into and out of engagement with the ballast; said ballast engaging member being biased to adopt a first angular position in a vertical plane relative to the jack rod, when the ballast engaging member is out of engagement with the ballast and to be moved against the bias out of said first angular position by contact with the ballast; and switch means operable by the ballast engaging member when in a predetermined angular position on the pivot to control the operation of the raising action of the piston and cylinder arrangement.

9. Apparatus as claimed in claim 8 in which the ballast engaging member is weighted so as to provide the bias.

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