July 4, 1961 R. G. KERSHAW 2,990,786

APPARATUS FOR RAISING RAILROAD TRACKS

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Fig. 1

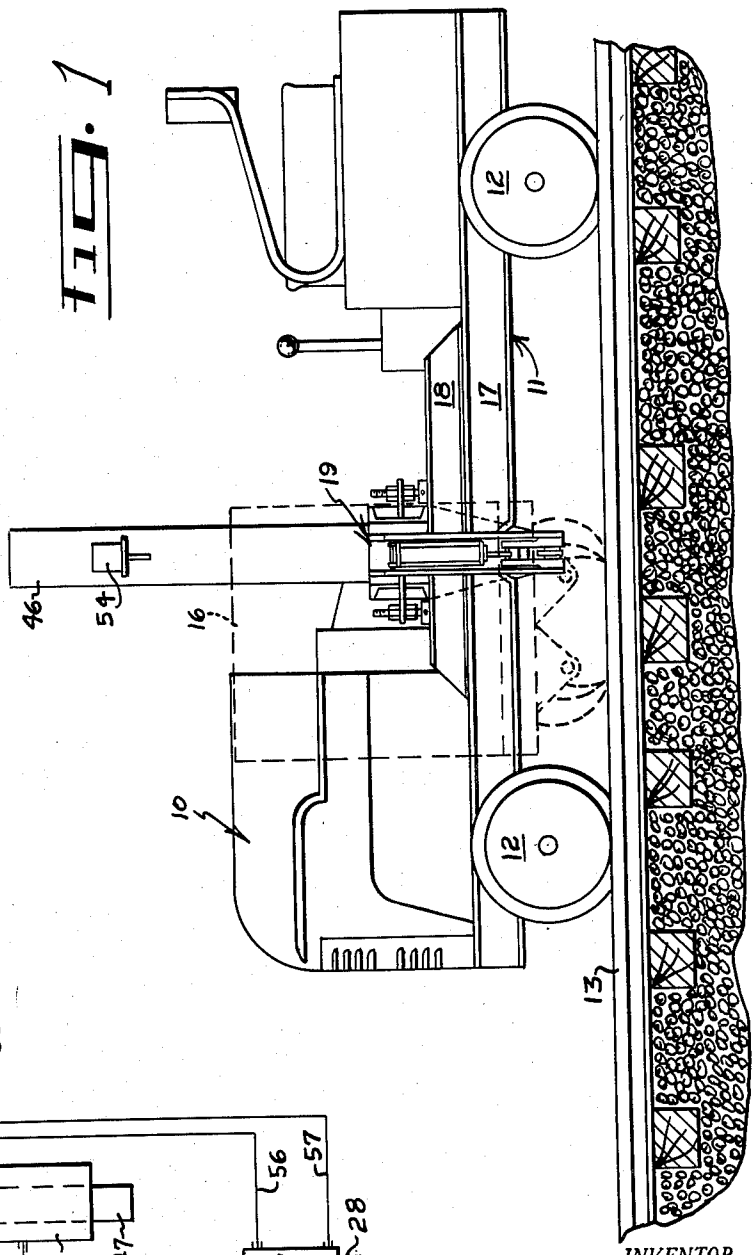
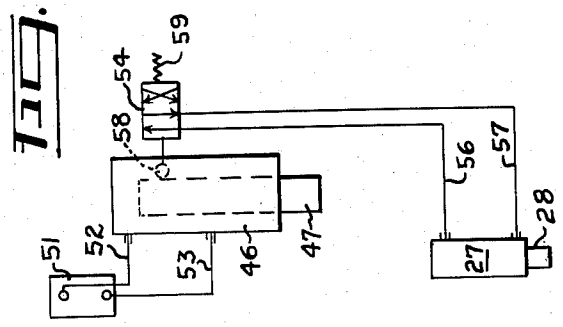


Fig. 6



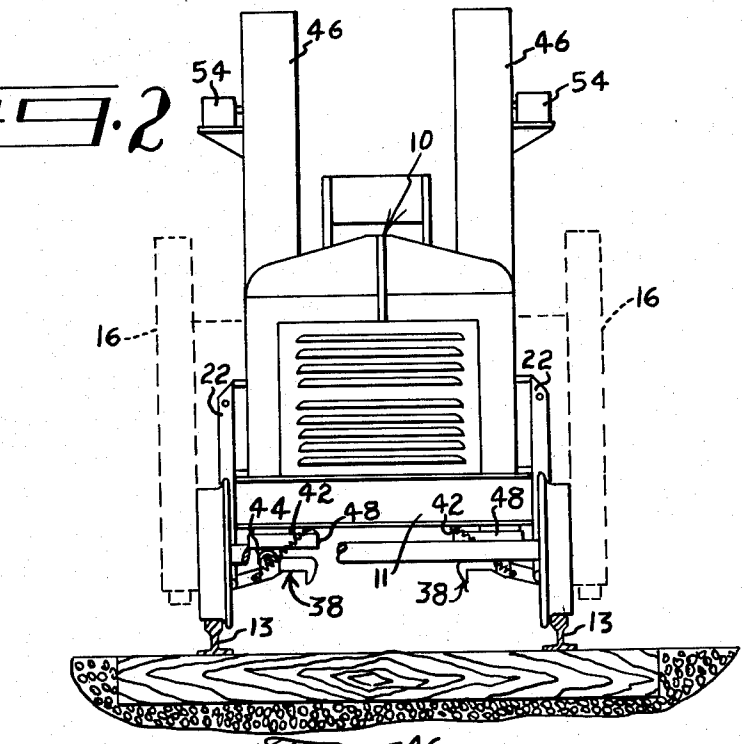
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APPARATUS FOR RAISING RAILROAD TRACKS

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FIG. 2



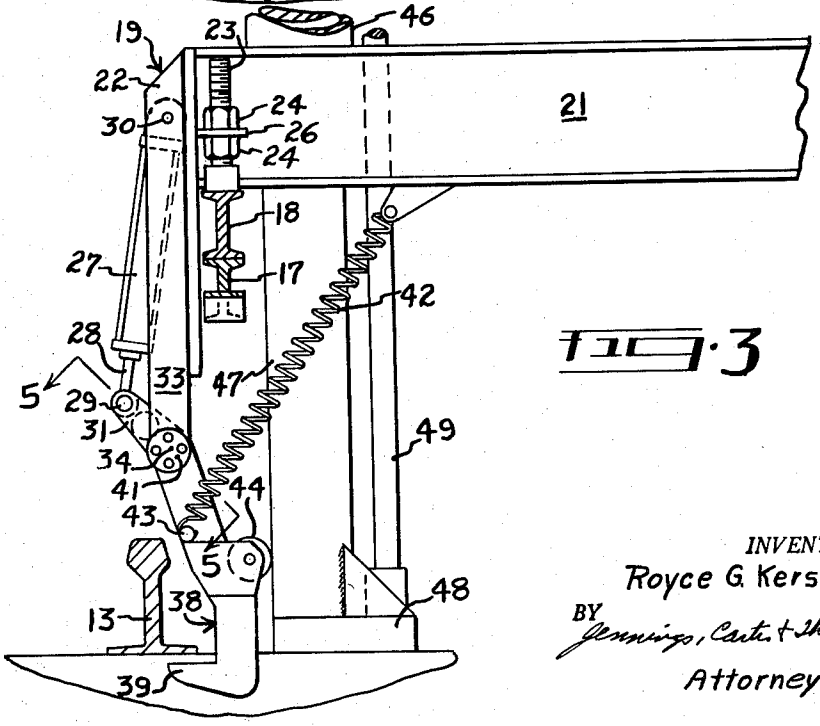


FIG. 3

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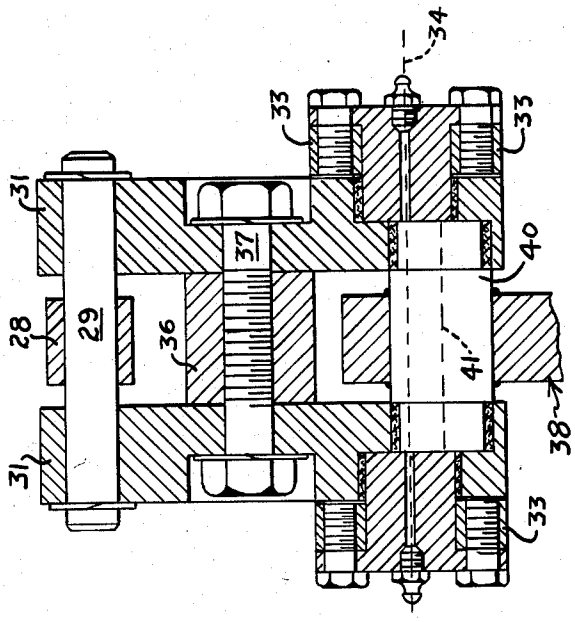


FIG. 5

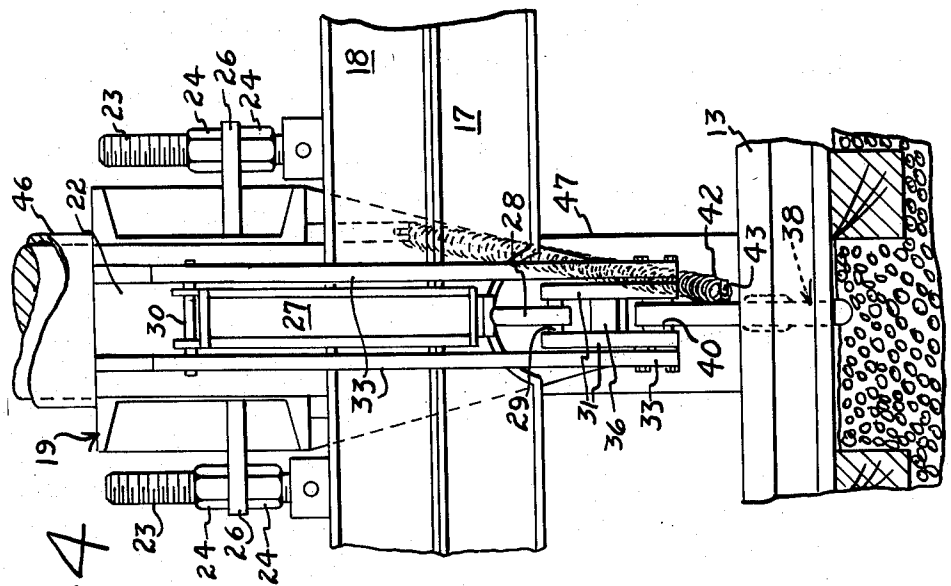


FIG. 4

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APPARATUS FOR RAISING RAILROAD TRACKS

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9 Claims. (Cl. 104—7)

This invention relates to apparatus for raising railroad tracks from the roadbed of a railroad and more particularly to such apparatus in which the underside of the base of the rails is tightly gripped by rail dogs.

It is an object of the present invention to provide track raising equipment having rail dogs that pivot beneath the underside of the base of the rails and that move vertically to grip the base of the rails tightly after they are pivoted beneath the rails.

It is a further object of my invention to provide rail dogs in track raising apparatus that are positioned automatically in gripping relation beneath the rails through the raising and lowering of the hydraulic jack means and without the actuation of any controls other than the controls for the jack means.

It is an additional object of my invention to provide jack operated rail dogs that are positioned in retracted position beneath the lower end of the jack means so that downward movement of the jack means force the dogs beneath the rails and retain the dogs in position beneath the base of the rails so long as the jack means are in lowered position.

Heretofore, in apparatus for raising railroad tracks, it has been common to engage the head or ball of the rails with the rail dogs to lift the track. With these previous arrangements, it has not been possible to engage the rails at the joints connecting adjacent rails as the splice or joint bars extending between adjacent rails are disposed adjacent the web of the rails and obstruct the rail dogs. Further, it has been very difficult with rail dogs gripping the ball of the rails to obtain a tight connection with the rails as the underside of the head of the rails is sloping and the rail dogs tend to slide outwardly from the rails. It is highly desirable to have a tight gripping action between the rails and the rail dogs when the track is raised as relative movement between the vehicle and the rails is apt to occur if the rails are not tightly gripped by rail gripping means, especially if a tamping operation is being performed while the track is lifted.

The present invention comprises track raising apparatus in which rail dogs tightly grip the flat underside of the base of the rails. The rail dogs have pointed ends and are pivotally mounted in retracted position in contact with the lower end of the jack means so that upon downward movement of the jack means the rail dogs are pushed under the base of the rails by the jack means. Even though the ballast is firmly packed, the ends of the rail dogs dig in the ballast under the force of the jack means and are positioned under the base of the rails. Further, the jack means are disposed directly adjacent the rail dogs in the lifted position of the track and thereby retain the rail dogs in position under the base of the rails without any danger of the rail dogs slipping from beneath the rails.

Only a single manual control is required for the combined operation of my rail dogs and jack means. Upon actuation of the manual control in one direction, the jack means move downwardly and push the rail dogs under the rails and, at a predetermined position, automatically actuate means for lifting the rail dogs. Likewise, upon actuation of the manual control to lift the jack means, the rail dogs are automatically released from the rails and pivot inwardly of the vehicle to retracted position upon continued upward movement of the jack means.

Apparatus embodying features of my invention is shown in the accompanying drawings, forming a part of this application, in which:

FIG. 1 is a side elevational view of my invention shown mounted on the railway vehicle adapted for tamping ballast;

FIG. 2 is a front end elevational view of my invention mounted on a railway vehicle and showing the rail dogs in retracted position in contact with the lower ends of the jack means;

FIG. 3 is a fragmentary, enlarged end elevational view, certain parts shown in section, of one of my rail dogs shown in position under a rail and before the rail dog is moved vertically to grip the underside of the rail;

FIG. 4 is a fragmentary, side elevational view of the rail dog shown in FIG. 3;

FIG. 5 is a sectional view taken generally along the line 5—5 of FIG. 3 and showing the off-center relationship of the rail dogs; and,

FIG. 6 is a diagrammatic view showing generally the cam means and hydraulic system for operating one of my rail dogs.

Referring now to the drawings, I show a railway vehicle indicated generally by the numeral **10** having a main frame **11** mounted on wheels **12** for riding on rails **13** of a railroad track. A tamping mechanism indicated in dotted lines on FIGS. 1 and 2 at **16** is mounted on my railway vehicle **10** to indicate a specific use for which the present invention is adaptable, it being understood that my invention could be used for lifting rails on any desired railway vehicle **10**.

The main frame **11** comprises longitudinal I-beams **17** and **18** mounted on each side of vehicle **10**. Mounted on the upper side of I-beam **18** is a rail dog frame indicated generally by the numeral **19** (see FIGS. 3 and 4) adapted for vertical movement relative to main frame **11**. Only half of rail dog frame **19** is shown in FIGS. 3 and 4, it being understood that the other half is identical to that shown. The rail dog frame **19** comprises a cross beam **21** having a bracket **22** secured to each end thereof. A pair of threaded studs **23** is secured to the upper surface of I-beam **18** and adjusting nuts **24** engage studs **23**. An extension **26** secured to the cross beam **21** and bracket **22** extends outwardly from each side thereof and the studs **23** extend through openings in the extensions **26**. Thus, it is evident that upon the adjustment of nuts **24**, rail dog frame **19** may be moved relative to main frame **11** and thereby adapt my apparatus for use on rails of different heights.

A cylinder **27** is pivotally mounted by a pin **30** to side plates **33** of bracket **22** and has a piston rod **28** extending downwardly therefrom. The lower end of piston rod **28** is connected by a pin **29** to a pair of links **31** which are pivotally connected to side plates **33** of bracket **22** along a central axis indicated at **34**. A spacer block **36** is positioned between links **31** and is secured thereto by means of bolt **37**. A rail dog indicated generally by the numeral **38** is pivotally mounted between links **31** on pin **40** and is adapted to pivot freely relative to links **31**. The central axis of pin **40** is indicated by the dotted line **41** and as shown in FIG. 3, the central axis indicated at **41** is positioned off center from the central axis of the links **31** indicated at **34**. A hook **39** having a flat upper surface is provided on rail dog **38** and is adapted to engage the underside of the base of rail **13**. Hook **39** has a pointed end so that it will dig into the ballast when pressure is exerted thereon.

Rail dog **38** is continuously urged upwardly to a retracted position shown in FIG. 2 by spring **42** connected at its upper end to cross beam **21** and at its lower end

to pin 43 secured to rail dog 38. A roller 44 is mounted for rotation on the inner side of rail dog 38.

A jack cylinder 46 is mounted on each side of railway vehicle 10 and has a downwardly projecting piston rod 47. An end plate 48 is secured to the lower end of piston rod 47 and a guide rod 49 is secured to plate 48 to prevent piston rod 47 from turning relative to cylinder 46. As shown in the retracted position in FIG. 2, roller 44 is in contact with plate 48 and upon downward movement of piston rod 47, rail dog 38 is pushed under the base of rail 13. After the rail dog 38 is in position under rail 13, it is retained in such position so long as piston rod 47 is in its downward position as roller 44 is in contact with piston rod 47 and the rail dog 38 cannot move inwardly or slip from under the base of the rail. This is an important safety advantage.

In the position of the dog 38 in FIG. 3, the dog has not been moved vertically to engage the underside of the rail 13 in "locked" position. To lift the rail dog 38 after it has been pushed under the rail 13 by the downward movement of piston rod 47, and referring also to FIG. 5 in which the rail dog 38 is pivotally mounted on the axis indicated by numeral 41, it is evident that upon actuation of cylinder 27 to move the piston rod 28 downwardly, the links 31 will move downwardly about the axis indicated by line 34 and will lift the rail dog 38 into contact with the underside of the rail 13. Upon the pivotal movement of links 31 the rail dog 38 moves about axis 41 relative to the axis 34 of the rail dogs. Upon movement of the piston rod 28 upwardly, the rail dog 38 will be moved downwardly away from the underside of the rail 13.

Referring now to FIG. 6 in which the means for operating one of my rail dogs 38 is shown diagrammatically, a manual three position valve 51 is shown for controlling the jack cylinder 46 through fluid lines 52 and 53. A four-way cam operated, spring offset valve 54 is provided to control rail dog cylinder 27 through flow lines 56 and 57. The movement of valve 54 is controlled mechanically by a cam roller 58 which is disposed to operate against piston rod 47 of jack cylinder 46. Cam roller 58 is an integral part of valve 54 and spring 59 urges roller 58 and valve 54 toward piston rod 47 as shown in FIG. 6. When jack cylinder 46 is actuated downwardly and after rail dog 38 is positioned under the rail 13 (see FIG. 3), the upper end of piston rod 47 passes beneath cam roller 58 permitting the spring loaded cam roller 58 to shift along with the shifting of valve 54. Upon shifting of valve 54 to the left viewing FIG. 6, piston rod 28 is lowered to pull rail dog 38 upwardly against the underside of rail 13.

Upon raising piston rod 47, the upper end thereof cams the cam roller 58 and valve 54 to the position shown in FIG. 6. Thus, the fluid flow to cylinder 27 is reversed to raise piston rod 28 and release rail dog 38 from gripping contact with the underside of rail 13. Spring 42 pulls rail dog 38 from under rail 13 upon further upward movement of piston rod 47 so that roller 44 contacts the underside of plate 48 when piston rod 47 is in its retracted position.

In operation, manual valve 51 is actuated to move jack cylinders 46 downwardly. When jack cylinders 46 reach a predetermined downward position after the rail dogs 38 have been pushed under the rails thereby, valve 54 shifts and results in the raising of hooks 39 of rail dogs 38 into locking engagement with the underside of rails 13. Rail dogs 38 remain in this position until jack cylinders 46 are lifted.

From the foregoing, it is clear that I have provided a single manual control for actuating jack cylinders 46 and rail dog cylinders 27. No separate controls are necessary to actuate the rail dogs 27 and they are actuated automatically at a predetermined position by the movement of jack cylinders 46. The rail dogs 38 are forced or pushed downwardly under the rails 13 by piston rods 47 and thereby can move through the ballast even though the ballast is tightly packed. Also, while the jack cylinder 46 is in a downward position the rail dogs 38 are prevented from slipping from beneath the rails since piston rods 47 are in contact with rollers 44 on rail dogs 38.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In apparatus for raising the rails of a railroad track from a roadbed, a vehicle having a frame and wheels supporting the same on the rails, a fluid pressure cylinder mounted on the frame and having a piston rod extending downwardly to exert thrust against the roadbed, a rail dog pivotally mounted on the frame and contacting the underside of the piston rod in the retracted position thereof, said rail dog having a generally pointed end and being pushed downwardly by the piston rod under the base of the rail upon downward movement of the piston rod, and said rail dog contacting the piston rod after it has been pushed under the rail thereby preventing the rail dog from moving from beneath the rail while the piston rod is in its downward position in contact with the roadbed.

2. In apparatus for raising the rails of a railroad track from a roadbed, a vehicle having a frame and wheels supporting the same on the rails, fluid pressure means having relatively movable parts mounted substantially vertically on the frame with one movable part extending downwardly to exert thrust against the roadbed, a rail dog pivotally mounted on the frame adjacent said one movable part and disposed to contact the underside of a rail adjacent thereto, said dog being mounted for pivotal movement beneath the rail upon downward movement of said movable part and being retained under the rail by the movable part until the movable part is raised, and means pulling said dog upwardly relative to the vehicle when said dog is positioned beneath the rail, said means being actuated automatically upon said movable part reaching a predetermined downward position whereby said dog is pulled upwardly tightly against the underside of the rail.

3. In lifting apparatus for raising the rails of a railroad track from a roadbed, a vehicle having a frame and wheels supporting the frame on the rails, fluid pressure means having relatively movable parts mounted substantially vertically on the frame with one movable part adapted to extend downwardly to exert thrust against the roadbed, a rail dog pivotally mounted on the frame adjacent said one movable part and adapted to contact the underside of a rail adjacent thereto, said dog being mounted for pivotal movement beneath the rail upon downward movement of said movable part and for movement from beneath the rail upon upward movement of said movable part, means pulling said dog upwardly relative to the vehicle when it is positioned beneath the rail, said means being actuated to pull said dog upwardly tightly against the underside of the rail upon said movable part reaching a predetermined downward position, and said means being actuated to release said dog from contact with the underside of the rail upon said movable part reaching a predetermined upward position after its downward movement whereby said rail dog may be pivoted from beneath the rail.

4. In apparatus for lifting the rails of a railroad track from a roadbed, a vehicle having a frame and wheels supporting the frame on the rails, fluid pressure means having relatively movable parts mounted substantially vertically on the frame with one movable part adapted to extend downwardly to exert thrust against the roadbed whereby said frame is moved vertically, a rail dog pivotally mounted on the frame adjacent said one movable part and being pivoted between retracted position in con-

tact with the lower end of said one movable part and lowered position beneath the rail, resilient means urging said rail dog upwardly to retracted position in contact with one said movable part, said rail dog being pivoted beneath the rail by said movable part upon downward movement of said movable part against the urging of said resilient means and being pivoted from beneath the rail by said resilient means upon the upward movement of said movable part, said movable part engaging and securing the rail dog beneath the rail when in engagement with the roadbed, means pulling said dog upwardly relative to the vehicle when it is positioned beneath the rail, said means being actuated upon said movable part reaching a predetermined downward position to pull said dog upwardly tightly against the underside of the rail and being actuated upon said movable part reaching a predetermined upward position to lower said dog from contact with the underside of the rail whereby said dog may be pivoted by said resilient means to retracted position.

5. Apparatus defined in claim 4 further characterized in that a roller is positioned on said dog and is adapted to contact the underside of said one movable part in the retracted position of the dog whereby said dog may be lowered through said roller upon lowering of said one movable part.

6. In apparatus for lifting the rails of a railroad track from a roadbed, a vehicle having a frame and wheels supporting the frame on the rails, a pair of fluid pressure cylinders mounted substantially vertically on the frame with the piston rods thereof adapted to extend downwardly to exert thrust against the roadbed whereby said frame is moved vertically, rail dogs pivotally mounted on the frame and adapted to be pivoted between retracted position in contact with the lower end of the piston rods and lowered position beneath the rails, said rail dogs adapted to be pivoted beneath the rails upon downward movement of said piston rods and to be pivoted from beneath the rails upon upward movement of said piston rods, means pulling said dogs upwardly relative to the vehicle when they are positioned beneath the rails, said means being actuated automatically upon said piston rods reaching a predetermined downward position to pull said dogs upwardly tightly against the underside of the rails and being actuated automatically upon said piston rods reaching a predetermined upward position to lower said dogs from contact with the underside of said rails.

7. Apparatus defined in claim 6 in which resilient means urge said rail dogs upwardly to retracted position in contact with said one movable part.

8. In apparatus for lifting the rails of a railroad track from a roadbed, a vehicle having a frame and wheels supporting the frame on the rails, reciprocable fluid pressure means having relatively movable parts mounted substantially vertically on the frame with one relatively movabe part adapted to extend downwardly to exert thrust against the roadbed, a rail dog pivotally mounted on the vehicle generally over a rail and adapted to be pivoted between retracted position above the rail and lowered position beneath the rail, and a second reciprocable fluid pressure means mounted on said vehicle and having relatively movable parts, a link operatively connected at one end to one of said relatively movable parts of said second fluid pressure means and pivotally connected at its other end to said frame, said rail dog being pivotally connected to said link for free pivoting relative to said link and having a pivotal axis offset horizontally from the pivotal axis of said link on said frame, the pivoting of said link moving the pivotal axis of said rail dog in a generally vertical direction whereby upon actuation of said second fluid pressure means said link is pivoted and moves the rail dog in a vertical direction thereby allowing said rail dog to be pulled tightly against the underside of the rail when in lowered position beneath the rail.

9. Apparatus defined in claim 8 in which cam means is actuated by said one movable part of the first mentioned fluid pressure means at predetermined positions to control the actuation of said second reciprocablie fluid pressure means and the vertical movements of said rail dog thereby.

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