May 5, 1942. L. G. PLANT ET AL 2,281,595

APPARATUS FOR SERVICING RAILWAY RUNNING GEAR

Filed April 11, 1941 3 Sheets-Sheet 1

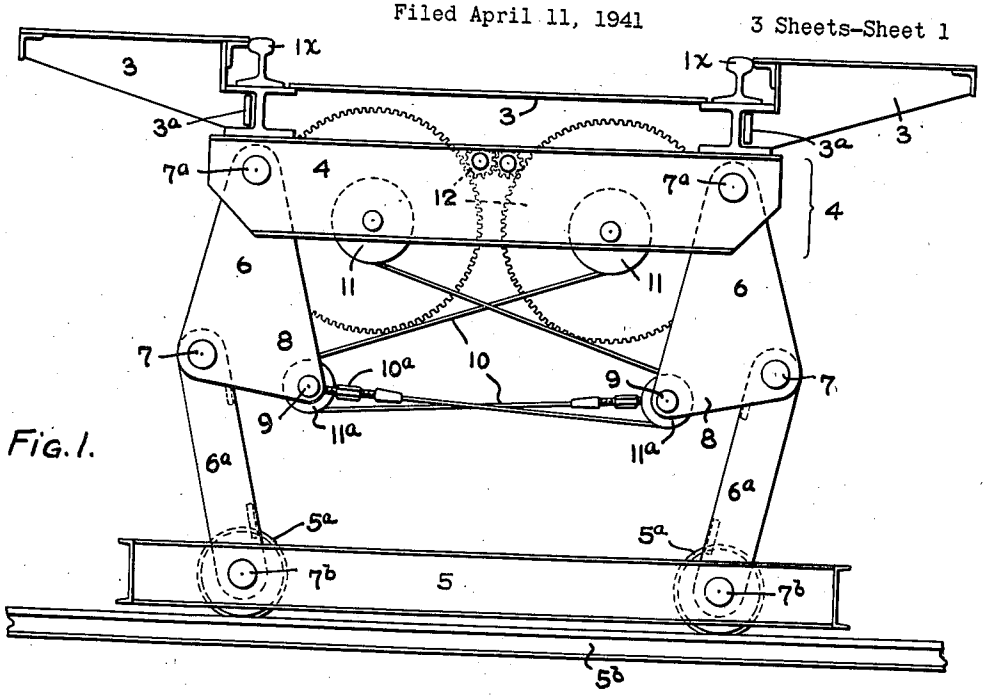


Fig. 1.

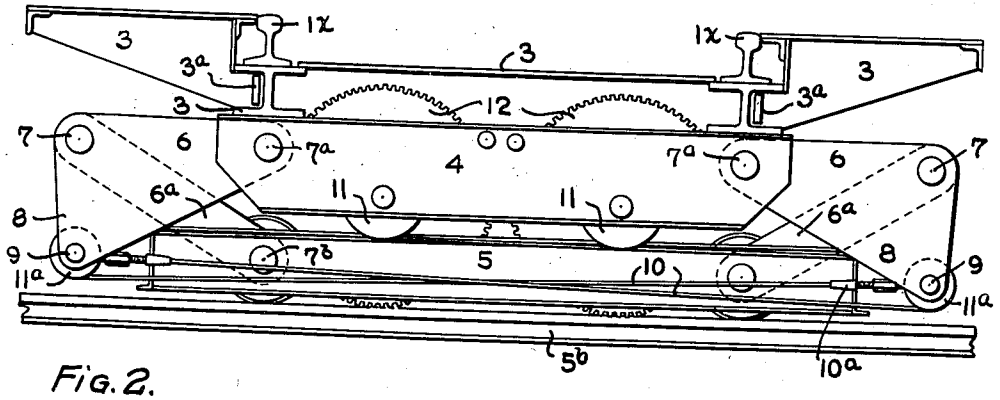


Fig. 2.

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APPARATUS FOR SERVICING RAILWAY RUNNING GEAR

Filed April 11, 1941 3 Sheets-Sheet 2

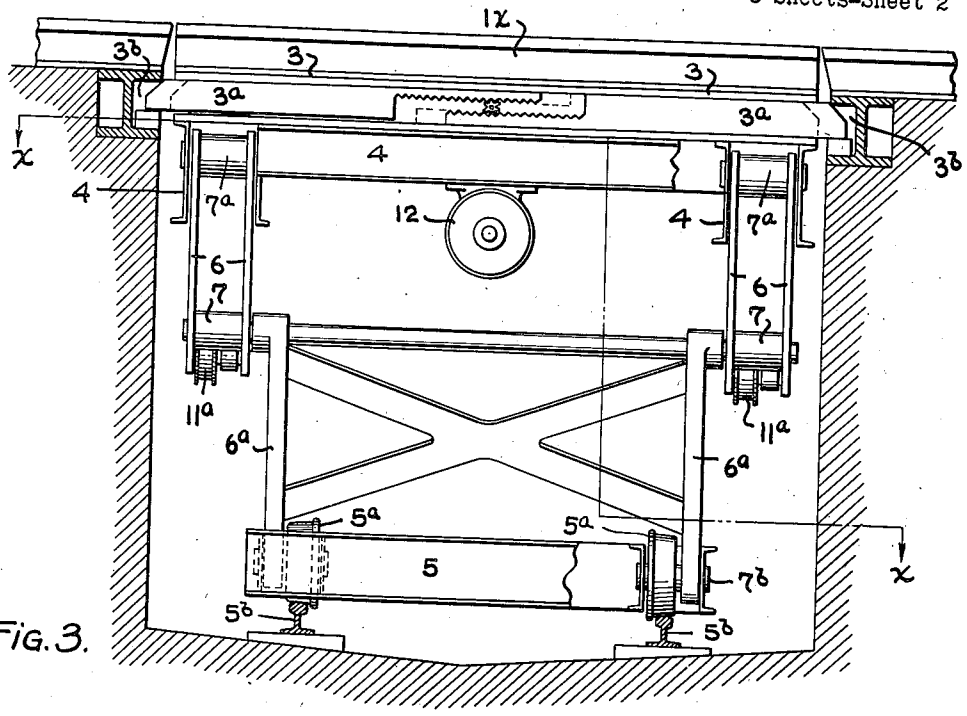


FIG. 3.

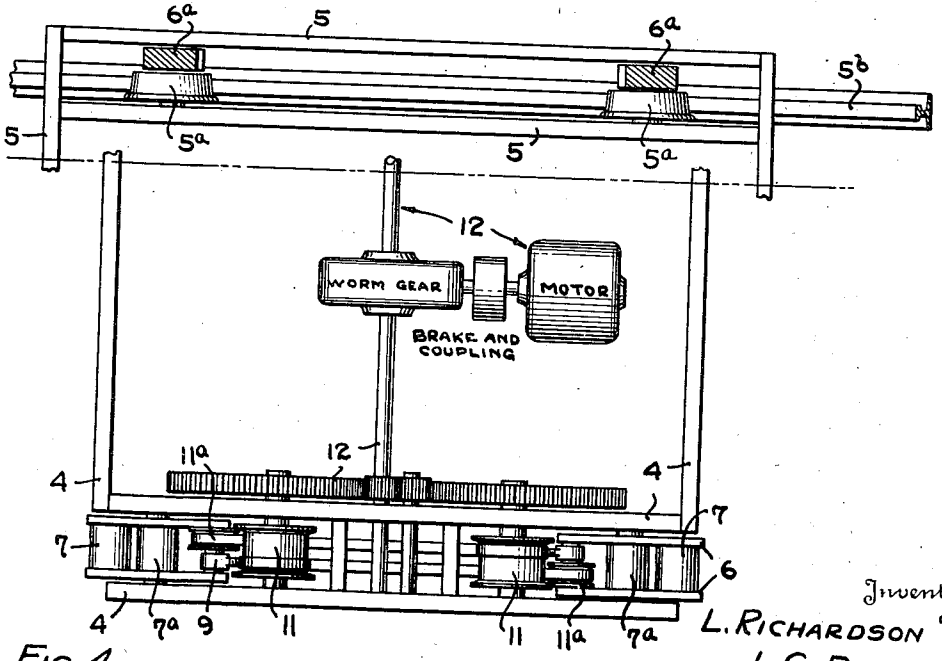


FIG. 4.

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APPARATUS FOR SERVICING RAILWAY RUNNING GEAR

Filed April 11, 1941 3 Sheets-Sheet 3

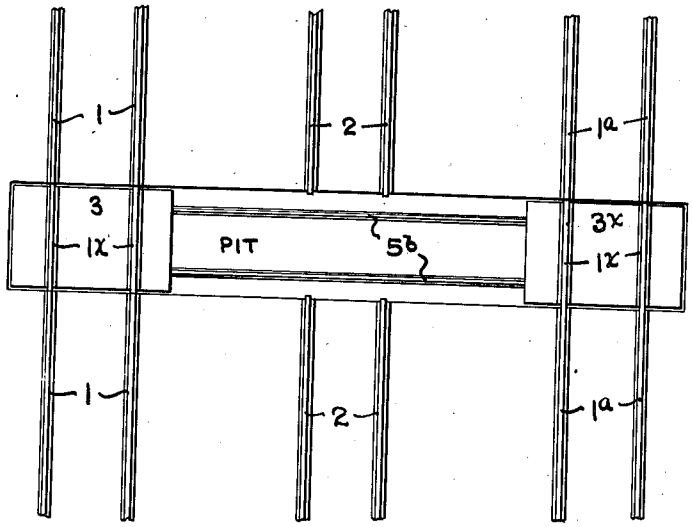


Fig. 5.

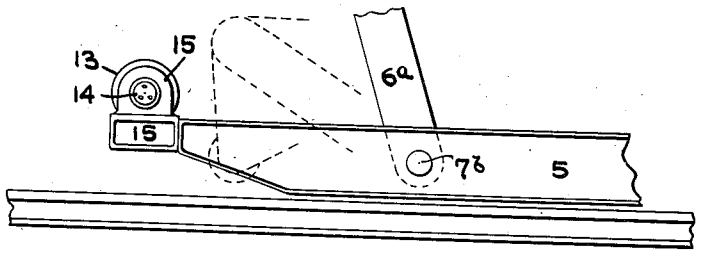


Fig. 6.

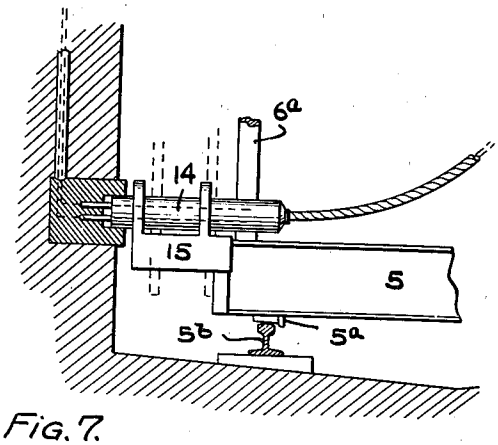


Fig. 7.

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2,281,595

UNITED STATES PATENT OFFICE

2,281,595

APPARATUS FOR SERVICING RAILWAY RUNNING GEARS

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Application April 11, 1941, Serial No. 388,154

1 Claim. (Cl. 104—32)

This invention relates to mechanism for the removal from and replacement in railway rolling stock of entire trucks or of wheels and axles. It is for an improvement in that type of such mechanism, commonly designated as a drop table, which provides for lowering and raising the section of track on which rest the wheels to be removed or replaced, with provision for shifting said table transversely, when in the lowered position, so that it can be raised to the track level in alignment with any of several tracks, for the purpose of transferring said truck and/or wheels removed from rolling stock on one track, to another track.

Several recent developments in rail transportation have increased the need for efficient facilities to perform this servicing operation at many locations where such equipment was not previously required or makeshift means sufficed. Principally, it is necessary now to minimize the time that rolling stock is held out of productive service on account of wheel repairs or replacements. Vastly increased cost per unit of motive power, both steam and Diesel engine propelled, is responsible for this necessity. Also, the running gear of high speed, stream-lined trains demand frequent and special servicing.

The object of this invention is not so much to overcome the faults of existing drop table mechanism, which has been quite highly developed in certain types, notably the invention of Blake—Patent No. 1,849,972 and Minty—Patent No. 2,111,917; but rather to effect a construction that will retain advantages of such earlier inventions, yet be adapted to installation at less construction cost in a relatively shallower pit.

Every inch saved in depth of pit required for equipment designed to accommodate wheels of a certain size, may substantially reduce the pit cost, especially where water is encountered near the surface of the ground in which the pit is to be excavated. The present invention minimizes required pit depth by employing a knee action device in which toggle arms are supplemented by crank leverage to equalize the power required for raising a table from its lowest position, with the power required to attain its maximum lift.

As in the Blake invention, the present apparatus is adapted to utilize wire ropes, winding upon drums, to lift the table, in lieu of the screw shafts necessary to other types of drop tables, said screw shafts being open to objection on the ground of first cost, maintenance cost and structural rigidity. Economy in structure and efficiency of mechanism in comparison with existing equipment may therefore be regarded as the general objectives of this invention, achieved notably in its application to a table adapted for handling a single pair of wheels in a Diesel locomotive with its traction motor attached to said wheels.

The manner in which these objectives are attained and the extent to which they are developed is shown by the following wherein:

Fig. 1 is an elevation of the drop table in its raised position, viewed in a plane transverse to one of the railway tracks served by said table.

Fig. 2 is an elevation of the drop table in its lowered position, viewed in the same plane and location as in Fig. 1.

Fig. 3 is an end elevation of the drop table, raised as in Fig. 1, showing a cross-section of the pit in which it can travel transversely to the railway tracks it is adapted to serve.

Fig. 4 is a sectional view of the drop table mechanism viewed in horizontal planes at the elevations indicated by line X—X in Fig. 3.

Fig. 5 is a general plan view of railway tracks, in an arrangement typical of that to be served by the drop table mechanism of this invention.

Fig. 6 shows an elevation of a bracket adapted to be supported on the truck frame of the drop table, as indicated, said bracket having a notch, recess or hole (as shown) through which an electric conduit plug, when inserted, will register with an electric conduit socket in a side wall of the drop table pit, when said table is in proper alignment with one of the railway tracks to be served.

Fig. 7 is a cross section through the pit wall socket of Fig. 6, showing the bracket on end of drop table truck frame and an electric conduit plug inserted in said socket, in line with a hole on side of the bracket, through which said plug extends. In this drawing an electric power circuit is indicated, through which, when thus connected, current is supplied from an extraneous source, to operate the motor, by means of which power the drop table is raised or lowered.

An index to the parts of this invention identified by numerals on the above drawings, is tabulated, as follows:

1, 1*a*, *etc.* Railway tracks on which rolling stock is placed for having its wheels and/or trucks removed and replaced.

1*x*. That section of tracks 1, 1*a*, etc. which is adapted to be raised, lowered and shifted in a pit transverse to said tracks, by means of this drop table mechanism.

2. A track adapted to receive trucks and/or

wheels removed from tracks, 1, 1a, etc. and transferred to it by means of the invention.

3. The platform on which track section 1x is mounted. NOTE.—This platform 3, is illustrated as being separable from the sub-mechanism used for lowering it into the pit, in which situation, said platform is supported, with its rails 1x, in alignment with rails 1 or 1a, etc., by means of latches resting on pockets in the sides of the pit. In this invention, platform 3, may be constructed as an integral part of the upper frame structure for this drop table sub-mechanism.

3x. An extra platform, mountable on the sub-mechanism of this drop table or supported independently, at will, by means of latches resting upon pockets in side walls of the pit, (as indicated in Fig. 5).

4. The upper frame structure of the sub-mechanism of this drop table, adapted to support the platform, either as an integral part of said structure or as a separable, demountable platform which can, at will, be independently supported by latches resting upon pockets in the pit walls, in a position to bridge the pit when said sub-mechanism is removed from underneath.

5. The lower frame assembly of structural shapes for the truck on the sub-mechanism of this drop table is carried; said lower frame structure, in turn, being supported (as a truck) upon a plurality of flanged wheels (commonly four, as here shown).

5a. Flanged wheels, with axles, bearings, etc., employed for supporting the frame structure 5, as a truck, adapted to be shifted through the pit, transversely to the several tracks 1, 1a, etc.

5b. Rails traversing the drop table pit, upon which the truck frame 5, can be shifted by means of its wheel mechanism 5a.

6. Knee action link members, pinned at one end to the upper frame structure 4, and at the other end to co-acting link members.

6a. Knee action link members, pinned at one end to the lower frame assembly 5, and at the other end to co-acting link members 6.

7. Pins, pivotally connecting the upper link members 6, to lower link members 6a.

7a. Pins, pivotally connecting the upper link members 6, to the upper frame structure 4.

7b. Pins, pivotally connecting the lower link members 6a, to the lower frame assembly 5.

8. Crank arm extensions provided either upon the upper or the lower set of link members (the upper members 6, in these drawings), to effect a reduction in the force of the initial pull required to raise the platform 3, from its lowered position, in which it is supported by link members 6 and 6a, in their collapsed relation.

9. Pins, on arms 8, at the approximate extremity of the crank arm, relative to the axis line between pins 7 and 7a, or 7b, with means for attaching thereto, ropes or other cord means for knee actuating the link members 6 and 6a, in a manner to raise or lower the platform 3, supported by the sub-mechanism of which these are parts.

10. Wire ropes, chains or other cord means employed for drawing the pins 9, in a direction required to knee actuate the link members 6 and 6a, in relation to themselves. Note.—The drawings indicate so-called "flat ropes" of the type in which wire strands are woven and laced together in a flat band assembly, adapted for winding upon drums and over sheaves of less diameter than requisite to circular ropes of equal strength.

10a. Take-up means of the design indicated, or equivalent devices for adjusting the relative lengths of cords 10, as may be required for leveling the drop table platform 3, said platform being kept level throughout its range of vertical travel by maintaining uniformity in the angularity between link members 6 and 6a.

11. Drums employed for drawing the cord members 10, and through said cords, the pins 9, and crank arms 8, in one direction or releasing them in the reverse direction, as required to raise or lower the drop table platform 3, by knee actuating the link members of the sub-mechanism supporting said platform. The drums 11, can all be rotated at a uniform speed, by which operation the platform 3, is supported in a level position throughout its travel, because each of the ropes 10, is dead-ended to one of the drums 11, and the length of each rope 10, can be initially fixed by the take-up means 10a.

11a. Sheaves over which the cord members 10, are spooled between their point of attachment 9, to crank arms 8, and the drums 11.

12. Motor drive mechanism, comprising an electric motor of suitable capacity and a compact gear reduction, said reduction having an input to output speed ratio appropriate for operation of the drop table mechanism in relation to speed of motor used. Said mechanism may be supported either upon the lower framework 5, by means of cross brackets (when crank arms 8, are positioned upon the lower link members 6a), or the mechanism 12, may be supported upon the upper frame 4, with location of drums 11, and sheaves 11a, as illustrated in these drawings.

13. Electric socket connection on side of the drop table pit, at which is available power current of suitable characteristics for operating the drop table motor mechanism 12.

14. Electric plug connection, adapted to register with socket 13, and when thus connected, to transmit power current to the drop table motor mechanism 12, through a flexible cable conduit and appropriate control apparatus.

15. Bracket, attachable to the truck frame 5, of this drop table, said bracket having a hole, notch or the like, contoured to fit around plug 14, when same is inserted into socket 13, in such manner as to interlock the electric power supply thus established to motor mechanism 12, with a fixed position of truck frame 5, at which position the platform 3, when raised, will have its track section 1x, aligned with one of the railway tracks, 1, 1a, etc.

In the operation of this mechanism, the purpose is to first remove wheels from trucks (or engine frames), or trucks from car or locomotive bodies, standing over the platform 3 (on track 1x). This may be facilitated by raising the platform a few inches above the rail level of adjoining track 1, or 1a, etc. Then, when a pair of wheels (with traction motor, if attached) or the truck, is free to be released, the platform 3 is lowered into the drop table pit. After being lowered sufficiently to be shifted horizontally without interference, the frame 5, supporting the detached wheels and/or truck, upon the platform 3, and its sub-mechanism, is shifted as a truck, horizontally, on rails 5b, by means of wheels 5a, until in a position where the track section 1x, on platform 3, when raised, will be in alignment with railway track 2. At this point the platform 3, is raised until the rails of track section 1x, are level with the rails of track 2,

permitting said wheels, or the truck, to be run off onto track 2, where they are available for repair. Replacement of the repaired, or new wheels and trucks, is accomplished by a reversal of the above procedure.

In the foregoing, the steps described are those commonly practiced with other drop table mechanism. It is in the movement of mechanism employed by this invention for raising and lowering the platform 3, that the operation and parts used in combination, differ from previous apparatus. Mechanisms most commonly used for lowering and raising the track platform are screw shafts, ordinarily disposed at the four corners of the platform. An improvement on this which avoids the maintenance and replacement cost of screw shafts, is the use of flat ropes, by which the platform is suspended at each corner. Both arrangements require structural posts for supporting the screw shafts in their vertical position, or as the supports from which the flat ropes are suspended. These posts have to be built upon an underlying truck frame and travel with this frame in traversing the pit. This construction necessarily involves a heavy structural assembly.

A characteristic in the operation of either the screw shaft or flat rope types of drop tables, as above described, is that the mechanism is called upon to exert a very much greater load in effecting release of the running gear than in carrying the weight of these parts alone. In releasing these parts, the table must not only support the weight of rolling stock normally distributed upon the wheels to be removed, but when releasing these wheels from their trucks, this normal load is exaggerated by compressing the springs in the truck (or engine frame) so that they can be blocked in position desired for release of the wheels. The use of links, to produce a simple toggle action at the height of the lift has been proposed because this type of mechanism produces its peak lifting force with little relative effort, as the links are straightened out, to effect the final lift required for releasing the wheels.

A limitation upon the simple toggle assembly of links, lies in its reduced lifting capacity when the platform is lowered and the toggle arms collapsed. The weight of wheels having traction motors attached and of trucks, is so considerable that when supported by a toggle mechanism, the links cannot be dropped much below an angularity, each of 30 degrees to the horizontal. or of 60 degrees total angle between the links. This means that the pit in which operated, must have a considerable depth below a platform carrying the wheels, etc., when said platform is in its maximum lowered position. This invention brings into combination with the links of a toggle mechanism for dropping railway running gear, in the manner described, crank arms 8, rigidly anglar to an axis line between the pivot pins 7 and 7*a*, or 7*b*, and applies to the extremity of said crank arms, at pins 9, the pull effort required for raising the load upon platform 3, by knee actuating said toggle mechanism.

A distinctive feature of this invention is to preserve the advantage of a toggle mechanism in producing a peak lifting force with relatively little effort, as link members 6 and 6*a*, straighten out, and also to enable the mechanism to be collapsed to a point where the total angle between its link members approaches 30 degrees, without exaggerating the force required to raise the load upon platform 3, from this lowered position. The result thus attained by the invention, is a mechanism so compact in its lowered position that the pit provided for its operation can be made more shallow than heretofore achieved in any apparatus of like structural standards and capacity. The invention provides a mechanism wherein the above effect can be most advantageously obtained with the use of flat ropes 10, applied to pins 9, on crank arms 8, for knee actuating the link members 6 and 6*a*. It is also well adapted to the use of screw shafts applied to oppositely disposed crank arms, for drawing the links together to produce a toggle effect.

The mechanism of this invention is the first construction of a railway drop table in which flat ropes are proposed for knee actuating oppositely disposed sets of link members in the process of raising a platform supported by mechanism of the toggle type. In this invention, each rope 10, connected to the crank arm 8, of a link member 6, or 6*a*, can be wound directly upon a power turned drum 11, but is preferably first spooled over a sheave 11*a*, on one crank arm 8, opposite another crank arm 8, to which the rope 10, is adjustably attached at pin 9, as shown in the drawings. Whatever the arrangement of ropes spun between oppositely disposed crank arms in modifications of the invention, the length of each rope, from pin 9, to point of contact upon the surface of drum 11, to which it is dead-ended, is adjusted by take-up means 10*a*, so as to draw up the pair of link members 6 and 6*a*, under each corner of the platform 3, in such manner as to level said platform, a condition that is maintained at all elevations of the platform, produced by winding said ropes at a uniform rate upon said drums. In the arrangement illustrated, one rope can fail entirely without disturbing the stability of platform 3 under load. The only effect of such failure is to double the load upon the adjoining rope, but these ropes 10, are customarily sized to carry several times their normal load, so that the mechanism will continue to function properly with a single rope drawing upon the links under one side of the platform 3, while said platform is held level by the two ropes being wound upon drums 11, uniformly rotated under the other side of said platform.

In the operation of this apparatus, the motor drive mechanism 12, functions in the conventional manner of an electric motor with its brake serving to prevent coasting when the current is shut off, and a train of speed reducing, torque increasing gears, that preferably includes a worm gear, acting to hold the rope drums 11, stationary under load, except when rotated by the motor turning under its own power. In practice, an average hoisting speed for the platform 3, of about two feet per minute is customary, the diameter of drums 11, is made as small as size of rope will permit, and ratio of geared reduction between the drum shaft and motor shaft is determined by speed of motor found most efficient for the power output required. The arrangement illustrated, shows an individual drum 11, for each rope 10. In modifications of the invention, two ropes may be wound upon the same drum, side by side. However, to maintain stability of the platform 3, in a level position, throughout its vertical travel, under all conditions of loading, there must be a rope or equivalent cord member of fixed length between attachment point 9, on two opposite pairs of link members 6 and 6*a*, supporting the platform on one side, and its dead-

end attachment to the drum upon which it winds, and the drums on which said ropes are wound must turn at a uniform peripheral speed to wind or unwind these drums in unison.

Positioning of the motor drive mechanism supported by structural members of the upper framework **4**, as shown, is optional to the purpose of this invention and said mechanism could be supported with equivalent effect by structural members of the lower frame **5**. However, the location of this mechanism, especially its motor and electrical controls, in a position where same would be high and dry should water get into the bottom of the pit, is an advantage of great practical value available to this invention.

The problem of getting the power supply current to the motor for running it, to raise or lower the platform **3**, into alignment with the several railway tracks served, is ordinarily met in drop table apparatus, either by exposed wires or collector bars mounted on a side wall of the pit, from which the current is picked up by contact shoes mounted on the truck which supports the table, or by a flexible conduit cable spooled upon a retrieving reel, through which conduit the electric power current is delivered, from a supply connection at one end of the pit, to the drop table truck. As the truck travels away from this end of the pit, the cable unwinds and lies on the floor of the pit. As the truck returns, the reel automatically rewinds the cable. Either arrangement is available for use in this invention, but the exposed collector bars, or wires, are hazardous to men working in the pit and an electric conduit cable lying on the floor of the pit may be covered with water and is subject to abusive wear. Consistent with its compactness and economy of construction, this invention combines with its other advantages, a simplified means for supplying electric current to the truck frame **5**, for operating the motor mechanism **12**, in any of the several locations at which the platform **3**, has to be raised or lowered.

In utilizing this feature of the invention, electric power is not supplied to the motor mechanism **12**, except at points in the pit where the truck frame **5**, is positioned so that the track section *1x*, on platform **3**, when raised to a level of railway tracks **1**, *1a*, **2**, etc. will be in alignment with the rails thereof. This is to prevent the inadvertent operation of submechanism supporting platform **3**, when its track section *1x*, is improperly aligned in relation to the several railway tracks served. When aligned properly, plug **14**, is inserted through the hole (or holes, notches or the like) on bracket **15**, and into socket **14**, said socket being positioned on the pit side wall and said hole being adjusted on bracket **15**, so that said socket and hole register in alignment only when the truck frame **5**, is located where the platform **3**, mounted thereon, when raised, will have its track section *1x*, in desired alignment. When thus positioned, the plug **14**, serves the double purpose of a latch locking the truck frame **5**, against transverse travel on rails *5b*, and as a connecting conduit through which electric power current can be supplied for operating the motor mechanism **12**.

We claim:

In a drop pit apparatus for servicing railroad vehicles, in combination, an elongated pit, a plurality of railway tracks intersecting the pit at spaced intervals, a truck adapted to be moved lengthwise of said pit, a pair of rails carried by said truck adapted to be brought into alignment with a selected railway track on proper positioning of said truck, means, including an electric motor carried by said truck for raising or lowering the said rails with reference to the truck, and means to insure a proper positioning of the truck with reference to the railway tracks prior to actuating said motor, said means including electric current supply sockets in the pit wall located one adjacent each of said intersecting railway tracks, a plug adapted to fit one of said sockets for supplying current to said motor, and a guide for said plug carried by said truck, arranged to permit the plug to be inserted in its socket only when the truck is in such position that the rails carried thereby when properly elevated, will be in alignment with the railway track intersecting the pit at that particular position of the truck.

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