

Nov. 10, 1942.

L. G. PLANT ET AL

2,301,579

APPARATUS FOR SERVICING RAILWAY RUNNING GEAR

Filed July 30, 1941

3 Sheets-Sheet 1

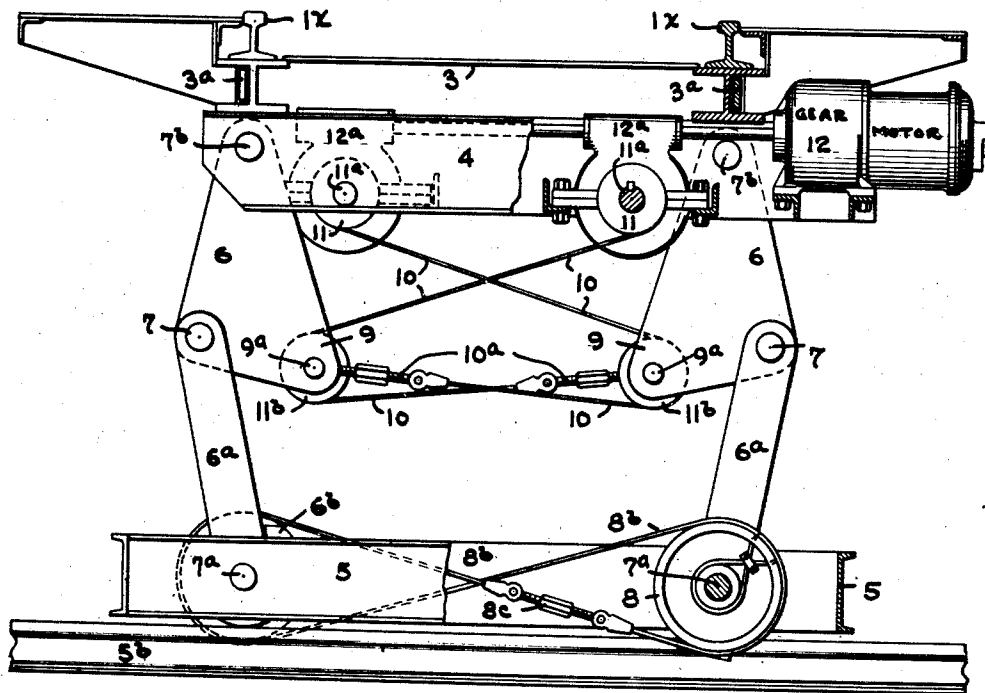


Fig. 1.

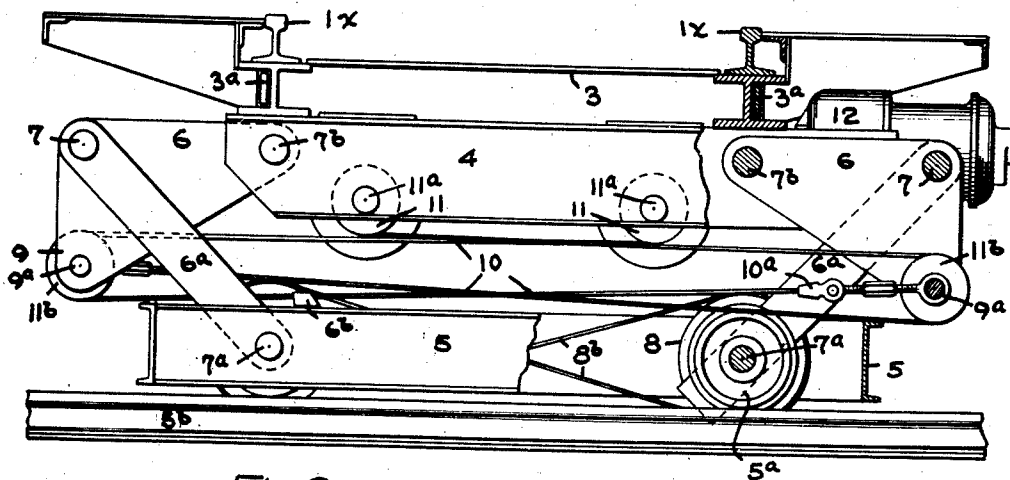


Fig. 2.

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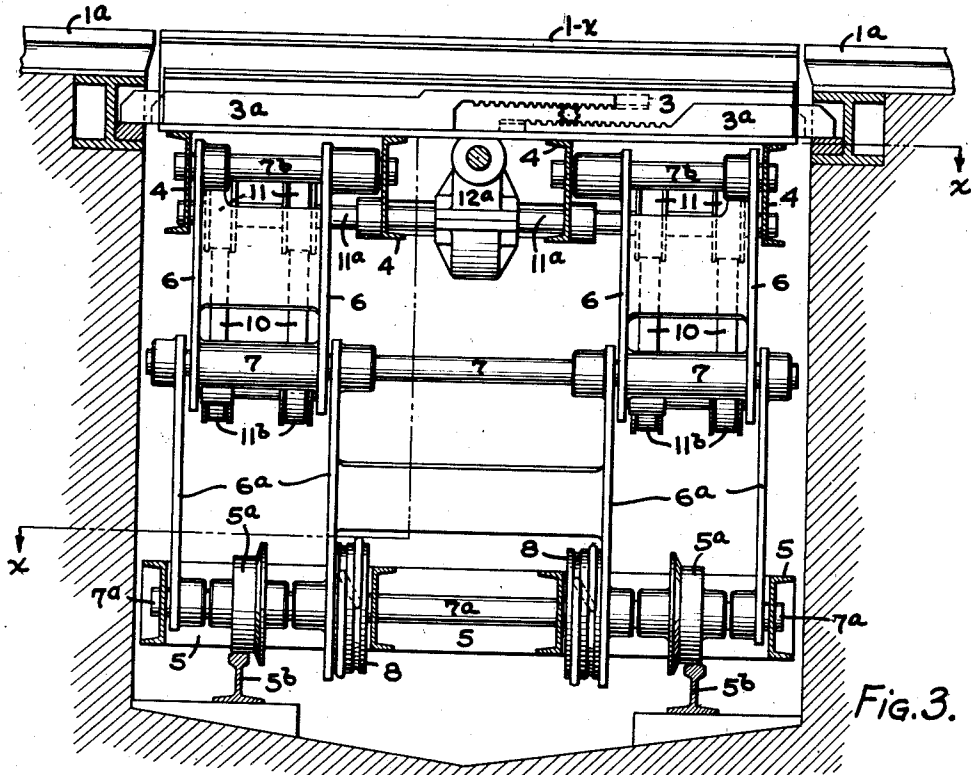
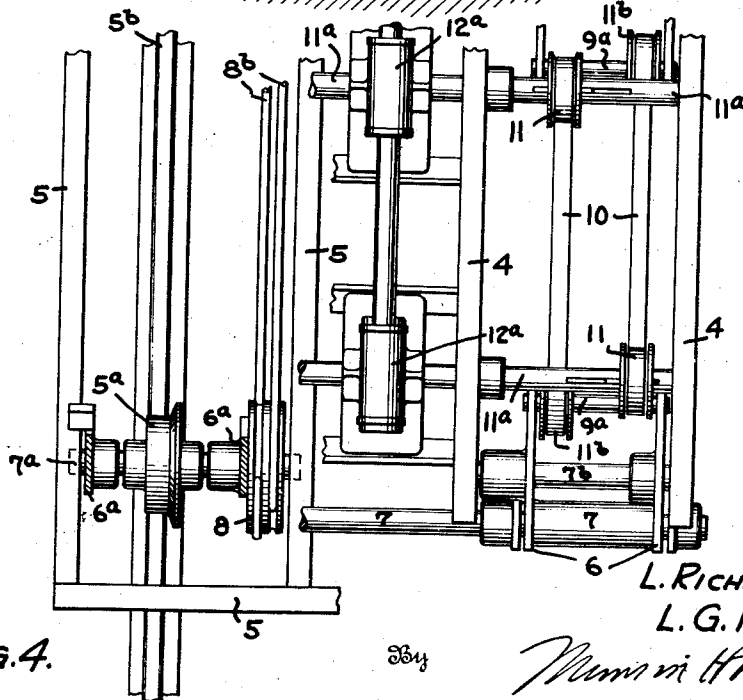
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

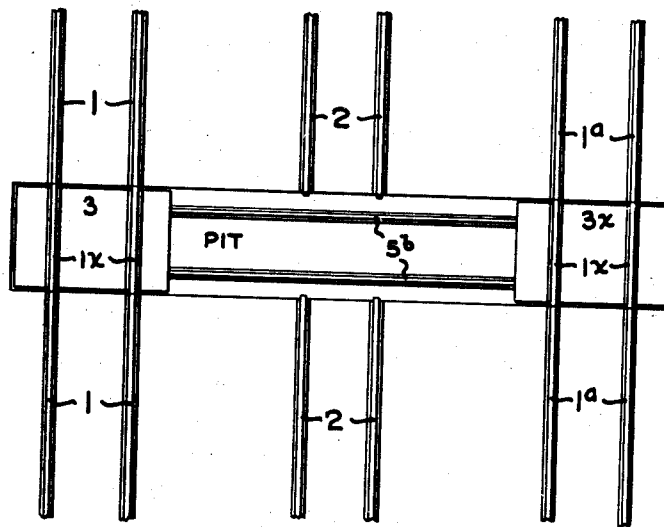


Fig. 5.

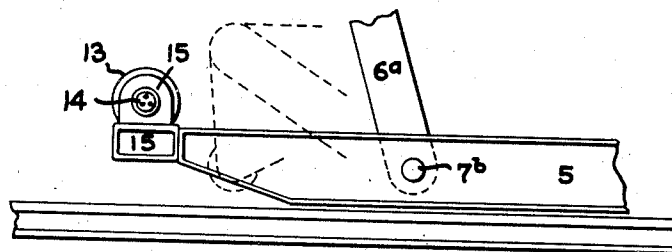


Fig. 6.

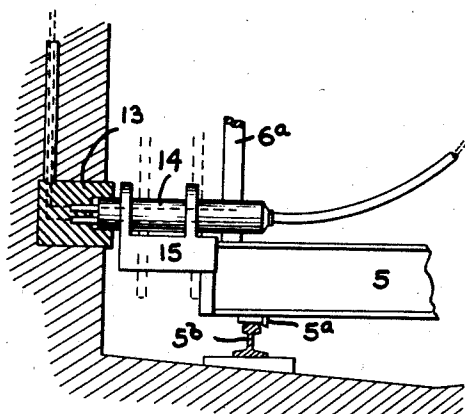


Fig. 7.

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2,301,579

APPARATUS FOR SERVICING RAILWAY
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Application July 30, 1941, Serial No. 404,716

29 Claims. (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.

The present application is a continuation-in-part of our application Ser. No. 383,154 filed April 11, 1941.

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 demands frequent and special servicing.

A purpose of this invention is to improve upon the operating characteristics of existing drop tables which have a constant rate of vertical travel. The invention is designed to accomplish this improvement without sacrificing important advantages found in preceding inventions, notably that of Blake—Patent No. 1,849,972, and Minty—Patent No. 2,111,917. The object of this invention is to accomplish the operating advantages cited, in a construction adapted to installation at less cost, in shallower pits than have been required for earlier drop tables of like travel and capacity.

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 and accomplishes a variable elevating speed from a maximum rate at its lowered position to a minimum rate of travel (with maximum lifting capacity) in its fully elevated position, 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 under load.

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 drawings, wherein:

Fig. 1 is a side elevation of the drop table viewed partially in section, transverse to the locomotive track, showing the table in its raised position.

Fig. 2 is a transverse elevation of the drop table in its lowered position, viewed partially in section.

Fig. 3 is an end elevation of the drop table in its raised position, 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 plan view of the drop table mechanism viewed in horizontal planes at the elevations indicated by lines 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, 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, 1a, etc., railway tracks on which rolling stock is placed for having its wheels and/or trucks removed and replaced. See particularly Fig. 5 for arrangement of tracks.

1x, that section of tracks 1, 1a, 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.

3a, latches, slidably mounted in the structure of platform 3, so that they can be withdrawn flush therewith, or moved out by means of a pinion and ratchet mechanism, or the equivalent, so as to rest upon pockets in side walls of the pit, to support the platform 3, as a bridge across said pit.

3x, an extra platform, mountable on a sub-mechanism of this drop table or supported independently, at will, by means of the latches 3a, as a bridge across the drop table pit. A plurality of separable platforms may thus be employed in the same pit (see Fig. 5) and operated by a single sub-mechanism.

4, the upper frame structure of the sub-mechanism of this drop table, adapted to support the track section 1x, either as an integral part of said structure or on a separable, demountable platform (such as 3) 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 assembly of structural shapes comprising a truck frame on which the sub-mechanism of this drop table is carried; said truck frame, 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 truck frame 5, as a truck, adapted to be shifted through the pit, transversely to positions in alignment with 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 their other end to co-acting link members.

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

6b, block pieces fixed upon the structure of truck frame 5, in a position to engage link members 6a, when said members are raised to a nearly vertical position and prevent their further movement in that direction to a fully vertical position.

7, pins (or shafts) pivotally connecting the upper link members 6, to the lower link members 6a.

7a, pins (or shafts) pivotally connecting the lower link members 6a, to the truck frame 5.

7b, pins, pivotally connecting the upper link members 6, to the upper frame structure 4.

8, cylindrical cord winding treads, rigidly affixed to the lower link members 6a, concentric

with pins 7a, (or to the upper link members 6, concentric with pins 7b, in case the knee-actuating mechanism is applied to the lower link members instead of the upper members as illustrated).

8b, wire ropes, chains or other cord means wound diagonally upon oppositely disposed cylindrical treads 8, and fastened against slippage thereon, in some effective manner, as illustrated.

8c, take-up means of the design illustrated, or an equivalent device for tightening cords 8, upon the surfaces of the oppositely disposed treads upon which they are diagonally wound.

9, bell 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 force of the initial pull required to be applied to said links for raising the platform 3, from its lowered position, in which it is supported by link members 6 and 6a, in their collapsed relation (see Fig. 2.).

9a, pins, on crank arms 9, at the approximate extremity of the bell crank arm, with means for attaching thereto, ropes or other cord means for pulling oppositely disposed pins 9a, together in the process of knee-actuating 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 cords means employed for drawing the pins 9a, 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 an equivalent device 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 9a, and crank arms 9, in one direction or releasing them in the reverse direction, as required to raise or lower the track section 1x, upon platform 3, by knee actuating the link members of the sub-mechanism supporting said platform. The drums 11, may be rotated at a uniform speed upon parallel shafts, turning in a direction counter to each other, by which operation (combined with the enforced counter-rotation in synchronism of oppositely disposed links 6a, effected by a mechanism such as 8, 8a, etc.) the platform 3, is supported in a level position at all elevations. Note: Each of the ropes 10, is dead-ended to one of the drums 11, and the length of each rope can be initially fixed by take-up means 10a, to place pins 7, in one plane and pins 7b, in another plane parallel thereto. Likewise, links 6a, are initially placed at a uniform angle of inclination to the horizontal, in which position the cords 8b, are fastened to and tightened upon treads 8, by take-up means 8c, so that pins 7a, are in a plane parallel to the planes of pins 7, and 7b, as above, which relation is maintained by the mechanism described, as the co-acting links 6 and 6a, are knee-actuated in the process of raising or lowering the platform 3, in relation to truck frame 5.

11a, shafts, upon which drums 11, are mounted and to which they are keyed.

11b, sheaves over which the cord members 10,

are spooled between their point of attachment 9a, to crank arms 9, and to the drums 11.

12, drive mechanism, which may be an electric motor of suitable capacity with built-in brake and a compact gear reduction (running enclosed in oil as indicated by the drawings), said reduction having an input to output speed ratio in relation to speed of motor used that is appropriate for operation of the drums 11, through worm and spur gears, as shown. Said drive mechanism may be supported either upon the lower framework 5, by means of cross-brackets (when crank arms 9, are positioned on the lower link members 6a), or the mechanism 12, may be supported upon the upper frame 4, by means of cross braces as shown in Fig. 1, with location of drums 11, and sheaves 11b, as illustrated in these drawings.

12a, worm and spur gear assemblies, right and left-hand, or an equivalent gear mechanism, for transmitting torque in the output shaft from drive 12, to two parallel shafts 11a, one turning clockwise, the other turning counter-clockwise, upon the ends of which shafts are mounted the cord winding drums 11.

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, when used for removing wheels from car trucks or from locomotive frames, the track section 1x, supported by platform 3, is first raised a few inches above the rail level of adjoining tracks, 1, 1a, etc. to compress the springs above the wheels to be removed, in which position the spring rigging on the car or locomotive is blocked. Then, when a pair of wheels (with its traction motor, if attached) is free to be released, the platform 3, having been unlatched (by withdrawing latches 2a, from the pockets in the side of pit wall) and track section 1x, is lowered into the drop table pit. After being lowered sufficiently to be shifted horizontally without interference of the wheels with the car or locomotive frame, the truck frame 5, supporting the detached wheels upon platform 3, and its sub-mechanism, if shifted through the pit 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 mech-

anism. 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 fully lowered position. This invention brings into combination with the links of a toggle mechanism for dropping railway running gear, in the manner described, bell crank arms 9, rigidly angular to an axis line between the pivot pins 7 and 7a, or 7b, and applies to the extremity of said bell crank arms, at pins 9a, the pull effort required for raising the load upon platform 3, by knee actuating said toggle mechanism.

This feature of the invention preserves the advantage of a toggle mechanism in producing a peak lifting force with relatively little effort, as link members 6 and 6a, straighten out, and also enables the mechanism to be collapsed to a point where the total angle between its link members approaches 30 degrees, without requiring a disproportionate force to raise the load upon platform 3, from this lowered position. In its initial lift from the lowered position the platform 3, moves up almost entirely in response to a rotating action of links 6, turned by bell crank arms 9; its rate of vertical travel in relation to the horizontal movement of pins 9a, being as the effective lever arm length of link 6, is to the

length of bell crank arm 9. From this point on, the platform 3, moves up in response to a combination of crank and toggle action as the pins 9a, are drawn together, until at its elevated position, the crank effect has practically disappeared and its movement is almost entirely responsive to the toggle action of links 6 and 6a, co-acting in pairs, as pins 9a, are drawn towards each other as the cords 10 are wound upon drums 11.

The above described feature of this invention enables its mechanism to be made so compact in its lowered position as to effect a substantial reduction in depth of pit required for its operation. Another objective of the invention resulting from the operation of this mechanism is a saving in time accomplished by its variable rate of vertical travel as compared with drop tables that have a constant speed from their lowest to highest elevation (unless complicated by variable speed motors or drives). The invention provides a mechanism that in response to a constant motor speed and uniform rate of rotation for the drums 11, lifts or lowers the platform 3, at a relatively slow speed when in the elevated position where it is necessary to spot it at exact levels, and at relatively high speeds for lowering or raising the platform when in the pin. Thus, in a particular application of this invention, designed for lowering the table a distance of six feet, and operated by an electric motor having the conventional speed of 1700 revolutions per minute, through gears which rotate the drums 11, at a constant speed of 2 revolutions per minute, the platform 3, and track section supporting the wheels, moves up or down, as directed, at a speed of one foot per minute when in its raised position and at a speed of approximately four feet per minute when in its lowered position. The average speed for the six feet of travel is 30 inches per minute, so that about two and one half minutes is required for lowering or for raising the table its full travel.

A speed of one foot per minute is desirable for spotting the table exactly at track level and other elevations in its raised position but if this rate of travel were constant for its entire travel of 6 feet, it would require 6 minutes for the operation which is accomplished by this application of the invention in two and one half minutes. In drop tables having a constant rate of travel it is either necessary to operate at a higher speed than desirable for spotting the table at exact locations when raised, or to operate at such a slow speed throughout its entire travel as would result in the loss of much valuable time of shop machinists and in withholding the rolling stock from revenue service. Also, in drop tables having a constant rate of travel, the motor power required in the elevated position must be sufficient to lift the maximum load at this rate of travel. The power consumed in operating the table at this rate below track level (when required to support only the weight of running gear removed from the car or locomotive) is very much less; under which condition the motor is running the greater part of its time in use at far less than its potential capacity. In the present invention, the power demand upon the motor is approximately the same throughout the range of table travel and a motor of much less power can be provided for operating the drop table than would have to be provided in a drop table of equal capacity with constant speed characteristics. In the above cited example, a motor of

5 horse-power is ample for operating a table of 60 tons maximum lifting capacity.

The invention provides a mechanism wherein the above described operating characteristics can be advantageously obtained with the use of flat ropes 10, applied to pins 9a, on bell crank arms 9, for knee-actuating the co-acting link members 6 and 6a. It can also be adapted to the use of screw shafts applied to oppositely disposed crank arms 9, for drawing oppositely disposed pairs of co-acting links 6 and 6a, towards each other 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 a bell crank arm 9, of a link member 6, or 6a, can be wound directly upon a power turned drum 11, but is preferably first spooled over a sheave 11a, on one bell crank arm 9, opposite another bell crank 9, to which the rope 10, is adjustably attached at pin 9a, as shown in the drawings. Whatever the arrangement of ropes spun between oppositely disposed bell cranks in modifications of the invention, the length of each rope, from pin 9a, to the point of contact upon the surface of drum 11, to which it is dead-ended, is adjusted by take-up means 10a, so as to draw up the pair of link members 6 and 6a, 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.

Movement of links 6a, in relation to the truck frame 5, on which they are pivoted at pins 7a, may be controlled by various means so that all of the pins 7, remain in a horizontal plane, parallel to the truck frame 5, while actuated in response to movement of pins 9a, on crank arms 9. One means of accomplishing this is shown in Fig. 1, wherein diagonal cord members 8b, are connected to oppositely disposed link members 6a, in such manner as to synchronize their rotation in counter directions. The load upon platform 3, is ordinarily positioned centrally thereon in respect to the rails of track section 1x, but should this load shift wholly to one rail, it would tend to depress links 6a, below the heavily loaded side. But the distance between oppositely disposed pins 7, is fixed by the system of links 6, frame 4, and cords 10, wound upon drums 11, so that any downward movement of one link 6a, would tend to draw its oppositely disposed link 6a, upward. Such movement of the two oppositely disposed links 6a, both clockwise or counter-clockwise, in unison, is restrained by one of the two diagonal cords 8b, on each side, which is thereby placed in tension. These cords are kept in tension by the take-up means 8c, and may have sufficient strength to thus restrain a downward movement of links 6a, on one side only when the load is eccentrically disposed on the rails of track section 1x.

In the arrangement illustrated, one rope can fail entirely without disturbing the stability of the platform 3, under load. The only effect of such failure is to increase the load distributed upon the other ropes, but these ropes are customarily sized to sustain five times their normal load without breaking, so that the mechanism will continue to function properly with a single rope 10, drawing upon pins 9a, on one side of

the mechanism, while the platform 3, is held level by the two ropes 10, being wound upon drums 11, which are uniformly rotated on the other side of the table. Likewise, should one of cords 8b, fail between oppositely disposed links 6a, the cord 8b, in tension between oppositely disposed links 6a, on the other side of the table would suffice to hold pins 7, in a plane approximately horizontal and thus keep the platform substantially level.

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, act to hold the rope drums 11, stationary under load, except when rotated by the motor turning under its own power. In practice, the diameter of drums 11, is made as small as the size of the rope will permit, and the ratio of geared reduction between the drum shaft and motor shaft is determined by the motor speed 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, so that both wind or both unwind as the drum rotates in one direction or the other.

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 the same would be high and dry should water get into the bottom of the pit, is an advantage of practical value available to this invention.

The problem of getting a 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 align-

ment with the rails thereof. This is to prevent the inadvertent operation of sub-mechanism 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. This feature is claimed in our copending application Ser. No. 338,154 filed April 11, 1941.

We claim:

1. In a railway drop table, a track platform, oppositely directed toggles supporting said platform, each toggle including a bell crank member having a projecting arm, and power means applied to said crank arms for actuating said toggles.
2. In a railway drop table, a track platform, a truck frame, oppositely directed toggles supporting said platform upon said frame, bell crank arms on said toggles, cords connecting said crank arms with power means for actuating the toggles at a uniform rate relative to said platform, and mechanism for interlocking the movement of said oppositely directed toggles at a uniform rate relative to said frame.
3. In a railway drop table, a track platform, a truck frame, oppositely directed toggles supporting said platform upon said frame, bell crank arms on said toggles, cords connecting said crank arms with power means for actuating the toggles at a uniform rate relative to said frame, and mechanism for interlocking the movement of said oppositely directed toggles at a uniform rate relative to said platform.
4. In a railway drop table, a track platform, a truck frame, oppositely directed toggles intermediate said platform and frame, cords connecting said toggles with power rotated drums for actuating them at a uniform rate relative to said platform, other cords diagonally connecting the oppositely disposed toggles in a manner causing their oppositely directed movement to be at a uniform rate relative to said frame.
5. In a railway drop table, a track platform, a truck frame, oppositely directed toggles intermediate said platform and frame, cords connecting said toggles with power rotated drums for actuating them at a uniform rate relative to said frame, other cords diagonally connecting the oppositely disposed toggles in a manner causing their oppositely directed movement to be at a uniform rate relative to said platform.
6. In combination, a railway track platform, platform sub-framing, a truck frame, an upper set of links pivoted to said sub-framing, a lower set of links pivoted to the truck frame, pins pivoting upper links to lower links, one set of links comprising bell cranks having projecting arms, said arms each rigidly angular to an axis line between pivot points of the link to which attached, and power means applied to said crank arms.
7. In a railway drop table, a track platform,

a truck frame, means for horizontally shifting said truck frame, mechanism for lowering and raising said platform, relative to said truck frame, at will, said mechanism including: one set of link members pivoted to said truck frame, another set of link members pivoted to said platform, pins pivoting members of one set of links to members of the other set of links, crank arms and constituting therewith bell cranks, said arms being rigidly angular to an axis line between the pivot points of the links on which positioned, and power means applied to said crank arms for actuating said links.

8. In a railway drop table, a track platform, a truck frame, means for horizontally shifting said truck frame, mechanism for lowering and raising said platform relative to said truck frame in a parallel relation thereto, said mechanism including: one set of link members pivoted to said truck frame, another set of members pivoted to said platform, pins pivoting one set of links to the other set, counter-directional interlocking means applied to the oppositely disposed members of one set of links, causing their counter-rotation to be at a uniform rate relative to said truck frame, and power means applied to bell crank arms upon the other set of links, causing oppositely disposed members thereof to counter-rotate at a uniform speed relative to said platform.

9. In a railway drop table, a track platform, a truck frame, means permitting horizontal shifting of said truck frame, mechanism for lowering and raising said platform relative to said truck frame in a parallel relation thereto, said mechanism including: one set of link members pivoted to said truck frame, another set of link members pivoted to said platform, pins pivoting one set of links to the other set, counter-directional interlocking means for insuring counter-rotation of said platform links at a uniform rate relative to said platform, and power means applied to bell crank arms upon the other set of links, causing oppositely disposed members thereof to counter-rotate at a uniform speed relative to said truck frame.

10. In a railway drop table, a track platform, a sub-frame separably contacting the underside of said platform, a truck frame, means for horizontally shifting said truck frame, said means including truck wheels and pit rails transverse to track rails on said platform, mechanism for lowering and raising said platform, in a parallel relation to said truck frame, at will, said mechanism including: an upper set of link members pivoted to said sub-frame, a lower set of link members pivoted to said truck frame, pins pivoting members of one set of links to members of the other set of links, crank arms positioned upon the members of one set of links and constituting therewith bell cranks, interlocking mechanism applied to members of each of said sets of links, and power means for actuating said arms.

11. In combination, a railway track platform, a pit with walls on both sides of said platform, a latch mechanism adapted to support said platform in a position bridging said pit and to release the platform from this position, at will, a sub-frame separably contacting the underside of said track platform, a truck frame, and toggles connecting said frames, said toggles comprising: an upper set of links pivoted to said sub-frame, a lower set of links pivoted to the truck frame, pins pivoting one set of links to the other set, bell crank arms positioned on the members of

one set of links, and power means applied to said crank arms for actuating said toggles at a uniform rate in relation to one of said frames, combined with interlocking means applied to said links, counter-directing the rotation of oppositely disposed links at a uniform rate in relation to the other of said frames.

12. In a railway drop table, a track platform, a platform sub-frame, a truck frame, and oppositely directed toggles, comprising: an upper set of links pivoted to said sub-frame, a lower set of links pivoted to said truck frame, pins pivoting members in the upper set of links to members in the lower set of links, pull means for knee-actuating each set of links in relation to the other at a uniform rate of rotation in relation to one of said frames, and interlocking means carried by the lower set of links, compelling the rotation of the oppositely disposed link members to be counter-directional, at a uniform rate in relation to the other of said frames, said pull means including sheaves carried by one set of links and a pair of flexible ropes, one anchored to each set of links, each rope passing from its anchor point, over a sheave upon an oppositely disposed set of links and thence to a winding drum supported by the upper frame.

13. In a railway drop table, a track platform, a platform sub-frame, a truck frame, and mechanism for lowering and raising said platform in relation to said truck frame while maintaining a parallel relation between said frames, said mechanism including: oppositely directed link members pivoted to said sub-frame, other oppositely directed link members pivoted to said truck frame, pins pivoting members in the upper set of links to members in the lower set, a flexible cord attached to each set of links, each cord winding upon drum mechanism mounted on one of said frames, cord length adjusting means for producing a uniform angularity between the drum supporting frame and links pinned thereto, power means applied to said drum mechanism for winding said cords at a uniform rate in relation to this frame, cords diagonally connecting the oppositely disposed links pinned to the frame other than that supporting the drum winding mechanism, said cords winding upon cylindrical faces fixed concentrically to the pin upon which is pivoted the link to which attached, and means for adjusting the length of each diagonal cord between the links to which they are connected.

14. In a railway drop table, a track platform, a platform supporting frame, a truck frame, and mechanism for lowering and raising said platform in relation to said truck frame while maintaining a parallel relation between said frames, said mechanism including: oppositely directed link members pivoted to said supporting frame, other oppositely directed link members pivoted to said truck frame, pins pivoting members in the upper set of links to members in the lower set, cords diagonally connecting oppositely disposed links of one set, said cords winding upon cylindrical faces fixed upon the oppositely disposed links in a relation concentric with the pin upon which the link is pivoted, means for adjusting the length of each diagonal cord between the links to which connected, and interlocking mechanism applied to the other set of said link members.

15. In a railway drop table, a lower frame, an upper frame carrying track members adapted to be raised and lowered with reference to the lower frame and be maintained parallel there-

to, a pair of oppositely disposed toggles connecting said frames, and means for actuating said toggles, said actuating means including a pair of sheaves, one carried by each of said toggles, a pair of flexible ropes, one connected to each of said toggles, each rope passing over the sheave carried by the opposite toggle, and power actuated mechanism on one of said frames for winding said ropes.

16. A railway drop table as set forth in the preceding claim, wherein two pairs of toggles are employed, one pair supporting each end of the table.

17. In a railway drop table, a track platform, oppositely directed toggles supporting said platform, sheaves carried by said toggles, and cords connecting said toggles, each cord being anchored to one toggle and passing over a sheave carried by the other toggle, and power means applied to said cords for actuating the same.

18. In a railway drop table, a track platform, pairs of oppositely directed toggles supporting said platform, sheaves carried on said toggles, and cords reeved upon said sheaves, each cord being anchored at one end to a toggle, and at its other end being wound upon power actuated drum mechanism, after passing over a sheave upon the toggle opposite that to which it is anchored.

19. In a railway drop table, a lower frame, an upper frame carrying track members adapted to be raised and lowered with reference to the lower frame and be maintained parallel thereto, pairs of oppositely directed toggles supporting the track carrying frame upon the lower frame, sheaves carried on said toggles, and cords connecting oppositely disposed sheaves, said cords being anchored at one end to one of said frames and wound at its other end upon power actuated drum mechanism, after being reeved over a pair of sheaves on oppositely disposed toggles.

20. In a railway drop table, a sub-frame and an upper frame carrying track members adapted to be raised and lowered with reference to the sub-frame and be maintained parallel thereto, oppositely disposed toggles connecting said frames, each of said toggles including a bell crank member one arm of which comprises a link of the toggle, the other arm comprising an operating member of the toggle.

21. In a device of the character described, a track platform, a pair of oppositely disposed toggles supporting said platform, each toggle including a link having a crank arm rigid therewith and extending substantially at right angles thereto, and means for actuating said crank arms to raise or lower the platform supported by said toggles.

22. In a railway drop table, a sub-frame, an upper frame carrying track members adapted to be raised and lowered with reference thereto, oppositely disposed toggles connecting said frames, each of said toggles including a bell crank member one arm of which comprises a link of the toggle while the other arm comprises an operating member for the toggle, and means for actuating the operating arms for raising or lowering the track members.

23. In a device of the character described in combination a lower frame member, and an upper frame member adapted to be raised or lowered with reference thereto, a pair of oppositely disposed toggles connecting the frames, said toggles including corresponding links each pivoted at one end to one of the frames and pivotally con-

nected at the other end to the other member of the toggle and each having an operating crank arm rigidly connected therewith; and operating means for actuating said crank arms, connected therewith at points out of alignment with the pivot points of said links.

24. In a railway drop table, a sub-frame, an upper frame carrying track members, adapted to be raised and lowered with reference to the sub-frame and be maintained in a plane parallel to the plane of the sub-frame, oppositely disposed toggles connecting said frames, each of said toggles including a bell crank member one arm of which comprises a link of the toggle while the other arm projects angularly therefrom and comprises an operating member for said toggle, said operating arms being substantially parallel when the track carrying frame is in its lowered position and being substantially in alignment with each other when said frame is in its raised position, and means for actuating said crank arms.

25. In a device of the character described, a track platform, a pair of oppositely disposed toggles supporting said platform, each toggle including a link having a crank arm rigid therewith and extending substantially at right angles thereto, and means for actuating said crank arms for operating said toggles to raise or lower the platform supported by said toggles.

26. In a railway drop table, a sub-frame, an upper frame carrying track members adapted to be raised and lowered with reference thereto, oppositely disposed toggles connecting said frames, each of said toggles including a bell crank member one arm of which comprises a link of the toggle while the other arm comprises an operating member for the toggle, and means for actuating the operating arms for raising or lowering the track members.

27. In a device of the character described in combination a lower frame member, and an upper frame member adapted to be raised or lowered with reference thereto, a pair of oppositely disposed toggles connecting the frames, said toggles including corresponding links each pivoted at one end to one of the frames and pivotally connected at the other end to the other member of the toggle and each having an operating crank arm rigidly connected therewith, and operating means for actuating said crank arms, connected therewith at points out of alignment with the pivot points of said links.

28. In a railway drop table, a sub-frame, an upper frame carrying track members, adapted to be raised and lowered with reference to the sub-frame, oppositely disposed toggles connecting said frames, each of said toggles including a bell crank member one arm of which comprises a link of the toggle while the other arm projects angularly therefrom and comprises an operating member for said toggle, said operating arms being substantially parallel when the track carrying frame is in its lowered position and being substantially in alignment with each other when said frame is in its raised position, and means for actuating said crank arms.

29. In a railway drop table, a track platform, oppositely directed toggles supporting said platform, each toggle including a bell crank having a projecting arm, cords connected to said arms and power means applied to said cords for actuating said toggles.

LELAND G. PLANT.

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