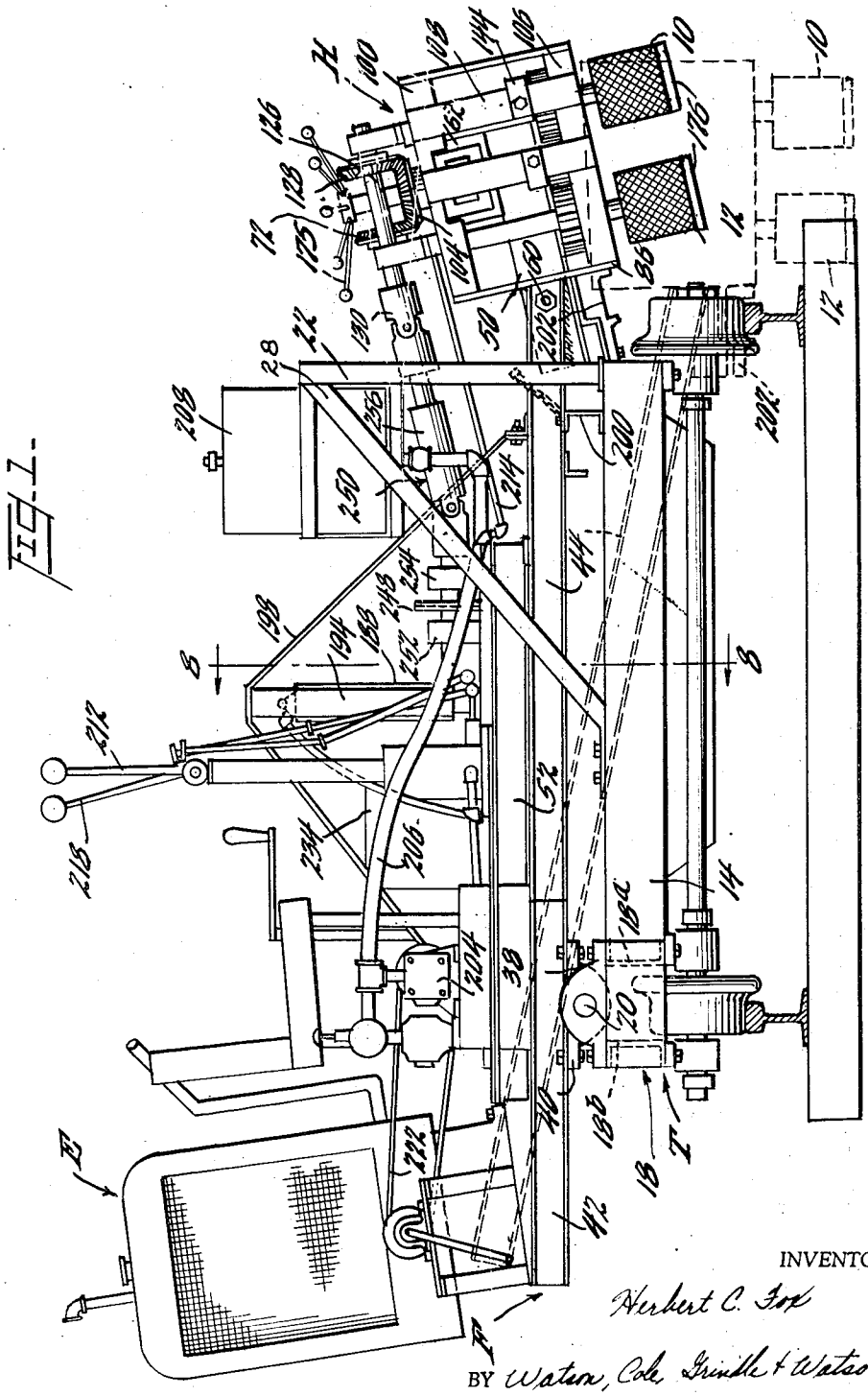
April 1, 1958 H. C. FOX 2,828,699

MACHINE AND METHOD FOR WITHDRAWING AND REPLACING RAILROAD TIES

Filed Aug. 29, 1955 5 Sheets-Sheet 1

FIG. 1.



INVENTOR

Herbert C. Fox

BY Watson, Cole, Grindle & Watson

ATTORNEY

April 1, 1958 H. C. FOX 2,828,699

MACHINE AND METHOD FOR WITHDRAWING AND REPLACING RAILROAD TIES

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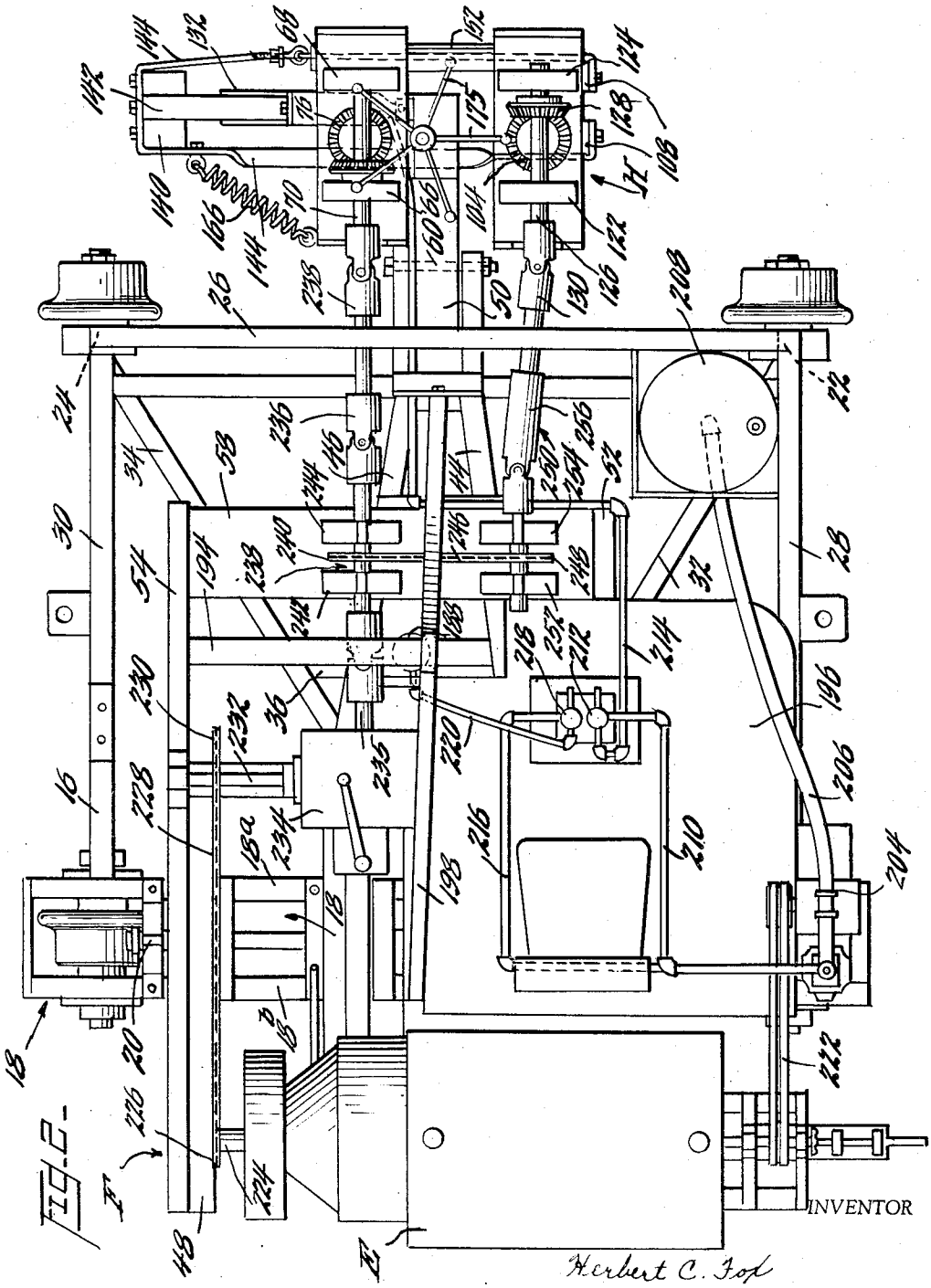


FIG. 2.

INVENTOR

Herbert C. Fox

BY Watson, Cole, Grindle & Watson

ATTORNEY

April 1, 1958 H. C. FOX 2,828,699

MACHINE AND METHOD FOR WITHDRAWING AND REPLACING RAILROAD TIES

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FIG. 3.

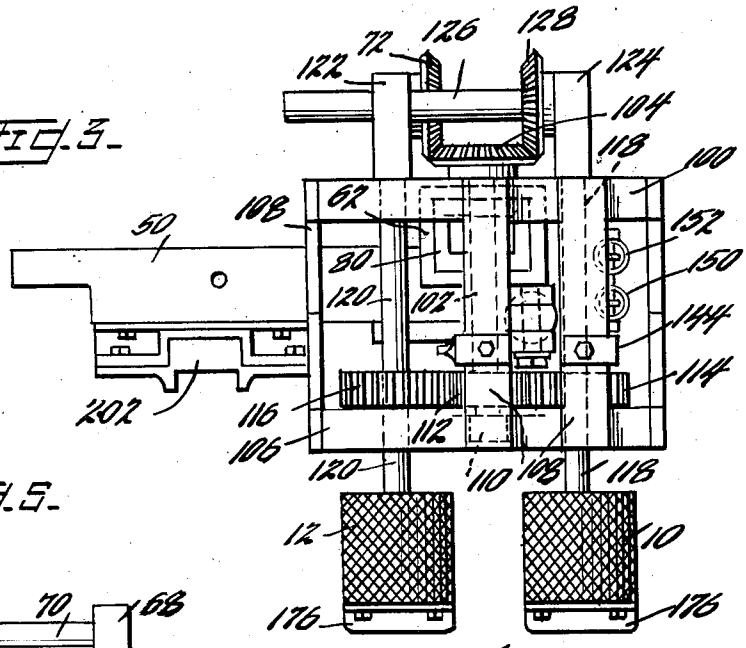


FIG. 5.

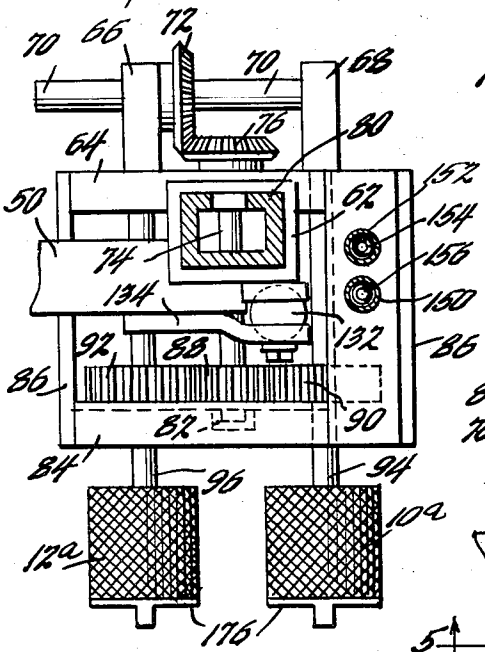
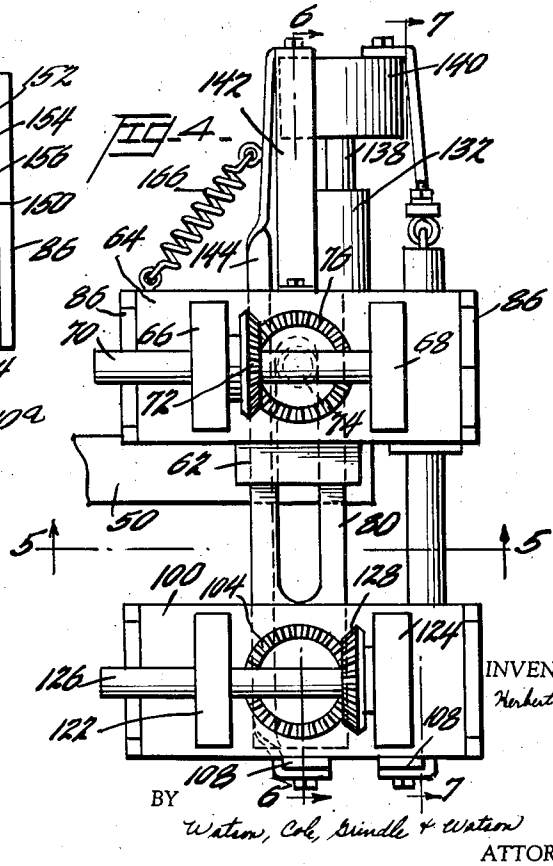


FIG. 4.



INVENTOR
Herbert C. Fox

BY
Watson, Cole, Grindle & Watson
ATTORNEYS

April 1, 1958 H. C. FOX 2,828,699

MACHINE AND METHOD FOR WITHDRAWING AND REPLACING RAILROAD TIES

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FIG. 6.

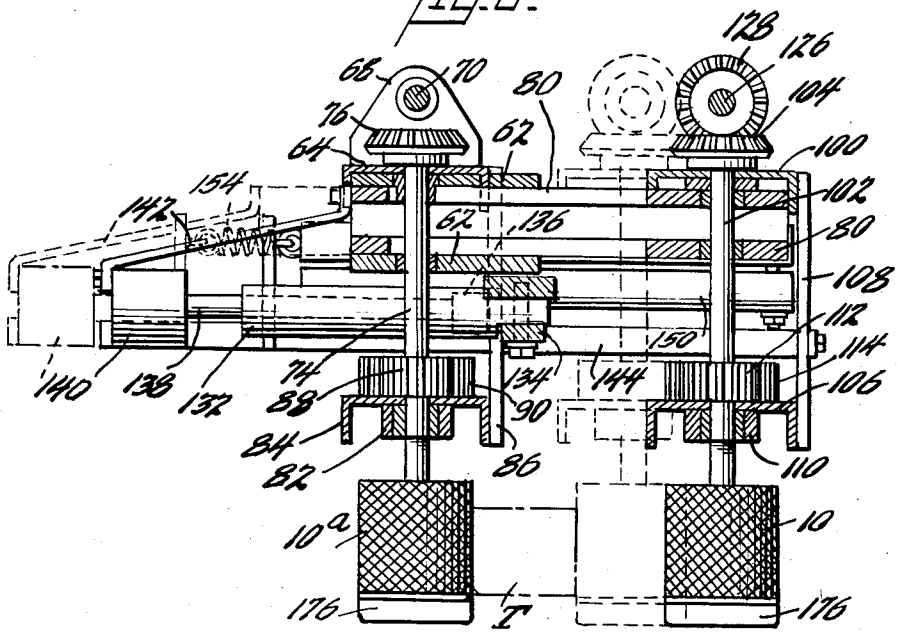
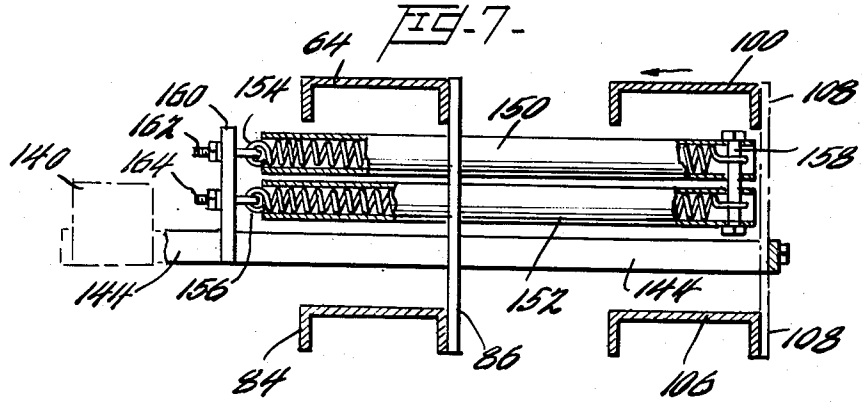


FIG. 7.



Herbert C. Fox INVENTOR

BY Watson, Cole, Grindle & Watson

ATTORNEY

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MACHINE AND METHOD FOR WITHDRAWING AND REPLACING RAILROAD TIES

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FIG. 8.

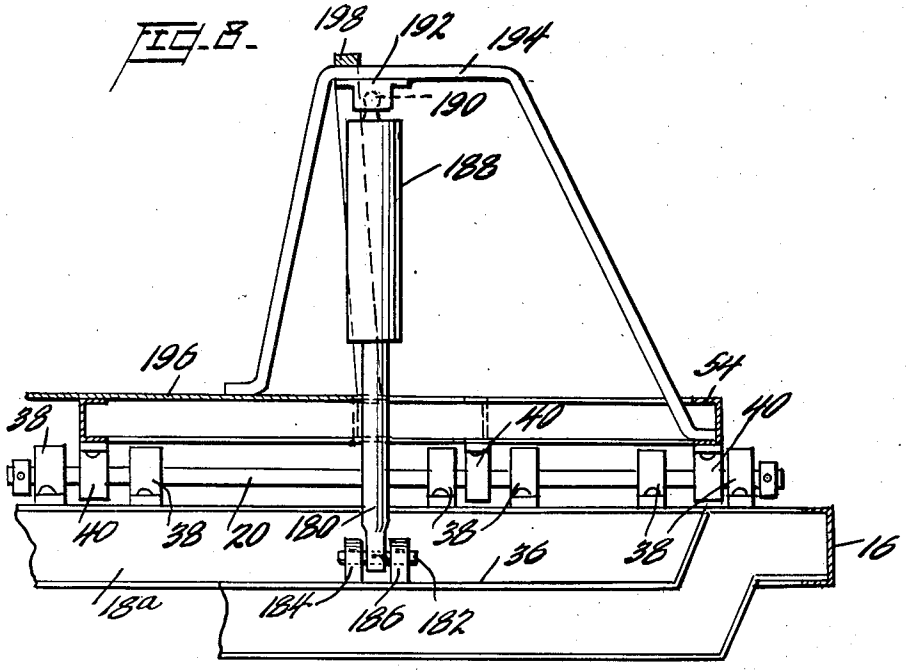


FIG. 9.

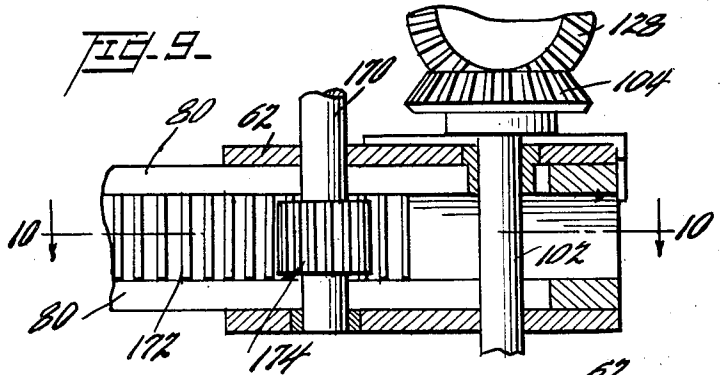
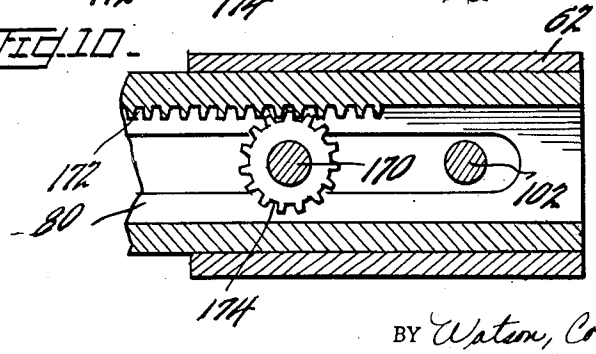


FIG. 10.



INVENTOR
Herbert C. Fox

BY Watson, Cole, Grindle & Watson

ATTORNEY

United States Patent Office 2,828,699 Patented Apr. 1, 1958

2,828,699

MACHINE AND METHOD FOR WITHDRAWING AND REPLACING RAILROAD TIES

Herbert Clyde Fox, Atlanta, Ga.

Application August 29, 1955, Serial No. 531,157

5 Claims. (Cl. 104—9)

The present invention relates to a machine and method for withdrawing and replacing railroad ties from a railroad track structure.

In maintaining a railroad track structure in satisfactory condition, it is necessary from time to time to replace individual ties upon which the tracks are laid, as the effective life of the ties in the structure varies according to the characteristics of the wood from which they are formed and also according to the effectiveness of the preservative treatments to which they have been subjected. It is also desirable, in the interest of economy, to re-use in the track structures of yards and sidelines ties which have been withdrawn from the roadbed of a main line in which it is necessary to maintain the track structure in excellent condition at all times. For this reason, any machine or method of withdrawing and replacing ties, in order to be economically feasible, must be capable of withdrawing the ties without seriously marring them or affecting their strength.

In the past, the removal and replacement of ties has been done principally by manual means, and the cost of maintaining the roadbed in good condition is costly for this reason. The purpose of the present invention is to provide a tie-removing and replacing machine which is inexpensive to construct, and which, at the same time, removes and replaces ties without damaging them. A further object of the invention is to provide a machine of this character mounted on a railroad truck which can easily be transported to the point at which the machine is to be operated.

Another further object of the invention is to provide a tie-removing and replacing machine which can be transported and operated with a minimum of labor, thereby making extensive savings in the cost of maintaining track structures in good condition.

Other objects and advantages of the invention will be apparent from the following description of the one embodiment of the invention which is illustrated in the accompanying drawings. It will be apparent to those skilled in the art that various changes and modifications may be made in the machine illustrated in the drawing without departing from the spirit of the invention, and that the specific illustration and description is for the purpose of facilitating an understanding of the invention.

In the drawings:

Figure 1 is a side elevational view of one form of machine constructed according to this invention in which the pivotally mounted head-supporting frame of the machine is shown in dotted lines in its tie-handling position, and in solid lines in its stored position;

Figure 2 is a plan view of the machine shown in Fig. 1;

Figure 3 is a side elevational view of the tie-engaging head of the machine shown in Figures 1 and 2;

Figure 4 is a plan view of the tie-engaging head of the machine shown in Figure 3.

Figure 5 is a vertical sectional view on the line 5—5 of Figure 4;

Figure 6 is a vertical sectional view on the line 6—6 of Figure 4;

Figure 7 is a vertical sectional view on the line 7—7 of Figure 4;

Figure 8 is a vertical sectional view on line 8—8 of Figure 2 showing the portions of the truck frame and the head-supporting frame at which they are pivotally connected, and also showing the hydraulic member which acts to return the head-supporting frame from its tie-engaging position to its stored position;

Figure 9 is a sectional view of a modification of a head-operating mechanism which may be employed in lieu of that shown in Figure 6; and

Figure 10 is a horizontal sectional view on the line 10—10 of Figure 9.

The general organization of a tie-pulling and replacing machine constructed according to this invention may be seen best in Figures 1 and 2. The machine shown therein comprises a four-wheeled truck T which is adapted to run on standard-gauge rails, and a tie-handling mechanism pivotally supported on the truck. The tie-handling mechanism consists essentially of a head H which is rigidly fixed to the forward end of a head-supporting frame F. The frame F is pivotally connected to the truck T, and the truck T and frame F are so designed that the tie-engaging members of the head H may be quickly and accurately lowered into working position and returned to stored position, as desired. At least one pair of tie-engaging members (10, 10*a*) forming a part of the head H, are supported for rotation about vertical axes, and are normally spaced apart longitudinally of the machine a distance greater than the width of a standard tie. The longitudinally spaced tie-engaging members are also movable relatively towards and away from one another. Normally the tie-engaging members of each pair are separated to the extent that when lowered into their working position these tie-engaging members may then be moved relatively towards one another to firmly engage the tie therebetween. The tie-engaging members are then rotated in the direction which will cause the engaged tie to be ejected from beneath the rails. One or more pairs of tie-engaging members constructed to coact in the described manner may be employed, and for purposes of illustration the machine shown in the accompanying drawings comprises two such pairs, namely 10, 10*a* and 12, 12*a*.

The necessary power for forcing the tie-engaging members into operative position, and thereafter rotating them, is derived from the engine E which is supported of the rearward end of the frame F so as to partially counterbalance the weight of the head H about its pivotal connection to the frame F. The mechanism through which driving torque is transmitted from the engine E to tie-engaging members will be described in more detail hereinafter. The relative motion of the tie-engaging members into their working positions is imparted, preferably, by a hydaulically actuated piston or pistons, the source of hydraulic pressure being a pump powered by the engine E. This same source of hydraulic pressure is conveniently employed to control the swinging movement of the head-supporting frame F into its working or stored position, as also explained more fully hereinafter.

It will be apparent that by providing an appropriate gearing and clutching mechanism the engine E may be employed to furnish motive power to the truck T, but the present invention is not concerned with means by which the wheeled tie-removing and replacing mechanism is moved from one work location to another.

The frame of the truck comprises transom members 14 and 16 which are rigidly connected at their rearward ends to either end of the longitudinal member 18 which lies along the back of the truck. The head-supporting frame F is pivotally connected to the truck frame by the

rod **20** and the forward end of the frame F supports the rigidly affixed tie-engaging head H. The head H is moved from its stored position, shown in solid lines in Figure 1, to its working position, shown in dotted lines, by causing the head-supporting frame to swing relatively to the truck T about the pivot rod **20**.

The forward ends of the truck transoms **14**, **16** are rigidly fixed with respect to one another by means of bracing which extends over the head-supporting frame F so that it may be lowered unobstructed into its working position. This bracing comprises the uprights **22**, **24**, fixed, respectively, to the ends of the transoms **14**, **16** and a cross-tie member **26** rigidly fixed between the ends of the uprights. Diagonal braces **28**, **30** are also fixed between the transoms **14**, **16** respectively, and the upper ends of their respective uprights **22**, **24**, thereby adding to the rigidity and strength of the truck T while permitting the head-supporting frame F to be moved freely between its working and stored positions. The truck T is further braced by the diagonal members **32**, **34** which at their forward ends are fixed to the inner sides of the transoms **14**, **16**. These members converge rearwardly and at their rearward ends are fixed to the forward section of the longitudinal member **18**. Midway between the ends of the members **32**, **34** the longitudinally disposed cross-piece **36** is fixed and this serves to support the lower end of the hydraulic mechanism by means of which the relative swinging movement between the truck T and the frame F is controlled, as will later be described in more detail.

It will be observed that the longitudinal frame member **18** of truck T consists of two parallel sections **18***a* and **18***b*. Referring to Figures 2 and 8, it will also be seen that journal blocks **38** are fixed to the upper sides of the sections **18***a*, **18***b* at longitudinally spaced intervals and that similar journal blocks **40** are fixed to the underside of the rearward portion of the frame F. All of these journal blocks **38**, **40** are provided with bearing apertures which are axially aligned and in which the pivot rod **20** is received, and about which the frame F is caused to swing relatively to the truck T.

The head-supporting frame F comprises sub-frame members **42**, **44**, **46** and **48** which lie parallel to one another up to the forward ends of members **42**, **48** as may be seen in Figures 1 and 2. The members **44**, **46** converge forwardly beyond the forward ends of members **42**, **48**, and at their distal portions are turned into parallel relationship to engage between them the supporting tongue **50** of the tie-handling head H. The frame F also comprises members **52**, **54** which are mounted, respectively, on the upper sides of sub-frame members **42**, **48**, and the forward ends of members **52**, **54** are rigidly held with respect to one another by the plate **58** joined thereto.

As previously indicated, the tie-handling head H is supported on the frame F by the tongue **50** which extends between the distal parallel ends of the members **44**, **46**, and is held securely in position by the bolt **60**. In addition, the tongue **50** is preferably welded to the members **44**, **46**.

The forward top portion of the tongue **50** is cut away to receive the bottom and a portion of the rear side wall of the tubular member **62**. This member **62** is rectangular in cross-section and open at either end, as may be seen best in Figure 5. The member **62** is welded or otherwise securely fastened to the tongue **50** in the position illustrated in Figure 5.

Referring to Figures 3 to 6, it may be seen that the head H consists essentially of two parts, one of which supports and holds in relatively fixed position the rotatable tie-engaging members **10***a* and **12***a*, and the other of which is slidably mounted with respect to the first part and on which the rotatable tie-engaging members **10** and **12** are supported. The first of these parts of the head H is shown best in Figure 5, and the second, or relatively slidable part, is shown best in Figure 3 and in the lower portion of Figure 4.

Referring to Figure 5, it may be seen that a plate **64** is fixed to the upper side of the tubular member **62** and that on this plate there is mounted two spaced-apart bearing blocks **66**, **68**. A stub shaft **70** is rotatably supported in these blocks, and on the portion of the shaft intermediate the blocks there is fixed a bevel gear **72**. The upper end of a shaft **74** extends upwardly through the plate **64** and on this end is fixed a bevel gear **76** which is positioned to coact with the gear **72**, and thus drive the shaft **74**.

As seen best in the left-hand portion of Figure 6, the shaft **74** extends downwardly through bearings supported in apertures in the bottom and top sides of the tubular member **62**, and through an elongated slot in a member **80** which is slidably received with the tubular member **62**. The relatively movable part of the head H is mounted on this sliding member **80**, as will be described more fully hereinafter.

Again referring to Figure 6, the lower end of the shaft **74** is journaled in a bearing **82** which is mounted on the underside of a plate **84**, supported in general parallelism with the plate **64** by the hanger plate **86**, which is fixed along its upper edge to the plate **64** (Figure 5). Immediately above the plate **84**, the shaft **74** carries a gear wheel **88**, which meshes with gear wheels **90**, **92** which are fixed to the shafts **94**, **96**, respectively, on which the tie-engaging members **10***a* and **12***a* are supported. The shafts **94**, **96** are journaled at their upper ends in bearings (not shown) fixed to the underside of the plate **64** and, at a portion intermediate the tie-engaging members and the driving gears, in bearings or bushings (not shown) carried by the plate **84**. The above-described arrangement is such that when turning torque is applied to the shaft **70** it will be transmitted through the shaft **74** to the gear **88** and applied to the shafts **94**, **96**, through gears **90**, **92**, in the direction which causes the tie-engaging members **10***a* and **12***a* to rotate in the same direction.

The relatively slidable part of the tie-handling head H is shown to best advantage in Figure 3, in the lower portion of Figure 5 and in the right-hand portion of Figure 6. The operating parts of this section of the head are supported towards one end of the member **80** which is slidably received in the tubular member **62**. A plate **100** extends transversely of the length of the sliding member **80** and is fixed to the upper side thereof towards the end which protrudes from the tubular member **62**. The plate **100** and the upper and lower sides of the sliding member **80** are provided with vertically aligned apertures through which the upper portion of the shaft **102** extends. A plate **106**, generally similar in form to plate **100**, is supported beneath the plate **100** by the hanger **108**, and the underside of the plate **106** carries a bearing **110** in which a lower portion of the shaft **102** is journaled. The gear wheel **112** is fixed to the shaft **102** immediately above the upper side of the plate **110**, and this gear wheel is meshed on either side with the gear wheels **114**, **116**. The vertically disposed shafts **118**, **120** are rotatively supported at their upper ends in bearings (not shown) carried on the underside of the plate **100**, and their lower portions extend through bushings (not shown) supported in the plate **106**. The tie-engaging elements **10**, **12**, respectively, are fixed to the lower ends of the shafts **118**, **120**, and through the described connections are caused to rotate in the same direction upon rotation of the bevel gear **104**. Referring to Figure 3, it may be seen that two transversely spaced bearing blocks **122**, **124** are supported on the upper surface of the plate **100**, and that a stub shaft **126** supported in these bearing blocks carries a bevel gear **128** which is positioned to drive the bevel gear **104**. The rearward end of the stub shaft **126** extends through the bearing block **122** and has fixed thereto one part of a universal joint **130** in the driving connections between the head H and the engine E.

The construction and arrangement of the tie-handling head described above are such that the tie-engaging ele-

ments 10 and 12 may be positioned on one side of a tie end and the tie-engaging elements 10*a* and 12*a* on the other side thereof. The portion of the head H on which the tie-engaging elements 10 and 12 are supported can be moved relatively towards their cooperating elements 10*a* and 12*a*, respectively, and the tie end firmly gripped the tie-engaging elements on either side thereof. As substantial force is necessary to move the tie-engaging elements into working position, and retain them there, means are provided for this purpose. The relative movement of the tie-engaging elements, and their retention, is accomplished by means of a hydraulically actuated piston and cylinder arrangement shown best in Figures 4, 5 and 6.

A cylinder 132 is supported by a bracket 134 on the underside of the forward end of the head supporting tongue 50. A piston 136, slidable in the cylinder (Figure 6) has fixed thereto a piston rod 138 which at its distal end carries a block 140. Referring to Figures 4 and 6, it may be seen that a strap 142 is fixed at one end to the block 140 and at its other end to the vertical end surface of the sliding member 80, which carries the structure, heretofore described, upon which the tie-engaging elements 10 and 12 are supported. Also fixed to the block 140 is one end of a strap 144 which extends longitudinally behind the vertical shafts 74, 102 and at its other grips the rear vertical edge of the plate 108. By these means, movement of the piston 136 to left as seen in Figure 6 will cause the tie-engaging elements 10 and 12 to move towards the tie-engaging elements 10*a* and 12*a*, respectively, and when positioned initially on either side of a tie will grip the tie firmly therebetween. Movement of the piston is accomplished by admitting a source of hydraulic pressure, later described, to the cylinder to the rear of the piston. Upon release of the hydraulic pressure, it is desirable to have the tie-engaging elements 10 and 12 return to their initial position, which is a short distance to the one side of the tie which they engage, in order to release the displaced tie and make ready for the placement and gripping of the new tie which is to be inserted. One means by which this may be accomplished is illustrated in Figure 7. A pair of longitudinally disposed tubes 150, 152 are welded or otherwise secured in apertures formed in the plate 86. Helical springs 154, 156, respectively, are placed within the tubes and the one ends of the springs are anchored to the corresponding ends of the tubes by means of bolts 162 and 164. The other ends of the springs are fixed to the upright 160 and this is fixed to the strap 144 which has been previously described. The righthand end of the tubes 150, 152, as seen in Figure 7, are more forwardly disposed than the forward edge of the plate 108 so that they do not obstruct movement of the slidable part of the head. It will be seen, therefore, that as the slidable part of the head H is moved by hydraulic pressure behind the piston 136 to the dotted line position shown in Figure 6, to grip the tie T, the springs 154, 156 will be extended. Upon release of the pressure, the springs contract and return the slidable part of the head to the solid line position shown in Figure 7 due to their connection with strap 144. To aid in guiding the return movement there is also provided a helical spring 166, which at one end is fixed to the plate 166 and at its other end to the strap 144 near its connection to the block 140. This may be seen best in Figure 2.

Auxiliary means is provided for moving the tie-engaging elements between their open and closed positions and this is illustrated in Figures 9 and 10. An operating shaft 170 is journaled in vertically aligned apertures formed in the tubular member 62 at a position longitudinally intermediate the shafts 72, 102. As previously explained, the sliding member 80 has longitudinally extending slots in its top and bottom sides which permit it to move relatively to the shaft 74 extending therethrough. The operating shaft 170 also extends through these slots. The rearward interior wall of the sliding member 80 has a rack 172 formed thereon, and a pinion 174 fixed to the operating shaft 170 engages this rack. Upon rotation of the shaft 170, which is facilitated by the handwheel 175 shown best in Figures 1 and 2, the sliding element 80 is caused to move relatively to the tubular member 62, and thus cause the tie-engaging elements to move to open or closed position, depending upon the direction in which the handwheel is rotated.

It will be observed that the head supporting tongue 50 is angled slightly upward from the plane of the frame members 44, 46 to which it is fixed. This is done so that when the frame and head are lowered into the operative position, shown in dotted lines in Figure 1, the bottom surfaces of all the tie-engaging elements will be in substantially the same plane. Other arrangements for accomplishing this same purpose will be apparent to those skilled in the art. Furthermore, other shapes and forms of the rotary tie-engaging elements may be employed in lieu of the cylindrical elements with heavily kurled circumferential surfaces which are disclosed in the exemplifying drawings. The bottom surfaces of the tie-engaging elements shown in the drawings are provided with cleats 176 which are highly advantageous in displacing ballast lying alongside of a tie which it is desired to remove, but the cleats may be dispensed with if desired, or replaced by a conical extension of the tie-engaging elements. All such changes and modifications are considered within the scope of the present invention.

The hydraulic mechanism for controlling the relative swinging movement between the frame F and the truck T is shown in Figure 8. The lower end of a piston rod 180 is pivotally held by the pin 182 which is supported in the upright ears 184, 186 fixed to the strength member 36 of the truck T. The piston (not shown) carried by the upper end of the rod 180 works in the cylinder 188 under the influence of hydraulic pressure admitted into the cylinder above the piston. (The same source of hydraulic pressure is employed to operate this piston as is employed to operate piston 136 which controls the opening and closing movements of the tie-engaging elements.) The upper end of the cylinder 188 is provided with a ball-shaped protrusion 190 which is received in a socket 192, thereby providing a pivotal connection to the bracing member 194 on which the socket is supported. The bracing member 194 is fixed to the frame F, one end being welded to the member 54 (Figure 2) and the other being welded to the floor panel 196. As seen best in Figure 8, the bracing member 194 is generally an inverted U-shaped and the socket 192 is fixed intermediate the side legs. A further bracing member 198, of the same general shape extends longitudinally over, and is fixed to, the member 194. The member 198 crosses over and reinforces the member 194 at approximately the point at which the socket 192 is fixed to the underside of the bracing member 194. Arranged in this manner, the relative swinging movement between the frame and the truck can be controlled by admitting to and releasing hydraulic pressure in the cylinder 188. When the frame F is in its stored position, shown in solid lines in Figure 1, a bar 200 is positioned beneath the forward portions of the frame members 44, 46 with its ends resting on the transom members 14, 16 of the truck. The bar 200 thus acts to support the frame in its stored position when the machine is being transported, and is removed when the machine is to be used. When the bar 200 is removed, the downward movement of the head H on the front end of the frame is controlled by releasing hydraulic pressure from the cylinder 188. The head H is lowered in this manner to position the tie-engaging elements relatively to a tie as shown in dotted lines in Figure 1 and in solid lines in Figure 6. A rail-gripping bracket 202 is fixed to the rearward side of the head H and cups the head of the rail on which the truck is supported, as shown in dotted lines in Figure 1. This aids in steadying the machine when a tie is being withdrawn or replaced, and

relieves the wheel assembly of the thrust forces which would otherwise be applied to them in full. The tie-engaging elements **10, 12** are then caused to move toward their coacting elements **10***a*, **12***a* and to grip the tie therebetween by admitting a hydraulic fluid under pressure behind the piston **136**. This pressure is supplied by a fluid pump **204** which is supplied through conduit **206** connected to a reservoir **208**. The pump is driven through the belt drive **222** from an output shaft on the engine E. Fluid under pressure is delivered by the pump through conduit **210** to a valve **212**. The conduit **214** delivers fluid under pressure into the cylinder **132**, and behind the piston **136**, upon manual actuation of the valve **212**. In a similar manner fluid under pressure is delivered through conduit **216** to valve **218**, upon manual actuation of which fluid under pressure may be delivered through conduit **220** to the cylinder **188** and thereby cause the frame F to swing about its pivot rod **20** to stored position.

When the tie-engaging elements have gripped the end portion of a tie firmly therebetween, the elements are caused to rotate in the direction which will eject the tie from its position beneath the rails. The necessary torque for rotating the tie-engaging elements is derived from the engine E. The main output shaft **224** of the engine E carries a sprocket **226** which is drivingly connected by the chain **228** to the sprocket wheel **230**. The sprocket **230** is mounted on the input shaft **232** of the reversing gearing **235**, which is of conventional design. The output shaft of the reversing gearing is connected through shafting **235**, including universal joints **236** and **238**, to the stub shaft **70**. The torque delivered to the shaft **70** is transmitted to the tie-engaging elements **10***a* and **12***a* through connections previously described with reference to Figure 5.

The drive for tie-engaging elements **10** and **12** is taken from the sprocket wheel **240** which is fixed to the the shafting **235** intermediate the bearing blocks **242, 244** which are supported on the frame member **58**. A chain **246** drivingly connects the sprocket **240** to the sprocket wheel **248** on the shafting **250** intermediate bearing blocks **252, 254** also supported on frame member **58**. The shafting **250** includes universal joints **256, 130** and is connected to the stub shaft **126** which carries the bevel gear **128**. The torque delivered to the stub shaft **126** is transmitted to tie-engaging elements **10** and **12** through the connections previously described with reference to Figure 3.

When the machine has been operated to eject a tie, as aforesaid, the hydraulic pressure on the piston **136** is released by actuation of the valve **212** and the springs **154, 156** act to return the tie-engaging elements to their open position, shown in solid lines in Figure 6.

The machine may then be employed to place a new tie in the position from which the old one was withdrawn by positioning the leading end of the new tie between the opened tie-engaging elements. The tie-engaging elements are then closed upon the tie end by actuation of valve **212**. The direction of rotary drive of the elements is reversed by manual adjustment of the reversing gearing **234**. The engine clutch may then be engaged and the tie will be drawn into proper position beneath the rails.

Upon the completion of the tie withdrawing and replacement operation, the valve **218** may be actuated to raise the frame F to its stored position. The retaining bar **200** may then be insered between the truck and frame to retain the frame in stored position when the engine E is stopped and power to the pump **204** is cut off. The machine is then ready to be transported, by rail if desired, to the next work location.

Having thus described the invention, what is claimed as new and is desired to be secured by Letters Patent is:

1. A machine for inserting and removing railroad cross ties beneath the rails of a track structure, comprising a wheeled truck guided for longitudinal movement along the rails, a frame pivotally supported on said truck for vertical movement between a raised inoperative position and a lowered operative position, movable means carried by said frame for operatively engaging and transversely moving a cross tie in the lowered operative position of said frame, a rail gripping bracket fixedly carried by said frame for operative engagement with a rail in the lowered operative position of said frame, said bracket including laterally presented abutment means rigidly fixed to said bracket against lateral displacement for engagement with the side of the rail for transmitting lateral thrust from the said frame to the rail.

2. A machine for inserting and removing railroad cross ties beneath the rails of a track structure comprising a wheeled truck guided for movement along said rails, a frame pivotally supported on said truck for vertical movement between a raised inoperative position and a lowered operative position, means for selectively raising and lowering said frame, a work head carried by said frame to one side of said truck, said head comprising cross tie engaging elements and means for operating said elements, a rail gripping bracket fixedly connected to said head for engaging one of said rails to determine the lowered operative position of said frame, said bracket receiving said rail and having abutment means depending on opposite sides of the rail for transmitting thereto the lateral thrust arising from operation of the said tie engaging elements.

3. The combination of claim 2 in which said cross tie engaging elements comprise a plurality of pairs of rollers, the rollers of each pair being selectively spaced apart in the direction of movement of the truck to depend on opposite sides of a cross tie, and said pairs of rollers being relatively aligned transversely to the said direction of movement to accurately guide the ties transversely to the rails.

4. The combination of claim 3 including means for simultaneously and equally moving the rollers of each pair relative to each other to vary their said spacing.

5. A machine for inserting and removing railroad cross ties beneath the rails of a track structure comprising a wheeled truck guided for movement along said rails, a frame member extending transversely to the movement of said truck and medially pivoted thereon for vertical swinging movement, a work head carried by said frame on one side of its medial pivot, and rotatable means carried by said head for operatively engaging and transversely moving a cross tie, a motor carried by said frame on the opposite side of said pivot for partially counterbalancing the weight of said work head, and means establishing a driving relation between said motor and said rotatable means.

6. The combination of claim 5, including a hydraulic pump on said frame in driven relation with said motor, and hydraulic means in circuit with said pump and driven thereby for tilting said frame about its pivot.

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