SPIKE PULLING GRAPPLE

FIG. 3

FIG. 4

FIG. 5

FIG. 6

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This invention relates to a spike pulling grapple, and more particularly concerns a device for withdrawing spikes from objects such as ties of railroad tracks and the like. This application is a division of my copending application Serial No. 406,645, filed January 28, 1954, now U.S. Patent No. 2,826,446.

While mechanical spike pulling devices have been proposed from time to time for effecting the removal of spikes from railroad ties, these have not been successful to any great extent since they have been heavy and bulky as well as difficult to adapt for removal of spikes disposed at various distances from the rails with which they are associated. Moreover, several manual operations have been necessary in connection with the use of such machines, including the steps of engaging the gripping element of the tool or machine with the spike, positioning and bracing the tool or machine with respect to the spike, and removing the spike from the gripping element of the tool or machine after it is withdrawn.

For the foregoing reasons it has been conventional in railroad practice to employ a lever or claw bar together with appropriate wedge means to apply lifting force to the base of the spike head for withdrawing the spike from the track tie. Such operations necessarily require extensive manual labor. Moreover by reason of exposure to the elements, spikes frequently become corrodcd in the area of the shaft immediately below the spike head as well as the head itself; accordingly the exertion of upwardly directed force upon the spike head is undesirable in that the spike has a tendency to break under tension at the corrodcd area. As a result the spike is pulled from the spike shaft which remains in place in the tie. Subsequent removal of the shaft from the track tie is difficult and in some cases the shaft must be driven through the tie with a drift punch, a costly and undesirable feature. Removal of railroad spikes by means of clawbars and wedges as well as conventional spike pulling machines is also dangerous in that spike heads tend to be liberated suddenly by breaking because of corrosion and to fly into the air, endangering personnel, this being a source of many personal injuries.

It is accordingly an object of this invention to provide a compact, and readily portable machine for withdrawing spikes from objects into which they have been driven. It is another object of this invention to provide a fluid operated spike pulling machine which may readily be braced against a track rail to effect withdrawal of the spikes from the ties of the track bed. Still another object is to provide a spike pulling machine having automatic means for engaging and releasing the spike to be pulled. Yet another object of the invention is to provide a machine for withdrawing corrodcd or otherwise weakened spikes from the objects in which they are embedded. It is still a further object of the invention to provide a device for withdrawing large numbers of spikes, one at a time, which is automatically rendered inoperative after each spike is withdrawn, and may immediately be re-positioned above the next successive spike to effect its withdrawal. Other objects of the invention, including the simplicity and economy of the same and the ease and safety with which it may be applied to effect withdrawal of spikes and nails from various objects, will become more apparent hereinafter.

In summary, the foregoing and other objects are accomplished by the present invention wherein the spike puller comprises a base, a rigid frame slidably mounted on said base, a grapple suspended from said frame in position to engage and disengage the spike to be pulled, a jack element on said base having capacity to slide said rigid frame up and down relative to said base, operating means for operating said jack element, and relieving means operative in response to the control means for releasine a spike after extraction and permitting the jack to return to a proper position for engaging another spike.

Of the drawings:

Fig. 1 is a view in vertical section of a spike pulling machine conveniently embodying my present invention, the machine being shown in position for withdrawing a rail holding spike from a point adjacent a track rail shown in cross section.

Fig. 2 is a fragmentary view in section taken as indicated by the angled arrows — in Fig. 1.

Figs. 3, 4 and 5 are front views of the grapple portion of the machine showing the movements of important parts in the operation of the grapple.

Fig. 6 is a detail sectional view taken as indicated by the angled arrows — in Fig. 4.

Figs. 7 and 8 show front views of the machine further illustrating its construction and operation.

With more specific reference to these illustrations, it will be noted that the grapple housing of the device designated 200 is threaded to a pair of vertical rods 201 which reciprocate up and down in response to a hydraulic mechanism 202.

The grapple housing 200 has two fixed posts 203, 203 adjacent its side walls near its top. It also includes a central vertically fixed post 204 and a central movable slide member or plug 205. A pair of grapples or claws 206 extends generally vertically in the housing. Each claw 206 has three relatively inclined inner cam surfaces 207, 210, 211 and has a rounded upper end 212. Adjacent each rounded end 212 is a flat face 213 which coacts with a spring-urged press bar 214 mounted in the top of the grapple housing. Each claw 206 has relatively inclined inner flat cam faces 215, 216 and has a concave face 217 adjacent the flat face 216. Adjacent to the concave faces 217 are concave notches 220 having a cylinindrical curvature of the same radius as plug 205 about which the claws are fulcrumed. Below the concave notch 220 of each claw is a flat face 221, and below face 221 is an inwardly angled claw end 222 which is shaped to grip the spike shank below its head.

Pivoted to the sides of the grapple housing 220, each at one end, are a pair of link bars 230 each of which has a slotted connection at its other end with the central movable plug 205. Each link bar 230 is undercut at 231 at its outer or pivoted end, forming a flat contact surface 232. Arranged to co-act with the flat surfaces 232 of the link bars is a pair of stops 233 which are bolted to the sides of a part 35 again referred to hereinafter, said part being slotted at 234 for purposes of adjustment of said stops.

The operation of the grapple will be apparent from Figs. 3-6. In Fig. 3 the rods 201 have moved down to the spike, the bottoms of the claws 206, 206 have contacted the spike, and the housing 200 has been forced further downwardly relative to claws 206, 206, thereby compressing the springs of press bar 214. Concurrently with such relative movement, the fixed posts 203 force cam followers 207 inwardly. The result is that the claws concurrently slide and rock until they are open, clearing
2,945,674. The spike head. Claws 206, 206 are then pushed downwardly by the press bar 214, the fixed post 204 bearing against the surfaces 216, 216, thereby closing the claws firmly, by combined sliding and rocking movement, on the spike shank. When claws 206, 206 move downwardly, they force plug 205 to move downwardly swinging the link bars 230, 230 downwardly to the position shown in Fig. 4. Lifting force is then applied to the rods 201, 201, as indicated by the arrows in Fig. 4. The flat faces 210, 210 are locked flat against the side walls of grapple housing 209, this being accomplished by fixed post 204 and inner inclined faces 216, 216. After the spike is drawn clear of the tie, the links are forced against the corresponding stops 233, 233 thereby swinging link bars 230, 230 upwardly to the position shown in Fig. 5. This slides the inclined faces 207 against the plugs 203 which spreads the claws 206, 206, releasing the spike.

The hydraulic mechanism 202 is best illustrated in Figs. 1 and 2 and as shown, is mounted on the post 35 which bears upon the top of the track rail 22 and which has a leg to rest upon the tie 23. The number 250 designates a housing for a reservoir 251 containing hydraulic fluid. A tube 252 extends vertically through the reservoir 251. A piston 253, reciprocable up and down in tube 252, is reciprocated by a threaded bushing 254 to a verticallyadjustable externally threaded center post 255. Center post 255 is fixed to a cross arm 256 to which the vertically reciprocable rods 201, 201 (Figs. 3, 4) are attached. A plunger reservoir 260 contains fluid which is pumped by a reciprocable plunger 261. On the up stroke of plunger 261, the fluid flows through a check valve 262 and passage 263, lifting the piston 253. On the up stroke of plunger 261, fluid is drawn out of reservoir 251 through passage 264 and check valve 265 into reservoir 260. In this manner, the jack is raised by reciprocating the plunger 261. This is conveniently accomplished manually, using a handle 266.

Hydraulic release means are provided for quickly lowering the jack in response to movement of handle 266, after the spike has been withdrawn. Plunger 261 has a transverse passage 270 (Figs. 1, 2) which comes into alignment with a pair of passages 271, 272 when the plunger 261 is drawn up to its upper limit as determined by a pair of stop members 273, 274 (Fig. 1). Fluid is quickly relieved from below the piston 253 through the passages 263, 275, 276, 272, 270, 271, 277, 250 and 251 to the reservoir 251. In this manner, after completing the extraction of one spike, the claws are rapidly permitted to descend to grasp the next spike, engaging another spike, all in response to a simple lifting movement of the jack operating handle. Concurrently with the raising and lowering steps, the claws are automatically brought together and spread apart in accordance with a predetermined sequence of movements for automatically engaging and ejecting the spikes. While the jack element of the machine is preferably a hydraulic device employing a liquid fluid such as oil or the like as a pressure transmitting medium, other fluids are contemplated as effective and equivalent pressure transmitting media. It will also be appreciated that, although the invention has been described in detail with reference to two embodiments thereof, it may also be practiced by substituting a wide variety of modifications or equivalents for the elements shown and described herein. All such modifications, including reversals of parts and the use of certain features independently of the use of other features, are within in the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim:

1. A grapple, for use in a device for withdrawing spikes from track ties, comprising a housing, means for lowering the housing to grip the spike and raising it to withdraw the spike, a pair of spike engaging hooks mounted slidably in said housing for movement upward and downward therefrom, resilient means in said housing having a portion bearing against said housing and another portion bearing against said hooks, urging said hooks downwardly relative to said housing as said housing is lowered, said hooks having opposing recesses in which a slidable fulcrum plug is located, means for moving the hooks about said plug to open them as the housing is lowered, and to close them upon the spike as the housing is raised, a pair of elongated links arranged transversely of said housing, said links being pivotally connected to the housing and having connections at their inner ends with said plug, stationary means on a fixed part of the device in the path of the links for actuating said links to cause the hooks to be moved upwardly of the housing in opposition to the resilient means aforesaid as said housing is raised.

2. The invention according to claim 1, wherein the stationary means is vertically adjustable in relation to the fixed part of the device.

3. A grapple, for use in a device for withdrawing spikes from railroad ties, comprising a housing having an opening in the bottom thereof, a pair of opposed vertically arranged spike engaging clamp elements slidably mounted for up and down movement in the housing and having claws extending out of said bottom opening, a vertically shiftable slide member on which said clamp elements are pivoted, link means fulcrumed at one end to the housing and having a slotted connection at the other end with said vertically shiftable slide member, spring means tending to yieldingly urge the clamp elements downward in the housing, a member fixed in the housing and operative by camming action with said elements to spread the upper ends of the clamp elements apart as they are urged downwardly by said spring means, means for actuating said link means in response to rise of the housing to shift said vertically shiftable slide member and the clamp elements in opposition to the spring means, and other means fixed in the housing and operative by camming action with said clamp elements to spread the lower ends of said elements apart upon withdrawal of the spike.

4. A grapple, for use in a device for withdrawing spikes from track ties, comprising a housing, means for lowering and raising the housing incident to removing the spike, a pair of opposed vertically arranged spike engaging hooks slidably mounted in the housing for up and downward movement therein, said hooks having engaging surfaces at their tops and also at their inner and outer sides, a pin by which the hooks are inter-pivoted, a link fulcrumed at one end to the housing and having a slotted connection at its other end with said pin, resilient means in the form of a spring pressed plate operative by coaction with the top cam surfaces of the hooks to depress said hooks in the housing, means fixed within the housing and operative by coaction with the cam surfaces at the inner sides of the hooks to spread the upper ends of said hooks as they are depressed in the housing, means for actuating the link in response to rise of the housing to raise the hooks in opposition to the spring means, and other means within the housing and operative by coaction with the cam surfaces at the outer sides of the hooks to spread the lower ends of the hooks apart upon withdrawal of the spike.

5. A grapple, for use in a device for withdrawing spikes having heads from track ties, comprising a housing having an opening in the bottom thereof, means for lowering and raising the housing incident to removing a spike, a pair of spike engaging hooks slidably mounted in said housing for movement up and down therein, resilient means in said housing having a portion bearing against said housing and another portion bearing against said hooks, urging said hooks downwardly relative to said housing, said hooks having opposed recesses in which a slidable fulcrum plug is located, means as the housing is lowered, and to close them upon the spike as the housing is raised, a pair of elongated links arranged transversely of said housing, said links being pivotally connected at one
end to the housing and having slotted connections at their inner ends with said plug, stationary means on a fixed part of the device in the path of the links for actuating said links to cause the hooks to be moved upwardly of the housing in opposition to the spring means as said housing is raised to extract the spike, and cam means in the housing operative between the hooks to open them for release of the spike upon its withdrawal from the tie as the housing is fully elevated and the links are actuated as aforesaid.

6. A grapple, for use in a device for withdrawing spikes having heads from track ties, comprising a housing means for lowering and raising the housing incident to withdrawing a spike, a pair of spike engaging hooks slidably mounted in said housing for movement up and down therein, resilient means in said housing having a portion bearing against said housing and another portion bearing against said hooks, urging said hooks downwardly relative to said housing, said hooks having opposed recesses in which a slidable fulcrum plug is located, means operative as the housing is lowered to close the hooks under the spike head, a pair of elongated links substantially of equal length arranged transversely of said housing, said links being pivotally connected at their outer ends to opposite sides of the housing and having their inner ends embracing said plug, stationary means on a fixed part of the device in the path of the links for actuating said links to cause the hooks to be moved upwardly of the housing in opposition to the resilient means as said housing is raised to extract the spike, and means concurrently operative to open the hooks for release of the spike when the housing is fully elevated.

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