July 2, 1957 H. H. TALBOYS 2,797,889

HYDRAULIC SPIKE PULLER

Filed Nov. 4, 1953 2 Sheets-Sheet 1

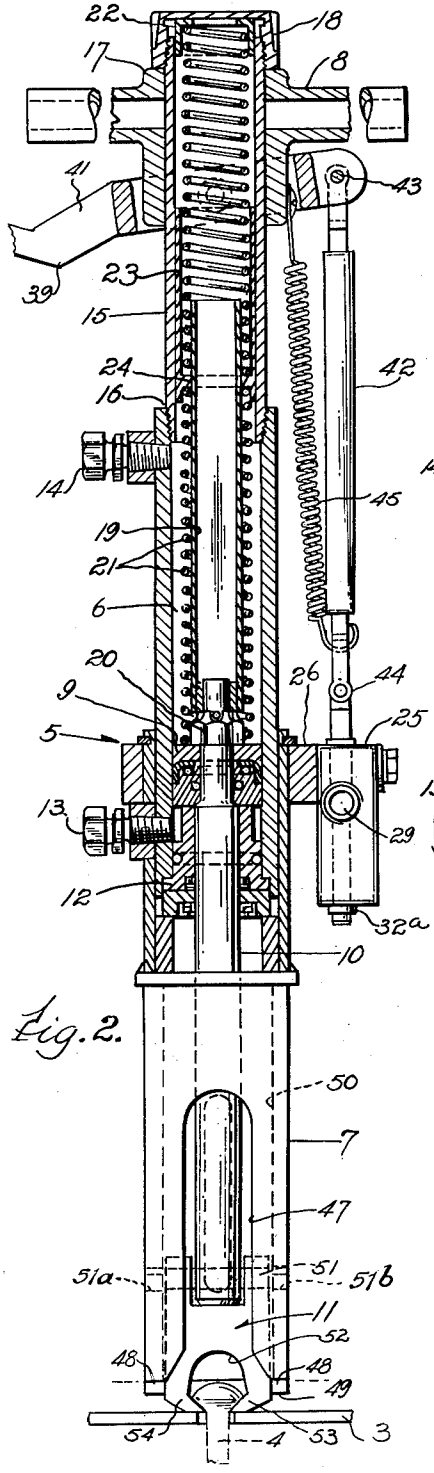


Fig. 2.

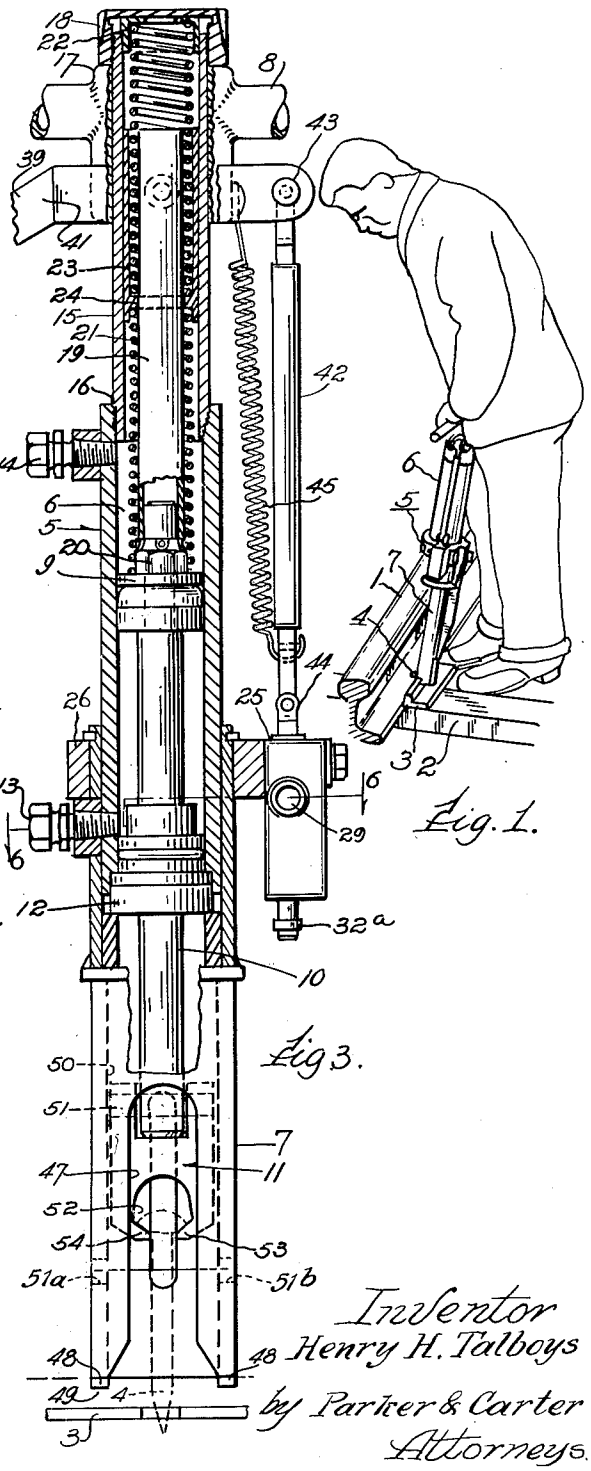


Fig 3.

Fig. 1.

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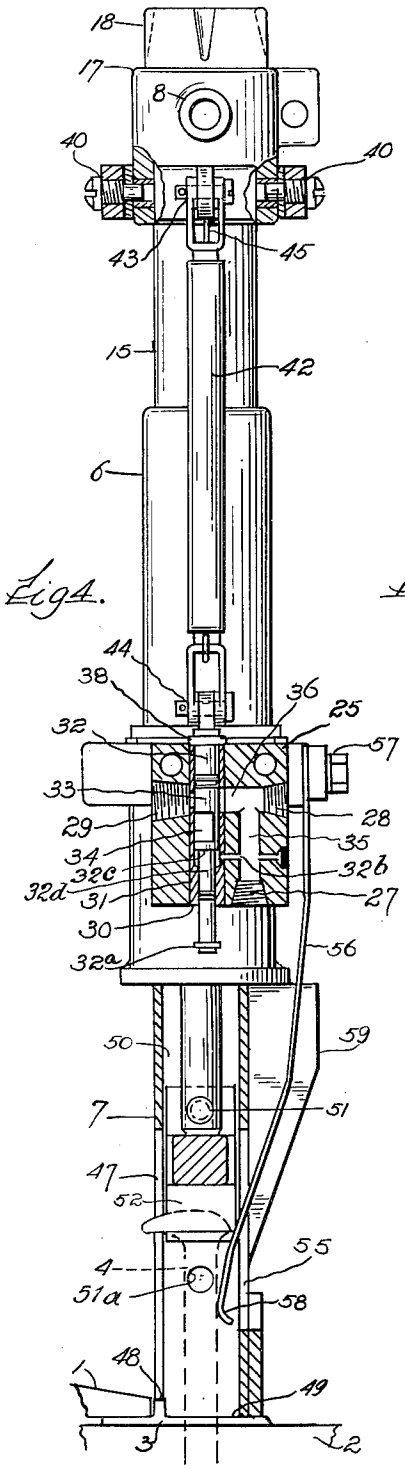


Fig. 4.

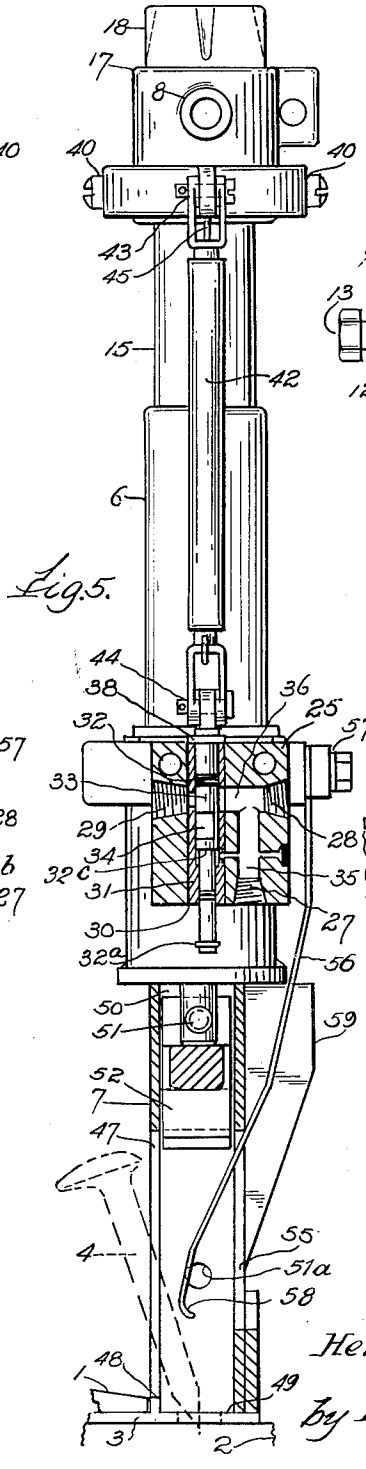


Fig. 5.

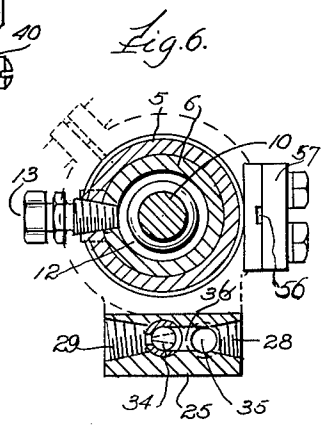


Fig. 6.

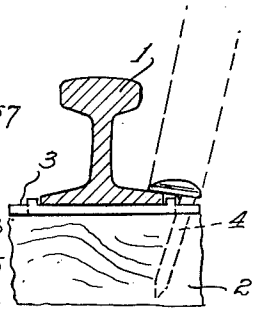


Fig. 7.

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HYDRAULIC SPIKE PULLER

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Application November 4, 1953, Serial No. 390,137

4 Claims. (Cl. 254—18)

This invention is directed to an improved portable power-operated spike-pulling implement.

One object of the present invention is the provision of a portable power-operated implement for removing spikes from their embedded positions along railroad rights-of-way and having provision for automatically disengaging the spike from the implement when the spike is removed. Thus, the labor of the operator of the implement is restricted generally to positioning the implement adjacent a spike to be removed and actuating the power controls for the implement.

Another object of the present invention is the provision of a portable power-operated spike-pulling implement having maximum flexibility of use and which may, for example, be conveniently used for operations in the inter rail area, the outer rail area and in the relatively restricted area between the rails disposed closely adjacent one another, as found in track switches.

Another object of the present invention is the provision of an improved hydraulic system for use in removing railroad spikes from their embedded positions in the rail supporting ties.

A further object of the present invention is the provision of a spike pulling implement with improved means for gripping and removing an embedded railroad spike.

Other objects will appear from time to time in the course of the ensuing specification.

Referring generally now to the drawings:

Figure 1 is a diagrammatic showing of the spike pulling implement, embodying the present invention as used along a railroad right-of-way;

Figure 2 is an enlarged elevational view of the implement shown in Figure 1, with certain portions broken away for purposes of clarity;

Figure 3 is a detail view similar to Figure 2, but showing another operative position of the elements making up the implement shown in Figure 1;

Figure 4 is another side elevational view of the implement shown in Figure 1, but taken along a section transverse to the view shown in Figure 2;

Figure 5 is an elevational view similar to Figure 4, but showing another operative position of the elements shown in Figure 4;

Figure 6 is a sectional view of the device shown in Figure 3, taken along the section lines 6—6 of Figure 3;

Figure 7 is a detailed view of certain portions of the spike-pulling implement as disposed along the rail of a track.

Referring specifically now to the drawings wherein like characters are employed to designate like elements throughout the specification and, in the first instance, to Figure 1, 1 represents a rail of a railroad track supported on the customary tie 2. 3 designates a tie plate seated on the tie. 4 represents a spike having the customary flange or head portion overlying the base of the rail and extending through an aperture in the tie plate 3 into the tie.

As shown in Figure 1, the implement 5 is adapted to

be manipulated by hand and positioned closely adjacent the rail 1 and spike 4. The implement 5 includes an upper frame portion 6 in the form of a cylinder and a lower base portion 7, the lower end of which is adapted to bear against the tie plate 3. The lower base portion 7 is relatively narrow in cross sectional width and is generally on the order of the greater dimension of an average spike as will be seen in Figure 4. The implement may be conveniently carried from place to place by means of a tubular handle portion 8 extending transversely of the longitudinal axis of the implement at the upper end portion of the implement.

The upper cylindrical portion of the implement 5 forms the cylinder of a cylinder-and-piston assembly. As shown in Figure 2, a piston 9 is positioned within the cylinder. A piston rod 10 extends downwardly from the piston 9 to a point spaced from the lowermost portion of the base 7. The piston 9 is adapted to actuate a spike-gripping implement, designated generally at 11, upon admission of fluid to the cylinder 6.

The cylinder 6 is closed at one end by means of any suitable member 12 providing a bearing for the piston rod 10. At the lower portion of the cylinder, an oil inlet and outlet passage 13 is formed to pass oil to the interior of the cylinder 6. When oil, under pressure, is admitted through the passage 13, the piston 9 will move upwardly within the cylinder 6. An air bleed passage, designated generally at 14, is formed in the upper portion of the cylinder 6 to allow ingress and egress of air in the upper portion of the cylinder as the piston 9 moves within the cylinder. A generally tubular extension 15 is screw-threaded into the upper end of the cylinder 6 as at 16, and provides a support for the hub 17 of the handle 8. The upper end of the tubular extension is closed by means of a cap 18, which is threaded upon the upper end of the extension 15.

A sleeve member 19 is attached to a nut 20 on the upper end of the piston rod 10. A coil spring 21 surrounds the sleeve 19 and has one end bearing against the piston 9, and the other end bearing against the spring seat 22 bearing against the cap 18. A spring guide member 23 is joined to the sleeve 19 as by means of radially extending webs 24, or the like, and is spaced from the sleeve sufficiently to provide clearance for the spring 21 therebetween. The sleeve 19 and the guide 23 serve to preclude undesired outward expansion of the spring 21. The outer diameter of the guide 23 is sufficient to loosely fit within the tubular extension 15.

The spring 21 is under compression and serves to bias the piston 9 downwardly to its lowermost position, as shown in Figure 2. However, when fluid is admitted through the inlet 13, the piston 9 moves upwardly within the cylinder 6 against the action of the spring 21, and the sleeve 19 and guide 23 move upwardly in unison with the piston. When the oil or hydraulic fluid behind the piston is permitted to exhaust through the port 13, the spring 21 forces the piston 9 to its lowermost position, thereby forcing the fluid out of the cylinder 6.

In order to control the action of the piston in the cylinder, I provide a valve body 25, which is attached to the cylinder 6 as by means of any suitable member 26 encircling and fixed to the cylinder 6. As will be seen in Figure 4, the valve body 25 includes a port 27 which is adapted for communication with the cylinder port 13.

A port 28 is adapted for communication with a pump of an hydraulic system and a port 29 is adapted for communication with the reservoir of the hydraulic system. A longitudinally extending bore 30 is formed in the valve housing and a sleeve 31 is seated therein. The sleeve 31 is adapted to receive a valve plunger 32. The valve plunger 32 is formed with a first portion 33 which is generally cylindrical so as to block passage between the

port 29 and the port 28. The lower end of the plunger includes a reduced portion which is generally V-shaped, as at 34, as will be seen more clearly in Figure 6.

The port 27 leads into a passageway 35 in communication with a passageway 36 extending from the portion 28 to the port 29 through the bore 30 and sleeve 31. The present implement can be actuated by any suitable portable pump and reservoir assembly, communicating, through suitable flexible conduits, with the valve body 25. The details of the pump, reservoir and conduits of the hydraulic system do not, of themselves, form part of the present invention and, for that reason, they are not shown herein.

When the valve plunger 32 is in the position shown in Figure 4, communication is established between the port 27 and the port 28 and communication is blocked between the ports 28 and 29 by the valve portion 33. The valve plunger, as shown in Figures 4 and 5, is in its lowermost position. In that position, further downward movement of the valve plunger is precluded by a stop member which may take the form of a ring 38, or the like, fixed to the plunger exteriorly of the valve housing. When in that position, hydraulic fluid is circulated from the port 28 through the port 27 to the cylinder 6 through the port 13 and the piston 9 is thereby forced upwardly within the cylinder. However, when the reduced portion 34 of the valve plunger is generally aligned with the ports 28 and 29, as by moving the valve plunger 32 upwardly, communication is established between the port 27, port 28 and port 29. Upward movement of the plunger 32 is limited by a stop ring 32*a* engageable with the lower end of the housing when the plunger portion 34 is generally aligned with ports 28 and 29. Under this condition, the fluid will simply be circulated from the pump to the reservoir, since the action of the spring 21 creates sufficient resistance to preclude actuation of the piston 9 by the fluid.

A bypass passage 32*b* is provided between the passage 35 and the lowermost portion of the interior of the sleeve 31. The plunger 32 includes a shoulder 32*c* below the V-shaped portion 34 and a reduced lower portion 32*d*. The bypass 32*b* permits the hydraulic fluid in the passage 35 to pass to the lower sleeve interior, thus subjecting the shoulder 32*c* to the pressure of the fluid. As the resistance to the movement of the piston 9 builds up, it results in a buildup of pressure in the passage 35 and build up of pressure exerted on the shoulder.

A valve actuating trigger 39 is pivotally mounted upon the hub of the handle 8, as at 40. The trigger includes a portion 41 extending in the direction of the handle 8 so that the operator of the implement may conveniently grasp both the handle 8 and the trigger portion 41 with one hand. A connecting link 42 is pivoted to the trigger 39, as at 43, on the opposite side of the cylinder 6 from the portion 41, and is pivotally connected at its lower end to the upper portion of the valve plunger 32 as by means of the pivot pin 44. A tension spring 45 acts constantly to bias the link 42 and valve plunger 32 upwardly or to a position where the reduced portion 34 is aligned with the ports 29 and 28. At this time, fluid circulates between the pump and the reservoir. However, when the operator desires to move the piston rod and claw 11 upwardly, he simply grasps the trigger portion 41 and pulls upwardly thereon, resulting in forcing the valve plunger 32 downwardly within the bore 30 to the point shown in Figure 4, where communication between the pump and the reservoir is precluded and fluid is admitted, under pressure, behind the piston 9. The piston 9 then moves upwardly within the housing. Upon release of the valve trigger portion 41, the spring 45 pulls the valve plunger 32 upwardly within the valve housing, where communication is established between the pump and the reservoir, and the spring 21 then forces the piston 9 downwardly within the cylinder 6.

The lower end of the implement, as formed by the base 7, includes an opening 47 of a length greater than the length of an average railroad spike and of a width generally greater than the width of the head of such a spike. This opening is formed in the side of the implement which is adapted to face toward the rail of the track. As shown, it is ninety degrees away from the handle 8 when considering the longitudinal axis of the implement as a center. As will be seen best in Figure 4, this side of the base 7 may include a cut-away portion 48 so that, when the lowermost portion 49 of the base 7 is disposed on a tie plate, the cut-away portion 48 may snugly abut against the supporting flange of a tie plate.

Claw 11 is formed from a generally unitary, rectangular block and is generally loosely received within a longitudinally extending opening 50 in the base 7. At its lowermost position(shown in Figure 2) the claw extends slightly below the lower portion of the base 7. The claw 11 is pivotally mounted upon the lowermost portion of the piston rod 10, as by means of a removable pivot pin 51. Aligned bores 51*a* and 51*b* may be provided in the base 7 to allow the pin 51 to be removed. Since the claw 11 is pivotally mounted on the piston rod 10 and loosely received within the opening 50, the longitudinal axis of the claw may assume an inclination with respect to the axis of the piston rod 10. When the claw grips a spike, this results in a generally linear pull on the piston rod 10, which is important from the standpoint of holding wear on the bearings for the piston rod to a minimum. Claw 11 includes a cut-away portion 52 at its lowermost end to define opposed finger portions 53 and 54. The opening 52 is made large enough to accommodate the head of the spike 4 and the opposed finger portions 53 and 54 are spaced apart a distance sufficient to allow the sides of the body of the spike beneath the head of the spike to enter between the portions 53 and 54.

On the opposite side of the base 7 from the opening 47, an opening 55 is formed for the reception of a generally elongated and flat spring member 56 which is attached to the member 26 as at 57. This spring member 56 has a lower end portion 58 adapted to bear against the claw 11 and spike 4. The inherent bias or resiliency of this spring 56 is such as to move from the position shown in Figure 4 to the position shown in Figure 5 when the spike 4 is completely removed from its embedded position.

When the claw 11 is first slipped under the head of the spike 4, the spring end 58 simply bears against the side of the claw 11. When the valve trigger 41 is actuated to move the claw upwardly within the base 7, the spring end 58 slides along the side of the claw to a point where it engages the head of the spike and then the body of the spike, as the spike moves progressively upwardly in the base 7. When the spike nears the upper extremity of its movement and is at a position where only the tip of the spike remains in the spike opening, the resiliency of the spring 56 will force the spike head from between the fingers 53 and 54 and the spike will be ejected from the claw 11 and the implement 5, as seen in Figure 5. Two components of motion are involved, the upward pull of the claw and the sidewise thrust of the spring.

A pair of flat plate members 59 straddle the spring 56 and serve as a guard for the spring 56.

Whereas I have shown and described an operative form of my invention, I wish it to be understood that this description is to be taken as an illustrative and diagrammatic form only, that there are many modifications which will be apparent to those skilled in the art and which will fall within the scope of the invention. I, therefore, wish my invention to be limited only by the scope of the claims appended hereto.

The use and operation of my invention are as follows:

I illustrate a spike-pulling implement which may be conveniently manipulated by the operator. It may be

readily carried from tie to tie along rails of a track to perform successive spike-pulling operations.

When the operator desires to remove a spike from its embedded position in a tie, he simply places the lower end of the implement in position over the head of the spike wherein the fingers of the claw **53** and **54** slip between the head of the spike and the tie plate, or the base of the rail, as will be seen in Figure 1. Then by pulling on the valve trigger **41** in the direction of the handle portion **8**, the valve plunger **32** is moved longitudinally with its sleeve **31** and establishes communication between the pump of the hydraulic system and the cylinder **6**. The pressure of the hydraulic fluid developed by the pump forces the piston **9** upwardly toward the handle end of the frame and the claw pulls the spike upwardly out of its embedded position. The reactive force of the hydraulic motor is in the direction of the tie plate.

As the claw **11** moves upwardly and inwardly with the base **7**, the side of the body of the spike is engaged by the spring ejector portion **58** which forces the spike outwardly through the side opening **47** in the base **7**. Thus the spike is automatically ejected from the implement.

When the piston **9** reaches its upward limit of travel, oil pressure builds up on the shoulder **32***c* of the valve plunger and forces the valve plunger up and causes the trigger **41** to be pulled out of the operator's hand and with the aid of the spring **45** automatically returns the valve plunger to the upper or open position where the piston return spring **19** forces the piston and the claw downwardly, with respect to the frame, and forces the fluid out of the cylinder to a point where the claw is in its extended position. The operator then simply moves the implement to the location of the next spike to be removed and then repeats the operation.

The claw **11** is pivoted to the piston rod **10**; thus in case the claw becomes worn the pivot pin **51** may be removed simply by slipping it out of the aligned bores of the claw and piston rod, through bores in the side of the base **7**, and then fitting another claw and pin in place. In case the ends of the fingers **53** and **54** on one side of the claw become worn excessively, the claw may be reversed. In addition to the foregoing, the pivotable mounting of the claw on the piston rod insures a generally lineally pull on the piston rod, with the result that there is a minimum of wear on the bearings for the piston assembly.

I claim:

1. A spike-pulling implement including a generally elongated frame, a spike-gripping claw mounted for reciprocating movement at one end of the frame, said frame including a portion adapted to bear against a surface external to an embedded spike, means for reciprocating said claw with respect to said frame to remove a spike from an embedded position, an opening on one side of said frame adjacent said claw, said opening being generally coextensive with the range of movement of said claw,

and a resilient arm mounted on the other side of said frame for contact with a spike engaged by said claw for forcing a spike through said opening.

2. A spike-pulling implement including a generally elongated frame, a spike-gripping claw mounted for reciprocating movement at one end of the frame, said frame including a portion adapted to bear against a surface external to an embedded spike, means for reciprocating said claw with respect to said frame to remove a spike from an embedded position, an opening in the end of said frame adjacent said claw, and a resilient ejector arm opposed to said opening for engaging a spike during upward movement thereof alongside said opening and forcing said spike through said opening after removal of the spike from the embedded position.

3. A spike-pulling implement including a movable spike-engaging claw for removing an embedded spike, hydraulic means for moving said claw toward an upper limit, a valve for actuating said hydraulic means, an operator actuated member for moving said valve between a normally inoperative position and an operative position, resilient means for biasing said valve and said member toward inoperative position, and means effective upon movement of said claw to said upper limit to build up a biasing pressure on said valve in opposition to an operator imposed force on said valve for moving said valve and said member toward inoperative position.

4. A spike-pulling tool for operating on railway spikes which includes a movable spike-engaging claw having portions formed and adapted to engage the head of a spike, hydraulic means for moving said claw upwardly in relation to a tie in which a spike is positioned, biasing means opposing the moving of the claw by said hydraulic means, a valve for said hydraulic means, control means for rendering said valve operative to permit the application of hydraulic pressure and for thereby actuating said hydraulic means and moving said claw toward spike lifting position, and means responsive to an increase in such pressure above a predetermined point for rendering said valve inoperative, said biasing means being effective to move said claw downwardly when said valve is inoperative.

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