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HOIST

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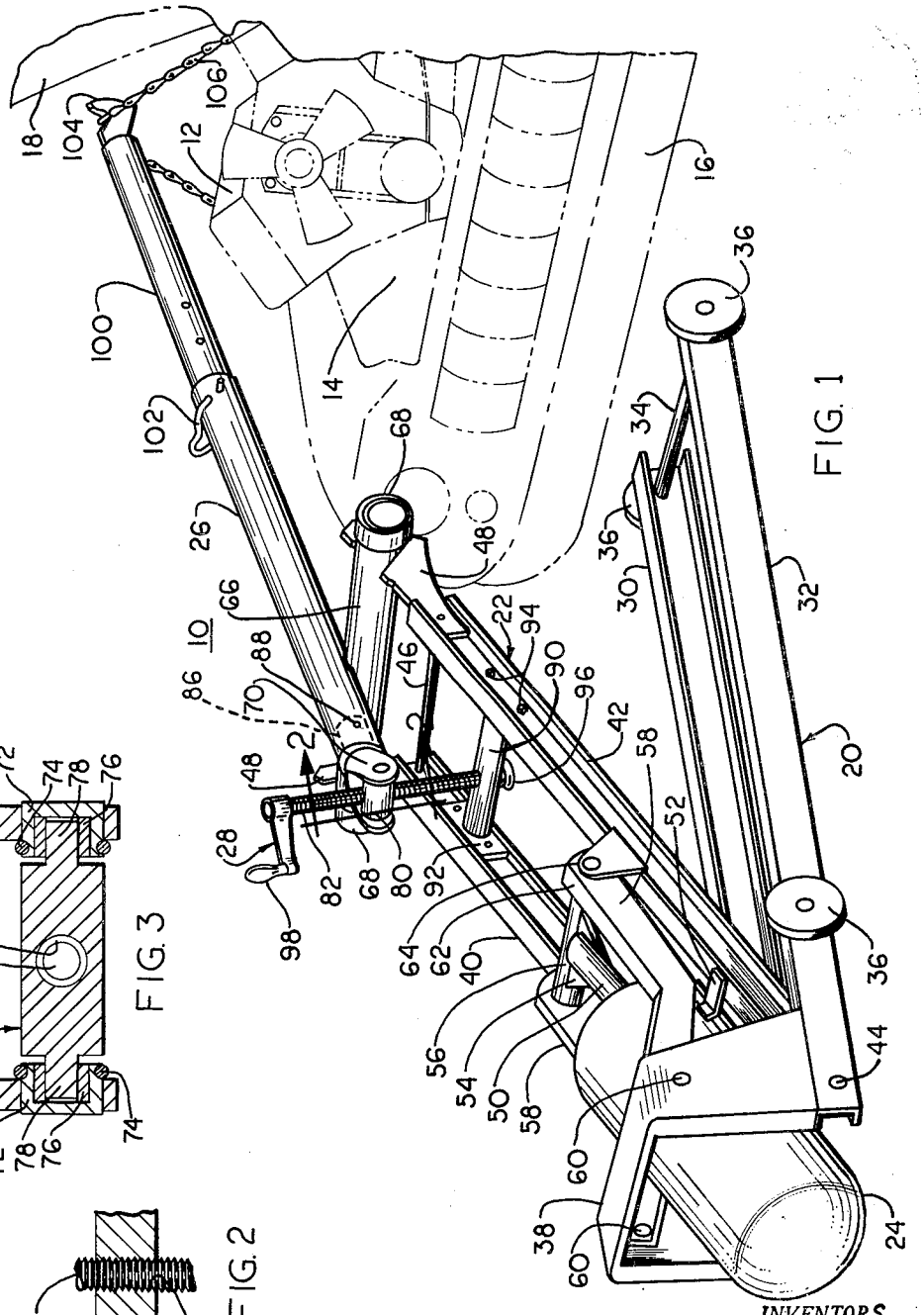


FIG. 1

FIG. 3

FIG. 2

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HOIST

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The present invention relates to improvements in hoists.

According to the present invention, there is provided a hoist which is particularly adapted for use in removing or replacing engines in automobiles, trucks, tractors, and the like. The hoist includes a mobile base which can be moved beneath the forward end of the automobile for easy accessibility to the engine compartment. A frame is connected to the base, and mechanism is provided which is operative upon the frame to raise and lower it with respect to the base. Such mechanism may conveniently take the form of a hydraulic or pneumatic cylinder which is pressurizable to move a piston having a rod connected to it, which is, in turn, coupled to the frame. This type of pneumatic or hydraulic mechanism may be operated to raise and lower comparatively heavy objects, but it is difficult to raise and lower such objects in small increments without undesirably jarring and bouncing the object. Thus, in a delicate operation such as the removal of an automobile engine, other mechanism is necessary to provide a more easily operable and controllable means for shifting the vertical position of the object being handled.

Accordingly, the present hoist also includes an elongated boom which is pivotally supported intermediate its ends by the frame, and means are connected to the frame and to the boom, which means are operable to vary the distance between the frame and the boom to thereby raise and lower the object being handled. Preferably such means takes the form of a threaded screw shaft which is rotatably carried by the frame and which is threadably disposed through the end of said boom which is opposite the end of the boom carrying the object. The threaded shaft is rotatable by manipulating a hand crank, and in this way a fine or vernier adjustment of the vertical position of the object is provided. This mechanical means for shifting the position of the boom independently of the frame has relatively little internal "take-up" or slack, as contrasted to the pneumatic or hydraulic means which are effective to raise the platform with respect to the base. Thus, it will be seen that the present hoist is sensitive to the demands of the hoist operator, and is adaptable to gently handle a heavy object like an automobile engine. The boom is made in elongated form so that it can be extended beneath the hood of an automobile so that the engine can be removed without the necessity of removing the hood itself. Both small and large adjustments may be made without any jerking effect, and one person can operate the hoist without additional aid. This is extremely valuable in engine overhaul work because the engine must be precisely aligned with fittings in the engine compartment and the precise control which characterizes the present hoist completely fills such requirements. If desired, the boom may be made extendible for access to areas which would otherwise be difficult to reach.

The boom section, and the means for actuating it, may be quickly removed from the frame, if desired, when it is necessary to use the hoist for such work as lifting a complete automobile.

Although the present hoist has been primarily discussed in connection with removal and replacement of automobile engines, it will be appreciated that this is merely exemplary and not intended to be limiting since

other uses for the hoist will immediately suggest themselves.

Other objects and features of the present invention will be readily apparent to those skilled in the art from the following specification and appended drawings wherein is illustrated a preferred form of the invention, and in which:

FIGURE 1 is a perspective view of the hoist of the present invention, the hoist being illustrated as it would be used in removing an automobile engine;

FIGURE 2 is a detail elevational view in cross section, illustrating the means for raising and lowering the boom independently of the hoist frame; and

FIGURE 3 is a detail plan view in cross section showing the manner in which the screw shaft is carried through the swivel joint, and also showing the details of the swivel joint.

Referring now to the drawings, hoist 10 is shown in the position which it would assume in installing an automobile engine 12 in an engine compartment 14 of an automobile 16, the hood 18 of the automobile being shown in raised position to permit access to engine compartment 14.

Hoist 10 comprises, generally, a base 20; a frame 22; a hydraulic or pneumatic apparatus 24 for raising and lowering frame 22 with respect to base 20; a boom 26 which is pivotally mounted intermediate its ends to frame 22; and an apparatus 28 which is operative to adjust the space or distance between one end of boom 26 and frame 22 to thereby raise and lower the other or outward end of boom 26.

Base 20 preferably takes the form of a pair of elongated, longitudinally extending channels 30 and 32 which are spaced apart and secured together by a pair of transversely disposed shafts 34 (only one of which is illustrated in FIGURE 1). Shafts 34 extend or are carried through channels 30 and 32, and rotatably mount a plurality of wheels 36 whereby hoist 10 is mobile and may be moved where desired. Base 20 also includes a heavy yoke 38 which includes depending sides which are rigidly secured, as by welding, to the upper faces of channels 30 and 32.

Frame 22 similarly includes a pair of elongated, longitudinally extending members 40 and 42, which conveniently take the form of I beam sections. The inner ends of members 40 and 42, that is, the ends to the left as viewed in FIGURE 1, are pivotally supported to channels 30 and 32, respectively, at 44, a pair of shafts (not shown) being disposed through the members and the channels for this purpose. The right or outer ends of members 40 and 42 are spaced apart and secured together by a rod 46 which is rigidly secured to members 40 and 42, and which protrudes through the sides of members 40 and 42 to rigidly carry a pair of support arms 48. Support arms 48 are formed or cut away to provide upwardly opening recesses for a purpose which will become apparent hereinafter. The spacing between members 40 and 42 is sufficiently less than the spacing between channels 30 and 32 that frame 22 is adapted to be lowered into a position where it is nested between channels 30 and 32.

Apparatus 24, which is effective to pivotally raise frame 22 with respect to base 20, is a hydraulic or pneumatic cylinder, and since such an apparatus is well known in the art the details thereof will not be discussed. A form of apparatus 24 which has been found to operate satisfactorily includes a usual piston which is axially movable through pressurization of chambers on either side of the piston, pressurization being afforded by pressure lines which are not shown. The piston carries a piston rod 50 which is axially movable when the piston is moved in one direction or the other, as will be obvious. The housing for apparatus 24 is rigidly secured,

as by welding, to members 40 and 42 by a plurality of tabs 52 (only one of which is illustrated). Thus, housing 24 is rigidly and integrally carried by frame 22.

Piston rod 50 is welded or otherwise rigidly secured by a pair of webs 54 to a transversely disposed shaft 56, shaft 56 in turn being rigidly secured at its ends to a pair of pivotable arms 58. Arms 58 are longitudinally offset so that the outward portions of arms 58 extend rearwardly at a slight angle with members 40 and 42, and thence angle upwardly toward the upper portion of yoke 38. The left or inner ends of arms 58 are pivotally secured by a pair of pins 60 to the sides of yoke 38. Similarly, a pair of pins 62 are provided at the outer or right ends of arms 58 to pivotally secure the outer ends of arms 58 to a pair of sliding elements 64 (only one of which is illustrated). Elements 64 are vertically disposed, but each includes an inward formed flange which extends beneath the upper flange of that one of members 40 or 42 to which it is adjacent. In this manner, elements 64 are not upwardly movable with respect to members 40 and 42, but are longitudinally slidable along the length of members 40 and 42.

In the operation of apparatus 24, pressurization thereof effects movement of piston 50, and, assuming this movement is outward, shaft 56 and elements 64 will transmit this force to members 40 and 42, lifting them upwardly. Frame 22 will pivot upwardly about shafts 44, and elements 64 will slide outwardly to compensate for the change in position of arms 58 with respect to members 40 and 42.

Boom 26 is welded or otherwise rigidly secured intermediate its ends to a support shaft 66 which is pivotally carried at its ends within the upwardly facing recesses provided in the pair of support arms 48. A retaining collar 68 is provided at each end of support shaft 66 to prevent endwise or axial movement of support shaft 66. Boom 26 is preferably made in the form of a tube or cylinder, and carries at its left end a bifurcated fitting 70 which includes aligned openings in the bifurcations thereof. A bearing holder 72 is pressed into each of these openings, and a retaining or lock ring 74 is provided to retain each holder 72 in position. A bearing 76 is carried in each holder 72, and rotatably supports a reduced diameter end portion 78 of a swivel joint element 80. A threaded screw shaft 82 is threadably disposed through a threaded opening 84 provided in element 80, and it will be apparent that the provision of bearings 76 permit pivotal movement of screw shaft 82 with respect to fitting 70. Fitting 70 includes a sleeve 86 which is disposed within the left or inner end of boom 26, and a pin 88 is disposed through boom 26 and fitting 70 to maintain element 80 in substantially horizontal relationship.

Screw shaft 82 is, as illustrated, threaded along its length, and the lower end thereof is disposed through an opening provided intermediate the ends of an element 90 which is rotatably supported by a pair of side plates 92 (only one of which is illustrated) which are secured to members 40 and 42 by a plurality of bolts 94. The lower end of screw shaft 82 is provided with a thrust bearing 96 which permits rotatable movement of screw shaft 82 while yet assuming the loads tending to move screw shaft 82 upwardly. It is noted that screw shaft 82 is preferably not threaded through the opening in element 90, but is freely rotatable therethrough.

Rotation of shaft 82 may be had through manipulation of a handle 98 which is rigidly secured to the upper end of screw shaft 82.

It is to be particularly noted that boom 26 and apparatus 28 are readily separable from frame 22 merely by removing bolts 92 and lifting support shaft 66 out of the recesses formed in the ends of arms 48. This is advantageous in that it permits the use of frame 22 in raising an automobile, for example, without boom 26 and apparatus 28 being in the way.

Boom 26 is preferably made in two sections, an outer end section 100 being of lesser diameter than the main body of boom 26 whereby end section 100 is telescopable within the inner portion of boom 26. The extended or adjusted position of section 100 with respect to boom 26 is maintained by an adjustment pin 102 which is disposable through transversely aligned openings provided in boom 26 and section 100 thereof. Pin 102 also orients section 100 so that a hook 104 secured to the outer end thereof will be properly positioned to support engine 12 by a chain 106, for example. As will be apparent, boom section 100 may be extended so that engine 12 may be lowered by hoist 10 into areas which are relatively inaccessible.

Operation of hoist 12 is simple and straightforward. Apparatus 24 is pressurized to raise frame 22 with respect to base 20, and hoist 10 is wheeled or rolled into position for removing engine 12 from engine compartment 14. Boom 26 is lowered into proper position by rotating screw shaft 82 through manipulation of handle 98. After hook 104 is engaged with chain 106 which is connected to engine 12, screw shaft 82 is rotated in the opposite direction to gently raise engine 12 out of compartment 14. Thereafter, the pneumatic or hydraulic apparatus 24 may be operated to raise engine 12 completely out of engine compartment 14. Hoist 10 is then lowered to a position where the engine can be lowered for working on it. In this manner, it can be seen that boom 26 and apparatus 28 provide a fine or vernier means for raising and lowering an object independently of the hoist platform 22, and without undesirable jarring or jerking of the object.

While one embodiment of the present invention has been specifically disclosed, it is understood that the invention is not limited thereto as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claim.

We claim:

A hoist comprising a base; a frame; said frame including a pair of elongated, spaced apart arms each terminating in an upwardly opening recess portion, said frame also including a transversely disposed element secured to said arms; first means connected to said base and operative upon said frame for raising and lowering said frame with respect to said base; a support shaft transversely disposed between said arms nad resting within the recess portions thereof; an elongated boom secured intermediate its ends to said support shaft; and second means connected to said element and said boom and operative to vary the distance therebetween to raise and lower said boom; said second means, said boom, and said support shaft being readily disconnectable from said frame by disconnecting said second means from said element.

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