March 7, 1967 J. L. VAN ALLEN 3,307,830

COMBINATION HYDRAULIC PRESS AND PULLER

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Fig. 1

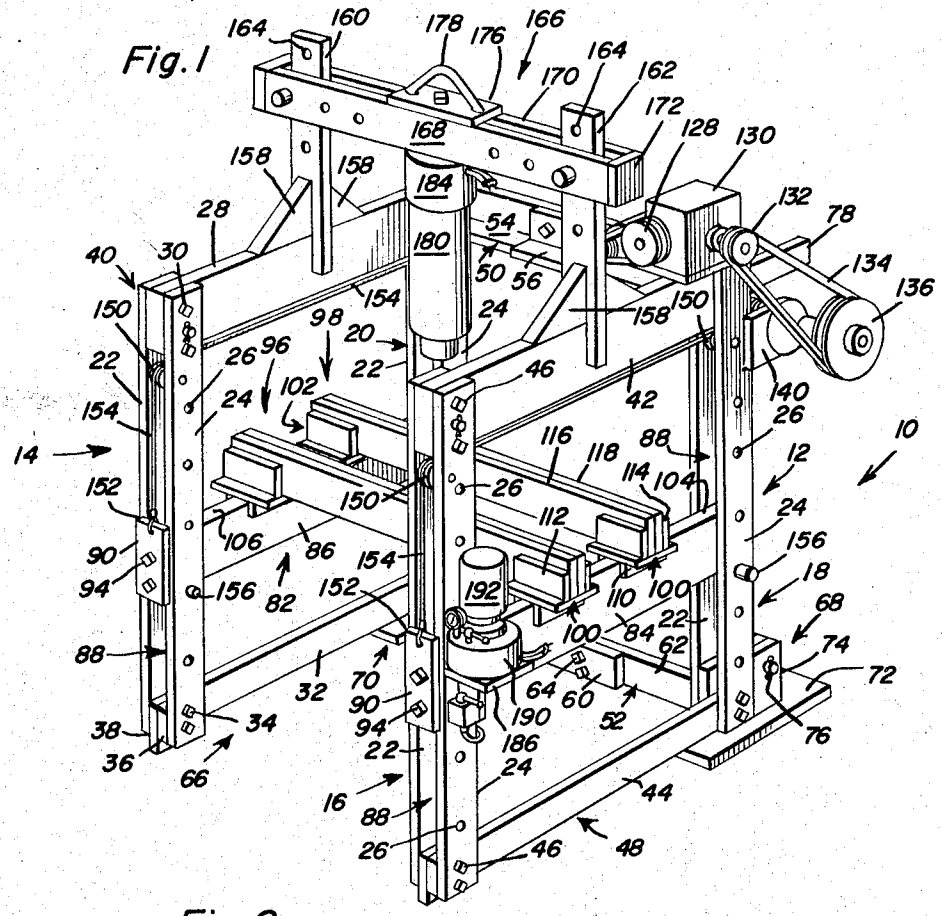
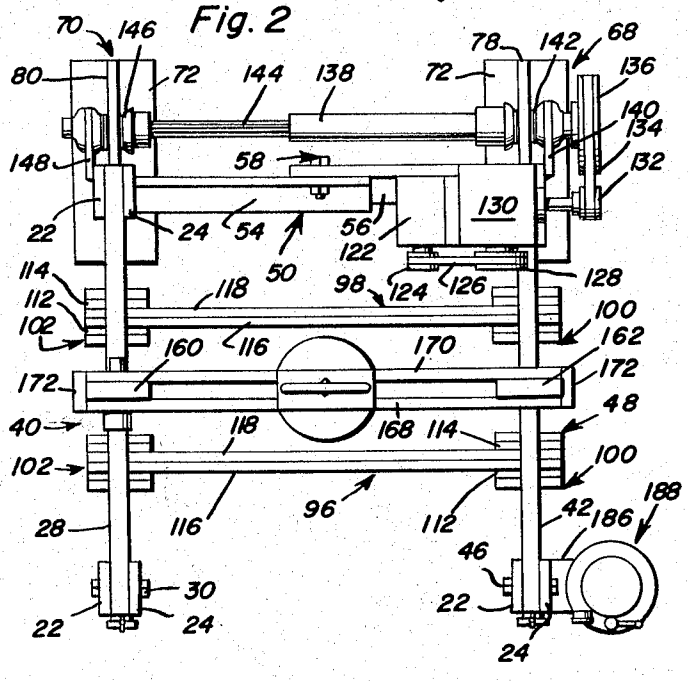


Fig. 2



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Fig. 3

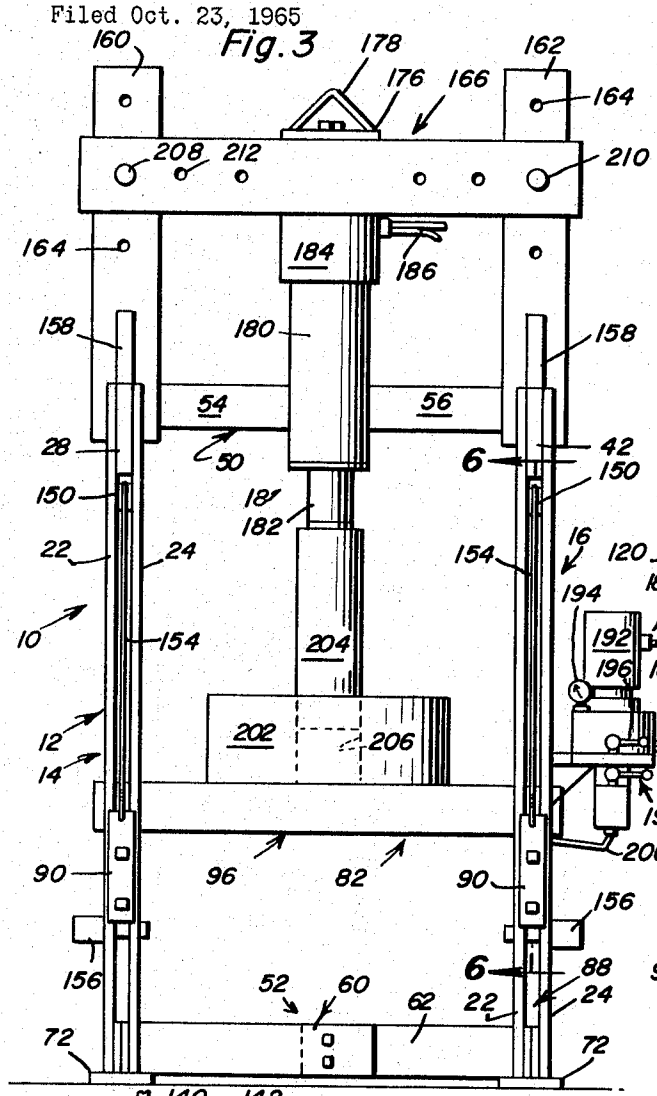


Fig. 10

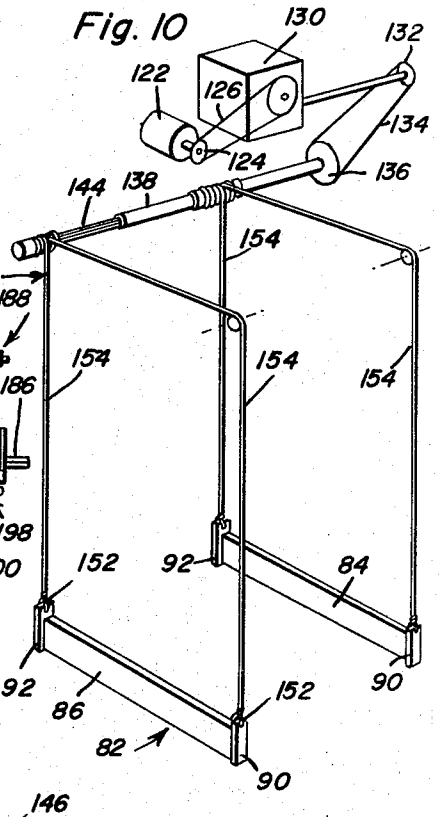
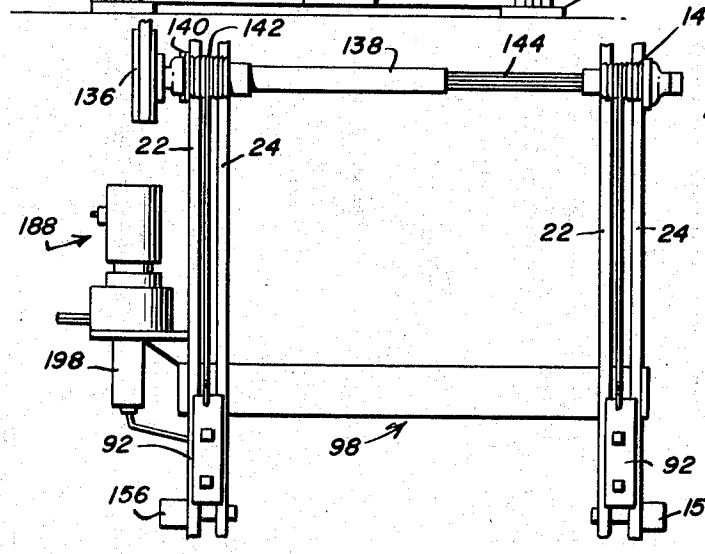


Fig. 4



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COMBINATION HYDRAULIC PRESS AND PULLER

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Fig. 5

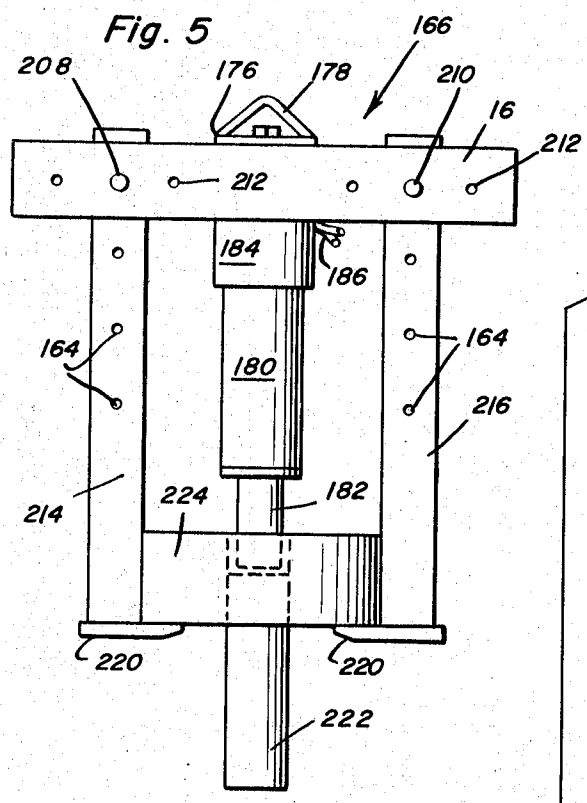


Fig. 9

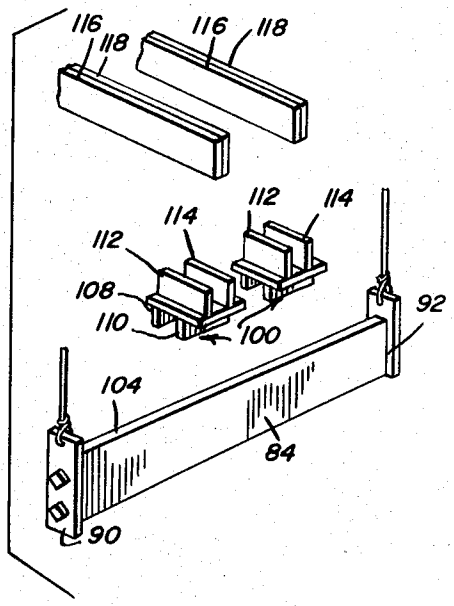
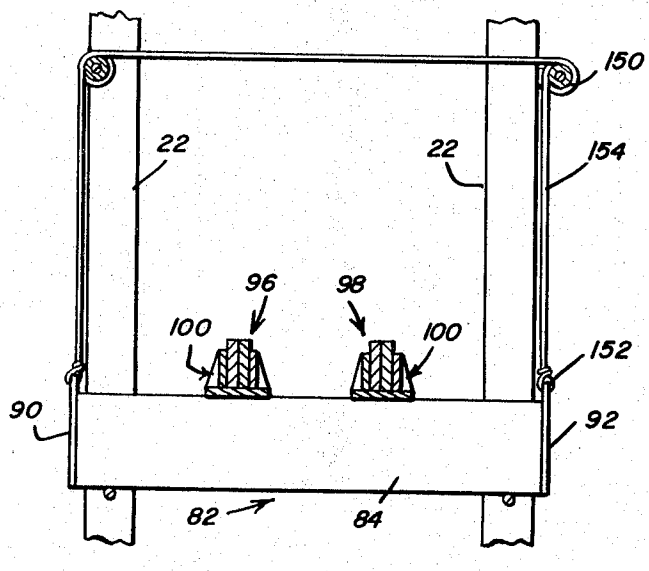


Fig. 6



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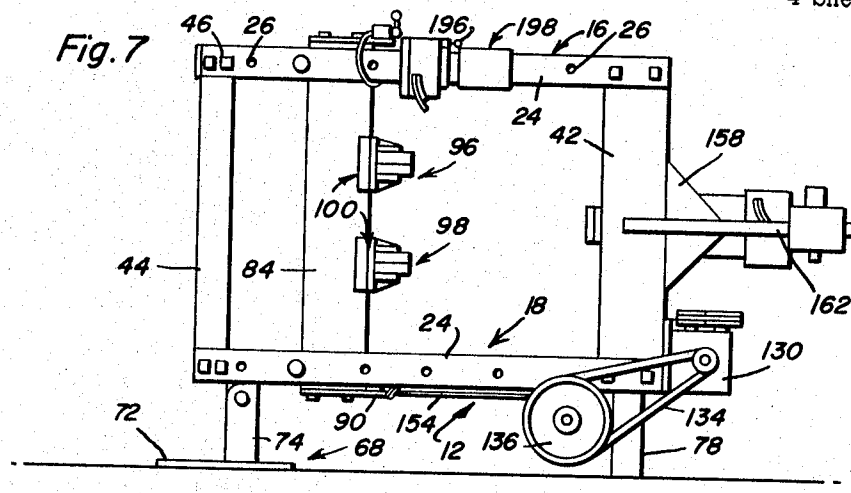
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COMBINATION HYDRAULIC PRESS AND PULLER

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Fig. 7



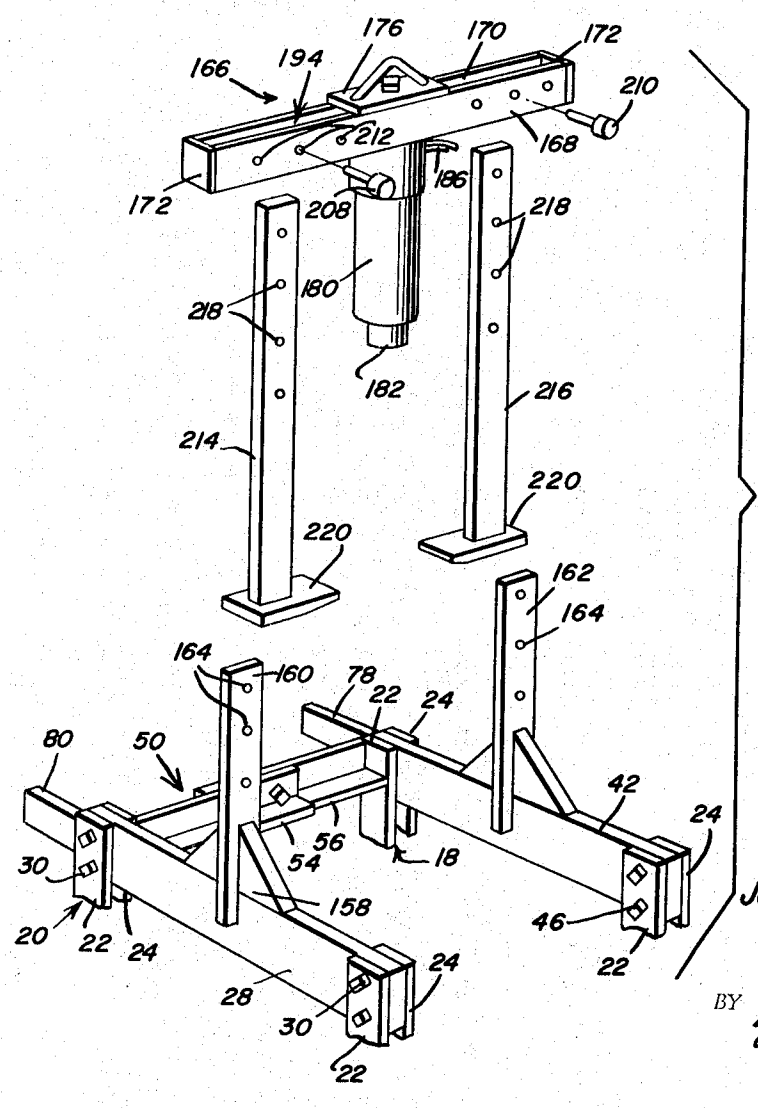


Fig. 8

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3,307,830

COMBINATION HYDRAULIC PRESS AND PULLER

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Filed Oct. 23, 1965, Ser. No. 503,742
11 Claims. (Cl. 254—93)

This invention relates generally to hydraulic machine tools and more particularly to a hydraulic operated combination pushing and pulling tool.

It is an object of the present invention to provide a combination hydraulic press and puller which can be easily and quickly adjusted to accommodate various sizes of workpieces.

It is another object of the present invention to provide a combination hydraulic press and pulling machine which is inexpensive to construct and efficient in its performance.

It is another object of the present invention to provide a multipurpose pushing and/or pulling tool especially adaptable for use in small machine shops, and including a demountable hydraulic cylinder with ram for use either in place of the frame of the device or in demounted position using readily attachable puller legs.

Still another object of the present invention is to provide a device of the character described in which the press bed is adjustable in both height and width, the device further including adjustable press bars on the press bed for accommodating various sizes of workpieces.

A further object of the present invention is to provide a combination hydraulic press and puller including a tiltable frame which allows use of the device in either upright or prone position.

A still further object of the present invention is to provide a hydraulic press including a vertically adjustable press bed support on which is mounted longitudinally adjustable press bed means.

Another object of the present invention is to provide a novel pulley drive arrangement for use in raising and lowering the press bed support structure of the present invention.

A final object of the present invention is to provide a pressure actuated press and puller device having a removable pressure head thereon for use either in conjunction with the device as a press or apart therefrom as a puller.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of the combination hydraulic press and puller comprising the present invention;

FIGURE 2 is a top plan view of the device illustrated in FIGURE 1;

FIGURE 3 is an enlarged front elevational view of the device illustrated in FIGURE 1;

FIGURE 4 is an enlarged partial rear elevational view of the device illustrated in FIGURE 1;

FIGURE 5 is an enlarged elevational view of the crosshead portion of the device illustrated in FIGURE 1 demounted from the device and including puller legs in place thereon thereby enabling the crosshead to be used as a puller;

FIGURE 6 is an enlarged partial vertical sectional view taken substantially on the plane of the line 6—6 of FIGURE 3;

FIGURE 7 is a reduced side elevational view of the device of FIGURE 1 illustrated in its prone position;

FIGURE 8 is an enlarged exploded view of the upper portion of the device illustrated in FIGURE 1 illustrating the demounting feature of the crosshead portion thereof;

FIGURE 9 is a partial exploded view of the press bed support and press bars illustrated in FIGURE 1; and

FIGURE 10 is a schematic illustration of the pulley drive arrangement for the press bed support utilized in the present invention.

Referring now more specifically to the drawings and primarily to FIGURES 1 and 3, reference numeral **10** is used to generally denote the combination hydraulic press and pulling device comprising the present invention. The hydraulic press and pulling device **10** includes a frame generally denoted by reference numeral **12** which comprises four vertical corner upright members **14**, **16**, **18** and **20**. The corner upright members are substantially identical in construction and each includes parallel spaced apart beam members **22** and **24**. Each of the beam members **22** and **24** of each corner upright includes a plurality of equally spaced apertures **26** therein, the spaced apertures in adjacent beam members of each upright being concentric. The purpose of the apertures **26** in the beam members **22** and **24** of each upright will be explained more fully below.

A first top crossbeam **28** extends between the corner upright members **14** and **20**, the crossbeam **28** being mounted between the beam members **22** and **24** of each corner upright member by suitable mounting means **30** whereby the beam members **22** and **24** are spaced apart as illustrated in FIGURE 1. A bottom crossbeam **32** extends between the corner upright members **14** and **20** substantially parallel to the top crossbeam **28**, the bottom crossbeam **32** also being mounted between the beam members **22** and **24** by suitable mounting means **34**. Further, a spacing block **36** is included between the beam members **22** and **24** so as to maintain the beam members **22** and **24** parallel throughout their length, and a foot portion **38** is provided in depending relation to the corner upright member **14** in order to abut the supporting surface on which the device **10** is mounted. Thus, it will be observed that the corner upright members **14** and **20** in conjunction with the top and bottom crossbeams **28** and **32** comprise a side **40** of the frame **12**.

Referring again to FIGURE 1, it will be observed that the corner upright members **16** and **18** also are interconnected by a top crossbeam **42** and a bottom crossbeam **44** which are mounted between the beam members **22** and **24** of upright members **16** and **18** by suitable mounting means **46**. Thus, it will be readily apparent that the corner upright members **16** and **18**, as joined by parallel top and bottom crossbeams **42** and **44** comprise a second side **48** of frame **12**.

Referring now particularly to FIGURES 1, 2 and 8, it may be seen that the frame **12** is supplied with a pair of top and bottom back cross sections **50** and **52**, respectively joining the sides **40** and **48** of the frame **12**. The top cross section **50** comprises a pair of ange irons **54** and **56**, the angle iron **54** rigidly connected at one end to the beam member **24** of corner upright member **20**, and the angle iron **56** rigidly connected at one end to the beam member **22** of corner upright member **18**. The angle irons **54** and **56** are joined by a suitable attaching means such as the nut and bolt **58**, the nut and bolt **58** being removable in order for the angle irons **54** and **56** to be moved apart or together and refastened in order to enable

the sides 40 and 48 to be moved together or apart. Further, the bottom cross section 52 comprises two beams 60 and 62 which are overlapped as are angle irons 54 and 56, and are joined by suitable attaching means 64, thus further enabling the sides 40 and 48 of frame 12 to be moved together or apart. Thus, it will be appreciated that the work entrance 66 formed by the open front of frame 12 between the sides 40 and 48 may be either widened or narrowed by unlocking the overlapped portions of top and bottom cross sections 50 and 52 and moving the sides 40 and 48 either together or apart.

Referring again to FIGURE 1, and also to FIGURES 2 and 3, it will be observed that the frame 12 includes a pair of swingable base members 68 and 70 each of which includes a ground engaging foot 72 of substantially rectangular shape and an upstanding leg 74 on which the corner uprights 18 and 20 are swingably mounted by pins 76. Thus, it will be readily apparent from viewing FIGURE 7 in conjunction with FIGURE 1 that the frame 12 is rotatably mounted on the base members 68 and 70 and thus the frame 12 may be positioned either in upright position as illustrated in FIGURE 1 or swung 90 degrees to a prone position as illustrated in FIGURE 7. A pair of ground engaging abutment members 78 and 80 are mounted adjacent the upper ends of corner upright members 18 and 20, respectively, in order to abut the ground for support of the frame 12 when the frame is swung to the position illustrated in FIGURE 7. Thus, it will be appreciated by viewing FIGURE 7 in particular that the combination hydraulic press and pulling device 10 may be utilized in either an upright position or in a prone position.

Slidably mounted in the sides 40 and 48 of frame 12 for vertical movement therein is a press bed support or carriage generally denoted by reference numeral 82. The press bed support 82 comprises a pair of support bars 84 and 86 which are substantially parallel and extend through the elongated slot-like opening 88 provided in each of the corner upright members 14, 16, 18, and 20 by the spaced apart parallel mounting of the beam members 22 and 24. The support bars 84 and 86 each includes a transversely mounted head portion 90 and 92 at each end, the head portions 90 and 92 being attached to the opposite ends of the support bars 84 and 86 by suitable attaching means 94 in order to secure the support bars 84 and 86 in the elongate slots 88, inasmuch as the width of the heads 90 and 92 is greater than that of the slots 88. Thus, it will be appreciated that the vertically slidable bed support 82 comprises a carriage or bed for the press bars generally denoted by 96 and 98.

The press bars 96 and 98 each includes a pair of identical bar mounts 100 and 102, the bar mounts 100 being longitudinally slidable along the top surface 104 of support bar 84, and the bar mounts 102 being slidable longitudinally along the top surface 106 of support bar 86. Thus, by viewing FIGURE 9 in particular, it will be appreciated that the bar mounts include depending legs 108 and 110 for seating the bar mount on the support bars 84 and 86, as well as upstanding legs 112 and 114 between which are mounted a pair of press bars 116 and 118.

A pulley arrangement generally denoted by reference numeral 120 is provided in order to move the slidable bed support or carriage 82 vertically in frame 12 whereby the press bed may be readily adjusted to support workpieces of various heights therein. The pulley arrangement 120 includes a drive motor 122 mounted on the angle iron 56, the motor 122 including an output shaft having a pulley 124 thereon. A drive belt 126 connects the power output pulley 124 to the input pulley 128 of gear box 130, the gear box 130 being mounted adjacent the motor 122 on the top of corner upright 18. The gear box 130 contains suitable gears therein for reducing the output speed of motor 122 while increasing the torque to an output pulley 132. The output pulley 132 is connected by a suitable connection such as the drive chain 134 to a pulley

136 mounted on the outboard end of a cable drum shaft 138. The cable drum shaft is journaled for rotation in a flange plate 140, and the shaft 138 has a cable drum 142 mounted thereon for rotation therewith as the shaft 138 is rotatably driven as pulley 136 is rotated. Splined in shaft 138 for rotation therewith and longitudinal movement with respect thereto is the spline shaft 144 which has cable drum 146 mounted thereon for rotation therewith, the shaft 144 being journaled in a flange mounting plate 148 similar to mounting plate 140. Thus, it will be readily observed that upon activation of the motor 122, the pulley 136 will be rotated and thus shafts 138 and 144, carrying cable drums 142 and 146, respectively, will be rotated. Further, due to the spline connection between shafts 144 and 138, the sides 40 and 48 of frame 12 may be moved apart as described above without hampering the drive connection between the shafts. A plurality of rollers 150 of substantially identical construction are rotatably mounted between the beam members 22 and 24 of each of the upright members 14, 16, 18 and 20. Extending over each of the rollers 150 and connected at the end thereof as indicated by reference numeral 152 to the mounting heads 90 and 92 is a cable rope 154. The end of the cable ropes 154 opposite the end designated by reference numeral 152 are rolled about and connected to the appropriate cable drum 142 or 146. Thus, it will be readily apparent that as the shaft 138 and shaft 144 and hence the cable drums 142 and 146 are rotated by the motor 122, the cable ropes 154 will either wind or unwind on the cable drums thus causing the support bars 84 and 86 to be moved vertically with respect to the frame 12 and hence carry the press bars 96 and 98 vertically within the frame 12. Thus, it will be readily apparent that the combination hydraulic press and pulling device 10 has a vertically adjustable press bed or carriage as well as a pair of press bars 96 and 98 which may be moved together or apart whereby the device 10 will be most versatile in receiving and operating upon various sized workpieces. Further, as stated above, the sides 40 and 48 of the frame 12 are movable either together or apart to further add to the versatility of the device. Of course, as the sides 40 and 48 are moved in relation to each other, the press bars 116 and 118 will slide between the upstanding legs 112 and 114 of the bar mounts 100 and 102. Further, as best illustrated in FIGURE 3, removable pin members 156 are provided for extending through the aforementioned aligned holes 26 in beam members 22 and 24 under the support bars 84 and 86 to rigidly support the bars 84 and 86 after they have been vertically adjusted in position in the frame 12. Of course, the pin members 156 are removable from the mounting bolt 26 in order to vertically adjust the bars 84 and 86, at which time the pins may be replaced.

Mounted in vertical upstanding position on the top cross-beams 28 and 42 of sides 40 and 48, respectively, by the triangular mounting plates 158 are a pair of supporting legs 160 and 162 having a plurality of mounting holes 164 vertically spaced therein. Normally mounted between the legs 160 and 162, but removable therefrom as best illustrated in FIGURES 5 and 8, is a crosshead generally denoted by reference numeral 166, comprising a rectangular body including front and back plates 168 and 170 as well as similar side plates 172. Mounted in the recess 174 in the crosshead 166 by the top mounting plate 176 including the handle 178 thereon is a hydraulic cylinder 180 of generally conventional variety including a reciprocating piston therein (not illustrated), and hydraulic ram 182 longitudinally movable therefrom as well as the conventional end cap 184 to which is connected flexible fluid hoses 186 for conveying hydraulic fluid thereto. Mounted on the outer side of the upright member 16 on mounting plate 186 is a suitable hydraulic pump of well-known variety generally denoted by the reference numeral 188 and including the fluid reservoir chamber 190, pump 192 and gauge 194. Leading from the pump

188 for connection to the end cap 184 are the flexible fluid lines 186. The pump 188 may normally be operated by the operating handle 196. Thus, it will be apparent that by using the operating handle 196, the pump 188 will convey fluid to the hydraulic cylinder 180 and thus the ram 182 will be movable from the cylinder 180. It is anticipated that the pump will be a conventional ten thousand p.s.i. hydraulic pump and the ram 182 of cylinder 180 will have an eighteen inch stroke at a pressure of approximately 150 tons.

Mounted on the underside of mounting plate 186 is a control switch 198 from which the lead line 200 extends to the motor 122 for energizing the motor and hence moving the support bars 84 and 86 vertically in the frame 12. Thus, in order to understand the manner of operation of the present invention, with reference to FIGURES 1 and 3 in particular, a workpiece such as the cylindrical wheel hub 202 is illustrated mounted on the press bars 96 and 98 with the ram 192 positioned in driving engagement with the bearing 204 to push the bearing 204 through the center opening 206 in the hub 202. Of course, it will be appreciated that the press bars 96 and 98 are spread apart far enough on the support bars 84 and 86 so that the bearing 204 may be slided therebetween. Thus, FIGURE 3 illustrates the device 10 in use as a press.

Referring now to FIGURES 5 and 8, the use of the device as a puller may be readily appreciated. The crosshead 166 is mounted on the legs 162 and 164 by pins 208 and 210 which extend through openings 212 in the side plates 168 and 170 as well as through the openings 164 in the legs 160 and 162. Thus, it will be appreciated that the crosshead 166 is adjustably mounted on the legs 160 and 162 and may be moved vertically and positioned thereon by virtue of the plurality of openings 164 vertically spaced in the legs. Further, inasmuch as there are a plurality of openings 212 horizontally spaced in the side plates 168 and 170 of crosshead 66 the crosshead may be mounted on the legs 160 and 162 as the sides 40 and 48 of the frame 12 are moved together or apart. By removing the pins 208 and 210, the crosshead 166 may be entirely removed from the legs 160 and 162 and a pair of puller legs 214 and 216, each including openings or apertures 128 vertically spaced therealong as well as work engaging jaws 220 on the lower ends thereof may be mounted in the crosshead 166 by the pins 208 and 210. Of course, when the crosshead 166 with the hydraulic cylinder 180 fixedly mounted thereon is removed from the frame 12 as explained above, and the puller legs 214 and 216 mounted therein, the flexible fluid hoses 186 are still connected between the end cap 184 and fluid pump 188. Thus, the crosshead may be used in demounted position as illustrated in FIGURE 5, the ram 182 being used in conjunction with the jaws 220 to move a bearing 222 from a cylindrical hub 224.

Thus, in view of the foregoing description, it will be readily apparent that the instant invention comprises an extremely adaptable and functional machine which may be used in upright or prone positions and which includes a demountable hydraulic cylinder for use either on the machine or separately therefrom.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A hydraulic pushing and pulling device comprising in combination, a frame including upstanding leg means, oppositely mounted crossbeams connecting adjacent leg means, said adjacent connected leg means comprising sides of said frame, means adjustably connecting said sides for horizontal movement with respect to each other, press bed support means mounted in said sides, means for vertically adjusting said press bed support means in said sides, press bed means slidably mounted on said press bed support means for receiving work thereon, and press means removably mounted between said opposed crossbeams and above said press bed means, and means for operating said press means either in mounted position on said opposed crossbeams or in demounted position removed from said opposed crossbeams.

2. The combination of claim 1 including means for hingedly mounting said frame for operation in vertically upright or in prone position.

3. The combination of claim 2 wherein said hinged mounting means comprises a pair of supporting feet, first and second of said upstanding leg means hinged at their lower ends to said feet, and means on said first and second leg means for abutting the surface on which said feet rest in order to support said frame in substantially level position when said frame is moved to prone position.

4. The combination of claim 1 wherein said press means comprises a hydraulic cylinder having a ram longitudinally movable therein, a cross head, means for removably mounting said crosshead between said sides on said opposed crossbeams, said cylinder fixed on said crosshead and extending downwardly between said sides, and means for adjusting the mounting of said crosshead on said removable mounting means as said sides are moved toward or away from each other.

5. In a pushing and pulling device, a frame, said frame comprising first and second sides, means for rotatably mounting said frame in upright or prone position, a hydraulic cylinder including a ram mounted between said sides, means for connecting said sides, means for adjusting the length of said connecting means whereby the distance between said sides may be adjusted, a pair of press bed supports vertically slidable in said sides, a pair of press bars mounted between said supports for sliding therealong, and means for moving said press bed supports vertically in said sides.

6. The combination of claim 5 wherein said sides each include a leg extending vertically upwardly therefrom, a cross member removably mounted on said legs, said hydraulic cylinder fixedly mounted in depending position from said cross member whereby said hydraulic cylinder may be used either on said frame or separately therefrom.

7. The combination of claim 6 including a pair of puller legs adapted for mounting in said cross member when said cross member is demounted from said legs, said puller legs each including work engaging jaws thereon whereby said cross member may be used apart from said frame as a puller.

8. The combination of claim 5 wherein said moving means comprises motor means mounted on said frame, a shaft journaled for rotation between said sides, motive power transmission means for transmitting the power output of said motor to rotate said shaft, first and second cables attached between one end of said shaft and the ends of a first of said press bed supports, third and fourth cables attached between the other end of said shaft and the ends of the other of said press bed supports whereby rotation of said shaft will wind or unwind said cable thereon and thereby lift or lower said press bed supports.

9. The combination of claim 8 wherein said shaft includes first and second shaft sections, said shaft sections splined together whereby said shaft may be lengthened or shortened as the distance between said sides is adjusted by said adjusting means.

10. The combination of claim 5 wherein said rotating means comprises a pair of ground engaging feet, leg

means extending upwardly from each of said feet, and means for pivotally connecting each side at the bottom rear end thereof to one of said leg means for rotation of said sides about said leg means.

11. The combination of claim 5 including hydraulic pump means mounted on said frame, flexible fluid hoses connected between said hydraulic pump means and said hydraulic cylinder for operation of said hydraulic cylinder either in place on said frame or separately therefrom.

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