

- [54] **COMBINATION MANUAL AND HYDRAULIC ARBOR PRESS**
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- [51] Int. Cl. **B21j 9/10**
- [58] Field of Search **72/453, 441; 100/231, 288, 100/269 R; 25/52**

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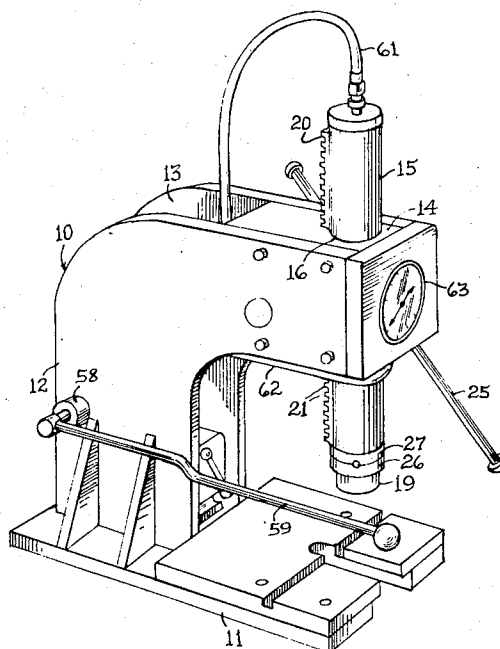
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Attorney—Edward C. Threedy

[57] **ABSTRACT**

An arbor press wherein the ram is adapted to be moved by a lever-operated pinion constantly in mesh with a rack attached to a ram carriage, with the ram continuously moved out of the ram carriage by hydraulic pressure. In the application of the hydraulic pressure so as to move the ram out of the ram carriage, a gear-faced lock is initially moved into meshing contact with the rack on the ram carriage so as to lock the same against continuous manual movement while the ram is further moved out of the ram carriage under the force of the hydraulics.

7 Claims, 8 Drawing Figures



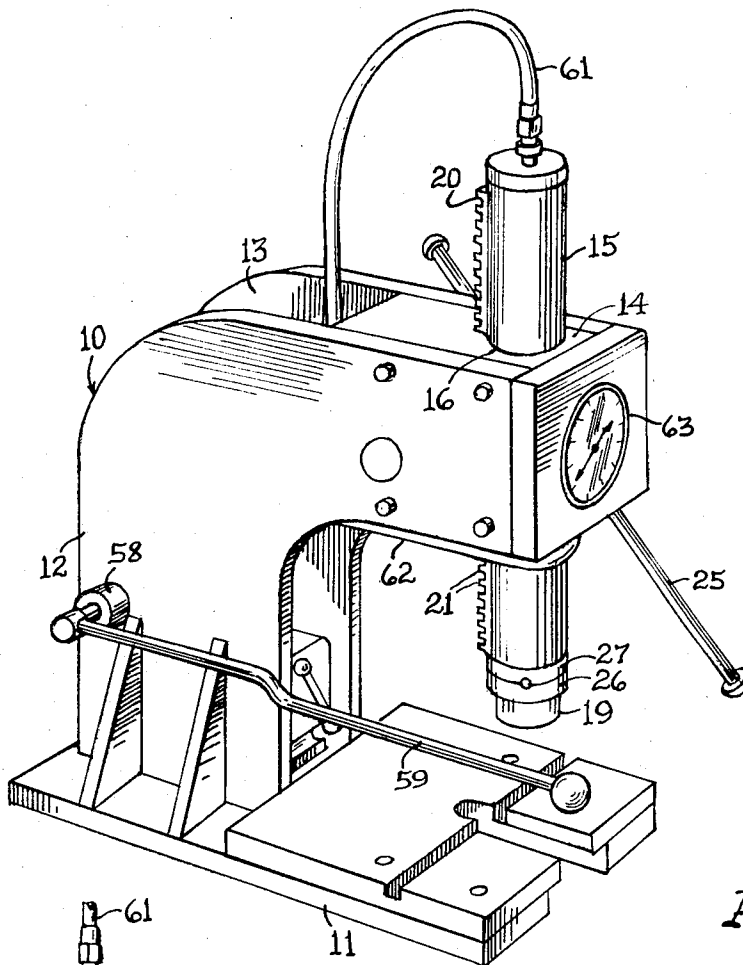


Fig. 1.

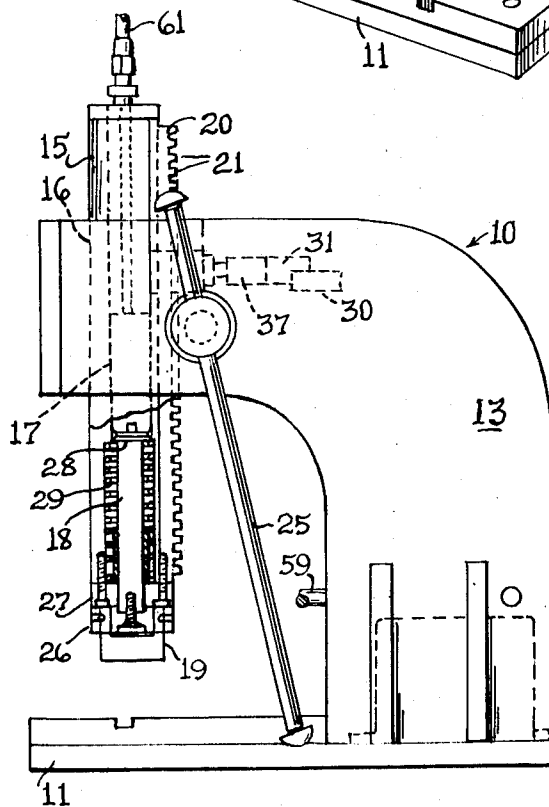


Fig. 2.

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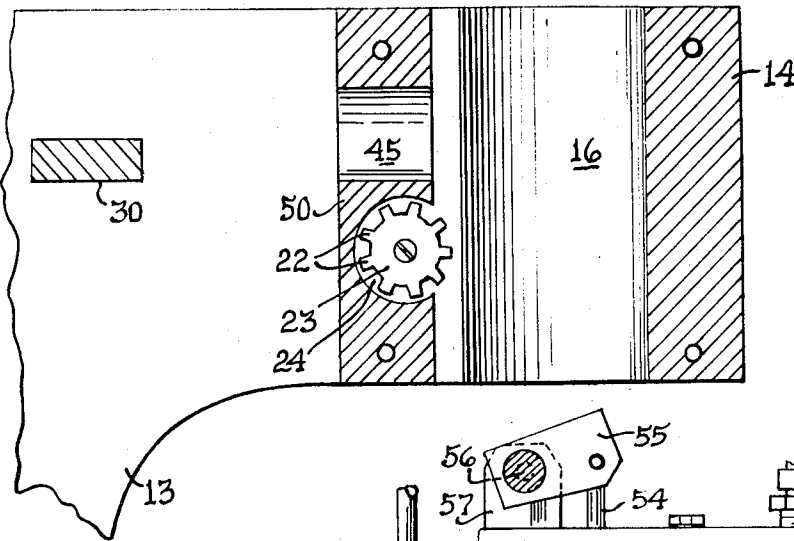


Fig. 3.

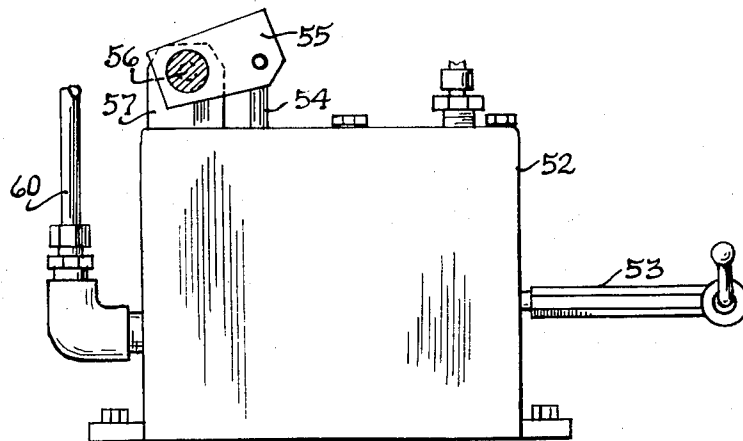


Fig. 4

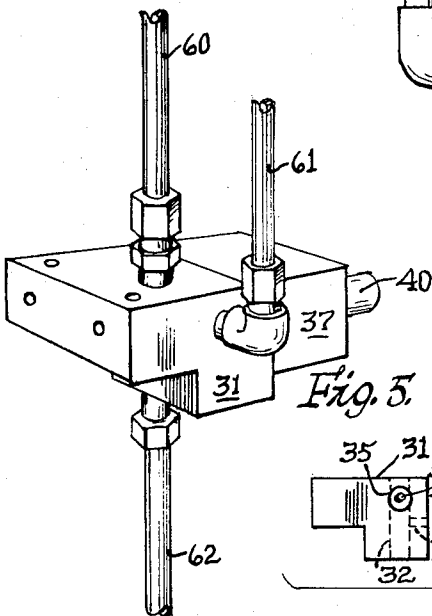


Fig. 5.

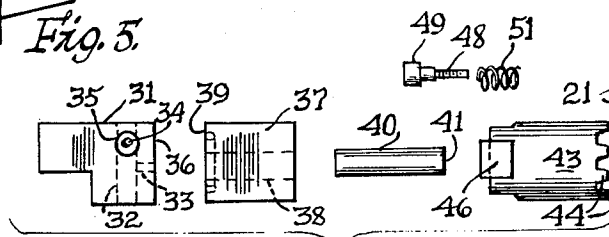


Fig. 6.

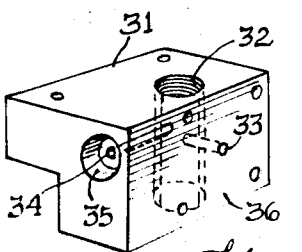


Fig. 7.

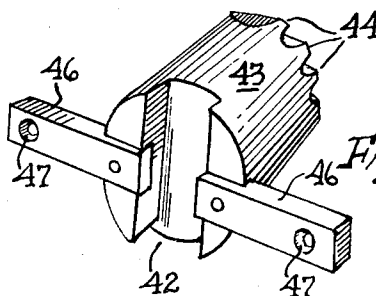


Fig. 8.

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COMBINATION MANUAL AND HYDRAULIC ARBOR PRESS

SUMMARY OF THE INVENTION

An arbor press having a selected mode of ram movement, which is either manual or hydraulic as determined by the operator, includes a rack and pinion arrangement whereby a ram carriage is manually moved. The rack and pinion movement may be arrested by means of a hydraulic lock, with the ram having continuous movement out of its carriage under hydraulic pressure. The locking of the rack and pinion is achieved by a piston-moved rack-engaging gear block, while the ram movement is accomplished through the hydraulic expulsion of a piston from a hydraulic cylinder. Both pistons act together under hydraulic pressure supplied from a hydraulic pump and distributed through a manifold.

The invention will be best understood by reference to the accompanying drawings which illustrate the preferred embodiment and in which:

FIG. 1 is a perspective view of an arbor press including the structure of this invention;

FIG. 2 is a side elevational view of the arbor press showing in dotted lines certain structure of the invention;

FIG. 3 is a fragmentary detailed sectional view of the head block employed in the arbor press of this invention;

FIG. 4 is a side elevational view of the hydraulic pump and reservoir as employed in this invention;

FIG. 5 is a perspective view of the locking structure employed in this invention;

FIG. 6 is a side elevational view of the locking structure in exploded relation and in relation to a portion of the ram carriage and rack thereof;

FIG. 7 is a perspective view of the manifold as employed in this invention; and

FIG. 8 is a perspective view of the gear block used in this invention.

GENERAL DESCRIPTION

The conventional lever-operated arbor as shown at 10, generally comprises a so-called C-frame consisting of a base 11, two spaced apart stanchions 12 and 13, and a head block 14. In a hydraulically operated press there is, in addition to the C-frame, a hollow ram carriage 15 contained in a vertically orientated passage 16 formed through the head block 14. Housed within the ram carriage 15 is a hydraulic cylinder 17 having a piston 18 in turn carrying a work-engaging ram 19.

The present structure of this invention includes all of the above elements and provides that the ram carriage 15 is moved through the passage 16 formed in the head block 14, by a rack 20 mounted on the periphery of the carriage 15. The teeth 21 of the rack 20 mesh with the teeth 22 of a pinion 23 journaled through an opening 24 formed in the block 14 transversely to and adjacent one edge of the passage 16. The pinion 23 is adapted to be rotated by a hand-manipulated lever 25.

The work-engaging ram 19 is removably connected to an end plate 26 fastened to the free end of the piston 18. The piston 18 is in turn freely journaled through a fixed head 27 connected to and closing the ram carriage 15. Mounted on the piston 18 adjacent to its emergence from the hydraulic cylinder 17, is a follower

ring 28 which provides a seat for one end of a spring 29 that is coiled about the piston 18 and which has its opposite end bearing against the fixed head 27. The cooperation between these parts will be hereinafter made apparent.

To achieve the transition from a manual movement of the ram carriage 15 to a hydraulic movement, requires the locking of the ram carriage 15 against further movement by means of the rack 20 and pinion 23. This is accomplished through utilization of the following structure.

Between the spaced apart stanchions 12 and 13 and rearwardly of the head block 14, there is provided a shelf 30. Adapted to be mounted upon the shelf 30 is a manifold 31 which, as seen in FIG. 7, includes an opening 32 which communicates with outlet ports 33 and 34, the latter of which terminates into a recess 35 which will accommodate a pipe fitting hereinafter identified. The manifold has connected to the face 36 thereof a piston block 37 which has a central opening 38 formed therethrough which, when the block 37 is mounted upon the manifold 31, lies in axial alignment with the port 33. The piston block 37 provides in its face 39 which abuts the face 36 of the manifold 31, recesses to receive suitable sealing rings as required.

Journalled within the opening 38 is a piston 40, the free end 41 of which is adapted to be projected into a slot 42 formed in the rear wall of a gear block 43. The front wall of the gear block 43 is provided with a series of teeth 44 which are adapted to mesh with the teeth 21 of the rack 20 mounted on the ram carriage 15.

The gear block 43 is adapted to be movably contained in an opening 45 formed in the head block 14, with such opening 45 extending transversely with respect to the passage 16 formed in the head block 14, as seen in FIG. 3. To mount the gear block 43 for limited movement through the opening 45, the gear block 43 is provided with oppositely extending arms 46 which extend laterally and transversely to the slot 42 formed in one wall of the gear block 43, as shown in FIG. 8. The free ends of the arms 46 are provided with openings 47 through which is projected the stem 48 of connecting screws 49 which are adapted to be threaded into suitable openings formed in the face 50 of the inner wall of the head block 14 to either side of the opening 45. Coiled about the shank 48 of the connecting screws 49 is a coil spring 51 which normally yieldably maintains the gear block 43 in position in the opening 45 such that the teeth 44 thereof are out of mesh with the teeth 21 of the rack 20. By this arrangement, the ram carriage 15 may be moved through the head block 14 by rotation of the pinion 23 without interference from the gear block 43.

Positioned on the base 11 between the stanchions 12 and 13 is a well known commercially available hydraulic pump structure 52 which includes an internal valve actuated by the valve lever 53 which extends externally of the pump structure 52, as well as a pump plunger 54 which, in the present case, is connected to an actuating block 55 press-fitted upon a shaft 56 which is journaled in a mounting bracket 57 and a bushing 58 carried by the external face of the stanchion 12, as seen in FIG. 1. The shaft 56 has connected thereto an operating lever 59 which extends forwardly of the stanchions 12 and 13, as seen in FIG. 1. By a suitable conduit 60,

the pump 52 is connected to the top of the opening 32 formed in the manifold 31. By a suitable conduit 61 the opening 35 formed in the side wall of the manifold 31 is connected to the hydraulic cylinder 17 carried within the ram carriage 15. By a suitable conduit 62, the opposite end of the opening 32 of the manifold 31 is connected to a pressure gauge 63 mounted on the front wall of the block 14.

In operation, the arbor press of this invention permits the operator to utilize the same with a so-called "quick-stroke" action, whereby, by manipulating the lever 25, the ram carriage 15 through the rack and pinion arrangement, is moved to and from a work-engaging position. However, if the operator is bending a piece of metal, the inherent strength of which cannot be overcome through the normal quick-stroke operation of the device, the operator needs only to move the lever 53 of the pump 52 to its operative position and, through the lever 59, pump the hydraulic fluid from the pump 52 through the conduit 60 into the manifold 31. The hydraulic fluid will cause the piston 40 to be expelled out of the piston block 37 so as to move the gear block 43 against the compression of the springs 51 through the opening 45 formed in the head block 14, until the teeth 44 of the gear block 43 engage the teeth 21 of the rack 20. This will lock the ram carriage 15 against further manual movement. While simultaneously the hydraulic fluid will pass through the manifold 31, the port 34, the conduit 61, to the cylinder 17, causing expulsion of the piston 18 against the action of the spring 29 so as to move the work-engaging ram 19 away from the locked ram carriage 15 so as to hydraulically complete the desired bending operation upon the metal work.

To return the press to its manual operating position, the operator needs only to return the valve lever 53 to its original position, thus making ineffective the pump 52 and valve thereof, releasing all of the hydraulic pressure within its system, permitting the springs 51 to return the gear block 43 to its position in the opening 45 where its teeth 44 are out of mesh with the teeth 21 of the rack 20. The spring 29 will force the return of the piston 18 into its cylinder 17 and the work-engaging ram 19 back onto the end of the ram carriage 15.

From the foregoing, it is apparent that I have devised an arbor press that can be conveniently operated manually or hydraulically, as desired.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. An arbor press having a C-frame including a base and spaced apart stanchions for supporting in an elevated position over an open work area a head block,

wherein the improvement comprises

- a. a ram supporting carriage mounted in the head block for movement therethrough into and out of the open work area,
- b. a work-engaging ram connected to said carriage for movement therewith into and out of the open work area,
- c. means for connecting said work-engaging ram to said carriage for independent coaxial movement through the open work area,
- d. a pinion and rack moving means for reciprocally moving said carriage through the head block,
- e. means for locking said carriage against movement through the head block and from being moved by said pinion and rack moving means,
- f. means for moving said work-engaging ram out of said carriage and through the open work area independently of said carriage, and
- g. means for actuating said carriage locking means and for actuating said moving means for said work-engaging ram.

2. An arbor press as defined by claim 1 wherein said means for locking said carriage against movement through the head block comprises a non-rotatable gear block movable into mesh with the rack and gear block-moving means for preventing the rack-moving means from moving said carriage through the head block.

3. An arbor press as defined by claim 2 including a hydraulically moved piston in contact with said non-rotatable gear block, for moving the same under pressure into contact with the rack.

4. An arbor press as defined by claim 1 wherein said means for moving said work-engaging ram out of said carriage comprises a hydraulic cylinder mounted within said carriage and having a piston connected to said work-engaging ram and movable coaxially of said carriage so as to move said work-engaging ram through the open work area independently of said carriage.

5. An arbor press as defined by claim 4 wherein said means for locking said carriage against movement through the head block comprises a non-rotatable gear block movable into mesh with the rack and gear block-moving means for preventing the rack-moving means from moving said carriage through the head block.

6. An arbor press as defined by claim 3 wherein said means for moving said work-engaging ram out of said carriage comprises a hydraulic cylinder mounted within said carriage and having a piston connected to said work-engaging ram and movable coaxially of said carriage so as to move said work-engaging ram through the open work area independently of said carriage.

7. An arbor press as defined by claim 6 wherein the means for actuating said hydraulically moved piston and said non-rotatable gear block and said hydraulic cylinder and piston within said carriage, comprises a manually operated pump including a hydraulic system having a manifold and conduits extending between the pump and said manifold for applying hydraulic pressure to said hydraulically moved piston and said hydraulic cylinder within said carriage.

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