Sept. 21, 1965 T. J. BOWMAN 3,207,406

CENTER CLOSING PRESS

Filed Jan. 15, 1963

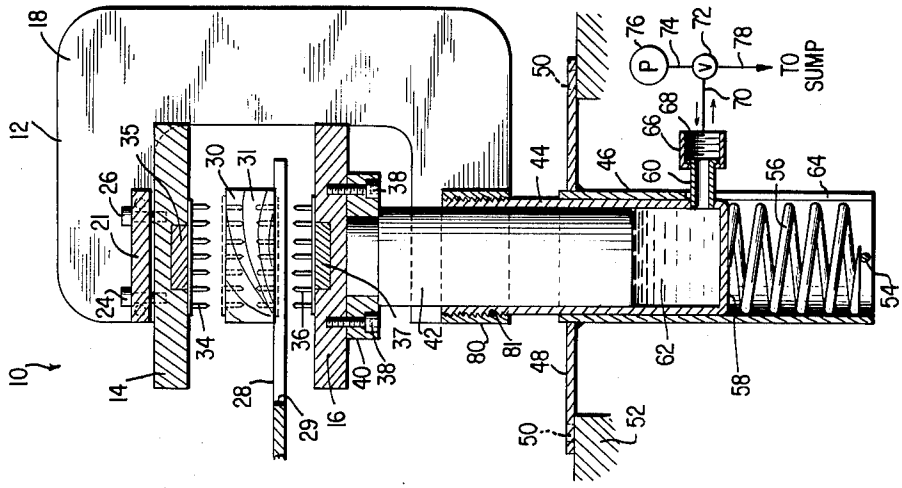


FIG. 3

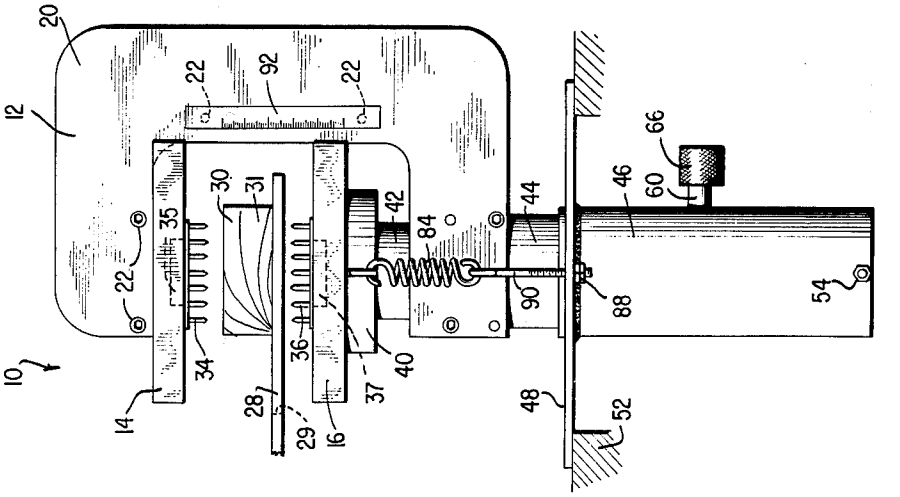


FIG. 2

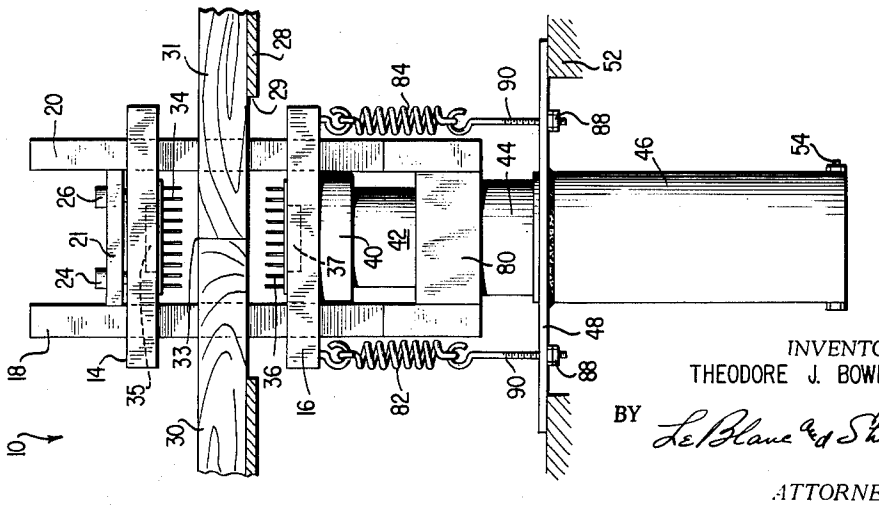


FIG. 1

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CENTER CLOSING PRESS

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This invention relates to a center closing press and more particularly to a hydraulically operated C-clamp press for driving metal connectors into structural wood joints.

Fluid operated C-clamps or vises are well known and are used in a great many operations for holding workpieces or material to be operated upon. In most instances, the C-clamp is itself portable and is provided with a single movable jaw, the stationary jaw being initially placed against one surface of the workpiece. In instances where the C-clamp is stationary or secured to a support such as a work bench or table, the workpiece is usually brought into engagement with the stationary jaw and the movable jaw then drawn into engagement with the other surface of the workpiece.

The present invention relates to a C-clamp type press wherein both jaws are movable to drive metal connectors into the opposite sides of a structural wood joint. The novel press of the present invention is of particular utility in situations where the workpiece or material to be operated upon is either relatively heavy or not otherwise easily moved into engagement with the surface of one jaw of the fixed or stationary press. In addition a novel adjustable compensating spring arrangement is provided to assure rapid and uniform movement of both press jaws into driving engagement with the workpiece. The press of the present invention is particularly adapted for conveyorized operation in forming the joints of relatively large structural elements such as house roof trusses and the like.

It is therefore one object of the present invention to provide a novel center closing press.

Another object of the present invention is to provide a novel C-clamp type fluid operated press.

Another object of the present invention is to provide a novel fluid operated press for driving metal connectors into wooden joints.

Another object of the present invention is to provide a novel compensating spring arrangement for a center closing C-clamp press.

These and further objects and advantages of the invention will be more apparent upon reference to the following specification, claims and appended drawings wherein:

FIGURE 1 is an elevational view of the novel press of the present invention;

FIGURE 2 is a side view of the press of FIGURE 1; and

FIGURE 3 is a side view similar to that of FIGURE 2 with parts in section.

Referring to the drawings, the novel press of the present invention generally indicated at **10** in each of FIGURES 1 through 3 comprises a C-shaped frame **12**, an upper movable jaw **14** and a lower movable jaw **16**. Frame **12** is made of a pair of side plates **18** and **20** both of identical C-shape joined by a cross bar **21** and screws **22**. The cross bar **21** receives screws **24** and **26** which removably support the upper jaw **14** as shown in FIGURE 1.

Resting on a table **28** or other suitable support are a pair of boards **30** and **31** to be joined in an end type butt joint at **33**. The boards are joined by a pair of metal connectors such as upper connector **34** and lower connector **36** which may be of the type disclosed in U.S. Patent No. 2,877,520. The portions of the boards **30** and **31** to be joined extend over a cut-out section **29** in the edge of the table **28** which provides clearance for the jaws **14** and **16**.

The connectors **34** and **36** are manually placed against the jaws and held in the proper position by suitable magnets such as permanent magnets **35** and **37** embedded in the jaws.

Lower jaw **16** is secured by screws **38** shown in FIGURE 3 to a collar **40** press fitted or otherwise rigidly connected to the top of a plunger or piston **42**. Piston **42** is received in a cylinder **44** in turn slidably mounted in a support tube **46**. Welded to the support tube is a supporting flange **48** having apertures **50** for connection by screws, bolts or the like to a rigid, stationary base indicated by the hatching at **52**.

Support tube **46** is provided with a transverse pin **54** upon which rests one end of a relatively heavy compression spring **56**. The upper end of compression spring **56** engages the bottom **58** of cylinder **44**. A supply pipe **60** passes through a suitable aperture in the wall of the cylinder **44** and communicates with the interior of the cylinder. The space between the bottom **58** of the cylinder and the bottom of the piston **42** is shown as filled with hydraulic fluid such as oil **62**. It is apparent that other liquids or gases such as water or air can be used to drive the press.

Pipe **60** is rigidly secured in the wall of cylinder **44** and the support tube **46** is provided with an elongated vertical slot **64** to permit upward and downward movement of the supply pipe **60** with upward and downward movement of the cylinder **44**. A socket **66** internally threaded as at **68** is secured to the pipe **60** for the reception of a flexible hydraulic line indicated diagrammatically at **70**. Line **70** is connected through a three-way valve **72** to the high pressure output line **74** of a hydraulic pump **76** and to a return line **78** leading either to the sump of the hydraulic system or to the low pressure input side of the pump **76**. It is understood that valve **72** alternatively connects the line **70** either to line **74** or to line **78**, so that hydraulic fluid is alternatively supplied to and exhausted from the oil chamber between the piston **42** and the bottom of cylinder **44**.

The lower side of the C-shaped frame **12** is welded or otherwise suitably attached to the opposite sides of a ring **80** having internal teeth **81** engaging similar teeth on the upper end of cylinder **44**. In this way the frame **12** is rigidly attached to and carried by the cylinder. As a result, upward and downward movement of the cylinder **44** results in upward and downward movement of the upper jaw **14**.

As best seen in FIGURES 1 and 2, a pair of tension springs **82** and **84** are connected between the lower jaw **16** and the support flange **48**. The tension of these two springs may be adjusted by turning the locking nuts **88** on the lower ends of hook bolts **90**. If desired, a suitable indicia strip **92** may be secured to one of the plates such as plate **20** for aligning the press with the top of table **28**.

In operation, connector **34** is first placed against upper jaw **14** and held in place by magnet **35**. The lower connector **36** is placed on the lower jaw **16** directly beneath the upper connector **34**. Valve **72** is then actuated either manually or automatically to connect high pressure line **74** with input line **70** so as to supply high pressure fluid to the underside of piston **42**. The action of the pressure fluid is to drive the piston **42** upwardly with respect to the cylinder **44** and at the same time drive the cylinder **44** itself downwardly in the support pipe **46**.

Upward movement of the piston **42** carrying lower jaw

16 is resisted by the tension springs 82 while downward movement of the cylinder 44 carrying the frame 12 and hence uppper jaw 14 is at the same time resisted by the larger compression spring 56. It is preferred that the springs be chosen so that the resistance of spring 56 is equal to the combined resistance of both springs 82 and 84 although the selection of the springs is not critical. The springs acting against the opposite movable jaws of the press provide a compensating action to assure that both jaws will move simultaneously towards each other to drive the plates 34 and 36 from the solid line position to the dashed line position illustrated in FIGURE 3 into the opposite surfaces of the boards 30 and 31. Once the connectors are completely driven, valve 72 is again actuated, disconnecting supply line 70 from high pressure line 74 and connecting to low pressure line 78. With the oil 62 in the cylinder connected to the exhaust side of the hydraulic system, the compensating springs 56, 82 and 84 serve the dual purpose of return springs drawing the piston 42 downwardly and pushing the cylinder 44 upwardly to squeeze oil from the chamber and back out through the pipe 60 and valve 72 to the return line 78. This return movement or opening of the jaws is limited by the equilibrium position of the spring system indicated by the rest position of the press illustrated in the respective figures of the drawing.

It is apparent from the above that the present invention provides a novel center closing press, particularly suited for use in driving metal connectors into structural lumber. While the press as shown is illustrated for use in conjunction with a table supported wood structure, it is apparent that the table 28 could be replaced by a movable conveyor with the press position adjacent the conveyor edge. Likewise, although shown utilizing hydraulic fluid, the press may be operated with liquids other than oil and may be pneumatically operated if desired. Novel features of the press include movement of both jaws with respect to a stationary support so as to make it possible to drive connectors into both the upper and lower surfaces of the wood elements to be joined, which action is particularly advantageous for the construction of structural timber such as roof trusses and the like which are of relatively large size and are not easily movable into engagement with one of the press jaws.

Additional important features include the provision of an adjustable compensating spring arrangement, which springs function not only as return springs for the two movable jaws, but act to automatically compensate for the different resistant forces acting on the jaws to insure simultaneous movement of both jaws toward and away from the workpiece. Adjustment of the tension springs 82 and 84 by means of nuts 88 makes it possible to easily modify the position at which the jaws will completely close so as to insure uniform closing movement of the jaws when lumber of a different thickness is joined in the press. The device is of relatively simple, rugged construction requiring a minimum of upkeep and repair.

The simultaneous movement of both jaws provides for a minimum of joint distortion during pressing and makes possible a strong, tight joint.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A press comprising a stationary support tube, a cylinder slidable in said tube and carrying a first jaw, a piston slidable in said cylinder and carrying a second jaw, and means for supplying pressure fluid between one end of said cylinder and said piston to move said jaws substantially simultaneously toward each other.

2. A press according to claim 1 wherein at least one of said jaws is provided with magnetic means for holding a metal connector.

3. A press comprising a rigidly mounted support tube, a cylinder having a closed end slidable in said support tube, a frame including a first press jaw carried by the other end of said cylinder, a piston slidable in said cylinder and carrying a second press jaw, and means for introducing a pressure fluid between said piston and said closed end of said cylinder to produce closing movement of said jaws.

4. A press comprising first movable means supporting a first jaw, second movable means spaced from said first means and carrying a second jaw, means for introducing a pressure fluid between said first and second means to move said jaws substantially simultaneously toward each other, and resilient means acting against both said first and second movable means to resist the movement of said jaws.

5. A press for driving metal connectors comprising a movable cylinder and piston, a C-shaped frame carrying a first jaw mounted on said cylinder, a second jaw mounted on said piston, means for moving said cylinder and piston to move said jaws substantially simultaneously toward each other, and spring means acting against both said cylinder and said piston to resist the movement of said jaws.

6. A center closing press for driving metal connectors comprising a stationary support, a hollow cylinder having a closed end slidable in said support, a C-shaped frame carrying a first jaw mounted on the other end of said cylinder, a piston having one end slidable in said cylinder, a second jaw mounted on the other end of said piston, and means for introducing pressure fluid between said closed end of said cylinder and said one end of said piston to produce closing movement of said jaws.

7. A press according to claim 6 including compression spring means between said closed end of said cylinder and a portion of said support for resisting closing movement of said first jaw, and tension spring means for resisting closing movement of said second jaw.

8. A press according to claim 7 wherein the resistive forces of said tension and compression spring means are equal.

9. A center closing press for driving metal connectors comprising a support tube having a flange for rigidly connecting said tube to a stationary support, a hollow cylinder having a closed end slidable in said support tube, a C-shaped frame carrying a first jaw mounted on the other end of said cylinder, a piston having one end slidable in said cylinder, a second jaw mounted on the other end of said piston, means for introducing pressure between said closed end of said cylinder and said one end of said piston to produce closing movement of said jaws, a compression spring bearing against said closed end of said cylinder for resisting closing movement of said first jaw, and a pair of tension springs coupling said flange to said second jaw for resisting closing movement of said second jaw.

10. A press according to claim 9 including permanent magnets in said jaws for holding metal connectors.

11. A center closing press for driving metal connectors comprising a vertical support tube having a flange for rigidly connecting said tube to a stationary support, a hollow cylinder having a closed lower end telescopingly received in the upper end of said support tube, a vertically extending C-shaped frame mounted on the upper end of said cylinder and carrying an upper press jaw, a piston having its lower end telescopingly received in the upper end of said cylinder, a lower press jaw mounted on the upper end of said cylinder in vertical alignment with said upper press jaw, means for introducing a hydraulic pressure fluid between the lower ends of said piston and cylinder to produce closing movement of both said jaws, stop means in the lower end of said support tube, a com-

pression spring between said stop means and the lower end of said cylinder for resisting downward movement of said upper press jaw, and a pair of tension springs connected between said lower jaw and said flange for resisting upward movement of said lower jaw.

12. A press according to claim **11** wherein said support tube is provided with an elongated vertical slot, and said hydraulic pressure fluid introducing means comprises a feed tube communicating with the interior of said cylinder and passing through said slot.

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