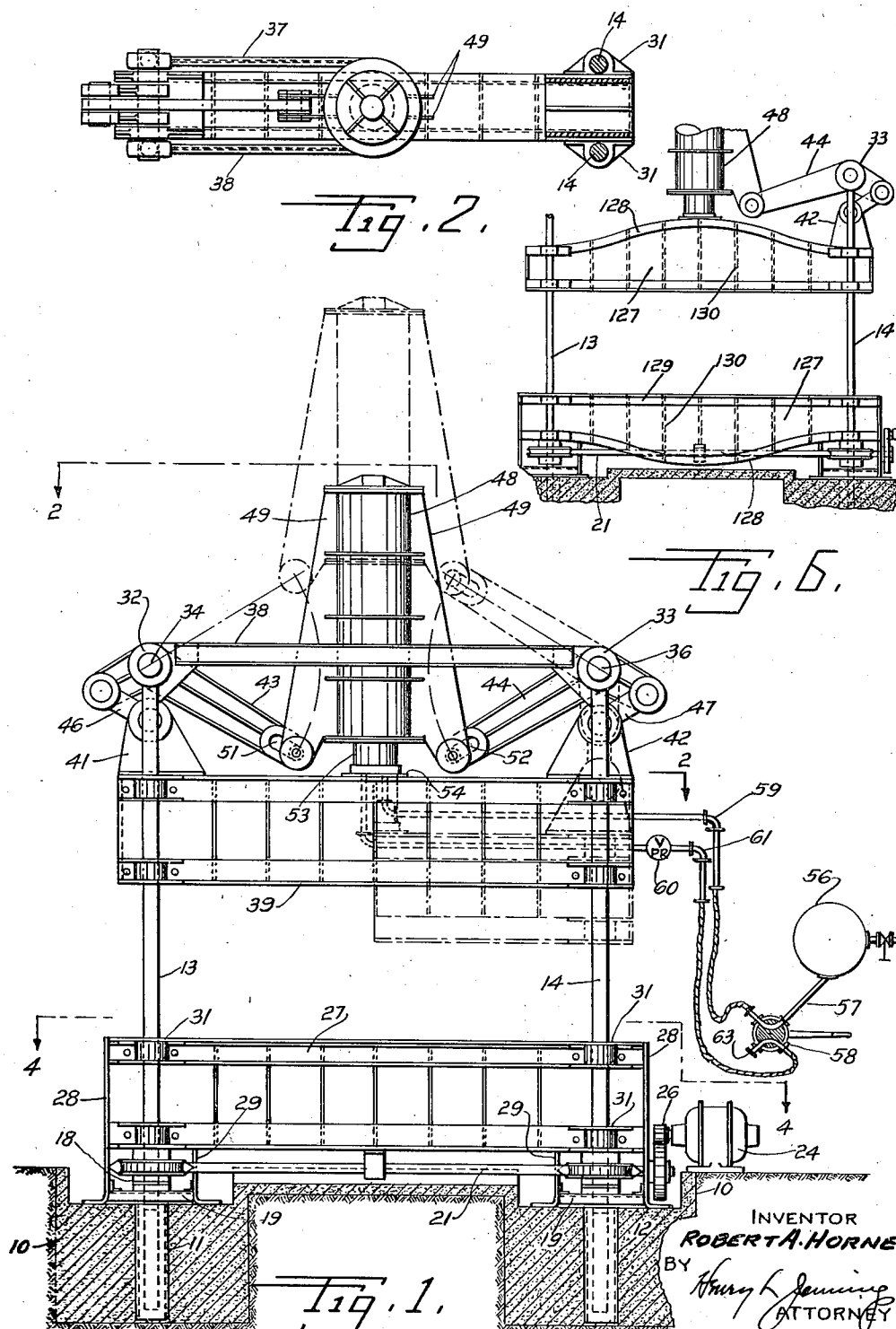


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Aug. 29, 1944.

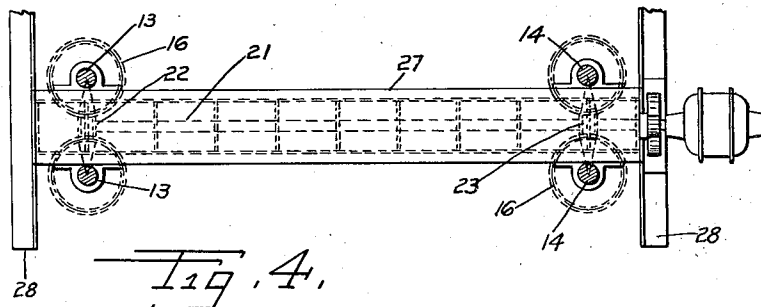
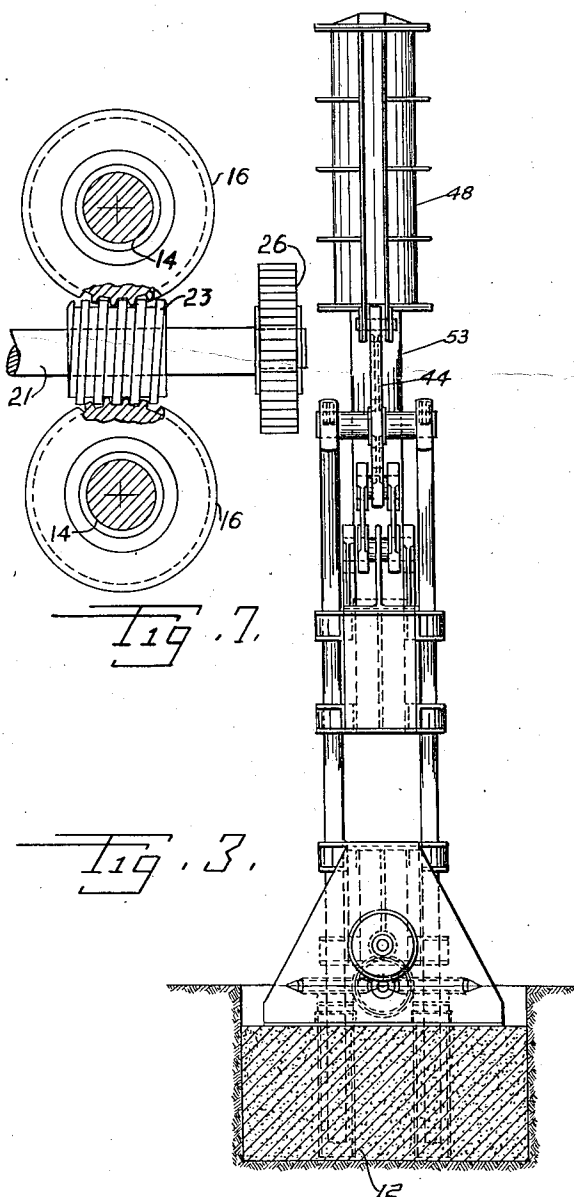
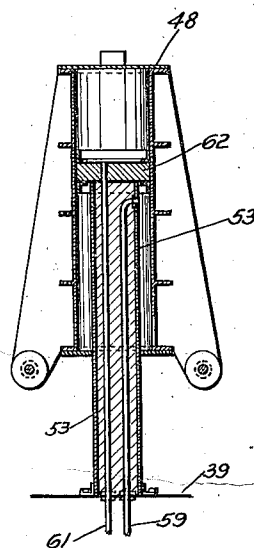
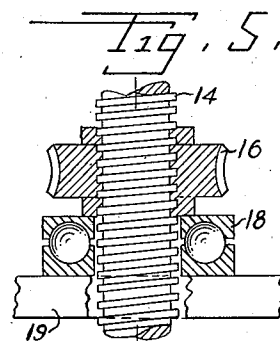
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2,356,790

POWER PRESS

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2 Sheets-Sheet 2



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2,356,790

POWER PRESS

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Application April 30, 1942, Serial No. 441,203

7 Claims. (Cl. 113—45)

This invention relates to a power press such as is employed, for example, in bending and shaping metal plates, sheets, shapes, and tubes, and has for an object the provision of apparatus of the character designated which shall be extremely flexible in its adaptation for different duties, and which shall be simple of design and operation and adapted to be readily installed with a minimum of labor and with a minimum of preparation of foundation.

A further object of my invention is to provide a power press including a stationary and a movable platen, together with fluid pressure operated means for actuating the movable platen, the fluid pressure operating means being mounted on, and movable with, the movable platen.

A more specific object of my invention is to provide a power press embodying a fixed lower platen and a movable upper platen, together with a power cylinder and a piston for actuating the movable upper platen, one of which is mounted directly on and movable with the upper platen and the other of which is connected through lever and toggle means to said movable platen.

A further object of my invention is to provide a power press embodying frame members, a fixed lower platen and a movable upper platen, together with a power cylinder having a piston mounted on the upper platen midway between the ends, and movable with said platen, the cylinder being connected through the frame by means of lever and toggle mechanism to the ends of the upper platen, thereby to distribute the power throughout the length of the movable platen.

Briefly, my invention comprises a fixed lower platen which may be mounted on any suitable foundation. The frame is comprised of opposed pairs of vertical members which extend up through the lower platen and which are threaded at their lower ends so as to be adjustable with respect to the lower platen. Gear driven adjusting nuts are provided on the vertical members whereby the position of the frame may be adjusted by simultaneous rotation of the adjusting nuts. The upper platen of the press is movable with respect to the vertical members and is supported therefrom by means of a link and lever mechanism through which the upper platen is in part actuated. Mounted on the upper platen is a power cylinder having a piston therein which is directly connected to the upper platen, the cylinder being connected to the vertical members by the lever and link mechanism above referred to. When fluid under pressure, such as air or

steam, is admitted to one end of the cylinder, the piston moves outwardly of the cylinder, transmitting its force directly to the platen, while the cylinder moving upwardly with respect to the piston transmits power through the lever and links to the ends of the upper platen. By this means, I provide a powerful and yet flexible press, the power being transmitted to the upper platen centrally and at the ends whereby an even pressure is applied thereto.

Apparatus embodying features of my invention is illustrated in the accompanying drawings forming a part of this application, in which

Fig. 1 is a front elevational view of my improved press;

Fig. 2 is a sectional plan view taken along the line 2—2 of Fig. 1;

Fig. 3 is an end elevation;

Fig. 4 is a sectional plan view taken along the line 4—4 of Fig. 1;

Fig. 5 is a sectional view of the power cylinder employed with my improved press;

Fig. 6 is an elevational view of my improved press with parts removed and embodying a modified form of platen construction;

Fig. 7 is a detail plan view partly in section, showing the worm gear adjusting means for the frame members; and

Fig. 8 is a detail, vertical sectional view of the same.

Referring to the drawings for a better understanding of my invention, I show a foundation 10 which may be made of concrete and having therein at one end spaced recesses 11 and at the opposite end similar spaced recesses 12. Movable mounted in the recesses 11 and 12 are frame members 13 at one end of the press, and similar frame members 14 at the opposite end of the press. The lower ends of the frame members 13 and 14 are threaded, the threads on the frame members on one side of the press being left hand threads, and on the opposite sides right hand threads. Mounted on each of the frame members is a worm gear adjusting nut 16. The adjusting nuts rest on frictionless bearings 18 mounted on channels 19, which in turn rest on the foundation 10. A worm shaft 21 extends the length of the press and has mounted thereon worms 22 and 23, which mesh with the adjusting nuts 16. The worm shaft 21 is driven by a motor 24 through a train of reducing gears 26 whereby the frame members 13 and 14 may be adjusted vertically simultaneously. See Figs. 7 and 8.

Mounted on the foundation 10 is a lower platen 27 which may be constructed of standard steel

shapes in a manner similar to that described in my prior Patent No. 1,266,684 of May 21, 1918. The platen 27 is mounted over the worm gear adjusting nuts 16, and is supported from the foundation 10 by means of gusset plates 28 at each end and intermediate plates 29. Mounted on the sides of the platen 27 are bearing brackets 31 for the frame members 13 and 14, whereby the said frame members may be raised and lowered in the recesses 11 and 12.

The upper ends of the frame members 13 and 14 are formed with heads 32 and 33 respectively, in which are mounted cross shafts 34 and 36. The heads 32 and 33 are connected by means of longitudinal beams or tie members 37 and 38, whereby to form a rigid upper frame structure.

Supported by, and movable with respect to the frame members 13 and 14, is a movable upper platen 39. The upper platen 39 may also be constructed in a manner similar to the lower platen 27. Secured to the opposite ends of the platen 39 are supporting brackets 41 and 42. Pivotaly mounted on the cross shafts 34 and 36 are bell crank levers 43 and 44 having links 46 and 47 connected to their outer ends and to the supporting brackets 41 and 42.

The upper platen 39 is operated by means of a power cylinder 48 which is connected to the inner ends of the bell crank levers 43 and 44 by means of gussets 49 fixedly connected to the cylinder and pivotally connected to the inner ends of the bell crank levers 43 and 44 through elongated openings 51 and 52. In the cylinder 48 is a piston rod 53 which is fixedly connected at 54 to the upper platen 39 so as to be movable therewith. With the arrangement just described, it will be seen that when the piston rod 53 is caused to move outwardly of the cylinder 48, the latter moves upwardly and the piston moves downwardly with the platen 39. Force is accordingly transmitted to the platen at both ends through the link and lever mechanism described, and intermediate the ends through the piston rod 53. I thus achieve a quick acting and very flexible action of the press elements.

The power cylinder may be supplied with either steam or compressed air from a source of fluid under pressure indicated diagrammatically at 56. The pressure is supplied through a conduit 57 to a four way valve 58. Conduits 59 and 61 lead to the lower side and upper side respectively of a piston 62 mounted on the upper end of the piston rod 53. A pressure relief valve 60 may be interposed in the conduit 61 to maintain a balancing pressure in the upper end of the cylinder 48. With the four way valve 58 in the position shown, fluid under pressure is being admitted through the conduit 59 to the underside of the piston 62 and is being exhausted from the upper side of the piston 62 through the conduit 61 and four way valve 58 to an exhaust port 63. The power cylinder 48 will accordingly be caused to move downwardly to its lowest position, and the piston 62, with the platen 39 to move upwardly to its highest position. When the four way valve 58 is turned 90° from the position shown, fluid under pressure is admitted through the conduit 61 to the upper side of the piston 62 and is exhausted through the conduit 59 from the lower side of the piston 62, which causes the power cylinder 48 to rise and the piston 62 to move downwardly, thereby moving the platen 39 downwardly to its lowest position. The vertical adjustment of the frame members 13 and 14 by means of the worm gear adjusting nuts 16 per-

mits the initial position of the upper platen 39 to be adjusted to accommodate whatever thickness of work is to be handled.

From the foregoing it will be apparent that I have developed a power press which is simple of design and operation, which is extremely flexible and quick acting, and which is adapted to exert pressure evenly throughout the platens; also one which may be installed with a minimum of labor and expense. My improved press may be quickly and cheaply built, largely from steel plate and shapes. It will handle many varieties of work that heretofore required large expensive tools. For example, it can be adapted for use as a multiple punch, gate shear, angle bender, steel plate flanging machine, bushing press, steel head and plate bumping machine, pipe bending and straightening machine, and many other uses which will suggest themselves to those skilled in the art.

In Fig. 6 I show a press embodying a modified form of platen which, instead of being constructed from beams, such as I beams, may be constructed from plates with suitable intervening stiffeners, the plates being constructed to provide additional strength. For example, I show a platen comprising side plates 127 (only one of which is shown) cut with a lateral depth at 126 greater than that at the ends, thus providing a truss-like beam. A bearing plate 129 forms the working face of the platen, and between the side plate, stiffeners 130, indicated by dotted lines, join the side plates. The platens are otherwise constructed as already described.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In a power press, frame members, a fixed platen, a movable platen adapted to coact with the fixed platen, fluid pressure operated means including members movable relative to the frame members and to each other for actuating the movable platen, one of said members being a cylinder and the other a plunger, means connecting one of said relatively movable members directly to the movable platen, levers pivoted on the frame members and having one end connected to the other of said relatively movable members, and links connecting the other ends of said levers to the movable platen.

2. In a power press, a stationary lower platen, frame members extending upwardly from the lower platen, a movable upper platen adapted to coact with the lower platen, fluid pressure operated means including members movable relative to the frame members and to each other for actuating the upper platen, one of said members being a cylinder and the other a plunger, means connecting one of said movable members to the upper platen midway the ends thereof, levers pivoted to the frame members and having one end connected to the other of said relatively movable members, and links connecting the other ends of said levers to the upper platen.

3. In a power press, a stationary lower platen, a frame comprised of opposed pairs of vertical members extending upwardly from the ends of the lower platen, means to adjust the frame ver-

tically with respect to the lower platen, a movable upper platen, fluid pressure operated means including members movable relative to the frame and to each other for actuating the upper platen, one of said members comprising a cylinder and the other a plunger, means connecting one of said relatively movable members to the upper platen midway the ends thereof, levers pivoted to the frame members and having one end connected to the other of said movable members, and links connecting the other ends of said levers to the upper platen.

4. In a power press, a stationary lower platen, a frame comprising members extending upwardly from the ends of the lower platen and adjustable vertically with respect thereto, an upper platen movable with respect to the frame and adapted to coact with the lower platen, a fluid pressure operated power cylinder movable with respect to the frame and having a piston connected directly to the upper platen midway the ends thereof, levers pivotally mounted on the frame above the upper platen, means connecting one end of each of said levers to the power cylinder, and links connecting the other ends of said levers to the ends of the upper platen.

5. In a power press, a foundation having spaced vertical recesses therein, frame members adjustably mounted in the recesses, means for effecting simultaneous vertical adjustment of the frame members, a fixed platen mounted on the foundation, a movable platen, a power cylinder

movable with respect to the frame members and disposed midway the ends of the movable platen, bell crank levers connected to the power cylinder and pivotally mounted on the upper ends of the frame members, links connecting the bell crank levers to the movable platen, a piston in the cylinder, and means rigidly connecting the piston directly to the movable platen.

6. In a power press, a foundation having spaced vertical recesses therein, frame members adjustably mounted in the recesses, means for effecting simultaneous vertical adjustment of the frame members, a fixed platen mounted on the foundation, a movable platen, a floating power cylinder movable with respect to the frame members, bell crank levers connected to the power cylinder and pivotally mounted on the upper ends of the frame members, links connecting the bell crank levers to the movable platen, a piston in the cylinder, and means rigidly connecting the piston directly to the movable platen.

7. In a power press, a foundation, a fixed platen mounted on the foundation, a movable platen, frame members for supporting the movable platen and adjustable vertically with respect to the foundation and the fixed platen, a floating power cylinder movable with respect to the frame members, a piston in the cylinder fixedly connected to the movable platen midway the ends thereof, and link and lever mechanism pivotally mounted on the frame connecting the movable platen to the power cylinder.

ROBERT A. HORNE.