(No Model.)

R. H. TWEDDELL, J. PLATT & J. FIELDING.

HYDRAULIC BENDING PRESS.

No. 509,265. Patented Nov. 21, 1893.

Fig. 1.

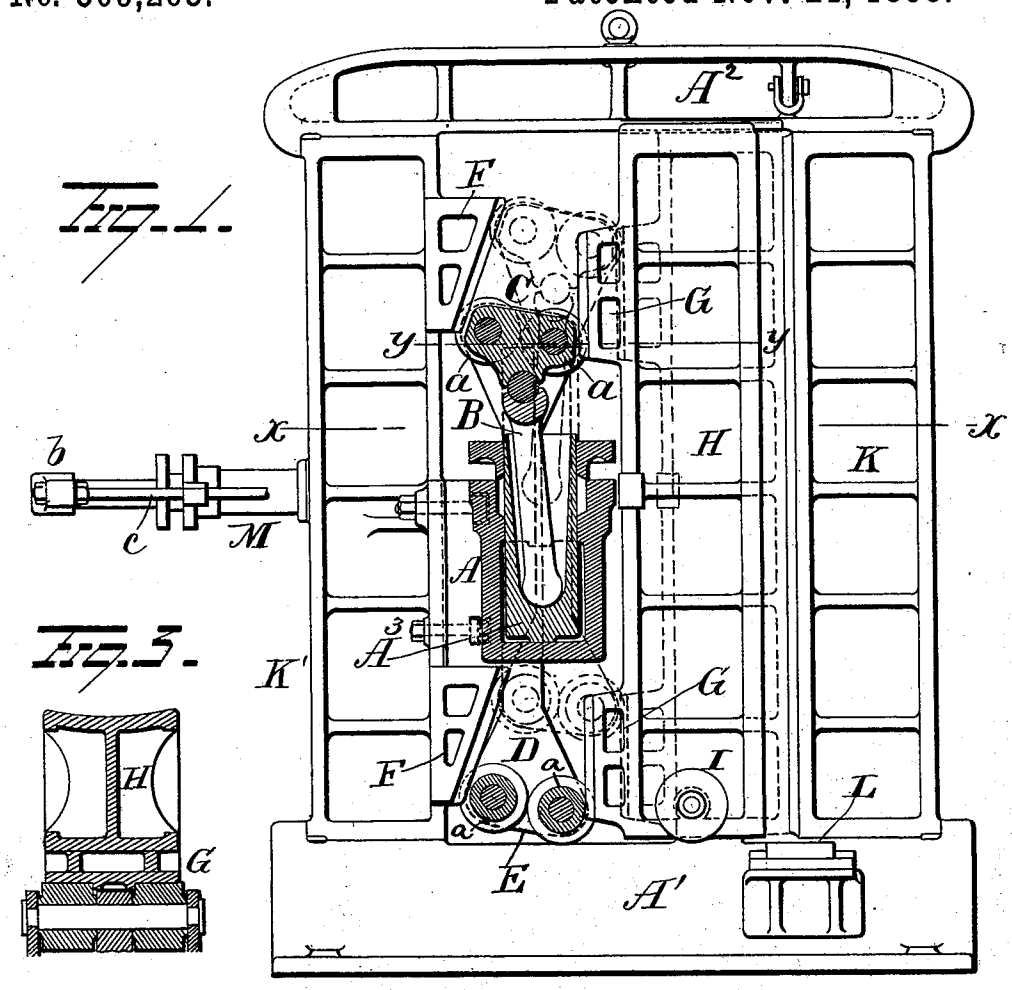
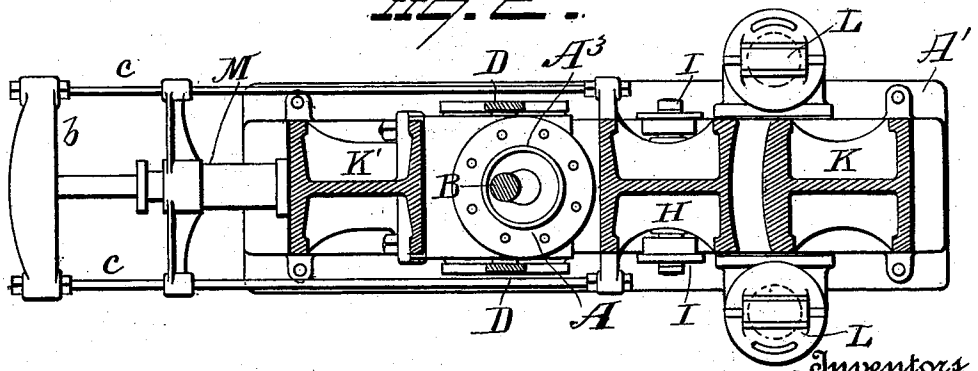


Fig. 3.

Fig. 2.



Witnesses
E. E. Nottingham
S. W. Foster.

Inventors
R. H. Tweddell
J. Platt and
J. Fielding
By H. A. Seymour Attorney

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

RALPH HART TWEDDELL, OF LONDON, AND JAMES PLATT AND JOHN FIELDING, OF GLOUCESTER, ENGLAND.

HYDRAULIC BENDING-PRESS.

SPECIFICATION forming part of Letters Patent No. 509,265, dated November 21, 1893.

Application filed August 11, 1893. Serial No. 482,891. (No model.) Patented in England February 24, 1888, No. 2,783.

To all whom it may concern:

Be it known that we, RALPH HART TWEDDELL, of Westminster, London, in the county of Middlesex, and JAMES PLATT and JOHN FIELDING, of Gloucester, in the county of Gloucester, England, have invented certain new and useful Improvements in Hydraulic Bending-Presses, (for which we have obtained British Patent No. 2,783, dated February 24, 1888;) and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to an improvement in hydraulic bending presses, and more particularly to hydraulic presses designed for bending large plates such as armor and boiler plates. When hydraulic presses are made with followers of large extent such as are employed for bending boiler or armor plates it is necessary to employ two, three or more separate hydraulic cylinders to move such followers. Where a series of cylinders are employed it is extremely difficult to so arrange and connect the cylinders that the plungers thereof start simultaneously and move an equal distance at the same rate of speed; hence the followers sometimes angle themselves and do not apply a uniform pressure throughout the whole extent of the object acted upon.

Our invention is designed to overcome such objection and consists of a hydraulic press and a single cylinder and means connected to the plunger thereof for simultaneously acting on or near the opposite ends of the follower of said press.

Our invention further consists in the parts and combinations of parts as will be more fully described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation, partly in section of a press embodying our invention. Fig. 2 is a view in horizontal section of same on line *x x* of Fig. 1, and Fig. 3 is a similar view in section on the line *y y* of Fig. 1.

The frame work of the press consists essentially of a base A′, side frames K, K′, and a top A^2. The base, side frames and top are secured together forming a rigid frame. The inner face of side frame K is curved, and the follower H is curved on its face adjacent to frame K so as to conform to the contour of the latter; hence it will be seen that a plate interposed between the curved faces of the frame K and the follower H and subjected to pressure will be bent to conform to the contour of such curved surfaces or to curve of greater radius by suitably regulating the stroke of the follower. With the parts as above described the follower H is arranged with its longer axis in a vertical position and moves horizontally, but it is evident that instead of so arranging the parts, the base A′ of the apparatus could be provided with the curved face corresponding to the curved face of side frame K, and the follower arranged to move vertically instead of horizontally.

As shown in the drawings the base A′ is provided with rests L for the lower end of the plate to be operated upon, and the follower is provided on its lower end with flanged rollers I which latter move on the base A′. The follower also overlaps the top frame A^2 at its sides and the latter construction in addition to the flanged rollers I prevents any lateral displacement of the follower. The hydraulic cylinder A is in this case vertical and its plunger A^3 is provided with a thrust connecting rod B which as the plunger ascends pushes up a cross head C carrying rollers *a*. By side links D, this cross head C is connected to a similar cross head E located near the opposite end of the plunger and carrying rollers *a*. The rollers *a* on the one side of both cross heads run along, or move in contact with inclined guides F fixed to the side frame K′, and the rollers on the other side of both cross heads move in contact with the vertical guides G on the face of the follower adjacent to the cylinder. With the construction as shown, the plate to be bent is introduced while in a vertical position between the follower H and the side frame K. Water under pressure is then introduced into cylinder A behind plunger A^3, and as the latter is forced outwardly the cross heads C and D carrying rollers *a* are moved in the same direction, and as the rollers on one side of each cross head move in contact with the inclined guides F it follows that the follower H must move toward side

frame K and bend the plate which as before stated is interposed between the curved faces of the follower and side frame K. After the required pressure has been exerted and the plate bent to the desired shape, the pressure is relieved from plunger A^3 and the latter together with the cross heads C and D descends by gravity. The follower H is caused to recede from the side frame K by the draw back cylinder M secured to side frame K′, the plunger of said cylinder carrying a cross head *b* which latter is connected to follower H by the rods *c*.

If desired the hydraulic cylinder might be located horizontally under the follower H, in which case the latter would descend by gravity, and also assist through the intervention of the inclines, F, in moving the plunger A^3 inwardly. The plunger could however be positively moved back by a suitable draw back.

Instead of the inclines F being on the fixed side frame K′ they might be on the follower H and the guides C be on the said side frame, or there might be inclines on both of the side frame and the follower. Also instead of two sets of cross-heads and rollers located at or near the ends of the follower, there might be several sets distributing the strain over the length of the follower.

Although we have shown in the drawings a press constructed for bending plates, it is evident that the follower H and frame K might be provided with shear blades for cutting plates, or with punches and dies for punching a number of holes in a plate interposed between them, for raising heavy weights and for other purposes for which hydraulic presses are applicable.

With the construction above described, it will be seen that as the plunger A^3 moves outwardly by the pressure behind it, the rollers *a* moving on the inclined guides push or force the follower in a direction at right angles to the line of motion of the plunger with a travel and force depending on the inclination of the guides. The incline may be curved so as to vary the force applied to the follower at different parts of the stroke.

It is evident that changes in the construction and relative arrangement of the several parts might be made without avoiding my invention and hence we would have it understood that we do not restrict ourselves to the particular construction and arrangement of parts shown and described; but,

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a hydraulic press, the combination with a frame and a follower, of a cylinder and plunger, having their axes approximately at right angles to the direction of movement of the follower, a series of cross-heads carrying rollers the said cross-heads being connected to the plunger for actuating the follower in one direction and guides against which said rollers move.

2. The combination with a frame and a follower, the adjacent faces of the frame and follower being shaped to correspond to each other, of a single cylinder and means actuated by the plunger of said cylinder for simultaneously acting on or near the opposite ends of said follower to move the latter toward the frame, substantially as set forth.

3. In a hydraulic press, the combination with a frame and a movable follower mounted in said frame, of a single cylinder having its axis approximately at right angles to the line of movement of the follower, cross-heads connected to the plunger of said cylinder and carrying rollers, and inclined guides against which said rollers move, substantially as set forth.

4. In a hydraulic press, the combination with a frame and a movable follower mounted therein, of a single cylinder, a plunger therefor the latter adapted to move in a direction approximately at right angles to the direction of movement of the follower, cross-heads actuated by said plunger, rollers carried by the cross-heads and inclined guides against which the rollers on one side of each cross-head move, the said guides being located near the ends of the follower, substantially as set forth.

5. In a hydraulic press, the combination with a frame and a horizontally movable follower, of an approximately vertical cylinder located between the follower and the adjacent side of the frame, the said cylinder being located at right angles to the direction of movement of the follower, a plunger for said cylinder, and means actuated by said plunger for simultaneously acting on or near the opposite ends of the follower, substantially as set forth.

6. In a hydraulic press, the combination with a frame and a follower, of a cylinder and plunger having their axes approximately at right angles to the direction of movement of the follower, means actuated by said plunger for simultaneously acting on or near the opposite ends of the follower, and a cylinder and rods for retracting the plunger, substantially as set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

RALPH HART TWEDDELL.
JAMES PLATT.
JOHN FIELDING.

Witnesses as to the signature of Ralph Hart Tweddell:
H. H. NEWMAN,
SIDNEY T. CHAMBERLAIN.
Witnesses as to the signatures of James Platt and John Fielding:
ERNEST M. SMITH,
ARTHUR GREY.