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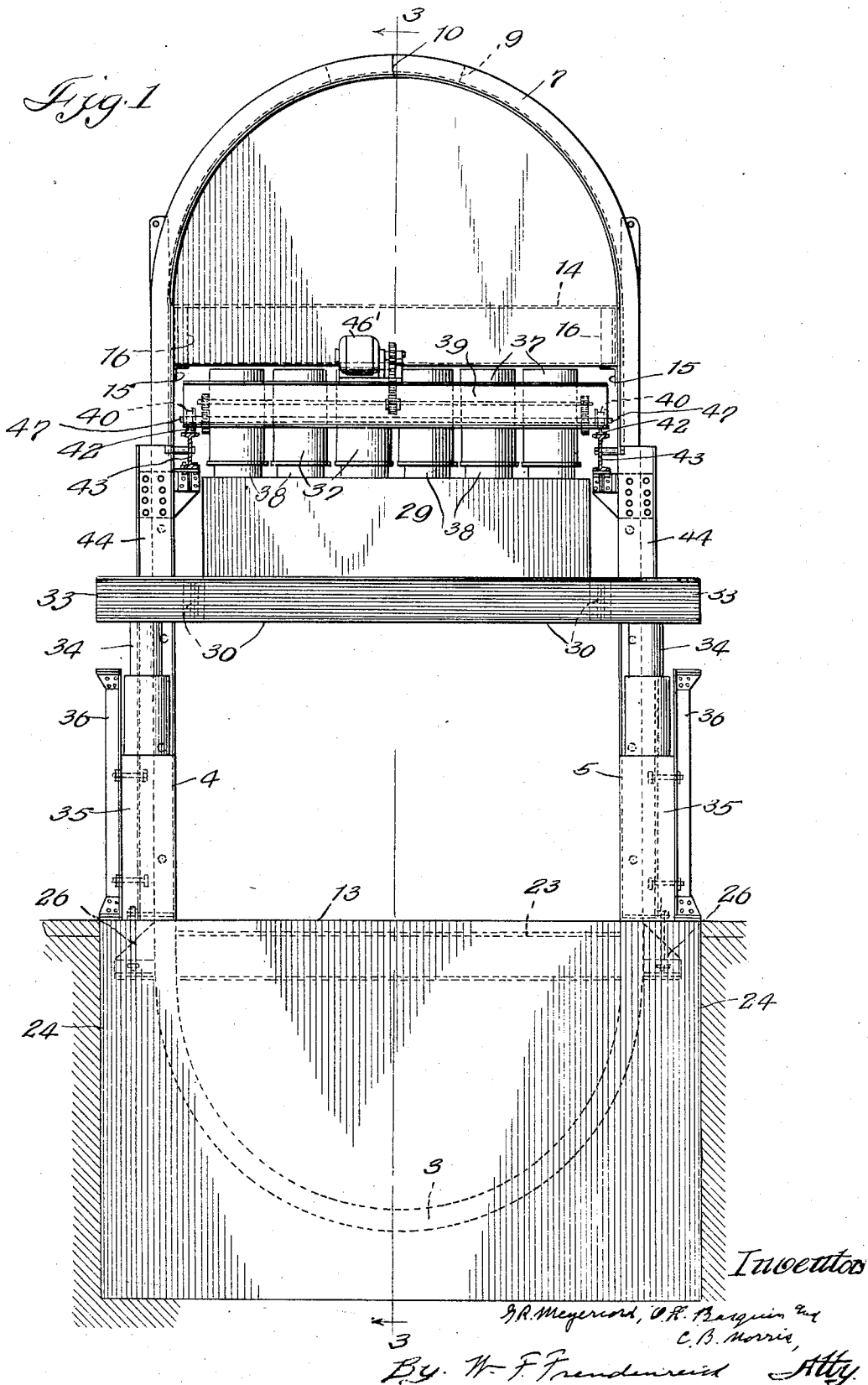
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POWER PRESS OF STEEL AND CONCRETE

Filed July 18, 1932

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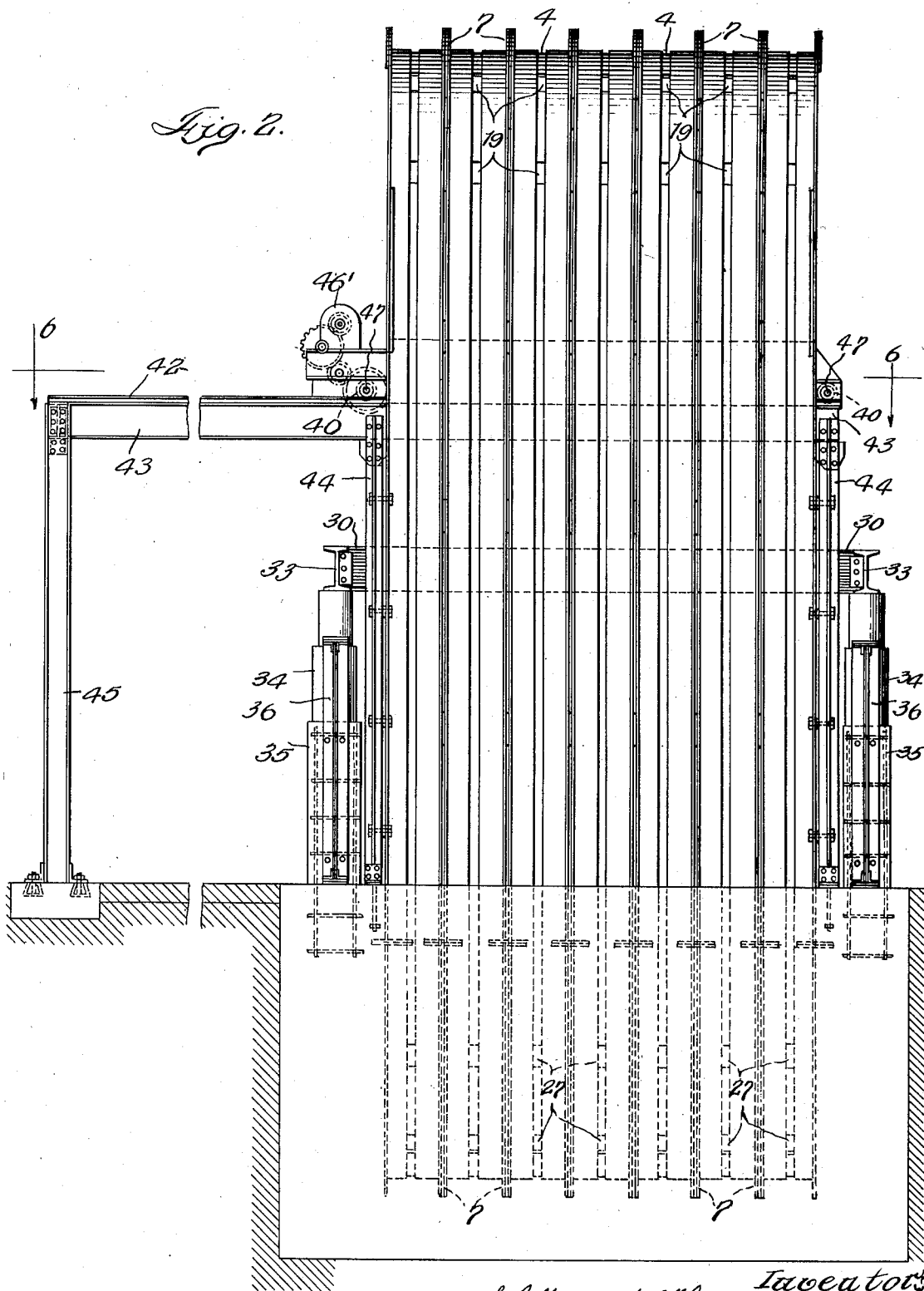
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Fig. 2.



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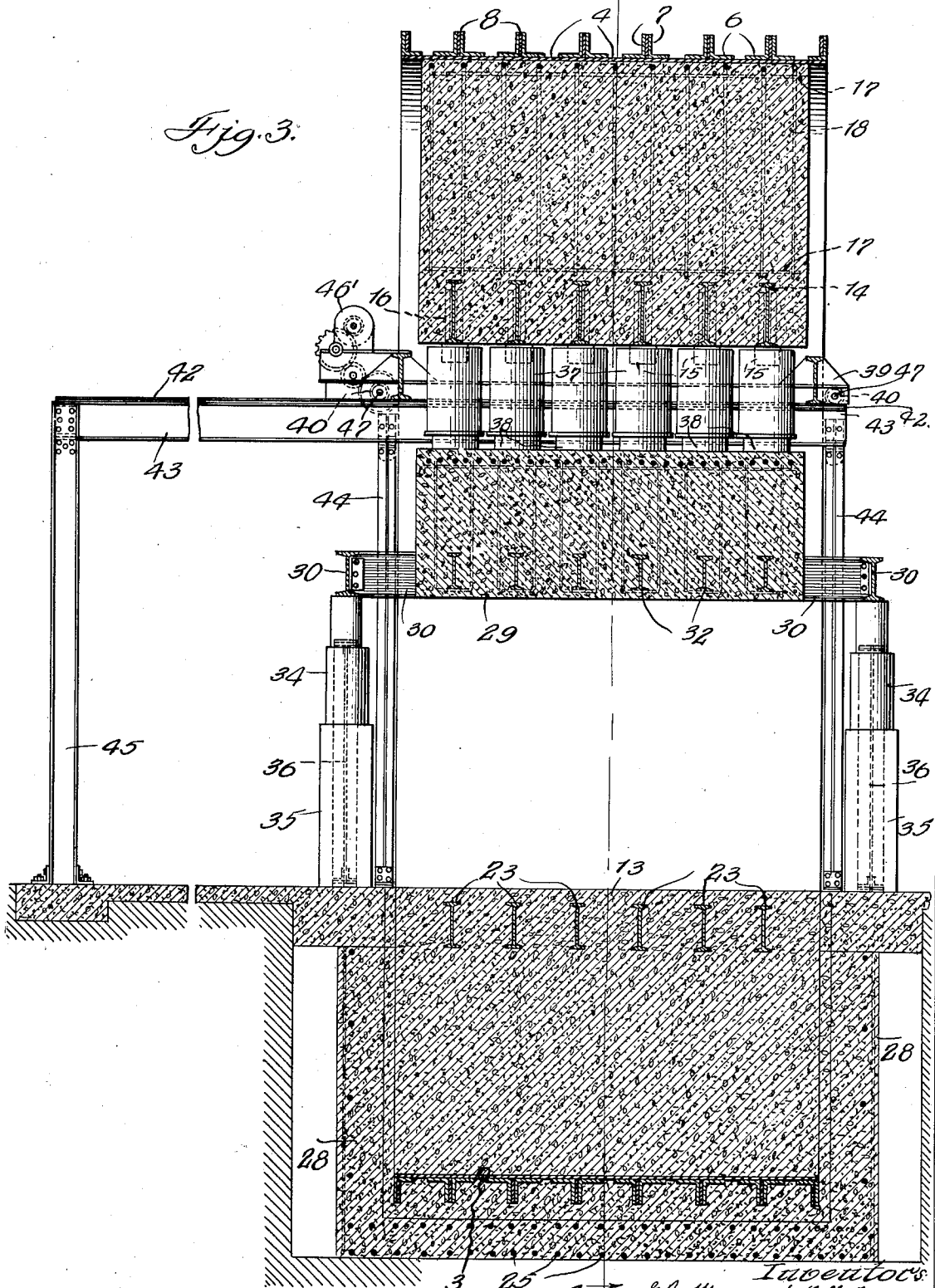
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Fig. 3.



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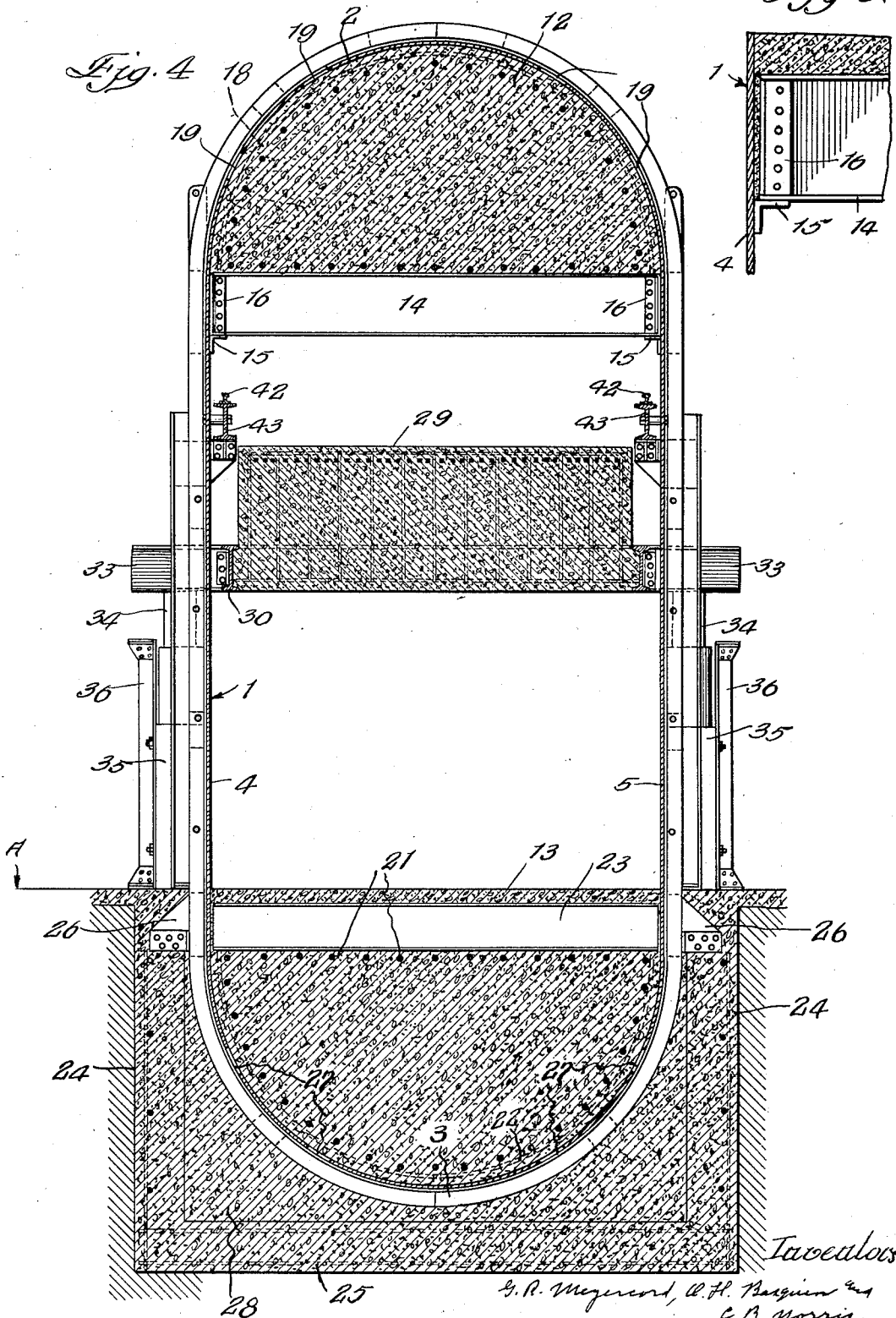
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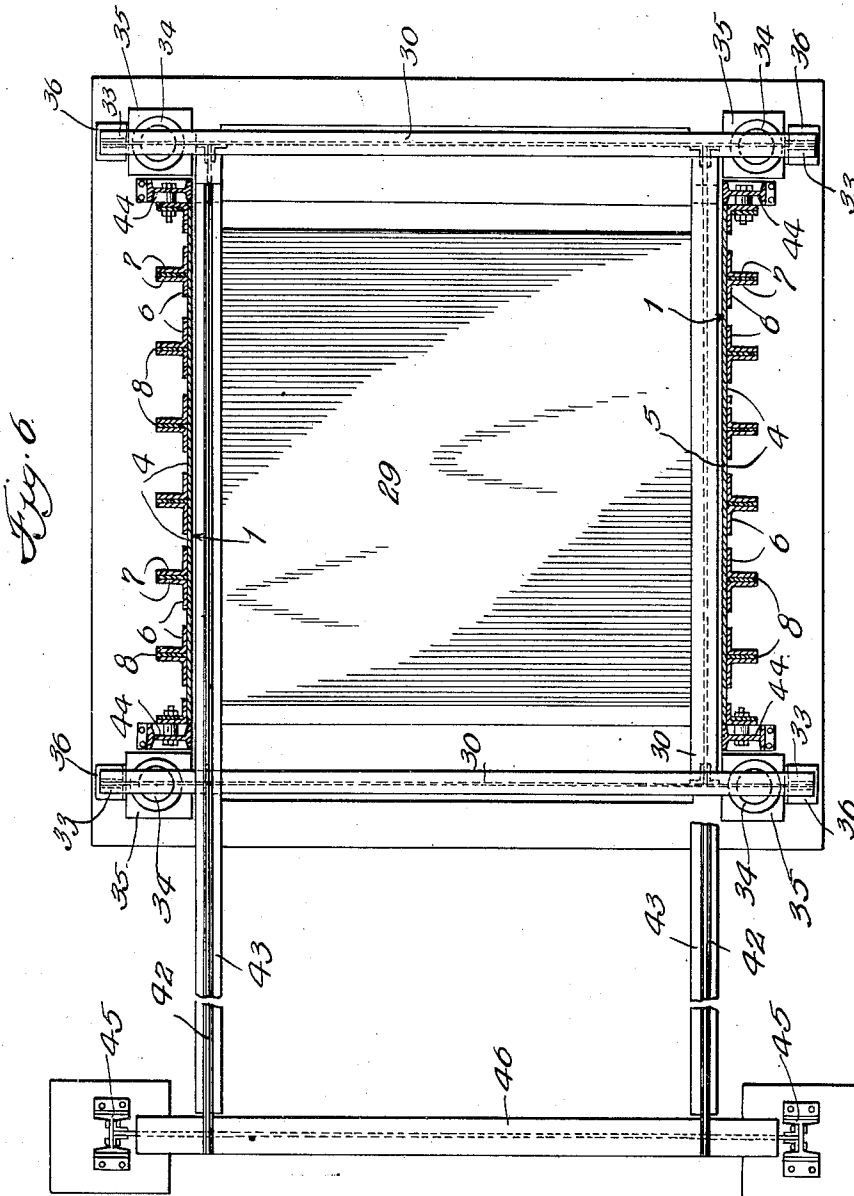
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UNITED STATES PATENT OFFICE

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POWER PRESS OF STEEL AND CONCRETE

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Application July 18, 1932, Serial No. 623,132

8 Claims. (Cl. 144—281)

The present invention relates to power presses composed of structural steel or the like and reinforced concrete, and has for its object to simplify and improve presses of this type.

In our Patent No. 1,907,083, we have disclosed a press composed of structural steel elements and concrete, whereby it is possible cheaply to produce very large presses and particularly presses having work-engaging faces of very large area; and, viewed in one of its aspects, the present invention may be said to have for its object to simplify and improve the construction of the press disclosed in that patent.

The frame of the press in the aforesaid patent is a monolith of concrete reinforced in such a manner that, when the press is closed on the work, the metal reinforcing elements are in tension, and must therefore have sufficient tensile strength to carry the entire load. In accordance with the present invention, the load is also carried by metal elements in tension, but the metal constitutes the frame of the press rather than serving as reinforcing means for a body of concrete; the concrete serving only to transmit the load to the upper and lower end sections of the metal structure, in such a manner that these end sections will be in tension.

Therefore, viewed in one of its aspects, the present invention may be said to have for its object to produce a simple and novel frame for a power press formed of a metal shell and top and bottom blocks of concrete arranged within the shell; the whole being so shaped and proportioned that the blocks of concrete resist the thrusts upon work in the press and transmit the same to the metal structure in a manner to place the metal structure in tension.

The various features of novelty whereby our invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of our invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a front elevation of a press embodying the present invention, including that portion lying below the floor of the room or other place in which the press has been set up, the carriage-supporting beams being shown in section; Fig. 2 is a side view of the press; Fig. 3 is a section on line 3—3 of Fig. 1; Fig. 4 is a section on line 4—4 of Fig. 3; Fig. 5 is a section on the same plane as Fig. 4, illustrating on a larger scale a small fragment of the press; and Fig. 6 is a section on line

6—6 of Fig. 2, that portion of one of the carriage-supporting beams extending through the interior of the press being omitted.

Referring to the drawings, 1 is a heavy steel plate fashioned into a shell open at the front and rear ends, having semi-cylindrical top and bottom sections 2 and 3 joined by parallel vertical side sections 4 and 5 tangential to the semi-cylindrical sections. The work-receiving space in this frame or shell is therefore as long as the width of the metal plate and as wide as the diameter of the semi-cylindrical end sections. Each of these two dimensions may be made large so that work 10 feet or more wide and 10 feet or more long may be operated upon by the press. In speaking of a plate we do not mean an element initially in one piece or even in what may be regarded as a single piece in the finished press, for the shell may be composed of any desired number of individual pieces suitably united into endless bands or strips. Furthermore, the shell may be made of a plurality of sections placed side by side, each section consisting of semi-cylindrical end portions and parallel side portions. If the shell is made of a plurality of sections placed side by side, these sections may be secured together or not. In any event, it will be apparent that a press of any desired size may be constructed by simply providing a plate or plates of the proper length and width.

In order to secure a maximum of strength for a given weight of metal, we prefer to provide the shell with a series of ribs extending around the same in the manner of hoops. In the arrangement shown, the ribs are structural steel elements, L-shaped in cross section. One flange 6 of each rib lies in contact with the exterior surface of the shell, while the other flange 7 projects outwardly at right angles to the surface of the shell. The ribs are preferably arranged in pairs, being made in rights and lefts, so that the flanges 7 of each pair may lie beside each other while the flanges 6 of each pair extend in opposite directions. The projecting flanges of the ribs of each pair are preferably spaced apart somewhat to provide between the same a passage wide enough to receive spacing plates 8 distributed at intervals around the shell and preferably welded to the flanges between which they lie. Where joints must occur in a rib, they are preferably formed by placing a long spacing plate so as to overlap the meeting ends and welding this spacing plate securely to such meeting ends. Thus, in Fig. 1, there is shown a long spacing plate 9 at the extreme top of the

press, to unite two rib sections meeting along the line 10.

In addition to the ribbed shell just described, all that is needed to complete the press are oppositely disposed work-engaging members and means, including pressure-producing means, to transmit the load to the shell. We have therefore fitted into the troughs of the upper and lower semi-cylindrical sections of the shell semi-cylindrical blocks or reinforced concrete whose flat faces are parallel and directed toward each other. One of these flat faces, preferably the lower one, we have to support the work, whereas pressure is applied to the work by power means interposed between the latter and the other of said flat faces, preferably and usually the upper face.

In the drawings the upper and lower semi-cylindrical concrete blocks are indicated at 12 and 13, respectively.

The upper semi-cylindrical block 12 has a downward extension in which are embedded deep structural beams 14 extending across the shell from one side to the other; there being preferably one of these beams in the plane of each double rib surrounding the shell. The beams 14 are not fastened to the shell, but simply rest at their ends upon little shelves 15, 15 welded to and projecting inwardly from the plate member of the shell. The beams are somewhat shorter than the interior width of the shell, so that they may be spaced apart from the shell at both ends. Each of the beams 14 has secured thereto at each end two angle irons 16; one flange of each of the members 16 lying against the vertical web of the beam and the other projecting laterally at right angles to the web. The members 16 serve as anchors to hold the beams against endwise movement in the concrete.

The upper block of concrete is formed by first placing in position the cross beams 14, the transverse reinforcing rods 17, extending across the tops of the beams 14 and also in a semi-circular row near the inner surface of the shell, and a group of reinforcing rods 18 bent into the form of semi-circles and lying in the space between the semi-circular row of rods 17 and the shell; placing in position a suitable form extending underneath the cross beams and over the open sides or ends at the top of the shell; and then pouring concrete through openings 19 placed at intervals in the semi-cylindrical section 2 of the shell.

The lower block 13 is formed in much the same way as the upper semi-cylindrical block, reinforcing rods 21 and 22, corresponding to the rods 17 and 18, and heavy structural steel beams 23, corresponding to the beams 14, being placed in position, and the concrete being then poured from above.

The upper face of the lower concrete block 13, in the construction shown, is adapted to support the work in the press and therefore, because of the large size of the press, it is desirable that the work-supporting surface be level with the floor A, so that a truck or carriage on which the work is being transported may be run directly into the press from the floor. It is therefore desirable that the lower portion of the press be sunk below the floor level. It is also, of course, necessary to provide a solid support for the high, heavy press. In the arrangement shown, the press is firmly supported with the flat face of the lower concrete block level with the floor by a suitable foundation. This foundation is shown as taking the form of a pit sunk below the floor level and

having vertical side walls 24 and a bottom wall 25 of reinforced concrete. This pit must be made and the concrete forming the walls thereof be allowed to set before the metal shell is lowered into the same. The upper faces of the vertical walls 24 of the pit or well either terminates at some distance below the floor level, or these walls are provided with notches or seats extending down through the upper edges thereof to a considerable distance below the floor level, in order that feet 26, 26, fixed to the sides of the shell at the lower ends of the vertical portions thereof, may rest on the upper faces of these walls or in such seats and support the steel structure in just the right position to bring the floor of the press flush with the surrounding floor level when the concrete is poured. The semi-cylindrical bottom section 3 of the shell is also provided with holes 27 similar to the holes or openings 19 in the upper section. Therefore, when the concrete is poured, it will run down through these holes and fill the space within the pit below the semi-cylindrical shell, as indicated at 28. Consequently, the press frame, including the semi-cylindrical block, rests in a semi-cylindrical saddle or seat and is also supported by the feet or projections 26 on opposite sides thereof.

As in the press of the aforesaid application, we prefer that the pressure shall be applied to the work through a suitable platen movable up and down within the opening in the press. Because of the large transverse dimensions that a platen of this kind must have, we prefer to form it of reinforced concrete, as indicated at 29. Furthermore, the platen is set at its lower end in a frame 30 of structural steel. In order to give the desired strength and rigidity to the platen, we prefer to embed within the lower end thereof a series of structural steel beams, preferably I-beams, such as indicated at 32.

The frame 30 is made longer than the platen and also longer than the metal shell, so that it projects at its ends beyond the open ends or sides of the shell. What may be termed the front and rear elements of the frame 30, which are those members lying in front of and in rear of the press, are extended laterally in both directions, as indicated at 33, so as to overlie hydraulic rams 34, 34 disposed at the four corners of the press. These hydraulic rams may conveniently be set upon suitable piers 35, 35 rising from the foundation or floor surrounding the press. By energizing the rams the platen may be raised so as to lift off the work in the press or to provide sufficient depth of opening in the press to permit the work to be entered or removed. When the rams are deenergized, the platen will descend by gravity into engagement with the work. It is desirable that the platen be supported otherwise than by the rams or jacks at times when the press is not in use, and we have therefore provided beside and just outwardly from each of the piers 35 a steel column 36 whose upper end lies somewhat above the upper face of the corresponding ram or jack when the plunger in the latter is in its lowermost position. These columns or posts are so located that they lie directly underneath the projecting ends 33 of the frame 30. Therefore, when the platen is lowered far enough, its supporting frame will come to rest upon the columns or posts, leaving the rams free.

In using the press, the work is set on the block 13 and the platen is lowered until it rests on the work. The platen is then forced down by means of power devices interposed between the top 75

of the platen and the upper block 12; the power devices being distributed across the length and breadth of the platen. The power devices conveniently consist of hydraulic jacks having cylinders 37 and plungers 38, the jacks being supported by a carriage 39. The carriage has wheels 40 running on rails 42 extending along the tops of horizontal beams 43 arranged in the press opening above the platen. The beams 43 project far out beyond one side of the press to permit the carriage to be rolled out clear of the press. These beams may be supported in any suitable way as, for example, by vertical beams 44 fixed to the frame at the four vertical corners, and a pair of vertical columns 45 at the outer ends of the beams. As best shown in Fig. 6, the columns 45 are placed outwardly from the beams 43, the adjacent ends of the beams being connected together by a cross piece 46 which is long enough to span the space between the columns 45. The carriage may be operated by a suitable motor 46' mounted thereon and geared to one of the axles 47 of the carriage.

It will be seen that the thrust of the jacks that produce the pressure on the work in the press is distributed across the length and the breadth of the upper pressure-resisting surface, so that the main stresses to which the upper concrete block is subjected are compression stresses which the concrete is well adapted to withstand. The thrust of this block upon the frame is applied in such a manner, however, that the frame is in tension. A similar effect is produced by the downward pressure of the work on the lower pressure-resisting face when the area of contact between the work and this face is large; the lower concrete block being under compression and the lower part of the frame being in tension. The great value of our invention lies, however, in the fact that powerful presses having work-engaging faces of large area may be manufactured at a comparatively low cost because all parts thereof, excepting only the hydraulic jacks or rams, may be constructed of structural steel and concrete.

While we have illustrated and described with particularity only a single preferred form of our invention, we do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of our invention constituting the appended claims, wherein the work plate is used in the sense heretofore explained.

We claim:

1. In a press, a frame comprising an endless plate fashioned to form upper and lower semi-cylindrical sections connected by parallel side sections tangent to the cylindrical sections, hoop-like ribs surrounding the plate structure in planes transverse to the axes of the top and bottom sections, semi-cylindrical pressure-distributing blocks fitting in the troughs of the top and bottom sections and having parallel pressure-resisting faces on the sides toward each other, vertical beams fixed to the ends of the side sections of the frame, beams for supporting a carriage extending horizontally through the opening in the frame and fixed to and supported by said vertical beams, a carriage supported by the horizontal beams and movable along the latter from a position within said opening to a position outwardly from the frame, a horizontal platen in said opening below the horizontal beams, and rams mounted on said carriage and adapted to engage with the upper pressure-resisting face and with the top of the

platen when the carriage is positioned within said opening and the rams are energized.

2. A press frame comprising semi-cylindrical top and bottom sections and upright side sections tangential and secured to the top and bottom sections, semi-cylindrical pressure-distributing blocks fitting in the troughs of the top and bottom sections and having parallel pressure-resisting faces on the sides toward each other, a vertically-movable horizontal platen in the opening in the frame, lifting jacks located outside of the frame at the four corners thereof, and rigid members fixed to the platen and projecting outwardly through the frame to points above said jacks.

3. A press frame comprising semi-cylindrical top and bottom sections and upright side sections tangential and secured to the top and bottom sections, semi-cylindrical pressure-distributing blocks fitting in the troughs of the top and bottom sections and having parallel pressure-resisting faces on the sides toward each other, a vertically-movable platen in the opening in the frame, means including lifting jacks outside of the frame to raise the platen, and a series of jacks distributed across the length and breadth of the platen and adapted to engage at one end with the platen and at the other end with the upper pressure-distributing block.

4. In a press, a frame comprising an endless plate fashioned to form upper and lower curved sections connected by parallel side sections tangent to the curved sections, hoop-like ribs surrounding the plate structure in planes transverse to the axes of the top and bottom sections, pressure-distributing blocks fitting in the troughs of the top and bottom sections and having parallel pressure-resisting faces on the sides toward each other, vertical beams fixed to the ends of the side sections of the frame, beams for supporting a carriage extending horizontally through the opening in the frame and fixed to and supported by said vertical beams, a carriage movable along said horizontal beams into and out of the opening in the frame, and means on the carriage to abut against the upper pressure-distributing block and impose a downward pressure on work resting upon the lower pressure-distributing block.

5. In a press, a frame comprising curved top and bottom sections and upright side sections tangential and secured to the top and bottom sections, pressure-distributing blocks fitting in the troughs of the top and bottom sections and having parallel pressure-resisting faces on the sides toward each other, a vertically-movable horizontal platen in the opening in the frame, lifting jacks located outside of the frame at the four corners thereof, and rigid members fixed to the platen and projecting outwardly through the frame to points above said jacks.

6. In a press, a frame comprising curved top and bottom sections and upright side sections tangential and secured to the top and bottom sections, pressure-distributing blocks fitting in the troughs of the top and bottom sections and having parallel pressure-resisting faces on the sides toward each other, a vertically-movable platen in the opening in the frame, means including lifting jacks outside of the frame to raise the platen, and a series of jacks distributed across the length and breadth of the platen and adapted to engage at one end with the platen and at the other end with the upper pressure-distributing block.

7. In a press, a vertical O-shaped metal shell, a foundation having a trough-shaped seat in which

the lower end of said shell fits and rests, outward projections on the sides of a frame embedded in said foundation, pressure-distributing blocks fitted in the troughs of the shell at the top and at the bottom and having on the sides toward each other horizontal pressure-receiving faces, the lower pressure-receiving face being in approximately the same plane as the top of the foundation, a vertically movable platen in the opening in the shell between said pressure-receiving faces, and means interposed between the upper of said faces and the platen to force the platen down.

8. In a press, a vertical O-shaped metal shell, a foundation having a trough-shaped seat in

which the lower end of said shell fits and rests, outward projections on the sides of a frame embedded in said foundation, pressure-distributing blocks fitted in the troughs of the shell at the top and at the bottom and having on the sides toward each other horizontal pressure-receiving faces, a vertically movable platen in the opening in the shell between said pressure-receiving faces, and power means between the platen and one of said faces to force the platen toward the other face.

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