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F. H. STILLMAN.
HYDRAULIC PRESS.
APPLICATION FILED FEB. 19, 1909.

Patented Aug. 30, 1910.

4 SHEETS—SHEET 1.

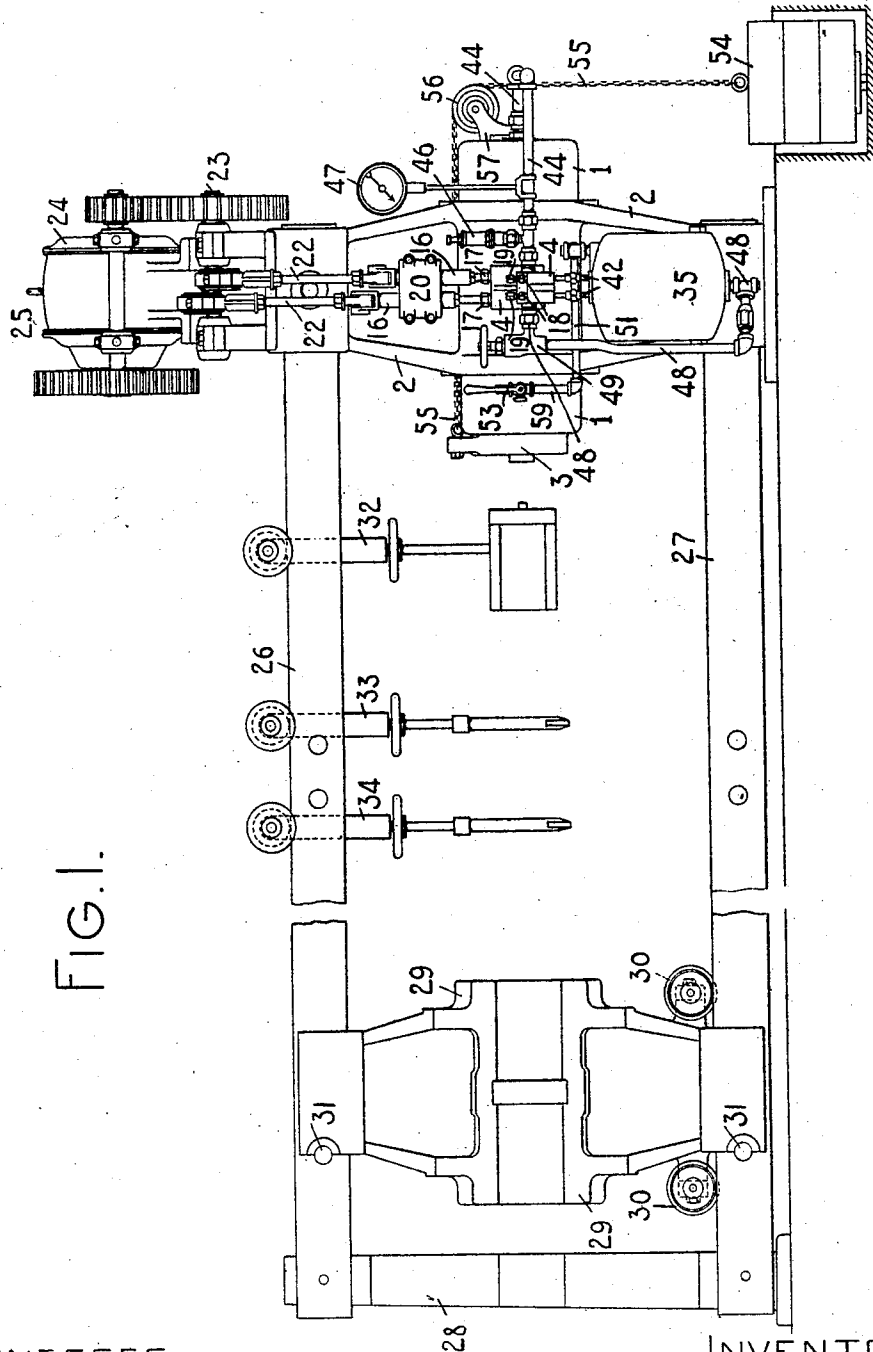


FIG. 1.

WITNESSES.

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Leonard Diehl

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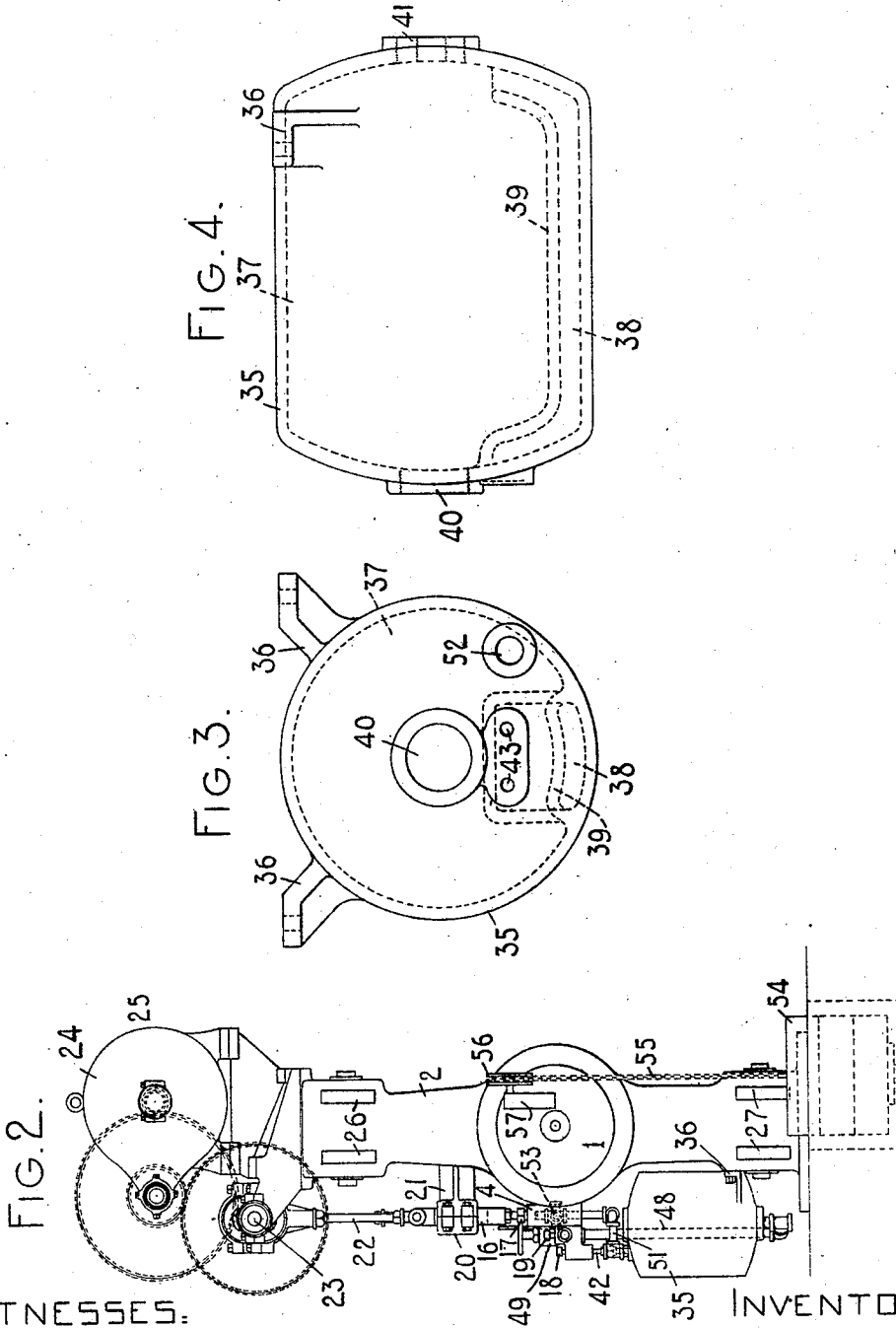
Francis H. Stillman
By Daniel A. Carpenter,
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WITNESSES:

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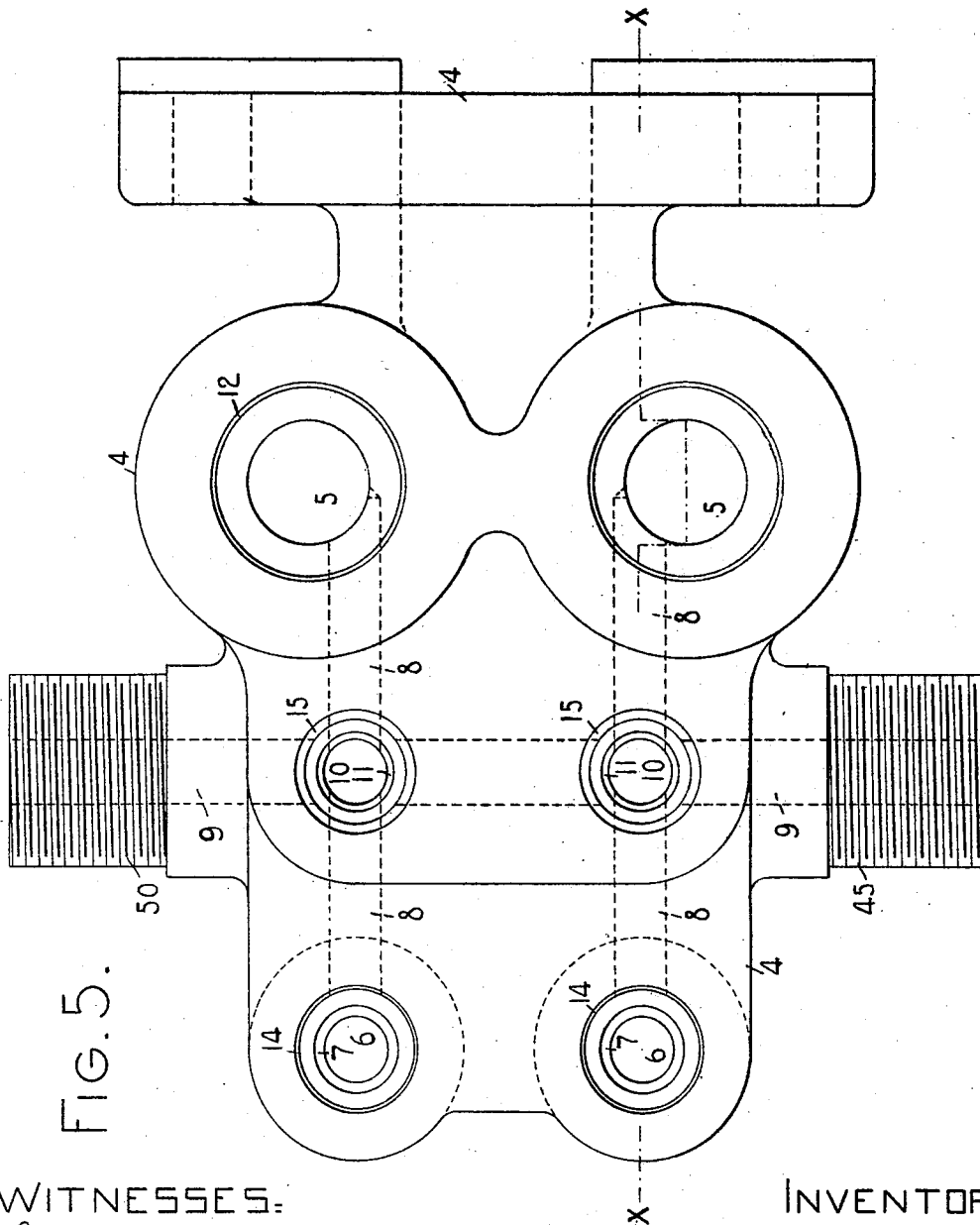
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

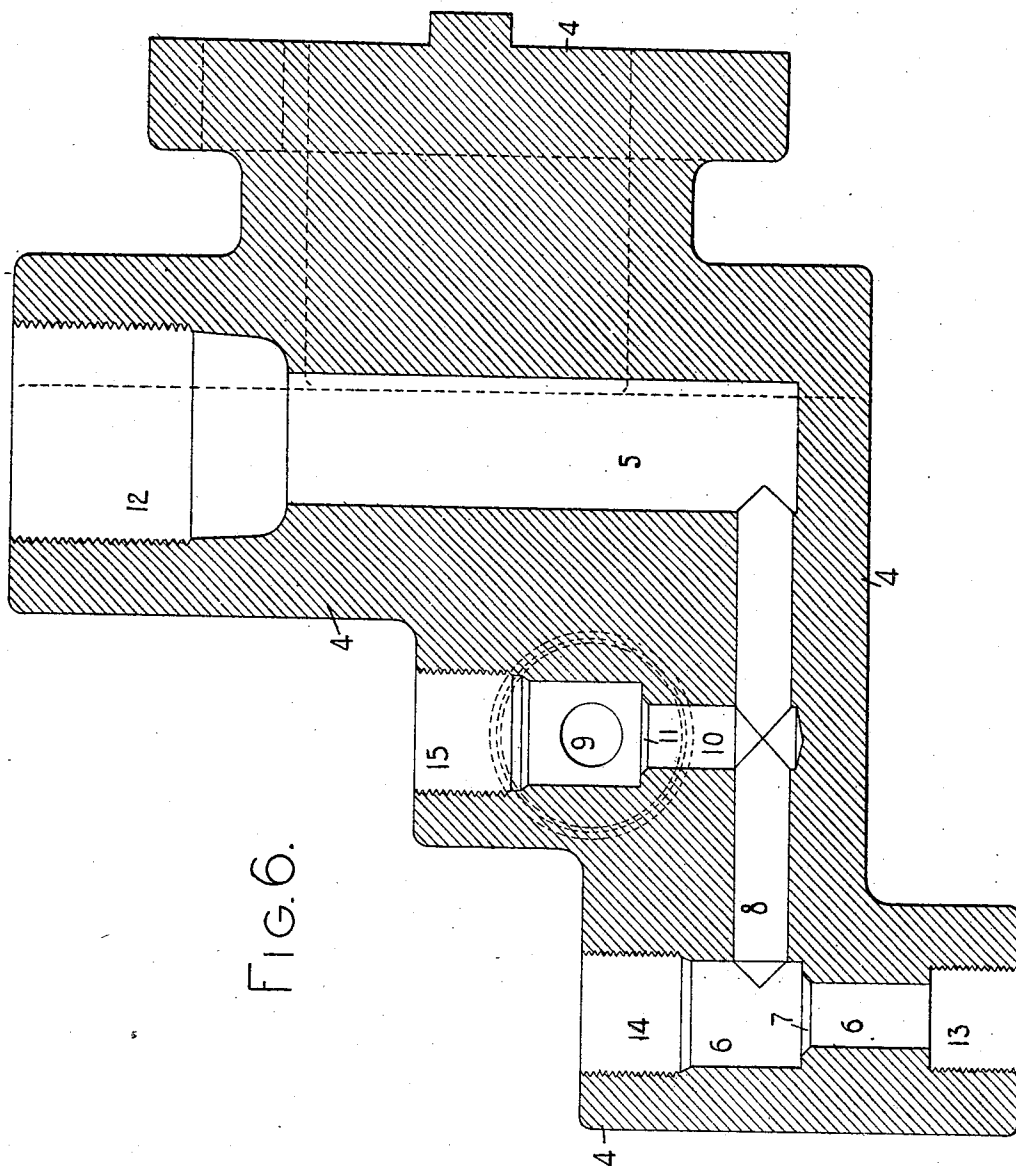


FIG. 6.

WITNESSES:

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UNITED STATES PATENT OFFICE.

FRANCIS H. STILLMAN, OF NEW YORK, N. Y.

HYDRAULIC PRESS.

968,999.

Specification of Letters Patent.

Patented Aug. 30, 1910.

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To all whom it may concern:

Be it known that I, FRANCIS H. STILLMAN, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings and city and State of New York, have invented a certain new and useful Improvement in Hydraulic Presses, of which the following is a full, clear, and exact description, reference being made to the accompanying drawings, forming part of this specification.

This invention relates especially to improvements in hydraulic forcing presses, which are used mainly in making or breaking forced fits in assembling or separating parts of heavy machinery, and which comprise a horizontal ram-cylinder and ram, a pump, horizontal tension-rods, an abutment-beam, a cistern, and means for retracting the ram.

The object of the invention is to expedite the operation and thus increase the efficacy of such presses.

The invention consists of the combination in a hydraulic press of the devices which are hereinafter described and specified in the claims.

In the accompanying drawings, which illustrate a motor-driven wheel-press, and on which like reference-numerals designate like parts of different views, Figure 1 is a broken side elevation of a press embodying the invention; Fig. 2, an end elevation thereof; Fig. 3, an enlarged top view of a peculiar cistern shown in Figs. 1 and 2; Fig. 4, a side view of the cistern; Fig. 5, an enlarged plan of the body of the pump; and Fig. 6, a vertical section of the body of the pump, on the planes *x, x*, of Fig. 5.

This invention enables the ram of a hydraulic wheel-press or other large forcing press to be advanced from its normal position into contact with the article on which it is to act, by means of pneumatic pressure, which moves the ram faster than hydraulic pressure does and so renders a forcing press containing the invention capable of performing more work regularly than an equally powerful hydraulic forcing press of a common type can perform.

The ram-cylinder 1 of the press shown is supported by a standard 2, and is preferably part of a steel casting forming both the cylinder and standard. The cylinder, standard, and the ram 3 which is represented in its normal position in Fig. 1, are such as

have been embodied in common hydraulic wheel-presses.

The body 4 of the pump is fast on the main casting or standard at one side of the ram-cylinder, and contains chambers 5 in which the pistons fit and work, fluid-passages 6 and valve-seats 7, passages 8 connecting the passages 6 with the chambers 5, a passage 9, and passages 10 and valve-seats 11, each of the last-named passages connecting one of the passages 8 with the passage 9. The body 4 also contains recesses 12, 13, 14 and 15 having screw-threaded walls. The piston-rods 16 pass through screw-plugs 17 which fit in the recesses 12, and the recesses 14 and 15 are closed by screw-plugs 18 and 19. Valves like those commonly used in hydraulic forcing presses fit on and normally make contact with the valve-seats 7 and 11, from which the valves are movable upward. The piston-rods 16 also pass through a guide-block 20, which is fast on a fixed arm 21 that projects from the standard 2, and are connected by pitman-rods 22 with cranks on a shaft 23 which is supported by a casting 24 and geared to an electric motor 25, the casting 24 being fast on the standard 2 and the motor being mounted on this casting.

The tension-rods 26 and 27 fit in holes in the standard 2 and are fast therein, and they extend from the standard to an upright 28 to which they are fastened, there being four of these rods or bars arranged in two pairs. The abutment-beam 29 fits loosely against the outer faces of the tension-rods of each pair, and is mounted on wheels 30, the lower tension-rods 27 forming a track which supports the abutment-beam and on which it may be moved easily toward and from the ram. It is kept in a proper position when the press is operated by means of pins 31 inserted in holes in the upper and lower tension-rods. On the upper tension-rods are mounted suspending slings 32, 33, and 34, to be used to help support the work, each of these slings being hung on wheels that fit on and are movable along the tension-rods 26. Tension-rods, abutment-beams and slings like those shown have been embodied in common hydraulic forcing presses.

The cistern 35 is a steel shell whose shape is represented in Figs. 3 and 4, and on which are formed lugs 36. It is fastened underneath the pump to the standard 2, by tap-

bolts which extend through the lugs into the standard. This cistern contains an air-tight fluid-chamber 37 which is connected at the bottom with the lower end of an upwardly extending passage, this being preferably a small compartment 38, separated except at its lower end from the chamber 37 by a partition 39. The form of this chamber and that of the passage 38 are indicated by dotted lines in Figs. 3 and 4. In the top of the shell is a screw-plug 40, and in the bottom is a screw-plug 41 having an opening extending through it, the plug being internally threaded around this opening. The upper end of the passage 38 is connected with the passages 6 in the body of the pump by pipes 42 whose lower ends fit in holes 43 in the top of the shell 35 and whose upper ends fit in the recesses 13 in the body of the pump. The passage 9 is connected with the interior of the ram-cylinder by a pipe 44, which is attached to a threaded hub 45 (Fig. 5) on the body 4 of the pump, and to the head of the ram-cylinder, and on this pipe are a safety valve 46 and a pressure-gage 47. The passage 9 is connected also with the bottom of the fluid-chamber 37 in the cistern by piping 48 and a valve-casing 49 containing a screw-threaded release-valve, this piping being attached to a threaded hub 50 (Fig. 5) on the body of the pump and to the screw-plug in the bottom of the cistern. The fluid-chamber 37 is connected at the top with an air-inlet, which may be a pipe 51 fitting in the opening 52 (Fig. 3) in the top of the cistern, and which contains a hand-actuated air-cock 53, this inlet being connected also with a reservoir (not shown) containing compressed air.

The means shown for retracting the ram consists of a weight 54 suspended by a chain 55 which passes over a pulley 56 and is attached to the ram, the pulley being mounted in a bracket 57 which is fast on the head of the ram-cylinder.

When the ram of the press above described is in its normal position and the press is ready for use, the chamber 37 of the cistern is nearly full of liquid, such for example as commonly is used in hydraulic presses, and the reservoir is charged with compressed air. After the articles on which the press is to act, and which may be a pair of car-wheels and an axle, have been arranged properly in the press in which they will be supported by the abutment-beam and the slings, the air-cock is turned to admit compressed air into the fluid-chamber 37 of the cistern. The compressed air forces liquid from the chamber 37 up through the passage 38 the pipes 42 and the passages 6, and thence into the passages 8, and thence up through the passages 10 into the passage 9, and thence to and through the pipe 44 into the ram-cylinder, and acting on the ram

through the liquid moves the ram quickly from its normal position and into contact with that part of the sling 32 on which the ram is to act. When the liquid is thus forced by the compressed air through passages 6 and 10 the valves in those passages are raised by the action of the liquid. The ram having been advanced to the work as described, then the pump, which is both a suction-pump and a force-pump, is operated and liquid is drawn from the cistern and forced into the ram-cylinder just as this is done when a common hydraulic pump is operated. After the press has done its work, the air-cock, which is a "three-way" cock containing an exhaust-passage, is turned to allow the air in the cistern to escape or be expelled therefrom, and the release-valve in the valve-case 49 is opened, whereupon the ram is retracted to its normal position by the weight 54, the liquid flowing and being forced by the ram from the cylinder, whence all but a small part of it returns through the pipe 44, passage 9 and the piping and valve-case 48 and 49 to the cistern.

It will be understood that the invention may be embodied in apparatus differing in form from that in which it is illustrated herein.

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

1. In a hydraulic press comprising a horizontal ram-cylinder and ram, a pump, horizontal tension-rods, an abutment beam, and means for retracting the ram, the body of the pump containing parallel piston-chambers, and fluid-passages and valves, the combination with said parts of a cistern containing an air-tight fluid-chamber connected at the bottom with the lower end of an upwardly extending passage, the upper end of said passage being connected with the interior of the body of the pump, and a connection extending from the body of the pump to the lower end of the cistern, said connection containing a fluid-return passage and a hand-actuated valve, and said fluid-chamber being connected at the top with an air-inlet consisting of a passage containing a hand-actuated air-cock, substantially as and for the purpose described.

2. In a hydraulic press comprising a horizontal ram-cylinder and ram, a pump, horizontal tension-rods, an abutment-beam, and means for retracting the ram, the body of the pump containing parallel piston-chambers, and fluid-passages and valves, the combination with said parts of a cistern placed underneath the pump and fastened to the lower part of the standard which supports the cylinder, said cistern containing an air-tight fluid-chamber connected at the bottom with the lower end of an upwardly extending passage, a connection extending

from the cistern to the body of the pump and containing a continuation of said passage communicating with the interior of the body of the pump, a connection extending
 5 from the body of the pump to the lower end of the cistern, this connection containing a fluid-return passage and a hand-actuated valve, and said fluid-chamber being connected at the top with an air-inlet consisting of a pas-
 10 sage containing a hand-actuated air-cock, substantially as and for the purpose described.

3. In a hydraulic press comprising a horizontal ram-cylinder and ram, a pump, horizontal tension-rods, an abutment-beam and means for retracting the ram, the body of the pump containing parallel piston-chambers, and fluid-passages and valves, the combination with said parts of a cistern placed
 15 underneath the pump and fastened to the lower part of the standard which supports the cylinder, said cistern containing an air-tight fluid-chamber and a fluid-passage connected with said chamber at the bottom and
 20 extending from the bottom to the top of the cistern, pipes attached to the top of the cistern and to the body of the pump, the interior of these pipes being in communication with said passage and with the interior of
 25 the body of the pump, a connection extending from the body of the pump to the lower end of the cistern, said connection containing a fluid-return passage and a hand-actuated valve, and said fluid-chamber being
 30 connected at the top with an air-inlet consisting of a passage containing a hand-actuated air-cock, substantially as and for the purpose described.

4. In a hydraulic press comprising a horizontal ram-cylinder and ram, a pump, horizontal tension-rods, an abutment-beam, and means for retracting the ram, the body of the pump containing parallel piston-chambers, and fluid-passages and valves, the combination with said parts of a cistern containing an air-tight fluid-chamber and a partition attached to the bottom and one side and the top of said cistern and forming with those parts of the cistern a fluid-passage connected with said chamber at the bottom, the
 45 upper end of said passage being connected with the interior of the body of the pump, and a connection extending from the body of the pump to the lower end of the cistern, said connection containing a fluid-return
 50 passage and a hand-actuated valve, and said fluid-chamber being connected at the top with an air-inlet consisting of a passage containing a hand-actuated air-cock, substantially as and for the purpose described.
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5. In a hydraulic press comprising a horizontal ram-cylinder and ram, a pump, horizontal tension-rods, an abutment-beam, and means for retracting the ram, the body of

the pump containing parallel piston-chambers, and fluid-passages and valves, the combination with said parts of a cistern placed
 65 underneath the pump and fastened to the lower part of the standard which supports the cylinder, said cistern containing an air-
 70 tight fluid-chamber and a partition attached to the bottom and one side and the top of said cistern and forming with those parts of the cistern a fluid-passage connected with said chamber at the bottom, pipes attached
 75 to the top of the cistern and to the body of the pump, the interior of each of these pipes being in communication with said passage at its upper end and with the interior of the body of the pump, and a connection
 80 between the interior of the body of the pump and said fluid-chamber, said connection comprising a fluid-return pipe extending above and below the cistern and attached to the lower end of the cistern, and said fluid-chamber
 85 being connected at the top with an air-inlet consisting of a passage containing a hand-actuated air-cock, substantially as and for the purpose described.

6. In a hydraulic press comprising a horizontal ram-cylinder and ram, a pump, horizontal tension-rods, an abutment-beam, and means for retracting the ram, the body of the pump containing parallel piston-chambers, and fluid-passages and valves, the combination with said parts of a cistern containing an air-tight fluid-chamber connected with the interior of the body of the pump by fluid-passages which communicate with said chamber at the bottom thereof, one of said
 90 passages having in it a hand-actuated valve, and said fluid-chamber being connected at the top with an air-inlet adapted to admit compressed air to said chamber, substantially
 95 as and for the purpose described.
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7. In a hydraulic press comprising a horizontal ram-cylinder and ram, a pump, horizontal tension-rods, an abutment-beam, and means for retracting the ram, the body of the pump containing fluid-passages and
 110 valves, some of the fluid-passages being horizontal and others vertical and the valves being in the vertical passages, the combination with said parts of a cistern containing an air-tight fluid-chamber connected with the
 115 interior of the body of the pump by fluid passages which communicate with said fluid-chamber at the bottom thereof, one of these passages having in it a hand-actuated valve, and said fluid-chamber being connected at
 120 the top with an air-inlet adapted to admit compressed air to said chamber, substantially as and for the purpose described.

FRANCIS H. STILLMAN.

In presence of—

E. L. BRADEN,

E. O. JOHNSON.