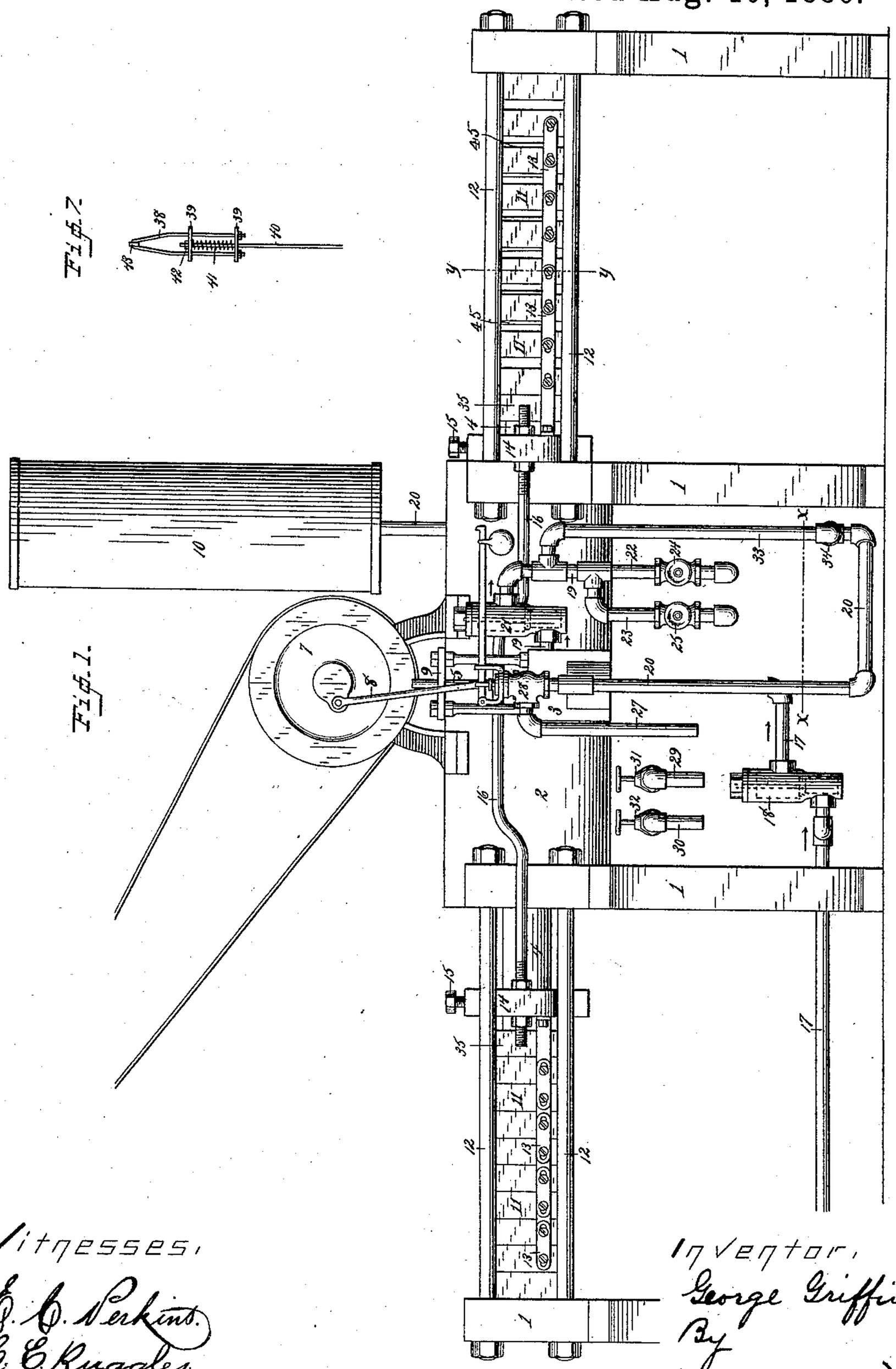
(No Model.)

3 Sheets—Sheet 1.

G. GRIFFIN.

HYDRAULIC PRESS.

No. 347,237. Patented Aug. 10, 1886.



Witnesses,
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E. E. Ruggles.

Inventor,
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A. M. Wooster)
Atty.

(No Model.) 3 Sheets—Sheet 2.

G. GRIFFIN.

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Fig. 3.

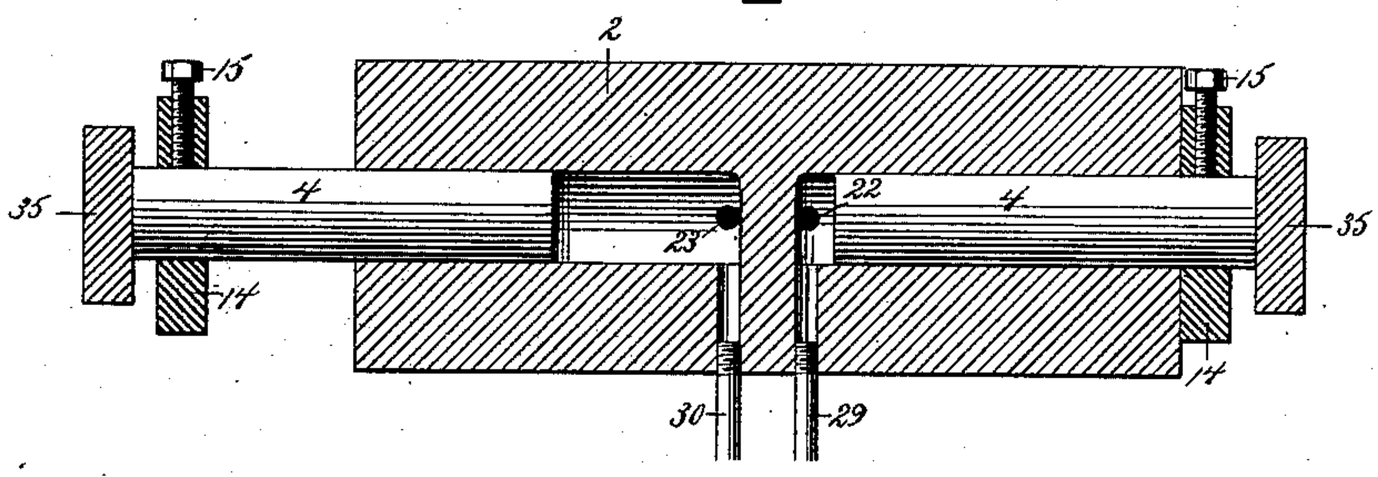


Fig. 5.

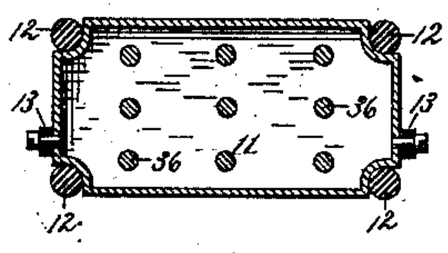


Fig. 4.

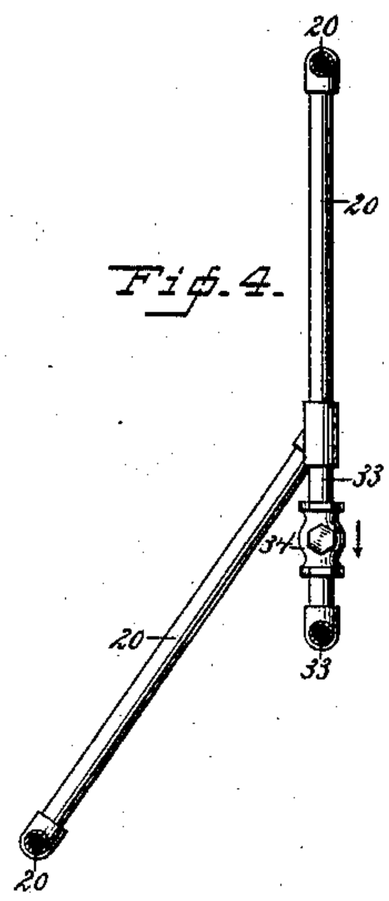


Fig. 2.

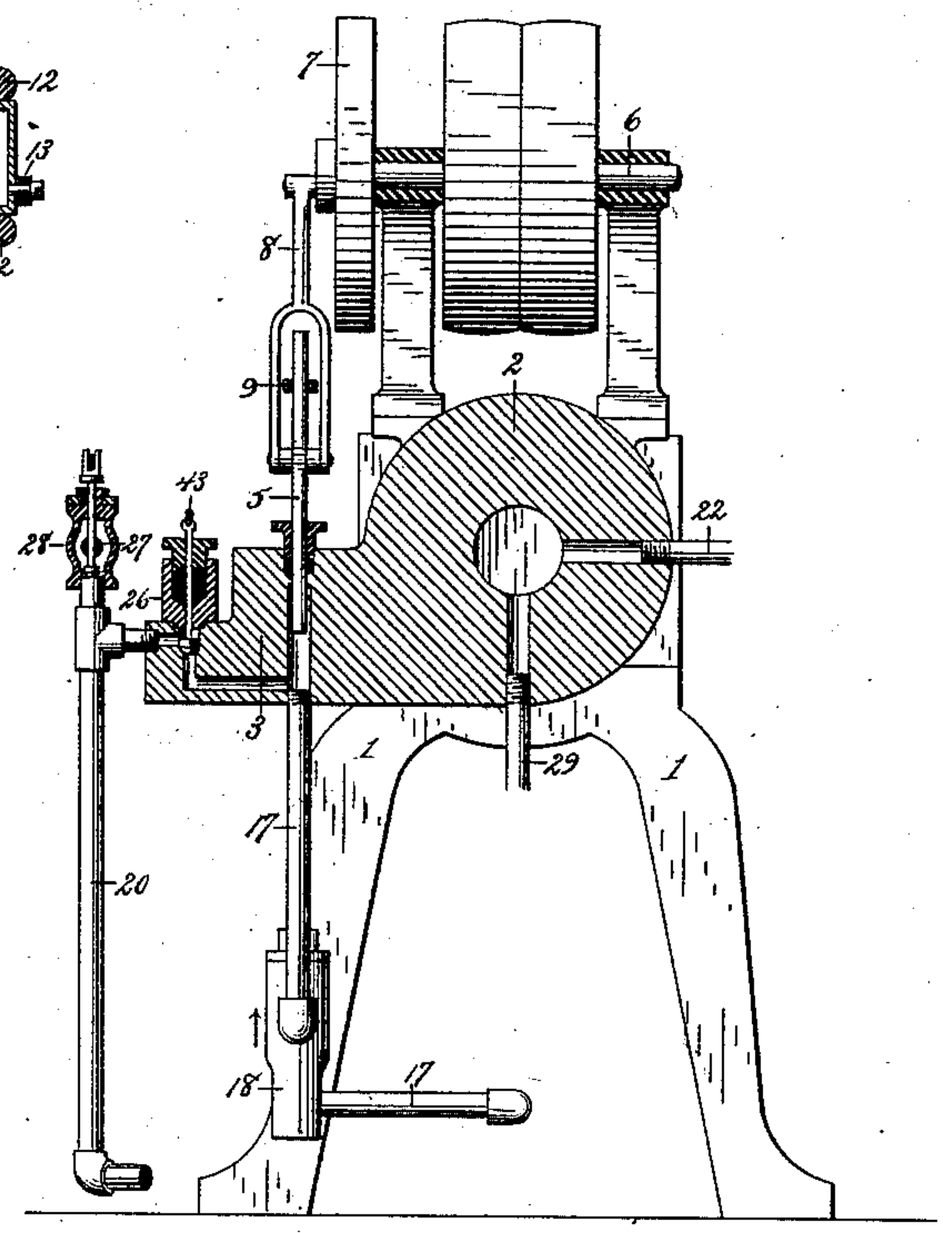
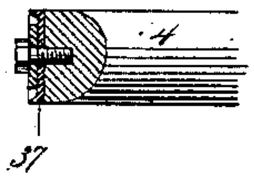


Fig. 6.



Witnesses,
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(No Model.)

3 Sheets—Sheet 3.

G. GRIFFIN.

HYDRAULIC PRESS.

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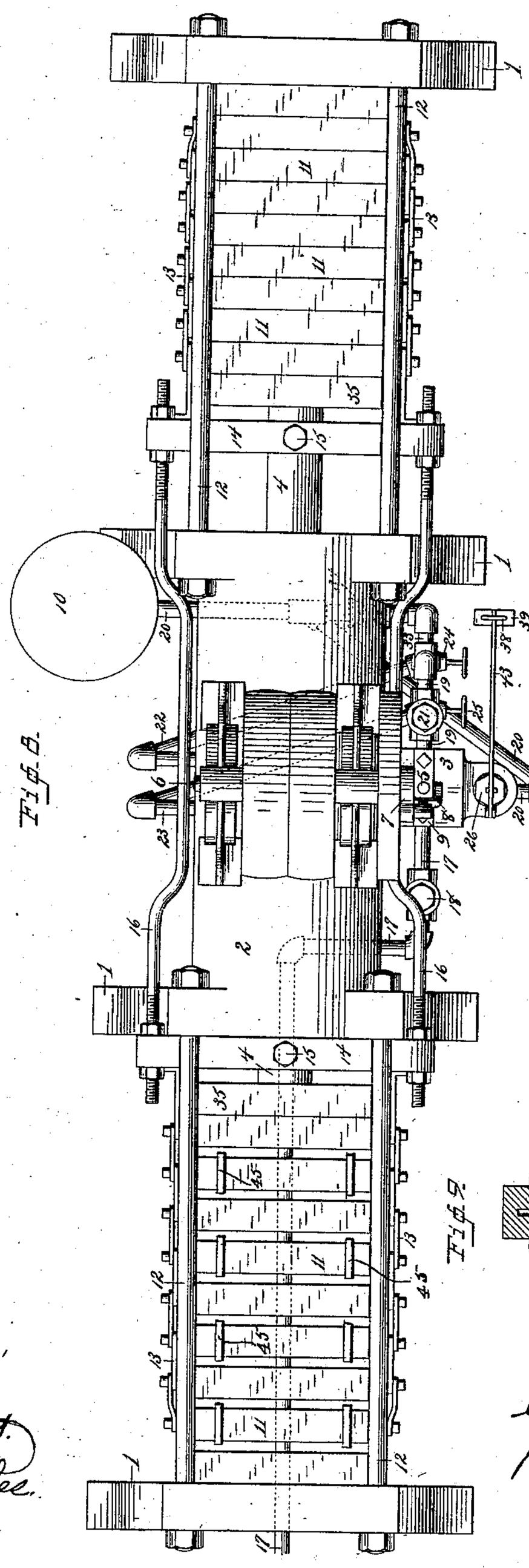

Fig. 1.

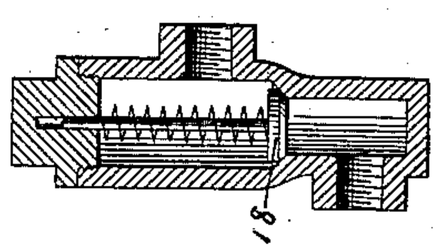

Fig. 2.

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Atty.

UNITED STATES PATENT OFFICE.

GEORGE GRIFFIN, OF BOTSFORD, CONNECTICUT.

HYDRAULIC PRESS.

SPECIFICATION forming part of Letters Patent No. 347,237, dated August 10, 1886.

Application filed February 10, 1886. Serial No. 191,398. (No model.)

To all whom it may concern:

Be it known that I, GEORGE GRIFFIN, a citizen of the United States, residing at Botsford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Hydraulic Presses; and I 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.

My invention has for its object to simplify and improve the construction of hydraulic presses, and more especially to quicken the action thereof, so that any amount of power within the limits of the press may be obtained in much less time than has been possible with any presses heretofore produced.

With these ends in view I have devised the novel construction of which the following description, in connection with the accompanying drawings, is a specification, reference being had to numbers upon the drawings to indicate the several parts of the machine, similar numbers indicating the same parts in the several figures of the drawings.

Figure 1 is a side elevation of the press complete; Fig. 2, a central cross-section; Fig. 3, a longitudinal section of the cylinder; Fig. 4, a detail section on the line *x x* of Fig. 1; Fig. 5, a detail section on the line *y y* of Fig. 1; Fig. 6, a detail view showing the manner in which the piston is packed. Fig. 7 is a detail view showing the manner in which the safety-valve on the accumulator-pipe is adjusted. Fig. 8 is a plan view of my press, and Fig. 9 a detail sectional view of one of the valves.

1 indicates frame-work, which may be of any suitable construction; 2, the cylinders, and 3 the case or body, of the pump, which, like the cylinders, must be made very heavy and strong, and may be cast integral therewith, as shown, or made in a separate piece and bolted thereto. As shown in Fig. 3, the two cylinders are wholly independent of each other, although made in a single casting. The device, in fact, consists of two independent presses, which in use work alternately.

4 indicates the pistons of the presses, and 5 the piston of the pump. The pump is operated from a shaft, 6, journaled in the frame-work above the cylinders, and provided with fast and loose pulleys, and having at one end a crank, 7, which is connected to piston 5 by rod 8, the upper end of the piston being supported in a guide, 9.

10 is a reservoir or accumulator, which may be placed in any suitable position. This is a strong air-tight cylinder, into which water may be forced from the pump, the air in said cylinder being compressed above the water, so that any amount of pressure may be stored up that is within the strength of the cylinder.

11 indicates boxes, a series of which are placed on opposite sides of the press. These boxes are supported by guide-rods 12, and are connected together by slotted links 13. The two outside boxes—that is, the two at the opposite ends of the press—are stationary—that is, not connected by links to the other boxes. The pistons abut against solid followers 35, made the full size of the boxes, the boxes themselves being braced and strengthened by solid cross-pieces 36, which are cored in when the boxes are cast.

In order to prevent loss of power in the cylinders by escape of water around the pistons, I preferably pack the pistons at the ends, using cup-shaped rubber washers 37, Fig. 6, each of which is held in place by a washer and bolt. In use the water acts to expand the flange of the cup against the cylinder, thus making a perfectly tight and durable packing.

14 indicates yokes, which are secured to the pistons by set-screws 15, or in any suitable manner.

16 is a connecting-rod by which the two yokes are secured together, there being a similar rod (not shown) on the opposite side of the press. The series of slotted links 13, by which the boxes are connected, are themselves connected to the yokes, so that the movement of the opposite sides of the press is necessarily in unison, one side opening as the other closes. It will of course be understood that the slots in the links allow to the boxes a limited amount of independent movement, which is necessary; but the special advantage of this portion of my invention is, that the boxes are opened and closed by the action of the press, and when at their opened position are held there without other means. The boxes are heated in any suitable manner, preferably by

steam. For the sake of clearness, however, I have not shown the steam-connections, there being of course no novelty in their use.

17 indicates the pipe by which water is supplied to the pump, a check-valve, 18, of any suitable construction being provided to prevent backflow of the water. Two pipes, 19 and 20, lead from the pump, the former being provided with a check-valve, 21, of suitable construction, and divided into two branches, 22 and 23, which supply, respectively, the right and left cylinders, stop-cocks 24 and 25 being provided to control the flow of water into the cylinders.

Check-valve 18, of the form herein employed, is shown in detail in Fig. 9, and check-valve 21 is or may be of the same construction.

26 is a safety-valve, which has to be lifted before water can pass into the accumulator, as will be more fully explained. This valve may be adjusted in any suitable manner. I preferably, however, provide a yoke, 38, near the end of the valve-lever 43, which has cross-pieces 39. A rod, 40, secured to the floor passes up through the cross-pieces, and a spring, 41, between the cross-pieces is adjusted by a nut, 42, at the end of the rod. It will thus be seen that the amount of pressure that can be exerted upon the cylinders by the pump is determined by the adjustment of safety-valve 26, as clearly shown in Figs. 2, 7, and 8.

27 is an overflow-pipe, and 28 a weighted safety-valve, that has to be lifted before water can escape from the accumulator. It will of course be understood that a spring adjustment similar to that upon safety-valve 26 may be used instead of the weight, if preferred.

29 and 30 (see Figs. 1 and 3) are the discharge-pipes, respectively, from the right and left cylinders, the discharge therefrom being controlled by stop-cocks 31 and 32.

33 is a pipe which connects pipe 20, leading from the pump to the accumulator, with pipe 19, leading from the pump to the cylinders; and 34, a check-valve of suitable construction, which prevents backflow of water toward the accumulator after it has entered pipe 33. It will thus be seen that pipe 33 enables me to utilize pressure stored up in the accumulator to drive the pistons forward in the cylinders, as will be more fully explained.

The operation is as follows: In starting the press for the first time stop-cocks 24, 25, 31, and 32 are closed and water supplied to the pump through pipe 17, the pump being operated from shaft 6, as already described. As the passage of water from the pump through pipes 22 and 23 is cut off by the stop-cocks, it follows that the water must pass from the pump through pipe 20, which leads to the accumulator, the pressure acting to raise safety-valve 26 as soon as stop-cocks 24 and 25 are closed, it being of course understood that check-valve 18 prevents back-pressure in the supply-pipe. The amount of pressure which it is desired to secure in the accumulator is determined by the adjustment of safety-valve 28. The pressure in the accumulator having been raised to the predetermined degree, safety-valve 28 is lifted and the water escapes from overflow-pipe 27. Stop-cocks 24 and 32 are then opened. The opening of 24 relieves the pressure on safety-valve 26, which instantly closes, thus causing the water from the pump to pass directly into the right cylinder. This also relieves the pressure upon safety-valve 28, which instantly closes, and the discharge of water from the overflow-pipe ceases. At the same instant that water is forced into the right cylinder from the pump the enormous pressure stored in the accumulator also acts to force water into said cylinder through pipe 33, which leads from pipe 20 into pipe 19. The action of this pressure stored in the accumulator is to instantly force out the right piston and close up the boxes until the resistance between the boxes overcomes the pressure from the accumulator. As soon as the pressure from the accumulator is expended—that is, when the pressure in the cylinder equals that in the accumulator—the direct action of the pump upon the piston commences. This continues until the desired pressure has been brought to bear upon the substance or articles between the boxes. I preferably use gages of any suitable form to limit the movements of the boxes toward each other. Such gages, in the form herein shown, consist simply of brackets or loops 45, of iron or other suitable material, attached to alternate boxes, near each end thereof, as shown in Figs. 1 and 8. These gages are, however, not essential, and may be used or not, as may be found most convenient. It will of course be understood from the description already given that as the right cylinder is forced out the left cylinder is drawn in, the yokes upon said cylinders being connected by rods 16. As soon as the boxes upon the right side have reached their closed position the left side of the press is ready for use—that is to say, the boxes will be at their farthest open position, ready to receive the articles or substance to be pressed, which simply have to be placed between the boxes. While the left side of the press is being filled the articles that have been compressed by the right boxes remain, of course, between said boxes. During this time steam may or may not be admitted to the boxes, as found necessary. While the parts are in this position the pump continues running; but as no more water can be forced into the right cylinder, and as the stop-cock leading to the left cylinder is closed, it follows that safety-valve 26 will be raised and the water from the pump forced into the accumulator, thus storing up pressure again in the accumulator. As soon as the maximum pressure has been reached in the accumulator safety-valve 28 will be lifted again, and the water from the pump will escape by the overflow-pipe 27. As soon as the left side of the press is ready for operation—that is, as soon as the articles to be pressed have been placed between the boxes—stop-cocks 24 and 32 are closed and 25 and 31

are opened. In other words, pressure from both pump and accumulator is cut off from the right cylinder and is diverted to the left cylinder, the escape of water from the left cylinder being cut off and the escape-pipe from the right cylinder opened. As soon as the stop-cocks are thus operated the stored-up pressure in the accumulator acts through pipe 33 to instantly close up the boxes upon the left of the press until the pressure in the accumulator and left cylinder becomes equal. While this has been taking place safety-valve 26 will have dropped to its closed position, cutting off the supply to the accumulator, so that the entire power of the pump will be brought to bear upon the left piston to close up the boxes at the left of the press. As the boxes at the left are closed up the right boxes are opened and the articles that have been pressed between them drop out. As soon as the limit of compression has been reached at the left of the press the right side is filled, as before, the pump meanwhile forcing water into the accumulator. Then stop-cocks 25 and 31 are closed and 24 and 32 are opened, and so on, these operations being continuous.

I do not desire to limit myself to the exact details of construction shown and described, as it is obvious that the construction may be greatly changed without departing in the slightest from the spirit of my invention.

I claim—

1. In a hydraulic press, the combination, with a pressure-cylinder and a piston or ram working therein, of a pressure-accumulating cylinder or accumulator, a pump, a pipe, 20, leading from said pump to said accumulator, pipes leading from said pump to said pressure-cylinder, a pipe, 33, connecting the said pipes from the pump to the accumulator and pressure-cylinder, a safety-valve, 28, communicating with the said pipe 20, and thus with said accumulator, and an overflow-pipe, 27, for said safety-valve, substantially as set forth.

2. In a hydraulic press, the combination, with a pressure-cylinder and a piston or ram working therein, of a pressure-accumulating cylinder or accumulator, a pump, connecting-pipes 19, 20, and 33, and safety-valves 26 and 28, whereby pressure may be stored and communicated to the pressure-cylinder when desired, the pump be kept in continuous operation, and no water be permitted to escape until the press is closed and the pressure in the accumulator is raised to a predetermined degree, substantially as set forth.

3. In a hydraulic press, the combination, with a pump, two cylinders, two connected pistons, and two sets of connected sliding boxes, of an accumulator, a pipe, 19, having check-valve 21, pipe 20, having safety-valve 26, pipe 33, having check-valve 34, pipes 22 23, and stop-cocks for controlling the flow of water to and from the cylinders, substantially as set forth.

4. The pump, pipe 19, having check-valve 21, pipe 20, having safety-valve 26, and pipe 33, having check-valve 34, in combination with the accumulator and cylinders, pipes 22 and 23, leading to the cylinders, and stop-cocks for controlling the flow of water to and from the cylinders.

5. The cylinders, pistons, boxes, pump, and accumulator, in combination with pipe 19, having valve 21, pipe 20, having safety-valve 26, and pipe 33, having valve 34.

6. In a hydraulic press, a continuous-acting pump, two cylinders and pistons, and an air-tight accumulator, in combination with pipes 19, 20, 22, 23, and 33, suitable valves and stop-cocks, and a series of sliding boxes connected together and to the pistons, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE GRIFFIN.

Witnesses:

A. M. WOOSTER,

C. E. RUGGLES.