

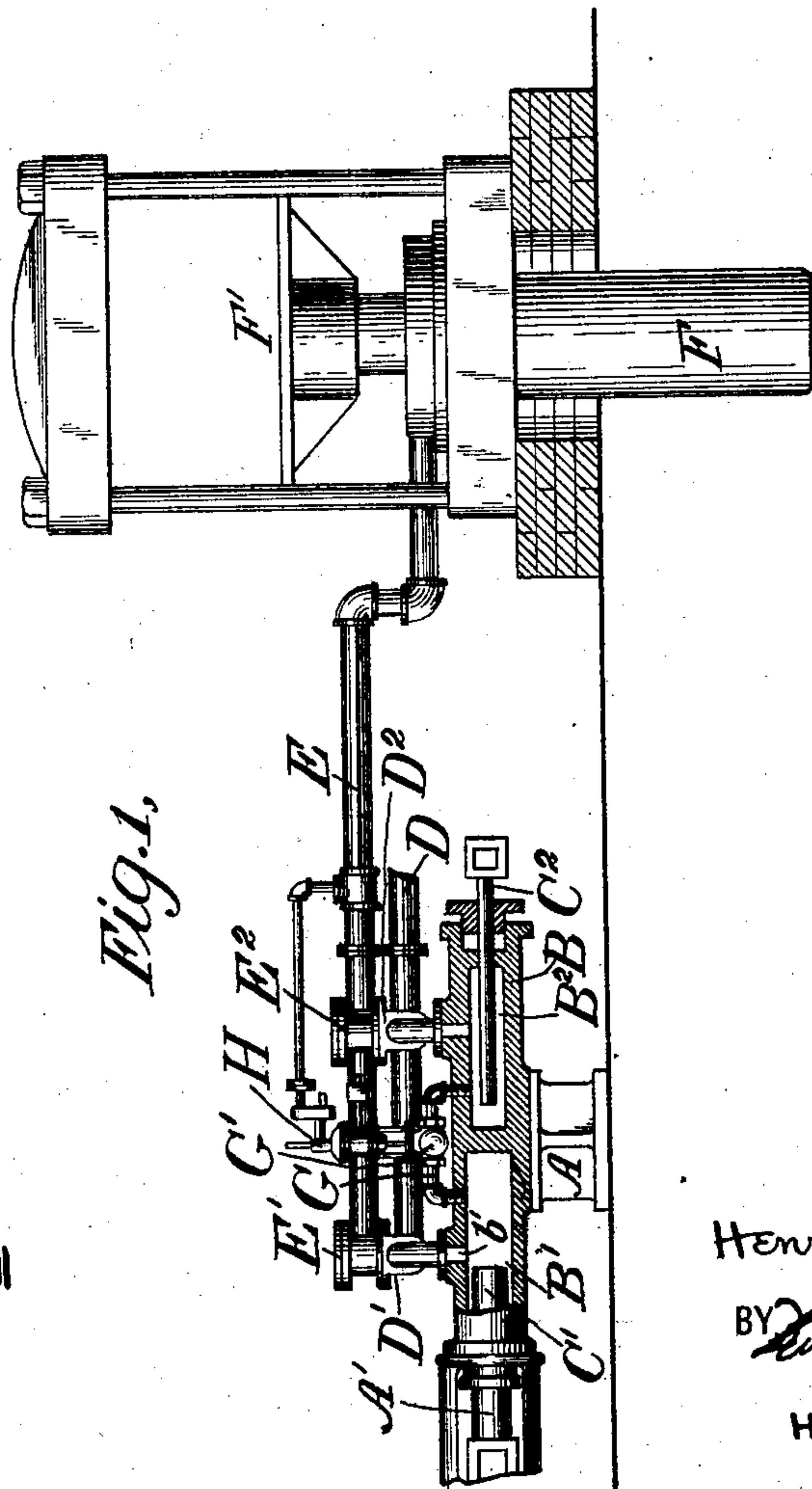
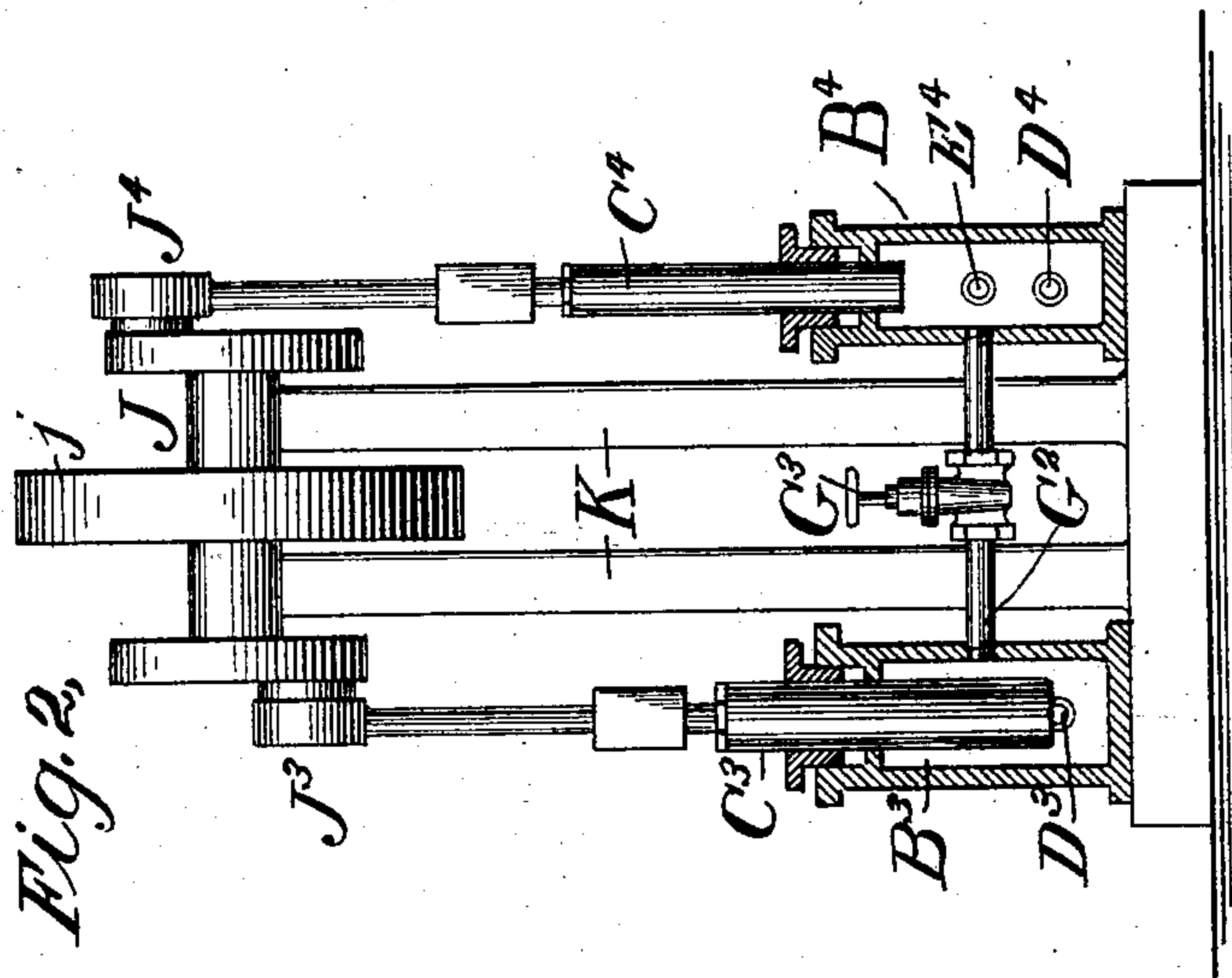
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H. M. CHASE.
PUMP.

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NO MODEL.



WITNESSES:

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PUMP.

SPECIFICATION forming part of Letters Patent No. 720,112, dated February 10, 1903.

Application filed April 26, 1902. Serial No. 104,743. (No model.)

To all whom it may concern:

Be it known that I, HENRY M. CHASE, a citizen of the United States, and a resident of Holyoke, Massachusetts, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

My invention relates to pumps, and more particularly to pumps designed to be used in connection with hydraulic presses.

The object of my invention is to produce a pumping apparatus that will permit of a simple and effective mode of changing the pumping-pressure from a lower to a higher point at will or upon the occurrence of a predetermined event.

I will first describe a pump embodying my invention and then point out the novel features in the claims.

Figure 1 represents a side elevation, partly in section, of one form of pumping apparatus embodying my invention, shown in connection with a hydraulic press, such as is used for compressing bales. Fig. 2 represents another form of pumping apparatus embodying my invention.

Similar letters of reference designate corresponding parts in both figures of the drawings.

Referring to Fig. 1, A represents suitable framework for a pumping apparatus. B represents a casing in which for convenience two pump cylinders or chambers may be formed. These pump cylinders or chambers are designated by the letters B' and B². Contained in the pump cylinders or chambers B' B² are plungers or pistons C' C², constructed and fitted to be reciprocated within the cylinders or chambers in the well-known manner of hydraulic displacement-pumps. The pistons or plungers which I employ in my invention are designed to effect displacements of different amounts, and this may be accomplished in several ways, although I prefer to do so by making the diameters or cross-sectional areas of such pistons or plungers of different sizes. I also prefer to reciprocate the said pistons or plungers in unison, one of them moving inwardly while the other moves outwardly, and vice versa. This may be accomplished in any well-known manner. The means I have shown comprises a reciprocating rod A', which may for convenience be a part of the engine or motor which is to furnish power for the

pump. Connected with so as to reciprocate with the rod A' are the pistons or plungers C' C², the latter being connected through the means of a bar (not shown) extending longitudinally of the pump. The plunger or piston C' may be connected directly with said rod A'. D represents a supply-pipe, and E represents a discharge-pipe. D' represents any well-known form of back-pressure valve adapted to permit of liquid being drawn into the cylinder or chamber B' from the suction-pipe D through an opening b' in said cylinder B'. A similar back-pressure valve D² is provided for the cylinder or chamber B². E' represents another back-pressure valve intermediate the chamber B' and the discharge-pipe E, adapted to permit of the discharge of liquid from said chamber into the discharge-pipe, but to prevent the return thereof. A similar valve E² will be provided intermediate the chamber B² and the discharge-pipe.

The operation of the parts above described will now be understood. When the rod A' moves to the right, carrying with it pistons or plungers C' and C², the piston or plunger C', entering the chamber B', will force the liquid through the opening b' and through the valve E' into the discharge-pipe E. In the meanwhile the plunger C² is moving outwardly, thereby drawing the liquid from the suction or inlet pipe D, the valve D², and into the chamber or cylinder B². On the reversal of movement of rod A' it is obvious that the piston or plunger C² will force liquid from the chamber B² into the discharge-pipe while the plunger C' is drawing water from the suction-pipe D. The discharge-pipe E may be connected with any suitable reservoir—as, for example, the cylinder or chamber F of a hydraulic press, whose platen F' is thereby elevated to effect the pressing or compressing operations upon a bale or other article in a well-known manner. This is the normal or usual operation of my pump. When the article to be pressed has nearly arrived at its minimum bulk, however, it is obvious that the pressure required to be exerted upon the platen F' will have materially increased. It is therefore desirable that an increased pumping power may be applied to the fluid that is pumped into the cylinder of the hydraulic press. At the same time it is also obvious

that a lower pressure is desirable during the first part of the pumping operation for the reason that a lower pump-pressure, which is synonymous with a greater rate of displacement, for a given horse-power will effect a more rapid operation or elevation of the platen of the hydraulic press during the first stages of the compressing, thereby saving considerable time.

My invention comprises the following means for permitting the pumping apparatus above described to be adjusted so that it may supply at will or under other control a lower or a higher pressure.

G represents a by-pass connecting the chambers B' and B², its purpose being to effect when desirable a communication between such chambers. G' represents a valve contained in said by-pass or passage G. This valve G' is usually closed, at which times the apparatus will operate as already described. Suppose now the valve G' is open to form communication between the chambers B' and B².

It is obvious that in such case if the plungers C' and C² be of equal displacing capacity or diameter the reciprocation thereof in unison will effect no pumping operation whatever, since the liquid displaced by one of the plungers or pistons will simply pass by way of the passage G into the chamber or cylinder containing the other plunger or piston, whose action in withdrawing from its cylinder exactly compensates for the displacement in the first cylinder.

As already stated, however, I have formed the plungers or pistons C' C² of different displacing capacity, C' being shown as being larger than C². In such case it will be seen that the liquid displaced by plunger C' when it moves toward the right will be more than the cylinder B² is capable of receiving, and therefore a difference, or what may be termed a "differential displacement," will necessarily pass through the back-pressure valve E' or E² into the discharge-pipe E.

On a reverse operation a volume of liquid equal to this differential displacement will necessarily be drawn into the cylinder or chamber B² from the suction or supply pipe D. This so-called "differential displacement" I prefer to have

smaller than either the plunger C' or C². When my pumping apparatus is operating with the by-pass G open, there will be pumped into the discharge-pipe E and into the reservoir or cylinder F of the hydraulic press at every alternate stroke of the pump a quantity of liquid that is smaller than is normally pumped thereunto at each stroke. In consequence for a given power a much higher effective pressure can be produced in the hydraulic press—as, for example, when the resistance to the upward movement of the platen F' becomes so great that the usual pumping-pressure is incapable of producing any further operation thereof. The opening of the

by-pass G may be effected by hand or by automatic means—as, for example, a balance-

valve of any well-known form that is connected with the discharge-pipe E and operates upon a predetermined pressure to open the valve G'.

In Fig. 2 is shown an upright form of pump embodying my invention. In this form of pump instead of arranging the two pump-cylinders B³ B⁴ in tandem they are shown as arranged alongside of each other and containing the two plungers C³ C⁴, which, as before, are of different diameters or different displacing capacities. The plungers are operated from a shaft J through the medium of cranks J³ and J⁴. The shaft J is mounted upon standards K of suitable design, and it is rotated by means of a pulley j in any convenient manner. As before, inlet and outlet valves D³ and E³ are provided for the cylinder B³ and similar valves D⁴ E⁴ for the cylinder B⁴. G² represents a by-pass for effecting a communication between the cylinders B³ B⁴, and G³ represents a valve in said by-pass, corresponding to valve G' of Fig. 1, but shown as adapted for operation by hand only.

The ratio of piston-diameters is in the drawing exaggerated. It may conveniently be as five to six, in which case when the strokes are equal in length the displacements will be as twenty-five to thirty-six and the differential displacement eleven.

What I claim as my invention is—

1. In a pump the combination with two pump cylinders or chambers having two plungers or pistons therefor of different displacing capacities, of mechanism for operating such plungers or pistons to pump liquid from said chambers into a common passage or reservoir, and means for effecting a continuously-open communication between such chambers whereby a differential displacement only may be produced, substantially for the purpose described.

2. In a pump the combination with two pump cylinders or chambers having plungers or pistons therefor of different displacing capacities, and suitable pump inlet and outlet valves, of mechanism for reciprocating said plungers or pistons in unison to pump liquid into a common outlet passage or reservoir, a valve-controlled passage connecting said chambers or cylinders, and means operated when the pressure in said outlet passage or reservoir reaches a predetermined point to open the passage connecting said chambers or cylinders, whereby a differential displacement is effected, and an increased pumping pressure.

3. In a pump the combination with two pump cylinders or chambers having plungers or pistons therefor of different diameters, and suitable pump inlet and outlet valves, of mechanism for reciprocating said plungers or pistons in unison to pump liquid into a common outlet passage or reservoir, a by-pass connecting said chambers or cylinders, a valve in said by-pass, and a balance-valve under

control of the pressure in said outlet passage or reservoir for opening or closing the valve in said by-pass.

4. In a pump the combination with two pump cylinders or chambers having plungers or pistons therefor of different displacing capacities, of mechanism for reciprocating said plungers or pistons in unison to pump liquid into a hydraulic press, said hydraulic press, a valve-controlled by-pass connecting said chambers or cylinders and means operated when the pressure in said hydraulic press reaches a predetermined point for opening the valve in said by-pass, whereby a differential displacement is effected to produce an increased pumping pressure.

5. In combination with a hydraulic press, a two-cylinder pump, the pistons or plungers of which are of different displacing capacities, means for operating said pistons or plungers in unison, means for effecting communication between the cylinders of said pump whereby a differential displacement may be effected, and means controlled from said hydraulic press for effecting the opening and closing of said communication, substantially as described.

6. A pump having two pump cylinders or chambers and plungers and pistons therefor of different displacing capacities, and mechanism for operating said plungers or pistons to independently pump liquid from said cylinders or chambers into a common passage or

reservoir, a passage between the said cylinders or chambers, which passage is normally closed, and means for opening said passage to afford a communication between the cylinders or chambers whereby a differential displacement only may be produced to effect a greater pumping pressure in the said common passage or reservoir.

7. In a pump, the combination with two pump cylinders or chambers having two plungers or pistons therefor of different displacing capacities, of mechanism for operating the said plungers or pistons, whereby each plunger or piston may, independently of the other, be caused to pump liquid from the corresponding chamber into a common passage or reservoir, and means for effecting a continuously-open communication between the said cylinders or chambers, whereby an amount of liquid equivalent to the difference only of the displacing capacities of said plungers or pistons, may be forced into the said common passage or reservoir at a single operation, substantially for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY M. CHASE.

Witnesses:

CHAS. H. JENNESS,
S. J. BERARD.