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H. VON MITZLAFF.

HYDRAULIC PRESS.

No. 475,224. Patented May 17, 1892.

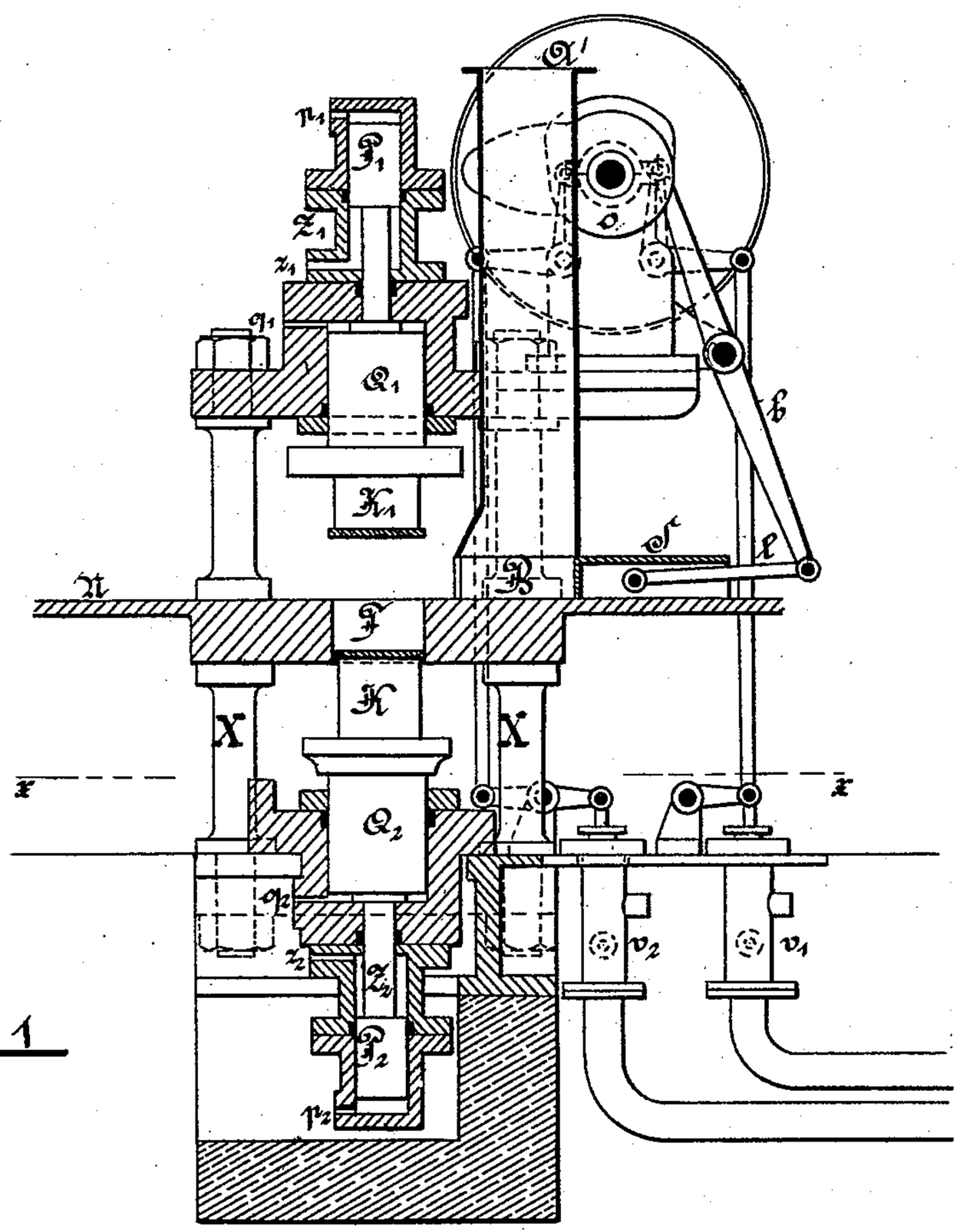

Fig: 1

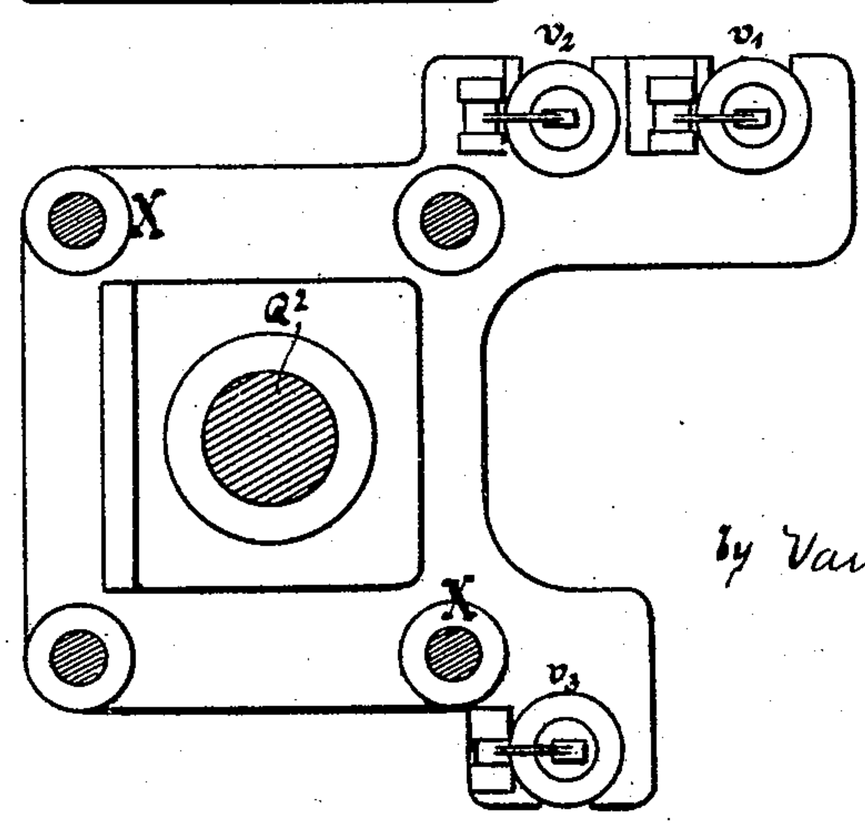

Fig: 2

Witnesses
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Edward Wolff.

Inventor.
Hermann von Mitzlaff.
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his attorneys

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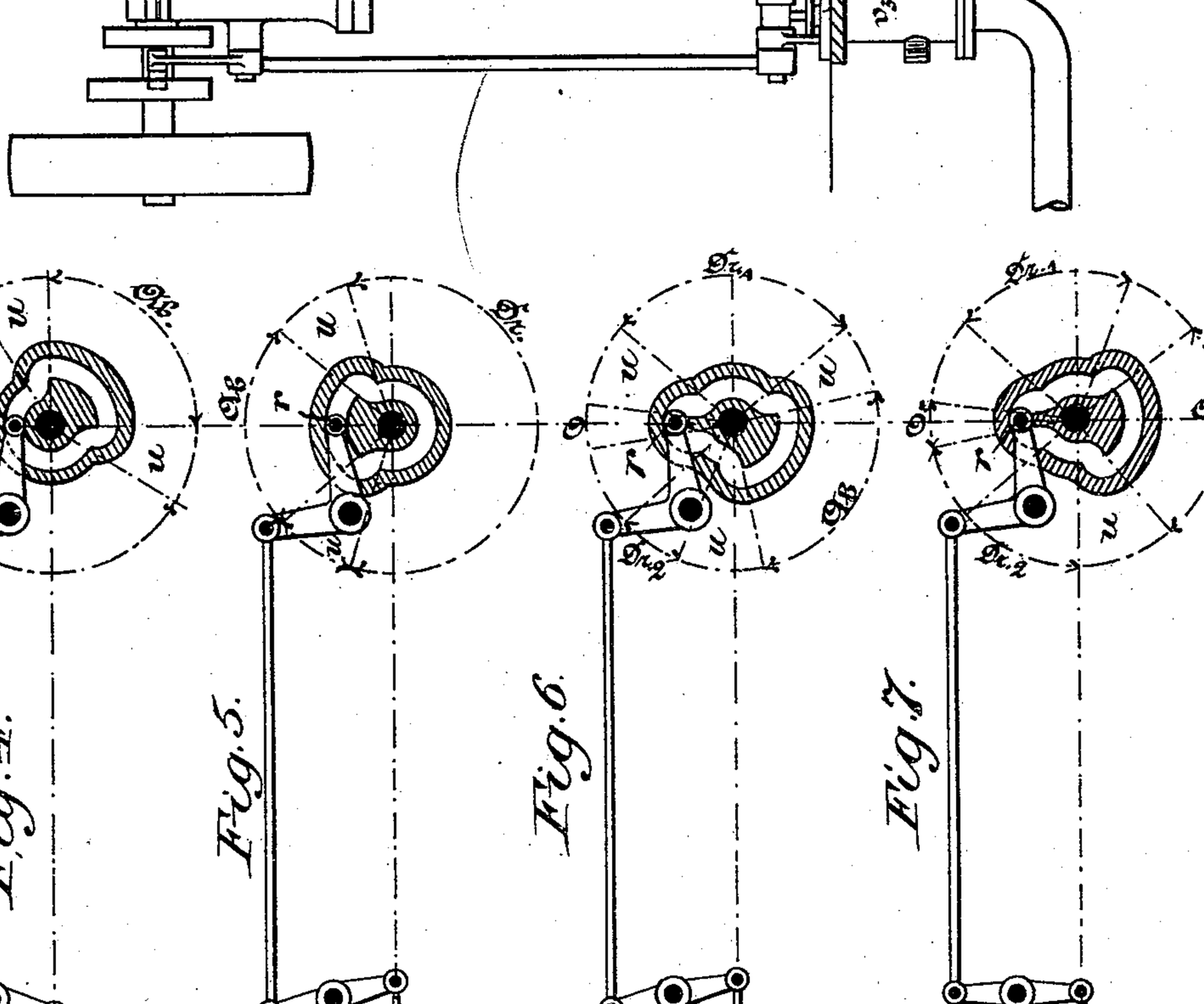
Fig: 3



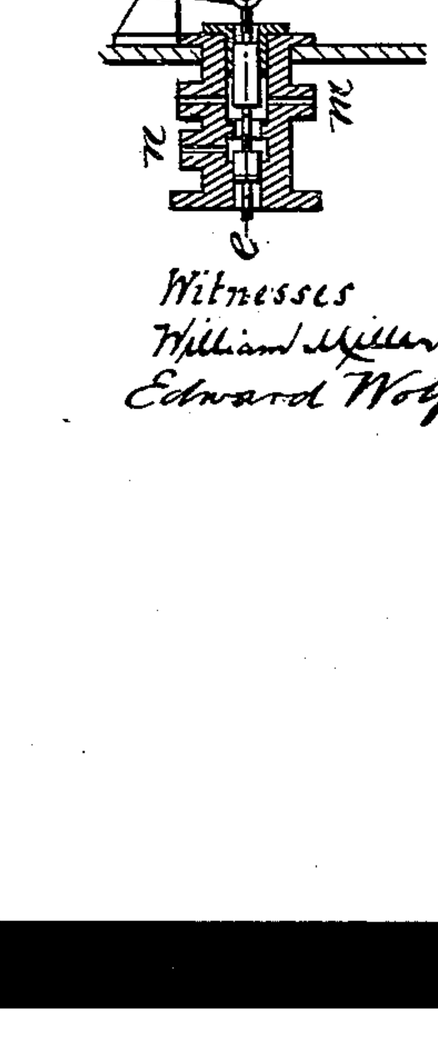


Fig. 4.

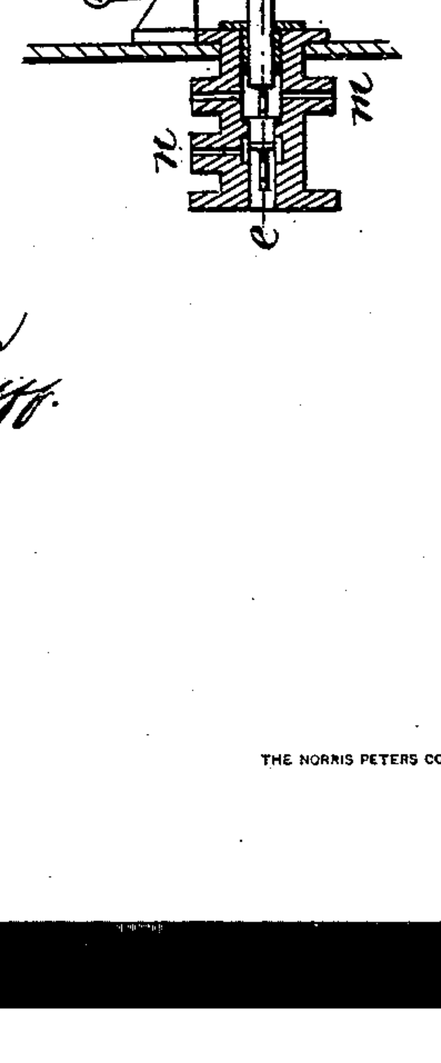


Fig. 5.

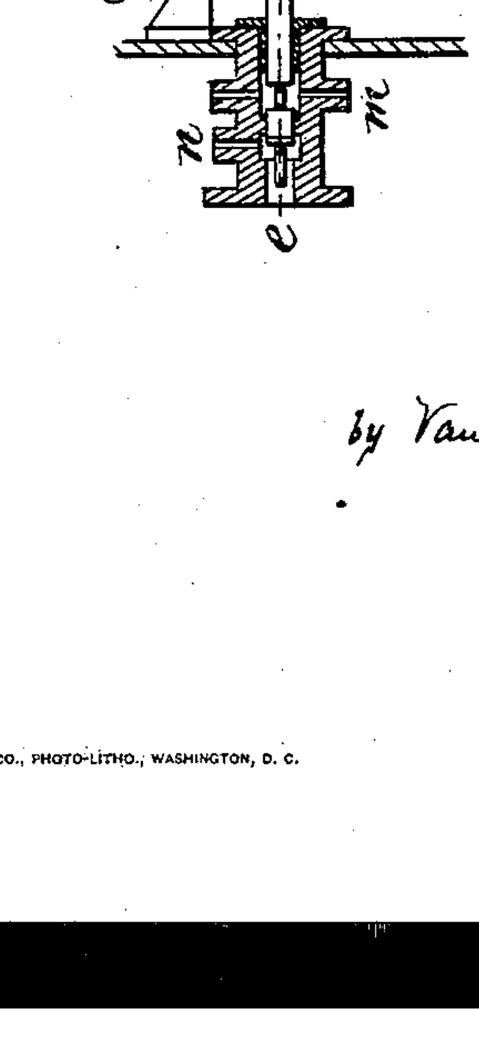


Fig. 6.

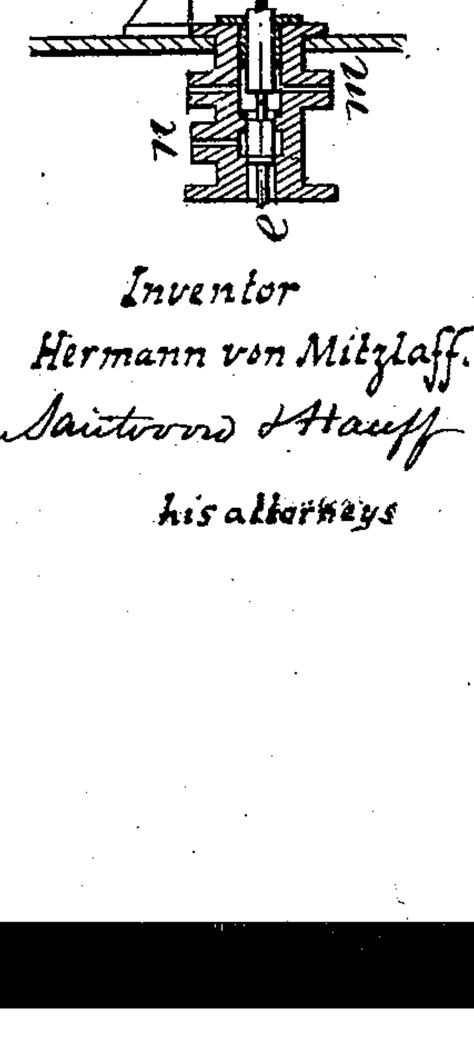


Fig. 7.

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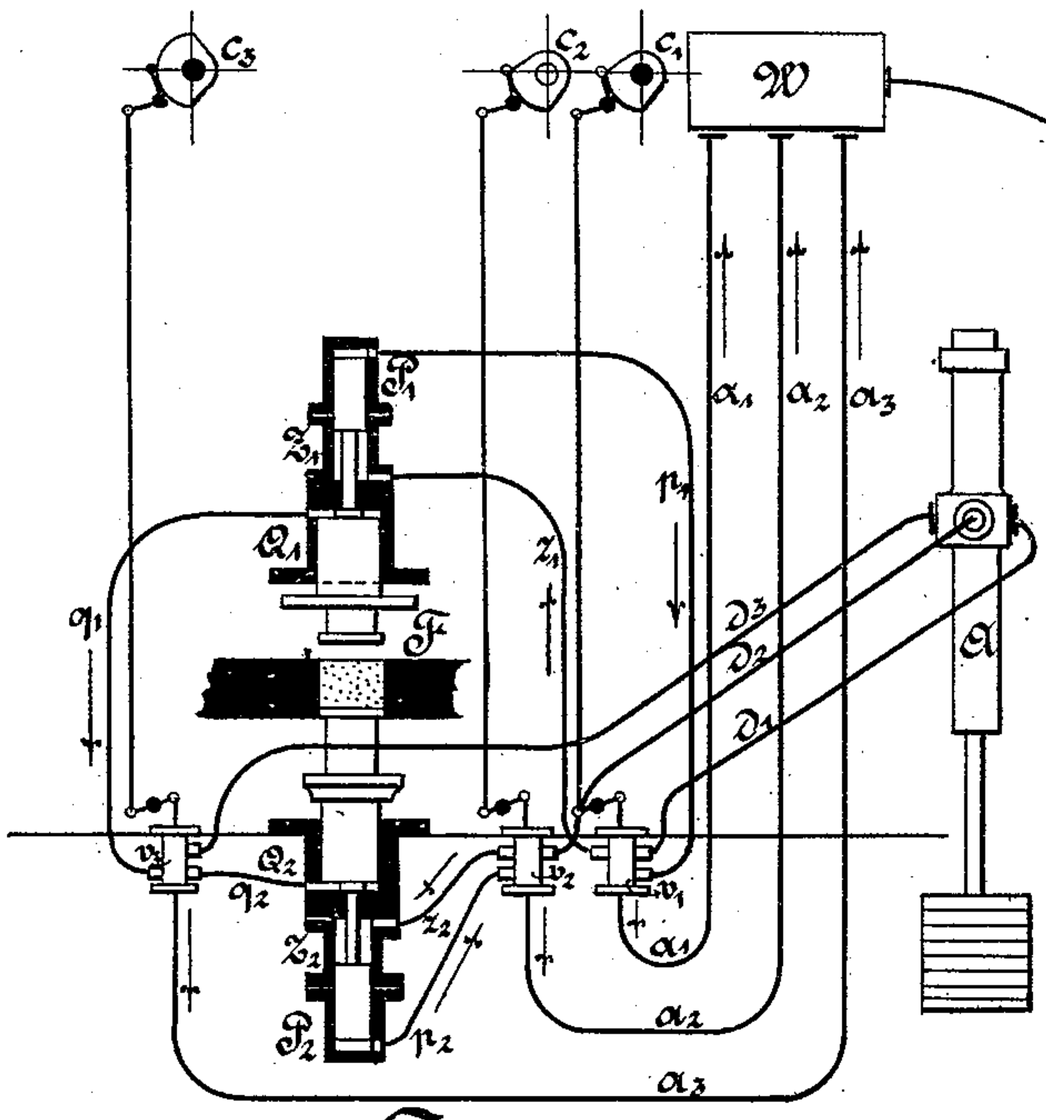

Fig: 8

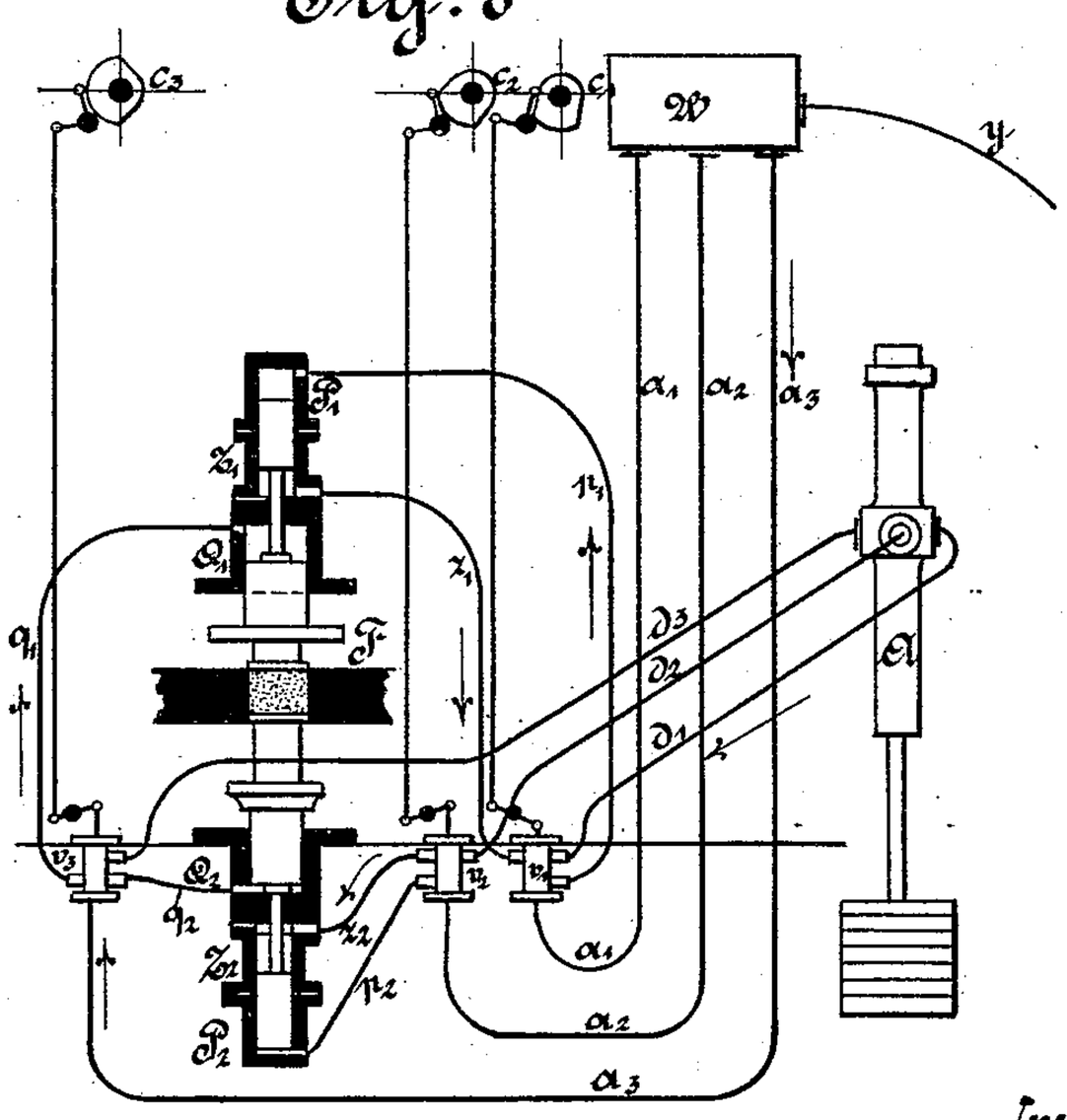

Fig: 9

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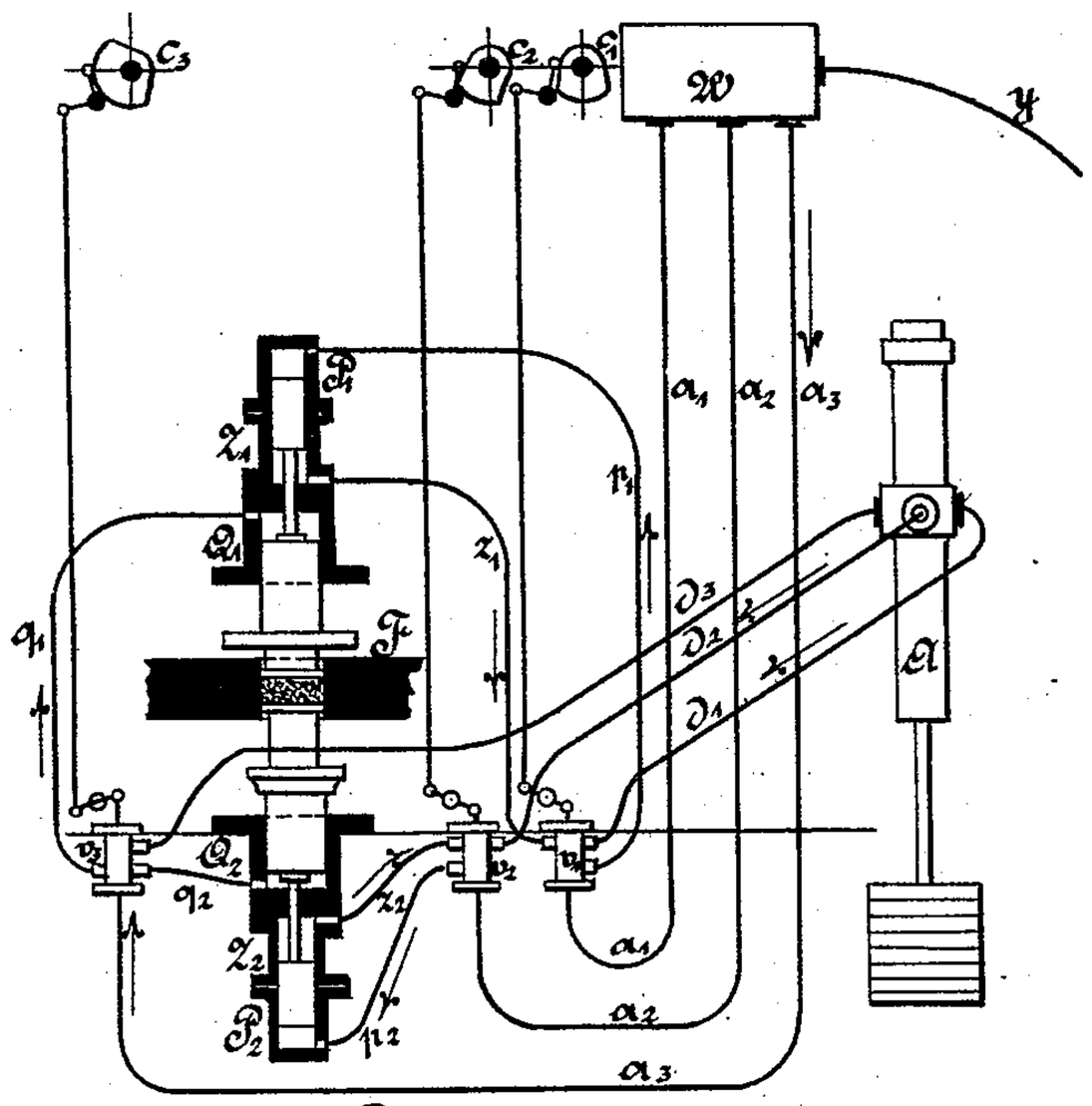

Fig: 10

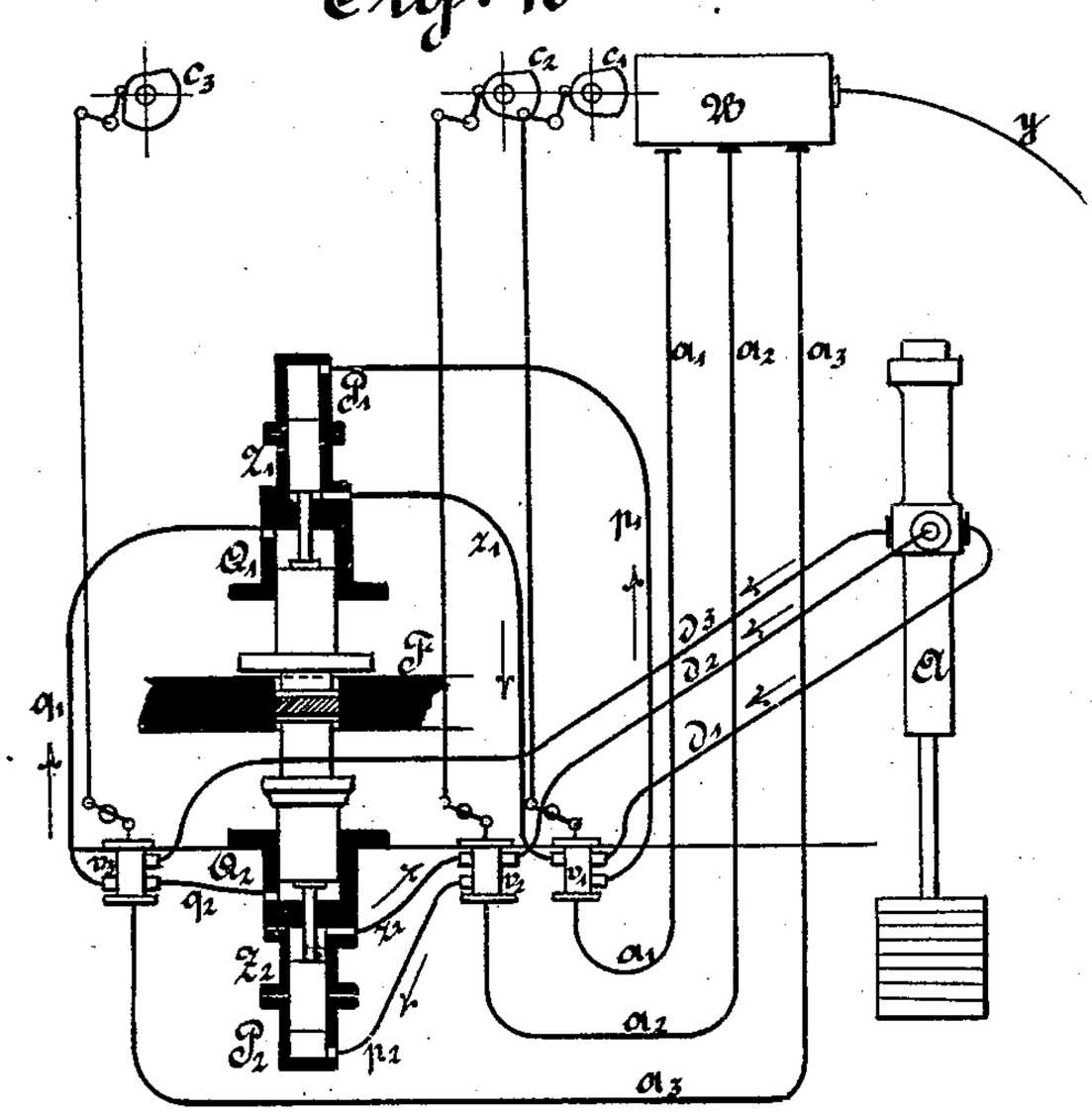

Fig: 11

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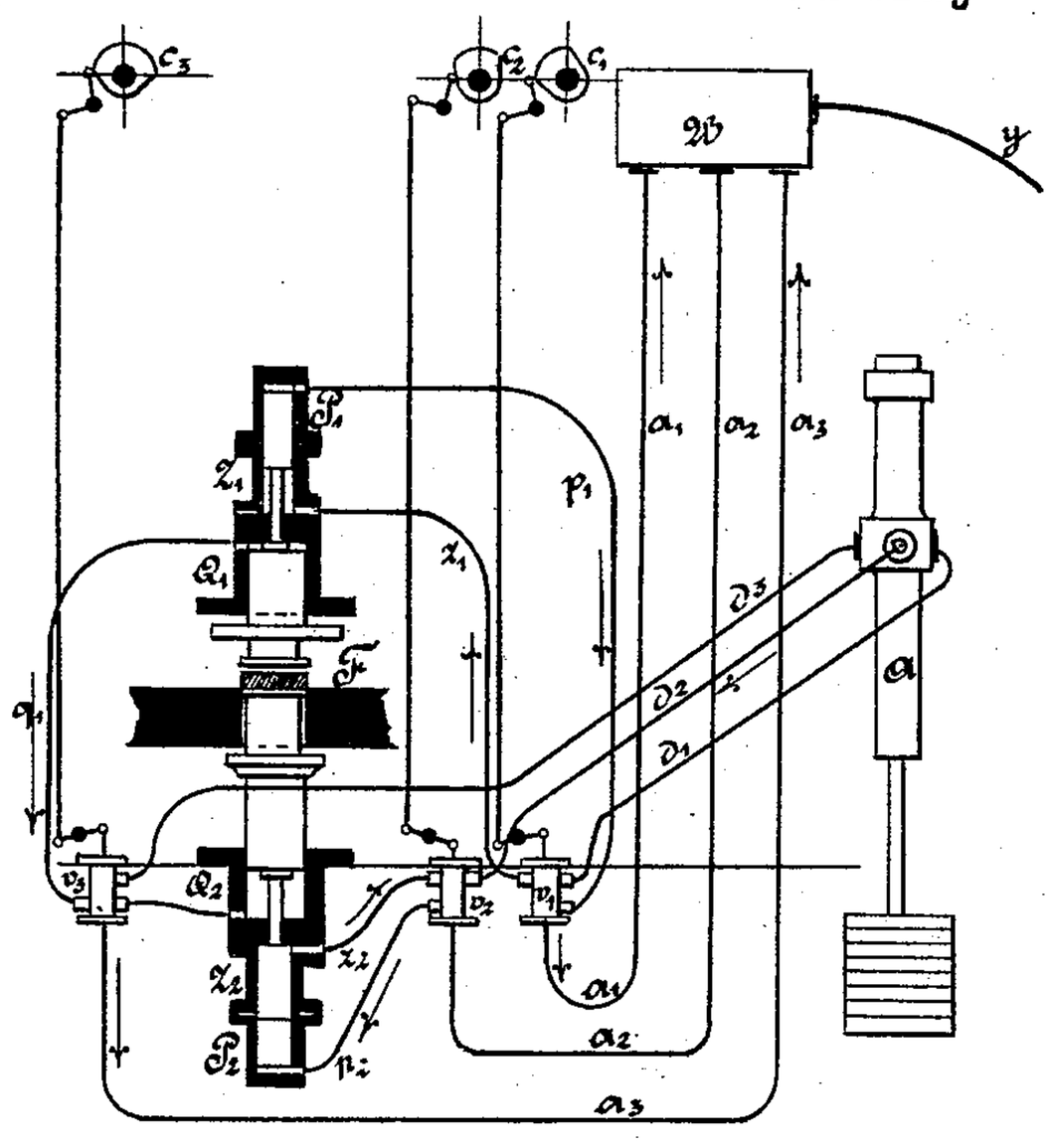

Fig: 12

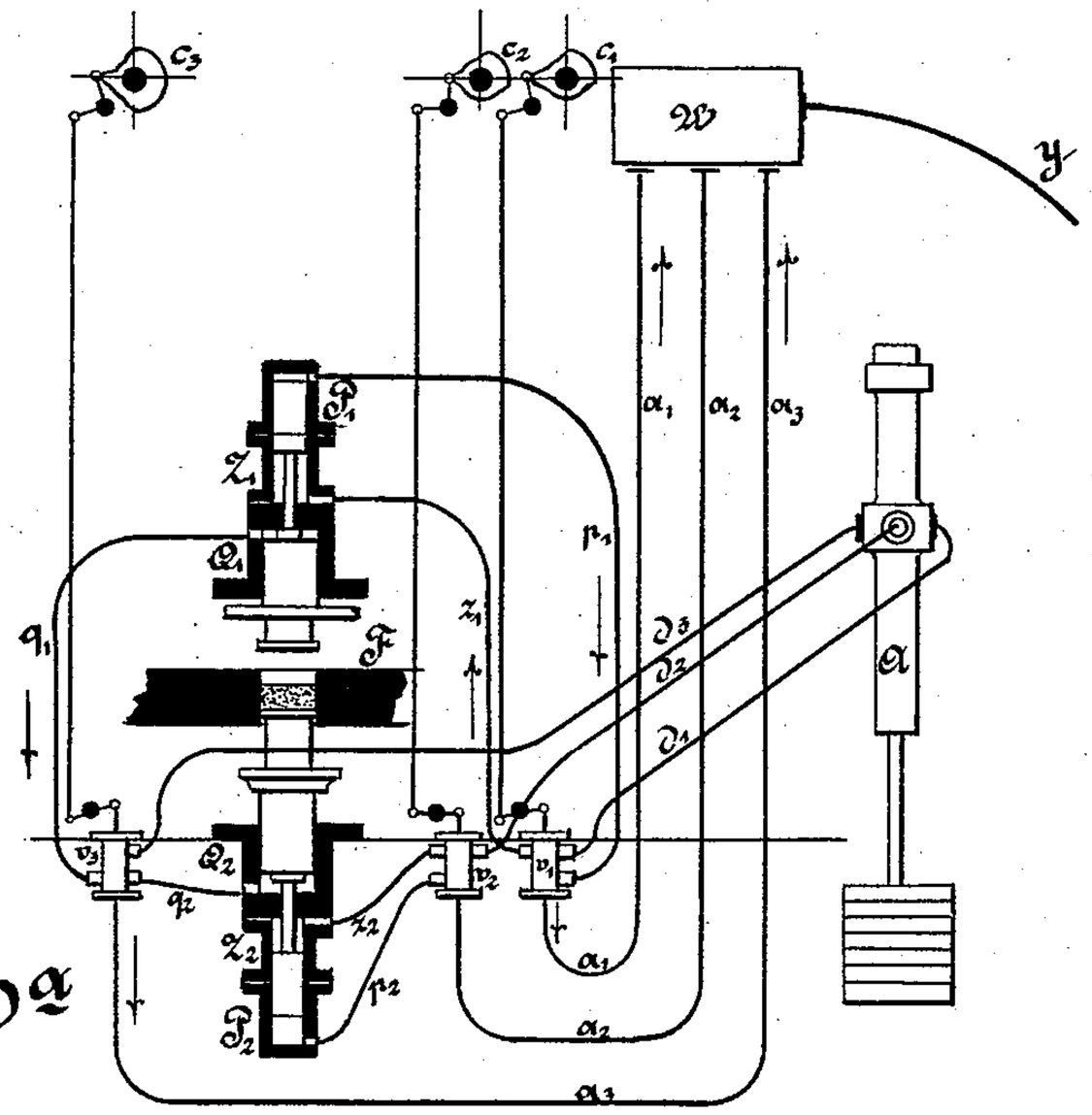

Fig: 10a

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UNITED STATES PATENT OFFICE.

HERMANN VON MITZLAFF, OF BERLIN, GERMANY.

HYDRAULIC PRESS.

SPECIFICATION forming part of Letters Patent No. 475,224, dated May 17, 1892.

Application filed September 12, 1891. Serial No. 405,537. (No model.)

To all whom it may concern:

Be it known that I, HERMANN VON MITZLAFF, a subject of the King of Prussia, residing at Berlin, in the Kingdom of Prussia and German Empire, have invented new and useful Improvements in Hydraulic Presses, of which the following is a specification.

This press is adapted for use in the formation of dry material into blocks or stones, such as tiles, carbon, briquettes, and the like, and by means of this press the same die or plunger serves not only to press the stones, but also to eject the same and to force out the compressed air.

The press is illustrated in the annexed drawings, in which—

Figure 1 is a sectional elevation of the press. Fig. 2 is a section along $x\,x$, Fig. 1. Fig. 3 is a front elevation of the press, partly in section. Fig. 4 shows a cam for operating a valve. Fig. 5 shows parts in a different position than in Fig. 4. Fig. 6 shows a modification of the cam of Fig. 4. Fig. 7 shows parts in a different position than in Fig. 6. Fig. 8 shows a diagram of the press with the upper plungers raised above the material to be compressed. Fig. 9 is a diagram similar to Fig. 8 with the upper plunger in contact with the material to be compressed. Fig. 10 shows the material partly compressed by the plungers. Fig. 11 shows a further compression of the material. Fig. 12 shows the compressed material being ejected. Fig. 10^a shows the material partly compressed, being relieved from pressure to allow the escape of air from said material.

The device is a double press, the pressure being exerted by two presses lying in the same vertical plane. Each press consists of a smaller plunger P′ or P^2, a larger plunger Q′ or Q^2, a stem or neck Z′ or Z^2, connecting each plunger pair, and suitable cylinders for the plungers. It is desirable to press several blocks or stones at once, as seen, for example, in the drawings, where there are three pairs of stamps or punches K and K′ acting together; but of course this number can be varied. In the table N, lying between the two presses, are arranged forms or dies F, corresponding to the stamps. The table N is shown supported by legs or columns X.

The water-pressure used to actuate the device is obtained from an accumulator or a pump. The regulating of the flow of water to and from the press-cylinders is accomplished by suitable piston-valves $v'\ v^2\ v^3$ of any suitable well-known construction. The valve v' communicates by tubes $p'\ z'$ with the cylinder of plunger P′, as seen in Fig. 8, the valve v^2 by tubes $p^2\ z^2$ with the cylinder of plunger P^2, and v^3 by tubes $q'\ q^2$ with the cylinders of Q′ Q^2. The valve v^3, in addition to communicating with the accumulator A by tube d^3, also communicates by tube a^3 with a reservoir or water-tank W, which in general is placed on a somewhat higher level than the press. The inner ends of the cylinder of plungers P′ P^2 are in constant communication with the accumulator by means of the tubes $z'\ z^2$, valves $v'\ v^2$, and tubes $d'\ d^2$.

The blocks or stones are produced as follows: The material to be formed or pressed is placed in the trunk or feeder A′ and falls or sinks out of the latter into a frame B, forming the forward part of a slide S, actuated by by link l, lever b, and cam o. While the presses are at work the frame B rests under the trunk A′ and is filled or charged with material. When the pressing is completed and the pressed stones ejected, the slide S moves forward and its frame B passes over the forms F. The front edge of the frame B pushes the stones ejected by the stamps K from the forms F onto the table N, and the frame B drops its charge into the forms F as soon as the stamps K descend. These stamps K descend when the ejected stones have been pushed far enough onto the table N to find support on the latter. The frame is of somewhat greater length than the form, so that the charge from the frame will completely fill the form. The top plate of slide S in its forward movement passes under the trunk A′ and closes the latter. When the frame B has left the forms F in its return, the valve v' is shifted, so as to bring the cylinder of plunger P′ into communication with the accumulator. The plunger P′ is thus moved toward the table N until the acting faces of the stamps K′ are flush with the table. The valve v^2 is also shifted, so that the cylinder of plunger P^2 is brought into communication with the accumulator and the plunger P, with the stamps K, rises. The upper and lower stamps now act

in common in compressing the mass in the forms. After such preliminary pressure the valve v^3 is shifted, whereby the cylinders of the plungers Q' Q^2 are brought into communication with the accumulator and the second supplemental pressure on the material is commenced. While the pressure from the accumulator exerted in the cylinders of plungers P' P^2 actuates the plungers in said cylinders for the preliminary pressure, the cylinders of plungers Q' Q^2 are in communication through valve v^3 with the tank W, so that the water from the tank fills said last-named cylinders. When, now, after sufficient preliminary pressure the valve v^3 is shifted to connect the cylinders of Q' Q^2 with the accumulator, it requires but a small quantity of water from the latter to effect the requisite pressure for the final compression. After the material has been exposed to the second pressure the valves v' v^3 are shifted, so as to break the communication between the accumulator and the cylinders of P', Q', and Q^2, so as to allow the water to flow from said last-named cylinders. The pressure from the accumulator is now shifted to the under rim or face of plunger P' and raises the latter, with the stamps K', while the accumulator-pressure on the under face of plunger P^2 raises the latter, with the stamps K, so as to eject the blocks or stones from the forms F. After such ejectment and after the frame B has moved forward far enough to slide the block along the valve v^2 is shifted so as to intercept the communication between the accumulator and lower part of cylinder of P^2 and to leave the water free to flow from the said cylinder. The pressure from the accumulator now acts on the upper part of plunger P^2 and forces down the latter, with the stamps K, and the forms are then again filled with material.

Figs. 4 and 5 illustrate the manner of operating the valves. Fig. 4 shows a valve (either v', v^2, or v^3) in the position it occupies when the respective plunger-cylinder is in communication with the accumulator. The opening m communicates with the accumulator, the opening n with the plunger-cylinder, and the opening e with the discharge. Fig. 5 shows the valve in the position in which the plunger is in communication with the discharge.

The valve-pistons are actuated by cams engaged by friction-rollers r, extending from levers connected or linked to the valves. Each cam consists of two concentric branches, the one with smaller radius effecting the communication between the plunger-cylinder and the accumulator and the one with larger radius the communication between the plunger-cylinder and the discharge. The passage of the roller r from one cam branch to the other shifts the valve. In the drawings the arc D r corresponds to the pressure or compressing period, the arc A b to the releasing or discharging period, and the arc u to the shifting period.

In some kinds of material it is necessary that the air inclosed in the material be given a chance to escape during the pressing operation. This is effected by dividing the preliminary pressure into two operations, separated by an interval of release, or a period during which the material is freed from pressure. During the period of release the air compressed by the first pressing operation can escape. The cams for shifting the valves v' and v^2 are then modified, as seen in Figs. 6 and 7. Fig. 6 relates to the valve v' for the upper plunger-cylinder and Fig. 7 to the valve v^2 for the lower plunger-cylinder.

As seen in the figures, the cam branches for causing pressure have interposed curves or branches which shift the rollers r, so as to slide the valve-pistons. In the case of valve v' this curve is of such length as to move the valve-piston sufficiently to open the discharge from the cylinder of plunger P'. In the case of valve v^2 the curve is of shorter length and the valve-piston is moved thereby to the point at which said piston shuts off the water-pressure from the accumulator to the cylinder of P^2, but does not allow the discharge of water from said cylinder.

In Figs. 6 and 7 the arcs D r' correspond to the first part of the preliminary pressure by the plungers P' P^2. At the end of such first operation the cam-rollers r are shifted to the releasing position, to which position the arcs O and O' correspond.

When the cylinder of plunger P' is cut off from the accumulator and connected with the discharge, the plungers P' Q', with the stamps K', rise under the influence of the remaining accumulator-pressure on the lower face of plunger P' and allow the air inclosed in the material to escape. The position of the material in the forms does not change place at this stage, since the stamps K retain their position, the valve v^2 being only shifted sufficiently to cut off the cylinder of P^2 from the accumulator, but not sufficiently to open the discharge. When the releasing portion of the cams corresponding to arc O has passed the cam-roller r, the second part of the preliminary pressure takes place, corresponding to the arc D r^2, and finally, as already described, the valve v^3 is shifted to produce the final pressure by the action of plungers Q' Q^2.

The diagrams Figs. 8 to 12 show the press in its various stages of work, and also indicate the tube connections joining the plunger-cylinders with the valves and the latter with the accumulator A and the tank W. The water from the several cylinders is supposed to flow back into the tank W, and the water collected in the latter, in so far as it is not utilized in filling the cylinders of plungers Q' Q^2, is led through tube y to the pumps. The tubes d' d^2 d^3 lead the pressure-water from the accumulator to the valves. The tubes p' z' q' and p^2 z^2 q^2 connect the cylinders of the upper and lower presses with the

valves. The tubes a' a^2 a^3 connect the valves with the tank. The cams c' c^2 c^3 actuate the valve-pistons.

In the example shown in Fig. 8 the forms are filled with material and the connections between the accumulator and the several plunger-cylinders cut off, excepting those parts of the cylinders lying opposite the stems Z' Z^2, which remain in constant communication with the accumulator. To begin the work of pressing, the cam c' shifts valve v' so as to send the pressure-water from the accumulator through tube p' and depress plunger P'. When the latter has reached the top of the filled form, Fig. 9, the cam c^2 shifts the valve v^2 so as to allow the pressure from the accumulator to act through tube p^2 and raise plunger P^2. The preliminary pressure is thus effected at once from above and below, Fig. 10, and during the advance of the plungers P' P^2 and the stamps K' K the cylinders of the plungers Q' Q^2 fill themselves with water from the tank W. The valve v^3 is then shifted to connect the cylinders of plungers Q' Q^2 with the accumulator and the final pressure is effected also at once from above and below, Fig. 11. When this is completed, the valves v' v^3 are shifted to cut off the connection of the cylinders of plungers P', Q', and Q^2 with the accumulator and the water-discharge from these cylinders to the tank W is opened. The constant accumulator-pressure through tube z' is now alone in action and raises the upper stamps K', while the pressure from the accumulator, continuing to act on the plunger P^2, causes the lower stamps K to rise, so as to eject the pressed stones or blocks from the forms, Fig. 12. The cam c^2 then shifts the valve v^2 to cut off the communication of the accumulator through tube p^2, and the constant accumulator-pressure through tube z^2 now moves back the lower stamps K and the parts return to the position shown in Fig. 8, when the forms are again filled with material.

Fig. 10^a shows the press in the period of rest between the two operations into which the preliminary pressure is divided in this case, said period of rest allowing the air to escape from the material. By changing the cam c', as indicated in detail in Fig. 6, the preliminary pressure is continued for a short time, after which the connection of the accumulator through tube p' is cut off and the plunger P' raised by the constant pressure from tube z', so that the air compressed in the material can escape upward. During this period the lower stamp K remains immovable, because the cam c^2 (shown in detail in Fig. 7) shifts the valve v^2 to an intermediate position, so that water can neither enter the accumulator in the cylinder of P^2 nor can water be discharged from said cylinder. After the escape of air the second operation of preliminary pressure occurs, after which comes the final pressure and then ejection of the pressed stones, as shown in Figs. 11 and 12.

The progress of the work set forth in Figs. 8 to 12 is accomplished during one revolution of the cams c' c^2 c^3, said cams in practice being mounted on a common shaft, as indicated in Figs. 1, 2, and 3.

What I claim as new, and desire to secure by Letters Patent, is—

1. A hydraulic brick-press consisting of the upper connected plungers P' Q', the latter having a stamp K', the lower connected plungers P^2 Q^2, the latter having the stamp K, the cylinders for the respective plungers, the dies F, arranged between the upper and lower stamps, the accumulator A, the tank W, arranged at a level above the press, the piston-valve v', connected with the tank and the accumulator and with opposite ends of the cylinder for the plunger P', a piston-valve v^2, connected with the tank and the accumulator and with opposite ends of the cylinder for the plunger P^2, a piston-valve v^3, connected with the accumulator and with the cylinders for the plungers Q' Q^2, and rotating cams for operating the several piston-valves, substantially as and for the purposes described.

2. A hydraulic brick-press consisting of the plunger P' Q', a connecting-stem Z' for said plungers, the plungers P^2 Q^2, and a connecting-stem Z^2 for said last-named plungers, stamps K K', and cylinders for each of said plunger pairs, in combination with the accumulator A and tank W for receiving the water from the plunger-cylinders, cams c' c^2 c^3, and piston-valves v' v^2 v^3, actuated by said cams, the cams c' c^2 being formed with a branch for actuating the valves for preliminary pressure, said first-named cam branch being divided by an intermediate cam portion for actuating the valve to secure a period of release during the preliminary pressure, and the cam c^3 effecting the final pressure, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HERMANN VON MITZLAFF.

Witnesses:
W. HAUPT,
J. MONOD VON FROIDEVILLE.