(No Model.) 2 Sheets—Sheet 1.

A. PIAT.

HYDRAULIC RIVETING MACHINE.

No. 467,309. Patented Jan. 19, 1892.

Fig. 1.

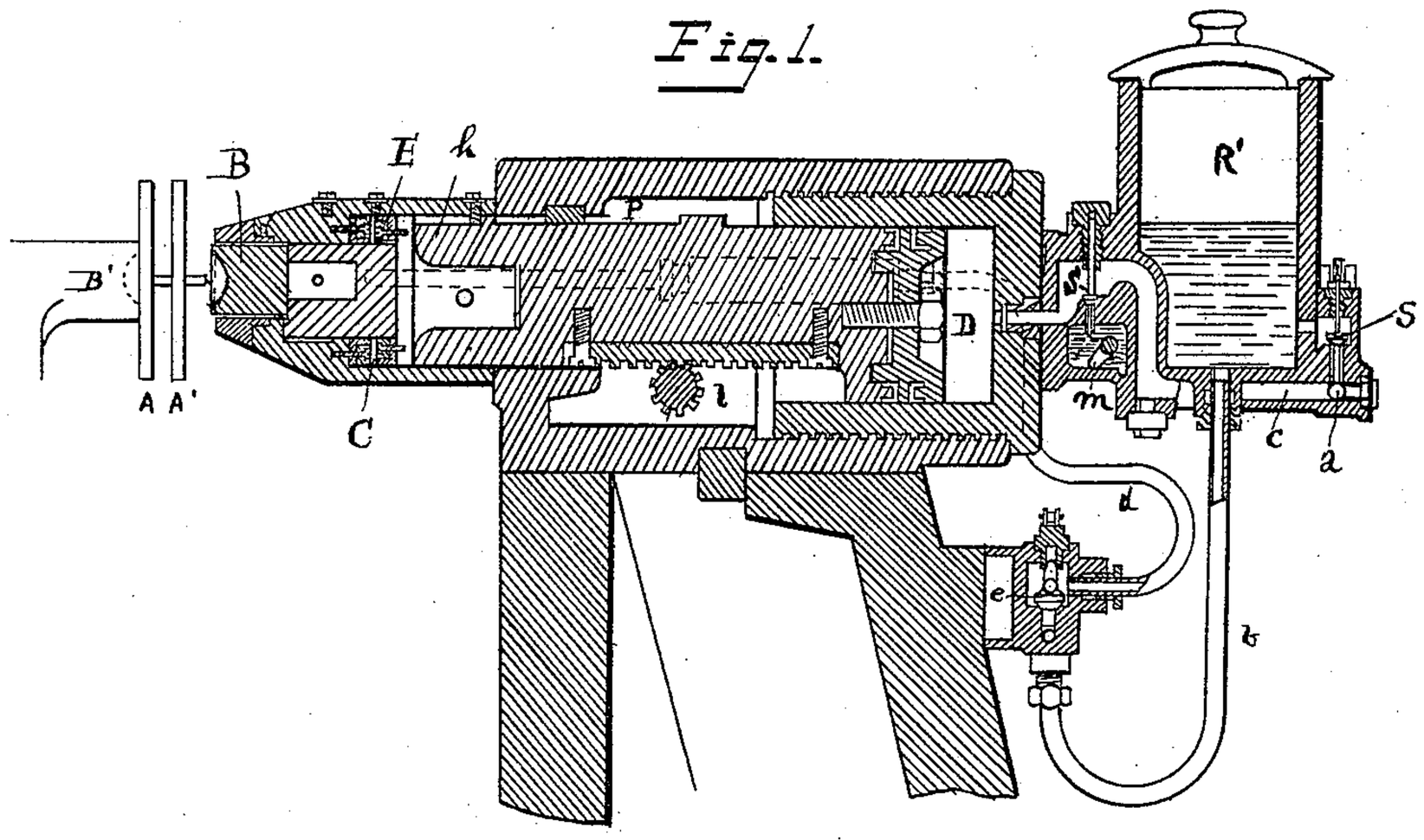
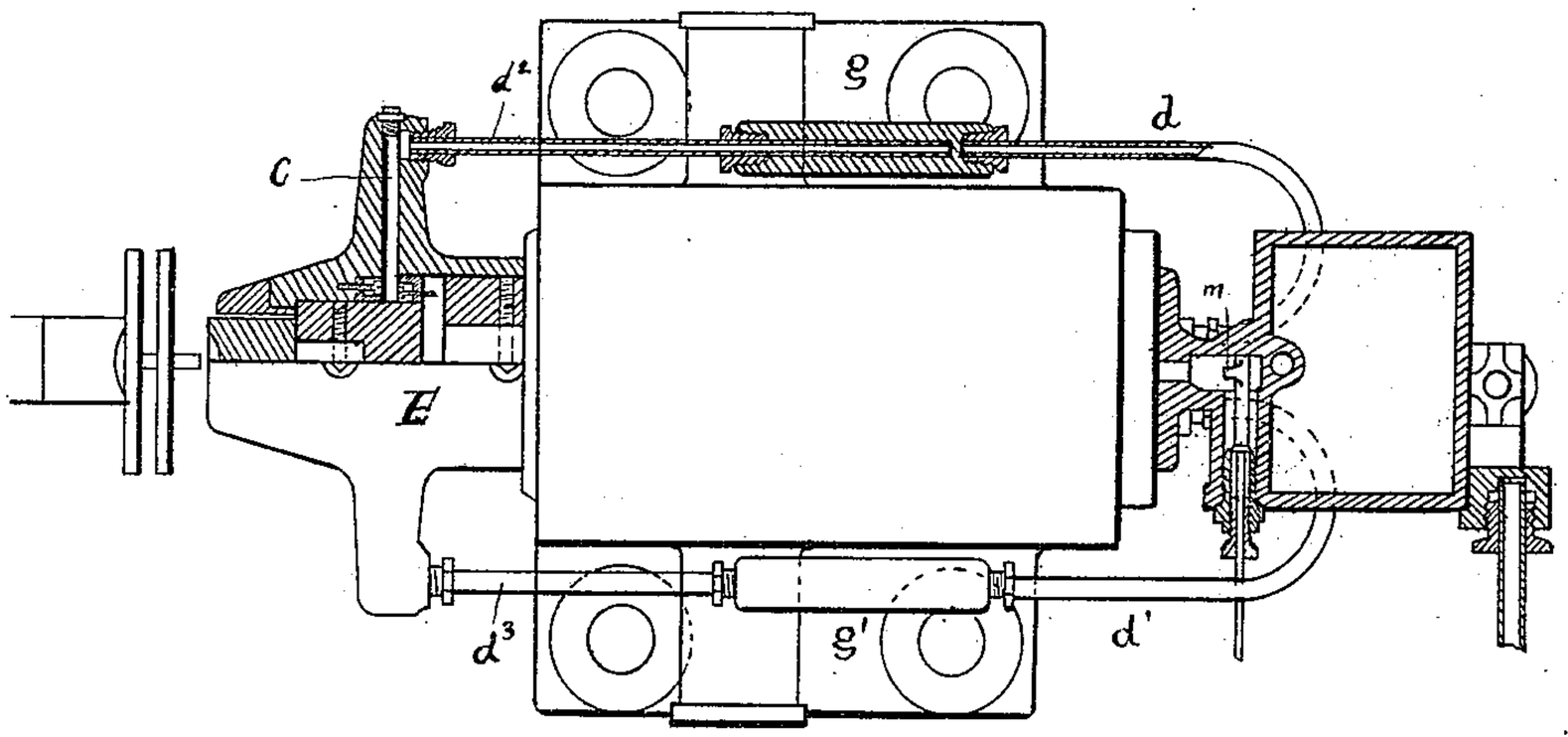


Fig. 2.



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Gales P. Moore

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(No Model.) 2 Sheets—Sheet 2.

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FIG 4

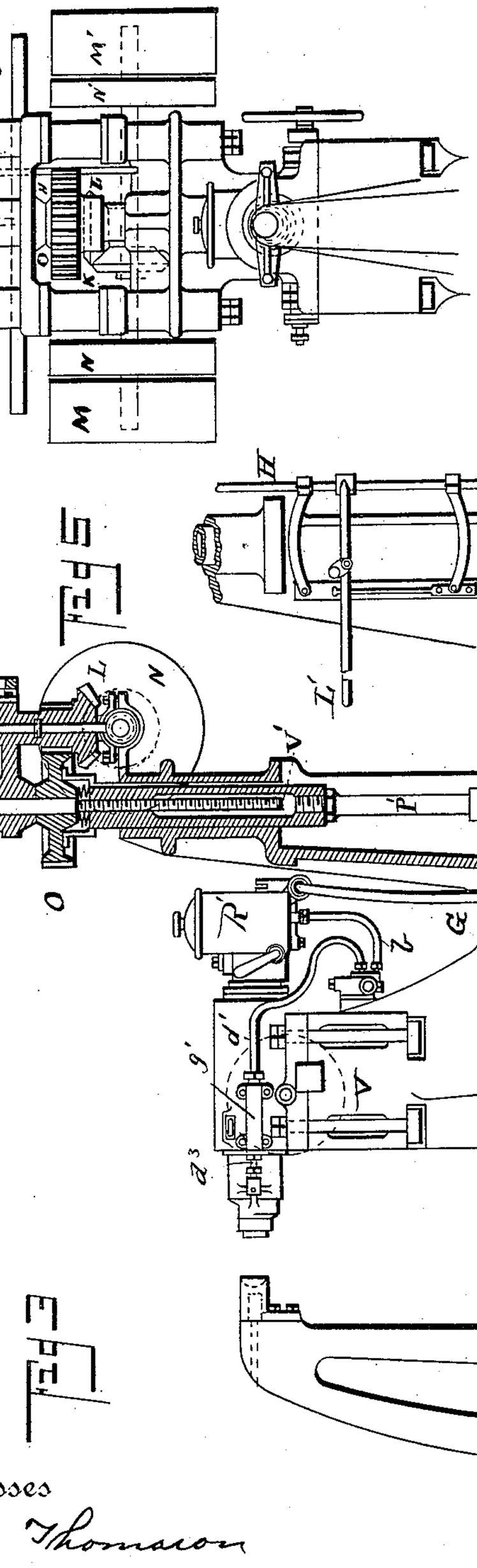

FIG 2

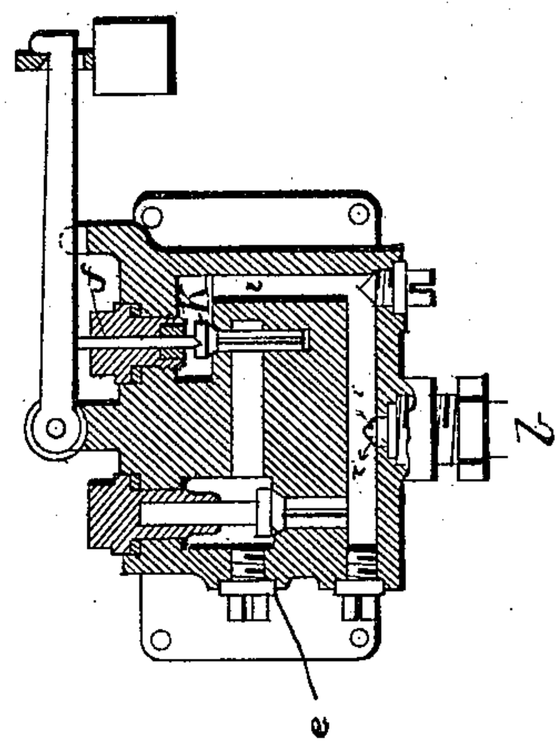

FIG 5

FIG 3

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UNITED STATES PATENT OFFICE.

ALBERT PIAT, OF PARIS, FRANCE.

HYDRAULIC RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 467,309, dated January 19, 1892.

Application filed February 12, 1890. Serial No. 340,229. (No model.) Patented in France July 10, 1889, No. 199,518.

To all whom it may concern:

Be it known that I, ALBERT PIAT, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in Hydraulic Riveting-Machines, (for which I have obtained Letters Patent in France, dated July 10, 1889, No. 199,518,) of which invention the following is a full, clear, and exact description.

These improvements relate to hydraulic riveting-machines wherein the necessary pressure for the riveting is transmitted to the machine either by hand or, when the rivets are very large, by a motor. They consist of a mechanical compressing apparatus attached to the machine and acting on a special arrangement which serves to bring together the iron plates which are to be riveted to each other.

Figure 1 shows a vertical section taken on the axis of the riveting-die and the piston. Fig. 2 is a plan view, partly in section. Fig. 3 is a side view, partly in elevation, the compressing mechanism being in vertical section. Fig. 4 is a front view of the upper part of this mechanism; Fig. 5, a side view of the starting devices. Fig. 6 shows a vertical section taken on the axis of the valves of the distributer.

A A′ represent the iron plates on the counter riveting-die B′, which should be brought together before the working of the rivet. The riveting-die B, securely fastened by the die-carrier U on the end of the piston-rod P, is surrounded by a solid case E, which slides longitudinally on the said rod by means of a guide-screw, the lower end of which works in a straight groove *h*.

In the annular space formed by the difference of the diameters of the casing E are placed two packings of pressed leather, forming a water-tight chamber C, and these pieces of leather are by turns extensible or incompressible up to a certain pressure. Water at a determined pressure, previously regulated by a valve *k*, Fig. 6, enters this chamber by two lateral pipes d^2 d^2, sliding through stuffing-boxes and entering into cylinders *g g′*, said valve being controlled by a closing-pin *f*, held down by means of a weighted lever. This valve rises when the pressure, previously determined, is exceeded, and the water which passes through it flows back into the reservoir R′ by means of the channel *i* and the inlet and outlet pipe *b*.

The following is the description of the operation of the machine, regarding it as in the position shown in the drawings. The valve *s* is raised by means of a handle acting on the interior arm *m*, situated in a space communicating with reservoir R′, and at the same time piston P is brought back to the end of its stroke to the right side, leaving a certain space empty, by means of the hand-wheel V and the pinion *l*, mounted on its axis and acting on the rack of piston-rod P. The result is that on the one hand the water contained in the cylinder D passes freely through the raised valve *s* into the reservoir R′, and on the other hand the casing E, bearing on the head of cylinder D, remains in a fixed position, while the riveting-die moves into it sufficiently far, and the chamber C increases its size and draws in thereby the required amount of water. The water, having passed valve *e*, which is raised through the suction of the chamber C, flows freely into this chamber from the same reservoir R′ by way of the pipe *b*, valve *s*, and the two orifices and pipes *d d′*, running, respectively, into the cylinders *g g′*, into which also enter, sliding through the stuffing-boxes, the series of telescopic tubes d^2 d^3, which are in communication with the chamber or box C. The operation is only effected by hand if the mechanism of compression and return should fail to effect it by drawing back the piston P completely to the end of its stroke. The machine being brought into this position, the wheel V is turned by hand in an opposite direction. The piston D then moves toward the left, and the water contained in the chamber C cannot flow off because the valves *e* and *k* are closed. The casing E will thus act for a moment as if integral with the piston P, and the riveting-die B, over which it projects sufficiently far, and the whole apparatus is moved against the iron plates A A′, which are to be pressed together. At the same time the water flows freely from the reservoir R′ into the cylinder D through the valve *s*, which is raised by the suction and which communicates by the space below with R′. The machine after having been brought into this second position by hand, and its whole effect be-

ing obtained by hand, the compression mechanism begins to work, first bringing the iron plates A A′ completely together and then performing the riveting. With the assistance of the lever L′ and the connecting-rod H, suspended from the end of the upper lever I at right angles thereto, the belt-shifter J shifts one of the two belts from the loose pulley M to the fixed pulley N, while the other still remains on the loose pulley M′. It follows that by the action of pinions K and L (the latter gearing by its hub with the wheel O, which is connected to the spindle V′) the piston P′ penetrates into the cylinder D′ and drives back the water contained therein through the tube G, which communicates freely by the orifice *a* and the channel *c*, connecting the latter with the cylinder D. At the moment when the water, which has been driven back, begins to act upon the piston P, when the iron plates A A′ have been brought together and the pressure corresponding to this latter action has been reached, the valve *k* opens and the water driven into the chamber C at the maximum of riveting pressure, leaves this chamber (whose size decreases) and returns through this valve *k*, as shown by the arrows *i i*, Fig. 6, by the tube *b* into the reservoir R′. The water thus driven back, being pressed by the piston P′ and still passing into D, proceeds to push piston P with a gradually-increasing force in proportion to the resistance offered by the rivet while being shaped by the action of the die, which has moved forward by sliding into the casing E. When the maximum riveting pressure is reached, the weighted valve S is raised, the water passes into the reservoir R′, and the machine, should it continue to work until it is stopped by the lever L′, whether working by hand or automatically, will have no greater force to overcome. The operation thus accomplished, we reverse the machine by means of the lever L′ in the direction of the movement of the transmitting mechanism by transferring to the fixed pulley N′ the belt which was running on the loose pulley M′, which belt must be crossed if the other one is open. Then the piston P′ is raised and the water from the cylinder D is drawn into the cylinder D′ until the piston P returns to the complete limit of its course. At the very beginning of this backward motion the riveting-die and its casing move together; but as soon as the casing bears against the head of the cylinder D it stops and the die enters it and rests therein and the chamber C becomes larger by drawing the necessary amount of water from the reservoir R′, as has been already described.

What I claim is—

1. In a hydraulic riveting-machine, the distributing-box having the inlet and outlet pipe *b*, communicating with the reservoir R′, the valves *e* and *k*, the latter acted on by a weighted lever, the two telescopic pipes d^2 d^3, and the pipes connecting the distributing-box with the cylinders *g g′*, and the corresponding cylinders *g g′*, into which these tubes run, and the chamber C, communicating with said pipes d^2 d^3, substantially as set forth.

2. In a riveting-machine, the combination of the casing E, the die-carrier connected with the main piston, the chamber C in the casing, a pipe connection between such chamber and a reservoir, and a weighted valve in such pipe connection, substantially as set forth.

3. In a riveting-machine, the combination of the cylinder D, a riveting-die consisting of the upsetting-tool carried by the piston P and arranged within the said cylinder, and the casing E, containing the fluid-chamber C, the casing E being outside of and having a limited movement independent of the upsetting-die and its carrier and being arranged to bear against and be limited in movement by the end of the cylinder, and the fluid passage-ways to the interior of the cylinder behind the main piston and to the chamber C, substantially as set forth.

4. In a riveting-machine, the combination of the casing E, the die-carrier connected with the main piston, the chamber C in the casing, a pipe connection between such chamber and a reservoir, and a weighted valve in such pipe connection, the fluid passage-way leading to the rear side of the main piston, and the fluid-forcing devices for the main piston, substantially as set forth.

5. In a hydraulic riveting-machine, the combination of riveting-die B, casing E, having chamber C and telescopic pipes d^2 d^3 opening into said chamber, cylinders *g g′*, having stuffing-boxes through which said pipes work, reservoir R′, pipe *b*, leading therefrom, a valve for automatically controlling communication between pipes *b d d′*, and means for controlling communication between reservoir R′ and the rear end of the cylinder in which piston P works, substantially as set forth.

In testimony whereof I have signed this specification in the presence of the subscribing witnesses.

ALBERT PIAT.

Witnesses:
I. DUPONT,
R. J. PRESTON,
CH. CASALONGA.