(No Model.)

R. H. TWEDDELL, J. PLATT & J. FIELDING.

DIRECT ACTING HYDRAULIC RIVETING MACHINE.

No. 307,355. Patented Oct. 28, 1884.

Fig. 1.

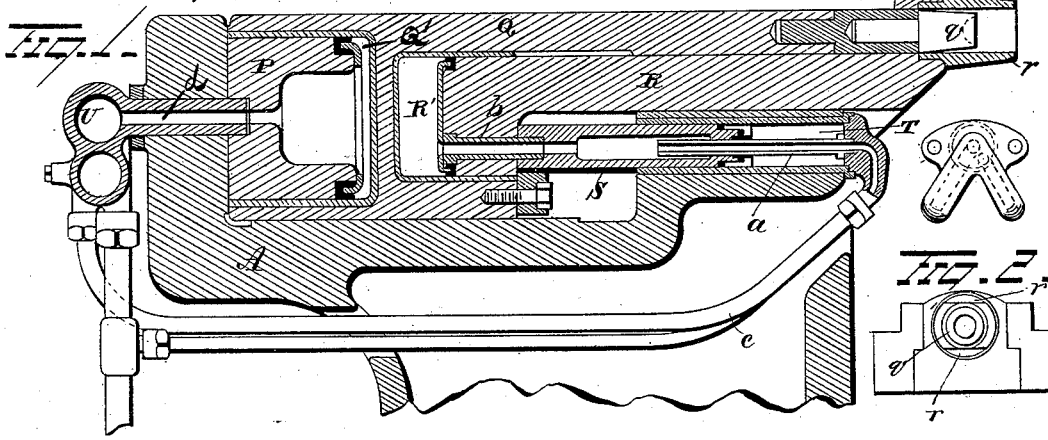

Fig. 2.

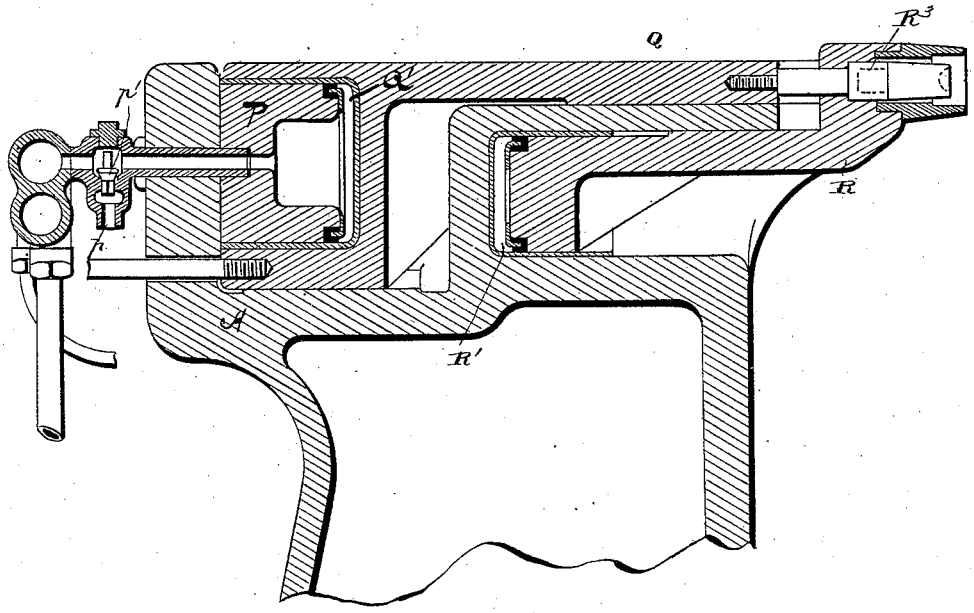

Fig. 3.

WITNESSES

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RALPH HART TWEDDELL, OF WESTMINSTER, COUNTY OF MIDDLESEX, AND JAMES PLATT AND JOHN FIELDING, OF GLOUCESTER, COUNTY OF GLOUCESTER, ENGLAND.

DIRECT-ACTING HYDRAULIC RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 307,355, dated October 28, 1884.

Application filed April 19, 1884. (No model.) Patented in England February 3, 1883, No. 597; in France August 6, 1883, No. 156,893, and in Belgium August 6, 1883, No. 62,233.

To all whom it may concern:

Be it known that we, RALPH HART TWEDDELL, of Westminster, in the county of Middlesex, and JAMES PLATT and JOHN FIELDING, of Gloucester, in the county of Gloucester, and country of England, have invented certain new and useful Improvements in Direct-Acting Hydraulic Machines for Riveting, &c.; and we 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.

Our invention relates to an improvement in direct-acting hydraulic machines for riveting, punching, &c., and more particularly to machines provided with additional plungers for closing together the plates to be riveted, the object of the same being to utilize the area of the additional plunger for giving additional force to the riveting-tool as it is completing its stroke; and it consists in the parts and combinations of parts, as will be more fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in longitudinal section of a machine embodying our invention. Fig. 2 is an end view of the same, and Fig. 3 represents a modification.

A represents the frame of the machine, the upper surface of which is adapted to receive the cylinders and plungers, to be hereinafter described. On this frame we secure the piston P, having such area that the available pressure acting on it will give the maximum force required. This piston is recessed, and is provided with a supply-opening, through which the acting fluid enters, and is fitted within cylinder Q′ of the plunger Q, which may be termed the "riveting-plunger," and which carries at its outer end the riveting-tool *q*. This plunger is bored centrally to receive the plunger R, considerably less in area than the fixed piston P. The plunger R projects upwardly at its outer end, and is provided with an opening through which the riveting-tool passes. The smaller plunger, R, working in the bore R′, which may be termed the "closing-cylinder," carries at its end the closing-tool *r*, which is in the form of a fork, having a limb on each side of the riveting-tool *q*, as shown in Fig. 2. At one side of the smaller plunger, R, there is a still smaller plunger, S, for effecting the back-stroke of the plungers Q and R, working in a stationary cylinder, T, which may be termed the "push-back cylinder." The hydraulic connections to these three cylinders are thus arranged: The small push-back cylinder T is always in communication with the pressure reservoir or accumulator, so that the pressure on its plunger can push back the riveting-plunger Q and the closing-plunger R when the former is relieved from the hydraulic pressure. The riveting-plunger Q is in communication by pipe *d* with a valve of ordinary construction located at U, by which it can be made to communicate either with the pressure or with the free discharge. The closing-cylinder R′ can also be made to communicate with the pressure-reservoir or the discharge, or its outlet can be entirely closed. The plunger S is provided with a central bore, in which one end of the pipe *a* is fitted, and on which pipe the plunger moves. The opposite end of the plunger S is rigidly secured to the plunger R by the pipe *b*, thereby forming a communication between the pipes *c* and the cylinder R.

In riveting with this machine the pressure is in the first place allowed to act on both the riveting and closing plungers Q and R, the closing-tool *r* presses the plates together, and the riveting-tool *q* upsets the rivet with the force due to the excess of area of the riveting-cylinder Q′ over that of the closing-cylinder R′. On now opening the discharge from the closing-cylinder R′, the riveting-cylinder is relieved from the back-pressure due to the area of R′, and consequently the force applied to the riveting-tool *q* is that due to the full area of the riveting-cylinder Q. The riveting being completed, the riveting-cylinder Q′ is opened to discharge by means of the valve at U, and thereupon the push-back plunger S effects the back-stroke of both the riveting and closing tools *q* and *r*. When only a moderate

riveting force is required and closing is unnecessary, the riveting-tool *q* may be fixed, instead of the closing-tool *r*, on the plunger R, which latter can effect the riveting, the large riveting-cylinder Q remaining stationary.

From the foregoing it will be seen that by using two plungers—one for pressing the plates together and the other for riveting—the closing or pressing plunger will cease moving first, and the riveting-plunger, continuing to advance, causes a discharge of fluid through the pipe *b*, plunger S, and pipe *a* from behind the closing-plunger R, and therefore acts with a force depending on the difference of the areas of the riveting operation. After the closing-plunger has forced the plates together and the riveting-plunger advanced against the rivet, the discharge from the closing-plunger can be opened, and thus relieve the riveting-plunger from the counter-pressure due to the area of the closing-plunger, thereby obtaining the pressure due to the whole area.

In order to economize the high-pressure liquid employed, we may make the riveting-cylinder communicate by a passage, *p*, governed by a check-valve, *p'*, with the discharge-cistern, and connect the closing-plunger R to the riveting-plunger Q by a shoulder, R^3, on the riveting-tool holder, as shown in Fig. 3. At first we admit the fluid under pressure only to the closing-cylinder R', and its plunger, advancing to effect a closing of the plates, draws with it the riveting-plunger Q, which becomes filled with low-pressure liquid. We then admit liquid under high pressure to the riveting-cylinder, thus effecting the riveting, as above described.

We do not claim, broadly, in this application a push-back plunger for forcing the riveting-plunger back into position, nor do we claim, broadly, a plunger having a cylinder formed in one end thereof in which a stationary piston fits, as these features are shown, described, and claimed in our pending applications, numbered 128,544 and 131,466.

We are aware that it is not broadly new to employ a closing-plunger, in connection with a riveting-plunger, and hence we do not claim the same, broadly; but,

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a riveting-machine, the combination, with a frame having a rigid piston, of a plunger resting on said frame and provided at one end with a cylinder, and at its opposite end with a riveting-tool.

2. In a riveting-machine, the combination, with a frame having a rigid piston, of a riveting-plunger resting on said frame, and provided at one end with a cylinder, and at its opposite end with a riveting-tool and a smaller push-back plunger for forcing the riveting-plunger back to its normal position, substantially as set forth.

3. In a machine for riveting, the combination of a riveting-plunger having two cylinders formed therein, a rigid piston, and a movable plunger situated within one of the cylinders of the movable plunger, substantially as set forth.

4. In a machine for riveting, the combination of a plunger provided with two cylinders and a riveting-tool, a rigid piston, a movable plunger provided with a closing-tool, and a push-back plunger for forcing the cylinder and plunger back to their closed or normal position.

5. The combination of the plunger provided with a riveting-tool, and with the cylinder R', the plunger R, push-back plunger S, and cylinder T, substantially as set forth.

6. The combination of the plunger Q, provided with a riveting-tool, stationary piston P, cylinder R', and plunger R, provided with a closing-tool, substantially as set forth.

7. The combination of the plunger Q, provided with a riveting-tool, the piston P, the cylinder R', plunger R, provided with a closing-tool, and the push-back plunger, substantially as set forth.

8. The combination of the plunger Q, provided with a riveting-tool, the cylinder R', plunger R, provided with a closing-tool, the cylinder T, push-back plunger S, and pipes *b* and *a*, substantially as set forth.

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

RALPH HART TWEDDELL.

Witnesses:
H. G. SCOTT,
WM. BAILEY.

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

JAMES PLATT.
JOHN FIELDING.

Witnesses:
JOHN A. POPE,
H. CADENNE.