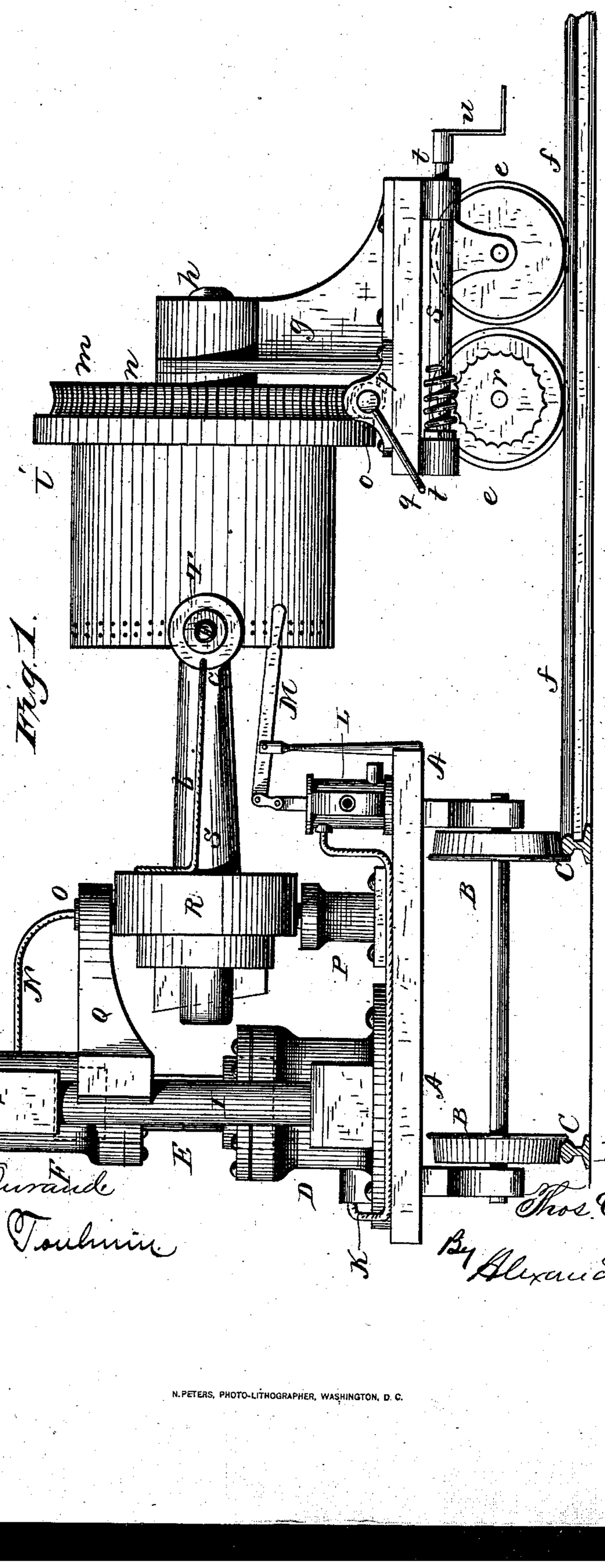
(Model.) 2 Sheets—Sheet 1.

T. CRITCHLOW.

Hydraulic Riveting Machine.

No. 239,454. **Patented March 29, 1881.**



2 Sheets—Sheet 2.

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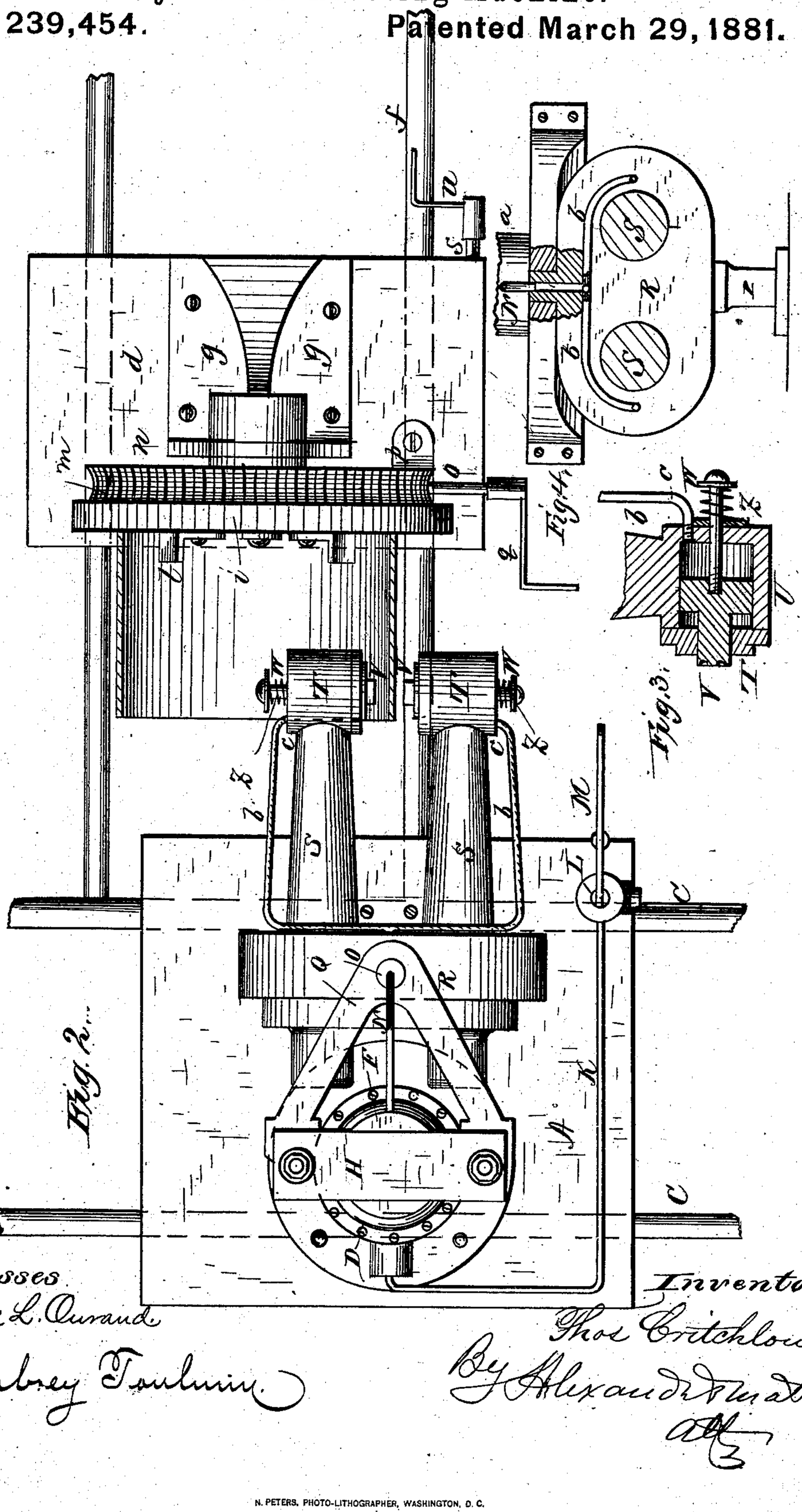

Witnesses
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UNITED STATES PATENT OFFICE.

THOMAS CRITCHLOW, OF STEELTON, PENNSYLVANIA.

HYDRAULIC RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 239,454, dated March 29, 1881.

Application filed December 29, 1880. (Model.)

To all whom it may concern:

Be it known that I, THOS. CRITCHLOW, of Steelton, in the county of Dauphin, and in the State of Pennsylvania, have invented certain new and useful Improvements in Hydraulic Riveting-Machines; and I do hereby that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

This invention relates to an improved apparatus for riveting boiler-plates together, for heading bolts, for stamping metal into various shapes, and for other purposes where a powerful pressure is required to be brought to bear upon an article to be manufactured.

The invention has for its object to provide an apparatus whereby the pressure-dies may be automatically operated by hydraulic power to accomplish the work, and whereby the article to be riveted to, headed, or stamped may be subjected to the action of the pressure-dies, as more fully hereinafter specified. These objects I attain by the apparatus and mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of my improved apparatus entire. Fig. 2 represents a top view of the same. Fig. 3 represents a sectional view of the pressure-dies and their operating mechanism; and Fig. 4 a view showing the passages leading to the pressure-die cylinders.

The letter A indicates a base or platform, of proper strength, mounted upon flanged wheels B, which rest upon rails C, laid on a substantial bed or foundation.

The letter D indicates a vertical cylinder, bolted to the said base or platform, and provided with a vertical piston-rod, E, which may be provided with cup-leather or other packings. Above said cylinder D and in direct line therewith is a smaller vertical cylinder, F, in which the upper end of the piston-rod E operates, the respective cylinders being thus connected with each other, as shown, making their operation simultaneous. The said cylinder F is formed with or secured to a cross-head, H, secured to the uprights I, bolted or otherwise secured to the cylinder D, or to the base or platform A.

The letter K indicates a tube leading from a three-way valve, L, to the lower part of the cylinder D, the said valve communicating with a steam-pump by means of proper pipe, and with the open air, whereby water may be forced into or discharged from the cylinder D by operating the valve by means of the lever M.

The upper part of the cylinder F communicates, by means of a pipe, N, with the upper vertical trunnion, O, of vertical trunnions which carry the riveting mechanism. The lower one of said trunnions is journaled in a foot-step, P, which is bolted to the platform or base A, the upper said trunnion being journaled in an outrider, Q, secured to the uprights I. The trunnions carry the base R, which supports the arms S of the riveting devices. These riveting devices consist of two cylinders, T T, one attached to or formed on the free end of each of the arms S, the said arms being so arranged as to leave a space between the cylinders T for the insertion of the sheets to be riveted, as more fully hereinafter explained. The cylinders T are provided with piston-rods U, which are provided with riveting-dies V, projecting toward each other. The pistons are also provided with projecting rods W, headed at their outer ends, and kept in and returned to a normal position by means of springs Z. The upper trunnion and a portion of the base R are provided with a passage, *a*, with which the pipe N connects at one end, the other end connecting with a small bifurcated pipe, *b*, the branches of which extend to the respective cylinders T, as indicated at *c*.

The letter *d* indicates a base or platform, similar to the base or platform A, and mounted upon flanged wheels *e*, which rest upon rails *f*, secured to the bed or foundation at right angles to the rails C. The said platform *d* has bolted to it an upright standard, *g*, in which is journaled the bearing *h* of a face-plate, *i*, which is provided with a series of radially-adjustable dogs, *l*, by means of which a cylindrical boiler-section may be centered upon its face. To the rear of said face-plate is secured an annulus, *m*, having a worm-gear, *n*, at its periphery, with which intermeshes a worm-screw, mounted on a shaft, *o*, journaled in bearings *p*, and provided with a crank, *q*, by means of which it may be rotated and the face-plate shifted to rivet the different portions succes-

sively. The axle of one of the sets of wheels is provided with a worm-gear, *r*, which intermeshes with a worm-screw on a shaft, *s*, journaled in bearings *t* and provided with a crank, *u*, whereby the base or platform may be traversed back or forth, to adjust the boiler-section between the riveting or pressure dies.

It will be seen that the arms carrying the riveting mechanism have a slight oscillating play upon the trunnions for the purpose of facilitating the adjustment of the boiler-section.

The operation of my invention will be readily understood in connection with the above description, and is as follows: Water is forced into the lower vertical cylinder from a steam-pump, by properly regulating the three-way valve. This forces the pistons upward, driving the water or other fluid (with which the upper part of the upper cylinder is filled) into the pressure-die cylinders and pressing the said dies with enormous force against the rivets. The three-way valve is then operated so as to change the ports and permit the water to escape, which permits the riveting devices to assume their normal position for another operation. The boiler-section is then turned a slight distance by means of the face-plate, so as to present another rivet, and the operation is continued until the riveting is completed.

It will be seen that by the employment of the double fluid-pressure cylinders, a greatly-multiplied pressure may be brought upon the riveting-dies, and that by reason of the movement of the riveting-arms upon the trunnions, the said arms may be readily adjusted to boiler-sections of various diameters. By means of the riveting-cylinders on opposite arms, the plates of the boiler-sections are pressed closely together, with the outer rivet-dies against the flange surrounding the inner rivet-die, the outer piston and its die operating in advance of the inner piston and its die, the pipe leading to the inner cylinder being contracted, which causes the outer die to crowd on the rivets and plates slightly in advance of the inner die.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with the pressure-dies and their operating mechanism, the traveling platform, mounted on wheels and provided with a face-plate having suitable adjustable dogs, and the mechanism for operating said face-plate and platform, substantially as specified.

2. In combination with the upper cylinder of the press, the riveting-arms and base, the latter mounted on trunnions, the pipe connecting with one of the trunnions, the die-cylinders and their dies, and the pipes connecting said cylinders with the upper cylinder, substantially as and for the purposes specified.

3. The combination, with the movable platform A, of the cylinders D and F, the vertical piston-rod with its pistons arranged within the said cylinders, substantially as set forth, the pipe K leading to the cylinder D, the riveting-arms and base, the latter mounted on trunnions, the pipe connecting the upper cylinder, F, with one of said trunnions, the die-cylinders and their dies, and the pipes connecting the die-cylinders with one of the trunnions, substantially in the manner and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 13th day of December, 1880.

THOS. CRITCHLOW.

Witnesses:

ALBRECHT BECHER,

JNO. J. SMITH.