



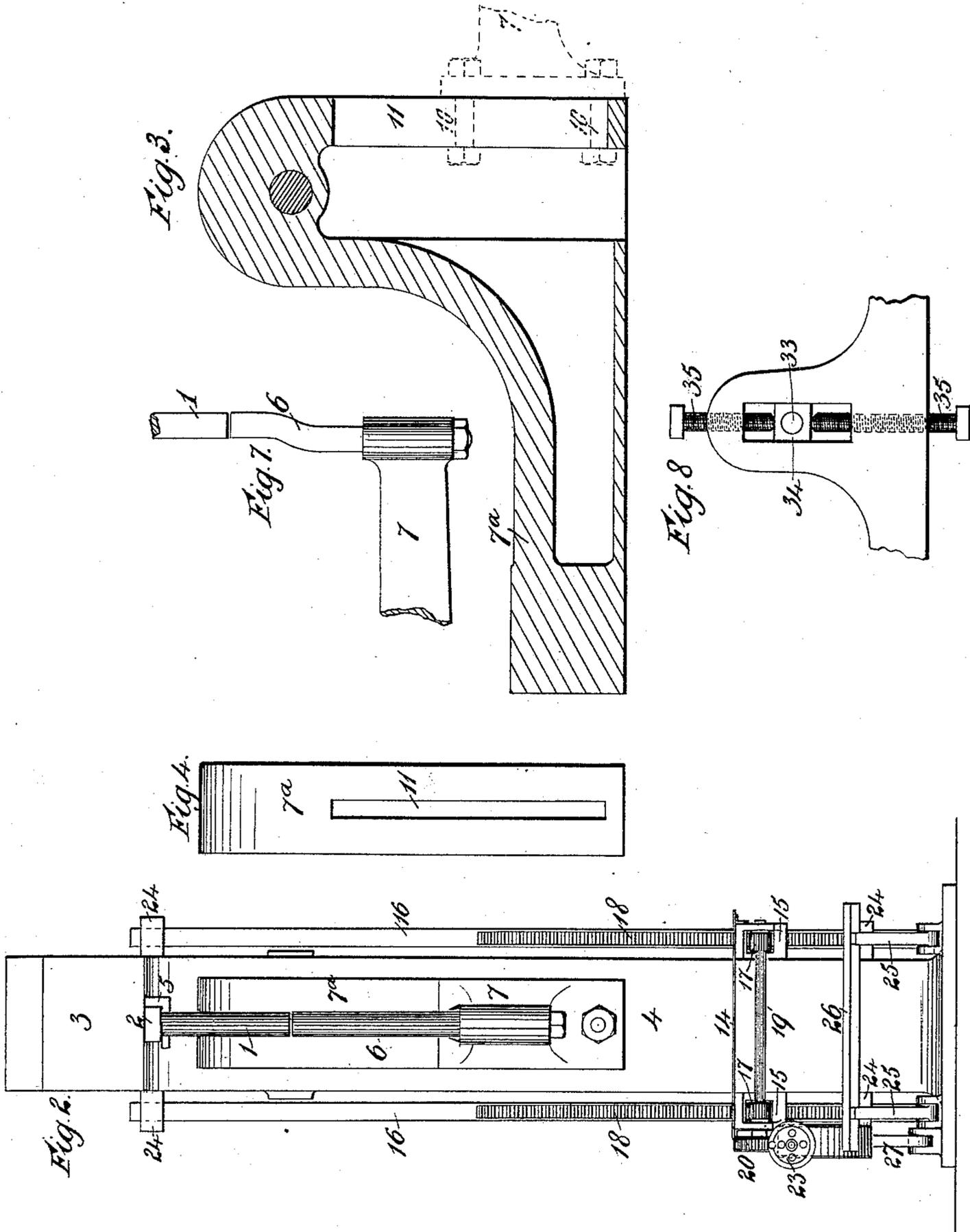
(No Model.)

3 Sheets—Sheet 2.

# W. SKAIFE. RIVETING MACHINE.

No. 421,324.

Patented Feb. 11, 1890.



Witnesses:  
*W. Cross*  
*W. J. Doolittle*

Inventor:  
*Walter Skaife*

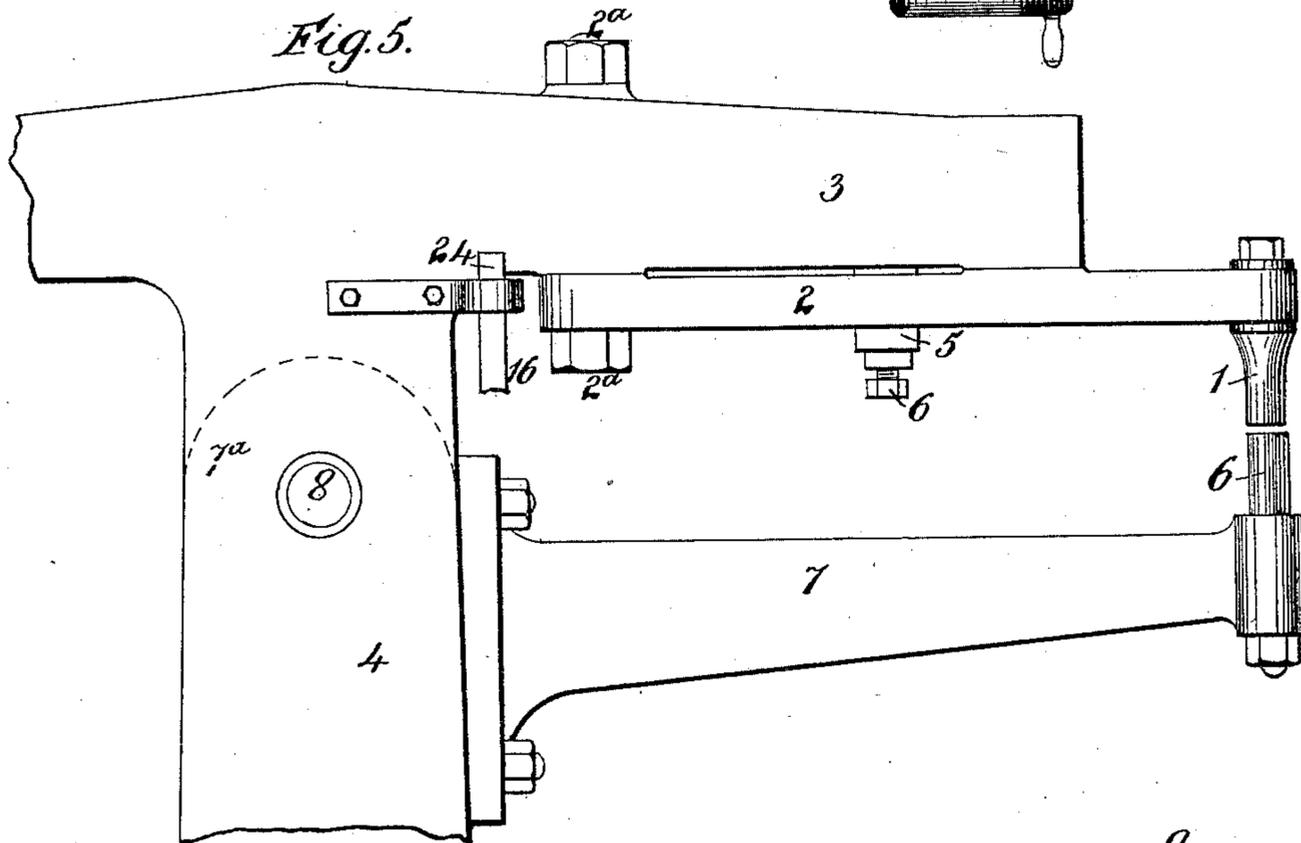
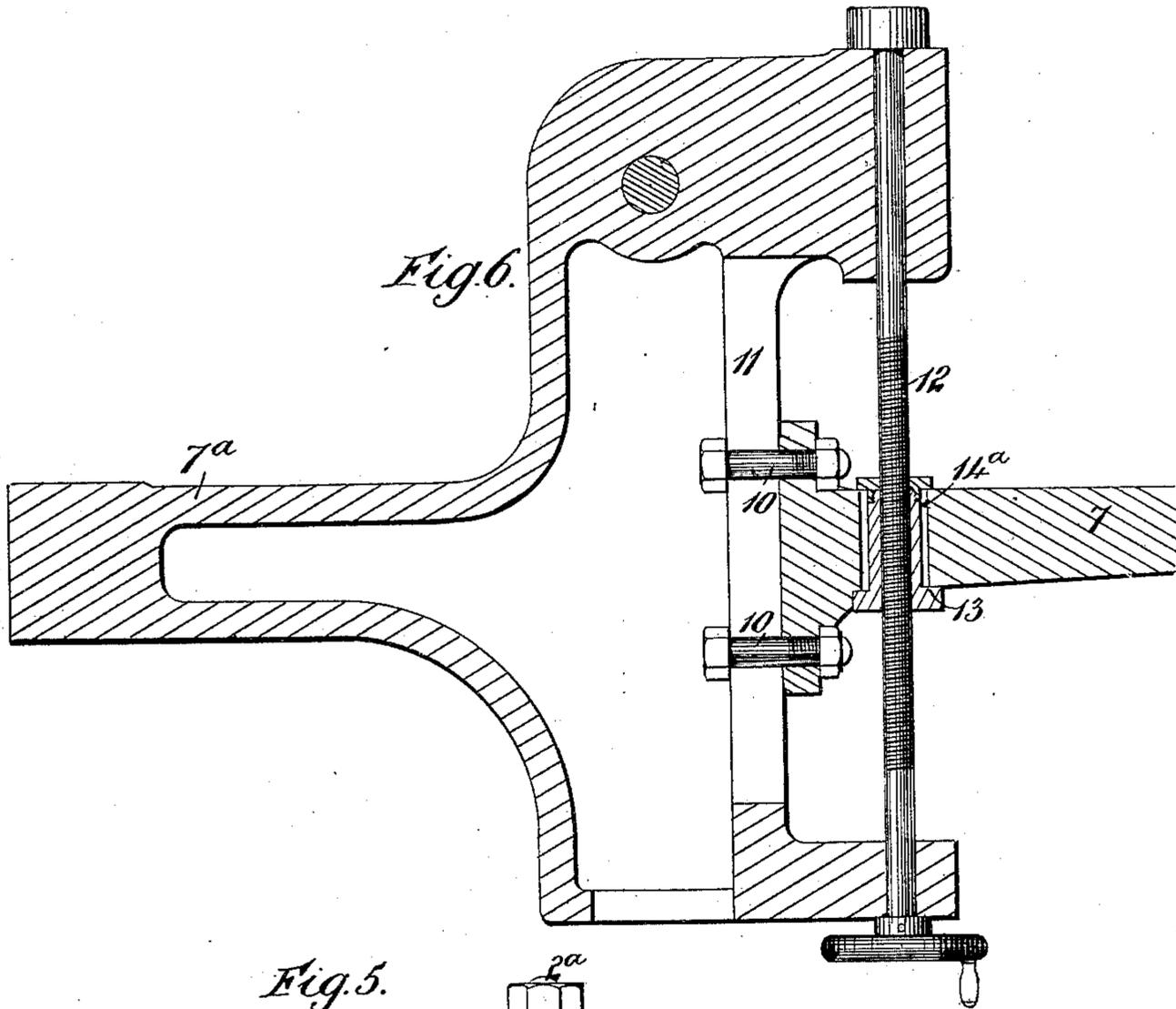
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# UNITED STATES PATENT OFFICE.

WALTER SKAIFE, OF COMMERCIAL ROAD, COUNTY OF MIDDLESEX,  
ENGLAND.

## RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 421,324, dated February 11, 1890.

Application filed September 6, 1889. Serial No. 323,217. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER SKAIFE, a subject of the Queen of Great Britain and Ireland, residing at Commercial Road, in the county of Middlesex, England, have invented certain new and useful Improvements in Riveting-Machines, of which the following is a specification.

This invention has reference to a construction of riveting-machine suitable for riveting together plates to form vessels—such as tanks—of various sizes.

To an overhanging arm or beam carried by a standard is attached a die or riveting-tool I will call the “stationary tool.” Below this is a snap or riveting-tool I will call the “movable tool.” It is carried by a riveting-lever that works on a pin, pivot, or trunnions supported by a standard.

Below that end of the lever that carries the movable tool is a table or support for the work. This table, which may be carried by a frame that can be traversed relatively to the machine for the purpose of placing the work in position for the swaging or closing of successive rivets, is provided with suitable means—such as a lever—whereby it can be raised or lowered. The lever may be weighted to counterbalance the weight of the table and attached parts.

For heavy work the table may be operated by hydraulic pressure.

That arm of the riveting-lever which carries the movable tool is adapted to enter a tank being riveted.

The parts are constructed and arranged to admit of the top of the movable tool and the center of motion of the riveting-lever being in a common horizontal plane on the termination of the stroke of the lever, whereby a rivet is swaged or closed, so that the final pressure may be given practically in line with the axis of the rivet. To this end the part of the riveting-lever that carries the movable tool may advantageously be made separate from and adjustable in relation to the remainder. The adjustable part may be arranged to slide in or on the other part, the adjustment being effected by any suitable means, such as a screw and hand-wheel.

The stationary and movable tools may, to suit various kinds of work, be made removable from the overhanging arm or beam and from the riveting-lever, respectively. With the construction described a tank to be riveted, when placed on the table, may be lowered for the insertion of a rivet and then be raised, thereby causing the lower of the two plates to be riveted together to form part of a tank to force the upper plate against the stationary die or anvil, so that both plates will be held close together before the riveting takes place. The formation of collars on the rivets between the plates, and consequently bad joints, is thus prevented when the rivets are swaged or closed.

The riveting-lever may be operated by steam, hydraulic or other fluid pressure, or by mechanical means, such as cams. According to one arrangement a hydraulic cylinder is secured to the arm or beam carrying the stationary riveting-tool, and a suitably-arranged hand-lever is provided for operating the valve or valves for controlling the admission and exhaustion of water to and from the cylinder.

In the accompanying illustrative drawings, Figures 1 and 2 are side and front elevations, respectively, of a riveting-machine constructed according to this invention. Fig. 3 is a vertical longitudinal section of part of the riveting-lever, and Fig. 4 is a front elevation thereof. Fig. 5 shows in elevation part of the machine slightly modified. Fig. 6 is a vertical section showing a modified construction of riveting-lever with adjustable arm. Fig. 7 is an elevation showing a modified form of riveting-tool. Fig. 8 is an elevation illustrating a modified method of mounting the riveting-lever,

Referring to Figs. 1 to 4, 1 is the stationary tool carried by a bar 2, pivoted at 2<sup>a</sup> to an overhanging arm or beam 3, that is carried by a standard 4.

5 is a stop with set-screw 6, by means of which the bar 2 and stationary tool 1 may be held in position for riveting. The stationary tool 1 may be directly connected to the arm 2; but it is advantageous to secure it to a pivoted bar, as shown, in order that it may

be moved laterally to enable a vessel—such as a tank—to be readily placed in position for riveting and afterward to be removed.

6 is the movable tool carried by one arm 7 of a riveting-lever that is journaled at 8 to the standard 4, and upon the other arm 7<sup>a</sup> of which acts the plunger of a hydraulic press 9, secured to an overhanging arm or beam 3<sup>a</sup>.

The overhanging arms or beams 3 3<sup>a</sup> are in one piece, and may be in one with the standard 4, as shown, or be separate and be secured thereto by suitable fastenings.

The lever-arm 7, which is of a form adapted to enter a tank to be riveted, is in the example shown made separate from and connected to the remainder of the riveting-lever by bolts 10, that pass through a slot 11, formed in the riveting-lever, as shown in Figs. 3 and 4. By loosening the nuts on the bolts 10 the arms 7 may be adjusted vertically by hand to any required height for the purpose hereinbefore mentioned, or the adjustment may be effected by a screw-threaded rod 12 and hand-wheel, as shown in Fig. 6. In this case, to prevent the rod 12 being strained or bent when the arm 7 is loosened from the remainder of the riveting-lever, it may work through a nut 13, arranged within a slot 14 in the arm 7, as shown.

The bar 2 and lever-arm 7 may, to suit some classes of work, be arranged to extend beyond the arm or beam 3, as shown in Fig. 5. The movable tool 6 may in certain cases be slightly cranked, as shown in Fig. 7, in order to adapt it to act upon rivets that could not be acted upon by a straight tool, such as shown in Fig. 1.

14 is a table or support for the work. It is, in the example shown, supported by side plates or frames 15, that are carried by guide-rods 16, upon which the said plates or frames can be caused to move vertically (to adjust the height of the table to suit the work to be done) by means of pinions 17, that gear with racks 18 on the guide-rods. These pinions are fixed upon a shaft 19, provided with a worm-wheel 20, that can be operated from the front of the table by a worm 21; shaft 22, and hand-wheel 23. The guide-rods 16 work in guides 24 and are carried by foot-levers 25, the outer ends of which are shown connected by a foot-board 26; or lever-arms 25<sup>a</sup>, fixed upon a shaft 25<sup>b</sup> and operated by a hand-lever 25<sup>d</sup>, (shown in dotted lines in Fig. 1,) may be used for raising the rods 16 and table 14.

27 is a weighted lever fulcrumed at 28 and connected by a link 29 with the arm 7<sup>a</sup> of the riveting-lever, so as to raise this arm when the cylinder of the hydraulic press is exhausting, and thus lower the movable tool 6 away from a rivet after the same has been swaged or closed.

The hydraulic press 9 may be of any suitable construction and be provided with valves operated by hand-lever 30 for controlling the admission and exhaustion of motive fluid.

31 is a block that transmits power from the plunger 32 of the hydraulic press when this plunger moves outward to the arm 7<sup>a</sup> of the riveting-lever. This block 31 is journaled to the plunger, as shown, so that it may always take a fair bearing on the arm 7<sup>a</sup>, notwithstanding that this arm will be inclined during the riveting operation.

The operation of the machine is as follows: The plates to be riveted together to form a tank are placed upon the table 14, as indicated in dotted lines in Fig. 1, the said table and the arm 7 of the riveting-lever being in their lowered positions. A rivet is then inserted from above, so as to be situated below the stationary tool 1, and the guide-rods 16 and table 14 are raised by the foot-levers 25, so as to cause the lower bent flange A of the one plate of the tank to force the upper plate B against the stationary tool 1, so that both plates will be held close together. The hydraulic press is then set in action to operate the riveting-lever and raise the movable tool 6, which then swages or closes the rivet. The guide-rods, with table and tank plates, are then lowered, the plates adjusted laterally for a fresh rivet, and the above-described operation repeated.

For enabling the riveting-machine to rivet flat plates of metal together—such, for example, as a strengthening-ring to a plate that is to form the top of a tank—the table 14 may be slotted or so formed that when it is above the arm 7 of the riveting-lever such arm may work through it, or the table may be formed with a hole, through which the movable riveting-tool 6 can work. This construction will be readily understood without the aid of drawings.

Instead of making the arm 7 adjustable relatively to the other part of the riveting-lever, for the purpose hereinbefore mentioned, the riveting-lever may, as shown in Fig. 8, be constructed with trunnions 33, carried by an adjustable block 34, arranged to work in a slot in the lever, so that the position of the fulcrum of the lever can be adjusted as required by means of screws 35; or the lever may be formed with a series of holes, as indicated in dotted lines in Fig. 1, in one or other of which, according to the height of the top of the movable tool 6, the fulcrum-pin of the lever can be inserted. When the center or fulcrum of the riveting-lever is made adjustable, the means employed for operating it should be capable of corresponding adjustment.

What I claim is—

1. In a riveting-machine, the combination of a stationary die, a movable die, a table or support for the work, and means for readily moving said table or support toward and from said stationary die, substantially as herein described, for the purpose set forth.

2. In a riveting-machine, the combination of a stationary die, a movable die, a riveting-lever for actuating said movable die, and

means for operating the lever, said riveting-lever being so arranged that its center of motion and the free end of the movable tool are in a common plane at right angles to the axis of the rivet during the final swaging or closing of such rivet, substantially as herein described.

3. In a riveting-machine, the combination of a stationary die, a movable die, a riveting-lever, the center of motion of which can be adjusted relatively to the free end of the movable die, and means for operating said lever, substantially as herein described, for the purpose set forth.

4. In a riveting-machine, the combination of a stationary die, a riveting-lever having one of its arms adjustable relatively to the remainder of the lever, a movable tool carried by said adjustable arm, and means for operating said riveting-lever, substantially as herein described, for the purpose specified.

5. In a riveting-machine, the combination of a stationary die, a movable die, a riveting-lever, and means for operating the same, a movable frame or support, a work-table adjustably mounted on said frame or support, and means for operating said frame or support to cause said work-table to move toward and from said stationary die, substantially as herein described, for the purpose set forth.

6. In a riveting-machine, the combination of a stationary die, a movable die, movable rods provided with toothed racks, a work-

table adjustably mounted on said rods and provided with toothed wheels to engage said racks and with means for rotating said toothed wheels, and means for moving said rods endwise and thereby causing said work-table to move toward and from said stationary die, substantially as herein described, for the purpose set forth.

7. In a riveting-machine, the combination of a stationary die carried by a movable bar, an arm or beam carried by a standard and to which said movable bar is pivoted, a riveting-lever fulcrumed to said standard, a movable riveting-tool carried by said lever, and a hydraulic press, the plunger of which is arranged to actuate said riveting-lever, substantially as herein described, for the purpose set forth.

8. In a riveting-machine, the combination, with a riveting-lever, of a hydraulic press and a block arranged to act against one arm of said lever and jointed to the plunger of said press, substantially as herein described, for the purpose set forth.

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

WALTER SKAIFE.

Witnesses:

FRED DAHUE,

AMBROSE FISH,

*Notary's Clerks, both of 19 Change Alley,  
London.*