No. 661,778. Patented Nov. 13, 1900.

H. H. THORNTON.

RIVETING MACHINE.

(Application filed Mar. 31, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

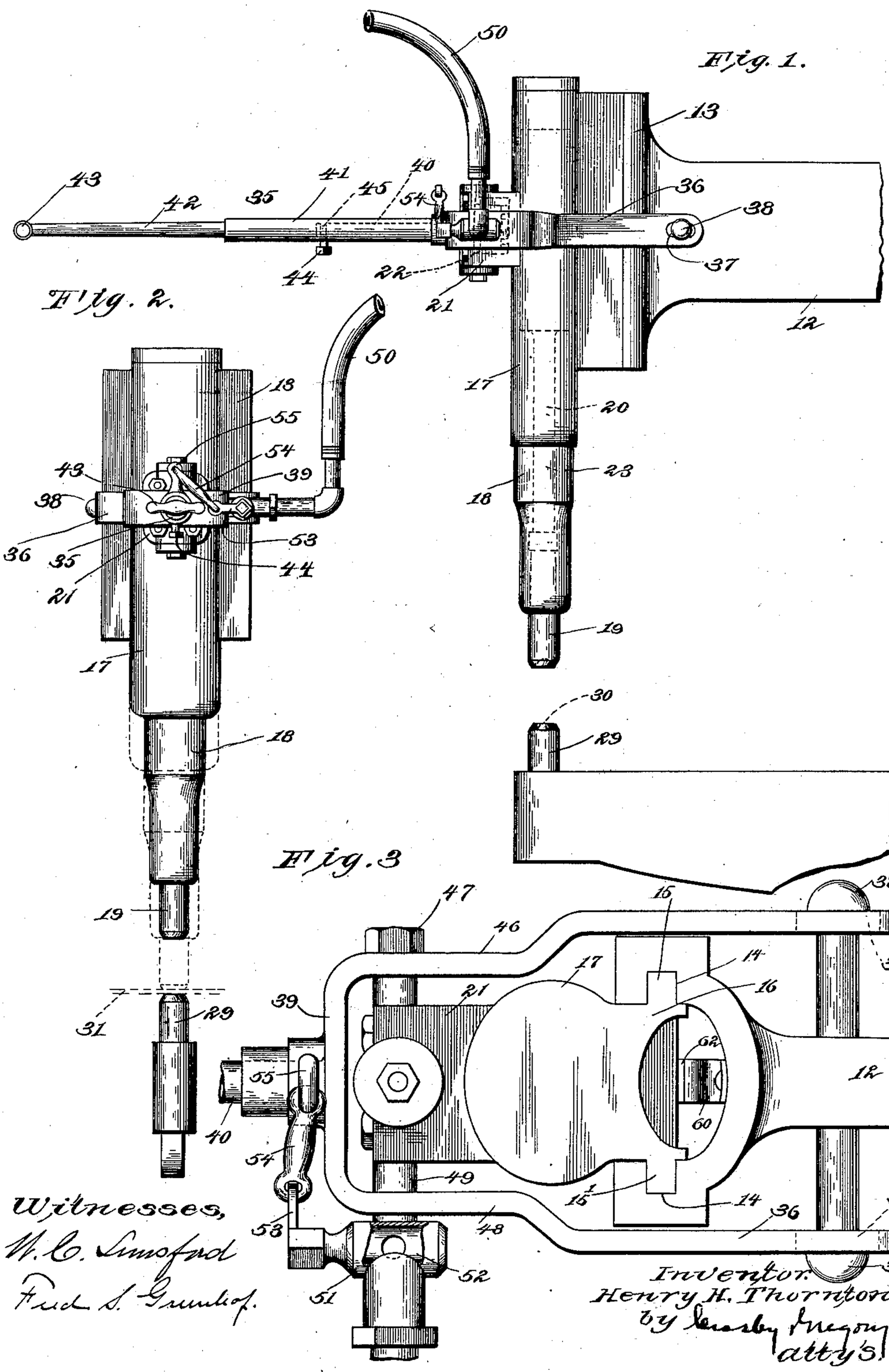

Fig. 2.

Fig. 3

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Fig. 6.

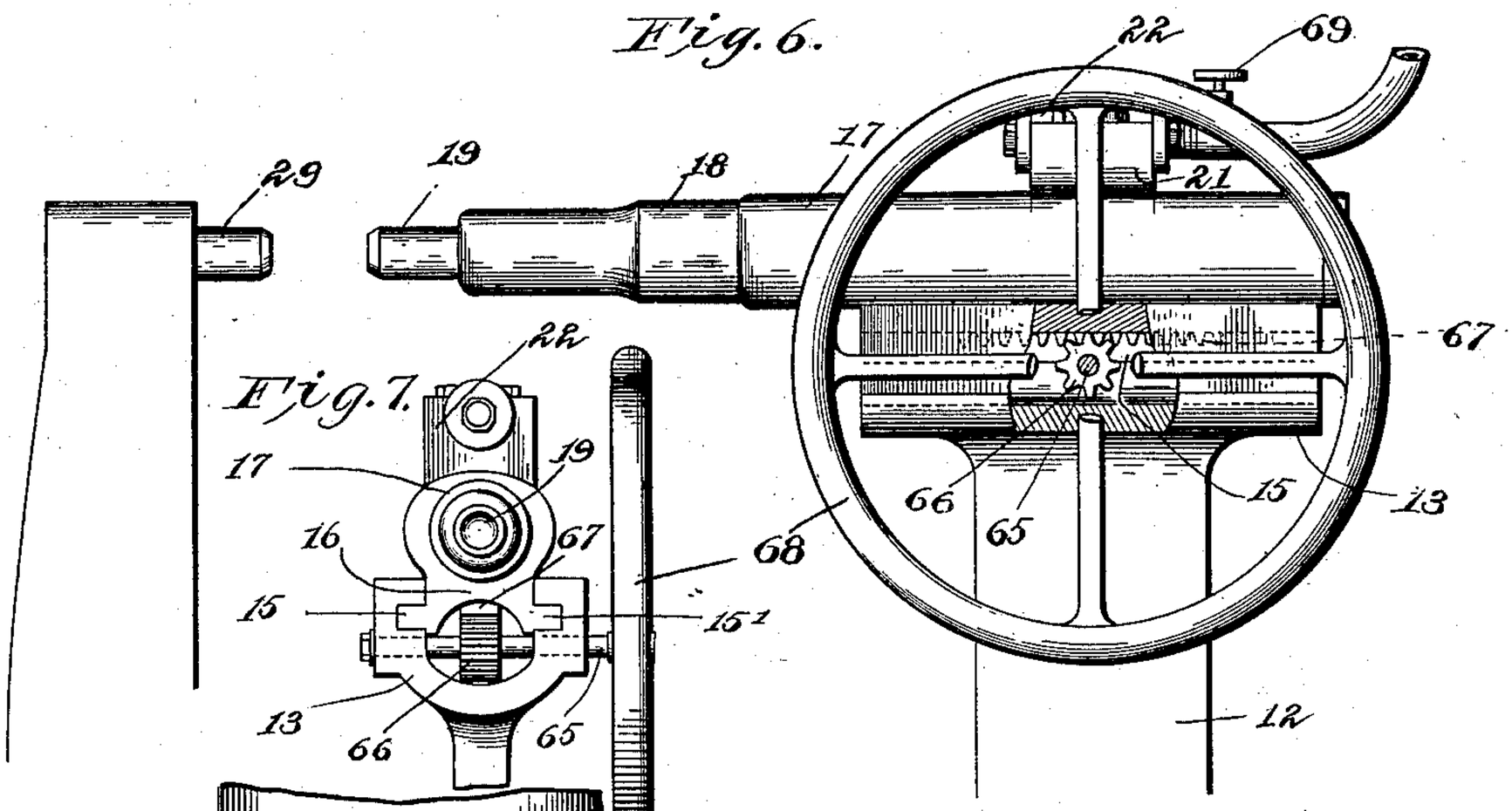

Fig. 7.

Fig. 5.

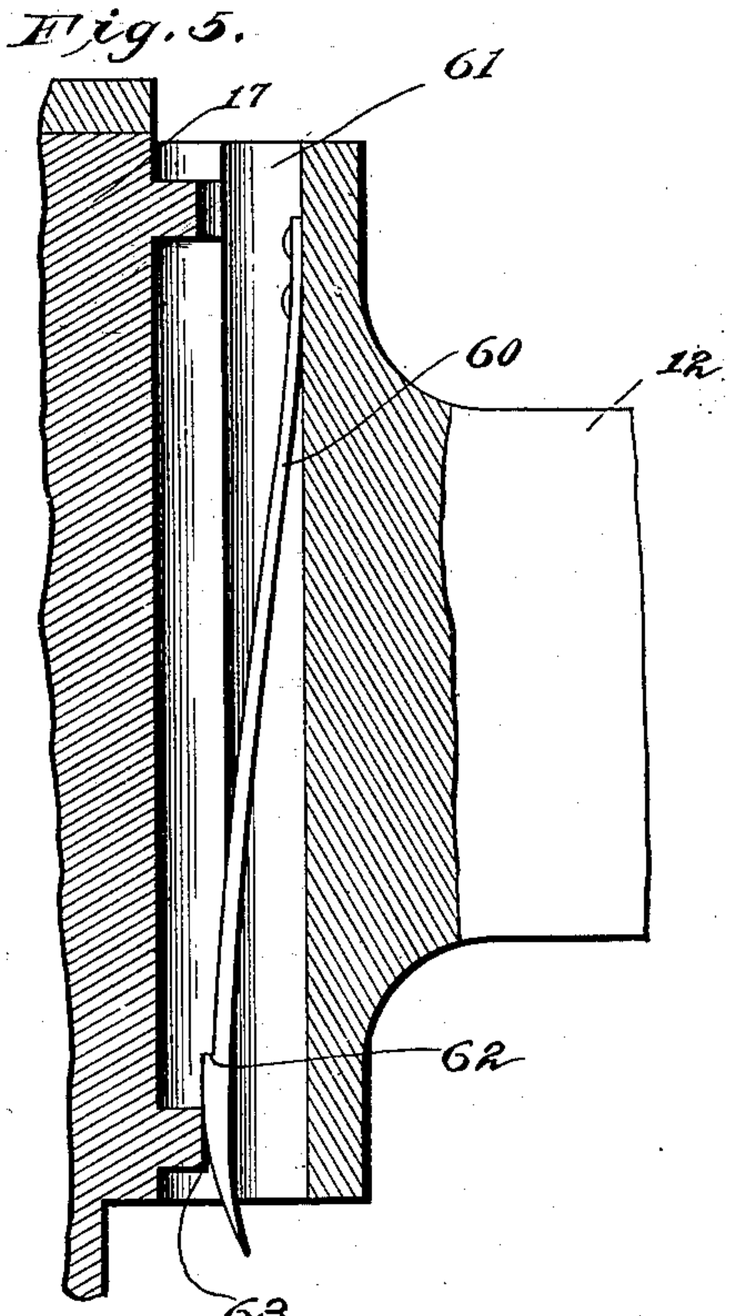

Fig. 4.

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UNITED STATES PATENT OFFICE.

HENRY H. THORNTON, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO THE ROBERTS IRON WORKS COMPANY, OF CAMBRIDGE, MASSACHUSETTS.

RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 661,778, dated November 13, 1900.

Application filed March 31, 1900. Serial No. 10,905. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. THORNTON, a resident of Somerville, county of Middlesex, State of Massachusetts, have invented an Improvement in Riveting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like figures on the drawings representing like parts.

This invention relates to riveting-machines, and in the embodiment of the invention illustrated in the drawings and hereinafter described I employ a fluid to secure the action of the riveting or heading tool, and although the fluid may be of any suitable character I secure highly-advantageous results by employing compressed air.

The improved machine involves as one of its features a tool, a carrier therefor, and an actuator to move the carrier back and forth to advance the tool into contact with the work, said actuator operating to set in operation mechanism which imparts a blow to the tool, these several parts being of the type hereinafter described, and pointed out in the claims.

In the embodiment of the invention illustrated the carrier consists of a cylinder having a piston provided with a hammer. The carrier or cylinder receives the tool and maintains it in such position as to receive the strokes of the hammer upon the reciprocation of the piston. The tool can be moved into contact with the work and when it is in such position I am enabled upon the first blow struck by the hammer upon the tool to secure the maximum effect of the machine, and also am enabled to secure work similar to hand operation, except, of course, that the force exerted is very much multiplied.

By the improved apparatus I avoid the use of springs now in general use for moving the tool back from the work, such springs requiring frequent tensioning and sometimes breaking.

In the drawings, Figure 1 is a side elevation, with a portion of the framing removed, of one type of machine. Fig. 2 is a front elevation of the same. Fig. 3 is an enlarged plan view of the forward side of the machine, showing more especially the supply-valve and the means for moving the carrier back and forth. Fig. 4 is a vertical sectional view, upon an enlarged scale, of the lower end of the carrier or cylinder, showing the tool and hammer therein, the hammer being down. Fig. 5 is a similar view of the upper or right-hand end of the carrier or cylinder, showing a means to hold the same in its retracted position. Fig. 6 is a side elevation showing a different type of apparatus, and Fig. 7 is a front view of the same.

The framework for sustaining the different parts of the apparatus may be of any suitable character. It is represented in Fig. 1 as consisting of a yoke 12, part of which has been broken away.

The machine shown in Fig. 1 has its carrier mounted for vertical movement to advance the tool into or out of contact with the work. The upper branch of the yoke 12 has a head 13, grooved, as at 14 and 14′, respectively, to receive the tongues or gibs 15 and 15′ upon the vertical reciprocative slide 16. The cylinder 17 is rigidly mounted upon said slide, and said cylinder is in the nature of a carrier for the riveting-tool. The sleeve 18 constitutes a part of the cylinder, it forming a detachable prolongation thereof and constituting a receiver, as well as a guide, for the tool 19. The cylinder 17 contains the piston 20, (shown only by dotted lines in Fig. 1,) and it has mounted thereupon the chest or casing 21, inclosing the slide-valve 22, also shown by dotted lines and only in said Fig. 1. The piston 20 and slide-valve 22 are adapted to be operated by fluid, which in the present case is air, and as they are both common types I deem it unnecessary to illustrate them any further than by the showing in the figure in question, said slide-valve 22 and piston being reciprocated upon the admission of fluid to the chest or casing 21. The piston is extended downward, as at 23, to constitute a hammer or striker, the extended portion being enlarged, as at 24, where it engages the upper end of the heading-tool 19.

The sleeve 18 is shown as being in screw-threaded engagement with the main or body part of the cylinder, as at 25, (see Fig. 4,) the screw-thread providing means for adjusting the force of the stroke of the hammer, for by unscrewing the sleeve 18 the hammer will be given a longer and hence a more power-

ful stroke, while by screwing the sleeve 18 up tightly against the cylinder 17, as shown in Fig. 4, the length of stroke of the hammer will be shortened, and consequently said hammer will give a less powerful blow.

The tool 19 is held frictionally within the sleeve 18, the pressure thereupon being comparatively light, just sufficient to prevent the tool falling from the sleeve, but enough to permit the relative motion of the tool with respect to the sleeve, as the tool has not only a slight backward motion when being operated upon, but it is found in practice that it has a rotative one also. The tool has a reduced stem, this construction forming a shoulder 26, abutting against the lower end of the sleeve 18. The stem of the tool 19 is engaged by a leaf-spring, as 27, secured at its lower end within the sleeve 18 and which constitutes a convenient medium for frictionally holding the tool in place.

The tool or punch 19 is cupped or concaved, as at 28, in its lower end, as is the custom, in order to head the rivet.

The lower branch of the yoke 12 is in the nature of an anvil, and it sustains in vertical line with the tool 19 the post 29, concaved, as at 30, in its upper side to receive the lower end of the rivet projecting through work, as 31, sustained upon the upper side of the post 29, as shown by dotted lines in Fig. 2. This will bring the upper end of the rivet in position to be headed. When the rivet is thus positioned, the carrier will be brought down with the tool 19 over and in engagement with the upper end of the rivet, and thereafter the tool will be operated in such manner that it can flatten out or head the rivet, the tool being acted upon in the present case by the fluid-operated piston which strikes a multiplicity of very powerful blows upon the upper end of said rivet.

The construction described in practice performs thoroughly efficient and very quick work, and it operates in a manner very like hand operation, this latter result being due to the fact that the tool is first moved directly into contact with the work and thereafter is hammered.

In the construction shown in Figs. 1, 2, and 3 I have shown an actuator for moving the carrier 17 back and forth and mechanism operative from said actuator for operating a supply-valve controlling the admission of fluid to the upper or body portion of the cylinder 17. The actuator is denoted by 35, (see Figs. 1 to 3,) and it involves in its construction a yoke, as 36, the branches of which fit over the upper end of the cylinder 17 and the head 13, the arms of the yoke being longitudinally slotted, as at 37, to receive the headed studs 38 upon the opposite sides of the upper branch of the yoke 12. The slot-and-stud connection permit the longitudinal movement of the actuator as the same is operated. The crosspiece 39 of the yoke 36 has a projection 40, which receives the tubular portion 41 of the bar 42, the latter being furnished at its outer end with a handle 43, by which the actuator can be raised or lowered or by which the tubular portion 41 of the bar 42 can be turned upon the projection 40. The tubular portion 41 receives a set-screw 44, (see Fig. 1,) the inner end of which fits in a groove 45 near the outer end of the projection 40. This connection permits the part 42 to be turned relative to the part 40, but prevents them being detached, a turning movement of the actuator being necessary, as will hereinafter appear, to effect the action of the main or supply valve. The branch 46 of the yoke 36 receives, near its forward end, the bolt 47, tapped into the casing 21, the opposite branch 48 receiving the pipe or nipple 49, also tapped into and connecting with said casing. This pipe or nipple 49 may be connected with a hose or tube, as 50, connecting with a suitable source of fluid-supply. Any kind of fluid may be employed, although I secure excellent results from compressed air. The pipe 49 is intersected by the valve-casing 51, containing a valve 52, shown as being of the plug type, though this is not essential. The stem of the valve has an offset 53 connected to the link 54, which in turn is united to the projection 55 at the inner end of the tubular portion 41 of the actuator 35. By grasping the handle 43 and turning the same to the right the part 41 will be also turned, so as to move the projection 55 in a corresponding direction and throw the link 54 diagonally downward to the right, so as to open the valve 52 and permit the compressed air to pass from the tube 50 into the casing 21 and thence into the body portion of the cylinder 17 to operate the piston 20, and consequently the hammer 23, so that the latter can strike the tool 19. The parts are represented in Fig. 1 as occupying their normal positions, the tool 19 being up. To head rivets, the outer end of the actuator 35 will be grasped and swung down, bringing the parts to the dotted-line position shown in Fig. 2.

When the tool 19 is positioned upon the work, the movable portion of the actuator 35 will be turned so as to open the main valve 52 to secure the operation of the piston, hammer, and tool. When the rivet is headed, the valve will be closed by turning the movable portion of the actuator in a reverse direction, after which the parts can be returned to their initial position by lifting up the actuator 35.

I provide means for holding the cylinder 17 elevated, and the same is shown consisting of a longitudinal leaf-spring 60, supported in the chamber 61 in the head 13 back of the slide 16, the shoulder 62 at the free end of the spring being adapted to engage the catch 63 upon the slide. (See Fig. 5.) The slide has a slight upward movement beyond that at which it is latched normally by the spring 60, and just before the parts are lowered the slide will be lifted for a short distance and after-

ward moved rapidly down, and as the motion is slightly accelerated the offset or catch 63 by engaging the shoulder 62 will force the spring-latch suddenly backward to release the slide. When the slide is lifted, the spring-latch 60 or its shoulder 62 will by its own action engage under the catch 63 to hold the slide, and consequently the other parts, up until again freed.

In Figs. 6 and 7 I have shown the carrier for the tool arranged for horizontal movement, and except for the means for advancing said carrier and the means for operating the valve the type of machine shown in said figures is the same as that illustrated in the other views, and hence I shall use corresponding characters for designating similar parts. Of course no latch is necessary to hold the cylinder back.

The head 13 supports the transverse shaft 65, having near its middle a pinion, as 66, in mesh with a rack 67 upon the under side of the slide 16. The shaft 65 is further provided with a hand-wheel 68, by turning which the cylinder 17 through the intermediate rack and pinion can be moved back and forth to carry the tool 19 into or out of engagement with the work.

The stem of the supply-valve is provided with a finger-piece, as 69, by which said supply-valve can be opened or closed to control the supply of air to the chamber 21, and consequently to the cylinder 17.

From the above description it will be observed that my riveting-machine embodies a supporting-frame having a suitable guide, on which guide a carrier is reciprocated, said carrier being so constructed as to contain all the operative parts of the riveting-machine. By this construction the riveting-machine as an entirety may be moved upon its support, so as to bring the tool in contact with the work, and subsequently by an independent operation the said riveting-machine is set in motion to perform the riveting operation.

The invention is capable of considerable modification within the scope of the appended claims, and it is evident that the machine may be employed for purposes other than riveting.

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

1. In a riveting-machine, a cylinder, a riveting-tool connected with the cylinder, a piston in the cylinder to operate the tool, a guiding-support for the cylinder, an actuator to move the cylinder back and forth on said support in the direction of the stroke of the piston to bring the tool in contact with the work, and means operated by the actuator for supplying a fluid to the cylinder to operate the piston.

2. In a riveting-machine, a tool, a cylinder, a piston in the cylinder to operate the tool, a slide connected with the cylinder, means to support the slide, an actuator to move the slide back and forth upon its support to carry the tool in contact with or away from the work, and means operated by the actuator to admit a fluid to the cylinder for operating the piston thereof.

3. In a riveting-machine, a cylinder, a tool having a smooth stem supported by the cylinder, a piston in the cylinder to operate the tool, a spring fixed in relation to the cylinder and bearing against the smooth stem of the tool whereby the tool is frictionally sustained by the cylinder but is free to rotate on its axis.

4. In a riveting-machine, a cylinder having an extension, a riveting-tool supported by said extension, a piston in the cylinder to operate the tool, and a spring fixed to the interior of said extension and bearing against the stem of the tool, whereby the tool is frictionally sustained in said extension but is free to rotate on its axis.

5. In a riveting-machine, a cylinder, a piston in the cylinder, means for admitting a fluid to the cylinder to operate the piston, a sleeve having a screw-threaded engagement with the cylinder, and forming an extension thereof, a tool having a smooth stem inclosed by said sleeve, a spring fixed to the interior of said sleeve, and bearing against the stem of the tool, whereby the tool is frictionally sustained in the extension but is free to rotate on its axis.

6. In a riveting-machine, a framework, a cylinder, a piston in the cylinder, an actuator to move the cylinder back and forth on the framework in the direction of the stroke of the piston, means operable by the actuator to admit a fluid to the cylinder to operate the piston, a sleeve connected with and forming a continuation of the cylinder, a tool inclosed by said sleeve, a hammer connected with the piston to operate the tool, and a spring in the sleeve to engage said tool.

7. In a riveting-machine, a framework, a cylinder on the framework, a piston in the cylinder, an actuator to move the cylinder back and forth upon the framework, means operated by the actuator for admitting a fluid to the cylinder to operate the piston, a sleeve adjustably connected with and forming a continuation of the cylinder, a tool inclosed by said sleeve, a hammer connected with the piston to operate the tool, and an anvil coöperating with said tool to head the rivet.

8. In a riveting-machine, a framework, a cylinder supported thereby, means to move the cylinder back and forth upon the framework, a piston in the cylinder, means operated independently of the cylinder-actuating means for admitting a fluid to the cylinder for operating the piston, a sleeve in screw-threaded engagement with and forming a continuation of the cylinder, a tool partially inclosed by said sleeve, said tool having a smooth stem, a hammer connected with the piston to impart a blow to the tool, and a

spring fixed to the sleeve and engaging the tool whereby the said tool is frictionally sustained by the sleeve and is free to rotate on its axis.

9. In a machine of the class described, a cylinder provided with a sleeve in screw-threaded engagement therewith and forming a continuation of the same, a piston in the cylinder, means to effect the operation of the piston, a tool partially inclosed by the sleeve, a flat spring also inclosed by the sleeve to engage the sides of the tool, and a hammer connected with the piston to operate the tool.

10. In a machine of the class described, a cylinder, a piston in said cylinder, a valve controlling the admission of fluid to said cylinder, an actuator for advancing the cylinder, and means operated by the actuator to open the valve.

11. In a machine of the class described, a cylinder, a piston in said cylinder, a valve controlling the admission of fluid to said cylinder, an actuator for advancing the cylinder, means operated by the actuator to open the valve, a tool, and means operative with the piston to impart a blow to the tool.

12. In a machine of the class described, a cylinder, a piston in the cylinder, a valve controlling the admission of fluid to the cylinder, an actuator for advancing the cylinder, including a turning member, connections between said turning member and the valve to operate the latter, a tool, and means operative with the piston to operate the tool.

13. In a machine of the class described, a cylinder, a yoke connected with the cylinder having a projection, a sleeve turning upon the projection, a piston in the cylinder, a valve controlling the admission of fluid to the piston, and connections between said valve and the sleeve.

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

HENRY H. THORNTON.

Witnesses:

HEATH SUTHERLAND,

LOUISE ROTHSTEIN.