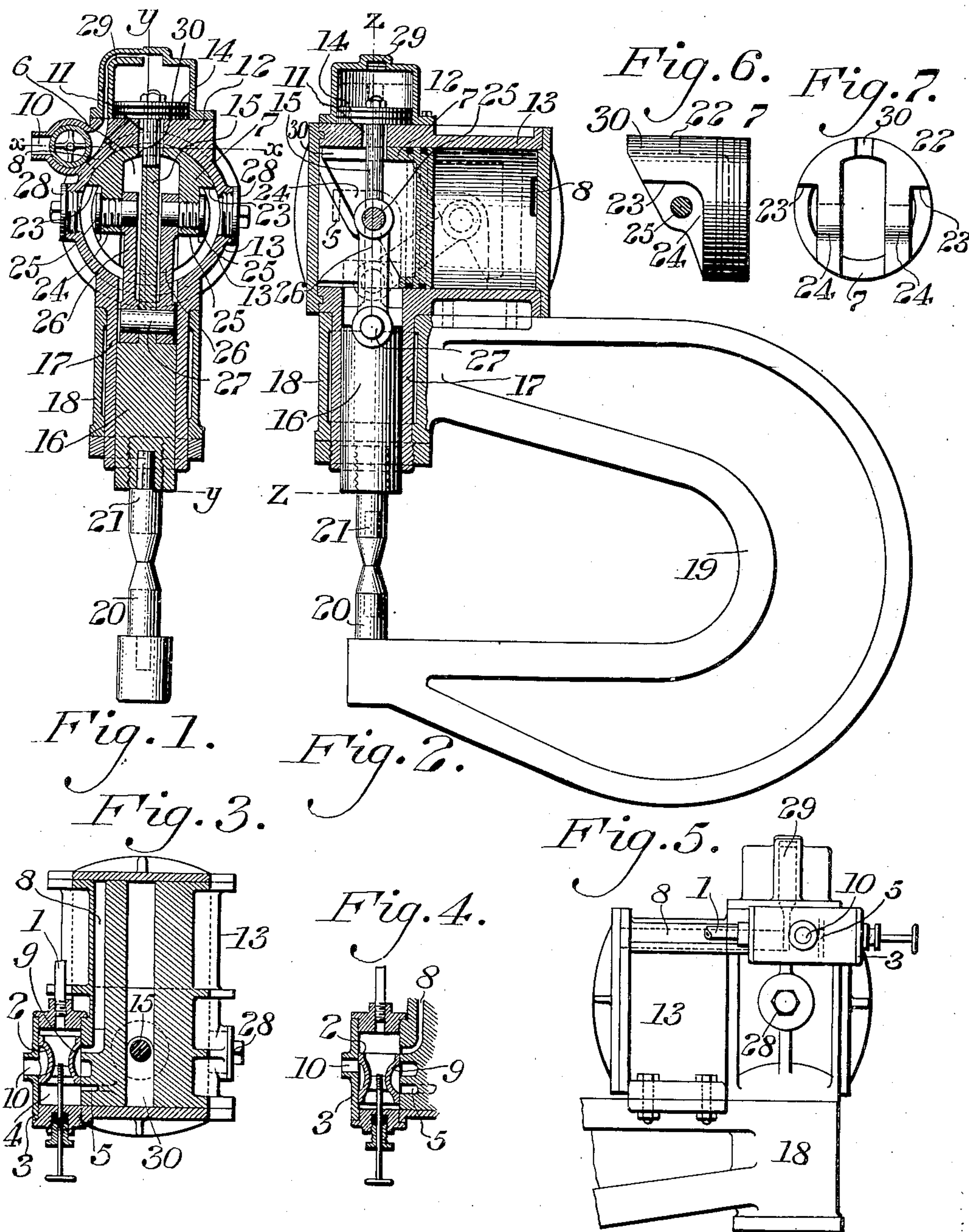


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S. S. CASKEY.
PUNCH OR RIVETER.

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UNITED STATES PATENT OFFICE.

SAMUEL S. CASKEY, OF PHILADELPHIA, PENNSYLVANIA.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SAMUEL S. CASKEY, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Punches or Riveters, of which the following is a specification.

My invention consists of a novel construction of a riveter wherein I employ a novel construction and combination of main piston, riveting-ram, and toggle mechanism connected therewith, whereby a powerful and efficient device is produced and wherein the motive fluid is utilized to the maximum degree of efficiency.

It also consists of the novel construction of a riveting-ram, main piston, and auxiliary piston rigidly connected to said riveting-ram, said main piston being connected to said riveting-ram by suitable toggle mechanism.

It also consists of a combination, with the construction above described, of a valve mechanism whereby the movement of the auxiliary piston, main piston, and riveting-ram are controlled in a simple and efficient manner.

It further consists of novel features of construction, all as will be hereinafter fully set forth and claimed.

Figure 1 represents a sectional view of a riveter embodying my invention, the section being taken on line *z z*, Fig. 2. Fig. 2 represents a section on line *y y*, Fig. 1. Fig. 3 represents a section on line *x x*, Fig. 1. Fig. 4 represents a sectional view of the valve seen in Fig. 3 in reversed position. Fig. 5 represents an outside elevation of the engine portion of the riveter. Fig. 6 represents a side elevation of the main piston in detached position. Fig. 7 represents a front elevation of Fig. 6.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, when the parts are in the dotted position seen in Fig. 2 the valve mechanism appears as seen in Fig. 3, it being understood that live air enters the inlet-pipe 1 and passes through the valve 2 in the valve-chest 3 into the chamber 4 and passes through the passage 5 into the toggle-chamber 6, thereby moving the main piston 7 from the position seen in full lines in Fig. 2 to the position seen dotted in said figure. During the movement of the piston 7 from left to right the exhaust takes place through the port 8 around the neck 9 of the valve 2 and

through the outlet 10 to the atmosphere. A portion of the air in the toggle-chamber 6 passes through the passage 11 in the upper wall of the main cylinder 13 and pressing upon the under face of the auxiliary piston 14 raises the latter from the position seen in full lines to the position seen dotted in Fig. 2.

The piston 14 has depending therefrom the rod 15, the lower end of which is connected to or integral with the riveting-ram 16, which reciprocates in the bushing 17, which is preferably a part of the main cylinder 13, said bushing being supported in the portion 18 of the hook 19, which supports the lower die 20, the upper die 21 being carried by the ram 16.

The piston 7 is preferably constructed with an extended bearing-surface 22 on its upper portion and has the recess 23 at each side thereof, adjacent to which are the lugs 24, through which pass the pins 25, which hold in position the upper ends of the links or struts 26, the lower ends of the latter having the pin 27 passing therethrough, whereby the ram 16 and said links are caused to operate in unison.

28 designates plugs or closures in the sides of the main cylinder for permitting access to the pins 25.

29 designates a port connected with the port 8, whereby air is admitted and exhausted above the piston 14 simultaneously with the admission and exhaust of air from the right-hand side of the piston 7 through the port 8.

30 designates an opening in the top portion 22 of the piston 7, through which the rod 15 is permitted to pass.

By the use of the auxiliary piston 14 in conjunction with the main piston 7 I am enabled to use a very simple mechanism and produce almost any desired pressure on the ram 16 with a minimum expenditure of motive fluid for the full stroke, for it is obvious that the area of the auxiliary piston need be only sufficiently greater than that of the head of the ram 16 to overcome the friction of the links.

It will be apparent that when the struts 26 are in an inclined position, as is seen dotted in Fig. 2, there will be a critical angle at which the thrust of the main piston 7, through the moving struts 26, will be more in a horizontal line than in a vertical line, as is desired. This limits the travel of the ram unless the auxiliary piston carries the lower ends of the struts above the critical angle on the upward stroke and below the critical an-

gle on the downward stroke. It will be further apparent that by my novel arrangement of auxiliary and main pistons whereby they move at an angle to each other there is never
 5 any dead-center, and the apparatus becomes instantly and effectively operative in whatever position the pistons may assume.

It will be apparent from the foregoing that this riveter is built for very hard usage, and
 10 there is very little liability of breakage. The packings are easy of examination, and the construction of the machine secures the maximum pressure on a rivet with as little weight in the machine as is possible. It works rapidly without shock or jar, is easy to handle,
 15 and gives a uniform pressure on every rivet. No blow is given when using this machine, and therefore no crystallization takes place upon the rivet when being driven.

20 It will be evident that various changes may be made by those skilled in the art which may come within the scope of my invention, and I do not, therefore, desire to be limited in every instance to the exact construction
 25 herein shown and described.

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

1. A punch or riveter having a ram and a
 30 plurality of actuating-pistons moving at an angle to each other and operatively connected with said ram, the connections between the pistons and ram being constructed and arranged to cause one of the pistons to in-
 35 crease its effective force during its stroke.

2. A punch or riveter having a ram and a plurality of actuating-pistons each independently connected with said ram, one of said
 40 pistons being adapted to move toward the line of movement of said ram and the connections between the pistons and ram being constructed and arranged to cause one of the pistons to increase its effective force during its stroke.

45 3. A punch or riveter having a ram and a plurality of actuating-pistons operatively connected with said ram, the line of travel of one of said pistons being at an angle with that of said ram, and the movement of each
 50 of said pistons being at an angle with the other.

4. A punch or riveter having a ram, an actuating-piston in line with and directly connected to said ram and a second actuating-
 55 piston moving at an angle with said ram.

5. In a punch or riveter, a ram, a main piston moving at an angle with said ram and connected therewith by a link and an auxiliary piston substantially in line with and di-
 60 rectly connected to said ram.

6. In a punch or riveter, a ram, a main piston moving at an angle with said ram, having link connection therewith and adapted by its relation to said ram to increase its effective
 65 force during its stroke and an auxiliary pis-

ton substantially in line with and directly connected to said ram.

7. In a punch or riveter, a ram, a main cylinder set at an angle with said ram, a main piston in said cylinder having link connection
 70 with said ram and an auxiliary piston substantially in line with and directly connected to the ram, said main piston having an extended bearing-surface at one side.

8. In a punch or riveter, a ram, a main cylinder set at an angle with said ram, a main piston in said cylinder having link connection
 75 with said ram and an auxiliary piston substantially in line with and directly connected to said ram, said main piston having an extended bearing-surface at one side and slot-
 80 ted to pass the rod of said auxiliary piston.

9. In a punch or riveter, a ram-chamber, a ram, a plurality of cylinders angularly disposed with respect to each other, actuating-
 85 pistons in said cylinders, connections independent of each other between said pistons and said ram, ports and passages leading to each end of all of said cylinders and a single valve controlling all of such passages.
 90

10. In a punch or riveter, a ram, a main cylinder set at an angle with said ram, an auxiliary cylinder set substantially in line with
 95 said ram, pistons in said cylinders connected with said ram, passages for the admission of air to each side of each of said pistons and unitary means controlling all said passages.

11. In a punch or riveter, a ram, a main cylinder set at an angle with said ram, an auxiliary cylinder set substantially in line with
 100 said ram, pistons in said cylinders connected with said ram, air admission and exhaust passages connected with each side of each of said pistons and a single valve controlling all
 105 said passages.

12. A punch or riveter comprising a yoke, a ram-cylinder engaged with one end of said yoke, a ram in said cylinder, a main actuating-cylinder set at a right angle with said ram-
 110 cylinder, a piston in said main cylinder, a link connecting said piston with said ram, an auxiliary actuating-cylinder, substantially in line with said ram-cylinder a piston in said auxiliary cylinder and directly connected with
 115 said ram and means for the admission of air to said cylinders.

13. A punch or riveter comprising a yoke, a ram-cylinder engaged with one end of said yoke, a ram in said cylinder, a main actuating-cylinder set at a right angle with said
 120 ram-cylinder, a piston in said main cylinder, a link connecting said piston with said ram, an auxiliary actuating-cylinder substantially in line with said ram-cylinder, a piston in said auxiliary cylinder directly connected
 125 to said ram and means for the admission of air to said cylinders, said main cylinder being so placed in relation to said ram-cylinder that its piston may move forward so as to bring
 130 said links substantially in line with said ram.

14. A punch or riveter comprising a yoke, a ram-cylinder engaged with one end of said yoke, a ram in said cylinder, a main actuating-cylinder set at a right angle with said cylinder, a piston in said main cylinder, a link connecting said main piston with said ram, an auxiliary actuating-cylinder substantially in line with said ram-cylinder, a piston in said auxiliary cylinder directly connected to said ram, and unitary means for air admission and exhaust connected with each of said actuating-cylinders whereby the pistons are moved simultaneously.

15. In a punch or riveter, a ram, an actuating-piston set at an angle with said ram and auxiliary means independently and positively connected with said ram for advancing said ram at the beginning of its stroke.

16. In a punch or riveter, a ram, an actuating-piston set at an angle with said ram, and auxiliary means independently and positively connected to the ram and operative both to advance said ram at the beginning of its stroke and to retract said ram.

17. In a punch or riveter, a ram, an actuating-piston having a line of travel at an angle with that of said ram and having link connection therewith and auxiliary means for moving said ram at or near the critical angle of the lines of travel of said piston and said ram.

18. A fluid-operated mechanism including a cylinder and a piston comprising a cylindric portion, a lateral extension and a lug having means for attaching thereto a connecting portion.

19. A fluid-operated mechanism including a cylinder and a piston comprising a cylindric portion, a laterally-extended bearing portion and a lug adjacent said bearing portion and having means for pivotally attaching thereto a link.

20. A fluid-operated mechanism including a cylinder and a piston comprising a cylindric portion, a laterally-extended bearing portion having a longitudinal slot therein and a lug apertured for the reception of a link-connecting pin.

21. A fluid-operated mechanism including a plurality of cylinders, a plurality of pistons set at an angle with each other, one of said pistons having a cylindric portion, a laterally-extended bearing portion having a longitudinal slot therein and lugs adjacent said bearing portion, the other of said pistons having a rod adapted to traverse said slot.

22. In a pressure-operated mechanism, a plurality of pistons set at an angle with each

other, one of said pistons having a cylindric portion, a laterally-extended bearing portion having a longitudinal slot and apertured lugs adjacent said bearing portion, the other of said pistons having a rod adapted to traverse said slot, links connected with the lugs on said first-named piston and a moving portion connected to both said rod and said links.

23. In a pressure-operated mechanism, a chamber, a plurality of cylinders connected with said chamber, actuating-pistons in a plurality of said cylinders, an actuated piston in one of said cylinders and a lateral aperture in said chamber whereby the assembling of the parts is facilitated and a removable plug closing said aperture.

24. In a pressure-operated mechanism, a chamber, a plurality of cylinders connected with said chamber, an actuated piston in one of said cylinders, actuating-pistons in a plurality of said cylinders, one of said last-named cylinders being at an angle with another, separate connecting means between each of said actuating-pistons and said actuated piston and a lateral-closure apertured in said chamber at a point common to the line of travel of said connecting means whereby the assembling of the parts is facilitated.

25. A punch or riveter having a ram and a plurality of actuating means therefor, said actuating means being constructed and arranged to be as to one member thereof uniformly, and as to the other increasingly effective, during the stroke of the ram.

26. A fluid-operated mechanism including a ram, a plurality of actuating-pistons and connections between said pistons and said ram said connections being constructed and arranged to cause one of said pistons to be uniformly and the other increasingly effective, during the stroke of the ram.

27. A fluid-operated mechanism including a ram and a plurality of actuating-pistons, connections between the ram and pistons in virtue of which one travels at the same rate as said ram and the other at a relatively increasing rate.

28. A fluid-operated mechanism including a ram, a plurality of actuating-pistons one of which is in line with said ram and connected thereto so as to move at the same rate, the other at an angle with said ram and connected thereto so as to move at a relatively increasing rate.

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