No. 833,441. PATENTED OCT. 16, 1906.

S. S. CASKEY & S. C. BOND.

RIVETER.

APPLICATION FILED APR. 4, 1902. RENEWED MAR. 16, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

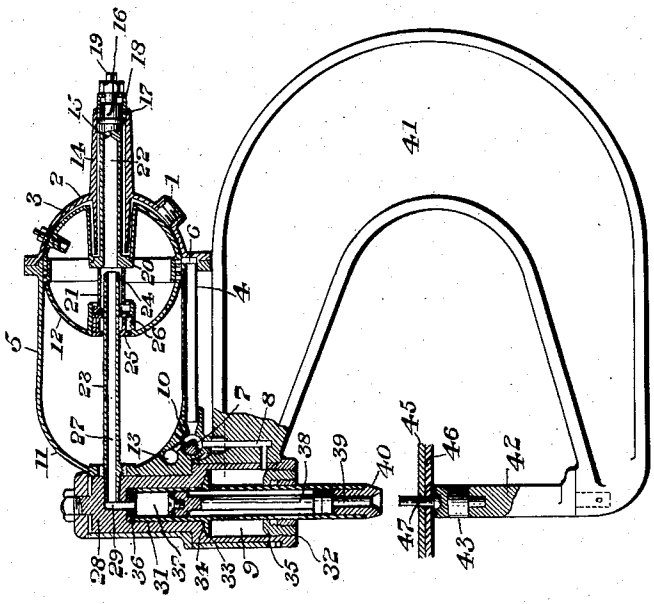


Fig. 3.

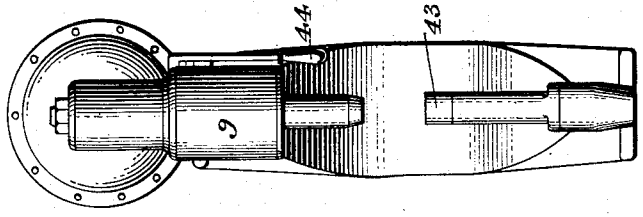
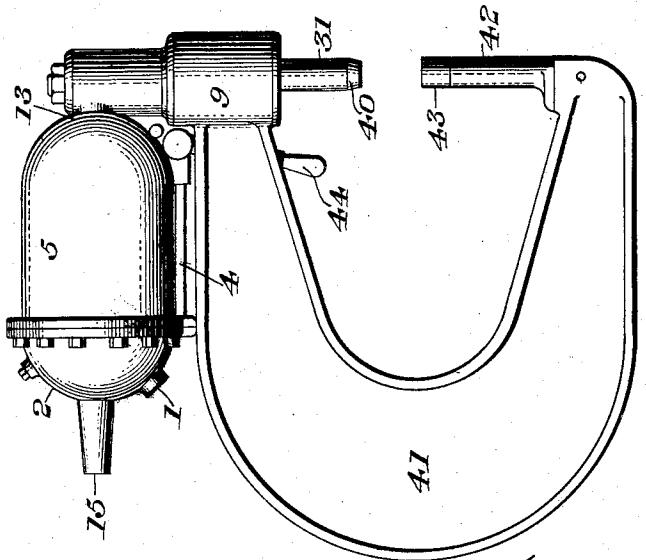


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 4.

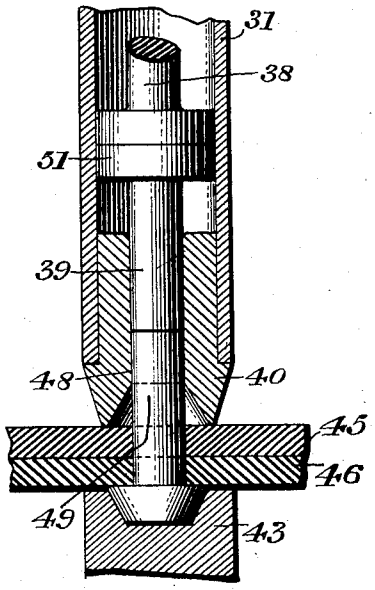


Fig. 5.

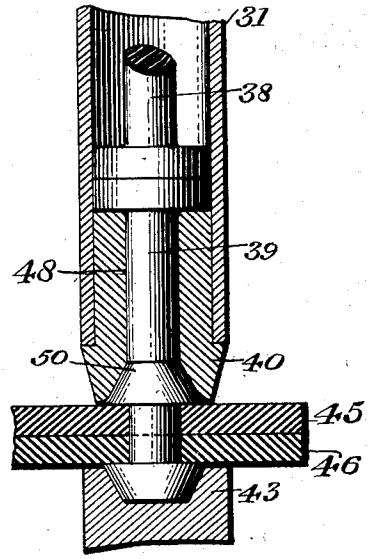
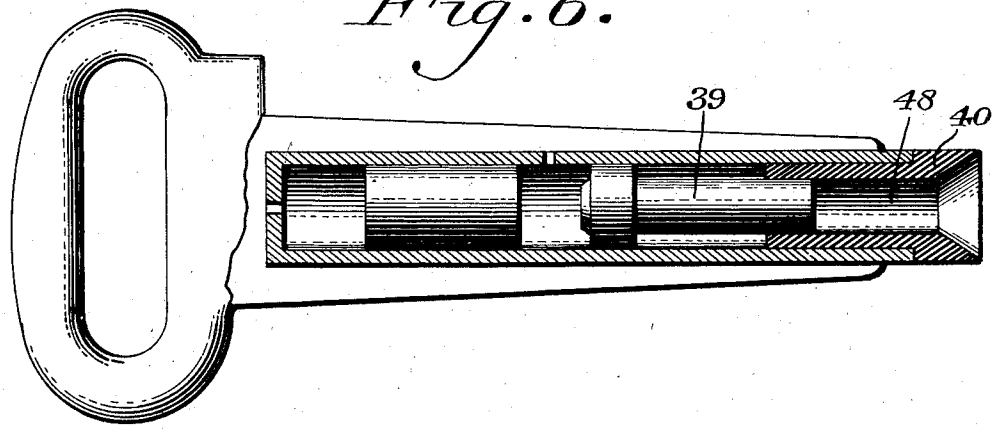


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 7.

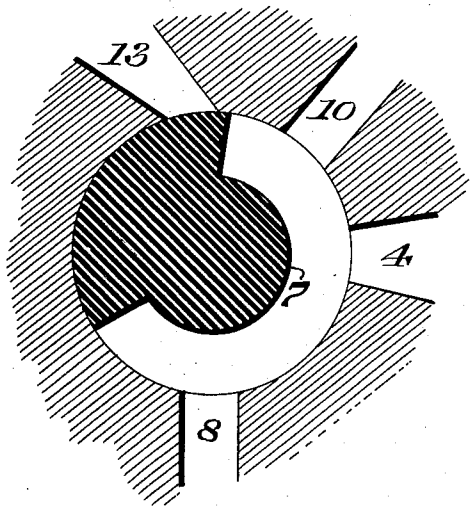


Fig. 8.

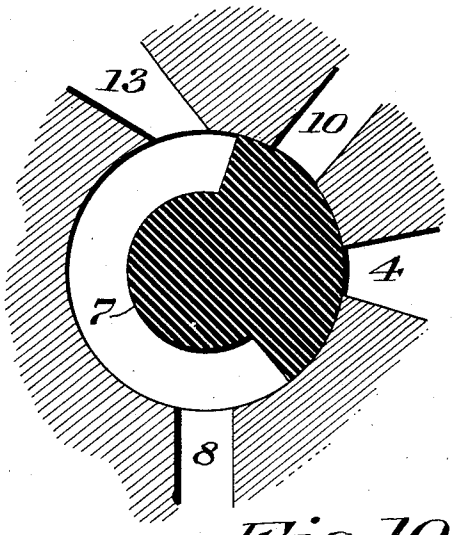


Fig. 9.

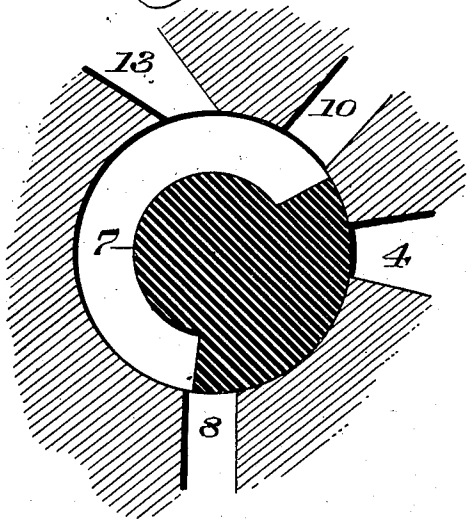
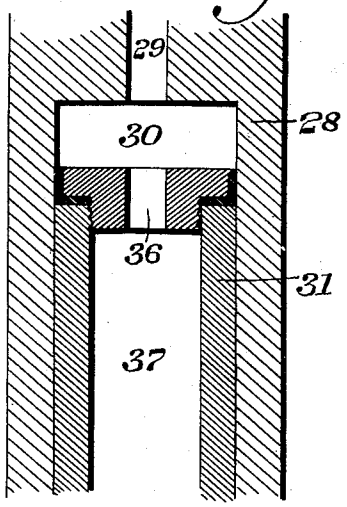


Fig. 10.



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RIVETER.

No. 833,441. Specification of Letters Patent. Patented Oct. 16, 1906.

Application filed April 4, 1902. Renewed March 16, 1906. Serial No. 306,347.

To all whom it may concern:

Be it known that we, SAMUEL S. CASKEY, residing in the city and county of Philadelphia, State of Pennsylvania, and SAMUEL C. BOND, residing at Wilmington, in the county of Newcastle, State of Delaware, citizens of the United States, have invented a new and useful Improvement in Riveters, of which the following is a specification.

Our invention consists of an improved construction of a fluid-pressure riveter or punch wherein the expense of production is reduced to a minimum and the construction simplified, whereby great power is obtained at a minimum cost.

It further consists of an improved construction of a rivet-set, whereby perfect alinement of the rivet-heads is assured.

It further consists of novel means for clamping the plates together before final action on the rivets.

It further consists in providing means whereby the excess of metal is utilized to cause the total pressure of the machine to act on the rivet-head at the proper time.

Figure 1 represents a longitudinal sectional view of a fluid-pressure riveter or punch embodying our invention, a portion thereof being shown in elevation. Fig. 2 represents a side elevation thereof. Fig. 3 represents an end elevation. Figs. 4 and 5 represent a sectional view of the rivet-set employed, on an enlarged scale, showing the same in different positions. Fig. 6 represents a partial sectional view and partial elevation of the rivet-set as applied to a hammer. Figs. 7, 8, and 9 represent diagrammatic views of the valve employed in different positions. Fig. 10 represents a sectional view of a portion of the head and plate-clamping piston on an enlarged scale.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates the inlet for the motive fluid in the cylinder-head 2, which is preferably of semispherical shape in its inner contour, whereby the curved inner wall 3 is formed.

4 designates a tube which is preferably exterior to the cylinder 5 and communicates with the interior of the cylinder-head 2 through the port 6, said tube having situated at substantially one end thereof the operating-valve 7, said valve controlling the passage in said tube and also controlling a port or passage 8, which leads to the interior of an auxiliary cylinder 9 and which thus forms with the tube 4 a communication between the interior of the cylinder-head 2 and said auxiliary cylinder 9. 10 designates a port or passage likewise controlled by the valve 7 and which communicates with the interior of the cylinder-head 11, which latter is always separated by the hollow piston 12 from the cylinder-head 2, so that there is no communication between said cylinder-heads 2 and 11 except as controlled by the valve 7, as hereinafter described. 13 designates the exhaust, which is also controlled by said valve 7.

The cylinder-head 2 is provided with the rearward extension 14, in which reciprocates the tail-rod 15, the latter having the enlarged portion 16, which is of substantially the same diameter as the inner bore of said extension, whereby a shoulder is formed, against which is held the packing 17 by means of the follower 18 and the nut or other fastening device 19, it being apparent that said tail-rod, packing-nut, and bolt reciprocate in unison. The inner extremity of the tail-rod 15 is secured within the piston 12 by means of the shoulder 20 and the sleeve 21, whereby it will be seen that said piston and tail-rod must move in unison. The tail-rod 15 is provided with the longitudinally-extending chamber 22, which is of substantially the same diameter as the alining stationary rod 23, the end 24 of which latter enters the piston 12 and terminates a short distance from the extremity of the tail-rod 15 when the latter and its piston are in their extreme position, for example, in their right-hand position, as indicated in Fig. 1. The rod 23 extends freely through the packing-nut 25, which is secured in the opening 26 of the piston 12 and is suitably packed by any means.

27 designates a longitudinally-extending passage in the rod 23, which latter is mounted in the head 28, which latter is suitably secured to the cylinder 5.

29 designates a passage in the head 28, whereby a communication is formed between the passage 27 and the chamber 30, as best seen in Fig. 10, in which chamber is situated and operates the upper portion of the plate-clamping piston 31, which also moves in the

auxiliary cylinder 9 and has one end extending therefrom and passes through a suitable stuffing-box or packing 32, said piston having the flange 33 moving in said auxiliary chamber 9 and which abuts against the shoulder 34 in its open position and against the shoulder 35 in its closed position.

In the end wall of the plate-clamping piston 31 is a port or passage 36, which is in alinement (at the proper time) with the port or passage 29 in the head 28, said port 36 leading to a chamber 37 within the plate-clamping piston 31, and in which is the rivet-driving piston 38, which is adapted to move therein and operate the rivet-driving bar 39, which is guided and moves in the rivet-set 40, which is suitably secured to or forms part of the plate-clamping piston 31 and has an opening 48 extending therethrough, into which the shank 49 of the rivet is adapted to enter and through which the rivet-driving bar moves to act upon the rivet.

41 designates a hook or yoke which is suitably secured to or carries the operating parts and also carries the anvil-bar 42, which supports the usual anvil 43.

44 designates a lever which is suitably secured to the valve 7 for operating the same.

The operation is as follows: The parts being assumed to be in the position seen in Fig. 1, the valve 7 will be in the position seen in Fig. 7—that is, the passages 4, 8, and 10 are open. The motive fluid enters the inlet 1 and passes through the port 6 and passage in the tube 4 and through the passage 8 and into the auxiliary cylinder 9 and supports the plate-clamping piston 31 in the position seen, which will occur by reason of the differential pressure areas below and above the same, it being seen that the motive fluid also passes through the port 10 into the cylinder-head 11 and holds the hollow piston 12 in the position seen, which will occur by reason of the differential pressure areas on the opposite sides of said piston 12. It will be understood that in the present instance the piston 12 is partly filled with a suitable liquid—such as oil, for example—on the upper surface of which a pressure is at all times exerted by a suitable amount of motive fluid entering the same at the proper time. The plates 45 and 46 are placed in position, with the rivet 47 in place on the anvil. The valve 7 is now turned to assume the position seen in Fig. 8. The passages 4 and 10 being closed, the passage 8, and consequently the interior of the auxiliary cylinder 9, is open to the exhaust 13. By reason of the decrease in pressure on the under side of the flange 33 (see Fig. 1) the pressure on the surface of the liquid in the hollow piston causes the liquid to pass through the passage 27 and the port 29 into the chamber 30 and thence through the port or passage 36 to the chamber 37 and lowers the plate-clamping piston 31, carrying with it the rivet-set 40 and the rivet-driving piston 38, the rivet-set and rivet-driving piston then being in the position seen in Fig. 4. The valve 7 is now turned and assumes the position seen in Fig. 9, the passage 4 being closed, the passage 8 partly closed and the port or passage 10 being open to the exhaust 13. This reduces the pressure on the hollow piston 12 on the left-hand side, (see Fig. 1,) and the motive fluid entering the inlet 1 forces the hollow piston 12 over the rod 23. This immediately cuts off communication between the interior of the hollow piston 12 and the passage 27 and prevents the high-pressure liquid from commingling with the low-pressure liquid. The rod 23 being forced into the passage 22 causes an accumulated or high pressure in the passage 27, which pressure is exerted upon the plate-clamping piston 31 and the rivet-driving piston 38, whereby the plates are clamped together and the head is formed on the rivet, as seen in Fig. 5. By the above it will be seen that perfect alinement of the rivet-heads is assured and the plates are clamped together before final action on the rivets. It will be seen that the opening 48 in the rivet-set is of such size as to correspond with the size of the shank of the rivet and that the set can be changed as is necessary, as is also the case with the rivet-driving bar 39. It will be noted that any excess of metal in the rivet in forming the rivet-head 50 will flow under the rivet-set 40 and slightly raise the same clear of the plate, whereby all the pressure of the machine will act on the rivet-head for evident purposes. It will be seen that we provide a flange 51 on the rivet-driving bar 39, which will abut against the end of the rivet-set 40, whereby the proper shaped head will always be formed on the rivet. In order to return the parts for the next operation, the valve 7 is turned to assume the position seen in Fig. 7, whereby the motive fluid will pass through the passage in tube 4, through passage 8 into the auxiliary cylinder 9, and also through port 10 in the cylinder-head 11, forcing back the hollow piston 12 and returning the plate-clamping piston 31 to its former position, (seen in Fig. 1,) and with it the rivet-driving piston 38 and the rivet-set 40 and rivet-driving plug 39, and the parts are in position to repeat the above-described operation.

In Fig. 6 we have shown the rivet-set 40 and rivet-driving bar 39 as applied to a hammer, the operation of these parts being the same as above described, the hammer operating the same by suitable pressure means.

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

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

1. In a riveting device, a hollow rivet-set and plate-clamping device, a rivet-driving bar, means for operating said set to bring the same in proper position whereby said set clamps the plates, means for operating the bar independently of said set to form the rivet, and means within the clamping device for engaging the inner end of the rivet-set to limit the movement of said bar within the set and prevent its passage therethrough whereby the head is formed within the set.

2. In a riveting device, a plate-clamping piston and rivet-set rigid with relation to each other to move in unison, said set having an opening therethrough adapted to receive the shank of the rivet, a rivet-driving bar movable in said opening, and means within said piston and rigid with said bar for engaging the inner end of the set to prevent the passage of the driving-bar through said set, whereby the head on the rivet is formed by said set within the lower end thereof.

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