

No. 615,245.

Patented Dec. 6, 1898.

T. R. BROWNE.
IMPACT TOOL.

(Application filed Dec. 17, 1897.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.

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 Henry Denny
 J. H. H. H. H.

FIG. 3.

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FIG. 4.

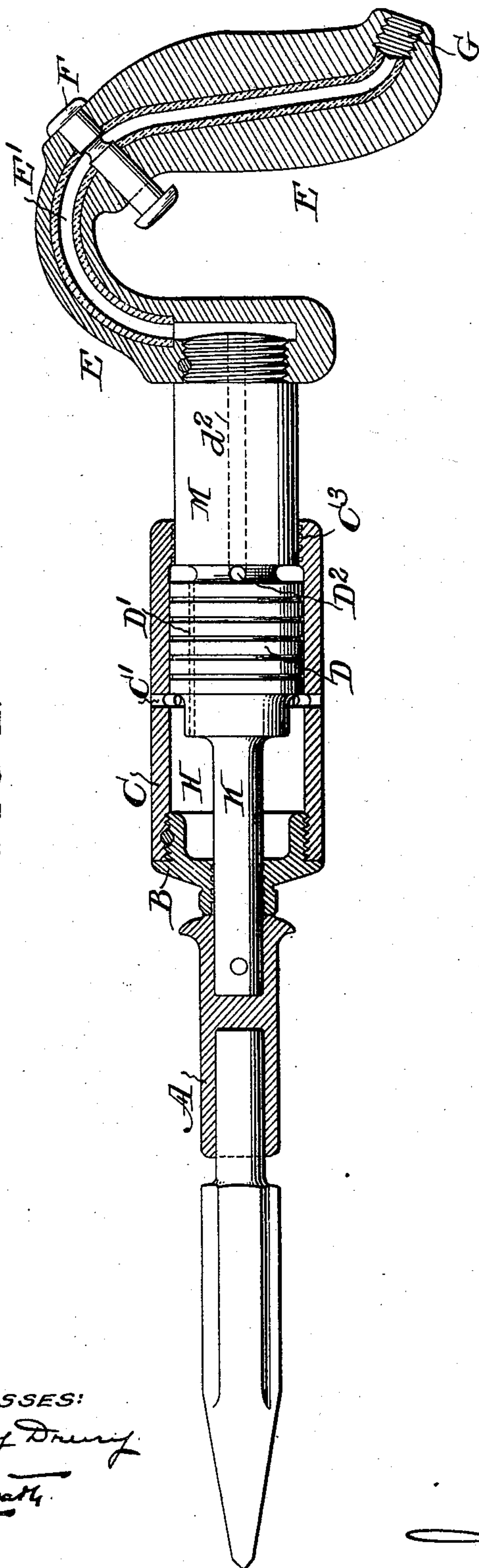
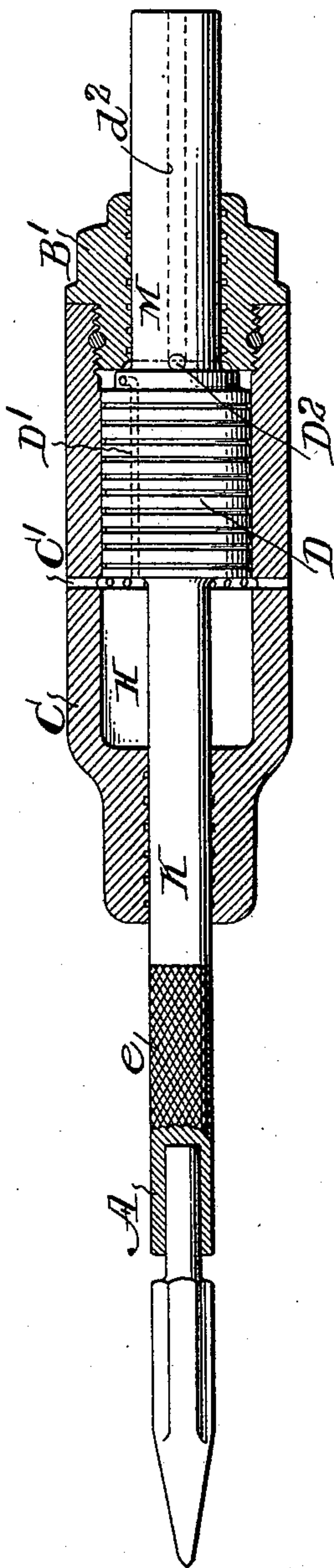


FIG. 5.



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UNITED STATES PATENT OFFICE.

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IMPACT-TOOL.

SPECIFICATION forming part of Letters Patent No. 615,245, dated December 6, 1898.

Application filed December 17, 1897. Serial No. 662,286. (No model.)

To all whom it may concern:

Be it known that I, THOMAS REATH BROWNE, a citizen of the United States of America, residing in Altoona, in the county of Blair, in the State of Pennsylvania, have invented a certain new and useful Improvement in Impact-Tools, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction of an improved automatic impact-tool such as is employed for calking, chipping, and analogous uses. Like most tools of this kind mine is especially adapted and intended to be used with compressed air, but may also be used with steam.

The object of my invention is primarily to construct an impact-tool in which the "hammer," so to speak, is the cylinder instead of using the piston to deliver the hammer-blow, as has heretofore been the case in tools of this description.

Further objects of my invention are to simplify the construction of the tool and to provide against blows and shocks other than those necessary for the proper operation of the tool itself, reducing the vibration and shock to the hands of the operator to a minimum, and practically avoiding the discomfort and injury to the operator, which has proved a serious drawback to the use of pneumatic tools of the general character to which mine belongs.

The nature of my improvements will be best understood as described in connection with the drawings, in which they are illustrated, and in which—

Figure 1 is a side sectional elevation of my impact-tool in the form in which I prefer to construct it, Fig. 2 being an end view; Fig. 3, a view illustrating a slight modification in the way of connecting the tool with the chisel or other device upon which it acts. Fig. 4 is a sectional elevation showing a modified construction of my apparatus somewhat simpler than that shown in Fig. 1, and Fig. 5 is a sectional view of still another modification embodying some of the broader principles of my invention.

In describing the tool I shall refer to the parts near the chisel as the "lower" and with

reference to parts nearer the opposite end of the tool I shall refer to as "upper" parts.

D is the piston of the tool, having extending from its lower face the piston-rod K and from its upper face the enlarged piston-rod or trunk extension M, through which portion M extends a channel d^2 for the motive fluid, said channel opening through a lateral branch or branches D^2 into the annular chamber N, formed around the upper face of the piston D. A port D' connects the upper and lower faces of the piston, and in the construction shown in Fig. 1 a port D^3 , formed in the trunk extension M, connects the annular space N with the upper outer face of the trunk extension. As shown in Figs. 1 and 4, the trunk extension M is fastened directly to a pistol-grip handle E, in which is formed a port or channel E' for the motive fluid, said channel connecting at one end, as shown, with the port d^2 and at the other end of the grip being provided with some means, as a threaded thimble, by which a flexible supply-pipe can be connected.

F is a valve extending through the upper part of the pistol-grip handle and serving as a cut-off valve to the port E' , its position being such that its upper and lower faces can be readily grasped between the finger and thumb of the operator holding the handle.

In the modification shown in Fig. 5 a grip is provided at e on the lower piston-rod extension K, the parts above described being in other respects similar, except that the extension M is here shown of much smaller diameter, and is rather of the character of a piston-rod than of a trunk extension.

Referring now particularly to the construction shown in Fig. 1, E^3 is a cylinder extending around the trunk extension M and secured to or formed integral, as shown, with the grip E, the arrangement being such as to form an annular chamber J between the trunk extension and the relatively stationary cylinder E^3 , the port D^3 opening into the top of the annular chamber J, as shown. C is the hammer-cylinder, working on the piston D and having an upper annular head C^3 , which fits on the trunk extension M and in the cylinder E^3 , as shown. The cylinder C is provided with exhaust-openings C^2 , formed through its walls, as shown, and so placed as to be cov-

ered and closed by the piston D, except when the hammer-cylinder is in its lower position—such, for instance, as is shown in Fig. 1. Where the cylinder C³ is also used, it is provided with exhaust-openings E², placed so as only to be open to the chamber J when the cylinder C is in its lower position. B is the striking-head of the hammer-cylinder, which is preferably made detachable, as shown, and which in use strikes against the head A⁴ of the tool or tool-holding device, the construction shown in Fig. 1 showing at A a tool-holding device provided with a socket A', into which the lower end of the piston-rod K extends and in which it is secured by a pin A⁵, the holding device having at its other end a socket A², adapted to receive the shank O' of the cutting or calking tool O. In the modification shown in Fig. 3 the socket A' is formed in the upper end of the tool O without the interposition of any tool-holding device. In both cases the outwardly-extending beading A³ serves to protect the fingers of the operator from getting pinched between the hammer and the head A⁴.

The operation of the tool is readily followed. The motive fluid coming through the port d² and its lateral branch or branches D² enters the annular chamber N, and where no pressure exists on the under side of the piston D or in the chamber J the fluid, acting on the annular inner face of the head C³ of the piston, forces it upward on the piston D and in the chamber J, and I here remark that the area of the chamber J and the effective area of the lower head of the cylinder C should be equal. The motive fluid also passes through the ports D' and D³ into the space below the piston D and into the chamber J, and as the upward motion of the hammer-cylinder has closed the ports C² and E² the pressure in the two chambers rapidly rises until it checks the backward motion of the hammer-cylinder and then rapidly exceeding the small amount of pressure exerted to move the hammer-cylinder backward and acting on its heads B and C³ it forces the said cylinder downward, delivering a blow through the hammer-head B on the tool or tool-holding device, simultaneously with or slightly before which the exhaust-ports C² and E² are opened, permitting the exhaust of the compressed air in the two chambers, whereupon the pressure in the chamber N again causes the hammer-cylinder to move backward, the operation being automatic and of great frequency.

The construction shown in Fig. 4 does not differ from that shown in Fig. 1 except that the cylinder E³ is omitted and no port D³ provided in the trunk extension M. The operation of this modification is the same as the first, omitting the action of the chamber J, and need not be further described.

In the modification shown in Fig. 5 the hammer-head of the cylinder is shown as being its upper instead of its lower head, and the blow is struck directly upon the piston and

transmitted through the piston-rod K to the tool instead of being struck directly upon the head of the tool or tool-holder, as in the previously-described constructions.

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

1. In an impact-tool, a piston in combination with an upper piston-rod or extension to which a grip is attached and a lower piston-rod to which the tool is connected, a cylinder-hammer working on the piston, and means for admitting and exhausting motive fluid whereby the cylinder-hammer is caused to reciprocate on the piston as described.

2. In an impact-tool, a piston having an upper piston-rod or extension of less diameter, and a lower piston-rod in combination with a cylinder-hammer fitting on the piston and its upper or lower rods and extensions, and having exhaust-ports as C² in its walls placed as specified so as to be closed by the piston except when the cylinder-hammer is in its lower position thereon, a port for motive fluid leading into the space between the upper face of the piston and the head of the cylinder-hammer, and a port leading from said space to that between the lower face of the piston and the lower head of the cylinder-hammer.

3. In an impact-tool, a piston having an upper piston-rod or extension of less diameter, a lower piston-rod and a port as D' connecting its upper and lower faces in combination with a cylinder-hammer fitting on the piston and its upper or lower rods or extensions and having exhaust-ports as C² in its walls placed as specified so as to be closed by the piston except when the cylinder-hammer is in its lower position thereon and a port for motive fluid leading into the space between the upper face of the piston and the head of the cylinder-hammer.

4. In an impact-tool, a piston having an upper piston-rod or extension of less diameter, a lower piston-rod, a port as D' connecting its upper and lower faces and an admission-port as D² leading into the space above the upper face of the piston in combination with a cylinder-hammer fitting on the piston and its upper and lower rods or extensions and having exhaust-ports as C² in its walls placed as specified so as to be closed by the piston except when the cylinder-hammer is in its lower position thereon.

5. In an impact-tool, a piston having rods or extensions of less diameter from both faces, a port as D' connecting its faces and a supply-port as D² leading to its upper face in combination with a hammer-cylinder having exhaust-ports as C' formed in its sides in position to be closed by the hammer-cylinder except when it is in its lower position, and a separable hammer-head attached to the end of the cylinder which strikes the blow.

6. In an impact-tool, a piston having rods or extensions of less diameter from both faces, a port as D' connecting its faces and a sup-

ply-port as D^2 leading to its upper face in combination with a hammer-cylinder having exhaust-ports as C' formed in its sides in position to be closed by the hammer-cylinder except when it is in its lower position, and a separable hammer-head as B secured to the lower end of the cylinder.

7. In an impact-tool, a piston having rods or extensions of less diameter from both faces, a port as D' connecting its faces and a supply-port as D^2 leading to its upper face through the upper rod or extension in combination with a hammer-cylinder having exhaust-ports as C' formed in its sides in position to be closed by the hammer-cylinder except when it is in its lower position and a pistol-grip as E secured to the end of the upper rod or extension and having a port E' extending through it and a valve F extending through the grip in position as described to be grasped by the thumb and finger of the operator.

8. A pistol-grip for an impact-tool having a port as E' extending through it for motive fluid and a valve F extending entirely through

the grip as specified and in position to be grasped at both ends between the thumb and finger of the operator.

9. In an impact-tool, the combination of a piston as D having an upper trunk extension as M of somewhat less diameter, a lower rod as K , a port as D' connecting the faces of the piston, a supply-port formed in the extension M and leading to the upper piston-face, and a port D^3 leading from the space above said face to the upper center end of the extension with a cylinder as E^3 surrounding the extension M so as to form the annular chamber J , a hammer-cylinder as C working on piston D and having an upper annular head as C^3 working in the annular chamber J and exhaust-ports as C^2 and E^2 formed in cylinders C and E^3 as described so as to open simultaneously when the hammer-cylinder is in its lower position.

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Witnesses:

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