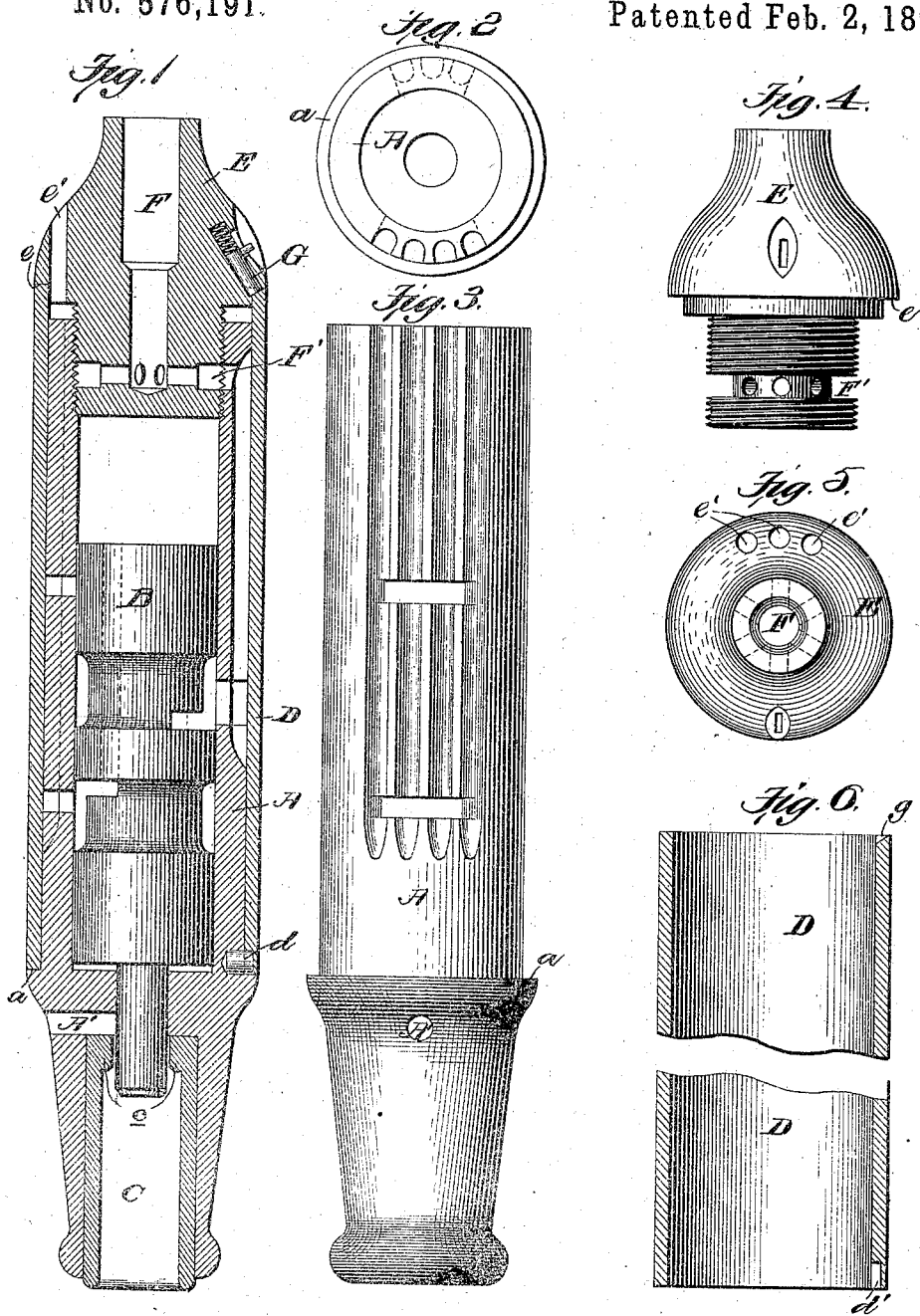


(No Model.)

T. R. HILL.
ENGINE.

No. 576,191.

Patented Feb. 2, 1897.



Witnesses:
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by Paul Bakewell
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UNITED STATES PATENT OFFICE.

THOMAS ROBY HILL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE
CHOUTEAU MANUFACTURING COMPANY, OF MISSOURI.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 576,191, dated February 2, 1897.

Application filed July 15, 1896. Serial No. 599,232. (No model.)

To all whom it may concern:

Be it known that I, THOMAS ROBY HILL, a citizen of the United States, residing at the city of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented a certain new and useful Improvement in Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a longitudinal sectional view through my improved engine. Fig. 2 is a top plan view of the cylinder. Fig. 3 is a side elevational view of the cylinder. Fig. 4 is a side elevational view of the head-block. Fig. 5 is a top plan view of the same. Fig. 6 is a detail sectional view of the sleeve.

This invention relates to a new and useful improvement in engines of that class which are designed more particularly to be run by compressed air as the motive fluid. The front end of the cylinder is formed with an opening to receive the end of a chisel or like tool, upon which the piston delivers impacting blows.

The engine is designed for use in cutting and carving stone, calking boilers, &c.

The special features of the invention which form the subject-matter of this present application reside in the construction of the cylinder, the sleeve, and the head-block, which coöperates with the cylinder and sleeve to hold the latter in position, there being suitable provision made for preventing independent rotation of the parts after they are once assembled.

Another feature of the invention resides in the construction of the front end of the cylinder whereby the end of the tool-shank may be inserted to receive the blow from the piston without being reduced in its diameter.

Other features of the invention reside in the construction, arrangement, and combination of the several parts, all as will hereinafter be described, and afterward pointed out in the claims.

In the drawings, A indicates the cylinder, bored to receive a suitable piston B. The piston shown in this application is provided

with ports with which coöperate suitable cylinder-ports substantially like those shown and described in United States Letters Patent No. 542,498, dated July 9, 1895, granted to Pierre Chouteau, assignee of Frank C. Rinsche, and I do not, therefore, claim the same here as my invention, nor do I desire to be understood as limiting myself to this particular form of piston or port arrangements, as there are other forms of pistons and port arrangements which could be used in connection with my invention. The forward end of the cylinder is bored for the passage of the piston-stem, the extreme forward end of the cylinder being bored to a larger diameter to receive a sleeve or bushing C, in which the end of the chisel (not shown) is inserted. The inner end of this sleeve is formed with an inwardly-projecting flange c, which is of greater diameter than the piston-stem opening leading from the piston-chamber. In the cylinder and connected with this space between the piston-stem and sleeve-flange is an opening A'. The object of so constructing the cylinder and sleeve is to enable the piston-stem to strike a blow of full strength on the end of the chisel or like tool without being influenced by the compression or suction of air which would occur were it not for this communication with the exterior. Again, by so enlarging the diameter of the sleeve and forming a flange at its rear end it is not necessary that the chisel-shank should be reduced to form a shoulder which would act as a stop to prevent the chisel following the piston-stem in its movement to the rear, said flange c here acting as a stop, which thereby greatly reduces the cost of production of chisels to be used in connection with an engine.

The forward end of the cylinder is formed with a shoulder a, against which abuts a sleeve D, said sleeve extending rearwardly beyond the cylinder. In order to prevent independent rotation of either the sleeve or the cylinder when said parts are assembled, I seat a suitable plug or pin d in the cylinder, which pin is received in a recess or notch d' in the forward end of the sleeve D.

In the construction of engines where a sleeve has been employed in connection with the cylinder, between which parts were formed the several cylinder-ports, it has been the practice heretofore, so far as I am aware, to form said ports in such a manner that the sleeve or the cylinder, as the case might be, would have to bridge a considerable space and be unsupported at the point of said ports. This is objectionable in this that in the rough handling of the tool the sleeve, being unsupported for some considerable portion of its diameter, would become indented and, perhaps, form a leak which would detract from the efficiency of the engine. Besides if the indentation is deep enough it will decrease the area of the port. I have overcome this objection by forming the ports between the cylinder and sleeve of a number of grooves which have a rib between them to support the sleeve. These grooves are connected together by the ports which lead into the cylinder, and said grooves may extend to the end of the cylinder, as shown in Fig. 3, or they may terminate short of the end of the cylinder, as shown at the right in Fig. 1.

E indicates a head-block which is formed with a shoulder *e*, adapted to fit against the rear end of the sleeve and clamp said sleeve in position. The forward end of this head-block is threaded and received into the rear end of the cylinder. The head-block is so formed that there is a chamber or space left therebetween and the rear end of the cylinder, into which space lead the grooves forming the exhaust-ports. Leading from this space are openings *e'* in the head-block, said openings being so arranged side by side that by covering one or more of said openings the exhaust will be choked and the speed of the engine controlled.

F indicates an inlet-passage formed in the head-block E, said passage leading to the chamber F', formed at the forward end of said head-block by reducing its diameter, as shown in Figs. 1 and 4. The object of forming this circular chamber around the head-block is that when the head-block is screwed into the cylinder its proper distance, no matter what rotary position it may occupy, it will still register with the cylinder inlet-port.

In order to prevent rotary movement of the head-block after it has been seated home, I mount in a suitable bore formed therein a spring-pressed locking-pin G, which engages with a notch *g* in the rear end of the sleeve D. The head-block is slotted, so that a projection on the locking-pin may pass through to enable the pin to be withdrawn from its engagement with the sleeve when it is desired to disassemble the tool.

From the above it will be seen that a tool constructed as shown in the drawings is simple, cheap of cost, and compact. There is very little danger of the tool becoming loos-

ened after it is once assembled, and by forming the cylinder-ports by groups of grooves, as shown, it will be seen that the cylinder supports the sleeve practically at all points of its periphery, and therefore there is very little danger of the sleeve becoming indented from rough usage.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination with the cylinder, of a piston formed with a stem on its forward end, and a sleeve or bushing having an internal flange at its rear end, the opening in the rear end of said sleeve being of larger diameter than the stem of the piston so as to leave a space between the two, and an opening in the cylinder connecting said opening in the rear of the sleeve with the exterior; substantially as described.

2. The combination with the cylinder formed with a shoulder near its front end, of a sleeve which abuts against said shoulder, said sleeve being formed with a recess in its forward end for receiving a pin seated in a recess in the cylinder, a head threaded in the rear end of the cylinder, a shoulder formed on the head for abutting against the sleeve and clamping it in position, and a spring-pressed locking-bolt arranged in the head and adapted to engage a notch in the rear end of the sleeve; substantially as described.

3. The combination with the cylinder, of a sleeve surrounding the same, a head for engaging said parts, there being a chamber formed between the end of the cylinder and head, into which chamber leads the exhaust, and two or more holes formed in the head leading from said chamber, whereby, the escape of the exhaust may be controlled; substantially as described.

4. The combination with the cylinder, of a sleeve surrounding the same, a head which fits into the rear end of the cylinder, and also engages the sleeve, there being a chamber formed between the end of the cylinder and head, into which chamber leads the exhaust, and a reduced portion in the front end of the head, which forms a chamber for the motive fluid; substantially as described.

5. The combination with a cylinder, of a head which fits into the rear end of the same, said head being formed with an inlet-passage, which leads to a chamber formed in the front end of the head, said head having its diameter reduced to form the chamber; substantially as described.

6. The combination with the cylinder which is formed with corrugations on its outer periphery to which lead ports from the interior, and a sleeve surrounding said cylinder; substantially as described.

7. The combination with the cylinder which is grooved longitudinally, said grooves being separated by a rib or partition, a port or ports

leading from the interior and connecting with said grooves, and a sleeve which surrounds said cylinder, said sleeve having practically a continuous bearing around the cylinder; substantially as described.

5 8. The combination with the cylinder whose periphery is grooved, said grooves being grouped, ports connecting said groups with the interior, and all of the grooves of a group

together, and a sleeve surrounding the cylinder; substantially as described.

In testimony whereof I hereunto affix my signature, in presence of two witnesses, this 27th day of June, 1896.

THOMAS ROBY HILL.

Witnesses:

J. F. LYNCH,
LOUIS L. DREW