

(No Model.)

H. G. KOTTEN.
PNEUMATIC HAMMER.

No. 605,486.

Patented June 14, 1898.

Fig. 1.

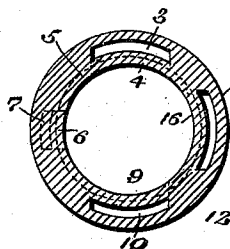
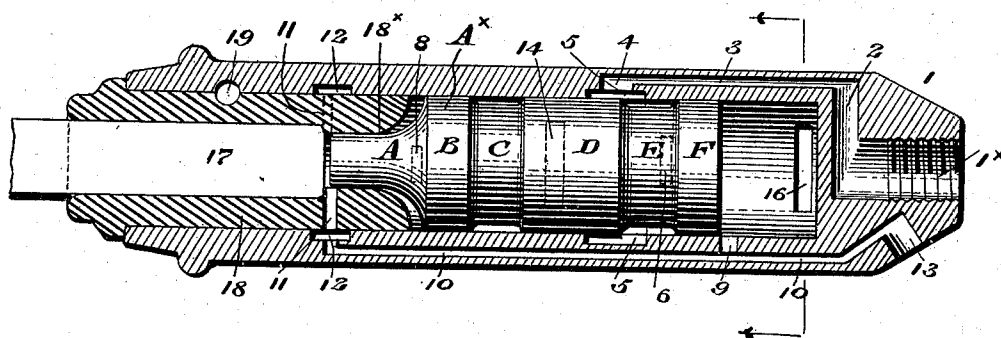
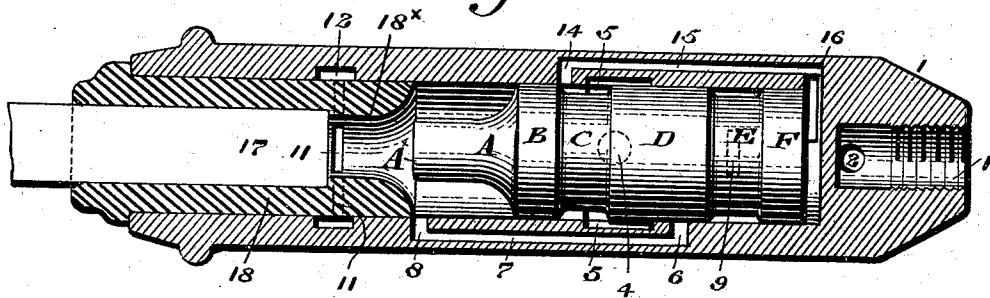


Fig. 3.

Fig. 2.



WITNESSES

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PNEUMATIC HAMMER.

SPECIFICATION forming part of Letters Patent No. 605,486, dated June 14, 1898.

Application filed October 22, 1897. Serial No. 656,063. (No model.)

To all whom it may concern:

Be it known that I, HERMAN GEORGE KOTTEN, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented a new and useful Improvement in Pneumatic Tools, which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists of an improved construction of pneumatic tool in which a solid piston-hammer is employed; and it consists especially in a novel construction of exhaust-ports which are located in the chisel-bushing and communicate with the main exhaust, in combination with other ports and passages so arranged relatively to each other that the hammer has a comparatively slow movement away from the chisel or tool employed, but has an exceedingly rapid or accelerated movement in the direction of said chisel.

It further consists of novel details of construction, all as will be hereinafter fully set forth, and particularly pointed out in the claims.

Figures 1 and 2 represent longitudinal sectional views of a pneumatic tool embodying my invention, showing the different positions which the piston-hammer thereof assumes at the commencement and end of its stroke, respectively. Fig. 3 represents a section on line *a a*, Fig. 1, showing the relative positions of the various ports and passages in the cylinder or casing of the tool.

Similar numerals and letters of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates a pneumatic tool, the same consisting of a suitable barrel or cylinder which has the inlet-port 1^x therein, said port communicating with the passages 2 and 3, which discharge into the main inlet-port 4, in proximity to which is located an annular groove or supply-chamber 5, which extends around the interior periphery of the cylinder, whereby no side pressure upon the piston-hammer A^x can exist and the same can reciprocate freely in either direction.

6 designates an inlet-port communicating with the interior of the cylinder a short distance at one side of or to the right of the chamber 5, said port 6 leading into the passage 7

and port 8, which opens into the cylinder near the chisel end of the hammer, in the present instance at a point adjacent to the termination of the chisel-bushing 18.

11 designates a plurality of exhaust-ports which pass through the chisel-bushing 18 and communicate by the annular passage 12 with the main exhaust-passage 10, which discharges into the atmosphere through the ports 13, said exhaust-port 11 being controlled by the nose or projecting striking-face A of the piston-hammer A^x, which latter consists of the enlarged portions B D F, which are connected by the grooves or reduced portions or necks C and E, said nose A entering the bore 18^x of the chisel-bushing 18 when said hammer is near the end of its stroke, it being noted that said nose moves entirely out of said bore 18^x when near the other end of its stroke.

14 designates an inlet-port located a slight distance to one side of or to the left of the main inlet-port 4 and communicating with the passage 15, which admits the motive fluid to the interior of the cylinder through the port 16, located at the right-hand portion thereof.

17 designates a chisel or tool which is held in the chisel-bushing 18, said bushing being held in position by means of a latch-pin 19 or any other suitable fastening device.

The operation is as follows: The fluid-supply pipe (not shown) is connected with the inlet 1^x of the cylinder, and the motive fluid entering the cylinder passes to the main inlet-port 4 and the annular supply-chamber 5. In Fig. 1 the piston-hammer A^x is shown at or near its extreme downward or left-hand position at the point where it contacts with the chisel or tool 17, the chamber 5 being now in communication with the port 6 through the medium of the neck or groove E of said hammer. The motive fluid passes through the port 6 and channel 7 and enters the cylinder at the port 8 in proximity to the chisel-bushing, and since the latter is secured within the cylinder or casing the pressure of the motive fluid drives the piston-hammer back or away from the chisel. When the piston-hammer is in the position seen in Fig. 1, the exhaust-port 9, which is substantially one-fourth the area of port 11, is open and allows

the pressure within the cylinder upon the back or right-hand end of said hammer to escape through the passage 10 and port 13 into the atmosphere. The motive fluid after passing through the port 8 in the front of the cylinder drives the hammer upwardly or toward the right until said hammer closes the supply-chamber 5, at which time no motive fluid can enter the port 6, passage 7, and port 8 in the front end of the cylinder; but the expansion of the compressed air will drive the hammer still farther back until the reduced end thereof leaves the bore 18^x of the chisel-bushing, in which latter it has an air-tight fit and opens the exhaust-port 11 in said bushing, by means of which communication is had with the port 12, passage 10, and the main exhaust-port 13, leading to the atmosphere. At about this period the supply-chamber 5 is in communication with the port 14, as indicated in Fig. 2, by reason of the neck or groove C, and the motive fluid passes through the port 14 and passage 15 and enters the back or extreme right-hand end of the cylinder through the port 16, and the hammer is driven forcibly and rapidly into contact with the chisel or tool 17. When the hammer is in the position indicated in Fig. 2, the exhaust-port 11 is open and permits all the air to escape from the front end of the cylinder out through the port 12, exhaust-passage 10, and main exhaust-port 13 into the atmosphere. When the hammer in its downward stroke closes the supply-chamber 5, no more air can enter the back or right-hand end of the cylinder; but the expansion of the compressed air will drive the hammer downwardly until the latter contacts with the chisel or tool and at about this period opens the exhaust-port 9 again, the parts then appearing as seen in Fig. 1.

It will be evident that since the hammer in the above-described tool works only for one-quarter of its stroke at a direct pressure and the remaining three-quarters of said stroke by expansion the tool uses the motive fluid very economically, and as the inlet-port 8 on the front end of the cylinder is but one-quarter the size of the inlet-port 16 on the back end of the cylinder and since the exhaust-port 9 on the back or right-hand end of the cylinder is but one-quarter the size of the exhaust-ports 11 on the front or chisel end of the cylinder the hammer has a comparatively slow backward movement and a very rapid forward movement in the direction of the chisel or tool, thereby striking a very hard and rapid blow thereupon.

It will be noted that the supply-pipe is secured directly to the cylinder or casing without any extra inlet-piece or other fittings, thereby making a perfectly air-tight casing under all conditions.

It will be understood that the terms "right" and "left" or "front" and "back" end of the tool are merely relative terms, the chisel end of the tool being termed the "front" and the opposite end the "back" end.

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

1. A pneumatic tool having its inlet-port in the front end of the cylinder, substantially one-quarter the size of the inlet-port on the back end of the cylinder, and the exhaust-port on the back end of said cylinder substantially one-quarter the size of the exhaust-port on the front or chisel end of the cylinder and all of said ports being controlled by the piston-hammer, whereby a comparatively slow backward movement and a very fast forward movement of the hammer are obtained.

2. In a pneumatic tool, a cylinder having a piston-hammer therein, the striking-face or nose of said hammer being of reduced diameter, a chisel-bushing in which said nose has an air-tight fit when the hammer is in its extreme forward or downward position, an exhaust-port controlled by said nose and leading to the atmosphere, said nose being adapted to be moved out of said bushing and other inlet and exhaust ports whereby movement is imparted to said hammer.

3. In a pneumatic tool, a cylinder, a piston-hammer contained therein, said hammer consisting of the grooved portions or necks C, E, the solid portions B, D, F of greater diameter and the nose A of reduced diameter, in combination with inlet and exhaust ports for admitting and exhausting the motive fluid to and from said cylinder, certain of said exhaust-ports being controlled by the nose of said hammer.

4. In a pneumatic tool, a cylinder and a main inlet-port having an enlarged supply-chamber communicating therewith, said chamber being located within the interior periphery of the cylinder, whereby no side pressure on the hammer exists, and other inlet and exhaust ports located within said cylinder, in combination with a hammer having a nose of reduced diameter, said nose being adapted to control certain of said exhaust-ports.

5. In a pneumatic tool, a cylinder having a chisel-bushing secured therein, a piston-hammer having a nose adapted to have an air-tight fit in said bushing, when said hammer is in its extreme forward position, an exhaust-port passing through said bushing, and communicating with a main exhaust-passage in said cylinder, a main inlet and other inlet and exhaust ports for enabling motion to be imparted to said hammer.

6. A pneumatic tool, consisting of a cylinder having an inlet-port in the front end thereof, substantially one-quarter the size of the inlet-port on the back end thereof, and an exhaust-port at the back end thereof substantially one-quarter the size of the exhaust-port on the front or chisel end thereof, and a hammer in said cylinder provided with a reduced nose, the latter being adapted to control said exhaust-port at the chisel end of said cylinder.

7. In a pneumatic tool, a cylinder, a piston-

hammer contained therein and provided with a nose of reduced diameter, exhaust-ports in said cylinder controlled by said nose and means for actuating said hammer.

5 8. In a pneumatic tool, a cylinder having a main inlet-port for the motive fluid, an enlarged supply-chamber communicating therewith, and located within the interior periphery of said cylinder, a piston-hammer movable in said cylinder and provided with a reduced nose, a chisel-bushing in said cylinder, which said nose is adapted to enter and an exhaust-port in said bushing controlled by said nose.

15 9. In a pneumatic tool, the combination of a cylinder having a chisel-bushing with an exhaust-port therein, a piston-hammer having a nose of reduced diameter controlling said port, and means for reciprocating said hammer.

20 10. In a pneumatic tool, the combination

of a cylinder, a chisel-bushing, inserted therein, a plurality of exhaust-ports extending through said bushing and communicating with an annular passage, the latter leading 25 to the atmosphere, a solid hammer in said cylinder provided with a nose of reduced diameter adapted to control said ports, and means for imparting to said hammer a comparatively slow backward movement and a 30 very fast forward movement.

11. In a pneumatic tool, a cylinder, a piston-hammer adapted to reciprocate therein, said hammer being provided with a projecting striking-face, an exhaust-port in said cylinder controlled by said striking-face and 35 other ports controlled by said hammer for actuating the latter.

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Witnesses:

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