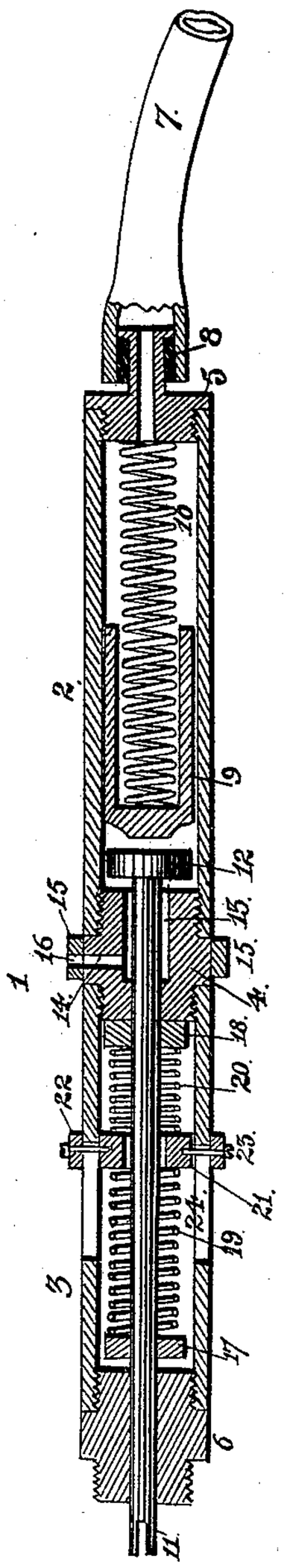
(No Model.)

W. G. SCOTT.

IMPACT TOOL.

No. 459,891. Patented Sept. 22, 1891.



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IMPACT TOOL.

SPECIFICATION forming part of Letters Patent No. 459,891, dated September 22, 1891.

Application filed November 29, 1889. Serial No. 332,047. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GIBSON SCOTT, a citizen of the United States, residing at Columbus, in the county of Lowndes and State of Mississippi, have invented certain new and useful Improvements in Impact Tools; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the figures of reference marked thereon, which forms a part of this specification.

My invention relates to power-driven hand-tools.

The objects of my improvements are to provide a power-driven hand-tool having a reciprocating movement with a variable movement of the tool, a variable stroke to the tool-driving piston, and an automatic mechanism whereby no movement of the tool results except when applied to its work.

My invention consists in the following construction and combination of parts, which will first be fully described, and the points of novelty then set forth in the claims.

The drawing represents a vertical central section showing the air-tube broken away, the same figures of reference indicating the same parts.

1 represents the tool-handle. This tool-handle is composed of two tubes or cylinders 2 and 3.

4 is an intermediate head interposed between the cylinders 2 and 3.

5 is the head at the rear of the tool-handle, and 6 the head at the front of the tool-handle.

7 is a flexible tube for conveying compressed air, gas, or other fluid for operating the piston in the tool-handle.

8 is a swiveling collar securely fastened to tube 7, and is adapted to rotate upon a rearward extension of the head 5, whereby the tool-handle may be revolved without twisting or turning the tube.

9 is the reciprocating piston which operates the tool.

10 is a spring interposed between the rear head 5 and the piston 9. One end of this spring enters within a counterbore made in the piston, as shown, and its tension is preferably quite light, but sufficient to hold the piston or hammer in contact with the tool-holder when the hammer is at rest. The spring is free at both ends and of spiral form. The air is introduced through the tube in pulsations from any suitable motor.

11 is the reciprocating tool-holder, and is carried in central longitudinal bearings made through the front head 6 and intermediate head 4.

12 is a head rigidly fixed to the inner end of tool-holder 11, so as to fit loosely in the tool-handle 1. This head 12 acts as a stop to limit the outward movement of the tool-holder and as a valve for closing an air-port leading from the cylinder 2 to the outer air. This air-port I have formed by counterboring the intermediate head 4 at 13 concentrically with the tool-holder bearing and connecting said counterbore 13 with a radial opening 14, extending therefrom out through the periphery of the head.

15 is a rotary collar provided with an opening 16, adapted to fully or partially register with the opening 14, so as to fully or partially close or open the air-port in front of the piston 9 for the purpose of varying the stroke and intensity of the piston independently of the motive power which drives the piston.

17 and 18 are washers or stops keyed to the tool-holder 11, and 19 and 20 are springs surrounding the tool-holder within the tool-handle.

21 is an adjustable collar interposed between the springs.

22 is another collar upon the exterior of the tube 3 of the tool-handle 1. These collars are oppositely connected by pins 23 passing through longitudinal slots 24. These collars are adapted to be moved along the tube 3 the length of the slots 24, which slots may be provided with offsets or bayonet-joints at each end, whereby the collars may be held at either end of the slots, or the pins 23 may be arranged to compress the collars against the sides of the cylinder at any point. Spring 19 bears against collar 21 and washer 17, and spring 20 bears against collar 21 and washer 18. By moving the collar 21 to the right, as shown in the drawing, the spring 20 is brought under increased tension, tending to throw the tool-holder inwardly and the

washer 18 against the head 4 and the valve-head 12 on the tool-holder away from the intermediate head 4 or valve-seat. In this position when the piston is operated by the motive power the tool-holder 11 is driven forward or outwardly, the spring 20 acting to return the holder back to its normal position, as shown by the drawing, after each pulsation. This gives the reciprocating motion to the tool which is attached to the holder 11. As before described, the rotary collar 15, controlling the air-port 14, acts to vary the intensity of the stroke. By moving the collar 21 to the left or the opposite end of the slot 24 from which it is shown in the drawing and fastened the spring 19 is brought under tension between washer 17 and stop-collar 21 and the tension of spring 20 released. This causes the washer 17 to be thrown against the outer head 6 and the valve-head 12 brought against intermediate head 4, thereby completely closing the air-port 14 in front of the piston. This is the normal position of the tool-holder when collar 21 is so adjusted, and no motion of the tool-holder or hammer can ensue, even though the pneumatic pulsations of the motor continue. When, however, the tool is pressed against its work, it causes the tool-holder and valve-head to be pushed inwardly, thereby uncovering the air-port 14 and its channels, when the reciprocating action of the piston-hammer again takes place and continues as long as the tool is held to its work, but which action instantly ceases when the tool is withdrawn. As there is no vibration of the tool under the above circumstances while it is carried to its work or removed therefrom, it can be controlled while in the hand with a steadiness and delicacy of touch impossible to a tool where the piston-hammer is continuously vibrating. The partial exhaust, suction, or vacuum in the tube causes the piston-hammer to be drawn rearwardly against the tension of the spring, and the succeeding compression or pulsation of the air will drive the piston or hammer against the tool-holder. The succeeding exhaust action withdraws the hammer again from the tool-holder, and so on, a continuous reciprocating action being kept up as long as the motor is in operation, the rapidity of the blows depending altogether upon the speed at which the motor is operated. The intensity of the blows of the piston-hammer depends upon the amount of air allowed to enter the port 14 to neutralize the tendency toward the formation of a vacuum in front of the piston. The greater the degree the port is opened the greater will be the blow delivered by the hammer.

The principal use I contemplate for my invention is for dental purposes; but the tool or any part thereof may be used for any other purpose for which it may prove applicable.

I claim—

1. The combination of a cylinder, a cylinder-head, an air-port in the head, and a collar or ring having an air-port therein and adapted to be rotated so as to wholly or gradually open or close the air-port.

2. In an impact tool, the combination of a tool-holder, a hammer or piston working therein, a normally-closed-valve device, and mechanism for opening the valve by pressure upon the tool-holder.

3. The combination of a tool-handle, a tool-holder reciprocating therein, a valve carried by the tool-holder, and means for adjusting or varying the normal position of the tool-holder and valve.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM GIBSON SCOTT.

Witnesses:

J. W. JOHNSTON,

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