

July 1, 1924.

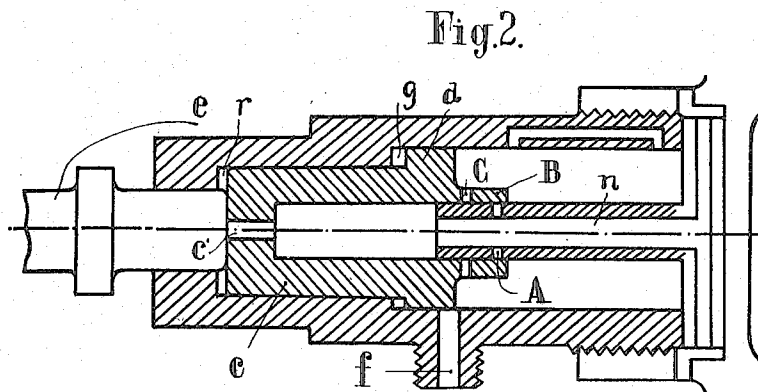
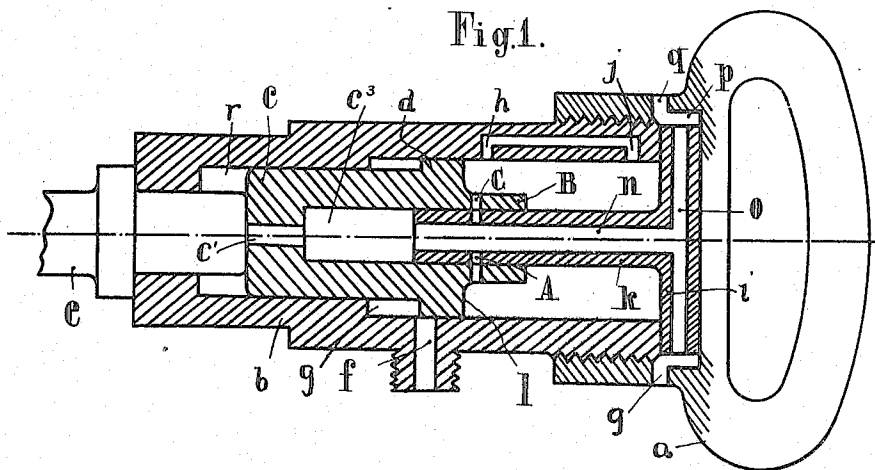
1,499,569

A. BAILLY

PNEUMATIC HAMMER

Filed Dec. 22, 1921

2 Sheets-Sheet 1



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Fig. 3.

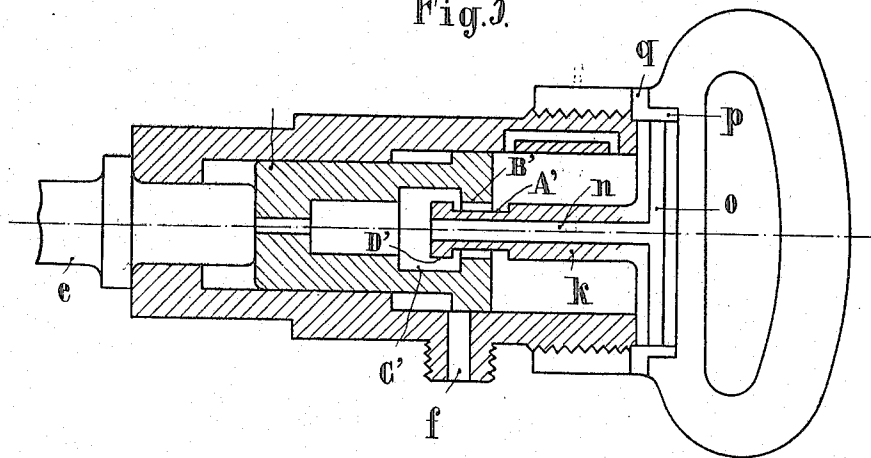
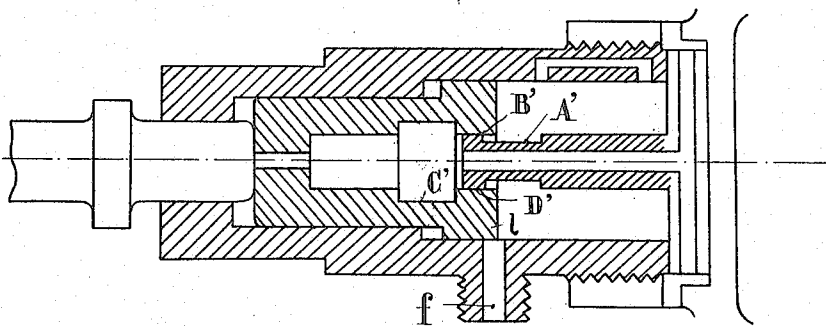


Fig. 4.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC HAMMER.

Application filed December 22, 1921. Serial No. 524,278.

To all whom it may concern:

Be it known that I, ARMAND BAILLY, citizen of the Republic of Switzerland, and resident of Paris, France, (post-office address 46 quai Henri IV), have invented new and useful Pneumatic Hammers, which improvements are fully set forth in the following specification.

This invention relates to pneumatic hammers, its object being the provision of improved means or devices permitting normal working of the reciprocatory impact element or piston, and instantaneous stoppage of said element as soon as the tool, for any reason, becomes displaced with relation thereto.

An embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a sectional view of one form of the invention showing the use of a device for effecting instantaneous stoppage of the piston in the event of the tool becoming displaced; in this figure, the piston is shown at the end of its normal outward movement.

Fig. 2 is a view similar to Fig. 1, showing the piston as having moved beyond its normal outer position.

Figs. 3 and 4 are views corresponding to Figs. 1 and 2, respectively, but showing the preferred form.

Referring more particularly to Figs. 1 and 2, the implement is shown as comprising a reciprocatory impact element or piston *c* disposed within a cylinder *b* and operated by a suitable motive fluid, in this instance compressed air. The cylinder *b* terminates at its rear or inner end in an operating handle *a* and is provided intermediate its ends with an inlet *f* for the motive fluid which is supplied from any desired source; the inner wall of the cylinder being bored at the opposite side from said inlet to form a by-pass *h-j*. The rear end plate or head *i* of the cylinder, which is clamped or otherwise secured between the cylinder end and the handle, as shown in Fig. 1, is formed with a lateral tube *k* which projects axially and forwardly into the cylinder; and the bore *n* of this tube opens at its free front end into the cylinder and at its inner or rear end into centrally-intersecting passages or conduits *o* formed internally of head *i*. The free outer ends of the conduits *o* open into an exhaust conduit *p* formed internally of the handle *a*; said exhaust conduit *p*, in turn,

opening into the atmosphere through ports *q*.

The piston *c* is reciprocated within the cylinder under the action of the compressed air, as hereinafter explained, and is provided at its inner or rear end with an annular shoulder or enlargement *d* (Fig. 1); and through the central portion of the rear face of the piston opens an axial socket *c^s* which is of a size and shape to slidably receive therein the exhaust tube *k* during the movements of the piston. A passage *c'* leads axially from the inner end of the socket and opens through the front or outer end of the piston. Consequently, the piston may thus be regarded as bored from end to end and the passage *c'* serves, as will be apparent, to permit the flow of the air leaving or entering the closed space *r* (Fig. 1).

As previously stated, means are provided for effecting instantaneous stoppage of the piston in the event that the tool, from any cause, has become displaced with relation to the piston. In the arrangement illustrated in Figs. 1 and 2, this object is effected by merely providing the piston with a rearward axial projection *B* through which the socket *c^s* opens; this projection being formed with lateral ports or apertures *C*, and the exhaust tube with corresponding ports or apertures *A*.

Starting with the piston at the end of its normal left-hand or outward stroke, as represented in Fig. 1, the operation is substantially as follows: Air under pressure passes into the cylinder through inlet *f* and fills the space *g* between the shoulder or enlargement *d* and the adjacent cylinder wall, acting on the shoulder to drive the piston inward or rearward toward the right. As the piston continues its inward movement, the exhaust tube enters further and further into the socket *c^s* and communication is ultimately established between space *g* and the forward end *h* of the by-pass *h-j*, with the result that the compressed air then flows through the by-pass into the space behind the piston. When the pressure behind the piston exceeds the pressure exerted against the front face of shoulder *d*, the piston commences its forward or outward stroke, this movement being rendered possible due to the outflow of the air in the space *r* in front of the piston through passage *c'*, socket *c^s*, bore *n* of the tube *k*, passages or conduits *o* and *p* and ports *q* to the atmosphere. As

soon as the piston, in its outward or rightward movement, brings its ports or apertures C into registration with the ports or apertures A in tube *k* exhaust takes place at the right-hand side of the piston through said registering ports, said bore and the parts *o-p-q*, the pressure on the left-hand side of the shoulder *d* predominates, and the piston again moves leftward, and so on.

As above explained, the two sets of ports or apertures referred to are brought into registration when the piston reaches the end of its normal forward or outward movement, as indicated in Fig. 1, and the air in the rear or inner part of the cylinder behind the piston then exhaust to the atmosphere through the parts C, A, *n, o, p, q*. But if, from any cause, the tool has been displaced forward, the piston will continue its forward movement beyond its normal limit and will reach the position illustrated in Fig. 2. In that position, the apertures C and A are out of registration, exhaust to the atmosphere is shut off and the compressed air entering the cylinder through inlet *f* acts against the rear face *l* of the piston, with the result that the latter is immediately stopped and held stationary. Consequently, any displacement of the tool as above described will automatically effect instant and absolute stoppage of the piston without any direct passing of the air into the atmosphere, as is generally the case with the apparatus heretofore used.

In the preferred construction represented in Figs. 3 and 4, the apertured projection B on the piston and the apertures A in the exhaust tube are omitted; and in place of the said apertures A, the tube is formed adjacent its forward end with a circumferential groove or recess A' which produces immediately in advance thereof a head or collar D' of the same diameter as the tube itself. In place of the projections B, the socket in the piston is enlarged intermediate its ends to form a chamber C'; the portion B' of said socket immediately in front of the groove having substantially the same diameter as the head or collar D' on the exhaust tube. When the parts are in Fig. 3 position, which corresponds to that illustrated in Fig. 1, the air in the rear part of the cylinder, behind the piston, will pass through the groove A' and the portion B' of the socket into the chamber C' and thence to the atmosphere through the parts *n, o, p, q*, as before; it being understood that the formation of a chamber, such as C', of

greater diameter and length than head D' is essential in order to permit the air entrance through A' and B' to pass around said head and to flow into the free end of bore *n*. On the other hand, when displacement of the tool occurs and the piston moves beyond its normal terminal position into Fig. 4 position, corresponding to the position in Fig. 2, then the head D' of the tube will be disposed within the portion B' of the socket and will shut off entry of air into chamber C' and its escape therefrom to the atmosphere. In this position, the inlet *f* will be uncovered and compressed air will enter and fill the cylinder, causing absolute stoppage of the piston.

I claim as my invention:

1. In a pneumatic hammer, the combination of a cylinder provided at its rear end with a stationary axial exhaust tube; and a reciprocatory impact piston in the cylinder having a socket in its rear end to receive said tube and a passage leading from its front end into said socket; the piston and exhaust tube having openings adapted to coact in establishing temporary communication between the cylinder and the atmosphere and thereafter to interrupt such communication and thereby cause the automatic stoppage of the piston.

2. In a pneumatic hammer, the combination of a cylinder having an operating handle at its rear end, and an axial exhaust tube fixed at said end and communicating at its rear end with outlet passages formed through said handle, said tube projecting forwardly into said cylinder; and a reciprocatory impact piston in said cylinder having an axial socket in its rear end to slidably receive said tube and an axial passage opening at one end through the front end of the piston and at the other end into said socket; said piston and exhaust tube having means for establishing temporary communication between the cylinder and the atmosphere, said means thereafter interrupting such communication so as to cause the automatic stoppage of the piston, and said cylinder having an inlet in its side wall for the motive fluid and a channel in said wall for by-passing the fluid from one side of the piston to the other.

In testimony whereof I have signed this specification.

ARMAND BAILLY.

Witness:

CHARLES LEON LOISEL.