R. S. PEIRCE.

DRILL.

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1,282,928. Patented Oct. 29, 1918.

Fig. 1.

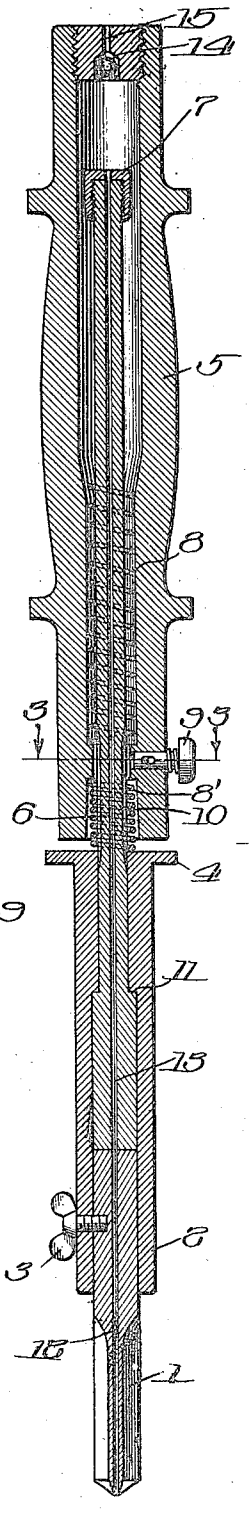


Fig. 3.

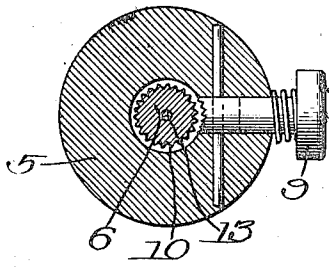


Fig. 4.

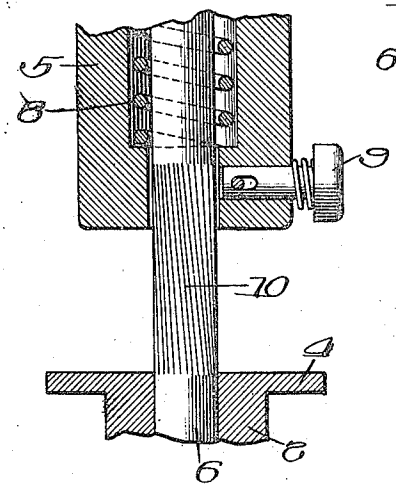
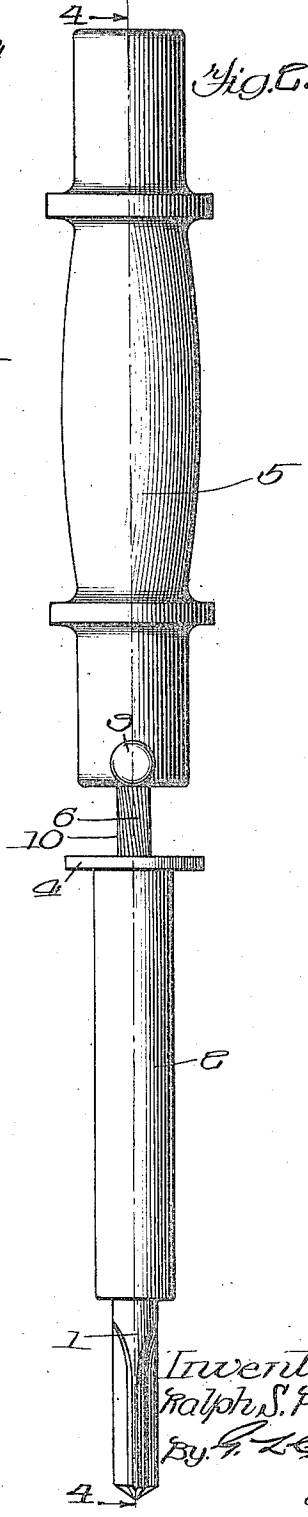


Fig. 2.



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UNITED STATES PATENT OFFICE.

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DRILL.

1,282,928. Specification of Letters Patent. Patented Oct. 29, 1918.

Application filed September 17, 1913. Serial No. 790,310.

To all whom it may concern:

Be it known that I, RALPH S. PEIRCE, citizen of the United States, residing at Hinsdale, in the county of Dupage and State of Illinois, have invented a certain new and useful Improvement in Drills, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to drills and finds a useful embodiment in hand operated percussion drills, though the invention is not to be limited to an embodiment in hand operated drills nor percussion drills.

The invention has for one of its objects the provision of a drill whose mechanism will preferably effect forced passage of air through or along the tool into the hole being drilled to eject the dust resulting from the drilling, though the invention is not to be limited to the means employed for forcing the air. Another object of the invention is to provide, in a percussion drill, a spring through the intermediation of which the drill point is raised or withdrawn preparatory to a fresh blow. There is also a spring to aid in the hammer recoil.

My invention has other characteristics and will be explained fully by reference to the accompanying drawing showing the preferred embodiment thereof and in which Figure 1 is a sectional view; Fig. 2 is a view in elevation of a modification; Fig. 3 is a sectional view on line 3 3 of Fig. 1; and Fig. 4 is a view, on a larger scale, of a part of the structure shown in Fig. 2 on line 4—4.

Like parts are indicated by similar characters of reference throughout the different figures.

The drilling tool 1 is held within the bore of a tool stock 2 by any suitable fastening device, such as a clamping screw 3. The tool stock has a head 4 at its upper end to receive the blows of a hammer 5, the stock being gripped by one hand and the hammer by the other. The stock is provided with a stem 6 in tight connection therewith and that projects upwardly therefrom and one of its purposes is to guide the hammer, which has a longitudinal bore freely receiving said stem, as it is driven toward the stock and as it is withdrawn. The upper end of the stem 6 is enlarged into a head by means of a cap 7 screwed thereon. A cushion preferably in the form of a coiled spring 8 is disposed within the bore of the hammer 5 and about the stem 6 projecting from the stock into or along the hammers, this spring being of such diameter as to enable it to be compressed when engaged by the head 7 with sufficient force. The bore of the hammer 5 is contracted at its lower end to afford a seat for the lower end of the spring.

The hammer surrounds the stem and strikes the stock head 4 whereby the stock is struck laterally of the stem to relieve the stem of direct hammer blows and avoid tendency of such blows to buckle the stem. The spring 8 acts as a cushion between the stem cap 7 and the hammer and through which the hammer, when lifted, operates to withdraw the tool, this spring receiving none of the hammer blows.

After the hammer blow has been struck, the hammer is moved upwardly with respect to the tool, to permit the spring 8 to press upon the head 7 with the necessary force upon said head to effect the slight partial withdrawal of the stock. In the form shown in Fig. 1, a spring cushion 8′ may be interposed between the hammer and the tool stock. This spring is placed under compression during the progress of the hammer into engagement with the stock and aids in the recoil of the hammer. The device is one with which light blows are to be rapidly struck, the springs obviously aiding in this result.

Upon each partial or slight withdrawal of the tool it may be slightly turned upon the depression of a plunger 9 to present the tool to a new portion of the work, this plunger having teeth upon its inner end for engaging helical grooves 10 upon the stem 6.

Hitherto the stem 6 and tool stock 2 were held together by a pin transversely passing through the stem and the stock, such pin weakening the stock and stem and being subject to shearing strain. These defects are overcome by enlarging the lower end of the stem to form a shoulder 11 that engages a corresponding shoulder within the bore of the stock. The stem thus operates directly upon the stock to effect withdrawal of the tool, and the major part of the force of the hammer blows may be directly transmitted from the stock to the enlarged lower end of the stem and through this lower stem and to the tool 1 in abutting engagement with the stem, this construction enabling me to dispense with the coupling pin and

to avoid the harmful results attendant upon the use thereof.

Alined air channels 12, and 13 are formed in the tool 1 and stem 6, through which air is forced downwardly for the purpose of dislodging the dust in the hole, the channel 13 extending to the working end of the tool. The means preferably employed for thus forcing the air resides in the mechanism of the device itself, for which purpose the head 7 has close sliding fit with the portion of the bore containing spring 8 then to act as an air pump piston, while the upper end of the hammer is provided with a ball valve 14 which closes the passage 15 leading from the hammer bore to the external air when the hammer is driven toward the tool, whereby air is jetted through the composite air passage 12, 13 during the movement of the hammer toward the stock to blow the dust away from beneath the tool preparatory to the operation the tool is to perform when the hammer strikes. When the hammer is raised the valve will unclose to permit air to enter the hammer interior by way of the passage 15. I do not limit myself to the formation of the air passage 12, 13 within the tool and stock stem. The spring 8^1 also maintains the hammer or impacting element 5 and the tool structure 1, 2, 4 slightly apart, when the tool is not in use, so that upon the initial movement of the hammer and during the time spring 8^1 is compressed the hammer causes a puff of air to flow through the passage 13 to the lower end of the tool.

While I have herein shown and particularly described the preferred embodiment of my invention I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention.

Having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. A percussion drill including a tool carrying stock; a hollow hammer arranged to strike the stock to drive the tool; a stem projecting from the stock into the hammer interior, and having an air channel affording communication between the hammer interior and the drilling end of the tool whereby air displaced by the stem within the hammer interior may be directed to the drilling end of the tool; and a valve operated by the air displaced from the hammer interior to close a valve passage which is provided between the hammer interior and the external air.

2. A percussion drill including a tool carrying stock; a hollow hammer arranged to strike the stock to drive the tool; and a stem projecting from the stock into the hammer interior and having an air channel affording communication between the hammer interior and the drilling end of the tool whereby air displaced by the stem within the hammer interior may be directed to the drilling end of the tool, there being a valve passage for permitting the entry of air within the hammer interior when the hammer is withdrawn from the tool.

3. A percussion drill including a tool carrying stock; a hollow hammer arranged to strike the stock to drive the tool; and a stem projecting from the stock into the hammer interior and having an air channel affording communication between the hammer interior and the drilling end of the tool whereby air displaced by the stem within the hammer interior may be directed to the drilling end of the tool.

4. A hollow impacting element in combination with a drill structure having a portion entering the hollow of the impacting element and provided with an air channel extending to the working end of the tool structure and communicating with the interior of the impacting element whereby the impacting element, in striking movement, forces air through said channel to the working end of the tool.

5. A hollow impacting element in combination with a drill structure having a portion entering the hollow of the impacting element and provided with an air channel extending to the working end of the tool structure and communicating with the interior of the impacting element whereby the impacting element, in striking movement, forces air through said channel to the working end of the tool; and a spring for normally spacing the engaging parts of the hammer and drill structure apart.

In witness whereof, I hereunto subscribe my name this twenty ninth day of July A. D., 1913.

RALPH S. PEIRCE.

Witnesses:
G. L. CRAGG,
C. L. PEIRCE.