Aug. 14, 1928. 1,681,044

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SAFETY TRIGGER FOR PNEUMATIC TOOLS

Filed Dec. 10, 1927

Fig. 1.

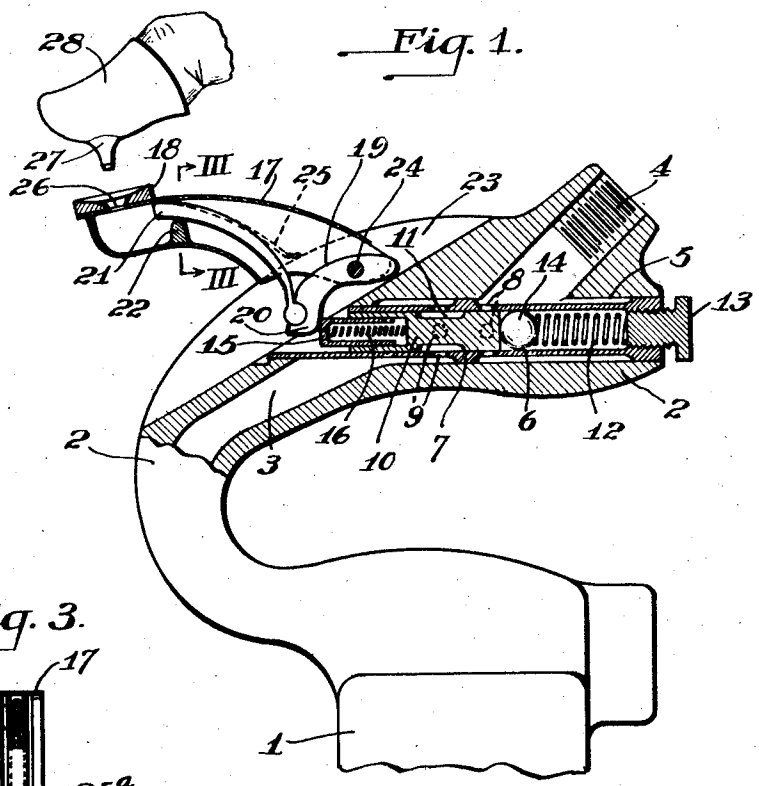


Fig. 3.

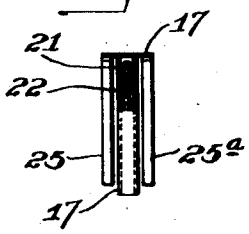


Fig. 5.

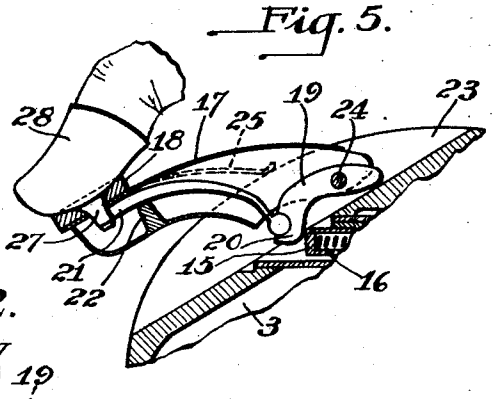


Fig. 4.

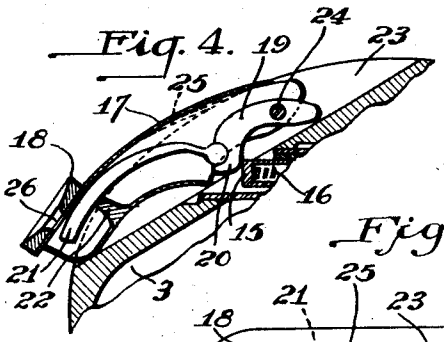
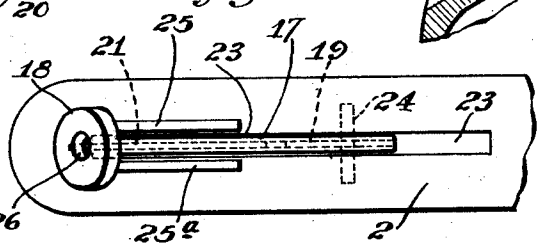


Fig. 2.



WITNESSES

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Patented Aug. 14, 1928. 1,681,044

UNITED STATES PATENT OFFICE.

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SAFETY TRIGGER FOR PNEUMATIC TOOLS.

Application filed December 10, 1927. Serial No. 239,148.

The invention relates to pneumatic tools, and more specifically it has to do with a safety device which renders accidental or unauthorized operation of the tool substantially impossible.

An object of the invention is to provide a pneumatic tool which cannot be accidentally actuated, and which is inoperative except in the hands of an authorized operator.

Another object of the invention is to provide a safety trigger for use with pneumatic tool valves which is incapable of opening the valve except when it is necessary for the operator to do so.

A further object of the invention is to provide a pneumatic tool valve trigger which is freely depressible at all times, but which is ineffective to operate the valve and thereby to actuate the tool except when rendered capable thereof by special means which do not form a part of the tool.

Other objects of the invention are to provide a safety trigger which can be substituted directly for the ordinary trigger on practically all pneumatic tools without requiring any modification or remaking of the tool; which is of simple construction and inexpensive to make; which does not depend upon a lock action for its safety performance; and which has the added advantage that where a number of tool operators are working, each man can operate only his own tool.

The dangerous character of pneumatic tools is well known, since injuries frequently result from accidental opening of the fluid pressure valve, or through careless or thoughtless manipulation thereof, and many safety devices have been proposed to overcome this objectionable feature. All of these safety devices have depended upon a lock of some type, either to prevent manipulation of the valve trigger, or to prevent movement of the valve stem. None of those developed thus far has achieved appreciable commercial success, partly because they are more or less complicated and require modification of the tools, and partly because they are not positive, i. e. the lock may accidentally be opened, or the operator may negligently fail to apply it, defeating in both cases its purpose.

The preferred embodiment of the present invention is illustrated in the accompanying drawings, in which Fig. 1 represents a central sectional view through the valve and handle portion of a pneumatic tool equipped with a safety trigger according to the invention; Fig. 2 a plan view of a portion of Fig. 1; Fig. 3 a cross-section of the trigger taken on line III—III, Fig. 1; Fig. 4 a fragmentary sectional view similar to Fig. 1 showing the trigger depressed in its normal condition and incapable of operating the valve; and Fig. 5 a view similar to Fig. 4, but showing the trigger rendered capable of opening the valve.

Pneumatic tools are generally provided with a valve for controlling the flow of an actuating fluid, and the invention broadly comprises the use with such a tool of a movable valve-opening trigger, and means associated with the trigger adapted to open the valve when the trigger is moved, the said means being normally inoperative and capable of being rendered effective to open the valve only when a pin or key is inserted in the trigger prior to movement.

Having reference now to the illustrative embodiment of the invention, there is represented a pneumatic tool, in this case a pneumatic hammer, indicated generally by the numeral 1, and provided with a handle portion 2, through which a conduit 3 is formed to convey fluid pressure to an operating cylinder, not shown. The outer end of this conduit is provided with a threaded nipple 4, for connection to a source of fluid pressure, compressed air for example, and the handle is counterbored at 5 to receive a bushing 6 which is spaced from the wall of the bore, as shown in Fig. 1, and is provided with an integral collar 7, which cuts off the fluid pressure passageway through bore 5. Fluid pressure communication is established through ports 8 and 9, disposed in the bushing on each side of the collar, as will be evident from Fig. 1. A valve mechanism of any desired type is disposed within the bushing, and that shown represents a commonly used type, which includes a valve stem comprising a plunger 10 whose ends accurately fit the bushing, and having a restricted portion 11 between the ends. The valve stem is normally held in passage-closing position, in which one end of the plunger seats against ports 8, by a spring 12, seated between a threaded plug 13, and a ball 14 which bears against the plunger. The trigger end of the plunger is bored out to receive a hollow pin 15, and a spring 16 interposed between plunger 10 and the

head of pin 15 permits slight play before the valve stem is moved sufficiently to establish communication between conduit 3 and nipple 4, thereby preventing sudden actuation of the tool. The handles of such tools are generally slotted forwardly of the valve mechanism to receive a trigger, adapted, when depressed, to act upon the valve stem to move it so as to permit fluid to pass from nipple 4 through ports 8 and thence through ports 9 to conduit 3. All of the construction described thus far is well known in the art, and many modifications may be employed.

The trigger illustrated comprises a frame 17, provided at one end with a thumb-piece 18, and its shape is somewhat similar to the triggers widely used in pneumatic tools, except that the end adjacent the valve is formed to be itself incapable of acting on the valve. This frame is preferably hollow, and disposed therein is a normally inoperative valve-actuating means which comprises an arm 19 having a finger 20 adapted to act upon the valve stem, and pivotally connected thereto, preferably by a socket joint, is a bent link 21, thus providing a type of toggle linkage. Link 21 rests on a support 22 disposed in the bottom of the trigger shell. The trigger is disposed in a slot 23 provided in the handle and is pivotally connected to the handle by a pin 24 passing through the trigger and arm 19. Preferably the top face of frame 17 is extended on each side, and to it are secured leaf springs 25 and 25ª, Fig. 3, positioned to bear against the periphery of the handle, to normally urge the trigger to its elevated position.

The normal, or safety condition of the trigger is shown in Fig. 1, and it will be observed that it can be depressed at will, the only restraint being that of springs 25 and 25ª. It will be observed also that when the valve is in this position, the plunger closes ports 8, and fluid pressure cannot be transmitted to the cylinder. Finger 20 is in contact with pin 15, but when the trigger is depressed no valve-actuating pressure can be transmitted to the valve stem because any pressure applied to the trigger will be taken up by the toggle linkage, causing it to expand by moving lever 15 along the frame; and the valve cannot be opened. The fully depressed position is shown in Fig. 4.

The trigger can be rendered operative to open the valve only by constituting the toggle linkage a rigid member, movable with the frame but immovable relative thereto, and to this end an opening 26 is disposed in the thumb-piece, through which a pin 27 can be inserted, so as to be in the path of the free end of link 21. Fig. 5 shows the condition when this pin is inserted. Link 21 is no longer free to move in the frame, being blocked by the pin, and when the trigger is depressed the linkage is immovable and becomes in effect unitary with the frame, so that pressure is transmitted directly to the valve stem, to open the valve. The pin 27 may be of any suitable form, and it may conveniently be secured to a thumb cot 28, so that it will be in position for ready application to the tool, and to prevent its being lost easily.

As long as the pin is not inserted in the trigger it will not be possible for fluid pressure to be applied to the cylinder, since depression of the trigger merely causes displacement of the valve-actuating arm, without transmitting any movement to the valve. Thus the tool can be handled with perfect safety. When the operator is ready to use the tool, he presses the pin into the opening in the thumb-piece, thus constituting the valve arm a rigid member, and pressure on the trigger will open the valve. As soon as he lifts his thumb from the trigger, it again becomes ineffective to open the valve.

It will be seen that the new trigger affords complete protection against accidental, malicious or unauthorized use of pneumatic tools. There is no lock to be forgotten or to be inadvertently unlocked, and it is impossible to open the valve until a suitable pin is inserted. Further protection may be insured by providing the tools in a shop with different openings, whereby only the man using a particular tool has the pin necessary for its operation. The trigger can be of any suitable type or form and its dimensions can be made such that it can be substituted for the regular trigger on tools now in use, as in the form illustrated by merely removing pin 24, removing the old trigger and inserting the new trigger. Thus it is possible at very low cost to make old tools entirely safe and foolproof, and no change in design or construction is necessary to equip new tools with it.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated what I now consider to be its best embodiments. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

I claim:

1. The combination with a pneumatic tool having a valve for controlling flow of tool-actuating pressure fluid, of a movable valve-opening trigger borne by said tool, and normally inoperative means associated with the trigger for opening said valve upon the movement of the trigger, said means being rendered effective for said purpose solely upon the insertion of a key in the trigger prior to the movement of the trigger.

2. The combination with a pneumatic tool

having a valve for controlling flow of tool-actuating pressure fluid, of a movable valve-opening trigger borne by said tool, and a normally inoperative pivotally-mounted valve-engaging member for opening said valve upon the movement of said trigger, said member being rendered effective for said purpose solely upon the insertion of a key in the trigger prior to the movement of the trigger.

3. The combination with a pneumatic tool having a valve for controlling flow of tool-actuating pressure fluid, of a movable valve-opening trigger borne by said tool, and a normally inoperative linkage associated with the trigger for opening said valve upon the movement of the trigger, said linkage being rendered effective for said purpose solely upon the insertion of a key in the trigger prior to the movement of the trigger.

4. The combination with a pneumatic tool having a valve for controlling flow of tool-actuating pressure fluid, of a movable valve-opening trigger pivotally borne by said tool, an arm pivotally connected to said tool co-axially with said trigger, and a lever pivotally connected to said arm to constitute a normally inoperative toggle linkage, for opening said valve upon the movement of the trigger, said linkage being rendered rigid to effect said purpose solely upon the insertion of a key in the trigger prior to the movement of the trigger.

In testimony whereof, I sign my name.

EMANUEL MALIK.