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J. C. CURTIS

2,300,406

OPERATING HANDLE

Filed Aug. 2, 1940

Fig. 1.

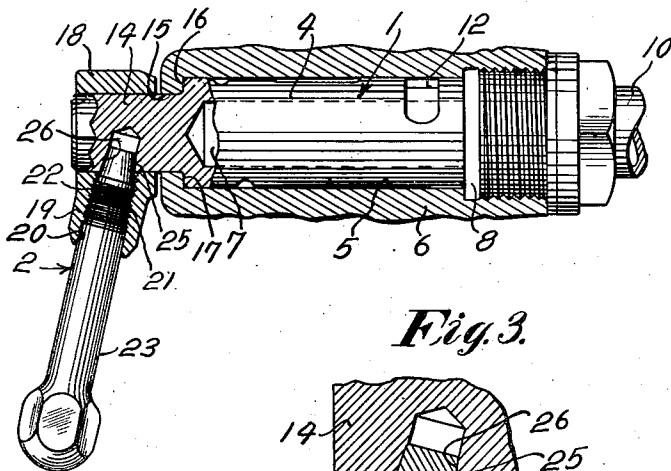


Fig. 2.

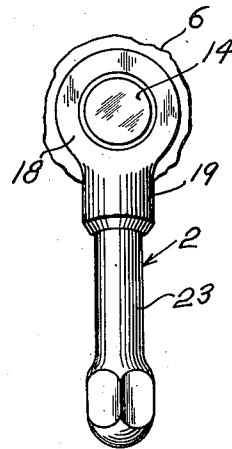


Fig. 3.

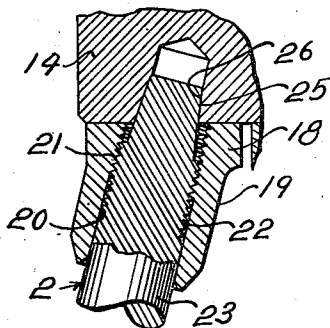


Fig. 4.

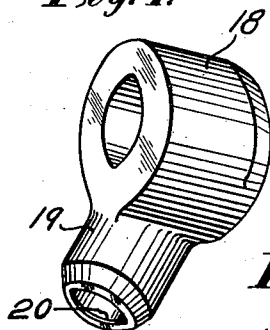


Fig. 6.

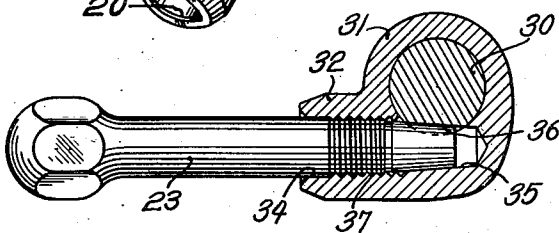
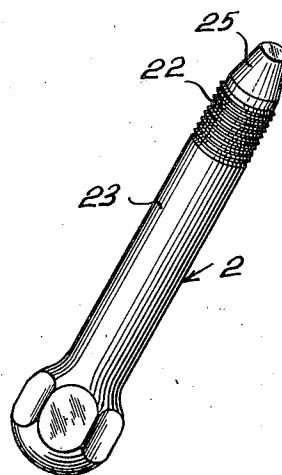


Fig. 5.



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UNITED STATES PATENT OFFICE

2,300,406

OPERATING HANDLE

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Application August 2, 1940, Serial No. 349,508

4 Claims. (Cl. 287—53)

This invention relates to improvements in operating handles, and more particularly to locking means for holding in a fixed tightened position an operating handle for a valve designed especially for use in a rock drill.

In mechanisms in which there is a vibration such as that obtained in the operation of rock drills of the reciprocating hammer piston type, much difficulty has been experienced in effectively connecting to the mechanism an element, such as a handle for controlling the operation of a throttle valve in the case of rock drills, that is to be held firmly against movement relative to the parts to which it is connected and prevented from loosening by the vibrations. It has been found, after considerable experimenting, that by providing at the connected end of the operating handle a frusto-conical shaped surface, with the angle between an element of the surface and the axis of the handle relatively small, there is obtained, on moving this surface within an opening having a surface of similar shape and of the same angle, a wedging action between the surfaces that holds them firmly against rotation relative to each other. An angle of fifteen degrees (15°) or less has been found very effective, but it is not to be understood that a greater angle is outside the scope of my invention in its broader aspects. With the surfaces formed at an angle within the range mentioned, it is necessary that they be moved into engagement with each other under only a very slight pressure, to obtain the desired frictional resistance preventing relative rotation, but in order to assure that the sloping surfaces firmly engage each other it is necessary that the opening be formed of a depth sufficient to prevent engagement between the inner end of the handle and the bottom of the opening. With operating handles such as those employed in rock drills there is a whipping action produced in the handle by the vibrations of the drill that may ultimately result in a fracture of the handle unless means are provided for supporting the handle along at least a substantial portion of its length. To obtain the desired support for the handle and the adjustment of the handle relative to the opening within which its end is received, there is therefore provided, in a preferred embodiment of the invention, a member having an opening that both engages the handle for a substantial portion of its length and provides for it a threaded connection.

It is an object of this invention to provide an improved operating handle for the throttle valve

of a rock drill. Another object is to provide improved means for attaching and holding an operating handle in a fixed position relative to the device operated thereby. Still another object is to provide improved means for operatively connecting an element to a mechanism in which there is a substantial vibration, and for holding said element against loosening by the vibration. Another object is to provide improved valve control means for a rock drill, comprising a control element having an inclined surface formed thereon, a controlled member having an inclined surface engageable by the inclined surface on said control element, and means for holding said control element in a position such that its inclined surface firmly engages, with a wedging action, the inclined surface on said controlled member, whereby said control element is held against movement relative to said controlled member which would effect a release between said surfaces. Still another object is to provide improved means for holding a control element in clamping relation with a controlled member and providing for said control element a support along a substantial portion of its length. Other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawing there are shown, for purposes of illustration, two forms which the invention may assume in practice.

In this drawing:

Fig. 1 is a view, with some parts in section and some in elevation, showing a rock drill throttle valve having a control handle attached thereto, according to one illustrative embodiment of the present invention.

Fig. 2 is an end elevational view of the control handle and valve shown in Fig. 1.

Fig. 3 is an enlarged detail sectional view showing the connection of the control handle to the throttle valve.

Fig. 4 is a perspective view of one of the attaching elements.

Fig. 5 is a perspective view of the control handle.

Fig. 6 is a sectional view, partially in elevation, showing a modified form of handle connection for the throttle valve.

In the illustrative embodiment of the invention shown in Figs. 1 to 5 inclusive, a throttle valve, generally designated 1, has connected thereto in an improved manner a valve-operating handle assembly, generally designated 2.

The throttle valve shown herein is of the type generally used for controlling the supply of pres-

sure fluid to the distributing valve of a pressure-fluid-actuated hammer rock drill, but it will be evident that the invention may be associated with valves of other types, or may even be employed with devices to be controlled other than valves. The throttle valve 1 herein comprises a cylindric portion 4 that is rotatably received within a bore 5 formed in a block 6. Formed within the cylindric portion is a pressure chamber 7 extending axially of the valve and opening through one end of the later into a chamber 8 in the block 6 to which pressure fluid is supplied from a supply line 10. Opening from the pressure chamber 7 through the side of the valve is a port 12 through which pressure fluid flows to suitable passages formed in the block 6 when the valve is rotated to its proper position and pressure fluid is conducted through the passages in the block to the desired point of use. Extending from the end of the cylindric portion 4 opposite the supply line 10 is a valve stem 14 having a transverse dimension somewhat less than that of the portion 4. The valve stem projects through an opening 15 in the block 6, and a shoulder 16 at the junction of the valve stem and the valve portion 4 abuts a shoulder 17 on the block to prevent outward axial movement of the valve relative to the block. Fitted on the valve stem is a hub 18 having a lateral boss 19 through which an opening 20 extends toward the center of the hub. Extending into the opening 20 throughout the inner portion of its length are threads 21 which engage threads 22 formed on an operating handle 23. The outer portion of the opening 20 has a smooth surface that fits closely along the handle 23 beyond the threads 22 and provides for the handle a support which prevents a whipping of the handle when the parts of the mechanism are caused to vibrate. The handle has a tapered inner end 25 adapted to seat within a tapered socket 26 formed within the valve stem. The socket 26 is of such depth that a clearance between the inner end of the handle and the bottom of the socket is assured when the tapered portion of the handle firmly engages the sloping walls of the socket. The angle of the taper at the end of the handle and within the socket is shown here as being approximately fifteen degrees, and when the handle is threaded through the opening in the lateral boss 19 so that its tapered end firmly engages the walls of the tapered socket there will be, due to the small angle of taper, a wedging action, that prevents the handle from being turned within the boss by any vibrations in the mechanism and thereby loosening. When the parts are in assembled relation as shown in Fig. 1, the handle serves the dual purpose of providing an operating member for the valve and means for securing the hub 18 to the valve stem so that it abuts a surface on the block 6 surrounding the valve stem on slight axial movement of the valve, and prevents the valve from moving axially out of communication with the passages to which it controls the supply of pressure fluid. When the supply line 10 is disconnected from the block and the end of the handle is removed from the socket in the valve stem, the valve may be withdrawn axially from within the block bore, in an obvious manner.

In the form of the invention shown in Fig. 6, an element 30 to be controlled has fitted on it a hub 31 having a lateral boss 32 through which an opening 34 is formed with its axis lying in a plane parallel to a plane including the axis of

the element 30. The opening 34 is so located that it opens through the inner wall of the hub at only one side of the opening. The opening is tapered at its inner end, as at 35, and formed in the controlled element 30 is a groove 36 so formed that the surface of the groove is in alignment with the walls of the opening 34. The operating handle 23 is threaded into the opening 34, as at 37, to bring the tapered end 25 of the handle into engagement with the tapered walls 35 of the opening and with the surface of the groove 36.

As a result of this invention there is provided improved means for holding a valve-operating handle firmly in a fixed position relative to the valve. It will be noted that the parts may be easily constructed and assembled, and are so arranged as to provide a rugged construction. Other advantages of the improved handle attachment will be clearly apparent to those skilled in the art.

This application is a continuation in part of my copending application Serial No. 152,609, filed July 8, 1937, now matured into Patent No. 2,224,859, granted Dec. 17, 1940.

While there are in this application specifically described two forms which the invention may assume in practice, it will be understood that these forms are shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In combination, an adjustable member to be controlled, a frusto-conical shaped surface formed on said adjustable member, a hub-shaped member mounted on said adjustable member, and a handle member adjustably secured to said hub-shaped member and provided with a relatively fixed portion having a frusto-conical shaped surface thereon engageable with the frusto-conical shaped surface on said adjustable member for binding said handle member against rotation on its own axis relative to said adjustable member.

2. In combination, an adjustable member, a recess formed in said adjustable member, handle supporting means mounted on said adjustable member, an opening in said handle supporting means having a sloping surface therein, and a handle member adjustably secured within said opening and having a relatively fixed portion formed with a sloping surface engageable with the sloping surface within said opening for binding said handle member against rotation relative to said handle supporting means, said opening so formed that on engagement of said sloping surfaces a portion of said handle member fits within said recess for locking said adjustable member against movement relative to said handle member.

3. In combination, an adjustable member having a tapered socket formed thereon, a handle hub mounted on said adjustable member and having a threaded opening therein, and a handle member threaded within the opening in said handle hub and having a relatively fixed tapered end portion received in said tapered socket with the sloping walls of said tapered end portion engaging the walls of said socket for binding said handle member against rotation about its own axis relative to said handle hub.

4. In combination, an adjustable member,

handle supporting means mounted on said adjustable member, a handle member adjustably secured to said handle supporting means and movable bodily relative to said adjustable member when rotated relative thereto, and means for binding said adjustable member and said handle member against rotation relative to each other,

5 said last mentioned means including surfaces on said adjustable member and said handle member movable into frictional engagement with each other, said surface on said handle member being formed on a portion fixed relative to said handle member.

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