

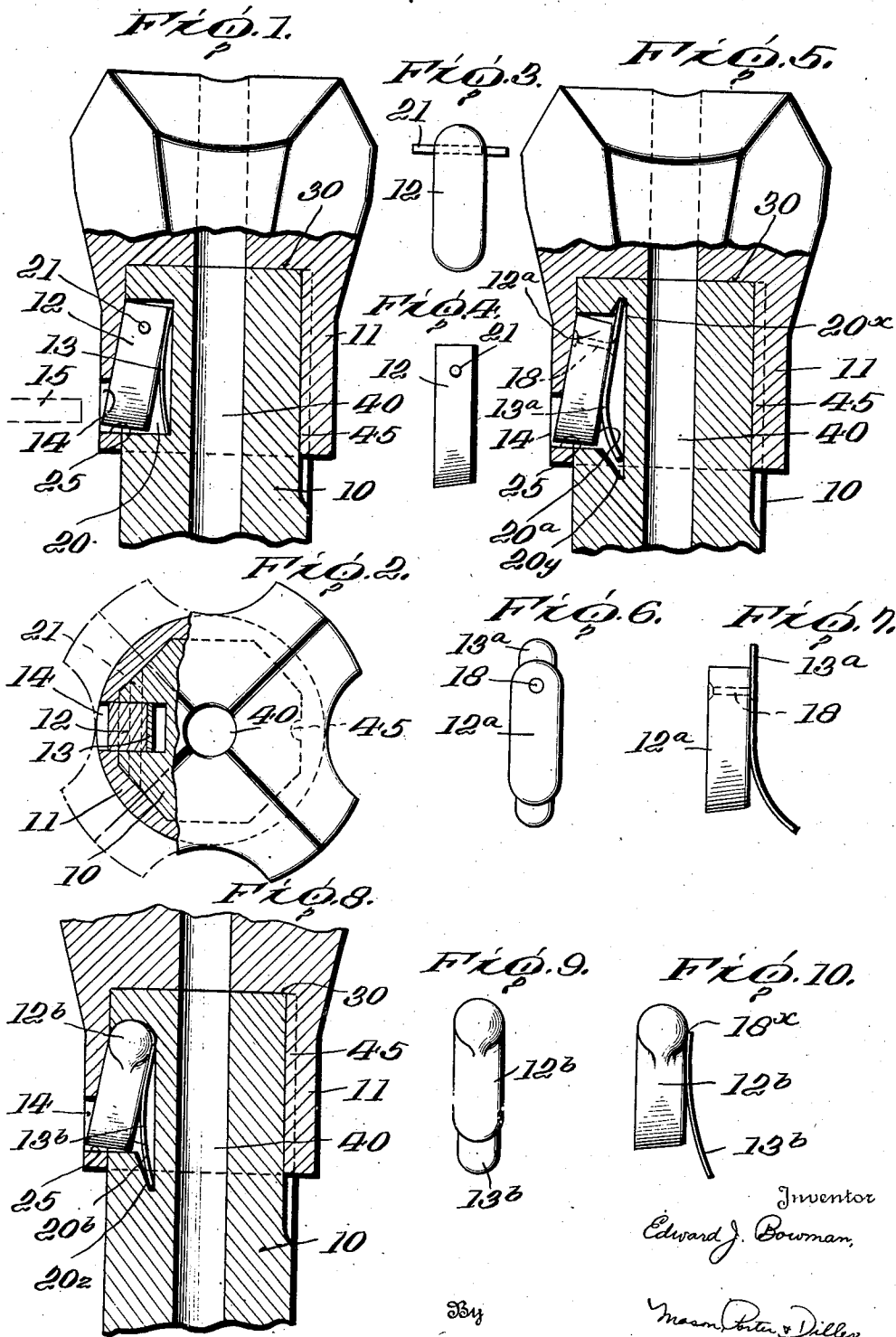
July 3, 1945.

E. J. BOWMAN

2,379,472

SEPARABLE CONNECTION FOR ROCK DRILLS AND LIKE STRUCTURES

Filed Sept. 25, 1943



Inventor
Edward J. Bowman,

By *Mason Bates & Diller,*
Attorneys

UNITED STATES PATENT OFFICE

2,379,472

SEPARABLE CONNECTION FOR ROCK
DRILLS AND LIKE STRUCTURES

Edward J. Bowman, Anaconda, Mont.

Application September 25, 1943, Serial No. 503,804

8 Claims. (Cl. 287—119)

This invention is concerned with a separable connection which is of particular value for rock drills and like structures in which the parts must be held against separation while pressure or traction is being exerted, but in which the parts may be easily separated when such effect is desired.

One of the features of the present arrangement is the provision of a simple, strong and compact assembly of parts.

Another feature of the invention is the provision of an assembly in which the locking elements are retained against accidental displacement while the separable elements are removed from one another.

A further feature is the provision of separable connections for rock drills in which a water channel may be provided in the separable pieces, with this channel extending linearly along the axis of the parts.

With these and other features in view as will appear in the following description and claims, an illustrated form of practicing the invention is shown in the accompanying drawing:

Figure 1 is a side elevation with parts in section and illustrates the securing of a separable drill bit to a drill steel or stem member.

Figure 2 is an end view, with parts broken away, of the structure in Figure 1.

Figures 3 and 4 are respectively face and side views of the locking element.

Figure 5 is a view corresponding to Figure 1 of a modified form of the structure.

Figures 6 and 7 are respectively face and side views of the locking element with its attached spring member.

Figure 8 is a view corresponding to Figure 1 of a further modified structure.

Figures 9 and 10 are respectively face and side views of the locking element of Figure 8 with its attached spring member.

In the drawing, a stem 10 is shown as removably connected with the socket member 11 herein illustrated as formed on a removable drill bit. A locking element 12 is mounted in a cavity 20 of the stem 10 so that it can rock relatively outwardly under the action of a spring member 13 and enter a recess extending from the inside surface of the socket member 11, and thus interposes itself between one end wall of the cavity 20 in the stem 10 and the opposite end wall of the recess in the socket member 11 so that it operates in compression when tension is exerted along the length of the assembly. An aperture 14 is provided in the socket wall so that

a tool 15 can be introduced for forcing the locking element 12 to a position where it lies inside of the inner surface of the socket member 11, and in this position will permit the separation of the parts of the assembly.

In Figure 1, the stem 10 has a cavity 20 and a drilled hole intersects this cavity in its upper end in the figure, thus being adjacent the end of the cavity 20 which is near the end of the stem 10. A pin 21 passes through the drilled hole and also through a hole in the locking member 12; preferably this pin is made to form a tight fit in the locking member 12 or in part of the hole in the stem 10, so that the pin cannot slide endwise after insertion, whereas it is correspondingly loose in the stem or in the locking member to permit free rocking of this member 12.

The spring 13 in Figure 1 is illustrated as mounted in the cavity 20, so that it bears at its ends against the inner surface of this cavity and bears intermediate its length against the locking member 12 at a point between the pivot pin 21 and the swinging end of the member. The spring 13 is bowed when free of stress and hence it is effective for rocking the locking member 12 about its pivot pin 21 and into notch 25 formed in the socket member 11 at its inner surface.

In accomplishing an assembly of the parts, the stem has the locking element 12 held herein by its pivot 21 and this element in turn prevents the spring 13 from leaving the cavity. The locking element 12 is normally in its outwardly rocked condition. When the socket member 11 is slipped over the end of the stem 10 and the parts pressed axially together, the socket member acts to force the locking element inwardly until the socket member attains essentially its final position, at which the notch 25 is presented opposite the locking element 12, and the latter is moved by its spring 13 into the holding position as shown in Figure 1. Disassembly is effected by introducing the tool 15 and forcing the locking element 12 to a position within the stem 10, and then the stem 10 and socket member 11 may be separated again.

It is preferred that the bottom or end surface 30 of the socket member should rest against the end surface of the stem 10 when the parts are assembled and the length of the locking element 12 is coordinated to the position of the notch 25, so that this condition exists when the locking element 12 is in its outward position. Under these conditions, when the stem 10 is employed in a rock drill and is subjected to endwise compressional stress (upwardly in Figure 1) the stem

transmits its effort to the surface 30, and thus serves to actuate the cutting surface in the usual way. When tension is exerted along the stem 10, to move the assembly backward or out of the hole, the upper wall of the cavity 20 (Figure 1) bears against the upper end of the locking element 12 and acts in compression through this element 12 against the lower wall of notch 25 in the figure, and thus transmits the traction to the socket member 11.

In the form shown in Figure 5, socket member 11 is formed with a notch 25 and a hole 14 as before. The cavity 20a in the stem 10 receives a locking element 12a which in this modification has the spring 13a fixed to it by a rivet 18. The cavity 20a has recesses 20x, 20y for receiving the ends of the spring 13a which extend beyond the corresponding ends of the locking element 12a. In operation this structure operates like that of Figure 1. When the parts have been separated, the engagement of the ends of the spring 13a in the recesses 20x, 20y prevents the locking element and its spring from dropping out of the cavity 20a. By exerting traction on the locking end of the locking element 12a, however, the spring 13a may be bowed until the ends can be separated from the recesses, and thus the locking element can be withdrawn from the stem 10. It can be replaced by a reverse operation.

In the form of Figure 8 the socket member 11 has a notch 25 and the hole 14 as before. The stem 10 has the cavity 20b with an extension 20z at its lower end. The locking element 12b has the spring 13b attached by a weld 18x (Figure 10) so that these parts form a unit. The upper end of the locking element 12b is spherical and fits in a spherical recess at the upper end of the cavity 20b and is guided for rocking by engagement of its sides with side walls of the cavity. By the engagement of the locking element 12b in this spherical recess and the engagement of the lower end of spring 13b in its recess 20z, the locking element and its spring are normally held against displacement. When traction is exerted on the lower end of the locking element 12b with the parts disassembled, this lower end can be fully withdrawn from the cavity 20b with a further bowing of the spring 13b, and then the unit can be withdrawn from the stem 10. It can be replaced by a reverse operation.

In each of these forms it will be noted that the socket member has no movable parts, and hence when the socket member is formed on a drill bit, this drill bit can be a simple one-piece device. Further, the water channel 40 can be provided at the axis of the stem 10 and can communicate directly with a co-axial extension of the channel in the socket member 11 whether or not this be formed as a drill bit. Thus, the water channel is a simple axial passageway which has no bends or turns in which damming can occur, and the channel can be easily cleared if necessary.

As shown in Figure 2, the drill stem 10 may be of polygonal sections, if desired, for transmitting rotational movements along the length of the assembly: and in such cases it is preferred to form the cavity 20 and the notch 25 in flat faces of the stem and socket members.

As shown in the drawing, the quick assembly of the structure in proper relation of its parts may be assured by providing a groove in the stem 10, and providing a rib 45 on the inner wall of the sleeve 11 for fitting this groove. With this arrangement, the socket and stem members may only be assembled in the correct relative position

for inter-engagement of the locking element with its corresponding notch in the socket member.

It is obvious that the invention is not limited to the forms of construction shown, but may also be employed in the scope of the appended claims.

I claim:

1. A separable drill assembly comprising a stem, a drill bit, a socket portion on the bit for closely receiving the end of the stem, with abutment of the stem against the bottom of the socket in said socket portion, and a locking device for clutching the stem and bit together; said stem having a cavity on its side, said socket portion having a notch located adjacent the cavity when the parts are assembled, said locking device including a block and a spring and being capable of being received wholly within the cavity during assembly and disassembly, the spring being located between the block and the bottom of the cavity and effective to cause a movement of the block so that a part of said block is caused to enter the notch, the block being constructed and arranged relative to said notch so that upon a withdrawing pull along said stem the block acts in compression to move said bit, said socket portion having a hole opposite the block through which external pressure can be exerted on the block to force it into the cavity for disassembly of the parts, and means included in said stem and locking device for preventing separation of the block and spring from the stem while the stem is separated from the socket portion.

2. A drill assembly comprising a stem, a drill bit, a socket portion on the bit for closely receiving the end of the stem, with abutment of the stem against the bottom of the socket in said socket portion, and a locking device for clutching the stem and bit together, said stem having a cavity in its side, said socket portion having a notch extending from its inner surface and located adjacent the cavity when the parts are assembled, said locking device including a block and a spring and being capable of being received wholly within the cavity during assembly and disassembly, the spring being located between the block and the bottom of the cavity and effective to cause a movement of the block so that a part of said block is caused to enter the notch, the block being constructed and arranged whereby upon a withdrawing pull along said stem one end bears against an end of said cavity and the other end thereof bears against the wall of said notch and the block is effective to act in compression to move said bit, said socket portion having a hole opposite the block so that external pressure can be exerted on the block to force it into the cavity for disassembly of the parts, means included in said stem and locking device for preventing separation of the block and spring from the stem while the stem is separated from the socket portion, and a pivot engaging the stem and block to prevent separation thereof after disassembly of the stem from the socket portion and to limit the relative movement thereof to a rocking.

3. A drill assembly comprising a stem, a drill bit, a socket portion on the bit for closely receiving the end of the stem, with abutment of the stem against the bottom of the socket in said socket portion, and a locking device for clutching the stem and bit together; said stem having a cavity in its side, said socket portion having a notch extending from its inner surface and located adjacent the cavity when the parts are assembled, said locking device including a block and a spring and being capable of being received

wholly within the cavity during assembly and disassembly, the spring being located between the block and the bottom of the cavity and effective to cause a movement of the block so that a part of said block is caused to enter the notch, the block being of the length whereby one end bears against an end of said cavity and the other end thereof bears against the wall of said notch so that a withdrawing pull along said stem causes compression through said block to move said bit, said socket portion having a hole opposite the block so that external pressure can be exerted on the block to force it into the cavity for disassembly of the parts, and means included in said stem and locking device for preventing separation of the block and spring from the stem while the stem is separated from the socket portion, including said spring being secured to the block and extending beyond its ends, the cavity having recesses longitudinally extending therefrom for receiving parts of the spring whereby to prevent separation of the block and spring from the stem after disassembly of the members.

4. A drill assembly comprising a stem, a drill bit, a socket portion on the bit for closely receiving the end of the stem, with abutment of the stem against the bottom of the socket in said socket portion, and a locking device for clutching the stem and bit together; said stem having a cavity, said socket portion having a notch extending from its inner surface and located adjacent the cavity when the parts are assembled, said locking device including a block and a spring capable of being received wholly within the cavity during assembly and disassembly, the spring being located between the block and the bottom of the cavity and effective to cause a movement of the block so that a part of said block is caused to enter the notch, said spring being secured to the block, one end of the cavity having a concave shape and one end of the block fitting into the said concave end of the cavity, the cavity having a recess longitudinally extending therefrom at its other end for receiving a part of the spring whereby to prevent separation of the block and spring from the stem after disassembly of the stem from the socket portion.

5. A drill assembly comprising a stem, a drill bit, a socket portion on the bit for closely receiving the end of the stem, with abutment of the stem against the bottom of the socket in said socket portion, and a locking device for clutching the stem and bit together, said stem having a cavity at its outer peripheral surface, said socket portion having a notch at its inner surface for alignment with the cavity when the parts are assembled, and a rockable locking device including a pivotally positioned element in said cavity and a spring located between the element and the inner wall of the cavity for rocking the element outwardly into locking position in said notch, said device being wholly within the cavity and notch and enclosed by the socket portion when the parts are in assembled and locked position, said device including means cooperative with the stem for preventing said element from accidentally leaving said cavity.

6. A separable connection for rock drills and like structures comprising a stem and a socket member for receiving the stem, interengaging means on the stem and socket member by which rotation of one member is transmitted to the other, said stem having a cavity at its outer

peripheral surface, said socket member having a notch at its inner surface for alignment with the cavity when the parts are assembled, and a rockable lock-device including a pivotally positioned element in said cavity and a bowed blade spring located between the element and the inner wall of the cavity for rocking a part of the element outwardly into said notch whereby the element is effective in compression to prevent separation of the stem from the socket member, said device being wholly within the cavity and notch and enclosed by the socket member when the parts are in assembled and locked position, said device including means for preventing said element from accidentally leaving said cavity, said spring being secured to and forming a unit with the element and having at least one end engageable in a recess extending from the cavity whereby to provide part of said preventing means.

7. A separable connection for rock drills and like structures comprising a stem and a socket member for receiving the stem, interengaging means on the stem and socket member by which rotation of one member is transmitted to the other, said stem having a cavity at its outer peripheral surface, said socket member having a notch at its inner surface for alignment with the cavity when the parts are assembled, and a rockable locking device including a pivotally positioned element in said cavity and a bowed blade spring located between the element and the inner wall of the cavity for rocking a part of the element outwardly into said notch whereby the element is effective in compression to prevent separation of the stem from the socket member, said device being wholly within the cavity and notch and enclosed by the socket member when the parts are in assembled and locked position, said device including means for preventing said element from accidentally leaving said cavity, said spring being secured to and forming a unit with the element and having both its ends engageable in opposed recesses extending from the cavity whereby to provide said preventing means.

8. A separable connection for rock drills and like structures comprising a stem and a socket member for receiving the stem, interengaging means on the stem and socket member by which rotation of one member is transmitted to the other, said stem having a cavity at its outer peripheral surface, said socket member having a notch at its inner surface for alignment with the cavity when the parts are assembled, and a rockable locking device including a pivotally positioned element in said cavity and a bowed blade spring located between the element and the inner wall of the cavity for rocking a part of the element outwardly into said notch whereby the element is effective in compression to prevent separation of the stem from the socket member, said device being wholly within the cavity and notch and enclosed by the socket member when the parts are in assembled and locked position, said device including means for preventing said element from accidentally leaving said cavity, said spring being secured to and forming a unit with the element and having one end engageable in a recess extending from said cavity, said element having at its end remote from said engageable end of the spring an end portion projecting beyond the spring and rockably received in a recess at the corresponding end of the cavity.

EDWARD J. BOWMAN,