Feb. 6, 1923. 1,444,334

E. W. CLEVELAND

DRILL CARRYING ARM FOR MULTIPLE SPINDLE DRILLS

Filed Sept. 15, 1919

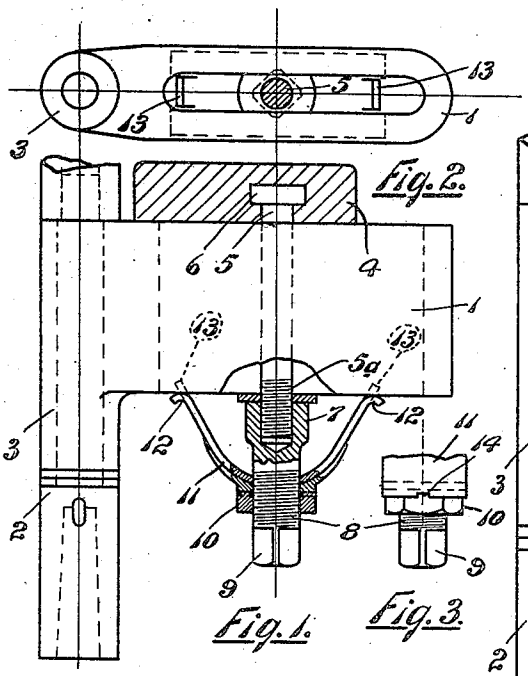


Fig. 1. Fig. 3.

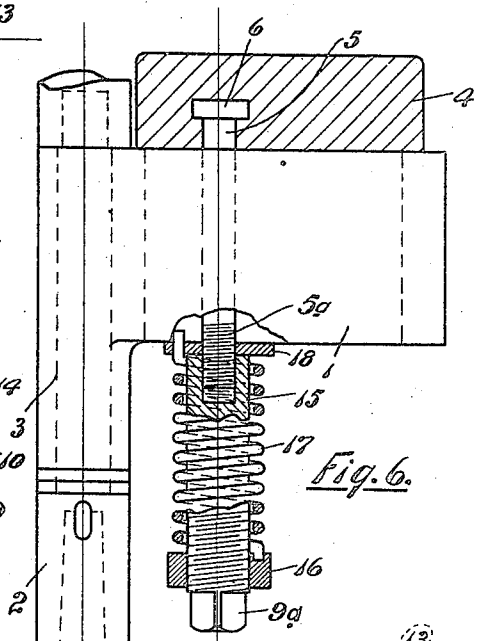


Fig. 6.

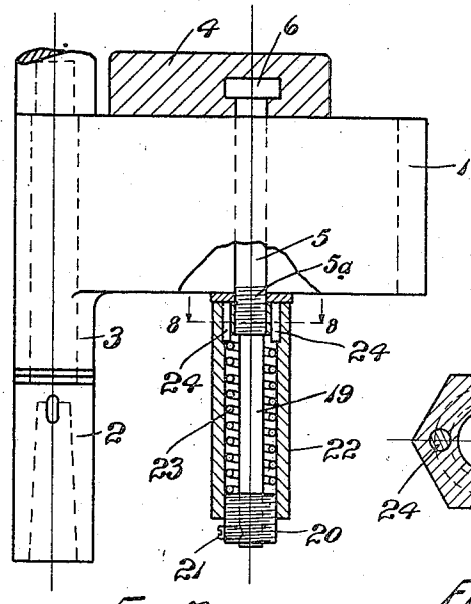


Fig. 7.

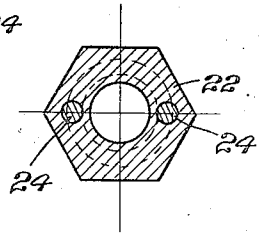


Fig. 8.

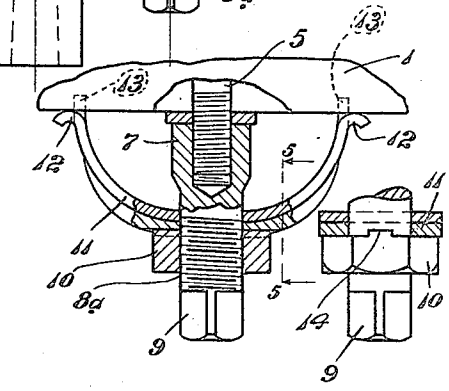


Fig. 4. Fig. 5.

Inventor

Edgar W. Cleveland

By Frank E. Linnane, Jr.

Attorney

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UNITED STATES PATENT OFFICE.

EDGAR W. CLEVELAND, OF HOLLAND, MICHIGAN.

DRILL-CARRYING ARM FOR MULTIPLE-SPINDLE DRILLS.

Application filed September 15, 1919. Serial No. 323,780.

To all whom it may concern:

Be it known that I, EDGAR W. CLEVELAND, a citizen of the United States of America, residing at Holland, in the county of Ottawa and State of Michigan, have invented certain new and useful Improvements in Drill-Carrying Arms for Multiple-Spindle Drills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a mechanism adapted to be applied to the adjustable arms which carry drills in multiple spindle drills. The invention relates to and comprises various improvements in the construction shown in my prior application, Serial No. 282,225, filed March 12, 1919, patent on which will issue September 16, 1919. It is an object and purpose of the present invention to provide a means for holding the drill carrying arm against the head or other support in a multiple spindle drill so that the same shall not drop at its drill carrying end when released for adjustment to a different position, the device used for this purpose being readily applicable to multiple spindle drills already manufactured and in use without change of construction of the machine. A further object of the invention is to construct this attachment for the arms of a multiple spindle drill in a very simple and economical manner whereby the same may be readily manufactured at low cost. A still further object of the invention consists in the provision of an attachment of this kind which when applied to an arm of a multiple spindle drill serves to hold the arm against the head of the machine by a yieldable spring pressure when the arm is relieved for adjustment, this spring pressure being uniformly maintained or increased as the arm is released and similarly maintained or diminished when the arm is tightened and bound securely against the head thereby relieving the strain on the spring means during the time when it is not needed.

For an understanding of the invention and the construction embodying the same, reference may be had to the accompanying drawings, in which:

Fig. 1 is a partial side elevation and vertical section illustrating the application of my invention to a drill carrying arm of a multiple spindle drill.

Fig. 2 is a plan view of the arm, the bolt used to attach it to the head being shown in transverse section.

Fig. 3 is a fragmentary side elevation of the lower part of the attachment which is used with the arm.

Fig. 4 is a fragmentary side elevation and section somewhat enlarged, of the attachment shown in Fig. 1, being slightly modified so as to increase the spring pressure with the release of the arm for adjustment.

Fig. 5 is a side elevation and section taken on the line 5—5 of Fig. 4.

Fig. 6 is a partial side elevation and section showing a modified form of construction serving the same functions as that shown in Fig. 1.

Fig. 7 is a similar view of a yet further modification; and

Fig. 8 is a horizontal section taken on the line 8—8 of Fig. 7.

Like reference characters refer to like parts in the different views of the drawing.

The arm 1 may be of any preferred construction and at one end carries a drill holding spindle 2 rotatably mounted in a suitable journal 3. The arm in the construction shown is adapted to be adjustably connected to the head 4 of a multiple spindle drill, a T-bolt 5 having a head 6 located in a suitable T-slot in the drill head 4 passing downwardly through the arm 1, which is longitudinally slotted, and receiving a binding nut 7 at its lower threaded portion 5^a which may be tightened against the washer shown interposed between the binding nut and the lower side of the arm. Heretofore, before my invention, application for which has been referred to, it was common to use only this binding nut on the lower end of the bolt and when the arm was adjusted the nut was released and, due to the heavier end of the arm carrying the drill spindle, such end of the arm tended to tilt or drop downwardly and throw the drill carried by the drill spindle away from true vertical position. This necessitated considerable trial and effort to properly adjust the arm to the desired position, greatly increasing the time spent in making a set-up on each arm in an adustable multiple spindle drill.

With my invention the nut 7 used to bind the arm against the head 4 or similar support has an integral extension 8 which is exteriorly threaded, terminating at its lower end in a squared portion 9 adapted to receive

a wrench. On the threaded portion of the extension 8 a nut 10 is placed serving as a support for a leaf spring 11 the ends of which are curved as indicated at 12, to bear against the under side of the arm at each side of the slot through the arm, while the intermediate portions of the ends of the spring between the curved parts 12, project into the slot as indicated at 13. This holds the spring from any rotative movement. The nut is held against rotative movement by a rib 14 thereon which extends into a notch or depression in the lower member of the spring 11 as shown.

It is apparent, with this construction, that on turning the member consisting of the binding nut 7 and the extension 8 so as to release the arm from the head, the spring pressure of the spring 11 does not vary, provided that the threads on the lower end of the bolt and on the extension 8 are the same. The spring may be regulated to any desired tension and left at that tension and whatever is done to the member consisting of the binding nut and its extension 8, this tension of the spring serving to yieldingly hold the arm against the head 4 remains constant. The force of the spring is designed to be sufficient to normally hold the arm against the head and keep its heavier end from dropping in any respect, yet with the spring capable of yielding to permit the arm to be moved with respect to the head for its adjustment to a new position. It is evident that this construction is a unit which may be applied directly to the lower ends of the usual bolts used to secure the arms on the head of a multiple spindle drill that it may be applied readily to constructions already in use.

In Figs. 4 and 5 a slight modification is shown in that the extension 8^a to the binding nut 7 is more finely threaded than is the lower end of the bolt 5, this resulting in increasing the force of the spring 11 against the arm when the binding nut is released. This is of value as the spring is not at all times held under full strain but is relieved during the times when it is not of use, being increased at those times when it has to perform its functions. The same effect may be obtained by making parts 5^a and 8^a with the same number of threads but with part 5^a double threaded and 8^a single threaded.

In Fig. 6 a slight modification in construction is shown. The binding nut 15 in this construction comprises a rod interiorly bored and threaded at its upper end to engage with the lower end 5^a of the bolt 5, threaded at its lower portion to receive a nut 16, and squared at its lower end as indicated at 9^a. A strong coiled spring 17 is placed around the rod 15 having its lower end connected with the nut 16 while its upper end passes through the washer 18, interposed between the arm and the rod 15. The upper end of the spring extends into the vertical slot in the arm. The spring is held from rotation by the engagement of this upper end with the arm, and the nut 16 is held from rotation other than a very limited amount by the torsional force of the spring. The action, so far as holding the arm in horizontal position with a yielding pressure, is the same as in the constructions shown in Figs. 1 to 5 inclusive.

In Figs. 7 and 8 a still further modification is shown. The bolt 5 has an integral extension 19 of smaller diameter at its lower end on which an exteriorly threaded plug 20 is secured by means of a set screw 21. A sleeve 22 is placed over the extension 19 and threaded into the threaded portion 5^a of the bolt 5, while the plug 20 is threaded into the lower end of the sleeve. A coiled spring 23 is located within the sleeve around the part 19 and between the plug 20 and the lower ends of two pins 24 which pass loosely through the upper end of the sleeve 22 and bear against the washer which is interposed between the sleeve and the lower side of the arm whereby the spring pressure is transmitted to the arm to hold it in horizontal position. In this construction the tension of the spring is more easily adjusted than in the others, it being necessary merely to loosen the set screw 21 and turn the plug 20 to any desired position after which it is again fixed to the part 19. When the sleeve 22 is turned to release the arm to permit its adjustment it threads downwardly on to the plug 20 so that the tension of the spring is not changed and this tension of the spring is directly transmitted to the arm to yieldingly hold it against the head 4.

All of these constructions are readily adapted to be applied to the arms of multiple spindle drills which are now in use without the necessity of changing or redesigning such arms. In the construction shown in Figs. 7 and 8, new bolts having an extension 19 thereto would be necessary but in the other the old bolts now in use can be used. I have shown the invention as applied to a short length of arm using one bolt only to hold it in position but it may be applied to the longer arms which use more than one bolt, the device being applied to either one or more of the bolts associated with an arm as may seem advisable.

Various other modifications to accomplish the ends desired may be resorted to without departing from the invention which is defined in the appended claims and I, accordingly, consider myself entitled to all such modifications as come within the scope of the claims defining the invention.

I claim:

1. In a multiple spindle drill, an arm support, an arm located against the support, a

bolt mounted on the support and passing through the arm, a means detachably connected to the end of the bolt for binding the arm against the support to hold the same in fixed relation thereto, said means being operable to release the arm for adjusting movement with respect to the support, and yielding means associated with the first means for yieldingly holding the arm against the support when the first means is released, said yielding means being located beyond the end of the bolt and having its tension maintained during operation of the first means, substantially as described.

2. In a multiple spindle drill, an arm support, an arm located against the under side of the support, said arm being provided with a rotatably mounted vertical drill spindle, a bolt connected to and depending from the support, said bolt passing through the arm, means threading on to the end of the bolt for securing the arm in fixed relation to the support, yielding means mounted on the securing means and engaging against the arm to hold the arm against the support when the securing means is operated to free the arm for adjustment, and means to maintain the tension of the yielding means during operation of the securing means, substantially as described.

3. In combination, an arm support, an arm located against the under side of the support, said arm carrying a drill spindle, a bolt connected to and depending from the support through the arm, a securing means threaded on to the lower end of the bolt and engageable against the arm to secure the same against the support, becoming inoperative for such purpose when moved on the bolt away from the arm, and spring means carried by the securing means and bearing against the arm to hold it against the support when the securing means is inoperative, and means for rendering the operation of the securing means to free the arm ineffective to lessen the pressure of the spring against the arm, substantially as described.

4. In combination, an arm support, an arm located against the under side of the support, a bolt connected to and depending from the head through the arm, means threaded on to the lower end of the bolt adapted to be operated to secure the arm in fixed relation to the support, said means having a downwardly projecting extension, a nut threaded on to said extension, a spring carried by the nut and bearing against the arm, and means connecting the spring and nut to hold the nut against turning when said extension is turned with the first means in releasing the arm from the suppot. substantially as and for the purposes described.

5. In combination, a support, an arm located against the under side of the support, a bolt connected to and depending from the support and passing through the arm, an elongated member interiorly bored and threaded at its upper end to thread on to the lower end of the bolt and secure the arm in fixed relation to the support, the lower portion of said member being exteriorly threaded, a nut threaded on to said lower portion of the member, a spring under compression disposed between the nut and the lower side of the arm, interengaging means between the spring and arm to hold the spring from rotative movement, and means for releasably holding the nut against rotative movement with respect to the spring, whereby said means is normally effective but is capable of being rendered ineffective so that the nut may be operated to adjust the force of the spring, substantially as described.

6. In combination, a support, an arm located against the support, a bolt connected to the support and extending therefrom through the arm, a member threaded on to the end of the bolt against the arm, a spring, means having threaded connection with the member on which the spring rests, the spring being disposed between said means and the arm, and means to hold said first means from turning with the member when it is operated to release the arm from the support, substantially as and for the purposes described.

7. In combination, a support, an arm located against the support, a bolt connected to the support and extending therefrom through the arm, means threaded on to the end of the bolt to releasably bind the arm to the support, a spring carried by said means and yieldingly pressing the arm against the support, and means for increasing the tension of the spring when said first means is moved to release the arm, substantially as described.

In testimony whereof I affix my signature.

EDGAR W. CLEVELAND.