E. W. CLEVELAND.

ADJUSTABLE ARM STRUCTURE FOR MULTIPLE SPINDLE DRILLS.

APPLICATION FILED MAR. 12, 1919.

1,316,142.

Patented Sept. 16, 1919.

2 SHEETS—SHEET 1.

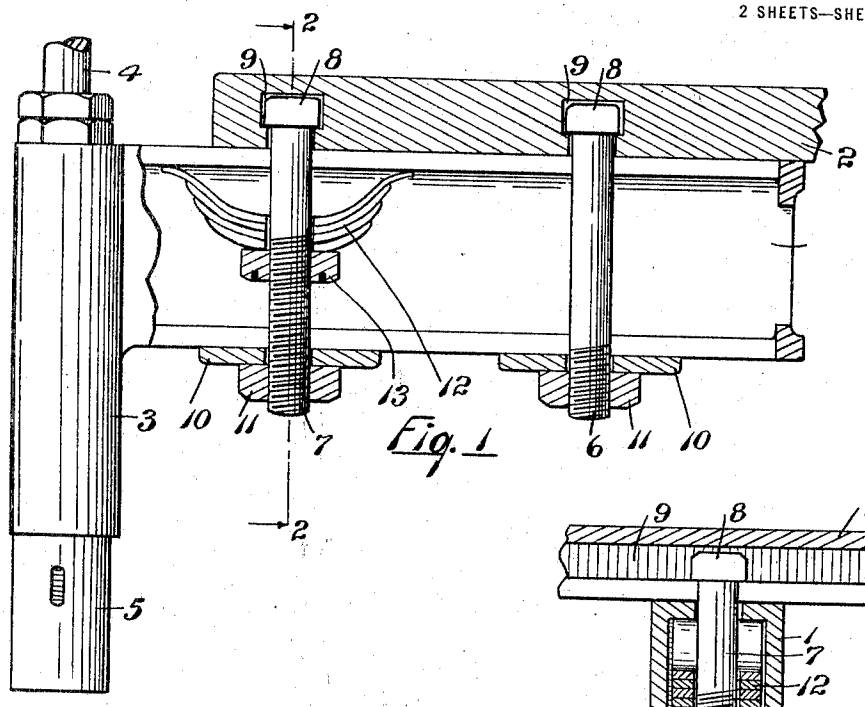


Fig. 1

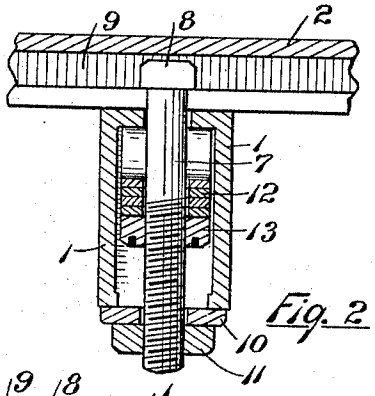


Fig. 2

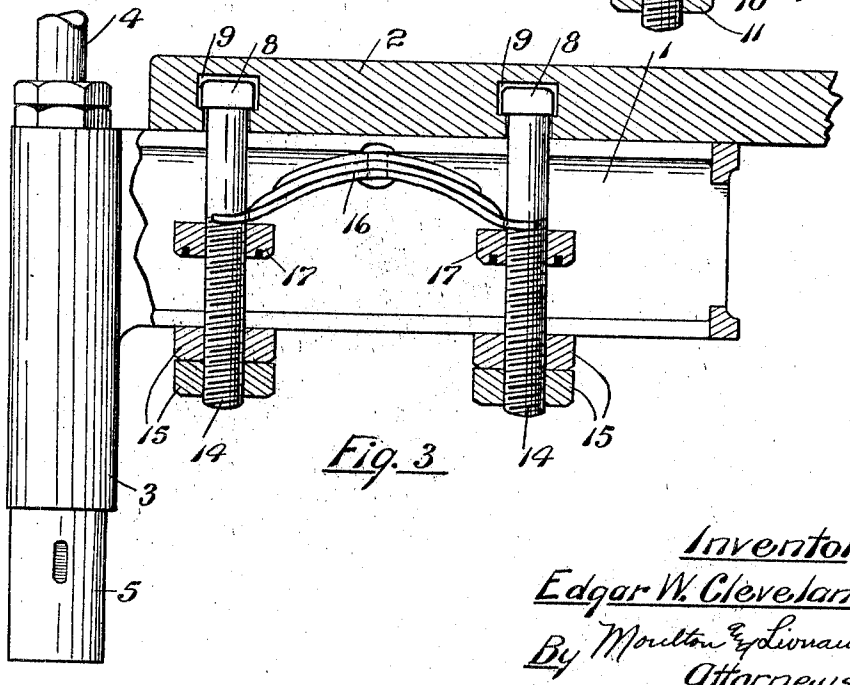


Fig. 3

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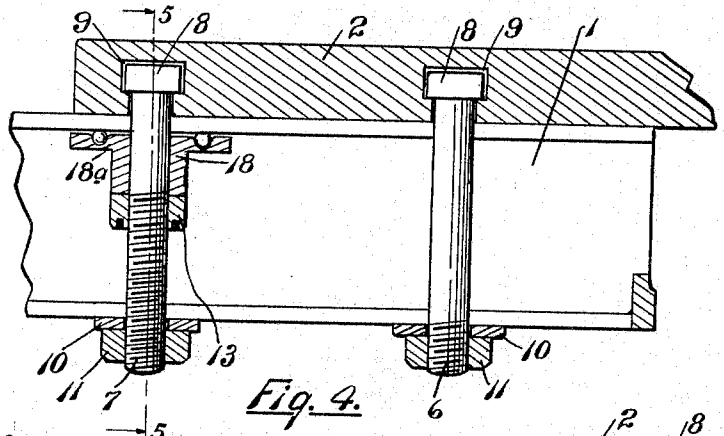


Fig. 4.

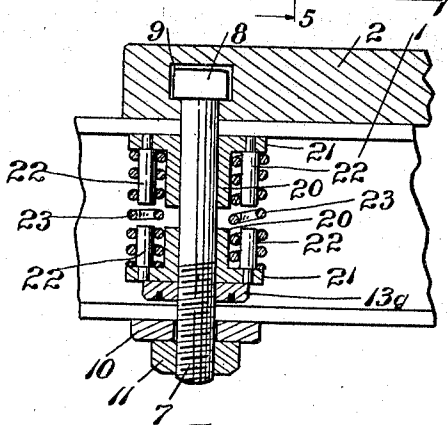


Fig. 6

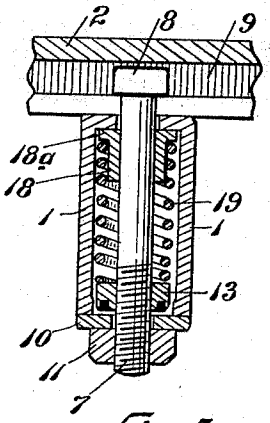


Fig. 5

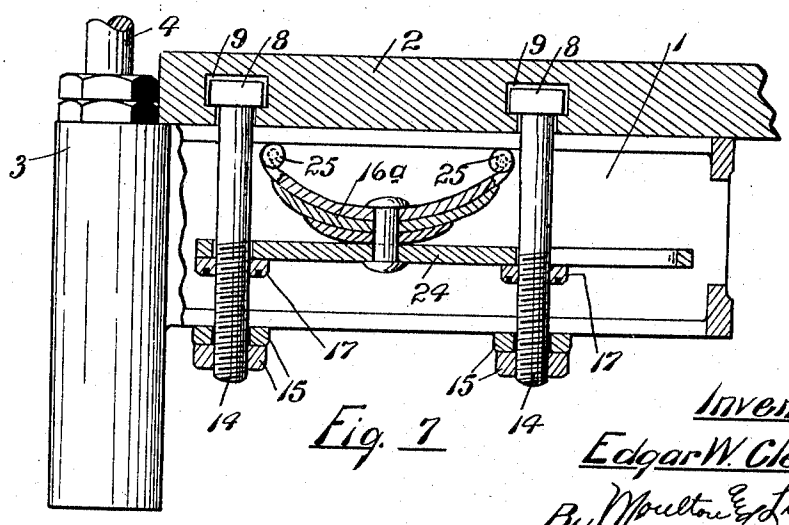


Fig. 7

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UNITED STATES PATENT OFFICE.

EDGAR W. CLEVELAND, OF HOLLAND, MICHIGAN.

ADJUSTABLE-ARM STRUCTURE FOR MULTIPLE-SPINDLE DRILLS.

1,316,142. Specification of Letters Patent. Patented Sept. 16, 1919.

Application filed March 12, 1919. Serial No. 282,225.

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 Adjustable-Arm Structures 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 the adjustable arms of multiple spindle drills and is particularly concerned with a construction applicable to and used in combination with said arms such that a change of position of the arms may be made without the trouble and effort now necessary, particularly with reference to the angular position of the drill carrying spindle, which when the arm is tightened against the head of the multiple drill machine is liable to be moved slightly from the position which it should take, this destroying the set up and necessitating a further trial and change to get the drill in its exact and proper position. With my invention, the outer end of the arm is always held in upper position against the head yet at the same time the arm may be moved with reference to the head for change to a new position, this holding the drill carrying spindle always in true vertical position without danger of its taking a slight angle to the vertical through the dropping of the outer end of the arm when it is loosened on the head. As a result the drill may be easily and readily brought directly above the point in the work where it is to operate, without the annoying and time wasting changes of the drills when the arms carrying the same are tightened against the head after having been placed in, what was thought, the proper positions. These features, as well as many others not at this point specifically enumerated, but which will appear as the description progresses, are present in the construction shown in the accompanying drawings, in which,

Figure 1 is a partial sectional and side view of a drill carrying arm equipped with my invention.

Fig. 2 is a vertical section on the line 2—2, of Fig. 1.

Fig. 3 is a view similar to Fig. 1, showing a modification in structure, the same ends being attained.

Fig. 4 is a fragmentary sectional view somewhat similar to Figs. 1 and 3, of another modification in construction.

Fig. 5 is a vertical section, slightly modified, and taken on the line corresponding to line 5—5, of Fig. 4.

Fig. 6 is a fragmentary section showing a still further modification, and

Fig. 7 is a view similar to that shown in Fig. 3, a further modification in construction being illustrated.

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

In multiple spindle drills, the drills are carried each at the outer end of an arm which in construction, preferably, has two spaced apart sides 1 with inturned flanges at their upper edges, said flanges coming directly below a head 2 to which all of the arms are adjustably secured. At its outer end each arm is formed with a sleeve 3 in which a spindle 4 is rotatably mounted, the same being provided at its lower end with a drill receiving head 5.

In practice the arms may be connected adjustably to the head 2 by using T-head bolts 6 and 7 the heads 8 of which are received in suitable T-slots 9 cut in the under side of the head, while the shanks of the bolts pass downwardly between the sides 1 of the arm to points below the arm. A suitable washer or bearing plate 10 is placed around each bolt and against the under side of the arm and binding nuts 11 threaded on to the bolts against said washers.

Bolt 7 nearest the drill carrying end of the arm is threaded for a greater distance than the bolt 6. A spring 12 comprised of several leaves is located within the arm, bolt 7 passing through it, its ends bearing against the under sides of the inturned flanges at the upper edges of sides 1, while it rests at its middle on a nut 13 threaded on to the bolt

7, it being obvious that the tension of the spring may be regulated by operation of the nut which may be turned by using a spanner wrench after the nut 11 and washer 10 on bolt 7 are removed.

The spring is strong enough, and it is designed that its tension shall be regulated so that it alone may serve to hold the drill carrying end of the arm against the under side of the head 2. This tension, however, will not interfere with moving the arm to a different position when the nuts 11 are loosened. Accordingly, whenever a new set up for the machine is desired, any arm is changed in position by merely loosening nuts 11 and moving the arm to a point such that the lower end of the drill carried in the socket 5 comes directly over the point in the work which is to be the center of a hole drilled by the drill, after which the nuts 11 are tightened to fix the arm firmly in such position. By reason of the fact that the drill carrying end of the arm, and in fact the entire arm is held firmly yet yieldingly against the head 2 by the spring 12, there is no dropping of the drill end of the arm so that the drill spindle is at a slight angle to the vertical, as is usual with most drills of the multiple type, such that when the nuts 11 are tightened a change of position of the drill takes place, but when once placed any drill stays in the exact vertical position to which it has been moved, and the tightening of the nuts merely fixes the arm so that it cannot move from such position. The value of this is evident in that no guess work is required to properly place an arm in changing set up of the machine, nor is there ever any necessity of trying a number of times before getting a drill properly set.

The same result may be attained in many different ways so far as the method of getting the spring pressure is concerned. In Fig. 3, a modification is shown in which the bolts 6 and 7 are replaced by two bolts 14, both of which are threaded substantially as far as the bolt 7 in the first construction and which receive nuts 15, one or more at their ends. A leaf spring 16 rests at its ends on nuts 17 threaded on the bolts 14, the middle part of the spring bearing against the flanges at the upper edges of sides 1 of the arm. The tension of this spring may be regulated by nuts 17 and the same effect generally is the same as with the former described construction. One advantage is present in this construction, that is, the arm may be moved over a greater range due to the fact that the ends of the spring do not pass beyond the centers of the bolts so that sleeve 3 may be brought nearer the head than in Fig. 1. Also pressure exerted on the arm is more uniform in the length of the arm, the pressure of spring 12 being largely at one end of the arm.

In Fig. 4, the spring 12 of Fig. 1 is eliminated and a sleeve 18 having an upper flange 18^a extending to each side is put in its place to rest on the nut 13. Preferably, anti-friction devices are located between the parts 18^a and the inturned flanges of the arm. By adjusting the nut 13, the arm may be made to practically ride on the anti-friction bearings when the lower nuts 11 are loosened, this without permitting the journal box end of the arm to drop, there being just sufficient space to permit free movement of the arm on loosening nuts 11. In Fig. 5, a coiled spring 19 is disposed between the flange 18^a of the sleeve and the nut 13, the action being substantially identical with the structure shown in Fig. 1.

In Fig. 6, two sleeves 20 are loosely positioned on the bolt 7 one over the other and from the upper and lower ends of the upper and lower sleeves, arms 21 project, each having a pin 22 connected thereto. A coiled spring 23 is disposed around and between the upper and lower pins at each side of the bolt, and the springs are regulated as to tension by operation of the nut 13^a against which the lower sleeve 20 rests. The construction provides a somewhat wider bearing for the application of the force of the springs to the arm but in all other respects gives the same results as the construction shown in Figs. 4 and 5.

In Fig. 7, a further modification is shown. The spring 16^a of the leaf type, is secured to a bar 24 disposed between bolts 14, and has openings at its ends through which the bolts pass, resting on nuts 17 on the bolts. At the ends of the spring rollers 25 are mounted which bear against said inturned flanges of the sides 1 of the arm, making an anti-friction rolling contact therewith. This construction is substantially equivalent to that shown in Fig. 3, except that the force of the spring is transmitted to the arm at two separated points instead of at one point, and the rolling contact makes the movement of the arm during adjustment easier, being preferred for this reason.

In all of the constructions described, the same ends are attained, particularly the holding of the arm against the head after the binding nuts are loosened for adjustment of the arm to a new position. The advantages flowing from this are apparent, especially the quick and accurate setting up of a machine, the drill carrying arms of which are equipped with my invention. I have indicated several ways in which this invention may be reduced to practical form, but do not wish that my invention shall be limited to the specific embodiments shown, as other modifications will occur to others

skilled in the art. All modifications coming within the scope of the appended claims are to be considered as comprehended by and included in my invention.

I claim:

1. In combination, an arm, a drill carrying spindle rotatably mounted at one end of the arm, a support, means for detachably connecting the arm in fixed position on the support, and independent means to yieldingly hold the arm against the support when said first mentioned means is inoperative, substantially as described.

2. In combination, a support, an arm located under and positioned with its upper side against the under side of the support, a drill carrying spindle rotatably mounted at one end of the arm, means for detachably connecting the arm in fixed position on the support, said arm being adjustable to different positions on the support when said means is released, and independent means acting on the arm to hold it against the support and the drill carrying spindle in vertical position when said first mentioned means is released and rendered inoperative.

3. In combination, a support, an arm located under and positioned with its upper-side against the under side of the support, a drill carrying spindle rotatably mounted at one end of the arm, bolts connected to and depending from the support through the arm, the heads of said bolts being received in slots in the under side of the support whereby said bolts may be changed in position on the support, spring means carried by said bolts within the arm and bearing against the arm to yieldingly hold it against the support, and nuts on the ends of the bolts below the arm to fix the arm against movement with respect to the support.

4. In combination, a support, an arm located under and positioned with its upper side against the under side of the support, a drill carrying spindle rotatably mounted at one end of the arm, bolts connected to and depending from the support through the arm, the heads of said bolts being received in slots in the under side of the support whereby said bolts may be changed in position on the support, spring means carried by said bolts and bearing against the arm to yieldingly hold it against the support, means for varying the force of pressure of the spring means, and nuts on the ends of the bolts to secure the arm against movement with respect to the support.

5. In combination, a support, an arm located under and positioned with its upper side against the under side of the support, a drill carrying spindle rotatably mounted at one end of the arm, bolts connected to and depending from the support through the arm, the heads of said bolts being received in slots in the under side of the support whereby said bolts may be changed in position on said support, nuts on the ends of the bolts to secure the arm against movement with respect to the support, a spring associated with said bolts and bearing against the arm to yieldingly hold it against the support, and adjusting means mounted on the bolts for regulating the pressure of the spring transmitted to the arm, substantially as described.

6. In combination, a support, an arm located under and positioned with its upper side against the under side of the support, a drill carrying spindle rotatably mounted at one end of the arm, bolts connected to and depending from the support through the arm, the heads of said bolts being received in slots in the under side of the support whereby said bolts may be changed in position on said support, a leaf spring housed within the arm, means adjustably carried by the bolts and against which the spring rests, said spring also bearing against the arm to yieldingly hold the same against the under side of the support, and nuts on the ends of the bolts for fixing the arm with respect to the support.

7. In combination, a support, an arm located under and positioned with its upper side against the under side of the support, a drill carrying spindle rotatably mounted at one end of the arm, two spaced apart bolts mounted on and depending from the support through the arm, the heads of said bolts being received in slots in the under side of the support whereby said bolts may be changed in position on said support, nuts threaded on to the ends of the bolts to fix the arm against movement with respect to the support, a nut threaded on to one of the bolts above the end thereof, and a spring disposed to bear against the arm and yieldingly hold it against the under side of the support, said spring being regulated as to bearing pressure by said last mentioned nut, substantially as described.

8. In combination, a support, an arm located with its upper side bearing against the under side of the support, means to adjustably secure the arm in any number of positions with respect to the support, said means being releasable for moving the arm to different positions, a leaf spring yieldingly bearing against the arm to press the same against the under side of the support and means to support and carry said spring, substantially as described.

9. In combination, a support, an arm located with its upper side bearing against the under side of the support, means to adjustably secure the arm in fixed position

with respect to the support, said means being releasable so that the arm may be moved to different positions, spring means yieldingly bearing against the arm to hold the same through spring pressure against the under side of the support when said first means is released, and means for adjustably carrying and supporting the spring means whereby the bearing pressure of the spring may be regulated, substantially as described.

10. In combination, a support, an arm located with its upper side bearing against the under side of the support, means to adjustably secure the arm in fixed position with respect to the support comprising two bolts connected to and depending through the arm, the heads of the bolts being received in slots in the under side of the support, and having nuts at their ends to bind the arm to the support, a second nut on each bolt within the arm, a bar resting at its ends on said second nuts and disposed between the bolts, a leaf spring connected to and above the bar, and a roller mounted at each end of the leaf spring and bearing against the interior upper portion of the arm, substantially as and for the purposes described.

11. In combination, a support, an arm disposed below the support with its upper side against the under side of the support, means to adjustably connect the arm to the support whereby it may be moved to a plurality of positions and fixed therein, a spring, antifriction devices between the spring and arm, and means to carry and support the spring with said devices bearing against the arm, whereby when the first mentioned means is operated to release the arm for adjustment, said spring will retain the arm against the support, substantially as described.

12. In combination with a head, an arm located under and positioned with its upper side against the under side of the head, a drill carrying spindle rotatably mounted at one end of the arm, means for detachably connecting the arm in fixed position on the head, said arm being adjustable to different positions on the head when the said means is released, and independent means acting on the arm to hold it against the support with the drill carrying spindle in vertical position when said first mentioned means is released and rendered inoperative, said last means from its independent relation to the first means not being affected by the inoperativeness of the first means when released.

In testimony whereof I affix my signature.

EDGAR W. CLEVELAND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."