W. T. SEARS.

DRILL TABLE MECHANISM.

APPLICATION FILED JULY 28, 1919.

1,376,168. Patented Apr. 26, 1921.

Fig. 1.

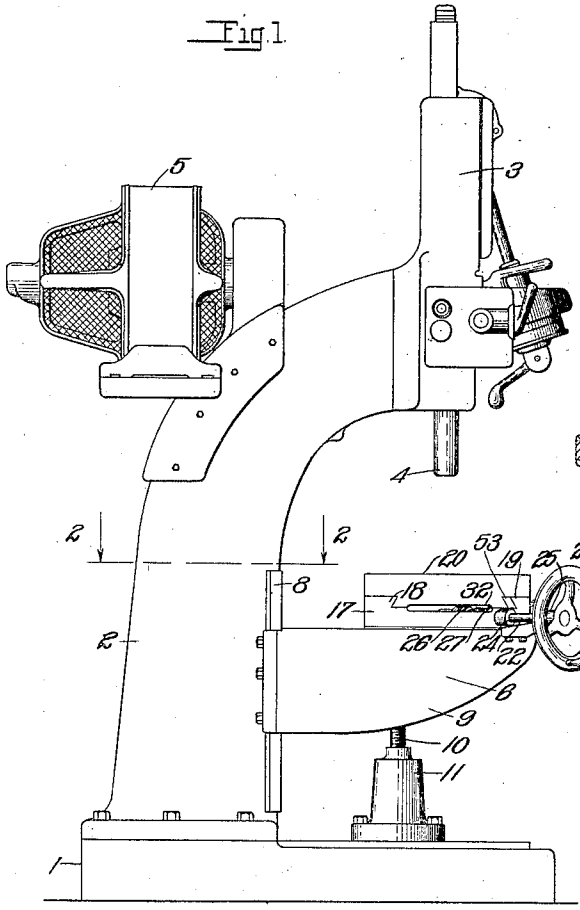


Fig. 5.

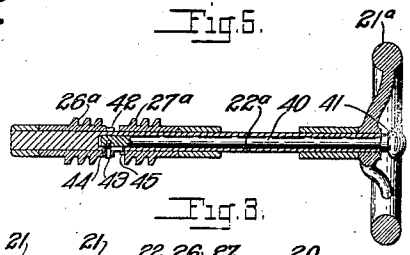


Fig. 8.

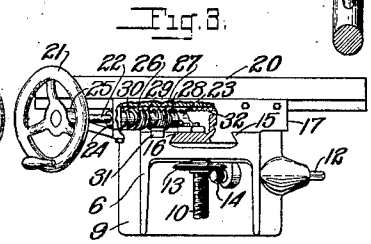


Fig. 7.

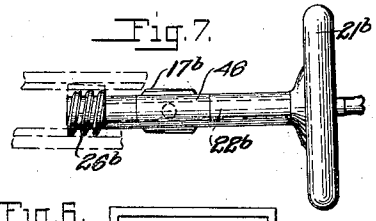


Fig. 2.

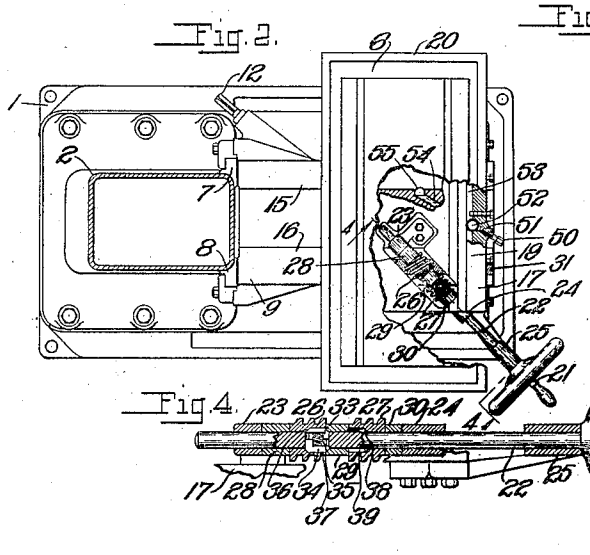


Fig. 6.

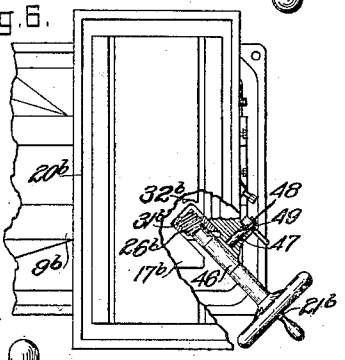


Fig. 4.

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DRILL-TABLE MECHANISM.

1,376,168. Specification of Letters Patent. Patented Apr. 26, 1921.

Application filed July 28, 1919. Serial No. 313,906.

To all whom it may concern:

Be it known that I, WILLARD T. SEARS, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Drill-Table Mechanisms, of which the following is a specification.

The present invention deals with that form of drilling machine having a vertical spindle rotatable about a fixed axis and an adjustable work-support positioned beneath the spindle. My invention applies particularly to the work-support and provides a means for effecting longitudinal and transverse adjustments in a horizontal plane.

In the drawings, I have shown the invention embodied in a preferred form, but it will be understood that it may be otherwise embodied and that the drawings are not to be construed as limiting or defining the scope of the invention, the accompanying claims being relied upon for that purpose.

Of the drawings:

Figure 1 is a side view of a vertical drilling machine embodying the invention.

Fig. 2 is a sectional view taken through the line 2—2 of Fig. 1 showing a plan view of the work-support with a portion of the table broken away to show the operating mechanism.

Fig. 3 is a front view of the work-support with a portion broken away.

Fig. 4 is an enlarged sectional view through the line 4—4 of Fig. 2.

Fig. 5 is an enlarged sectional view similar to Fig. 4, but disclosing an alternate form of the invention.

Fig. 6 is a fragmentary plan view of the work-support with a portion of the table broken away to show another alternate form of the invention.

Fig. 7 is an enlarged view of the mechanism disclosed in Fig. 6.

Referring to the drawings, 1 is the bed of the machine and 2 is a vertical column secured thereto and supporting a drill head 3. A vertical spindle 4 is mounted in suitable bearings within the drill head 3 and is adapted to be driven and fed from a motor 5 supported on the column 2 by means of mechanisms incased within the head. A work-support 6 is positioned beneath the spindle and is preferably adapted to be adjusted vertically. As shown in the drawings, this adjustment may be attained by providing the column 2 with vertical guideways 7 and 8 and constructing a lower member or carriage 9 of the work-support to engage these guideways. Means is provided for elevating and lowering the table comprising a screw 10 rotatably mounted in a bearing in the carriage 9 and fitted into a nut supported in a bracket 11 secured to the bed. A mechanism for rotating the screw 10 and thus raising or lowering the work-support is mounted in the carriage 9 and consists of a shaft 12 connected to the screw 10 by two bevel gears 13 and 14. The end of shaft 12 is shaped to be engaged by a crank or wrench and rotated manually. The parts of the machine already described have no direct bearing on the present invention and may be varied widely.

The carriage 9 is provided with horizontal guideways 15 and 16 and a saddle 17 is slidably mounted thereon. The upper part of the saddle is also provided with horizontal guideways 18 and 19 which extend in a direction perpendicular to that of 15 and 16. A table 20 is constructed to engage the guideways 18 and 19 and is slidably movable therealong.

In accordance with my invention, a mechanism is provided for effecting adjustment between the saddle and the carriage and also between the table and the saddle. This mechanism comprises a single hand-wheel 21 and means for connecting it in such a manner that it may be used to effect either adjustment. As shown in Figs. 1, 2, 3 and 4, the hand-wheel is secured to a shaft 22 making an angle of approximately 45° with the direction of each adjustment and rotatably mounted in bearings 23, 24 and 25 secured to the saddle. Two helical pinions 26 and 27 are mounted on the shaft and are held in place by collars 28, 29 and 30. The pinion 26 meshes with a rack 31 secured to the carriage 9 and the pinion 27 meshes with another rack 32 secured to the table 20.

A device is provided whereby either one of the pinions may be made to rotate with the shaft and hence effect the corresponding adjustment when the hand-wheel is rotated. This may be accomplished by means of two keys 33 and 34 fitted into a slot in the shaft 22 and pressed outward by a spring 35. The keys are beveled at both ends and the pinions are provided with key-ways 36, 37, 38 and

39 shaped to receive them. The collar 29 is also beveled at its inner circumference to fit the keys. Fig. 4 shows the keys fitted into the key-ways of pinion 26. By pulling the hand-wheel 21 outward the shaft 22 is moved longitudinally and by means of the engagement between the beveled faces of the keys 33 and 34 and the corresponding surfaces of the collar 29, the keys are forced inward and the spring 35 is compressed. When the keys reach a position opposite the key-ways 38 and 39 of the pinion 27 they are pushed outward by the spring 35 and the pinion 27 becomes rotatably locked with the shaft 22. Hence by moving the hand-wheel 21 inward and outward the keys 33 and 34 may be brought to enter the key-ways of either of the pinions.

An alternate construction for accomplishing the same purpose is disclosed in Fig. 5 in which the means for connecting the hand-wheel 21^a with either of the pinions 26^a and 27^a is operated by means of an inner shaft 40. This shaft fits inside the shaft 22^a and may be moved longitudinally by means of a knob 41 integral with one end thereof and extending through the hub of the hand-wheel 21^a. Longitudinal movement of this shaft is utilized to rotatably lock either of the pinions 26^a or 27^a to the shaft 22^a by any usual or preferred means. The means shown in Fig. 5 comprises a clutch member 42 secured to the shaft 40 by means of a pin 43. The pinions 26^a and 27^a have clutch members 44 and 45 integral with them respectively and constructed to engage the member 42. The clutch member 42 is splined to the shaft 22^a and rotates with it. Therefore when one of the clutch members 44 and 45 is in engagement with 42, the pinion integral with that member is positively rotated when the hand-wheel is turned. By longitudinally moving the shaft 40 either pinion may be so engaged and connected with shaft 22^a.

Figs. 6 and 7 disclose another mechanism for effecting either adjustment with a single hand-wheel. This mechanism comprises a single pinion 26^b secured to one end of a shaft 22^b and a hand-wheel 21^b secured to the other end. The shaft 22^b is rotatably mounted in a bearing 46 which is pivotally supported by the saddle 17^b. Preferably this pivotal engagement is attained by means of a pin 47 integral with the bearing 46 and having its axis perpendicular to the axis of the bearing. The pin fits into a hole 48 in the saddle 17^b and is threaded at its end which extends through a portion of the saddle. A nut 49 with a handle attached thereto for convenience in turning, fits the threaded portion of the pin 47 and by tightening this nut the bearing 46 may be locked against pivotal movement. Racks 31^b and 32^b are secured to the carriage and the table respectively as in the previous construction, but in this case they are so situated that one is directly above and the other directly below the pinion 26^b.

The pivotal engagement of the bearing 26 permits the rocking of shaft 22^b which raises and lowers the pinion. The racks are so placed that when the pinion is raised it will mesh with rack 32^b secured to the table 20^b and when lowered will mesh with rack 31^b secured to the carriage 9^b. By means of the nut 49, the pinion may be locked meshed with either rack. The movement of the pinion and the relative positions of the racks are shown in dot-and-dash lines in Fig. 7. As the pinion 36^b is rigidly secured to the shaft 22^b, movement of the hand-wheel will effect the adjustment corresponding to the rack with which the pinion is meshed.

It is desirable that a locking device is combined with the present invention to prevent movement of the table during the operation of the machine. A preferred form of locking device is shown in Fig. 2, but it will be understood that this device is in no way essential to the present invention. A screw 50 is fitted into a tapped hole 51 in the saddle 17. A vertical pin 52 is loosely mounted in the saddle in such a position that pressure may be applied to it by means of the screw 50. One end of the pin engages a gib 53 which is in contact with the table 20 and the other end engages a horizontal rod 54. This rod is in contact with a second vertical pin 55 shaped to fit the guideway 15 of the carriage.

When the screw is tightened pressure is transmitted through the means described to both the carriage and the table thereby locking the work-support against both horizontal adjustments. The point of contact of the screw 50 with the pin 52 is between the gib 53 and the rod 54 which enables the pin 52 to act as a lever. This construction is shown more fully in my copending application Serial No. 313,905 filed July 28, 1919.

By means of my invention the operator is enabled to effect horizontal adjustment of the table in all directions by means of a single hand-wheel. It will be noted that the hand-wheel is positioned so that it will not be in the way of the operator and yet may be conveniently reached by him from a position in front of the machine.

What I claim is:

1. In a drilling machine, a work-support, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and means operated by a single shaft on one of the members for optionally and independently effecting either the adjustment of the table on the saddle or the saddle on the support.

2. In a drilling machine, a work-support,

a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong in a direction angularly to the saddle adjustment, and means operated by a single shaft on one of the members for optionally and independently effecting either the adjustment of the table on the saddle or the saddle on the support.

3. In a drilling machine, a work-support, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong in a direction at right angles to the saddle adjustment, and means including a rack and pinion and operated by a single shaft on one of the members for optionally and independently effecting either the adjustment of the table on the saddle or the saddle on the support.

4. In a drilling machine, a work-support, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong in a direction at right angles to the saddle adjustment, and means including two racks and a pinion connection thereto operated by a single shaft on one of the members for optionally and independently effecting either the adjustment of the table on the saddle or the saddle on the support.

5. In a drilling machine, a work-support comprising a carriage, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and a mechanism for independently effecting these adjustments including a rack secured to the table, a second rack secured to the carriage and means rotatably mounted in the saddle and adapted to be operably connected with either rack.

6. In a drilling machine, a work-support comprising a carriage, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and a mechanism for independently effecting these adjustments including a rack secured to the table, a second rack secured to the carriage, a shaft rotatably mounted in the saddle and means on the shaft adapted to be operably connected with either rack.

7. In a drilling machine, a work-support comprising a carriage, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and a mechanism for independently effecting these adjustments including a rack secured to the table, a second rack secured to the carriage, a pinion rotatably mounted in the saddle and means whereby the pinion may be operably meshed with either rack.

8. In a drilling machine, a work-support comprising a carriage, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and a mechanism for independently effecting these adjustments including a rack secured to the table, a second rack secured to the carriage, a shaft rotatably mounted in the saddle, a pinion secured to one end of the shaft, a hand wheel secured to the other end adjacent the front of the machine and means whereby the pinion may be operably meshed with either rack.

9. In a drilling machine, a work-support comprising a carriage, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and a mechanism for independently effecting these adjustments including a rack secured to the table, a second rack secured to the carriage, a shaft rotatably mounted in the saddle, a pinion secured thereon and means whereby the shaft may be pivoted about an axis perpendicular to its axis of rotation, enabling the moving of the pinion to mesh with either rack.

10. In a drilling machine, a work-support comprising a carriage, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and a mechanism for independently effecting these adjustments including a rack secured to the table, a second rack secured to the carriage, a shaft, a pinion mounted thereon, a bearing supporting the shaft and movably mounted on the saddle allowing the shaft pivotal movement about an axis perpendicular to its own in order that the pinion may be meshed with either rack, and means for securing the pinion in engagement with either rack.

11. In a drilling machine, a work-support comprising a carriage, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and a mechanism for independently effecting these adjustments including a rack secured to the table, a second rack secured to the carriage, a shaft, a pinion mounted thereon, a bearing supporting the shaft and a supporting pin integral with the bearing and rotatably mounted on the saddle allowing the shaft pivotal movement about an axis perpendicular to its own in order that the pinion may be meshed with either rack.

12. In a drilling machine, a work-support comprising a carriage, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and a mechanism for independently effecting these adjustments including a rack secured to the

table, a second rack secured to the carriage, a shaft, a pinion mounted thereon, a bearing supporting the shaft, a supporting pin integral with the bearing and rotatably mounted on the saddle allowing the shaft pivotal movement about an axis perpendicular to its own in order that the pinion may be meshed with either rack, and a device for locking the pinion in a position meshed with either rack.

13. In a drilling machine, a work-support comprising a carriage, a saddle mounted thereon and horizontally adjustable therealong, a table mounted on the saddle and horizontally adjustable therealong, and a mechanism for independently effecting these adjustments including a rack secured to the table, a second rack secured to the carriage, a shaft, a pinion mounted thereon, a bearing supporting the shaft, a supporting pin integral with the bearing and rotatably mounted in the saddle allowing the shaft pivotal movement about an axis perpendicular to its own in order that the pinion may be meshed with either rack, threads on the end of the pin and a nut engaging these threads whereby the pinion may be locked in a position meshed with either rack.

In testimony whereof, I hereto affix my signature.

WILLARD T. SEARS.