

G. McKNIGHT.
 DRILLING MACHINE.
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953,486.

Patented Mar. 29, 1910.

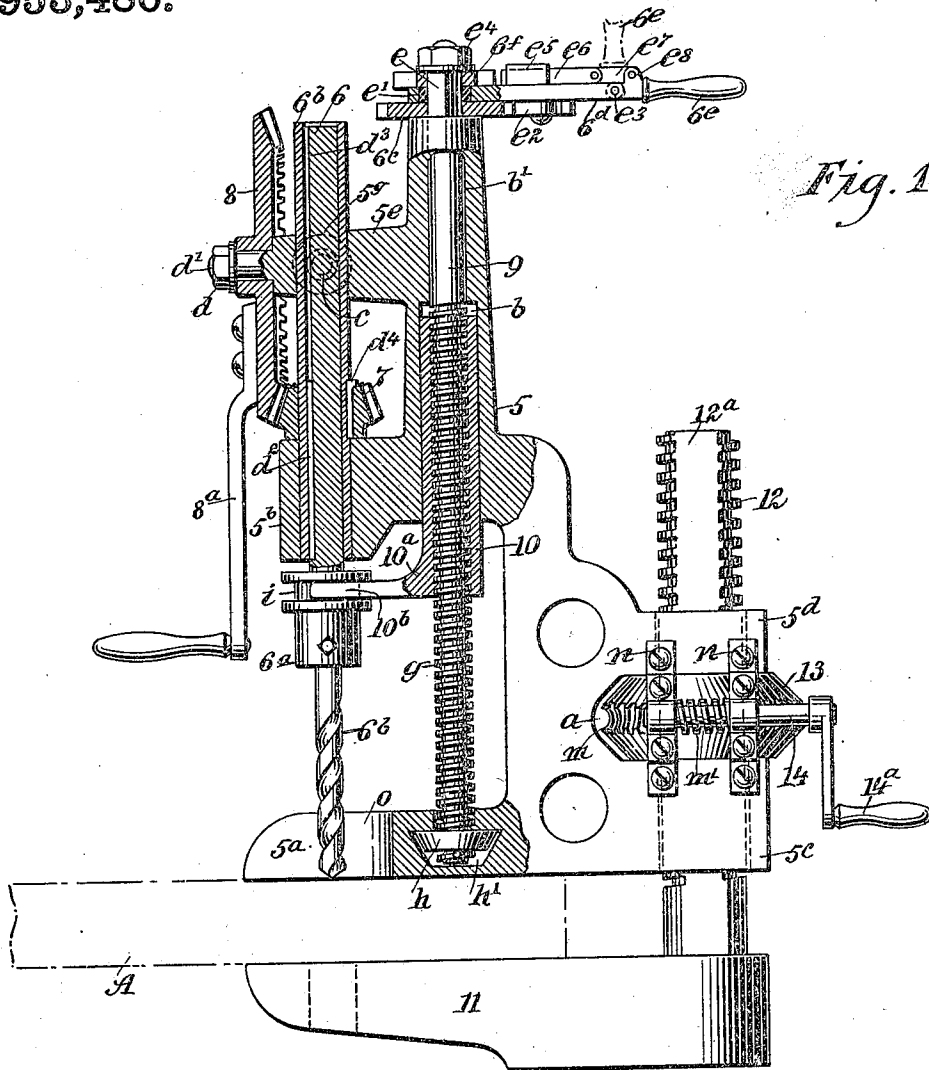


Fig. 1,

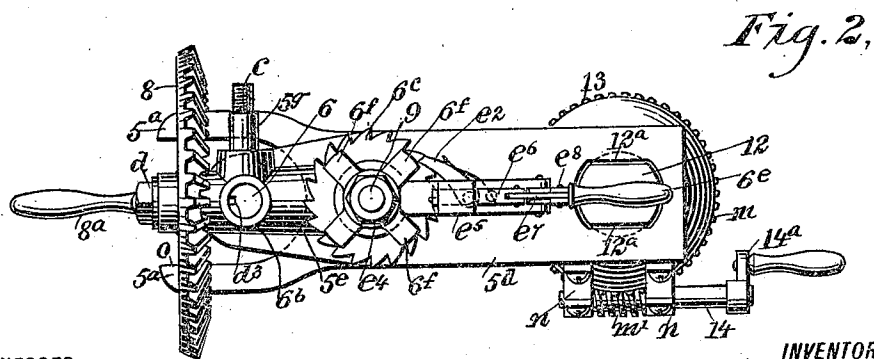


Fig. 2,

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GEORGE MCKNIGHT, OF TOWNSEND, MONTANA.

DRILLING-MACHINE.

953,486.

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Application filed May 25, 1909. Serial No. 498,231.

To all whom it may concern:

Be it known that I, GEORGE MCKNIGHT, a citizen of the United States, and a resident of Townsend, in the county of Broadwater and State of Montana, have invented a new and Improved Drilling-Machine, of which the following is a full, clear, and exact description.

This invention relates to drilling machines of a class that are portable, are adapted for operation manually, and that may be clamped upon a stationary support when in service.

The purpose of my invention is to provide a manually-operated drilling machine, having novel features that render it very convenient, afford a positive manually-controlled feed for the drill, and facilitate its withdrawal from a bored hole when this is desired, and also provide reliable, novel means for detachably securing the drilling machine upon an object that is stationary, or has sufficient weight to afford proper support to the drilling machine while in use.

The invention consists in the novel construction and combination of parts, as is hereinafter described and defined in the appended claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a partly sectional side elevational view of the improved drilling machine, and Fig. 2 is a plan view of the same.

The frame of the drilling machine is preferably cast from a suitable metal, and comprises an upright column 5 that is erected vertically upon a base that is bifurcated, as appears at *o*, thus producing two spaced members 5^a at the front end of the base, as is indicated in the drawings.

On the column 5 at its forward side and a suitable distance above the bifurcated front portion of the base, an arm 5^b is formed thereon. The portion of the column 5 that is between the base and arm 5^b, projects oppositely therefrom and is bifurcated at *a*, providing a lower frame member 5^c and a spaced upper frame member 5^d, these members or jaws having level, opposed surfaces that are parallel with each other. A bore *b* is formed in the arm 5^b and column 5, which is central in the latter, and at a suitable point this bore is reduced in diameter, providing

an extension *b'* thereof which continues upward through the top of the column. A short distance above and parallel with the arm 5^b, an arm 5^e is formed on the column 5 in the same vertical plane with the arm 5^b, said upper arm 5^e having a lateral member 5^g, whereon a journal *c* is formed or secured, that at the free end is exteriorly threaded for accommodation of a keeper nut *d*. Through the arms 5^b, 5^e, two axially-alined cylindrical bores are formed at an equal proper distance from the bore in the column 5 and parallel therewith. A cylindrical, hollow mandrel 6^b is rotatably fitted in the bores in the arms 5^b, 5^e, and preferably extends from the lower side of the arm 5^b to a point nearly the height of the column 5. Upon the hollow mandrel 6^b, a bevel gear 7 is fitted and secured by a key *d'*, said gear seating upon the true upper surface of the arm 5^b. Within the hollow mandrel 6^b, a cylindrical solid mandrel 6 is slidably fitted, it preferably having an equal length with the hollow mandrel. In the solid mandrel 6, a key-way *d''* is formed parallel with the longitudinal axis thereof, and extending from end to end of said solid mandrel. Within the hollow mandrel 6^b, a spline *d'''* is secured that extends from the lower end thereof, having a proper length, said spline having a loose-seated engagement within the key-way *d''*, whereby the solid mandrel is adapted to receive slidable adjustment for a considerable distance in the hollow mandrel and be rotated therewith. Upon the outer end *d'* of the upper arm 5^e, a bevel gear 8 of greater diameter than the gear 7, is rotatably mounted; a crank handle 8^a that extends radially from the bevel gear 8 affords means for manually rotating said gear, the crank handle having sufficient length to enable the easy rotation of the two co-acting mandrels 6, 6^b, when the machine is in use.

A feed shaft 9 is vertically supported within the column 5, the cylindrical upper portion thereof being rotatably fitted in the bore *b'*, a portion *e* of said shaft that projects above the column, having an angular body, as appears in Fig. 1. The feed shaft 9, where it enters the larger bore *b* in the column 5, is threaded, the thread *g* thereon extending to the lower end thereof, and with said thread, an elongated sleeve nut 10 has threaded engagement, said nut being slidable within the bore *b*. There is a collar *h* secured on the lower end of the feed shaft

9, said end and the collar thereon being rotatably seated in a recess h' formed in the base rearward of the forked members 5^a thereof. A drill-holding socket or chuck 6^a , is formed or secured on the lower end of the solid mandrel 6 and in said chuck body a peripheral groove i is formed. An arm 10^a is laterally extended from the lower end of the sleeve nut 10, and at its outer end two forked members 10^b are formed, one being shown in Fig. 1, said members passing oppositely into the groove i , thus effecting a loose connection between the sleeve nut and the solid mandrel 6.

The frame members 5^c , 5^d , are vertically perforated centrally therein, and said alined openings are of an equal diameter. Between the frame members 5^c , 5^d , that constitute parallel jaws, a circularly-edged nut block 13 is loosely fitted. A screw stem 12, preferably having two opposite flattened sides 12^a , has a threaded engagement within the nut block 13 passing upwardly therethrough, the body of the screw stem being flattened as shown, to reduce friction when the nut is rotated thereon. A clamping jaw 11 is formed at a right angle to the screw stem 12 and has sufficient length to adapt it for co-operation with the jaw members 5^a , when employed as a clamp, and in the free forward end portion of the jaw 11, a vertical opening is formed, that may be disposed directly below a drill 6^b that may be secured in the socket 6^a , said opening being indicated by dotted lines in Fig. 1.

In the circular edge of the nut block 13, a worm thread m is formed, that is engaged by the mating thread m' on a worm shaft 14, said shaft being supported for rotation on the jaws 5^c , 5^d , by the bracketed strap boxes n , n , as is shown in the drawings. A crank handle 14^a is secured on the outer end of the worm shaft 14, and it will be seen that a rotation of said crank handle in one direction will correspondingly rotate the nut block, and pull the clamping jaw toward or move it from the bifurcated jaws 5^a in accord with the direction of rotation had by the crank handle.

In the chuck 6^a , the drill 6^b is secured by a set screw or other means, and any size may be had by the drill within the capacity of the drilling machine. The means for feeding the drill 6^b downward as it is rotated, is located on the upper end of the column 5 and consists of the following details: Upon the squared upper portion e of the feed shaft 9, a ratchet wheel 6^c is mounted, and upon said wheel an end portion of a lever 6^d is seated, said end portion having a circular opening therein that receives the circular edge of a hub plate e' , which is centrally and angularly apertured, said aperture being of a form and size as to adapt said hub plate to fit closely upon the angular

body e of the feed shaft. Upon the lower side of the lever 6^d , a spring-pressed pawl e^2 is pivoted at one end thereof, the toe of the pawl having engagement with the teeth of the ratchet wheel 6^c , as appears in Fig. 2.

It will be evident that while the crank handle 8^a is being rotated with one hand, the lever 6^d may be operated with the other hand, and by its vibration a step-by-step rotatable movement be given to the feed shaft, which will correspondingly actuate the sleeve nut 10, giving it a gradual downward movement. The outer end portion of the lever 6^d , which constitutes a handle 6^e , therefore, is hinged at e^3 on the adjacent end of the lever 6^d , which permits the handle to be rocked into an upright position, as is indicated by dotted lines in Fig. 1. Over the end portion of the lever 6^d that is seated on the ratchet wheel 6^c , a spider 6^f is mounted on the squared portion e of the feed shaft 9, and is thereon secured by a washer and nut e^4 , the latter being screwed upon a reduced and threaded end portion of said feed shaft which extends above the spider. In a guide box e^5 , that is mounted upon the upper side of the lever 6^d , a slide bar e^6 is loosely inserted, which is loosely connected by a short link e^7 with an ear e^8 that projects upward from the lever where it is joined to the handle member 6^e . The spider 6^f is preferably provided with four radial arms, between any adjacent two of which the slide bar e^6 may be slid by raising the lever handle 6^e and shoving it and the slide bar toward the spider. This adjustment of the slide bar e^6 adapts it to serve as a locking means, so that by a reversed movement of the lever from that which feeds the drill downward, the sleeve nut 10 and mandrel 6 together with the drill 6^b , may be raised and the drill thus withdrawn up out of the hole it has bored or has partially bored; this provision being of great service in boring deep holes, as it enables the removal of chips and of introducing a lubricant to aid the drilling operation. By turning the handle 6^e into a horizontal position, the slide bar e^6 will be withdrawn from engagement with the spider 6^f , and enable the operation of drilling to be resumed, the regular feed being now employed.

The employment of the hollow mandrel 6^b as a guide and support for the solid mandrel 6, is of great advantage, as it permits the downward feeding of the latter to be effected by its sliding movement in the hollow mandrel a degree that enables the boring of quite deep holes, as occasion may require.

The improved drilling machine is well adapted for use in repairs in small smith shops, as it enables the clamping attachment of the machine on work that requires holes drilled therein. The device is also well adapted for use in the erection of steel

frames for high buildings, where it is essential that rivet holes or bolt holes be formed at their junctions, after such structural beams have been erected and temporarily secured, as it will be noted that the clamping means which is of novel construction enables the firm and reliable attachment of the drilling machine upon any one of the structural beams, in various positions to suit the requirements of the service, and thus locate the drill at an exact point where a perforation is required.

It will be noted that the lateral arm 5^g, affords means for changing the large bevel gear 8 from the position shown to place it on said arm 5^g, whereon it may be loosely secured by the employment of the nut *d*, so that the gear and its handle 8^a may be disposed at one side of the mandrel and of the arms 5^b, 5^c, which in some situations will greatly facilitate the proper disposal of the drilling machine and its convenient operation while drilling holes in structural work.

While the arm 5^g is shown as located at the left side of the machine viewed from the front, it is to be understood that it may be placed on the right side if this is preferred, or an arm of that character may be placed on each side as well as at the front of the machine, to enable its operation in any position required.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a machine of the character described, a supported, rotatable mandrel, a drill depending therefrom, said mandrel having an annular groove therein, a vertically-supported feed screw, a sleeve nut mounted upon the feed screw and having an arm loosely engaging the groove, the upper end of said screw being squared, a spider having radial arms and secured on the squared portion of the feed screw, a lever mounted upon the feed screw, a slide bar carried by the lever, and a hinged handle on the outer end of the slide bar, the other end of the slide bar entering between the spider arms when the handle is rocked upward.

2. In a device of the class described, a frame a hollow shaft journaled vertically in the frame, a mandrel movable longitudinally of the hollow shaft but constrained to rotate therewith, means for rotating the hollow shaft, a threaded rod journaled parallel with the shaft, a nut on the rod, said nut being provided with a fork extending laterally therefrom, the mandrel having a groove for engagement by the fork, and means for rotating the rod, said means comprising a ratchet wheel secured to the rod, a lever journaled on the rod and provided with a pawl for engaging the ratchet wheel, a handle hinged to the lever, a slide bar movable on the lever and pivoted to the handle, and a spider secured to the rod for engagement by the slide bar.

3. In a device of the class described, a frame, a hollow shaft journaled vertically in the frame, a mandrel movable longitudinally of the hollow shaft but constrained to rotate therewith, means for rotating the hollow shaft, a threaded rod journaled parallel with the shaft, a nut on the rod, said nut being provided with a fork extending laterally therefrom, the mandrel having a groove for engagement by the fork, and means for rotating the stem, said means comprising a ratchet wheel secured to the stem, a lever journaled on the stem, and a pawl on the lever.

4. In a device of the class described, a frame, a hollow shaft journaled vertically in the frame, a mandrel movable longitudinally of the hollow shaft but constrained to rotate therewith, means for rotating the hollow shaft, a threaded rod journaled parallel with the shaft, a nut on the rod, said nut being provided with a fork extending laterally therefrom, the mandrel having a groove for engagement by the fork, and means for rotating the stem.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE McKNIGHT.

Witnesses:

W. B. DOLENTY,
S. J. PERKINS.