No. 628,992 Patented July 18, 1899.

H. J. ROBERTS.

BORING MACHINE.

(Application filed Mar. 8, 1895. Renewed Dec. 19, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

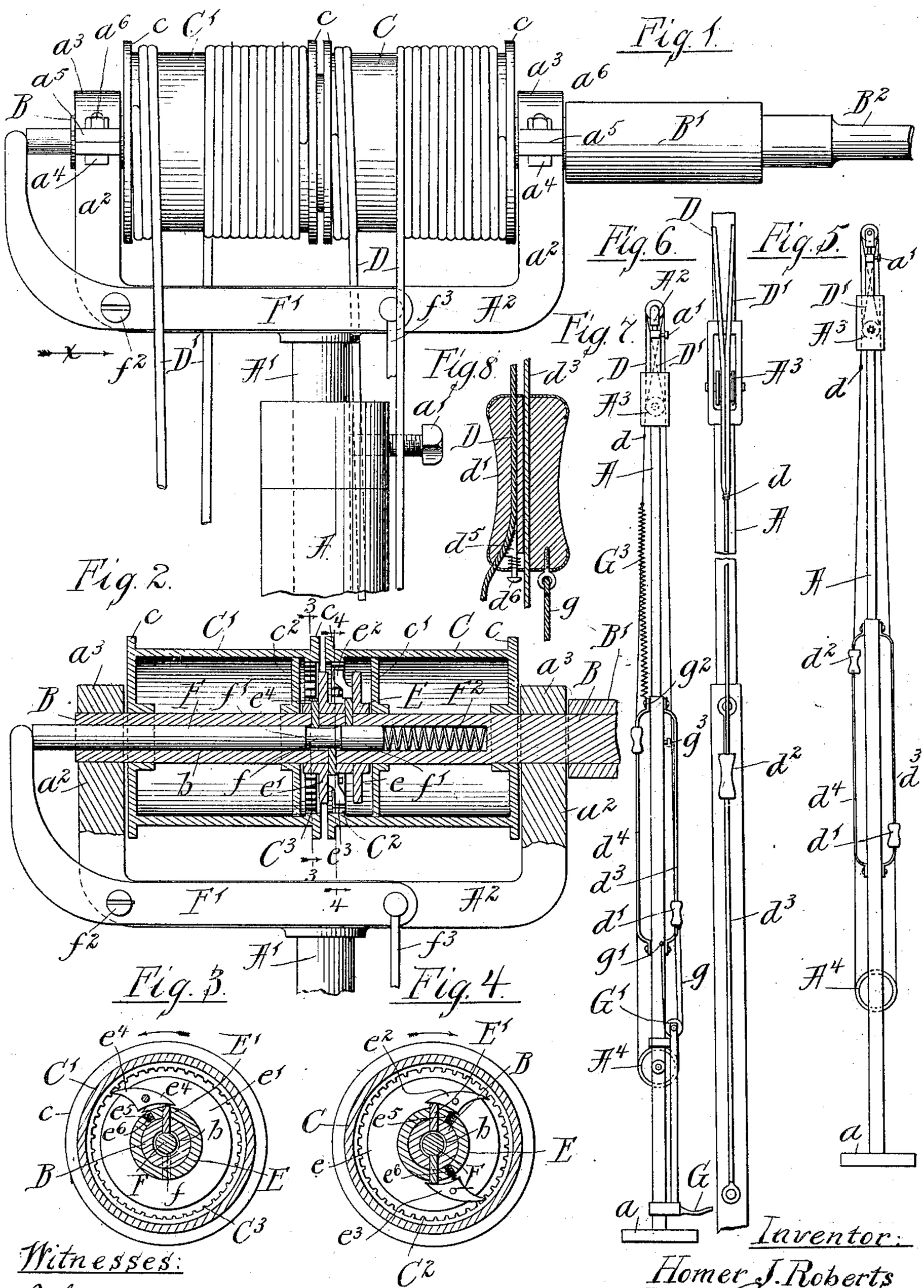

Fig. 6.

Fig. 5.

Fig. 7.

Fig. 8.

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Fig. 9.

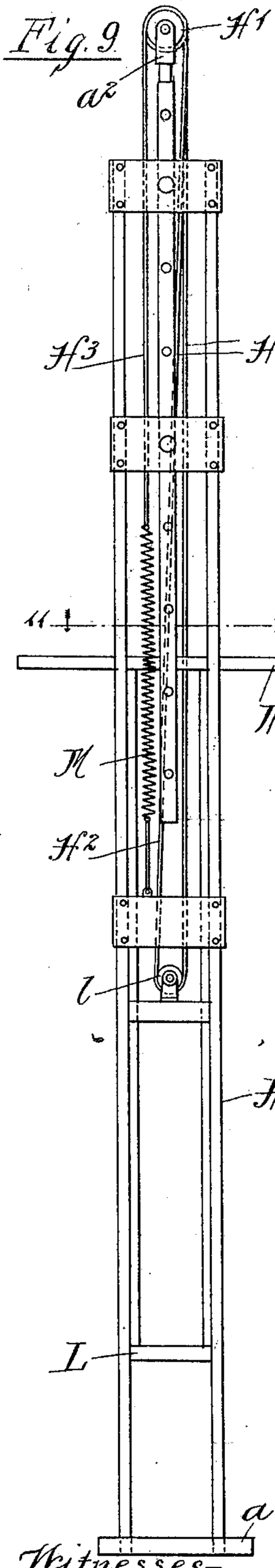

Fig. 10.

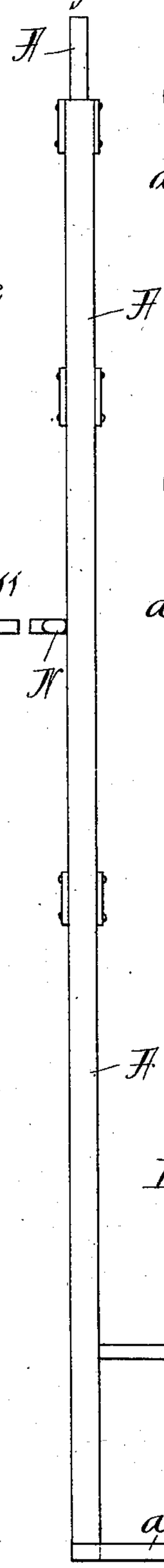

Fig. 13.

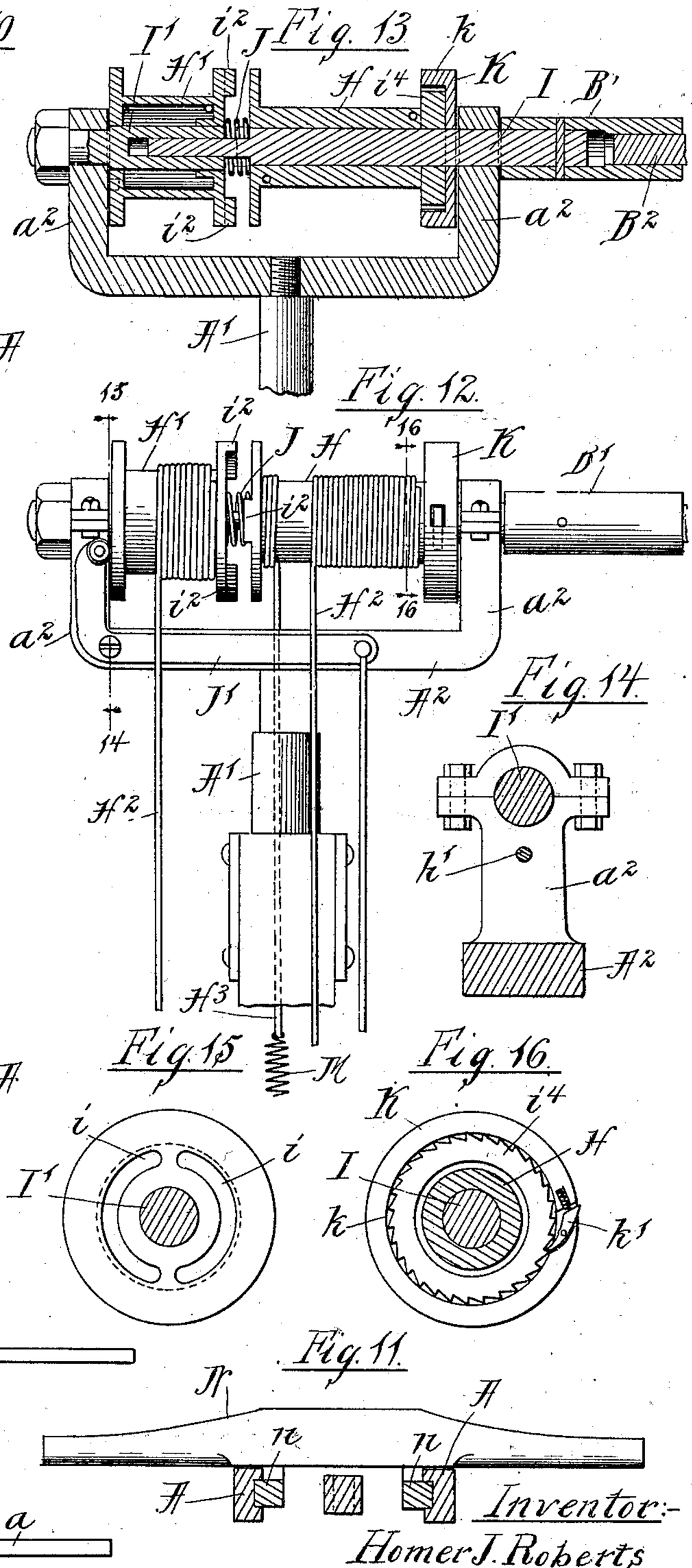

Fig. 12.

Fig. 14.

Fig. 15.

Fig. 16.

Fig. 11.

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UNITED STATES PATENT OFFICE.

HOMER J. ROBERTS, OF CHICAGO, ILLINOIS.

BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 628,992, dated July 18, 1899.

Application filed March 8, 1895. Renewed December 19, 1898. Serial No. 699,753. (No model.)

To all whom it may concern:

Be it known that I, HOMER J. ROBERTS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Boring-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to portable boring-machines adapted more especially for the convenient boring of holes in joists of a ceiling or floor for the passage of concealed electric wires and other purposes.

The object of the invention is to provide an improved apparatus of the character described which shall be positive in action, effective in operation, durable in construction, and yet comparatively inexpensive.

Another object of the invention is to provide a device with mechanism for rotating a drill or bit carrying spindle in which the operating mechanism shall be within convenient reach of the operator standing upon the floor and which may be actuated by a vertical reciprocation of parts—that is to say, by a sliding operating mechanism which may be pulled down by hand and which may then be returned to its former position either by any suitable lifting mechanism, such as a spring, or by a second downward pull by the operator on a second part acting to return the first. This and other features of the invention will be more fully understood from the subjoined description of the accompanying drawings and from the appended claims.

In said drawings, Figure 1 illustrates in side view the upper portion of my improved boring device. Fig. 2 represents a central longitudinal vertical sectional view of a portion of the same. Figs. 3 and 4 represent transverse vertical sectional views taken, respectively, upon the lines 3 3 and 4 4 of Fig. 2, looking in the direction indicated by the arrows. Fig. 5 is a side elevation of the entire device shown upon a reduced scale, looking endwise upon the parts shown in Figs. 1 and 2; and Fig. 6 is a similar view, somewhat enlarged, of a portion of the same, looking in a direction at right angles to that of Fig. 5. Fig. 7 is a view like that of Fig. 5, showing a modification embodying additional features. Fig. 8 is a detail of one of the handle-grips, a part being broken away to expose the clamping-wedge. Fig. 9 is an end view of the device in a modified form, showing the sliding arrangement of the frame. Fig. 10 is a side view of the latter. Fig. 11 is a horizontal transverse sectional view of the same, upon an enlarged scale, taken upon the line 11 11 of Fig. 9 and looking in the direction indicated by the arrows. Fig. 12 is a view similar to Fig. 1, showing a modified form of the device. Fig. 13 is a central longitudinal vertical sectional view of the modification shown in Fig. 12. Fig. 14 is an end elevation of a portion of the frame shown in Fig. 12. Fig. 15 is an end view of a drum, the section being taken on line 15 14 of Fig. 12. Fig. 16 is an end view, partially in section, of a part of the winding-drum to show the pawl-and-ratchet mechanism, being taken on line 16 16 of Fig. 12.

Referring now to Figs. 1 to 6 inclusive, A represents a standard of any suitable construction, material, and strength, adapted to rest at its base a upon the floor or other convenient place and provided at its upper portion with an inwardly-projecting recess or socket in which the spindle or stem A′ of the drill-carrying frame A^2 may enter and in which said stem A′ is firmly and adjustably secured by means of an adjusting-bolt a', adapted to enter a suitable screw-threaded aperture in the said frame-standard A and to engage or to impinge upon the exterior of the spindle or stem A′ in a familiar manner. By this construction the drill-carrying frame A^2 may be adjusted within the frame-standard A as circumstances require. The frame A^2 is preferably of metal and is provided at its ends with upturned arms or supports a^2, having suitable recesses in their ends adapted to receive and to constitute bearings for a shaft B. The shaft B is properly secured in position by means of caps a^3, suitably secured to the upturned supports a^2 by means of bolts and nuts, the bolts a^4 passing through suitable apertures in flanges a^5, projecting laterally from the said supports a^2 and caps a^3, and being secured in position by retaining-nuts a^6. The forward end of the shaft B carries the

drill-holding spindle or chuck B′, in the forward end of which the shank of the spindle or drill B^2 is inserted.

Occupying the distance substantially between the adjacent faces of the supports a^2 and mounted upon the shaft B are two drums C C′, each provided at its two ends with an outwardly-extending annular flange *c*. The two ends of a cable or rope D are secured at opposite ends of the drum C, and said cable or rope winds upon said drum in opposite directions, as clearly shown in Fig. 1, so that a downpull upon one portion of said cable will cause the drum to revolve and that portion to unwind from the drum, while the other portion of the cable is being simultaneously wound upon the drum, the drum revolving of course in the direction of the cable which is being unwound by the pull thereon. The ends of the cable D′ are similarly secured to the drum C′, and said cable D′ is wound upon said drum in precisely the same manner as the cable D is wound upon the drum C, excepting that the sections thereof are wound in directions the reverse of the corresponding sections of the drum C. The cable D′, depending from the left-hand side of the drum C′, when looking at it as indicated by the arrow X in Fig. 1, is trained across to the opposite side of the device and over a guide-pulley A^3 and is suitably spliced or secured, as at *d*, to the right-hand portion of the cable D, while that portion of the cable D′ depending on the right-hand side of the drum C′ is similarly trained across and over the opposite side of the pulley A^3 and suitably spliced or secured to the left-hand portion of the cable D, the points at which the several cables are spliced being at such distance from the drums C C′ as never to interfere with the winding of the cables. The two depending portions of the cables D and D′ are united to form a continuous cable, which is trained around a pulley or guide A^4, suitably mounted in the lower portion of the standard-frame A. At convenient places upon the cable are hand-grips d' d^2, which grips are loosely mounted to slide upon guide-rods d^3 d^4, secured at opposite sides of the standard A. From this construction it will readily be understood that the pulling down upon one handle or grip, as d', until it shall be in position (for example, shown in Fig. 5) will cause a downward pull and an unwinding of the right-hand coils of both cables D D′ and the consequent revolution toward the right and left of the drums C C′, respectively, while at the same time the left-hand coils of the cables will be wound up upon their respective drums. Similarly it will be obvious that the operation of the cables and the directions of rotation of the drums C C′ will be just the reverse of this when the operator takes hold of the grip d^2 and pulls it down upon the side d^4.

The drums C C′ are mounted loosely upon the shaft or spindle B, and in order that each drum may be engaged positively with said spindle or shaft B at certain times, so as to rotate the latter when the drum is rotated in the proper direction, a pawl-and-ratchet mechanism is employed, which will be presently described. The construction of this mechanism is such that each one of the drums may be alternately locked with the shaft B when said drum is being operated or rotated toward the right, but is free to rotate upon the shaft when turned in the opposite direction, whereby a continuous boring operation is maintained, although the drums are alternately reversed. Provision is also made for reversing the pawl-and-ratchet engagement, whereby the drill may be withdrawn, and, still further, for positively locking one of the drums to the shaft, whereby the power may be applied to the drill first in one direction and then in the other, as in loosening the drill after having become wedged or fastened in a knot or the like. This pawl-and-ratchet mechanism is as follows: Surrounding the shaft B is a sleeve E, provided with two annular disks or flanges *e e′*. This sleeve E is located between the inner end heads c' c^2 of the drum C and C′, respectively, which heads are positioned sufficiently within the ends of the drums so that the latter will project over the heads, and thus form the space for said flanged sleeve E, as more clearly shown in Fig. 2. Ratchet-teeth C^2 C^3 are provided interiorly upon the adjacent ends of the drum C and C′ in position adapted to be engaged by suitable pawls e^2 e^3 e^4. The pawl e^4 is fulcrumed to the flange *e′*, while the pawls e^2 and e^3 are fulcrumed to the flange *e*. Within suitable apertures e^5, extending in or through the sleeve E, are springs e^6, each of which is adapted to engage and press against a suitable projection upon each pawl e^2 e^3 e^4, respectively, and thus normally cause the outward or engaging ends of the said pawls to enter the spaces between the several teeth of the ratchets C^2 C^3. In Figs. 3 and 4 the pawls e^3 e^4 are shown thus engaged, while the pawl e^2 is shown disengaged from the ratchet-teeth C^2. The disengagement of the pawls is accomplished by means of sliding pins E′, which are arranged within and project through radial openings in the sleeve E and in the shaft B. There are three of these radial sliding pins E′, one for each pawl, each of which engages at its outer end a suitable projection upon the pawl, whereby when said pin is actuated by the means hereinafter described, so as to be protruded at its outer end beyond the periphery of the said sleeve E, it will press against and lift up the engaging projection of the pawl, compress the spring e^6 of said pawl, and, turning said pawl upon its pivot or fulcrum, lift its outer end out of engagement with the ratchet-teeth, as clearly shown in said Fig. 4. The means for actuating said sliding pins E′ is as follows: The shaft B is provided with an axial recess *b*, extending throughout a portion of its length, which is adapted to receive a sliding arm F. For convenience of construction said arm is

preferably a circular pin or rod of substantially the same diameter as the diameter of the recess *b*, provided near its inner end with a reduced portion or recess *f*, which is provided at each end with a rounded or beveled shoulder *f' f'*. The location of the reduced part *f* is such that when the sliding arm is moved one way or the other said part will be reciprocated between the ends of the pins E', and its length is greater than the distance between the remote sides of two adjacent pins, but less than the distance between the pins farthest apart, so that the inner ends of either two adjacent pins may enter the reduced part or recess at once when the sliding arm is in proper position, but not all three of them. It will be obvious that with this construction the sliding arm may be shifted so that any desired single pawl is permitted to engage or so that the central pawl e^3 and the one on either side of it will engage the ratchet simultaneously. The rounded or beveled shoulders *f'* act as cam-surfaces to project the pins E' when the arm is shifted, and therefore act to throw the pawls out of engagement.

Means for shifting the arm F are provided in the form of a lever F', fulcrumed to the frame A^2 at f^2, one end of which is curved upwardly in position to engage the outer end of the said sliding arm. A rod or cord f^3 is attached to the other end of the lever, by means of which the lever may be oscillated to force the arm F inwardly against the action of a coiled spring F^2, interposed between the inner end of the arm and the end of the bore or recess *b*.

From the above description it will readily be understood that the operator may move the handle-pieces *d' d²* continuously in alternate directions and produce a continuous rotary movement of the drill. When the aperture is drilled through the floor-joist or drilled through to the desired extent, the drill may be withdrawn from the aperture by reversing the ratchet mechanism, so as to rotate the drill in an opposite direction. This is accomplished by shifting the arm F, so as to throw the pawls e^3 and e^4 out of engagement with their respective drums and to permit the pawl e^2 to engage the ratchet of the drum C. This will obviously reverse the direction of rotation of the drill; but the latter will be actuated intermittently, since only the drum C is provided with a pawl acting in this direction, and the drill will therefore remain stationary during the rotation of said drum C in the right-hand direction, while the rotation of the drum C' will have no effect whatever on the drill. Obviously the drum C' may be provided with an additional pawl acting in the same direction as the pawl e^2, in which case the rotation of the drill would be continuous when reversed, the same as when driven in a right-handed direction. In some cases it may not be necessary to reverse the drill to withdraw it, but it may be withdrawn by simply pulling it out by hand force or by continuing the feeding revolution of the drill with one hand while applying an outwardly-pulling pressure on the implement with the other.

In Fig. 7 I have shown the same machine equipped with devices by which it is adapted for the application of foot-power in conjunction with the hand-grip hereinbefore described. In this instance a step or treadle G is mounted to slide vertically upon or within the lower part of the standard-frame and carries a pulley or roller G'. A cord *g*, attached at one end to the frame-standard, as at *g'*, is trained around said pulley and attached at its other end to one of the grips *d'* or d^2. As thus arranged, it will be obvious that pressure applied on the treadle will aid in pulling down the handle or grip to which the end of the cord is attached, and also that the treadle will move downward or have a travel less in extent than that of the grip. In order that a part of the power which may be applied by the foot in this manner may be utilized to aid the other hand in pulling down the grip d^2, a coiled contractive spring G^2 is secured at one end to the frame, as at g^2, and at its other attached to that one of the cables which will be wound up when the grip *d'* is pulled down in such manner that the winding up of said cable will expand the spring. Obviously when the grip d^2 is pulled down the contractive force of the spring will aid in driving the drill. Additional adjusting devices are also shown in said Fig. 7, by which the vertical length of the standard may be adjusted when the extent of adjustment required exceeds that provided for by the devices hereinbefore described, devices being also shown for adjusting the lengths of the cables. The upper part of the standard A is here shown as made to telescope within the lower part thereof, and these parts are held in adjusted relation by means of a set-screw g^3, extending through the outer part and engaging the inner in a familiar manner.

The means herein shown for adjusting the lengths of the cables consists in dividing the cables at the points where the grips are secured thereon, securing the ends of the lower section to the lower ends of the grips immovably and extending the ends of the upper cable-section down through holes formed lengthwise through the spool-shaped grips. In the lower end of each grip is arranged a spring-pressed friction-clutch in the form of a wedge d^5, which engages the cable and prevents the grip from slipping downwardly therein. A knob d^6 is provided on the end of the wedge, by which the latter may be withdrawn to release the cable.

In Figs. 9 to 16, inclusive, I have shown a modified form of my invention which comprises but a single drill-actuating drum, but is provided with an auxiliary or power-increasing drum, which may be brought into action when required. As shown in these figures, H designates the drill-actuating drum, H' the

auxiliary drum, and H^2 the main driving-cable. The upper part of the standard, the yoke-frame, and bearings for the drums are substantially like those of the first-described figures and are therefore similarly lettered herein and need not be more particularly described. The spindle or shaft is divided or formed in two sections I I′, the adjacent ends of which telescope together, as indicated clearly in the sectional figure, the length of each shaft-section between the bearings corresponding in length to that of the drum thereon exclusive of the telescoping parts. The short section I′ is desirably secured immovably in the yoke-arm a^2, (as herein shown by means of an inner shoulder and a clamping-nut threaded on the outer end of the shaft,) so as to project therefrom as a stud, although such construction is not necessary. The combined length of the two drums is somewhat less than the length of the shaft-sections between the yoke-arms, so that the shorter drum H′ may be shifted longitudinally a short distance, and said drums are held normally away from each other by means of a coiled spring J. The outer end of the drum H′ is provided with recesses *h h*, adapted to engage positively with a stud *h′*, projecting from the inner face of the arm a^2, when the drum is adjacent to the latter, and the proximate ends of the drums are provided with interlocking lugs h^2, adapted to lock the drum so as to rotate together when the drum H′ is shifted up against the drum H. A bell-crank lever J′, arranged and operated similarly to the lever F′ of the former machine, acts on the end of the drum H′ to force it into engagement with the drum H against the action of the spring J. The ratchet mechanism in the present instance comprises a disk K, secured rigidly upon the shaft I and provided with a flange *k*, within which is mounted a spring-pressed pawl *k′*, adapted to engage with a series of ratchet-notches formed in the periphery of an annular end flange i^4, forming a part of the drum H. The main cable H^2 is in the present instance coiled about the forward end of the drum H, trained from thence down and around a pulley *l*, carried upon a treadle L, mounted to slide in the lower part of the frame in a manner similar to that of the former device, and from thence carried upward and wound upon the auxiliary drum H. H^3 is a second cable, one end of which is coiled about the rearward or left-hand end of the drum H in a direction the reverse of that of the coils of the cable H^2 thereon and the other end of which is attached to the upper end of a coiled contractile spring M, similar to the spring G^2 hereinbefore described. The lower end of this spring is suitably secured to a cross brace or bar of the standard-frame. Instead of the grips *d′* d^2 of first-described machine a transversely-arranged handle-bar N is provided, mounted to slide upon the standard-frame A by means of guide-bars *n n*, (shown in section in Fig. 11,) attached to said handle and arranged to engage and slide within suitable grooves formed in the inner faces of the two side members of the standard-frame, said guides being attached to and forming the guiding members of the treadle L, so that the handle-bar and treadle necessarily move together.

Arranged as above described it will be obvious that when the handle-bar and treadle are downward the main cable H^2 will be unwound from the drum H and at the same time the auxiliary cable H^3 will be wound up thereon against the tension of the spring M, which, when the pressure is relieved, will reverse the motion of drum, unwind the cable H^3, wind up the cable H^2, and return all the parts to their normal position, it being understood that the drum H′ is meantime locked in the position shown in the drawings, and is consequently without movement in either direction, and that the cable H^2 simply runs around the pulley on the treadle. When, however, it is desired to increase the power thus applied at the expense of movement or number of revolutions of the drill produced by a single reciprocation of the actuating devices, the drum H′ is shifted up into engagement with the drum H, thereby releasing it from engagement from the stud and permitting it to rotate. Inasmuch as this permits the cable H^2 to unwind from both drums when treadle is depressed, it follows that if the drums were of equal diameter they would be rotated but one-half as many times with the same stroke of the treadle as in the former case, when one end of the cable was practically immovably attached to the yoke-frame, and that the power is therefore increased in a like proportion. In the present instance the diameter of the drum H′ is greater than that of the drum I, and consequently the power is still further increased at a corresponding sacrifice of movement.

It will be understood that I do not wish to be limited to the details of construction described herein except as claimed, it being obvious that these may be varied considerably without departing from the spirit of the invention.

I claim as my invention—

1. A boring-machine for overhead boring, comprising a tool-carrying spindle, a drum rotatably mounted thereon having ratchet engagement with the spindle, a standard-frame of sufficient length to rest at one end upon the working floor and extend above the reach of the operator at its other end, journal-bearings on the upper end of said standard within which said spindle is mounted, a guide upon the lower part of the standard and an operating-cable having its two ends coiled upon the drum in opposite directions and its intermediate portion trained about the guide, substantially as set forth.

2. A boring-machine for overhead boring comprising a tool-carrying spindle, a drum rotatably mounted thereon and having ratch-

ets adapted to act in opposite directions on the spindle, a standard-frame adapted to rest on the working floor and extend above the head of the operator, a yoke-frame mounted on the standard-frame, provided with bearings for the tool-carrying spindle, mechanism for shifting the several ratchets into and out of operative position, a part of which shifting mechanism is arranged to extend downwardly to a point accessible to the operator, and an operating-cable having its two ends wound upon the drum and its intermediate portion trained around a guide on the lower part of the standard-frame, substantially as set forth.

3. A boring-machine for overhead boring comprising a tool-carrying spindle, two drums rotatably mounted on the spindle and each having ratchet engagement with the spindle, a standard-frame of a length to rest at one end upon the working floor and extend above the head of the operator at its other end, bearings on said upper end with which the spindle is engaged, and means for driving the spindle comprising two cable-sections wound upon each drum in opposite directions and having depending portions interconnected between the two drums in crossed relation, whereby the drums will be rotated in reverse directions simultaneously and one of the coils of each wound up at the same time its other coil is unwound, substantially as set forth.

4. A boring-machine for overhead boring, comprising a tool-carrying spindle, two drums rotatably mounted on the spindle and each having ratchet engagement with the spindle, a standard-frame of a length to rest at one end upon the working floor and extend above the head of the operator at its other end, bearings on said upper end with which the spindle is engaged, and means for driving the spindle comprising two cable-sections wound upon each drum in opposite directions and having depending portions interconnected between the two drums in crossed relation whereby the drums will be rotated in reverse directions simultaneously and one of the coils of each wound up at the same time its other coil is unwound, said interconnected portion being trained around a guide on the lower part of the standard, substantially as set forth.

5. A boring-machine comprising a tool-carrying spindle, a supporting-frame with which said spindle has revoluble connection, two drums revolubly mounted upon said spindle, a pawl-and-ratchet mechanism in each drum adapted to engage and actuate the spindle when the drum is revolved in one direction, said pawl-and-ratchet mechanisms of the several drums being arranged to act in the same direction, a third ratchet mechanism in one of said drums adapted to act in a direction the reverse of the other ratchet in the same drum, means for shifting said pawls out of operative position, and an operating-cable wound upon each drum, substantially as set forth.

6. A boring-machine comprising a tool-carrying spindle, a supporting-frame in which said spindle is revolubly mounted, two drums revolubly mounted upon the spindle, a pawl-and-ratchet mechanism for each drum adapted to engage and actuate the spindle with the drum, said pawls of the several drums being arranged to act in the same direction, a third pawl for one of the drums, arranged to act on the spindle in a direction the reverse of the other pawl of said drum, means for shifting said pawls out of operative positions, comprising a member movable longitudinally within the drums and provided with cam-surfaces adapted to force said pawls out of engagement with the ratchets and operating-cables wound upon each drum, substantially as set forth.

7. A boring-machine comprising a tool-carrying spindle, a supporting-frame in which said spindle is revolubly mounted, two drums revolubly mounted upon the spindle, each provided with a series of ratchet-notches, a spring-pressed pawl for each drum, mounted upon the shaft, said pawls being arranged to act in the same direction, a third pawl mounted upon the shaft and adapted to engage the ratchet-notches of one drum in a direction the reverse of the other pawl acting on said drum, means for moving said pawls out of operative engagement with their several drums, comprising a recess extending longitudinally of the spindle, pins extending from the pawls through the shaft into said recess, an arm, provided with cam-surfaces adapted to act on said pins, and arranged to slide within said recess, and an actuating-cable wound upon each drum, substantially as set forth.

8. A boring-machine comprising a tool-carrying spindle, a supporting-frame in which said spindle is revolubly mounted, two drums revolubly mounted upon the spindle, each provided with a series of ratchet-notches, a spring-pressed pawl for each drum, mounted upon the shaft, said pawls being arranged to act in the same direction, a third pawl mounted upon the shaft and adapted to engage the ratchet-notches of one drum in a direction the reverse of the other pawl acting on said drum, means for moving said pawls out of operative engagement with their several drums, comprising a recess extending longitudinally of the spindle, pins extending from the pawls through the shaft into said recess, an arm, provided with cam-surfaces adapted to act on said pins, and arranged to slide within said recess, a lever pivoted on the frame and arranged to shift said arm longitudinally and an actuating-cable wound upon each drum, substantially as set forth.

9. A boring-machine comprising a tool-carrying spindle, a driving-drum operatively connected therewith, a supporting standard-frame upon which the spindle and drum are mounted, a driving-cable having each of its ends wound upon the driving-drum and its intermediate portion trained about a guide-pulley

mounted on the standard-frame, a second pulley mounted upon a vertically-sliding treadle arranged within the lower part of the standard-frame, an auxiliary driving-cable attached at one end to frame above the treadle, trained around the pulley of the latter and attached to the main driving-cable, and a hand-grip attached to the cable and arranged to slide upon guides at each side of the standard-frame, substantially as set forth.

10. A boring-machine comprising a tool-carrying spindle, a frame within which said spindle is mounted and a change-speed driving mechanism for the spindle comprising a drum operatively connected with the spindle, a second drum mounted to rotate concentrically with the former drum, an operating-cable having its opposite ends wound upon the respective drums, and means for locking the second drum from rotation and also for locking it so as to rotate with the other drum, substantially as set forth.

11. A boring-machine comprising a tool-carrying spindle, a frame within which said spindle is mounted and a change-speed driving mechanism for the spindle comprising a drum mounted upon the spindle and operatively connected therewith, a second drum mounted upon the spindle adjacent to the former, a spring interposed between said drums to force them normally apart, an operating-cable having each end wound upon one of the several drums, said ends being wound in the same direction, and means for locking said second drum to the frame and also for locking it to rotate with the other drum, substantially as set forth.

12. A boring-machine comprising a tool-carrying spindle, a frame within which said spindle is mounted and a change-speed driving mechanism for the spindle comprising a drum mounted upon the spindle and operatively connected therewith, a second drum mounted upon the spindle adjacent to the former, a spring interposed between said drums to force them normally apart, an operating-cable having each end wound upon one of the several drums, said ends being wound in the same direction, a second cable wound upon one of said drums in a direction opposite that of the first cable, and a spring arranged to act on said second cable to resist winding up of the latter, substantially as set forth.

13. A boring-machine for overhead boring, comprising a tool-carrying spindle, a drum rotatably mounted thereon, having ratchet engagement with the spindle, a standard-frame of a length to rest at one end upon the working floor and extend above the reach of the operator at its other end, journal-bearings with which said spindle has engagement at said upper end, a guide upon the lower part of the standard, an operating-cable having its ends coiled upon the drum in opposite directions and its intermediate portion trained about the said guide, a treadle mounted to slide vertically upon the lower part of the standard and provided with a guide-pulley, and an auxiliary cable secured at one end to a part of the standard trained thence around the treadle-pulley and secured at its other end to a part of the main operating-cable, substantially as set forth.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

HOMER J. ROBERTS.

Witnesses:
TAYLOR E. BROWN,
ALBERT H. GRAVES.