

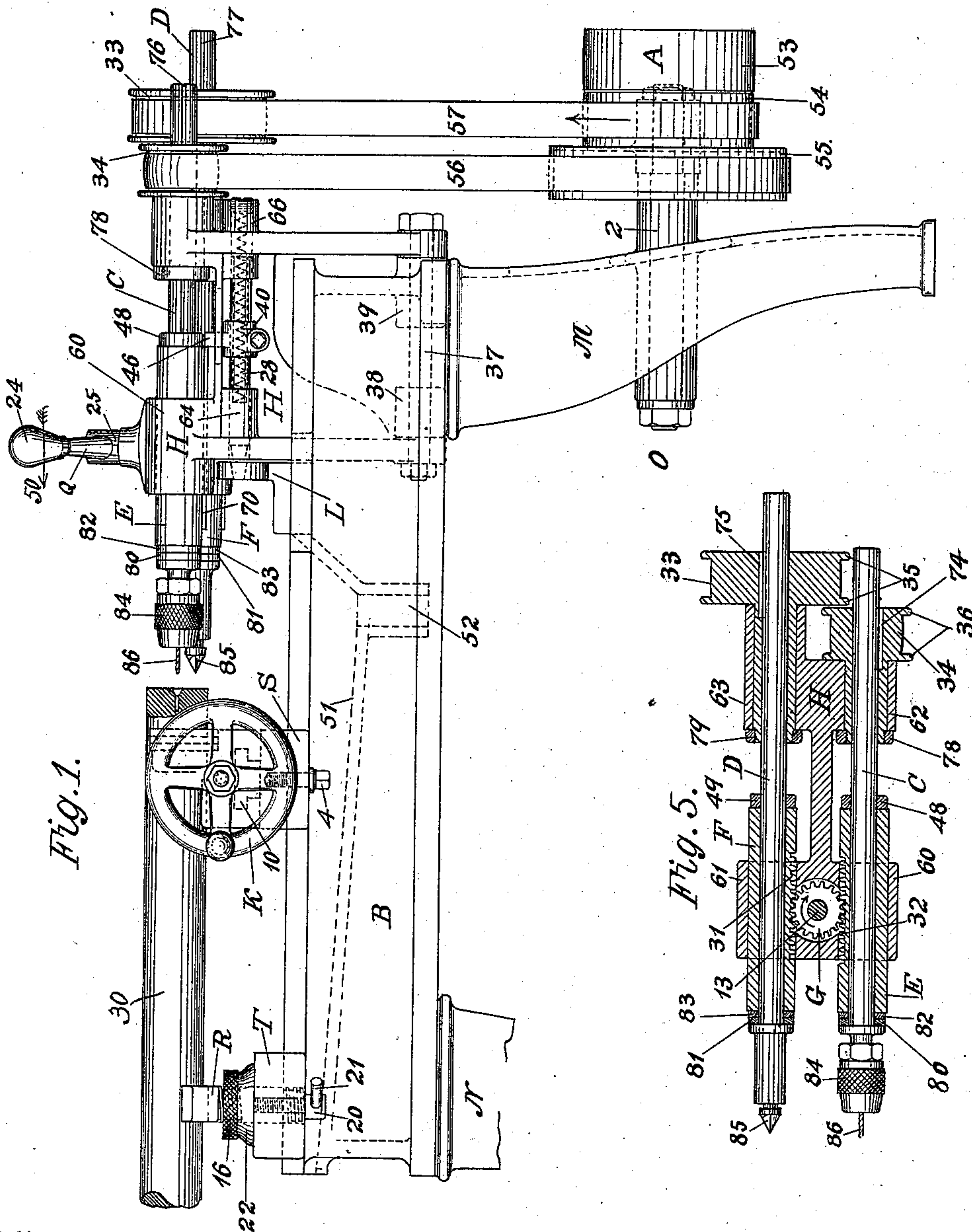
(No Model.)

3 Sheets—Sheet 1.

A. WHITNEY.
DRILLING MACHINE.

No. 376,838.

Patented Jan. 24, 1888.



Witnesses,

Geo. W. Drake
Wilbur M. Stone

Inventor,

Amos Whitney,
By his Attorney,
F. H. Richards.

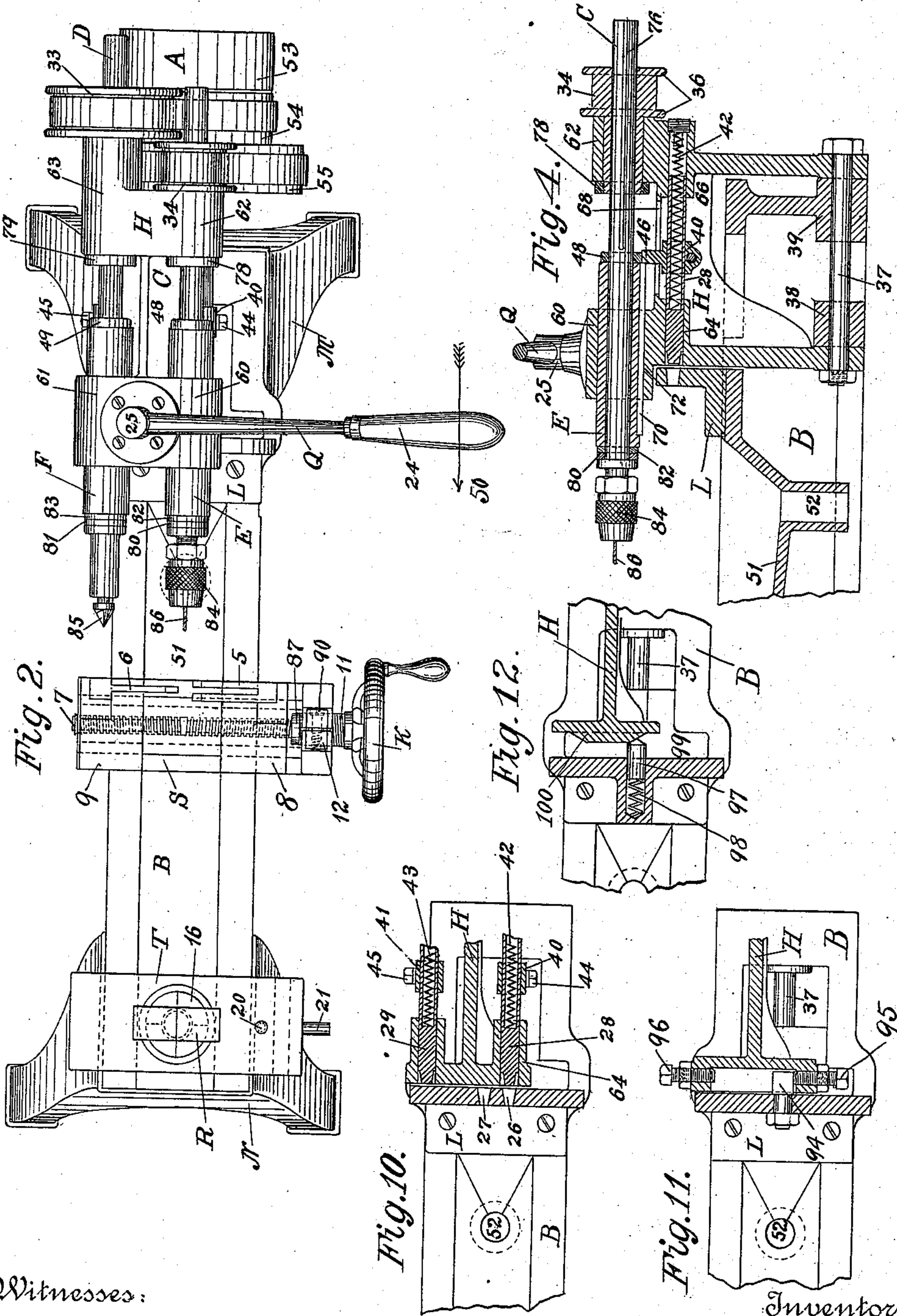
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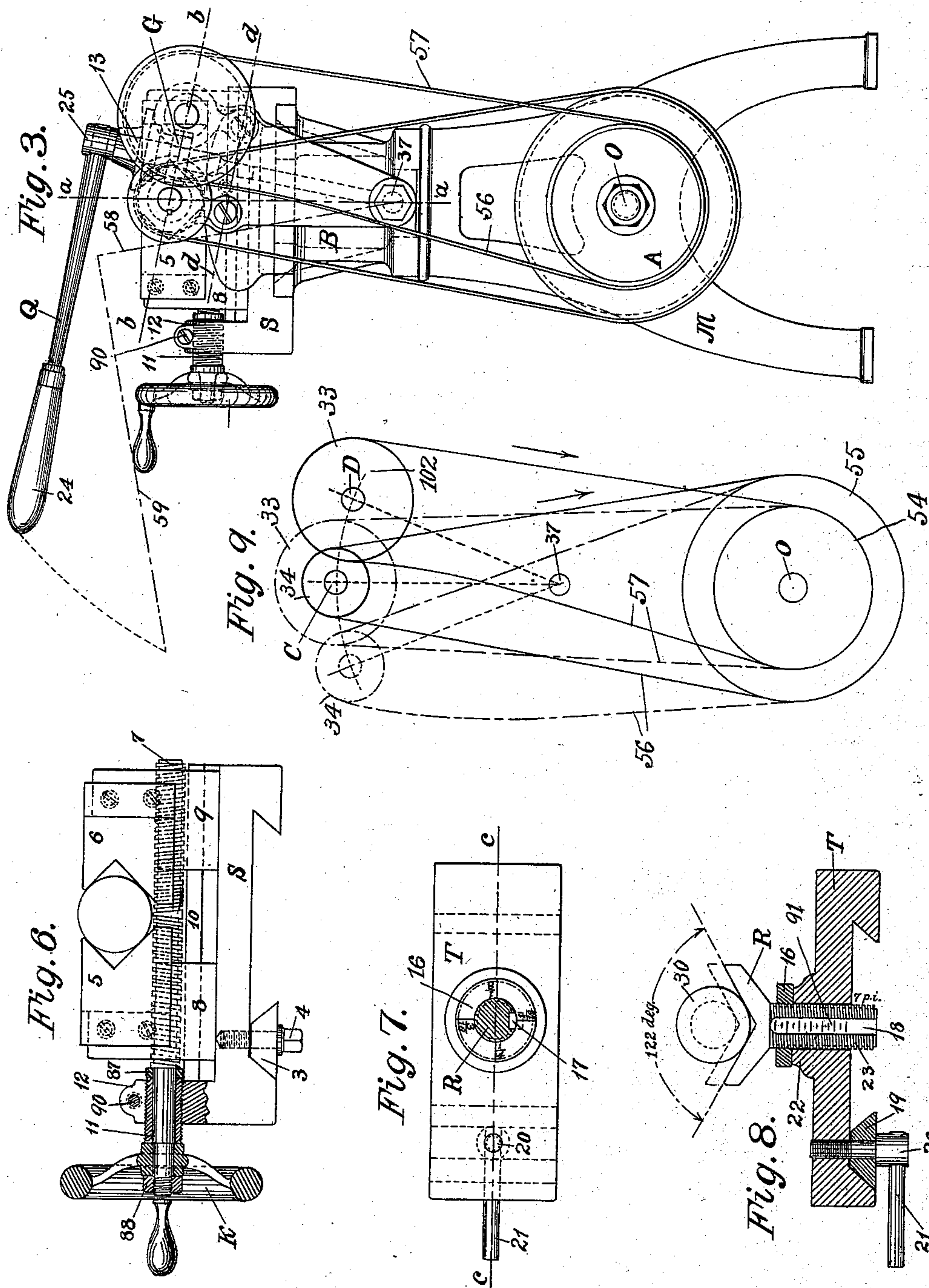
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UNITED STATES PATENT OFFICE.

AMOS WHITNEY, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE PRATT & WHITNEY COMPANY, OF SAME PLACE.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 376,838, dated January 24, 1888.

Application filed July 25, 1887. Serial No. 245,246. (No model.)

To all whom it may concern:

Be it known that I, AMOS WHITNEY, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

This invention relates to that class of drilling-machines which are used for centering work previous to turning, and which are provided with one spindle to carry a drill and another spindle to carry a reamer.

The invention has for its object to furnish a machine of that class in which both spindles may be operated longitudinally and also laterally by means of one handle, and which shall have improved means for locking the spindle-head and for holding the pieces to be centered.

To this end the invention consists in the improvements and combinations hereinafter more fully set forth.

In the drawings accompanying and forming a part of this specification, Figure 1 is a front elevation of a drilling-machine embodying my improvement. Fig. 2 is a top view of same. Fig. 3 is a right-hand end elevation of same. Fig. 4 is a vertical section of the rocking spindle-head and part of the bed in line *a a*, Fig. 3. Fig. 5 is a horizontal section of said head in line *b b*, Fig. 3. Fig. 6 is an enlarged front elevation, partially in section, of the vise for holding the piece to be drilled. Fig. 7 is an enlarged top view, partially in section, of the rest-slide. Fig. 8 is a vertical section on line *c c*, Fig. 7. Fig. 9 is a diagram illustrating the action of the belts which drive the spindles. Fig. 10 is a section of a part of head H in line *d d*, Fig. 3. Fig. 11 is a view similar to Fig. 10, illustrating a modification of the mechanism shown in said Fig. 10. Fig. 12 is a sectional view further illustrating said modification.

Similar characters designate like parts in all the figures.

The frame or the bed of the machine may have any construction suitable for carrying the several parts thereon. In the drawings such a bed is designated in a general way by B. Said bed has bearings 38 and 39 for the shaft or pivot-bolt 37, on which the spindle-head H swings. Said bed has a bottom, 51,

sloping to a well or pipe, 52, which is provided to lead off the oil used on the cutting-tools. It is supported on legs N and M, the latter of which has a bearing, 2, for driving-shaft O. On shaft O there is the driving-pulley A, having face 53, on which runs the belt (not shown) furnishing the motive power, face 54, from which is a belt, 57, to pulley 33 on rear spindle, D, and face 55, from which is a belt, 56, to pulley 34 on front spindle, C.

The spindle-head H is so hung on pivot 37 that it may be swung from the position shown in Figs. 1, 2, and 3, with the axis of the front spindle, C, concentric with the axis of a piece of work held in the vise and rest, to the position shown by the broken center lines, 58 and 59, with the axis of the rear spindle, D, concentric with the axis of said work. Said head has bearings 60 and 61 for spindle-sleeves E and F, respectively; also bearings 62 and 63 for the sleeves of pulleys 34 and 33, respectively. Said head has bearings 64 and 66 for lock-bolt 28, bearings for lock-bolt 29, and guide-slots, as 68, for the projections 46 on the dogs 40 and 41, respectively. Rotation of the sleeves E and F is prevented by suitable keys, as 70, fast in their respective sleeves, and sliding in ordinary keyways, as 72, in head H. The spindles C and D are driven by a gear, G, meshing with racks 32 and 31 on sleeves E and F, respectively. Gear G is secured to shaft 13, and is actuated by the handle 24 of lever Q, which is fixed in the upper end, 25, of said shaft.

Lock-bolts 28 and 29 have springs 42 and 43, respectively, which hold the projections 46 (one only being shown) of dogs 40 and 41 against the ends of keys 70, (one in each spindle-sleeve,) and hold said bolts in their places. Pulley 34 has flanges 36, and pulley 33 has flanges 35, to hold the belts on the faces of said pulleys. Said pulleys are held in their respective bearings 62 and 63 by the collar-nuts 78 and 79, respectively. Power is communicated from said pulleys to spindles E and F through the keys 74 and 75, respectively, secured in their respective pulleys 34 and 33 and sliding in the keyways 76 and 77 in said spindles. Spindle C usually has an anti-friction collar, 80, running against a similar collar, 82, on sleeve E.

Spindle D and sleeve F are provided with similar collars, 81 and 83. Said spindles are held in their places in said sleeves by collars 48 and 49, fixed to their respective spindles. Spindle C has a chuck, 84, for holding the center drill 86, and spindle D has the reamer 85 fixed therein. It does not matter, however, which spindle carries the reamer. The vise-base S (best shown in Fig. 6) has formed thereon a T-shaped way, 10, on which the vise-slides 8 and 9 are fitted to move. Fixed to slide 8 is the double vise-jaw 5, and fixed to slide 9 is the single vise-jaw 6. Motion is transmitted to jaws 5 and 6 from hand-wheel K through the screw 7, having a left-hand thread in a position of its length engaging with a corresponding thread in vise-slide 8, and having a right-hand thread in another position of its length engaging with a corresponding thread in vise-slide 9.

The horizontal position of the axis of a piece of work held in vise-jaws 5 and 6 can be adjusted by means of the threaded sleeve 11 in the threaded clamp 12, formed on slide S. The vise-screw 7 is held in its normal position in sleeve 11 by the collar 87 and hand-wheel K. Said hand-wheel is or may be secured to said screw by the customary nut 88. By loosening clamp-screw 90 the clamp 12 is allowed to open sufficiently to permit the externally-threaded sleeve 11 to be screwed in or out, as may be required in any particular case. Base S is held firmly in position on bed B by means of the ordinary gib, 3, and clamp-screw 4. The rest base or slide T (best shown in Figs. 7 and 8) has a projection or boss, 22, through which passes the threaded stem 23 of rest R. Said rest has thereon a crotch or V for supporting the work to be operated upon. It has an angular opening of about one hundred and twenty-two degrees between the faces, this being a proper angle for a seven-per-inch thread on stem 23. The face of nut 16 is divided into four equal angular divisions, and screw 23 has seven threads per inch. One division on the nut now represents one-sixteenth of an inch in diameter of the round bar 30 being drilled. Rest R is prevented from turning by the key 17, fast in slide T, and which slides in slot 18 of the stem 23. Said rest is raised and lowered by nut 16 turning on said stem. Slot 18 is graduated, as at 91, Fig. 8, corresponding to the thread on the stem 23, so that the upper end of key 17 marks the elevation of the rest in turns of the nut 16, these divisions being further graduated by means of the graduations of said nut, as above referred to, and as shown in Fig. 7. Slide T is held fast to bed B by means of the gib 19 and screw 20, turned by lever 21.

The diagram, Fig. 9, illustrates the peculiar arrangement of the axis O of the driving-pulley, the spindle-head pivot 37, and the working position and the idle positions of the spindles, whereby the respecting driving-belts are each tightened when the spindle driven thereby is shifted from its idle to its working posi-

tion. One position of the spindles C and D, with their driving-pulleys, is shown in solid lines and one in dotted lines. C denotes also the working position of each spindle, which position is substantially in line with axis O and 37; but as point 37 is between C and O, it is evident the movement of the spindle away from C on arc 102 will bring said spindle nearer shaft O, and consequently will slacken the belts, as clearly illustrated in the diagram by the curved lines representing said belts.

Figs. 11 and 12 illustrate a modification of the devices for limiting the lateral stroke of the spindle-head H and for detaining the same at one end or the other of its stroke. In this arrangement (see Fig. 11) the plate L has a stop, 94. The stop-screws, 95 96, in head H one at a time bear against this stop, and also furnish a means for accurately adjusting the stroke of said head. Below said stop there is a detent-pin, 97, (see Fig. 12,) held out by spring 98 against the beveled detent-faces 99 or 100, as the case may be. The bearing-surfaces being properly inclined, the detent does not positively hold the head H in position, but in practice does so with a sufficient force.

The operation of my improved centering-machine is as follows: The several parts of the machine being at rest in the positions shown in Figs. 1 and 2, with the spindle-head swung to its rear position and the spindles furnished with a drill and reamer and the work to be centered securely held in the vise, the pulley A is started, revolving in the direction shown by the arrow on belt 57, Fig. 1, thereby rotating through belts 56 and 57 the spindles C and D. Spindle C, carrying drill 86, is now moved toward and into the work by moving handle 24 of lever Q in the direction shown by arrow 50, Fig. 1. Said movement of handle 24 turns the gear G, which meshes with rack 32 in sleeve E and rack 31 in sleeve F, in the direction shown by the arrow on said gear in Fig. 5. As sleeve E goes forward, spring 42 pushes lock-bolt 28 into hole 26 in lock-plate L, thereby locking head H firmly in place. In feeding spindle C forward spindle D is moved back from the position shown in Figs. 1 and 2 through a distance equal to the distance through which spindle C is moved forward. After drill 86 has been fed in to a sufficient depth the movement of handle 24 is reversed and continued in the opposite direction, thereby withdrawing spindle C and advancing spindle D. This movement is continued until the position shown in Figs. 1 and 2 is again reached and the lock-bolts are both removed from the lock-plate L, as shown in Fig. 10, when said handle is pressed down, thereby swinging head H to its forward position, with spindle D in the position previously occupied by spindle C. Continuing the backward movement of said handle 24, the reamer 85 is now carried forward and into the work by spindle D in sleeve F. As said sleeve goes forward spring 43 pushes lock-bolt 29 into hole 27 in

lock-plate L, thereby locking head H firmly in place. Reamer 85 having been fed to a sufficient depth, the direction of the movement of handle 24 is again reversed, being now in the direction indicated by arrow 50. The movement in this direction is continued until both lock-bolts are again removed from lock-plate L, when the operator lifts the handle, thereby swinging head H back into the position shown in Figs. 1 and 2. The several parts of the machine are now in their original position, ready for a repetition of the whole operation.

It will be understood that the use of my improved machine is not limited to centering work, for the spindles C and D may be supplied with a drill and counter-bore, or with other tools of a similar character, for making screw-holes and like work. It will also be understood that this machine is capable of modification in various ways and degrees, after the manner of machines in general, within the scope and limits of my invention.

Having thus described my invention, I claim—

1. The combination, in a drilling-machine, of a laterally-swinging head carrying two revolving and sliding spindles, a lever pivotally mounted on said head, whereby the head may be swung laterally on its pivot, and connecting-gearing, substantially as described, whereby the spindles are both operated from said lever, all substantially as set forth.

2. The combination, in a drilling-machine, of a vise holding the piece to be drilled in a

fixed position, a laterally-movable head carrying two revolving and sliding spindles, a lever connected to actuate said spindles, and serving at the same time to shift said head, and a lock or detent temporarily holding the head at one or the other end of its stroke, all substantially as set forth.

3. The combination, in a drilling-machine head, of spindles C D, sleeves E F, gear G, and a handle connected to operate said gear, substantially as set forth.

4. The combination, with the head H and lock-plate L, of the sliding sleeve E, carrying the spindle, bolt 28, sliding in said head and fitting into said plate, a spring acting on the bolt, and arm 46, adjustably fixed on said sleeve, and operated in one direction from said sleeve, all substantially as set forth.

5. The combination, in a drilling-machine of the class specified, and with a spindle-head swinging on a pivot, of two pulley-provided spindles carried by said head above said pivot, driving-pulleys below said pivot, and belts connecting each of said driving-pulleys with the corresponding spindle-pulleys, the whole being organized and arranged to tighten the belt on shifting either spindle driven thereby from its idle to its working position, as shown and described.

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Witnesses:

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