(No Model.) 2 Sheets—Sheet 1.

T. I. BROWNE.

METAL TAPPING OR DRILLING MACHINE.

No. 517,023. Patented Mar. 27, 1894.

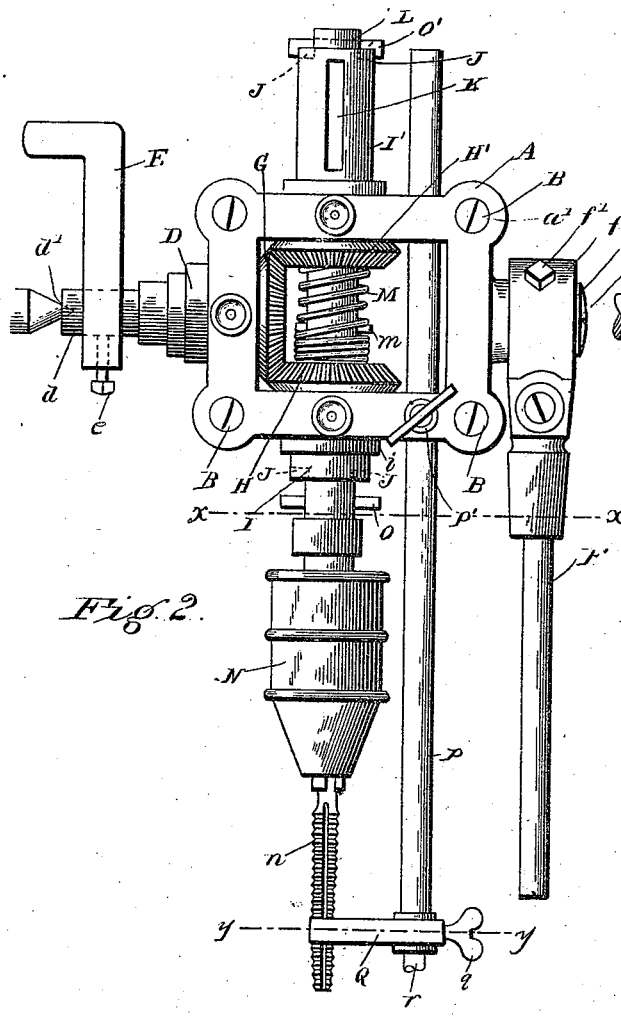


Fig. 2.

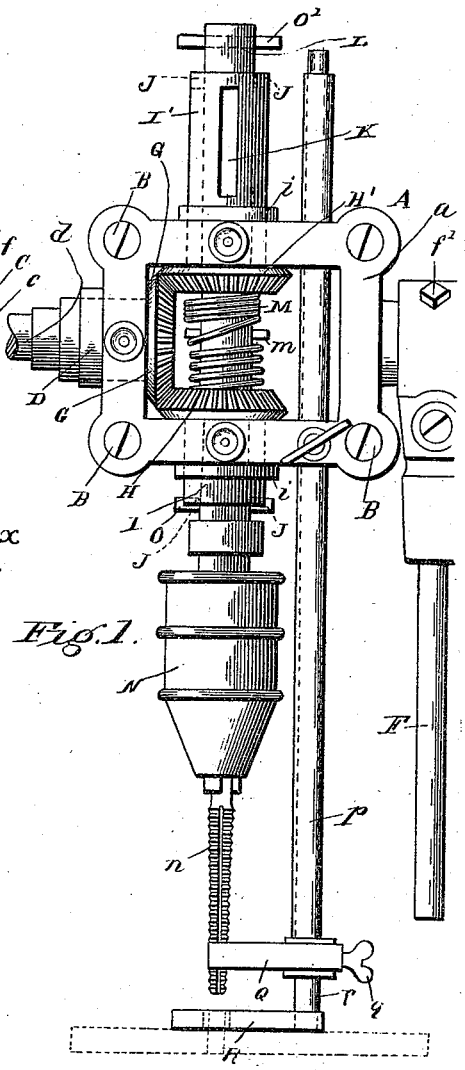


Fig. 1.

Fig. 3.

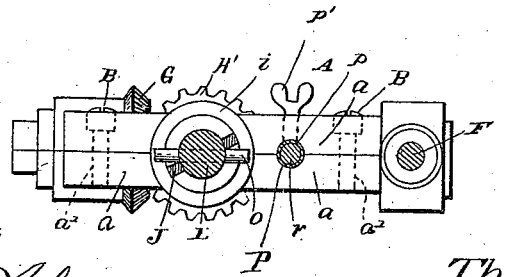
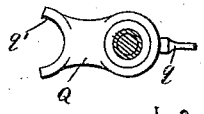


Fig. 4.



Witnesses

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(No Model.) 2 Sheets—Sheet 2.

T. I. BROWNE.

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Fig. 5.

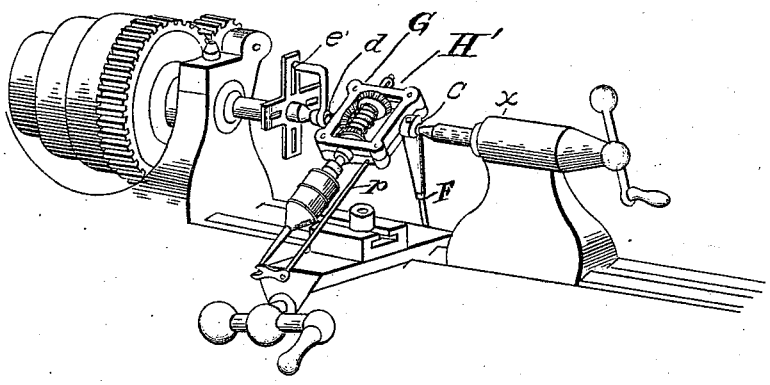
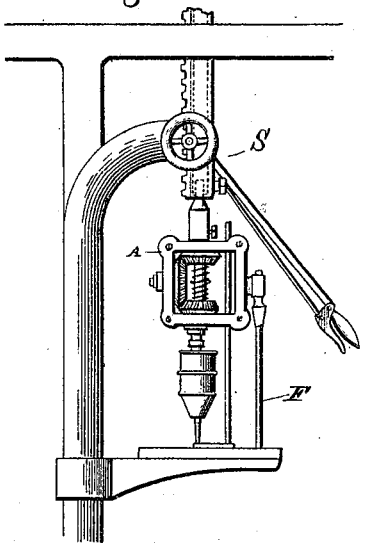


Fig. 6.



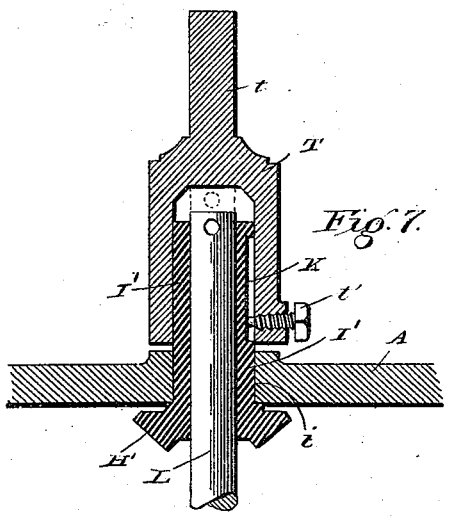


Fig. 7.

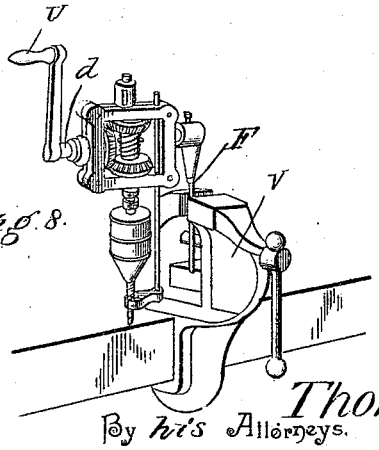


Fig. 8.

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THOMAS I. BROWNE, OF ST. JOHNSBURY, VERMONT.

METAL TAPPING OR DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 517,023, dated March 27, 1894.

Application filed May 8, 1893. Serial No. 473,477. (No model.)

To all whom it may concern:

Be it known that I, THOMAS I. BROWNE, a citizen of the United States, residing at St. Johnsbury, in the county of Caledonia and State of Vermont, have invented a new and useful Metal Tapping or Drilling Machine, of which the following is a specification.

This invention relates to metal tapping and drilling machines; and it has for its object to provide an improved machine of this character, capable of being mounted in various positions, in connection with ordinary lathes, drill presses, vises, &c., for the purpose of tapping and drilling holes in light and heavy work.

To this end the main and primary object of the present invention is to provide certain improvements in machines of this character whereby the same are rendered much more efficient for various classes of work.

With these and other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is an elevation of a drilling machine constructed in accordance with this invention, showing the same with its parts in position for entering the work, the latter showing in dotted lines. Fig. 2 is a similar view showing the parts of the machine in position as it is withdrawing itself from the work. Fig. 3 is a transverse sectional view on the line *x*—*x* of Fig. 2. Fig. 4 is a similar view on the line *y*—*y* of Fig. 2. Fig. 5 is a detail in perspective of a portion of an ordinary metal lathe showing my improved machine centered thereon. Fig. 6 is an elevation of a portion of an upright drill press showing my machine connected therewith. Fig. 7 is an enlarged detail in section showing the connection of the upper gear sleeve-hub with the drill press spindle. Fig. 8 is a detail in perspective showing my machine clamped in position by an ordinary vise.

Referring to the accompanying drawings, A represents an open rectangular frame consisting of the duplicate superposed members *a*, provided with the aligned threaded perforations *a'*, to receive the clamping screws B, which hold the members of the frame together. The sectional rectangular frame A is provided at one side thereof with the off-standing rounded stem C, provided in its extremity with the recess *c*, which in certain cases is adapted to receive one of the centers of an ordinary lathe X, such as illustrated in Fig. 5 of the drawings, while directly opposite the stem C, the frame is provided with the bearing opening and collar D, to receive the short gear shaft *d*, also provided in its outer end with the recess *d'*, to receive the opposite center of the lathe, so as to provide a pivotal support for the machine frame on the spindles or centers of the lathe whereby such machine frame can be readily adjusted to the proper angle on such lathe. Adjustably attached to the outer end of the shaft *d*, is the angled chuck arm E, held adjustably to the shaft *d*, by the set screw *e*, and adapted to engage the slotted lathe heads *e'*, Fig. 5, carried by the live spindle of the lathe, so that as the live spindle of the lathe is put in motion, the shaft *d*, which is locked therewith, is caused to rotate and transmit motion to the tapping or drilling devices, in the manner to be presently described.

In order to hold the machine frame A, in any suitable position convenient to the work being operated upon and at any angle, I employ the adjusting stop arm F. The adjusting arm F, terminates at one end in the attaching collar *f*, adapted to loosely fit over the stationary stem C, at one side of the frame A, and clamp tight thereon, according to its adjustment, by means of the clamping set screw *f'*, passing through said collar and impinging on the stem. As illustrated in the drawings, the free end of the adjusting arm F, which also acts in the capacity of a stop arm, is disposed at one side of the lathe head, so that when the work is being fed onto the tap of the machine, the machine will be held at an angle convenient to the work and will remain in such position until the work has been completely operated upon. Other uses of this arm will be more particularly referred to.

Assuming the machine to be used in connection with an ordinary turning lathe such as illustrated in Fig. 5 of the drawings, it will

be seen that motion is imparted to the shaft *d*, from the live lathe spindle, and said shaft carries at its inner end, inside of the frame, the beveled gear drive wheel G, which meshes with both of the opposite and the reversely disposed beveled gear wheels H, and H′, respectively. The reversely disposed gear wheels H and H′, are each provided with the gear sleeve hubs I, I′, journaled in the bearings *i*, formed in opposite sides or ends of the frame at right angles to the shaft *d*, and having at their outer ends the end notches J. The sleeve hub I′, of what may be termed the upper one of the gear wheels designated as H′, is longer than the sleeve hub of the other gear wheel, and is provided in its outer face with the elongated groove or slot K, the function of which will be hereinafter described. The sleeve hubs of the gear wheels H and H′, are aligned to loosely receive the tool spindle L. The tool spindle L, is normally supported in an inactive position within the gear hubs by means of a centrally arranged supporting spring M, coiled there-around and having its ends resting against the opposing faces of the wheels H and H′, and supporting the transverse supporting pin *m*, passing through the spindle L, at a point intermediate of the ends of the spring M, so that the said spindle will not be disposed to normally slip into engagement with either of the sleeve hubs I, except when forced into such engagement during operation. The tool spindle L, has attached to one extremity thereof the tool chuck N, which carries a screw tap or drill tool *n*, adapted to be used in tapping or drilling a hole, and said tool spindle L, is further provided at a point beyond the notched ends of each of the sleeve hubs with the transverse engagement pins or studs, O, O′, which are adapted to be thrown in engagement with the notches in the ends of said hubs.

The machine frame A, is provided at one side of the bearings *i*, in the same ends thereof, with the perforations P, which are adapted to receive the adjustable stop tube *p*, held in any adjusted position within the perforations of the frame by means of the adjusting screw *p′*, working through one side or end of the rectangular frame and impinging against said stop tube. The said stop tube *p*, carries at one outer end the stop arm Q removably clamped in position on the tube at one end by the set screw *q*, and provided with an opposite curved stop end *q′*, adapted to embrace the tap or drill *n*.

Now from the foregoing it is thought that the general operation of the herein-described tapping and drilling machine will be readily apparent to those skilled in the art. After the machine has been hung on the lathe centers as described, it is only necessary to adjust the stop arm in order to regulate the depth to which it is desired for the tool to enter the work, and then the work is fed onto the screw tapping tool by hand or other suitable means. As the work is pressed onto the tool, the tool spindle L, is moved so that the intermediate engagement pins, O, are forced into the notches of the sleeve hub I. Motion is communicated to both of the gear wheels H and H′, from the drive gear wheel G, but the wheel H, is at this time the only active wheel, inasmuch as the tool spindle is connected therewith as clearly shown in Fig. 1 of the drawings, thereby communicating motion to the tool spindle in a direction which causes it to force the screw tapping tool into the work and thread the hole formed therein. When the work reaches the stop arm Q, the further advance of the work on the tool ceases, and the further rotation of the tool spindle necessarily draws down the engagement pins O, out of the notches of the hub I, and thereby causes such tool spindle to stop its rotation inasmuch as it is now not engaged with the hub of either of the wheels. The work, with the tapping tool or cutter in it, is now drawn away from the machine so that the engagement pins or studs O′, at one outer end of the tool spindle, are pulled into engagement with the outer notched end of the sleeve hub I′, as may be seen in Fig. 2 of the drawings, so that the tool spindle will be caused to rotate in an opposite direction, and "back" the tool out of the work.

In certain classes of light work it is necessary to provide means whereby the pieces of work will be tapped or drilled perfectly straight, and to insure this I employ the flat perforated guide plate R, which is adapted to work beyond the stop arm and is attached to one end of the rod *r*, which slides freely within the stop tube *p*. By placing the work flat against the plate R, and moving it onto the tap or drill, such tap or drill will pass through the plate and enter the work perfectly straight and at the desired angle.

In operating on heavy work, the machine herein described is adapted to be used on an ordinary drill press S, a portion of which is illustrated in Fig. 6 of the drawings, and in this adaptation of the machine the arm F, is adjusted to rest against one side of the press bed plate or table as clearly shown in the drawings, so as to properly hold the machine to its work, and the upper elongated hub I′, is embraced by the spindle socket T, Fig. 7. The spindle socket T, is provided with a reduced shank *t*, which is clamped to the ordinary drill press spindle so as to be rotated therewith, and the lower end of the socket T, receives the pin screw *t′*, adapted to project into the groove or slot K, of the sleeve hub I′, so as to form a spline connection of the machine with the drill press spindle, whereby the entire machine will be fed onto the work by the thread of the tap, when it is employed for tapping purposes, it also being seen that sufficient space is left above the sleeve hub I′, in order to allow the necessary play for the tool spindle, which is necessary to secure the stop motion herein-before described. In connection with the drill press, it will therefore

be apparent that it is only necessary for the drill press spindle to rotate in tapping, and when the machine is used for drilling a hole in a piece of work supported on the press, the drill spindle is lowered as far as it will go and the feed of the drill press applied to carry the tool through the work.

Other adaptations of the herein-described machine will readily suggest themselves to those skilled in the art, such as applying a crank handle U to the shaft *d*, and clamping the machine in a suitable position by holding the arm F, in a vise V.

Changes in the form, proportion and the minor details of construction as embraced within the scope of the appended claims, may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a tapping and drilling machine, the bearing frame capable of being fixedly supported and having oppositely aligned bearings, reversely disposed gear wheels having notched hubs working in and projecting through the aligned bearings of the frame, an intermediate drive gear meshing with both of said gear wheels, a longitudinally movable tool spindle loosely mounted in the hubs of said gear wheels and having suitably arranged engagement pins adapted to engage the hub notches of either of the same, means for normally holding the spindle pins out of engagement with the notched hubs, and means for automatically throwing the tool spindle out of engagement with one of the hubs by the continued rotation of said tool spindle, substantially as set forth.

2. In a machine of the class described, the bearing frame, reversely disposed gear wheels having notched hubs journaled in said frame, an intermediate gear meshing with both gear wheels, a tool spindle loosely mounted in said notched hubs and having engagement pins beyond the hubs adapted to engage either of the same, and a supporting spring connected with the spindle to normally hold the same out of engagement with the said hubs, substantially as set forth.

3. In a machine of the class described, the bearing frame having suitably disposed bearings, reversely disposed gear wheels having notched hubs aligned with each other and journaled in opposite bearings of said frame, an intermediate gear meshing with both of said gear wheels, a rotatable tool spindle loosely mounted in said hubs and having engagement pins or studs beyond the hubs to engage either of the same and a supporting pin disposed between the reversely disposed gear wheels, and a supporting spring coiled on the spindle between said gear wheels and connected with the spindle supporting pin, substantially as set forth.

4. In a tapping and drilling machine, the open bearing frame having suitably disposed bearings, reversely disposed beveled gear wheels having aligned notched hubs journaled in opposite bearings of said frame, a short gear shaft journaled in one of the bearings of the frame and carrying at its inner end a beveled gear wheel meshing with both of the reversely disposed wheels, a spring supported tool spindle loosely mounted in the aligned hubs and having separate engagement pins or studs beyond the hubs to engage either of the same, a tool attached to one end of said tool spindle, an adjustable work stop embracing the tool, and a perforated guide plate working beyond said work stop, substantially as set forth.

5. In a tapping and drilling machine, the combination with the bearing frame; of the longitudinally movable tool spindle loosely mounted in said frame and carrying a tap or drill, separate gears to turn said spindle in both directions and adapted to engage the same one at a time, a stop tube mounted in said frame for longitudinal adjustment and a stop arm removably clamped on said tube and having a curved stop end embracing the tool, substantially as set forth.

6. In a tapping and drilling machine, the combination with the bearing frame; of the tool spindle loosely mounted in said frame and carrying a tap or drill, gearing to turn said spindle in both directions, a stop tube adjustably mounted in said frame and carrying at one outer end a work stop, a rod free to slide in said stop tube, and a perforated guide plate secured to the outer end of said rod beyond the stop arm, substantially as set forth.

7. In a tapping and drilling machine, the combination with a drill press and its spindle; of the bearing frame, the tool spindle loosely mounted in said frame and carrying a tap or drill, gearing for turning said spindle in both directions and one of the wheels of the gearing having an elongated hub provided with a groove or slot, and a spindle socket adapted to be clamped to the drill press spindle and to embrace the elongated gear hub, and a pin screw working through said socket and into the groove or slot of said hub, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

THOMAS I. BROWNE.

Witnesses:
O. W. TAYLOR,
E. E. SARGENT.