A. A. SHAFER.

TAPPING MACHINE.

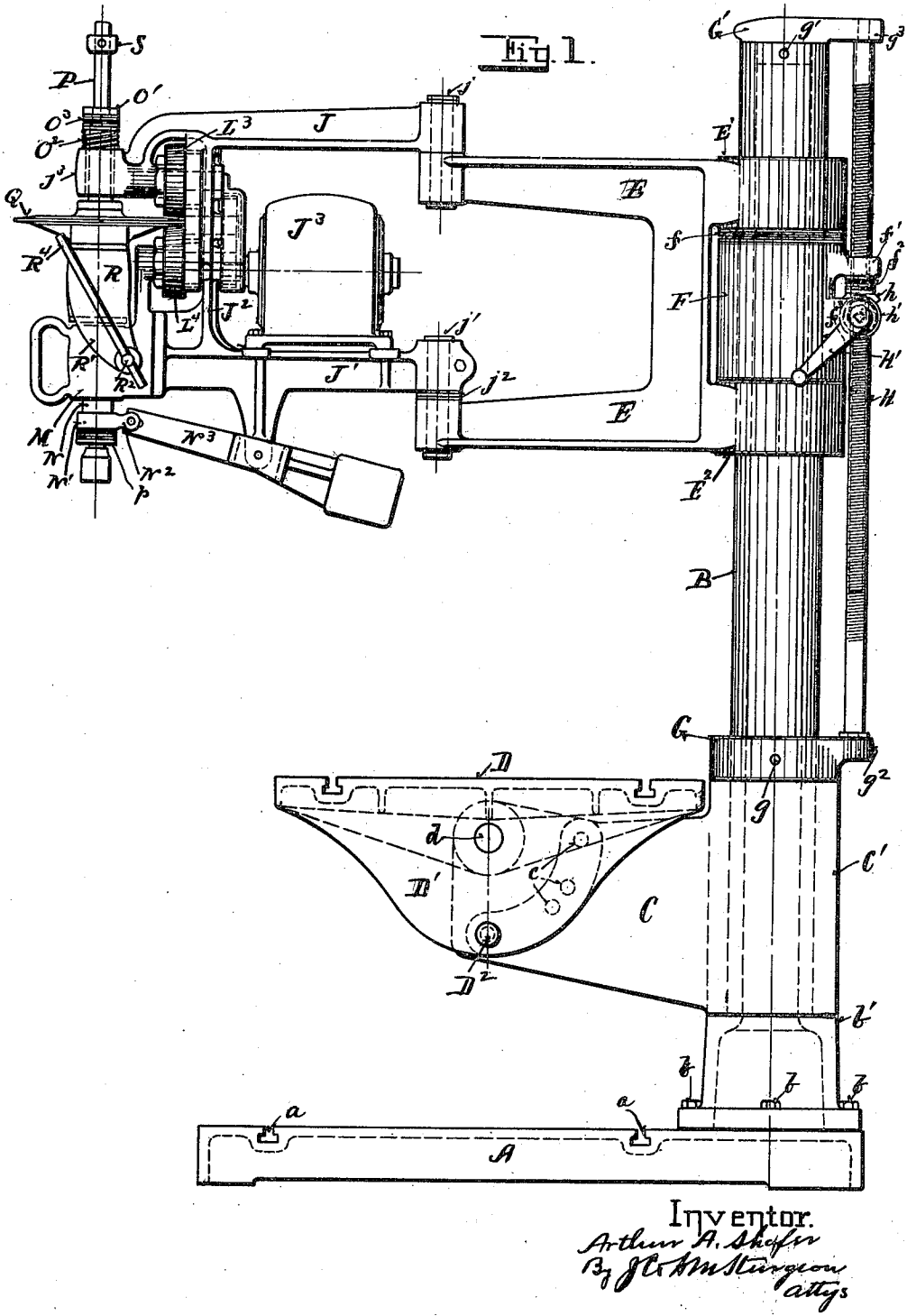
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1,244,084.

Patented Oct. 23, 1917.

2 SHEETS—SHEET 1.

Fig. 1.



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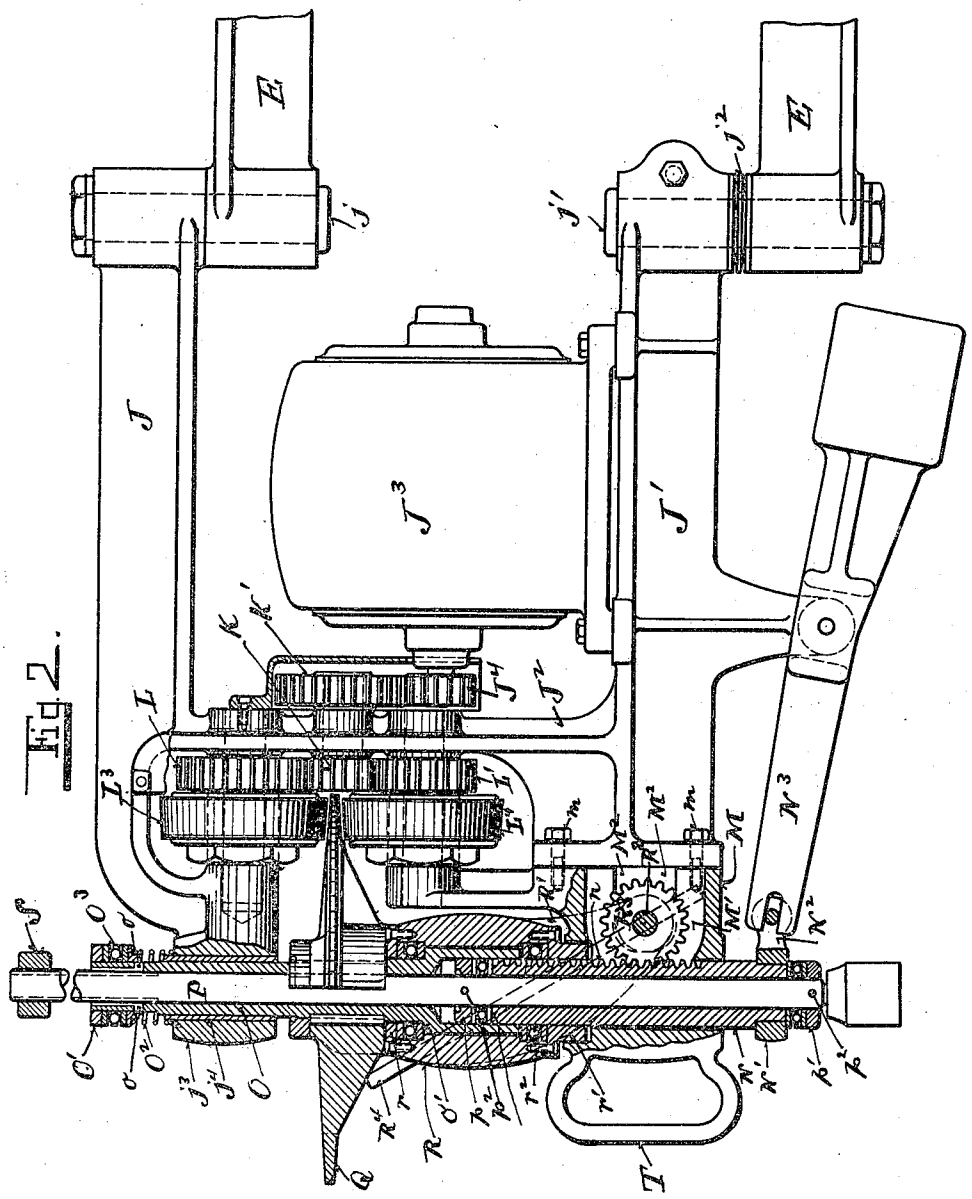
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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TAPPING-MACHINE.

1,244,084. Specification of Letters Patent. Patented Oct. 23, 1917.

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To all whom it may concern:

Be it known that I, ARTHUR A. SHAFER, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Tapping-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

This invention relates to tapping machines, in which it is necessary to reverse the direction of rotation of the tap spindle so that it may be rapidly screwed out after the hole has been threaded; and the object of the present invention is to construct a tapping machine in the form of a pedestal drill press, having the tap spindle and motor for operating the machine, mounted upon a jointed arm supported upon an upright post; and to provide means for raising and lowering said jointed arm upon its supporting post.

The features of my invention are hereinafter set forth and pointed out, and are illustrated in the accompanying drawings, in which:

Figure 1, is a side elevation of a tapping machine embodying my invention.

Fig. 2, is a like view, somewhat enlarged, of a portion of the spindle supporting arm, partially in section.

In these drawings A, indicates the base of the machine, which is provided with bolt-head receiving slots by means of which pieces of work may be secured upon said base when desired, as hereinafter described.

Secured upon the base A, preferably adjacent to one edge thereof, as shown in Fig. 1, is a pedestal B, by means of bolts b, or in any other suitable manner, so that said pedestal B, will be firmly fastened upon the base plate A.

This pedestal B, is provided with an annular shoulder b', at the lower portion thereof, and above said shoulder it is rounded and finished like a piece of shafting, as indicated in Fig. 1. Upon this pedestal is placed a bracket C, by means of a sleeve C′, through which the pedestal B, passes; said sleeve C′, resting upon the shoulder b', so that the bracket C, can be easily swung around the pedestal B, when desired. Upon the bracket C, is hinged a work-table D, by means of a pivot d, said table D, being provided with a bifurcated flange D′, on its under side, into which the bracket C, extends, as indicated by broken lines in Fig. 1; said bracket C, being provided with a series of holes c, indicated by broken lines in Fig. 1, so that the table D, can be maintained in a level position, as shown by full lines in said Fig. 1, by means of a pin D^2; or can be maintained in a tilted position by placing the pin D^2, in one of the holes c, as desired.

Upon the pedestal B, is placed a bracket arm E, by means of rings E′ E^2, through which the pedestal passes, so that said bracket arm E, can freely swing upon the pedestal B. Between the rings E′ and E^2, is a sleeve F, and upon the upper end of said sleeve F, is an anti-friction bearing f, upon which the ring E′, rests. Upon the pedestal B, above the sleeve C, is placed a ring G, which is non-rotatably secured thereon by means of a stud-pin or set-screw g; and at the top of the pedestal B, there is secured a cap G′, by means of a pin or set-screw g'. The ring G, and cap G′, are each provided with arms g^2 and g^3 between which is non-rotatably secured a screw H, parallel with the pedestal B.

The sleeve F, is provided with an ear f', through which the screw H, passes, and below the ear f', I place upon the screw H, a miter gear h, which is provided with internal screw-threads adapted to engage the threads of the screw H. Between the gear h, and the ear f', is an anti-friction bearing f^2.

Upon the sleeve F, below the ear f', is a bracket arm f^3, in which a miter gear h', is journaled, which intermeshes with the miter gear h; and I provide a crank H′, by means of which the miter gears h and h', may be rotated for the purpose of adjusting the elevation of the bracket arm E, upon the pedestal B.

Upon the bracket arms E E, are hinged, by means of pivots j j', a pair of arms J J′, which are rigidly connected by a cross-bar

J^2, so that the two arms J and J′, operate as one arm, there being interposed between one of the arms J′, and the bracket arms E, an anti-friction bearing j^2.

Mounted between the arms J and J′, preferably upon the arm J′, is an electric motor J^3, having on its shaft a spur-gear pinion J^4, (see Fig. 2), and journaled in the cross-bar J^2, is a short shaft, (see broken lines) upon one end of which is secured a spur-gear wheel K, which intermeshes with the pinion J^4, on the motor shaft, and on the other end of which is secured a spur-gear wheel K′. Above and below the spur-gear K′, and intermeshing therewith are gears L, and L′, and integrally secured to the gears L and L′, are friction wheels L^3, and L^4, the gears L and L′, and friction wheels L^3 and L^4, being supported upon journals secured in the cross bar J^2, as indicated by broken lines in Fig. 2.

The upper arm J, terminates in a ring j^3, in which is placed a bushing j^4. Upon the end of the lower arm J′, is secured an extension M, by means of bolts m, which is provided with a recess M′, which has lateral openings M^2, in the side walls thereof. Slidably mounted in the extension M, in vertical alinement with the bushing j^4, thereabove, is sleeve N, which is provided with a rack of gear teeth n, and at its lower end with a collar N′, which has an ear N^2, thereon; and hinged under the lower arm J′, is a counter-weighted lever N^3, which engages said ear N^2, to prevent the sleeve N, from falling out of the extension M.

Mounted within the bushing j^4, in the upper arm J, is another sleeve O, which extends downwardly therefrom a short distance over the upper end of the lower sleeve N, there being preferably an enlarged opening in the lower end of the upper sleeve O, for that purpose. To maintain the sleeve O, supported upon the upper arm, J, a collar O′, is secured to the upper end thereof, and a coiled spring O^2, placed thereabout, upon the ring j^3, with an anti-friction bearing O^3, between said spring O^2, and the collar O′.

Within the sleeves N and O, is placed a tap-spindle P, which is prevented from sliding in the lower sleeve N, by means of collars p, and p', secured thereon by means of transverse pins p^2, there being thrust bearings between said collars and the upper and lower ends of the sleeve N; said tap-spindle being free to rotate in the lower sleeve N. The tap-spindle P, is slidably mounted in the upper sleeve O, but is rotatable therewith by means of keys o, working in keyways in the spindle P.

Upon the upper sleeve O, is secured a double faced friction disk Q, of sufficient diameter so that it will extend between the friction wheels L^3 and L^4.

Mounted upon the upper sleeve O, below the friction disk Q, is a sleeve R, having downwardly extending ears R′, on opposite sides thereof, which extend down outside of the extension M, on the arm J′, and journaled in said ears R′, is a shaft R^2, upon which a pinion R^3, is secured between said ears, and within the recess M′, in the extension M, so that said pinion R^3, will intermesh with the rack teeth n, on the sleeve N.

The shaft R^2, is provided with an operating lever R^4, (see Fig. 1). The upper sleeve O, is provided with a shoulder o', within the sleeve R, upon which an anti-friction bearing may be placed, and retained within the upper end of the sleeve R, by means of a ring r, secured thereon by means of screws, as shown in Fig. 2. A similar anti-friction thrust bearing is placed under the lower end of the upper sleeve O, and secured within the sleeve R, by means of a ring r', bolted to the sleeve R, by means of bolts or screws r^2, as shown in Fig. 2.

On the upper end of the spindle P, a collar S, is adjustably secured, which is adapted to engage the upper end of the sleeve O, when the spindle has reached the lower limit of its travel, and thereby cause the friction disk to disengage itself from the upper friction wheel L^3.

The extension M, on the lower arm J′, is provided with a handle T, whereby the tap-spindle-bearing mechanism can be moved into the position required for the work to be performed.

In operation, when it is desired to operate upon a piece of work which stands too high to be placed upon the table D, the table may be swung to one side, and the work placed upon the base plate A, and the lever H′, operated to raise or lower the bracket arms E E, as may be desired; said arms E E, and the arms J J′, hinged thereon, permitting of placing the tapping tool (not shown) secured in the lower end of the tap-spindle P, in any position required, within the range of said arms.

When the tap has been placed in the required position, the lever R^4, is operated to lower the tap-spindle, and as soon as the tap (not shown) presses against the work, the action of the gear R^3, upon the rack-teeth n, raises the sleeve R, sleeve O, and friction-disk Q, upward until said disk engages the upper friction wheel L^3, (the wheels L^3 and L^4, being driven in the same direction by the motor J^3, through the gears K and K′) which causes said spindle P, to rotate.

When the lever R^4, is moved in the opposite direction, the sleeves R and O, and the disk Q, is moved downward until the disk Q, contacts with the upper side of the lower friction wheel L^4, which reverses the rotation of the disk Q, and spindle P; and when the lever R^4, is released the spring O^2,

coöperating with the counter-weighted lever N^3, allows the disk Q, to assume a position midway between the friction wheels L^3 and L^4, so that the tap-spindle P, will remain at rest.

The collar S, on the upper end of the tap-spindle can be so adjusted, longitudinally thereon, that it will engage the upper end of the upper sleeve O, when the tap has been lowered the distance required, and thereby cause the sleeve O, and disk Q, to drop so that the rotation of the disk Q, will be reversed by the lower friction wheel L^4, and the tap unscrewed from the threads it has cut.

From the foregoing description and the drawings of my improved tapping machine, it will appear to those skilled in the art, that many modifications in the construction thereof can be made, without departing from the scope of my invention, as set forth in the claims, as I have herein shown only my preferred form of mechanism for embodying my invention. Therefore, I do not desire to limit myself to the exact form of mechanism shown and described herein, but what I claim as new and desire to secure by Letters Patent, is:

1. The combination in a machine of the class described, of a frame, a vertically movable sleeve mounted in the lower portion of said frame, a series of rack teeth on said sleeve, a sleeve slidably and rotatably mounted in the upper portion of said frame, a tool spindle passing through said sleeves, means to cause said spindle to rotate with said upper sleeve while permitting longitudinal movement of the spindle in the sleeve, collars secured on said spindle above and below said lower sleeve to prevent said sleeve sliding on said spindle, a friction disk around said upper sleeve, a sleeve non-slidably journaled on said upper sleeve, arms on said sleeve, a shaft journaled in said arms, a spur gear on said shaft intermeshing with the rack teeth on said lower sleeve and means to cause said shaft and spur gear to rotate, substantially as set forth.

2. The combination in a machine of the class described, of a frame, a sleeve slidably mounted in the lower portion thereof, another sleeve slidably and rotatably mounted in the upper portion of said frame and telescoping over the upper end of said lower sleeve, a friction disk secured on said upper sleeve, another sleeve rotatably and non-slidably mounted on said upper sleeve below said friction disk, downwardly depending arms on said last named sleeve, a shaft journaled in said arms, a spur-gear secured on said shaft to engage the rack teeth on said lower sleeve, a lever to operate said shaft and spur-gear, a tool spindle extending through said sleeves, collars secured on said spindle above and below said lower sleeve to prevent said spindle sliding therethrough, means to permit said spindle to slide in said upper sleeve and to cause it to rotate therewith, a collar on said upper sleeve, a spring between said collar and said frame, counter-weight mechanism connected with said lower sleeve, and motor and gear mechanism to cause said friction disk to rotate, substantially as set forth.

3. The combination in a machine of the class described, of a frame, a tool spindle slidably and rotatably mounted in said frame, a friction disk slidable with relation to said spindle adapted to rotate the same, means adapted to move said spindle downward and said disk upward, and vice-versa, a pair of friction wheels mounted in said frame above and below said friction disk and in spaced relation thereto, and motor and gear mechanism mounted in said frame adapted to drive said friction wheels in the same direction, whereby, when said spindle is forced downward, said disk will be moved upward against the upper friction wheel, and vice-versa, substantially as and for the purpose set forth.

In testimony whereof I affix my signature.

ARTHUR A. SHAFER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."