No. 832,222. PATENTED OCT. 2, 1906.

H. A. TUTTLE.

TAPPING MACHINE.

APPLICATION FILED APR. 5, 1905.

Fig. 1.

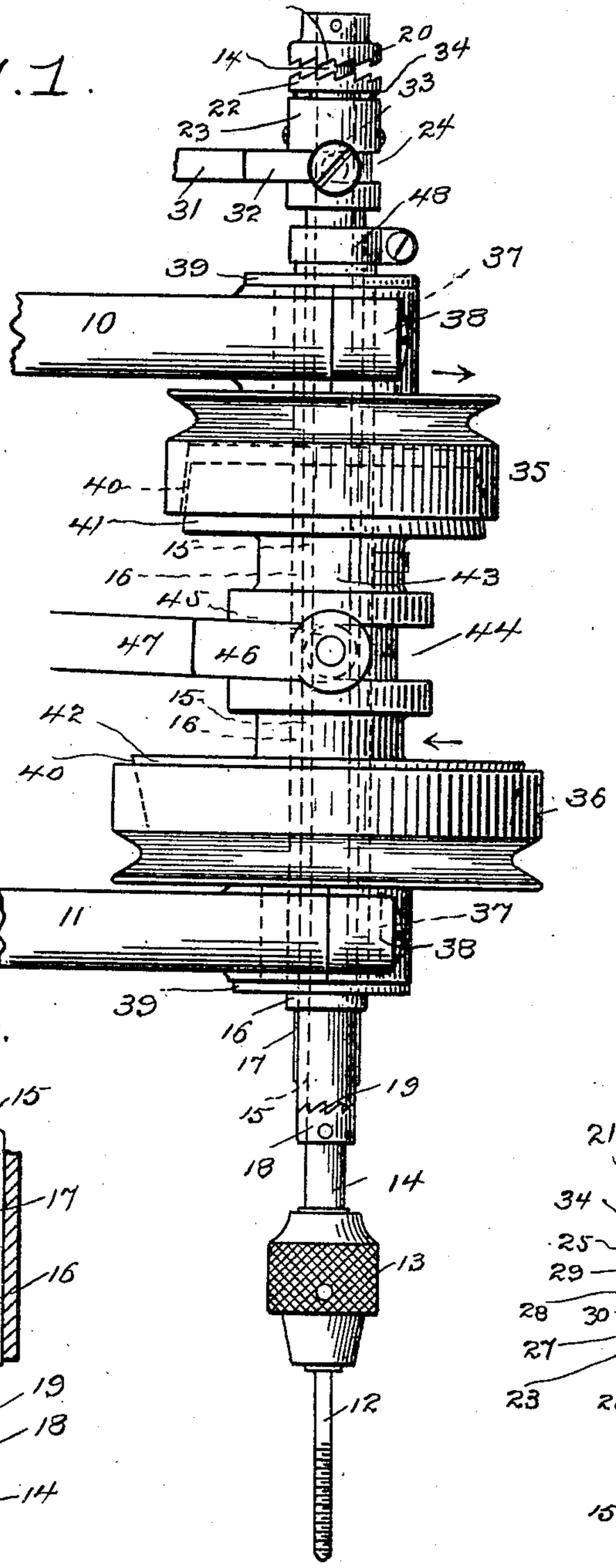


Fig. 3.

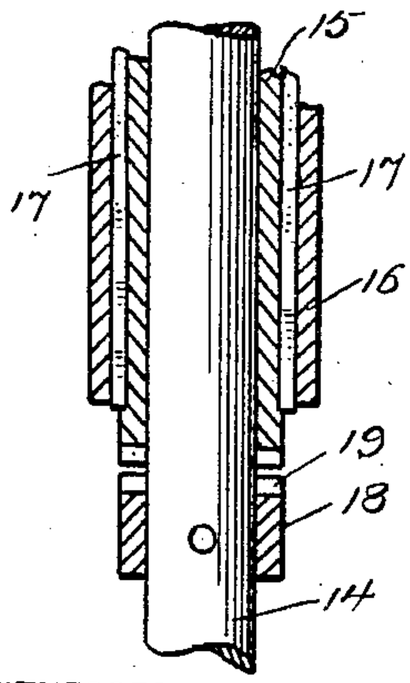
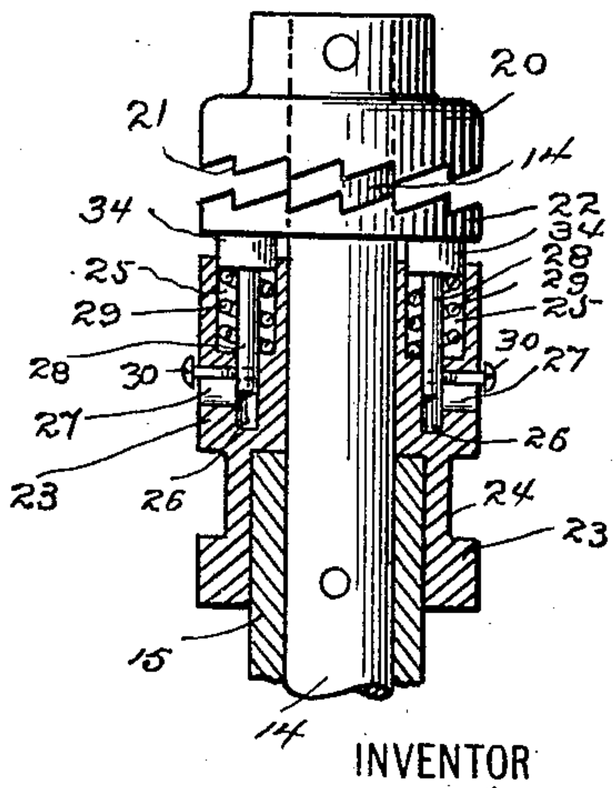


Fig. 2.



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TAPPING-MACHINE.

No. 832,222. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed April 5, 1905. Serial No. 254,030.

To all whom it may concern:

Be it known that I, HENRY A. TUTTLE, a citizen of the United States, residing at South Norwalk, county of Fairfield, State of Connecticut, have invented a new and useful Tapping-Machine, of which the following is a specification.

My invention has for its object to simplify, cheapen, and to generally improve the construction and mode of operation of tapping and similar machines.

With these and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, which will be hereinafter described and then specifically pointed out in the claims hereunto appended.

In the accompanying drawings, forming a part of this specification, Figure 1 is an elevation illustrating the construction and mode of operation of my novel invention, the parts being in the driving position; Fig. 2, a detail view, partly in section, on an enlarged scale, showing the upper end of the spindle and the reversing connections, the reversing ratchet-collars being separated, as when driving; and Fig. 3 is a detail sectional view showing the sliding connection of the inner and outer sleeves and the driving ratchet-collars in the inoperative position, as when reversing.

10 and 11 denote upper and lower arms which extend from a frame. (Not shown.)

12 denotes a tap which is secured in a chuck 13, carried by a spindle 14, which has free longitudinal and rotary movement in an inner sleeve 15, which in turn is secured to an outer sleeve 16 by key-and-slot connections, as at 17, so that the inner sleeve may have longitudinal movement relative to the outer sleeve, but will be driven thereby. In practice the spindle may move longitudinally an eighth of an inch, more or less, relative to the inner sleeve, and the inner sleeve may move longitudinally an inch, more or less, relative to the outer sleeve.

18 denotes a collar rigidly secured to the spindle near its lower end and provided on its upper face with ratchet-teeth 19, which are adapted to engage corresponding ratchet-teeth at the lower end of the inner sleeve, as clearly shown in Fig. 1, the engagement of these ratchet-teeth constituting the driving connection for the spindle and tap.

20 denotes a collar rigidly secured to the upper end of the spindle, which is provided on its inner face with ratchet-teeth 21, which are adapted to engage corresponding ratchet-teeth on a collar 22, which is carried by the inner sleeve. The ratchet-teeth upon collars 20 and 22 constitute the reversing connection for the spindle and tap.

In order to prevent the possibility of the ratchet-teeth upon these collars meeting end to end and preventing reversal of the clutch, presently to be explained, I attach collar 22 to the inner sleeve in such a manner as to permit said collar to yield longitudinally, as when the ratchet-teeth meet end to end, but still be rotated by the inner sleeve.

23 denotes a hub which is rigidly secured to the upper end of the inner sleeve. This hub is provided with a groove 24, with sockets 25, with holes 26 leading inward from the bases of the sockets, and with slots 27 leading into said holes from the outer side.

28 denotes pins extending downward from collar 22 through the sockets and into holes 26, where they are engaged by pins 30 in slots 27, which extend inward from the outer side and limit the movement and retain the parts in place.

29 denotes coil-springs lying in sockets 25 and surrounding pins 28, the ends of which are shown as bearing, respectively, against the bottoms of the sockets and against enlargements 34 of the pins to support the collar, as clearly shown in Fig. 2. These enlargements of the pins provide bearings in the sockets, the lower ends of the pins bearing in holes 26.

31 denotes an operating-lever, which may be operated mechanically or by a foot or hand lever, as preferred, it being wholly immaterial, so far as the present invention is concerned, what means are used to operate the lever. This lever is shown as provided with a yoke 32, carrying rollers 33, (see dotted lines, Fig. 1,) which travel in groove 24 in the hub, this engagement of the operating-lever with the hub constituting the means for raising the inner sleeve and the tap and for starting the feed of the tap, as will be more fully explained.

35 denotes an upper clutch-pulley, which is the reversing-pulley, and 36 a lower-clutch pulley, which is the driving-pulley. These pulleys are provided with hubs 37, through

which the outer sleeve passes freely and which are journaled in upper and lower boxes 38 on the frame. The outer ends of these hubs are provided with flanges 39, which engage the outer faces of the respective upper and lower boxes. The upper and lower clutch-pulleys are provided in their inner faces with tapering recesses 40, which are adapted to be engaged, respectively, by upper and lower friction-cones 41 and 42. These friction-cones are carried by a clutch-sleeve 43, which is rigidly secured to the outer sleeve and is provided with a groove 44, which is engaged by rollers 45, (see dotted lines, Fig. 1,) carried by a yoke 46 at the end of the clutch-lever 47. The clutch-pulleys are driven in opposite directions, as indicated by arrows, in any suitable manner, as by means of an endless belt (not shown) passing over said pulleys and over pulleys on a driving-shaft. (Not shown.)

48 denotes a collar rigidly secured to the inner sleeve and acting by engagement with the upper end of the outer sleeve to limit the downward movement of the inner sleeve, so that driving ratchet-collar 18 on the spindle will draw out of engagement with the ratchet-teeth at the lower end of the inner sleeve to stop the rotation of the spindle and tap at the completion of the threading of a hole.

The operation is as follows: It is unimportant, so far as the present invention is concerned, whether the machine to which it is applied normally holds the spindle and tap in the raised or lowered position. In starting to thread a hole the spindle and tap are raised by means of operating-lever 31. When the tap has been lowered into alinement with the hole to be threaded, starting pressure is applied by means of the operating-lever to start the tap into the work; but when once started it will of course draw in, and pressure is not required. In the starting position collar 48 is above and out of engagement with the upper end of the outer sleeve. As soon as this collar engages the outer sleeve the downward movement of the inner sleeve will stop, but the spindle and tap will continue to move downward until the teeth on ratchet-collar 18 draw out of engagement with the corresponding ratchet-teeth at the lower end of the inner sleeve. This disengagement of the ratchet-teeth will stop the rotation of the spindle and tap, but the inner and outer sleeves will continue to rotate until the clutch is reversed. In the position of the parts shown in Fig. 1 the lower friction-cone is in engagement with the lower clutch-pulley, and the spindle and tap are being driven forward, as in threading a hole. Collar 48 on the inner sleeve has just engaged the upper end of the outer sleeve, which limits the downward movement of the inner sleeve; but the spindle will continue to be driven forward until the lower ratchet-collar disengages from the corresponding ratchet-teeth at the lower end of the inner sleeve, as in Fig. 3, this disengagement being effected by the drawing in of the tap in threading a hole. As soon as the rotation of the tap ceases clutch-lever 47 may be oscillated, a very slight movement disengaging the lower friction-cone from the lower clutch-pulley, which will stop the rotation of the inner sleeve, as neither friction-cone will be in engagement with a clutch-pulley, both clutch-pulleys rotating freely. A slight additional movement of the clutch-lever will place the upper friction-cone in engagement with the upper or reversing clutch-pulley, which will impart reverse movement to the inner sleeve through the slot-and-key connections, as shown in Fig. 3. This continued upward movement of the outer sleeve by the clutch-lever to reverse the clutch will raise the inner sleeve through the engagement of the upper end of the outer sleeve with collar 48 on the inner sleeve and will place the ratchet-teeth on collar 22 in engagement with the ratchet-teeth on collar 20, carried by the spindle, and thus impart reverse movement to the spindle and cause it to draw out, collar 22 yielding, as already explained, should the ratchet-teeth meet end to end and insuring operative engagement of the ratchet-collars. After the tap has withdrawn from the threaded hole, operating-lever 31 may be operated to raise the tap and retain it above the work until the work has been shifted to place another hole to be threaded in alinement with the tap. The tap is then lowered to operative position again by swinging the operating-lever downward, and sufficient pressure is applied thereto to start the tap.

Having thus described my invention, I claim—

1. In a tapping-machine, the combination with a spindle, an inner sleeve through which the spindle extends, said sleeve being free to rotate and move longitudinally on said spindle, and driving and reversing connections whereby said spindle and sleeve may be coupled to move in unison, of an outer sleeve keyed to the inner sleeve so as to permit longitudinal movement thereon, connections between said sleeves whereby the longitudinal movement of the outer sleeve will impart a similar movement to the inner sleeve in one direction, and means for imparting forward and reverse movement to the outer sleeve.

2. In a tapping-machine, the combination with a longitudinally-movable spindle having driving and reversing ratchet-collars and an inner sleeve through which the spindle extends, said sleeve being free to rotate and move longitudinally on said spindle, said sleeve having ratchet-teeth corresponding with the ratchet-collars, of an outer sleeve keyed to the inner sleeve so as to permit longitudinal movement, means for imparting forward and reverse movement to the outer

sleeve, the longitudinal movement of the spindle serving to engage and disengage the ratchet connections.

3. In a tapping-machine, the combination with a longitudinally-movable spindle having a driving ratchet-collar and an inner sleeve having ratchet-teeth to coöperate with the teeth on the collar, means being provided for engaging and disengaging said spindle and sleeve to move the spindle in the opposite direction, of an outer sleeve keyed to the inner sleeve so as to permit longitudinal movement, means for imparting forward and reverse movement to the outer sleeve the longitudinal movement of the spindle serving to engage and disengage the ratchet-teeth on said collar and sleeve.

4. In a tapping-machine, the combination with a longitudinally-movable spindle having a reversing ratchet-collar and an inner sleeve carrying a spring-actuated collar having coöperating ratchet-teeth, means being provided for engaging and disengaging said spindle and sleeve to move the spindle in the opposite direction, of an outer sleeve keyed to the inner sleeve so as to permit longitudinal movement, means for imparting forward and reverse movement to the outer sleeve, the longitudinal movement of the spindle serving to engage and disengage the ratchet-collars, the ratchet-collar on the inner sleeve being adapted to yield should the teeth meet end to end.

5. In a tapping-machine, a spindle, an inner sleeve through which said spindle extends, said sleeve being free to rotate and move longitudinally of said spindle, connections between said sleeve and spindle for engaging and disengaging them, an outer sleeve keyed to said inner sleeve to permit longitudinal movement thereon, connections between said sleeves whereby the longitudinal movement of the outer sleeve will impart a similar movement to the inner sleeve in one direction, and means for imparting a rotating movement to said outer sleeve.

6. In a tapping-machine, the combination with a longitudinally-movable spindle having driving and reverse ratchet-collars and an inner sleeve through which said spindle extends, said sleeve being free to rotate and move longitudinally on said spindle, and which is provided with ratchet connections corresponding with the ratchet-collars on the spindle said sleeve carrying a collar 48 to limit the longitudinal movement thereof, of an outer sleeve keyed to the inner sleeve so as to permit longitudinal movement and means for imparting driving and reverse movement to the outer sleeve, the collar on the inner sleeve engaging the end of the outer sleeve and stopping the downward movement thereof so that in use a tap will draw the driving ratchet-collar on the spindle out of engagement with the corresponding ratchet connection on the inner sleeve and stop the rotation of the spindle at the completion of the threading operation.

7. In a tapping-machine, a spindle, an inner sleeve through which said spindle extends, said sleeve being free to rotate and move longitudinally of said spindle, connections between said sleeve and spindle for engaging and disengaging them, an outer sleeve keyed to said inner sleeve to permit longitudinal movement thereon, the outer sleeve limiting the movement of the inner sleeve in one direction, and means for imparting a rotating movement to said outer sleeve.

8. In a tapping-machine, the combination with a longitudinally-movable spindle having driving and reverse connections, and an inner sleeve through which said spindle extends, said sleeve being free to rotate and move longitudinally on said spindle, said sleeve being provided with corresponding connections, of an outer sleeve keyed to the inner sleeve and movable longitudinally thereof, the independent longitudinal movement being limited in one direction by the inner sleeve, and clutch mechanism for imparting forward and reverse movement to the outer sleeve, the spindle being free to move longitudinally independently of the sleeves.

9. In a tapping-machine, the combination with a longitudinally-movable spindle having driving and reverse connections and an inner sleeve through which said spindle extends, said sleeve being free to rotate and move longitudinally on said spindle, said sleeve being provided with corresponding connections and a collar, of an outer sleeve keyed to the inner sleeve so as to permit longitudinal movement and mechanism for imparting forward and reverse movement to the outer sleeve, the collar on the inner sleeve being adapted to engage the end of the outer sleeve and stop the rotation of the spindle at the completion of the threading operation.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY A. TUTTLE.

Witnesses:

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S. W. ATHERTON.