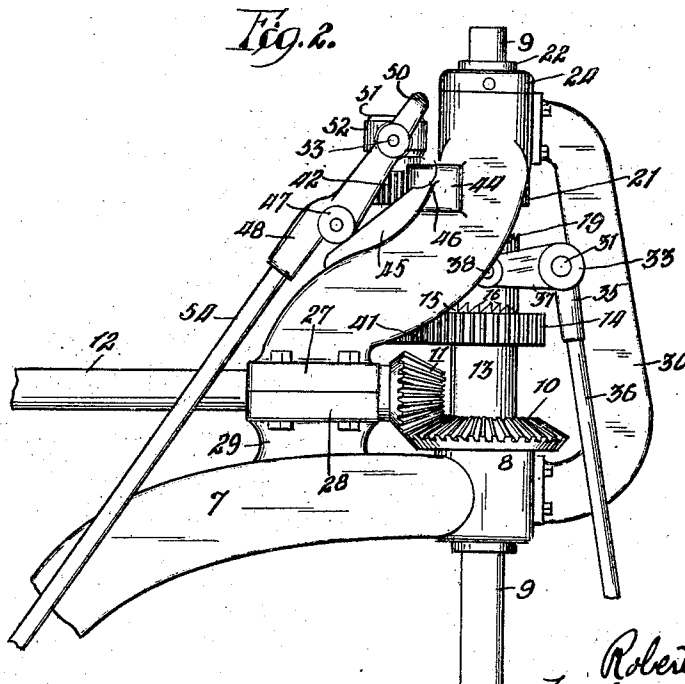
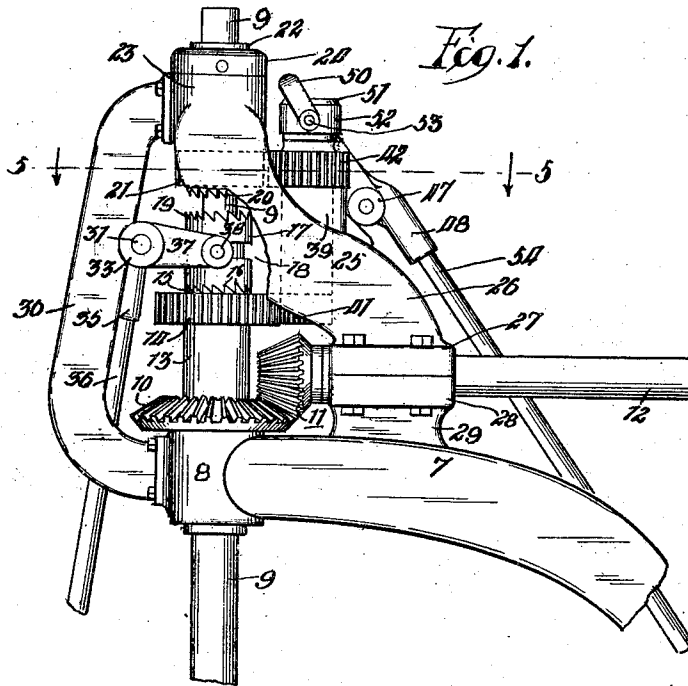


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APPLICATION FILED FEB. 4, 1908.

928,780.

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2 SHEETS—SHEET 1.



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Inventor:

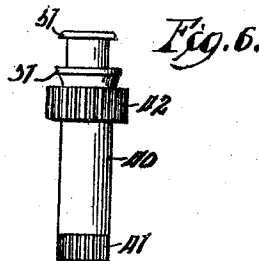
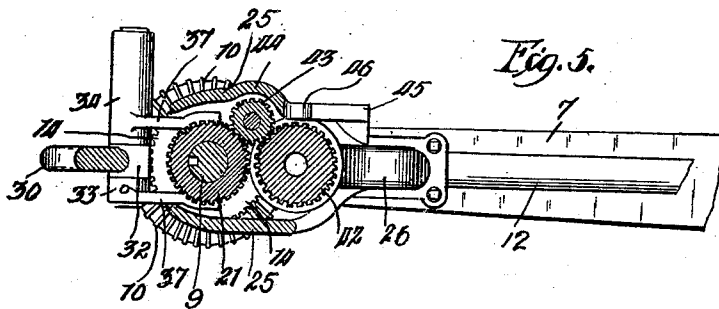
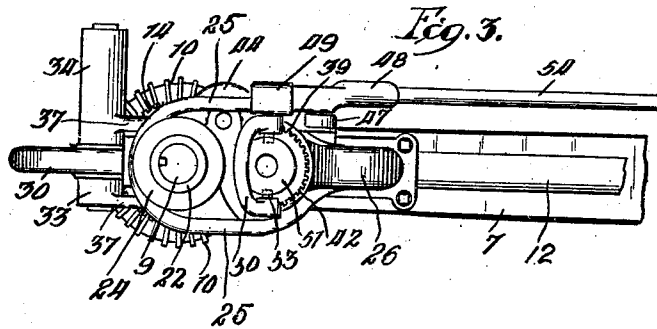
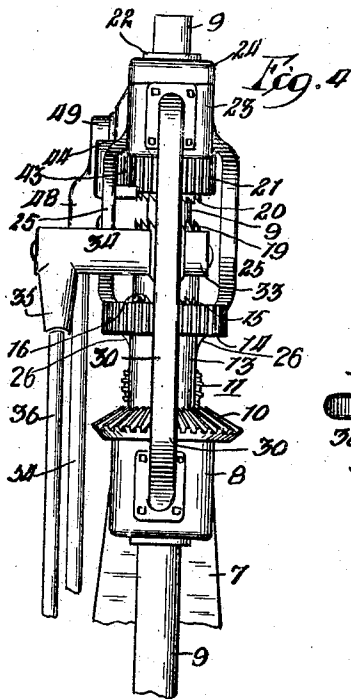
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# UNITED STATES PATENT OFFICE.

ROBERT MILNE, OF ROCKFORD, ILLINOIS, ASSIGNOR TO ROCKFORD DRILLING MACHINE COMPANY, A CORPORATION OF ILLINOIS.

## TAPPING ATTACHMENT FOR DRILLING-MACHINES.

No. 928,780.

Specification of Letters Patent.

Patented July 20, 1909.

Application filed February 4, 1908. Serial No. 414,199.

*To all whom it may concern:*

Be it known that I, ROBERT MILNE, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Tapping Attachments for Drilling-Machines, of which the following is a specification.

The object of this invention is to provide a tapping attachment, of suitable formation and construction to be applied to the head of a standard drilling machine without materially disorganizing or rearranging the drilling mechanism.

In certain prior constructions the reversing feed for the tapping attachment has been derived from gears positioned on the main driving shaft at a point behind the beveled gear wheel for the drill spindle. This method of securing the reversing drive for the tapping attachment is objectionable, in that it requires considerable readjustment and rearrangement of the upper portion of the drilling machine, and likewise necessitates the employment of a greater number of gears than is necessary in securing the reverse drive for the drill spindle of the present invention.

A further object of the invention is to simplify the structure and render it more compact than has hitherto been possible in tapping attachments of previous constructions.

The invention consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of the tapping attachment of the present invention positioned on the head of a drilling machine frame; Fig. 2 a similar view showing the reverse side of the attachment; Fig. 3 a top or plan view of the same; Fig. 4 a front elevation of the same; Fig. 5 a sectional plan view taken on line 5—5 of Fig. 1 looking in the direction of the arrow; and Fig. 6 a detail showing the transmission gears.

The attachment is applied to the top of a drilling machine of standard construction, having a main frame 7, the top of which only is shown, which frame terminates in a journal head 8 within which a vertical drill

spindle 9 is mounted. The spindle has loosely journaled thereon, above the head 8, a beveled spindle gear 10 which meshes with a driving bevel pinion 11 on the forward end of a main driving shaft 12, which arrangement of the beveled gear wheel and driving pinion is of standard construction in drilling machines. In providing the drilling machine with a tapping attachment, the drill spindle 9 is upwardly extended, as shown, a considerable distance above the beveled gear wheel, which latter connects with an upwardly extending sleeve 13 which carries on its top a transmission spur gear wheel 14, which forms, in effect, an extension of the spindle gear wheel. The gear wheel 14 is provided, on its upper face, with clutch teeth 15 which are adapted to register with lower teeth 16 on a movable clutch collar 17 which is slidably keyed on the drill spindle and is provided with the usual clutch groove 18. The clutch collar 17 is provided with upper teeth 19, having a reverse thrust as compared with the lower teeth, which upper teeth are adapted to register with reversing clutch teeth 20 formed on the under face of a reversing gear wheel 21, which is loosely journaled upon the extended drill spindle 9 as a mounting, and is provided with an upwardly extending journal sleeve 22 which passes through a journal bracket head 23 which forms the extreme top of the frame of the tapping attachment. The sleeve 21 has secured thereto a collar 24 which bears against the upper face of the bracket head 23, which arrangement provides a suitable bearing for the reversing gear wheel 21.

The bracket head 23 has connected therewith side supporting arms 25 which merge into a single supporting standard 26 which springs from a recessed plate 27, which plate affords the upper half of a journal box for the main driving shaft 12, the lower half being afforded by a lower recessed plate 28 connected by a short standard 29 with the top of the main frame 7. The structure is further reinforced by a front bracket 30 of forwardly bowed formation, which bridges the space between the main journal head 8 and the bracket journal head 23, and serves, in combination with the supporting arms 25, to provide a compact and rigid structure for

the mounting of the reversing gears. The front bracket further serves as a mounting for a transversely extending yoke pin 31, which is passed through an inwardly projecting tongue 32 formed on the inner edge of the bracket in substantial alinement with the clutch groove 18 on the movable clutch member. The pin has keyed thereto, on opposite sides, a pair of yoke hubs 33 and 34, the latter of which is of greater length than the former and is provided with a downwardly extending tubular socket 35, which receives the upper end of a lever 36 adapted to rock the pin 31. Each of the yoke hubs is provided with an inwardly extending yoke arm 37, which yoke arms embrace the movable clutch member and are provided with inwardly extending fingers 38 which engage the slot 18, so that the movement of the lever 36 will serve to throw the slidable clutch member from one position of adjustment to the other.

The supporting standard 26 is provided, on its top, with a centrally positioned boss 39, through the center of which is slidably journaled a gear transmission stub shaft 40, shown in Fig. 6. The stub shaft has, at its lower end, inwardly cut gear teeth 41 which mesh with the teeth of the transmission gear wheel 14. The stub shaft, at its upper end, is provided with an upper transmission gear wheel 42, which is of larger diameter than the stub shaft and rests upon the upper face of the boss 39 as a bearing. The gear wheel 42 meshes with an intermediate transmission gear wheel 43, shown in Fig. 5, which latter is housed within a chambered protuberance 44 formed on the side of one of the supporting arms 25 near the point of juncture thereof with the journal bracket head 23. The intermediate gear wheel 43 also meshes with the reversing gear wheel 21 on the drill spindle, so that the upper gear transmission wheel and the upper reversing gear wheel will travel in the same direction.

Laterally adjacent to the boss 39 is an inclined trackway 45 which terminates, at its upper end, in a hollow or concavity 46, and the trackway has mounted thereon a roller 47 which is journaled on the inner side of a yoke arm 48, which latter, at its upper end, terminates in a head 49, to which is secured a yoke 50 which may be termed the gear disengaging yoke as distinguished from the clutch yoke previously described. The yoke 50 is of bowed formation and extends over the top of a channeled head 51, formed integral with and on top of the top transmission gear wheel 42. The head has entered in the channel thereof a split collar 52 into the opposite sides of which are entered pins 53, which inwardly extend from opposite sides of the yoke 50. The yoke arm 47 has entered into its end a lever 54 whereby it may be swung forward and back.

A forward movement of the lever will cause the roller to ascend the inclined trackway until it has reached the concavity at the forward upper end thereof, and this movement of the roller serves to raise the yoke 50, and with it the split collar 52, thereby elevating the stub gear transmission shaft 40 to a position in which the gear teeth 41 and the gear wheel 42 are out of mesh with the gears with which they normally cooperate.

In use, when it is desirable to operate the machine for drilling purposes, the transmission gears will be thrown out in the manner above indicated, and the clutch will be thrown to its lowermost position, which gives a forward drive to the drill spindle. When it is desired to use the machine for tapping purposes, the lever 54 will be thrown to position to lower the transmission gears and thereby throw them in mesh. Thereafter, when it is desired to give a reverse movement to the drill spindle, the clutch member will be thrown to its elevated position, which brings it into engagement with the upper reversing gear wheel 21, which, being in mesh with the reversing train of gears, will give a reverse movement to the spindle. The construction is one which interferes in no way with the drill structure and is adapted to be applied to drilling machines of standard formation, without requiring any substantial modification in the machine and by merely attaching to the top of the machine frame the mechanism hereinbefore described and altering the beveled gear to the extent indicated. By securing the reversing drive from the top of the spindle gear wheel, instead of from elsewhere on the driving shaft, the gear will be located at the most advantageous point to secure absolute rigidity and accuracy in work as well as extreme compactness in arrangement.

In certain previous constructions, bevel gears rather than spur gears have been used in the reversing chain. The use of spur gears is highly advantageous, in that no change is made in the angle of the drive, all the gears revolving on a vertical axis. This gives a maximum of compactness and efficiency and considerably cheapens the cost in that spur gears are much less expensive and are ordinarily more accurately registered in mesh than bevel gears.

It is not intended to limit the invention to the precise details of construction and arrangement shown and described, since the manner of positioning and mounting the gears may be changed or modified, and the clutch mechanism changed or other well known clutch mechanism substituted therefor without changing the character of the invention. In like manner, other details of the invention may be modified without substantial change in the operation of the mechanism.

What I regard as new and desire to secure by Letters Patent is:

1. In a tapping attachment for drilling machines, the combination of a drill spindle, the spindle gear wheel and connected transmission gear rotatably mounted on the drill spindle, a clutch collar slidably keyed on the drill spindle and adapted, when in lowered position, to engage with the transmission gear wheel, an upper reversing gear wheel rotatably mounted on the spindle above the clutch collar, transmission gearing in mesh with the transmission gear wheel and the reversing gear wheel, a member adapted to lift the transmission gearing out of operative position, a roller journaled to said lifting member, and an inclined trackway, upon which the roller is adapted to run and so arranged as to elevate the lifting member when the roller reaches the top of the trackway, substantially as described.

2. In a tapping attachment for drilling machines, the combination of a drill spindle, the spindle gear wheel and attached transmission gear wheel rotatably mounted on the drill spindle, a reversing gear wheel rotatably mounted on the drill spindle, a clutch collar slidably keyed to the drill spindle and adapted to be thrown into engagement with either the transmission or reversing gear wheels, a vertically arranged transmission gear member, having teeth at the lower end normally meshing with the transmission gear wheel, and having teeth at the upper end, an intermediate gear wheel meshing with the reversing gear wheel and the upper teeth, and means for vertically moving the gear member to break the chain of reversing gears, substantially as described.

3. In a tapping attachment for drilling machines, the combination of a drill spindle, the spindle gear wheel and attached transmission gear wheel rotatably mounted on the drill spindle, a reversing gear wheel rotatably mounted on the drill spindle, a clutch collar slidably keyed to the drill spindle and adapted to be thrown into engagement with either the transmission or reversing gear wheels, a vertically arranged transmission gear member, having teeth at the lower end normally meshing with the transmission gear wheel, and having teeth at the upper end, an intermediate gear wheel meshing with the reversing gear wheel and the upper teeth, a yoke engaging the upper end of the vertically arranged gear transmission member, an arm connected with said yoke, a roller on said arm, and an inclined trackway adjacent to the gear transmission member and adapted to provide means for vertically adjusting the position of the yoke, substantially as described.

4. In combination with the frame of a drilling machine, and a vertical drill spindle journaled therein, a spindle gear

wheel rotatably mounted on the drill spindle and located above the frame, a transmission gear wheel secured to and located above the spindle gear wheel, a reversing attachment frame comprising side arms merging into a journal bracket head at their upper ends, within which bracket head the upper end of the drill spindle is journaled, a reversing gear wheel rotatably mounted on the drill spindle below the bracket head, a clutch slidably keyed to the spindle and adapted to throw the spindle into engagement with one or the other of the transmitting or reversing gear wheels, a vertical transmission shaft slidably mounted between the arms of the bracket and having, at its lower end, teeth adapted to mesh with the transmission gear wheel, and having, at its upper end, teeth adapted to mesh with the reversing gear wheel, the said vertical shaft having a grooved head at the upper end thereof, a yoke adapted to engage said groove, an arm with which the yoke is connected, a roller on the arm, an inclined trackway along which the roller is adapted to run, provided, at its upper end, with a recess adapted to receive the roller and prevent its descent, and a lever for swinging the arm to move the roller along the inclined trackway to raise and lower the yoke and throw the transmission gear shaft into and out of meshing position, substantially as described.

5. In a tapping attachment for drilling machines, the combination of a drill spindle, the spindle gear wheel and connected transmission spur gear rotatably mounted on the drill spindle, a clutch collar slidably keyed on the drill spindle and adapted, when in lowered position, to engage with the transmission gear wheel, an upper reversing spur gear wheel rotatably mounted on the spindle above the clutch collar, and transmission spur gearing in mesh with the transmission gear wheel and the reversing gear wheel, substantially as described.

6. In a tapping attachment for drilling machines, the combination of a drill spindle, the spindle gear wheel and connected transmission spur gear rotatably mounted on the drill spindle, a clutch collar slidably keyed on the drill spindle and adapted, when in lowered position, to engage with the transmission gear wheel, an upper reversing spur gear wheel rotatably mounted on the spindle above the clutch collar, transmission spur gearing in mesh with the transmission spur gear wheel and the reversing spur gear wheel, and means for throwing the transmission gearing out of operative position, substantially as described.

7. In a tapping attachment for drilling machines, the combination of a drill spindle, the spindle gear wheel and connected transmission spur gear rotatably mounted on the

drill spindle, a clutch collar slidably keyed on the drill spindle and adapted, when in lowered position, to engage with the transmission gear wheel, an upper reversing spur gear wheel rotatably mounted on the spindle above the clutch collar, transmission spur gearing in mesh with the transmission spur gear wheel and the reversing spur gear

wheel, and means for lifting the transmission gearing and thereby breaking the chain of gears, substantially as described.

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Witnesses:

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SAMUEL W. BANNING.