E. RENDANO.

DRILL GEAR AND RATCHET MECHANISM.

APPLICATION FILED MAY 27, 1915.

1,192,227. Patented July 25, 1916.

Fig. 1

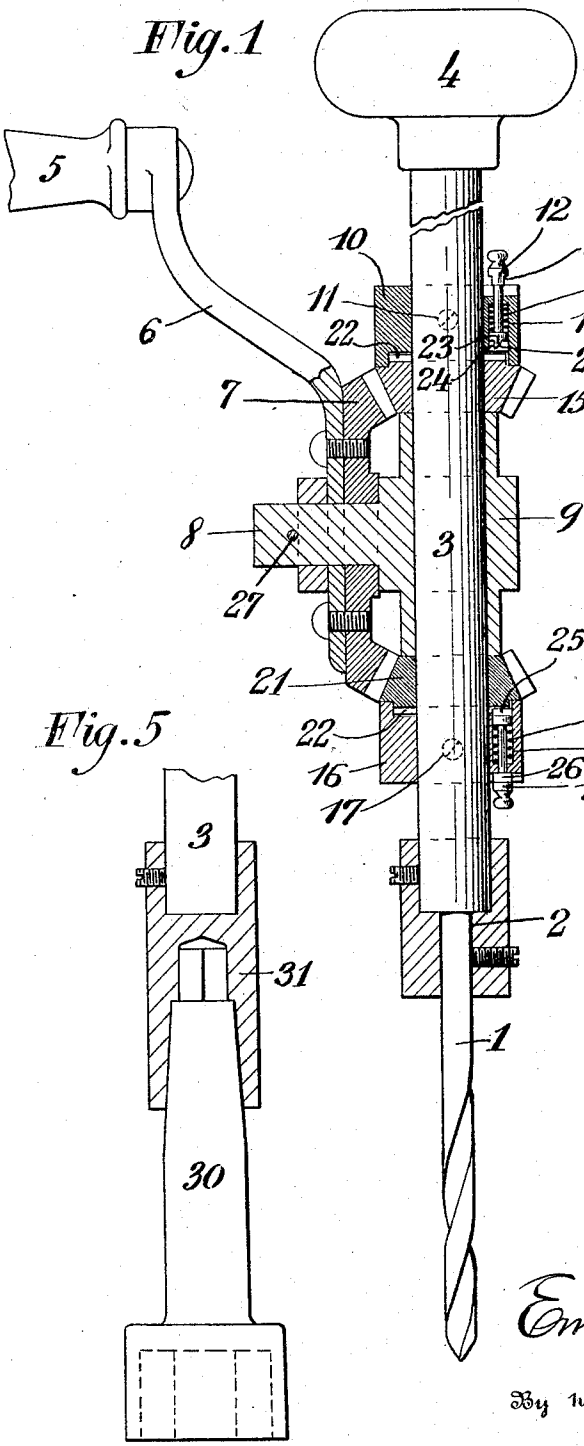


Fig. 2

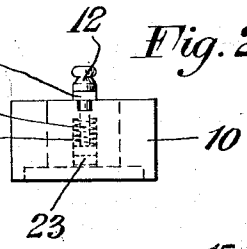


Fig. 4

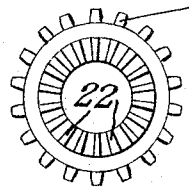


Fig. 3

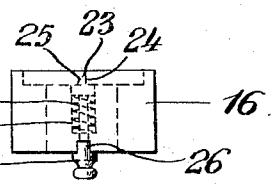


Fig. 5

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UNITED STATES PATENT OFFICE.

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DRILL GEAR-AND-RATCHET MECHANISM.

1,192,227. Specification of Letters Patent. Patented July 25, 1916.

Application filed May 27, 1915. Serial No. 30,737.

To all whom it may concern:

Be it known that I, EMIL RENDANO, a subject of the King of Italy, residing in borough of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Drill Gear-and-Ratchet Mechanism, of which the following is a specification.

This invention relates to universal double throw ratchet tools and is especially directed to drills, wrenches, and the like.

More particularly, my invention relates to a tool constructed to be operated by movement of the handle continuously in clockwise or counter-clockwise rotation or on both strokes with a reciprocating handle.

In the usual forms of my invention, the tool, such as a drill or socket wrench, or the like, is carried by a shaft to which is fixed a pair of suitable members each comprising a pawl and a pair of gears loosely mounted on said shaft, each provided with ratchet teeth coöperating respectively with said ratchet pawls and a suitable gear or train of gears for driving said pair of gears. For simplification the handle may be secured directly to a single bevel gear, and the aforesaid pair of gears is also constructed of the bevel type arranged to be in direct mesh with said first named bevel gear. Upon setting the ratchet pawls in a certain predetermined position, the tool member is actuated in clockwise rotation either upon continuous clockwise rotation of the handle or upon both strokes of reciprocation of the handle; by reversing the aforesaid position of the ratchet pawls, the tool will be operated in counter-clockwise rotation upon clockwise rotation of the handle or on both strokes of reciprocation of the handle. Upon disengaging either one of the ratchet pawls, the tool will be changed to the single stroke ratchet type producing clockwise or counter-clockwise rotation of the drill or wrench depending upon the setting of the ratchet pawls.

Further features and objects of my invention will be understood from the following description and accompanying drawings, in which—

Figure 1 is a vertical elevation, partly in central section of one form of a drill embodying my invention, and provided with a handle suitable for rotative drive; Figs. 2 and 3 are detail elevations of the upper and lower pawl-carrying members; Fig. 4 is a detail top plan view of the upper bevel gear carried by the driving shaft; and Fig. 5 is a detail view showing a socket wrench attached to the driving shaft.

Referring to Figs. 1, 2, 3 and 4, the drill bit 1 is suitably positioned within the socket 2 fixed at one end of the driving shaft 3. The grip member or bearing point 4 is loosely carried at the opposite end of driving shaft 3 preferably by means of a ball bearing or other anti-frictional support. The operating handle 5 is suitably carried by the crank arm 6 fixed to the main bevel gear 7 mounted on the stud 8 of the sleeve 9 loosely carried by the driving shaft 3. The upper stop member 10 is fixed to the driving shaft 3 as by means of the positioning screw 11. The stop 10 carries one or more ratchet pawls 12 mounted within the recess 13 and normally biased downwardly by means of the coil spring 14. The upper bevel gear 15 is positioned between the upper stop 10 and the upper terminal of collar 9. If desired, a ball bearing or other anti-frictional means may be interposed between the upper bearing terminal of collar 9 and the bevel gear 15. Similarly, the lower stop 16 is fixed to the driving shaft 3 by means of the positioning screw 17. The lower ratchet pawl or pawls 18 is disposed within the recess 19 and is normally biased upwardly by the spring 20. The lower bevel gear 21 is positioned between the lower stop member 16 and the lower terminal of collar 9 and a ball bearing or other anti-frictional means may be interposed between the lower bevel gear 21 and the lower bearing terminal collar 9. In the form of the invention illustrated in Fig. 1, the main bevel gear 7 meshes directly with the upper gear 15 and the lower gear 21. On the upper face of bevel gear 15 (see Fig. 4) is provided the series of ratchet teeth 22 shown as a ratchet gear. The head 23 of ratchet pawl 12 is formed of the right angular face 24 and the slanting face 25 as indicated in Fig. 1. Upon clockwise turning of the ratchet pawl 12 through an angle of 90 degrees from the position indicated in Fig. 1, the head 23 will allow slippage of the bevel gear 15 when rotated in counter-clockwise direction but upon clockwise direction of bevel gear 15, the stop member 10, and therewith the driving shaft 3 will be driven in clockwise rota-

tion. The lower bevel gear 21 is similarly provided on its lower face with ratchet teeth, similar to ratchet teeth 22, and the head 23 of lower ratchet pin 18 comprises the same right angle face 24 and the slanting face 25. In the position of lower ratchet pawl 18, as shown in Fig. 1, the ratchet arrangement allows slippage of the bevel gear 21 when rotated in counter-clockwise direction, but upon clockwise rotation of bevel gear 21 the lower stop member 16 and therewith the driving shaft 3 will be rotated in clockwise rotation. In the positions of upper ratchet pawl 12 and lower ratchet pawl 18, as thus described, the drill bit 1 will be rotated in clockwise rotation upon movement of the handle 5, irrespective of the direction of movement of the handle 5. If the handle is continuously moved in clockwise rotation the upper bevel gear 15 will be moved in counter-clockwise rotation allowing the ratchet arrangement to produce slippage between bevel gear 15 and upper stop member 10 but the counter-clockwise rotation of lower bevel gear 21 will cause the lower stop member 16 to be rotated therewith and thereby actuate the drill bit 1 in clockwise direction. In similar manner, upon continuous rotation of handle 5 in its counter-clockwise rotation, slippage between the lower bevel gear 21 and its stop member 16 will take place, but the upper bevel gear 15 will cause the upper stop member 10 to rotate in counter-clockwise direction, and driving the drill bit 1 in the same direction. Furthermore, if the handle 5 is reciprocated in either of its two paths of reciprocation, upper bevel gear 15 and lower bevel gear 21 will produce continuous actuation of the drill bit 1 in clockwise direction of rotation. Upon reversing the relative position of the heads 23 of the upper ratchet pawl 12 and the lower ratchet pawl 18, movement of the handle 5, either continuously in clockwise or counter-clockwise rotation or in reciprocatory directions, the drill bit 1 will be actuated in the counter-clockwise direction. It will be noted that each ratchet pawl 12 and similarly each ratchet pawl 18, is provided with the offset 26 whereby any desired ratchet pawl may be raised and held in its disengaging position, namely by turning the ratchet pawl through a slight angle, whereupon the offset 26 will hold each ratchet pawl in its disengaging position. By such arrangement, the drill will be converted to the single stroke type.

The arrangement shown in Fig. 5 corresponds precisely to that shown in Fig. 1 with the exception that the socket wrench 30 is inserted within a suitable tool socket 31 fixed to the end of the driving shaft 3. In the simplified form illustrated, the main gear is held onto the stud 8 by the pin 27, but other suitable fastening means may be provided for such purpose and also for readily compensating for wear of the teeth of the main and secondary gears. If desired, any approved anti-frictional means may be interposed between the main gear 7 and its support. Similarly, anti-friction means may be disposed between the driving shaft and the collar and also the secondary gears. In the above described construction, the strains and stresses encountered by the driving shaft 3 are reduced to a minimum by mounting the main gear on the collar disposed intermediate the secondary driving gears. The provision of the ratchet pawls within the stop members secures a rigid construction, as compared with prior constructions wherein the ratchet pawls are disposed within recesses within the gears themselves. In addition, the present invention results in disposing the manipulating ends of the ratchet pawls to provide free access for setting the same. If desired, the exterior ends of the ratchet pawls may be marked with a proper designation to enable the operator to readily set the same for securing either counter-clockwise or clockwise actuation of the tool. Also, if desired, the grip member 4 may be replaced by the usual pressure point for use in connection with a yoke, as will be understood by those skilled in the art. It will be further noted that the various driving and mounting parts of my ratchet tool are of individually rigid parts and are readily assembled and positioned on the driving shaft.

Whereas I have illustrated my invention by reference to specific forms thereof, it will be understood that many changes and modifications may be made without departing from the spirit of my invention.

What I claim and desire to secure by Letters Patent is:—

1. In a drill, the combination with a driving shaft, of oppositely disposed stop members fixed to said shaft, a main gear, secondary gears meshing with said main gear and respectively positioned adjacent each said stop member, a series of ratchet teeth disposed on the face of each secondary gear and directed toward its corresponding stop member, each said stop member being provided with an opening, and pawls in said openings coöperating respectively with said ratchet teeth.

2. In a drill, the combination with a driving shaft, of oppositely disposed stop members fixed to said shaft, a main gear, secondary gears meshing with said main gear and respectively positioned adjacent each said stop member, a series of ratchet teeth disposed on the face of each secondary gear and directed toward its corresponding stop member, each said stop member being provided with an opening, and pawls in said openings coöperating respectively with said

ratchet teeth, said pawls having ends adapted to be manipulated and extending exteriorly of said respective openings.

3. In a drill, the combination with a vertical driving shaft, of oppositely disposed circular stop members, a vertical main gear, horizontal secondary gears meshing with said main gear and positioned respectively adjacent said stop members, each said secondary gears having a horizontal series of ratchet teeth, vertical openings in said stop members and vertical pawls having manipulatable ends extending freely exteriorly of said openings, said pawls coöperating respectively with said series of ratchet teeth.

4. In a drill, the combination with a driving shaft, of a main gear, secondary gears meshing with said main gear, said secondary gears being disposed opposite to one another, members fixed to said shaft for maintaining the position of said secondary gears relative to said shaft, a series of ratchet teeth on said secondary gears, said members having openings therethrough and extending respectively toward said series of ratchet teeth, pawls in said openings coöperating respectively with said series of ratchet teeth and means extending exteriorly of said members for setting said pawls.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EMIL RENDANO.

Witnesses:
HENRY J. LUCKE,
S. M. BAEDER.

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