

No. 822,391.

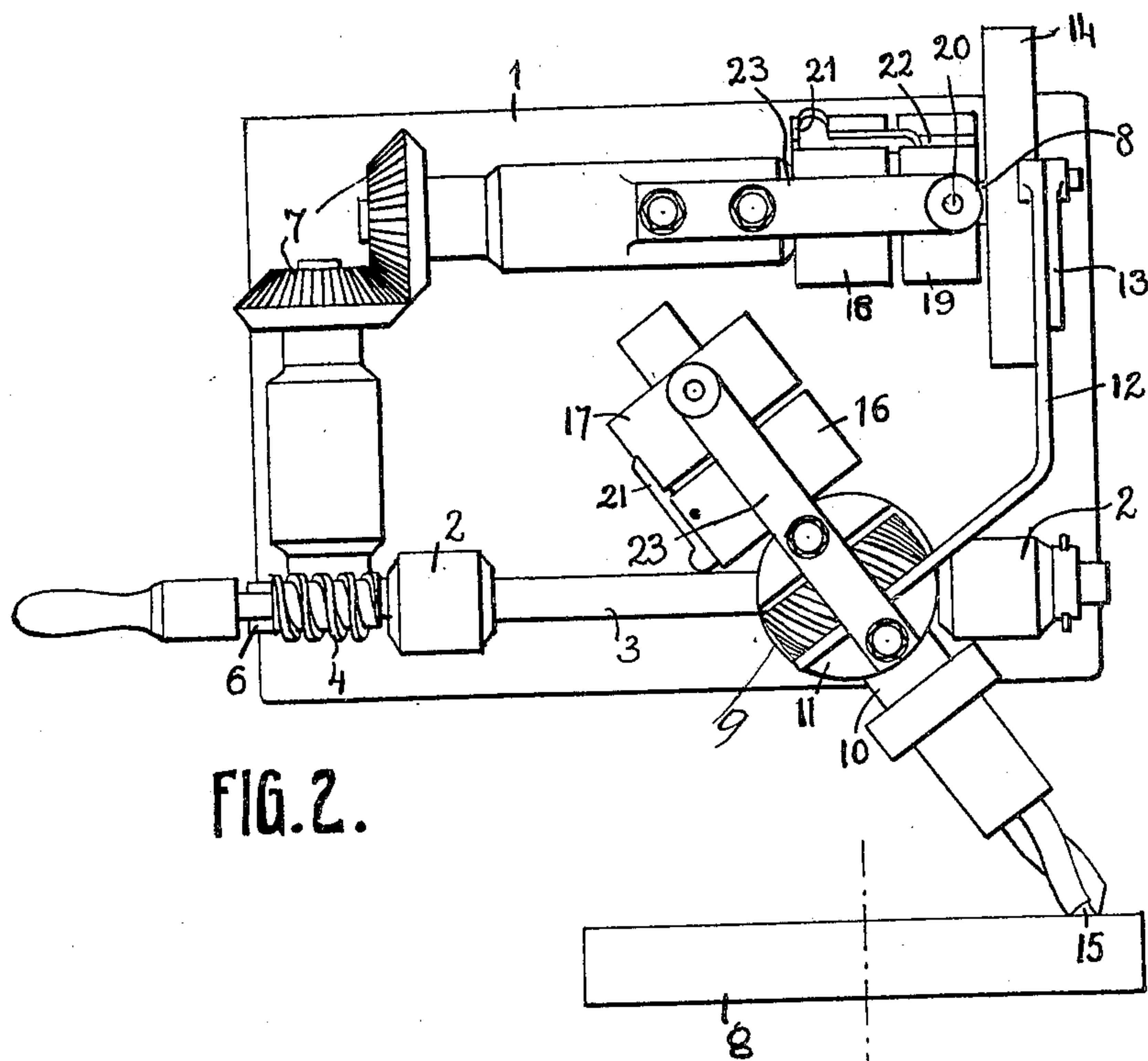
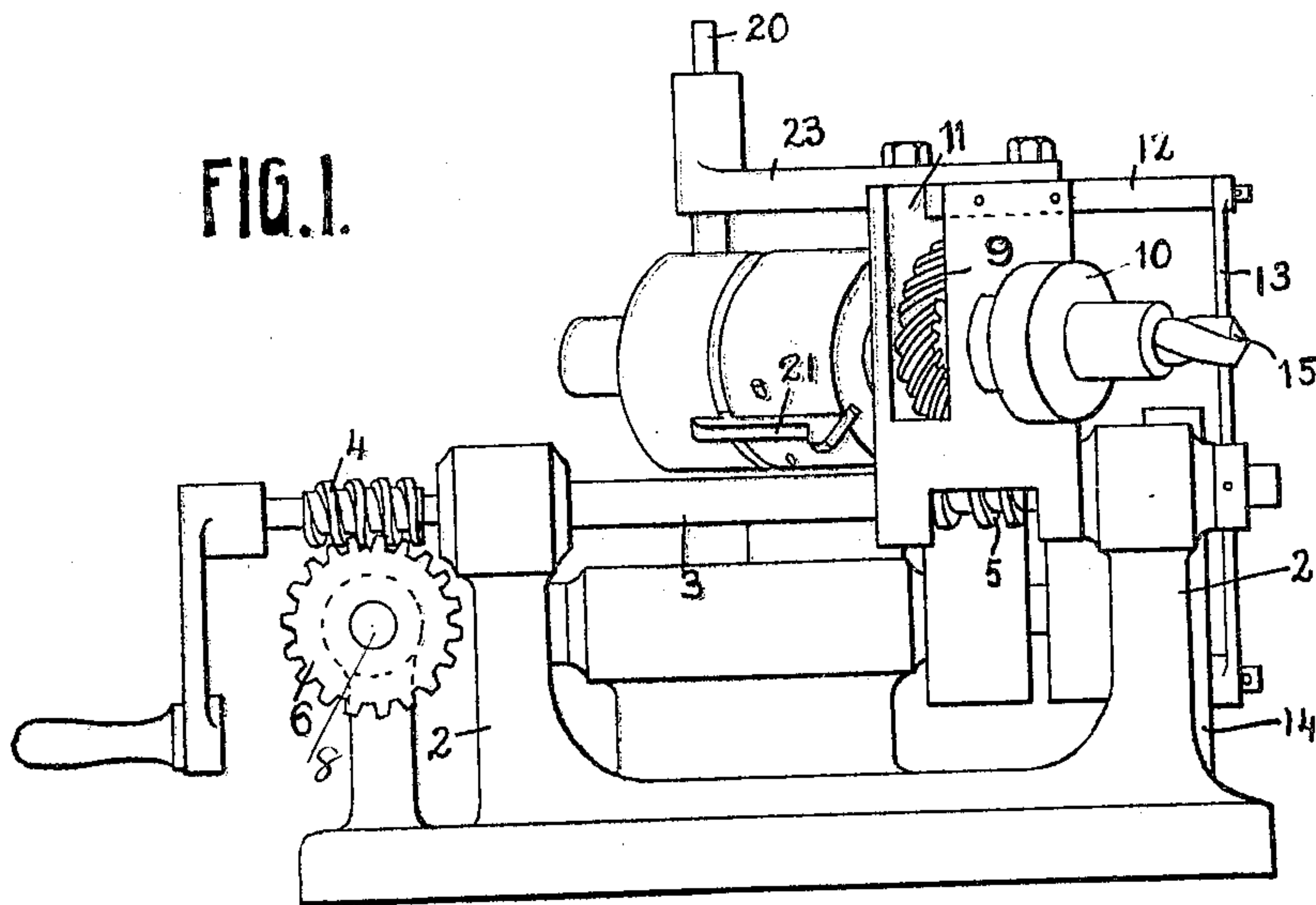
PATENTED JUNE 5, 1906.

F. SCHMALTZ.

APPARATUS FOR GRINDING DRILLS, BORERS, AND LIKE TOOLS.

APPLICATION FILED AUG. 11, 1903.

2 SHEETS—SHEET 1.



Witnesses.

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Inventor

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FIG. 3.

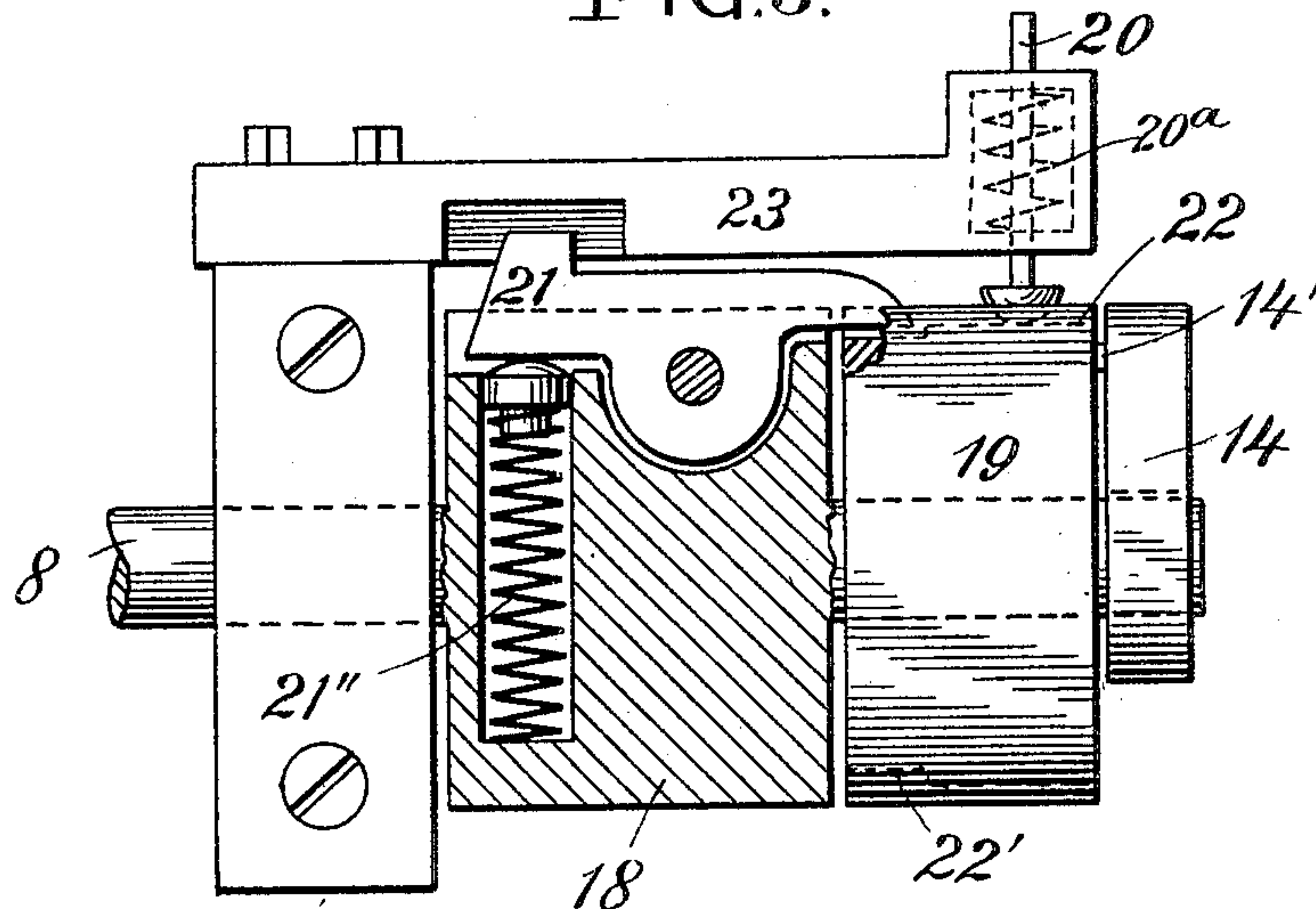


FIG. 4.

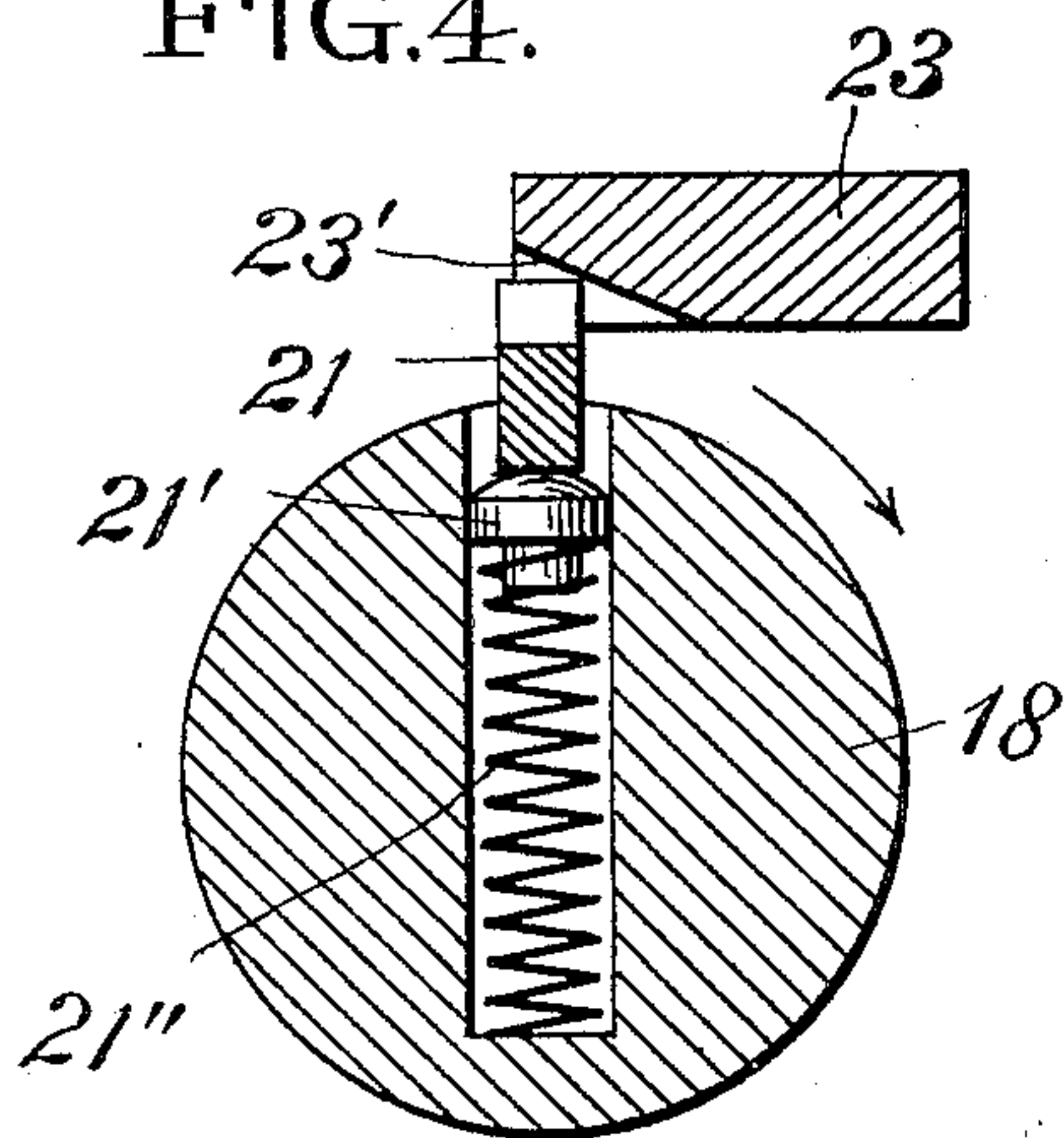


FIG. 5.

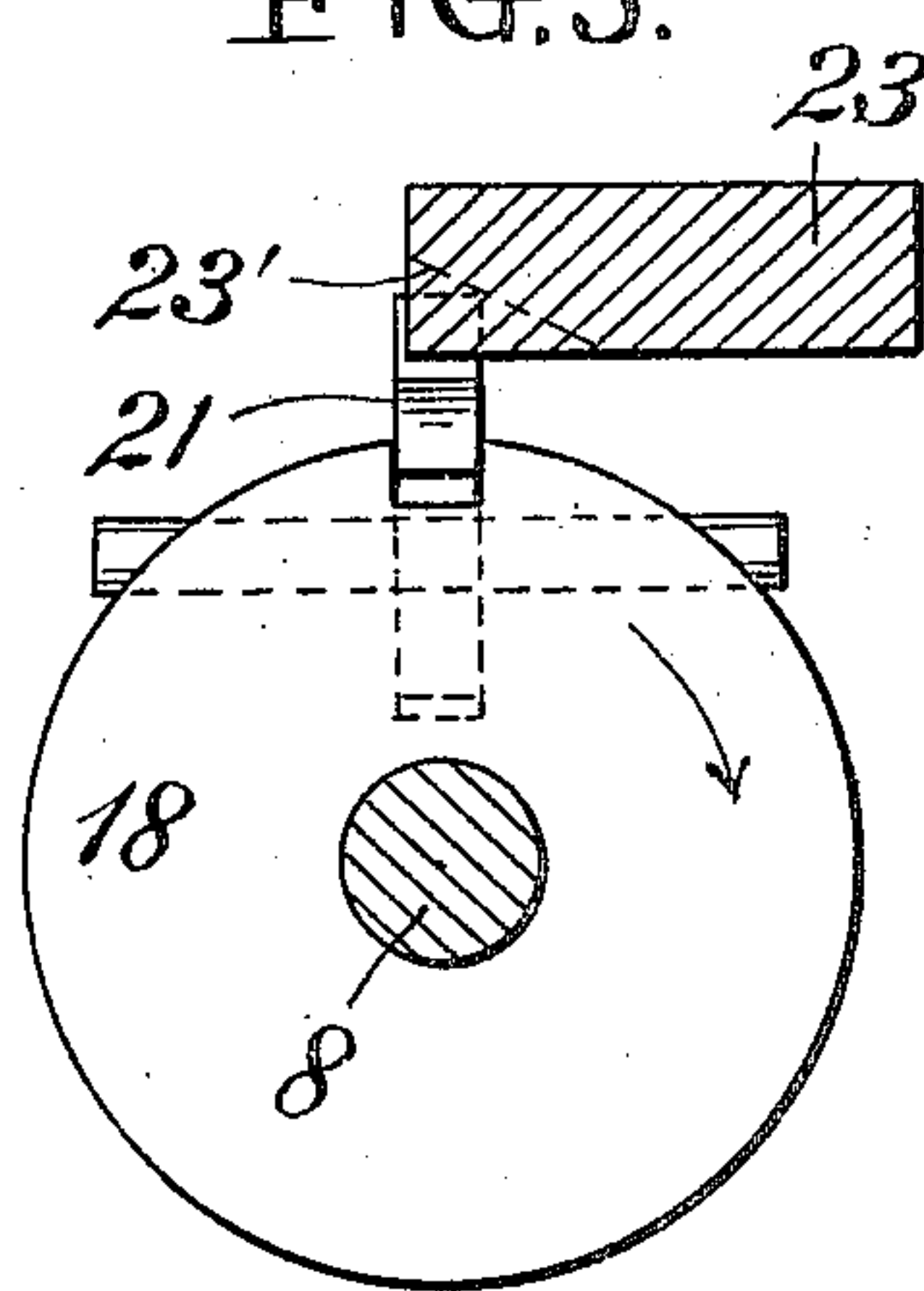
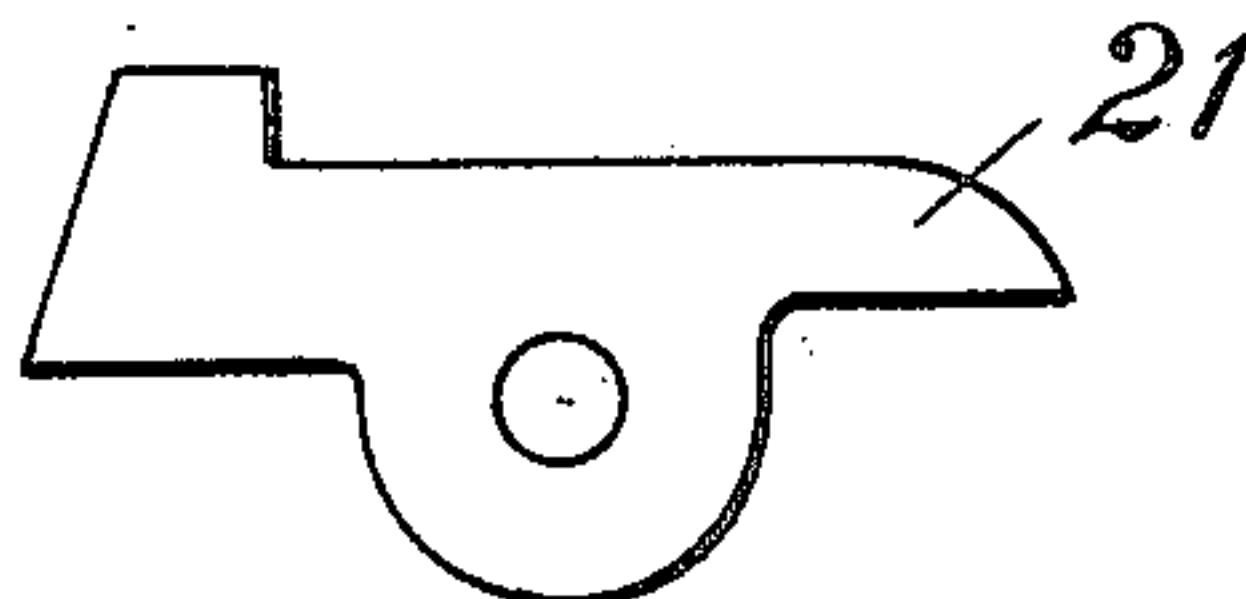


FIG. 6.



Witnesses
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UNITED STATES PATENT OFFICE.

FRIEDRICH SCHMALTZ, OF OFFENBACH-ON-THE-MAIN, GERMANY.

APPARATUS FOR GRINDING DRILLS, BORERS, AND LIKE TOOLS.

No. 822,391.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed August 11, 1903. Serial No. 169,118.

To all whom it may concern:

Be it known that I, FRIEDRICH SCHMALTZ, a subject of the German Emperor, and a resident of Mühlweg, Offenbach-on-the-Main, in the Empire of Germany, manufacturer, whose post-office address is Mühlweg, aforesaid, have invented certain new and useful Improvements in Apparatus for Grinding Drills, Borers, and Like Tools, for which application has been made in Great Britain, No. 14,582, dated June 30, 1903; in Germany, February 2, 1903; in Belgium, June 27, 1903; in France, June 16, 1903, and in Austria, June 13, 1903.

This invention relates to means for grinding spiral and other borers or drills automatically on all their cutting-surfaces. By this invention the borer or drill (whether spiral or flat) is automatically beveled off to the rear, either on the flat or on the cylindrical surface, and after having been ground on one side is turned through a half-revolution on its own axis, so that now the second cutting-surface is presented to the grinding-disk. The foregoing movements are either continuous or intermittent or are operated by rotating or oscillating means, whereby cutting-surfaces are formed on both sides, which surfaces are bound to be exactly identical.

In the accompanying drawings, Figure 1 is a front view of the grinding means; Fig. 2, a plan view of same. Figs. 3, 4, 5, and 6 are enlarged views and sections of details for more clearly explaining their operation. The parts are reversed in Fig. 3 as compared with Figs. 1 and 2. Figs. 3, 4, 5, and 6 are details of those parts of the machine which, on the one hand, operate the intermittent swinging of the drill-holder and, on the other hand, the intermittent axial rotation of the drill.

In Figs. 1 and 2 the machine-frame 1 carries a shaft 3 in bearings 2. The shaft has two worms 4 and 5, of which 4 operates a shaft 8 by means of worm-wheel 6 and bevel-gears 7, while the worm 5 produces the rotation of the drill-holder 10 by means of worm-wheel 9.

The drill-holder is mounted in a bearing 11, the lower part of which in turn is mounted on the shaft 3, and thus may be turned about the latter. On the upper part of the bearing 11 a lever 12 is mounted. This is carried backward to an oblique angle and connected with a crank-disk 14 by means of a linked connecting-rod 13. By the rotation of this crank-disk 14, which is fixed on

the shaft 8, the bearing 11 may be turned suitably forward and backward upon the shaft 3. The drill-point 15 is thus passed over the grinding-disk *g* alternately forward, downward, and vice versa. In this case the movements take place intermittently. Two pairs of change-wheels are provided each consisting of two parts, one of which, 16 or 18, as the case may be, is fixed on the shaft, while one of the other pair, 17 or 19, as the case may be, is loose and is always retained during each half-revolution by spring-pin 20 until the catch 21 drops into the slot 22 and carries it forward. The catch 21 is then released after one revolution by its free end encountering the bridge 23, and thereby being depressed behind, but raised in front out of the slot 22. In consequence of this arrangement while the shaft continually rotates, the drill is first deflected from above downward by the lever 12, and thereby one cutting edge ground. The drill then remains in its position, but is turned on its own axis one hundred and eighty degrees by the wheels 16 and 17 and is then moved back in an arc from beneath upward, and thus the other cutting edge is ground. It then again remains stationary and is again in turn turned one hundred and eighty degrees, and the same operation is repeated until the drill is finished grinding.

An arrangement may also be adopted by which the axial rotation of the spiral drill takes place during the grinding, the throwing into and out of action of the change-couplings being suitably regulated.

Figs. 3, 4, 5, and 6 will now be described to explain some parts not clear in Figs. 1 and 2. The shaft 8 when rotating propels the pulley 18 with it continuously. The pawl 21, pivoted to the pulley 18, catches the loose pulley 19, which rotates until the pawl is tripped by the bevel-surface 23' on the support 23. The pawl continues to slide over the pulley 19 until it falls into the next notch 22' after it has been tripped and released from the first notch 22. The pin 20 by the action of the spring 20^a holds the pulley 19 during the time that the pawl 21 passes from one notch 22 to the next notch 22'. The pulley 19' is also loose on the shaft 8, but is connected to the pulley 19 by the pin 14'. Therefore the pulley 14 is intermittently rotated a half-rotation at a time. The spring 21'', having the button 21', maintains the pawl 21 against the pulley 19.

I declare that what I claim is—

1. In an apparatus for grinding identical cutting-surfaces in borers, drills and similar tools, means for automatically, and simultaneously rotating a borer on its own axis, and means for swinging it on an axis crossing its own axis in such a way that both cutting edges are alternately passed over the grinding-disk and ground uninterruptedly, the axis of the drill-holder being transverse to the axis of said grinding-disk.

2. In an apparatus for grinding identical cutting-surfaces on borers, drills and similar tools, a rotating disk having a grinding-surface, means for automatically passing the tool over said grinding-surface backward and then forward in the arc of a circle with a rest at each end of the arc, in combination with devices for automatically rotating the tool through a definite fraction of a circle when its axis is stationary at the point intermediate between its stopping and again starting its travel in the arc, and mechanism for automatically causing said motions to alternate with each other and a tool-holder for the tool, with its axis transverse to the axis of said disk.

3. In an apparatus for grinding identical cutting-surfaces on borers, drills and similar tools, a constantly-rotating grinding-surface, means for automatically passing the tool over said grinding-surface backward and then forward in the arc of a circle with a rest at each end of the arc, in combination with devices for automatically rotating the tool through a definite fraction of a circle when stationary at the point intermediate between its stopping and again starting its travel in the arc, and mechanism for causing said arcuate and rotary motions to automatically alternate with each other said mechanism for the former motion consisting of a crank and connecting-rod, and the mechanism for the crank motion being a duplicate in construction of that for the rotary motions of the tool.

4. In an apparatus for grinding identical surfaces on borers, drills and similar tools a drill-holder, means for intermittently rotating said holder in one direction, a carrier supporting said holder, a pivot for said carrier, devices for oscillating said carrier about said pivot, whereby the tool describes an arc of a circle both backward and forward, and mechanism for causing said intermittent rotary and said oscillating motions to alternate with each other, all of said motions being

performed automatically said means consisting of fixed and loose pulleys, a clutch between the pulleys, the drill-holder rotating when the loose pulley is clutched to the fixed pulley, and a device for rotating the fixed pulley continuously.

5. In an apparatus for grinding identical surfaces on borers, drills and similar tools, a drill-holder, means for intermittently rotating said holder in one direction, a carrier supporting said holder, a pivot for said carrier, the axis of said pivot lying in a different plane from the axis of said holder, devices for oscillating said carrier about said pivot, whereby the tool describes the arc of a circle both backward and forward, and mechanism for causing said intermittent rotary and said oscillating motions to alternate with each other, all of said motions being automatic and a rotating grinding-disk, the axes of said disk of said drill-holder, and of said pivot intersecting substantially the same straight line at right angles in one of the phases of the drill-holder.

6. In an apparatus for grinding identical cutting-surfaces on borers, drills and similar tools, means for intermittently rotating a borer on its own axis, devices for oscillating said borer on an axis crossing its own axis, and mechanism for causing said oscillatory and rotary motions to automatically alternate with each other a holder for the borer, said devices consisting of a crank and connecting-rod between said crank and said holder, a rotating pulley, a loose pulley connected rigidly to the crank, a catch connecting the loose and fixed pulley, and a stop for lifting the catch from the loose pulley, and a pin for holding the loose pulley.

7. In an apparatus for grinding identical cutting-surfaces on borers, drills and similar tools, a rotating grinding-disk means for intermittently rotating a borer on its own axis, devices for oscillating said borer on an axis crossing its own axis and the axis of said disk, the two said axes lying in different planes, and mechanism for causing said oscillatory and intermittent rotary motions to automatically alternate with each other.

In witness whereof I have hereunto signed my name, this 15th day of July, 1903, in the presence of two subscribing witnesses.

FRIEDRICH SCHMALTZ.

Witnesses:

JEAN GRUND,
CARL GRUND.