Feb. 13, 1923. 1,445,294

H. P. CAMP

ELECTRIC HAND DRILL

Filed Jan. 3, 1921 3 sheets-sheet 1

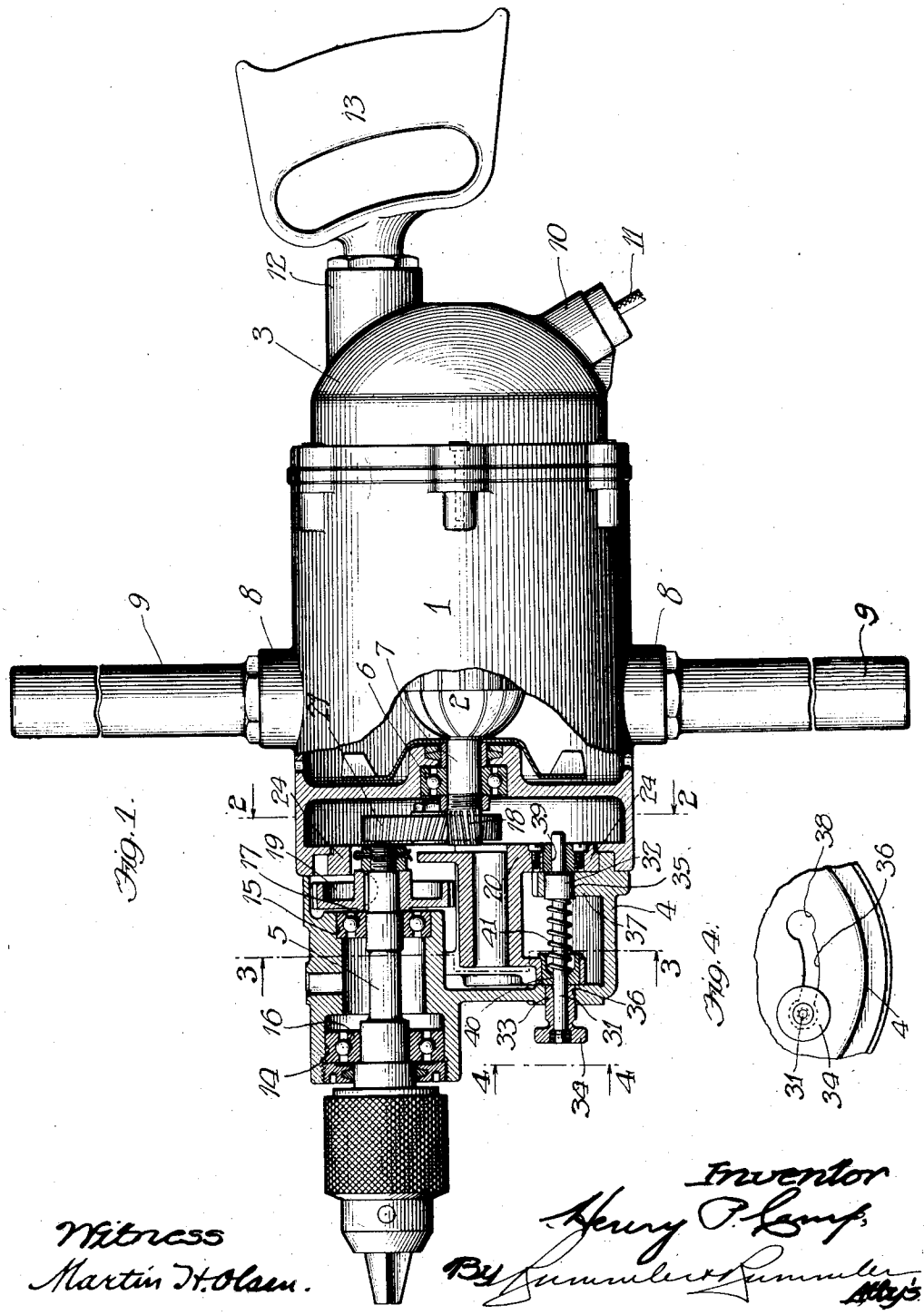


Fig. 1.

Fig. 4.

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Fig. 2.

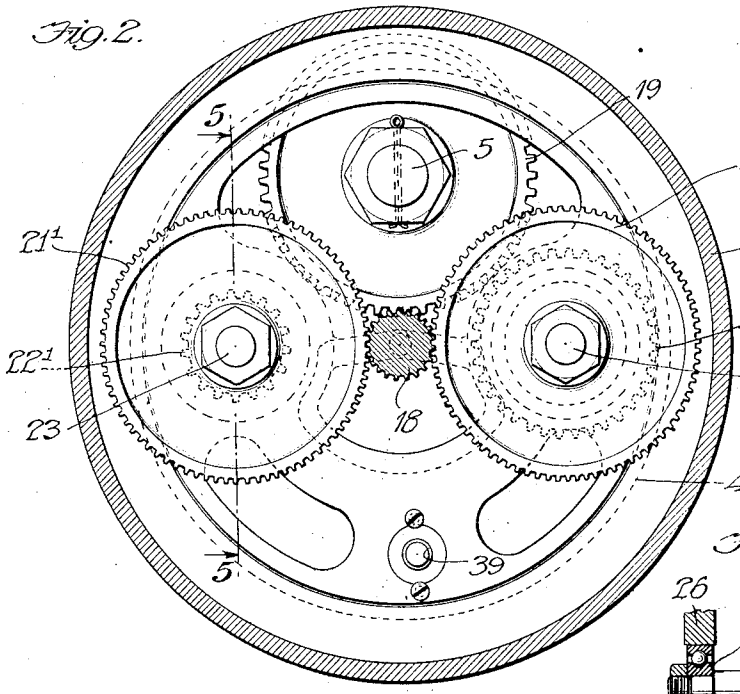


Fig. 5.

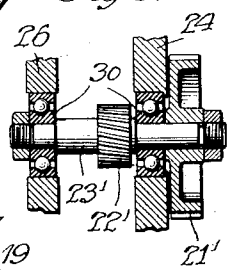
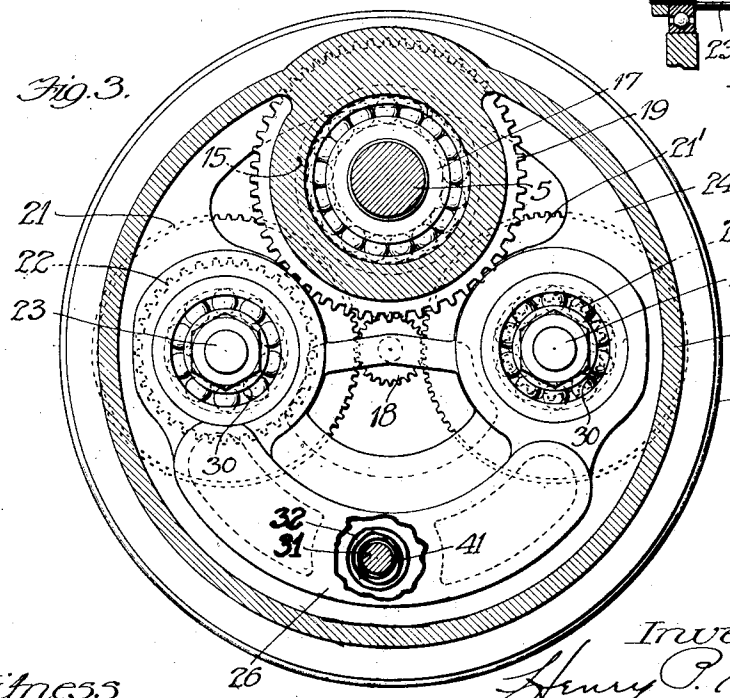


Fig. 3.



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Fig. 7.

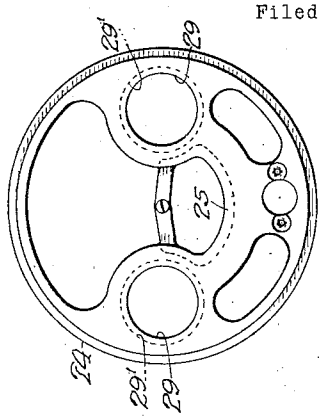


Fig. 10.

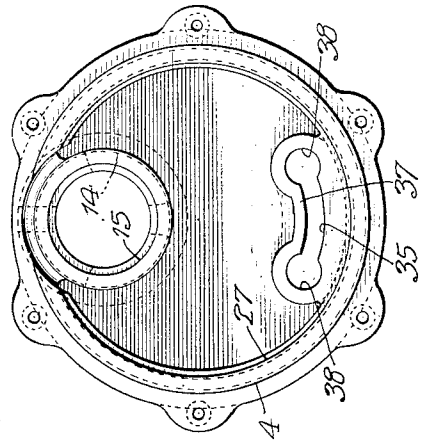


Fig. 6.

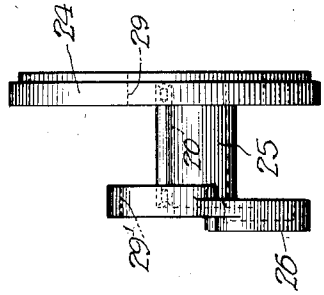


Fig. 9.

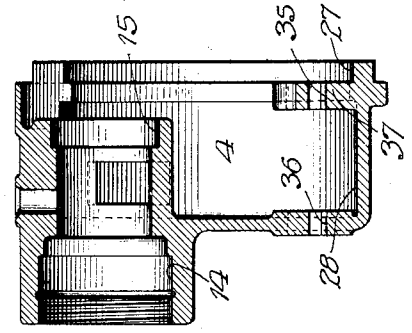
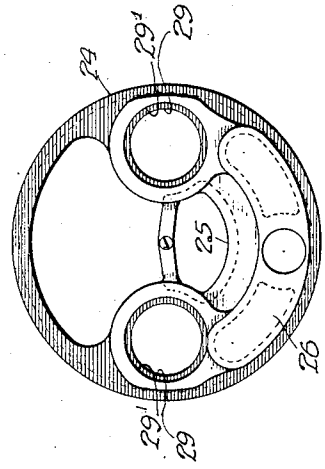


Fig. 8.



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UNITED STATES PATENT OFFICE.

HENRY P. CAMP, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO JONES, MACNEAL AND CAMP, INCORPORATED, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ELECTRIC HAND DRILL.

Application filed January 3, 1921. Serial No. 434,850.

To all whom it may concern:

Be it known that I, HENRY P. CAMP, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Electric Hand Drills, of which the following is a specification.

The main objects of this invention are to provide an improved electric hand drill; to provide an improved construction and arrangement of the gearing by which the motor is operatively connected to the drill chuck; to provide improved shiftable supporting means for said gearing which permits the shifting of the gears for the purpose of varying the relative speed of the drill chuck; and to provide a device of this kind which is simple in construction and easy to handle and operate.

An illustrative embodiment of this invention is shown in the accompanying drawings in which—

Fig. 1 is a side elevation of an electric drill constructed in accordance with this invention, a part of the housing being broken away for the purpose of more clearly illustrating the interior construction.

Fig. 2 is an enlarged transverse sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a similar view taken on the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary detail viewed from the plane of line 4—4 of Fig. 1.

Fig. 5 is a reduced sectional detail taken on the line 5—5 of Fig. 2.

Fig. 6 is a side elevation of the gear-train supporting member which carries the gearing and enables the shifting thereof for the purpose of varying the relative speeds of the drill chuck.

Fig. 7 is a view of the same taken from the right of Fig. 6.

Fig. 8 is a similar view taken from the left of Fig. 6.

Fig. 9 is a sectional detail of the front end cap upon which the drill-chuck spindle and gearing, together with its shifting mechanism, are supported.

Fig. 10 is a view of the same taken from the right of Fig. 9.

In the specific embodiment of the invention herein shown the electric drill housing comprises a main body part 1 within which the motor 2 is journaled, a rear end cap 3 which encloses the motor brushes and rear motor bearing (neither of which is herein shown), and a front end cap 4 within which the drill-chuck spindle 5 and the intermediate gearing (shown in Figs. 2 and 3) are supported and housed. The details of construction of the motor housing and the mounting of the motor therein are more fully described and claimed in my copending application on electric motor housings, Serial No. 434,849, filed January 3, 1921.

The main body part 1 is made up of two sections and supports the bearings 6 (only one of which is shown in the drawings) upon which the shaft 7 of the motor 2 is journaled. At the sides of the body part 1 threaded sockets 8 are provided to which handles 9 are adapted to be secured. The rear end cap 3 is provided with an apertured lug 10 in through which the conductor 11 leads, and a threaded socket 12 to which a suitable handle 13 (or breast plate if desired) is secured.

The front end cap 4 is formed, as will be most clearly observed from Figs. 9 and 10, to provide bearing supports 14 and 15 for the roller bearings 16 and 17 respectively, upon which the drill-chuck spindle 5 is journaled. This end cap is also shaped so that when attached to the end of the main body part 1 it will locate the axis of the drill-chuck spindle 5 in alinement with the axis of the threaded socket 12 on the rear end cap 3 and in the plane of the handles 9. Thus when any pressure is applied, either by means of the handles 9 or the part secured to the socket 12, it is applied in a direct axial direction against the drill-chuck spindle 5.

The gearing by which the motor 2 is operatively connected to the drill-chuck spindle 5, comprises a pinion 18 rigid on the end of the motor shaft 7, a gear 19 keyed to the rear end of the drill-chuck spindle 5, and a plurality of gear trains, the gears of which are adapted to mesh respectively with the pinion 18 and the gear 19, as may be determined by the shifting of the gear-train supporting member 20. Through the shifting of these gear trains the drill-chuck spindle 5 may be connected with the motor 2 so as to be rotated at relatively different speeds, the advantage of which is, of course, perfectly obvious.

The intermediate gearing as herein illustrated comprises two gear trains, each of

which includes a large gear and a smaller gear and a shaft. In the drawings (Figs. 2 and 3) the large gears are numbered 21 and 21′ respectively and the smaller gears are numbered 22 and 22′ respectively, and the shafts upon which they are mounted are numbered 23 and 23′ respectively. The gears 21 and 21′ are of the same diameter and the shafts 23 and 23′ are so journaled with respect to each other and with respect to the motor shaft 7 that the gears 21 and 21′ are always in mesh with the motor shaft pinion 18. The gears 22 and 22′ are of relatively different diameters and are so arranged that one or the other may be shifted into mesh with the gear 19 on the drill-chuck spindle 5.

The gear-train supporting member 20 is most clearly illustrated in Figs. 6, 7 and 8. This member comprises an annulus 24, an axially disposed hub 25 and a part 26 which is practically half of an annulus and is disposed parallel to the annulus 24. The member 20 is preferably a single casting and shaped so that the annulus fits within and is rotatably supported upon the flange 27 of the front end cap 4 and the part 26 fits and bears upon the surface 28 adjacent to the forward end of the front end cap 4. The annulus 24 and part 26 are provided with axially alined roller bearing supports 29 and 29′ within which are supported the roller bearings 30 for journaling the shafts 23 and 23′. The mounting of one of these gear trains is most clearly shown in detail in Fig. 5.

The shifting of the gear-train supporting member 20 is controlled by means of a pin 31 (see Fig. 1). This pin has an enlargement 32 integrally formed thereon and an enlargement 33 integral with the knurled head 34 which is detachably supported upon said pin. Arcuate slots 35 (see Figs. 9 and 10) and 36 (see Fig. 4) are formed in the front end cap 4, the former in a flange part 37 and the latter in the front or end of the cap 4. These slots are formed on an arc the center of which is coincident with the motor shaft 7 and at their ends have enlarged circular recesses 38. Alined with these slots are apertures 39 and 40 arranged in the lower edges of the annulus 24 and the parallel part 26 of the member 20. The arrangement of these slots and apertures is such that the pin 31 under the influence of the spring 41 is normally urged inwardly and seats the enlargements 32 and 33 in the enlarged circular recesses 38 at one or the other ends of the arcuate slots 35 and 36 for the purpose of securing the member 20 in such position that the gear 22 or 22′ meshes with the gear 19. When the pin 31 is retracted by pulling on the knurled head 34 the enlargements 32 and 33 are withdrawn from their respective recesses 38 and the adjacent portions of the pin may move through the slots 35 and 36 to permit the partial rotation of the member 20 to locate the other gear train in operative relation with the gear 19.

This arrangement of gearing is simple and compact and provides quick and easy means for changing gear ratios so as to vary the relative speeds of the drill-chuck spindle 5. The operation of the device is thought to be obvious from the foregoing description and the drawings, and therefore not to require any detailed explanation of the same.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. An electric drill, comprising a housing, a motor journaled therein, a pinion on the motor shaft, a drill-chuck spindle journaled in said housing eccentrically of said motor shaft, a gear-train supporting member in the form of an annulus fitting within said housing so as to rotate therein about said motor shaft as a center and having an axially disposed hub formed thereon which has a part of an annulus, secured thereto in parallel relation with said annulus, a plurality of gear trains arranged on said member each of which includes a shaft and a pair of gears, said shafts being journaled in bearings on said annulus and parallelly disposed part with the gears so arranged thereon that one gear of each pair is constantly in mesh with said motor-shaft pinion, and means for shifting said member so as to locate the other gear of one or another of said pairs in mesh with said drill-chuck spindle gear, said other gears being of relatively different pitch diameters whereby said drill-chuck spindle may be driven at relatively different speeds by said motor.

2. An electric drill, comprising a housing, a motor journaled therein, a pinion on the motor shaft, a drill-chuck spindle journaled in said housing eccentrically of said motor shaft, a gear-train supporting member in the form of an annulus fitting within said housing so as to rotate therein about said motor shaft as a center and having an axially disposed hub formed thereon which has a part of an annulus secured thereto in parallel relation with said annulus, a plurality of gear trains arranged on said member each of which includes a shaft and a pair of gears, said shafts being journaled in bearings on said annulus and parallelly disposed part with the gears so arranged thereon that one gear of each pair is constantly in mesh with said motor-shaft pinion, means for shifting said member so as to locate the other gear

of one or another of said pairs in mesh with said drill-chuck spindle gear, said other gears being of relatively different pitch diameters whereby said drill-chuck spindle may be driven at relatively different speeds by said motor, said gear-train supporting member having alined apertures formed in said annulus and the parallelly disposed part, said housing having arcuate slots formed therein one adjacent to said annulus and the other adjacent to the parallelly disposed part of said member, said slots being alined with the apertures in said member and having the center about which they are formed coincident with the center of said motor and having the ends thereof enlarged, a pin extending from the outside of said housing through said housing apertures and slots, said pin having reduced portions of substantially the same size as the width of said slots and having enlarged portions of substantially the same size as the enlarged ends of said slots, and a spring normally urging said pin so as to seat said enlarged parts in the enlarged ends of said slots but permit the retraction of said enlarged parts so as to permit the movement of said reduced portions through said slots when said member is to be rotated for changing the gear relations.

Signed at Chicago this 31st day of Dec., 1920.

HENRY P. CAMP.