C. A. HERMAN.

BALL BEARING HANDPIECE FOR TOOLS.

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1,380,716.

Patented June 7, 1921.

Fig. 1

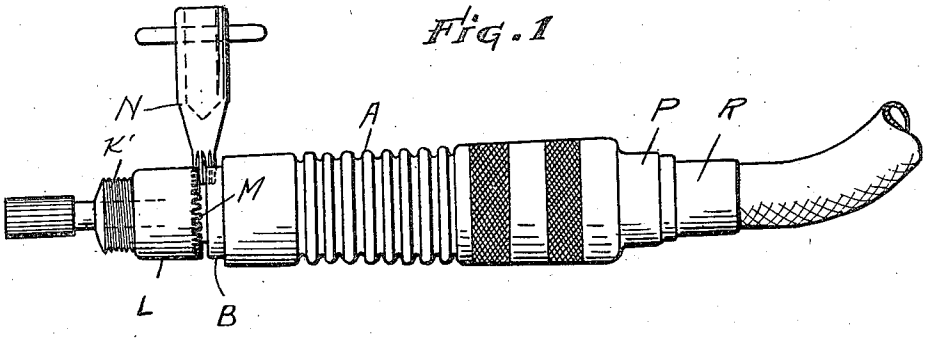


Fig. 2

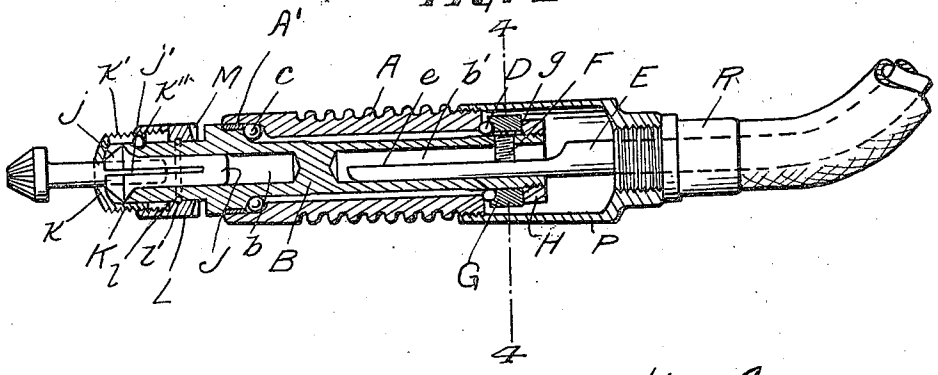


Fig. 4.

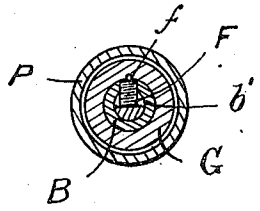
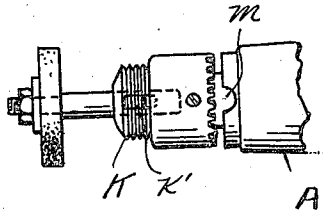


Fig. 3.



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CLAUDE A. HERMAN, OF BRIDGEPORT, CONNECTICUT.

BALL-BEARING HANDPIECE FOR TOOLS.

1,380,716. Specification of Letters Patent. Patented June 7, 1921.

Application filed June 7, 1920. Serial No. 387,113.

To all whom it may concern:

Be it known that I, CLAUDE A. HERMAN, a citizen of the United States, and resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Ball-Bearing Handpieces for Tools, of which the following is a specification.

The object of this invention is to provide an arrangement whereby drills, burs, grinding wheels and like devices can be operated by a flexible shaft connection from suitable power, such as an electric motor, to permit convenient manipulation and interchange of the various devices mentioned.

More specifically the novelty resides in a handpiece having a socket for the reception of a tool adapted to be driven by a flexible shaft connection with a motor the socket being provided with means for releasing the tool, the entire arrangement being within a casing formed with a hand gripping surface.

Reference will be had to the accompanying drawings, forming a part of this specification and wherein like reference characters designate corresponding parts throughout the several views, in which,—

Figure 1 is a side elevation of the assembled device showing the key in position for operation of the chuck or socket.

Fig. 2 is a vertical section of the device showing the flexible connection and a tool in position.

Fig. 3 is a fragmentary elevation showing a grinding tool in the socket, and

Fig. 4 is a transverse section on line 4—4 of Fig. 2.

Referring now to Figs. 1 and 2 a cylindrical casing is provided having corrugated or fluted outer surface, indicated by reference character A and in which is arranged the stem B— mounted in ball bearings C— and D— to facilitate rapid rotation. This stem B— is provided with axial sockets *b*— and *b'*— which project inwardly from each end a sufficient distance to permit the reception of the tool gripping element and the flexible driving connection as will more clearly hereinafter appear.

Referring now to the connection between the driving cable E— and the driven stem B— it will be seen that the end of the cable that projects into the socket *b'*— is provided with a flattened face *e*— against which the set screw F— engages. By reference to Figs. 2 and 4 it will be seen that this screw F— which extends through the wall of the stem is formed with the key or rib *f*— in place of the usual head and this rib or key *f*— is adapted to project above the outer surface of the stem through which it extends for engagement with a ball race collar G—. This collar G— has formed therein the internal groove *g*— in which the rib or key *f* is seated for engagement and it will be seen that by this arrangement when the screw is driven home and the ball race collar G— is in position there is no possibility of the same working loose due to the excessive vibrations caused by the rapid rotation of the parts. A nut H threadedly attached to the stem B serves to hold the ball race collar G against the longitudinal movement on the stem.

The axial socket *b*— receives the tool gripping sleeve or clutch J— which comprises the shank and the forward conical end *j*— and a plurality of longitudinal slits *j'*— forming clutch pieces between the slits. An externally threaded sleeve K— having inwardly projecting annular flange *k*— is shown for engagement with the conical end *j*— of the clutch J. This sleeve K is formed with the longitudinal slot *k'* in which travels the ball or pin *k''*, the latter being seated in fixed position in a recess formed in the stem B. It will be seen that by this arrangement the sleeve is permitted a longitudinal movement with relation to the axis of the stem whereby the flange *k*— engages and contracts the spring clutch pieces heretofore mentioned to cause their engagement with a tool shank that may be inserted therein. For causing the longitudinal movement of this sleeve K an external sleeve L— having internal screw threads for engagement with the external threads on the sleeve K, is provided. This latter sleeve L— is arranged between the internal sleeve and the gripping casing and is formed at its inner end with the inwardly projecting shoulder *l* which contacts with the external surface of the stem. To prevent the longitudinal movement of this sleeve L— and to permit the rotation of the same an annular key is provided which seats in corresponding grooves in the contacting faces of the said sleeve L and the stem B—. This annular key, indicated by the reference character *l'*— may be of any desired form as for instance a wire ring or a plurality of

balls. The end face of the inner end of the sleeve L— is formed with gear teeth M— for engagement with the teeth carried by a suitable key N— whereby this sleeve can be readily rotated to cause the longitudinal movement of the internal sleeve and the consequent operation of the clutch pieces. It will be seen that a portion of the stem has been cut away at *m*— to facilitate the insertion of the key.

A casing P— connects the gripping member A— and the cable shield R— protects the parts and prevents the rotation of the handle A. The felt bushing A′ fitted between the end portion of the member A and the shoulder on the stem B serves to keep the dust out of the bearing.

It will be seen from the foregoing description that a neat and compact handpiece is provided whereby, without the necessity of complicated construction, a direct driving connection is obtained between a flexible driving shaft and a tool, and in which the cable terminal is firmly fixed and the tool is securely gripped and easily released from its socket.

Particular attention is called to the fact that the construction provided by this invention enables the use of numerous grinding and cutting tools such as are necessary in finishing and repair work.

What I claim as new and useful and desire to secure by Letters Patent, is:—

1. A handpiece comprising a casing, a stem formed with sockets in each end and being arranged to rotate in said casing, means for rotating said stem, means for fastening said stem rotating means in one of said sockets, a clutch carried by the other socket, and means for operating said clutch, said clutch operating means including an externally threaded sleeve having a slot, a ball adapted to travel in said slot, and means for causing longitudinal movement of said sleeve.

2. A handpiece comprising a casing, a stem formed with sockets in each end and arranged to rotate in said casing, driving means for said stem including a flexible drive shaft, and means for securing one end of said drive shaft in one of said sockets comprising a set screw formed with a rib at one end, a ball race collar formed with an internal groove for engaging said rib, and means for holding said collar in position.

3. A handpiece comprising a casing, a stem formed with sockets arranged to rotate in said casing, driving means engaging one of said sockets, a clutch seated in another of said sockets, and means for operating said clutch comprising a reciprocating sleeve having an annular flange in engagement with the outer wall of said clutch, and means for reciprocating said clutch operating means including a rotatable ring having gear teeth at one end.

4. A handpiece comprising a cylindrical casing, a rotatable stem mounted axially in said casing and being formed with axial sockets in each end, a driving shaft having its end secured within one of said sockets, a tool clutch arranged in the other of said sockets and comprising a plurality of expansible jaws, means for expanding and contracting said jaws comprising a reciprocating sleeve having an internal annular flange engaging the outer faces of said jaws and being provided with external screw threads at one end, and means for reciprocating said sleeve comprising a rotatable ring having internal screw threads in engagement with the external threads on said sleeve, means for preventing the longitudinal movement of said ring, and means for rotating said ring.

5. A handpiece comprising a casing having a rotatable stem arranged therein and being formed with axial sockets in each end, driving means locked in one of the sockets, a tool clutch arranged in the other of said sockets, means for operating said tool clutch comprising a sleeve adapted to reciprocate on said stem, means seated in the outer face of said stem to prevent the rotation of said sleeve, means for reciprocating said sleeve, and means connecting said last mentioned means and the stem to prevent the longitudinal movement of the said last mentioned means.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut, this 2nd day of June, A. D., 1920.

CLAUDE A. HERMAN.

Witnesses:
C. M. NEWMAN,
LILLIAN M. ALLING.