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STRIKING AND BORING MECHANISM

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My invention relates to the class of mechanism that is embodied in tools for carving, boring and other purposes wherein either a percussive bit or a rotary boring bit may be used.

A prime object of my invention is to provide a portable tool that may be used to apply a rapid succession of blows to a percussive bit or continuous rotary movement to a boring bit or the like.

A further object is to provide self-contained means for disengaging the said percussive element and engaging the rotary element and vice versa.

Another object is to provide a novel face-member for the hammer element of said tool and a complementary element provided on the tang ends of the percussive bits.

A still further object is to provide a socket within said hammer to accommodate said boring-bits.

A further object is to provide external means for changing from either of said movements to the other, so as to effect the change without having to interchange any parts of the tool proper.

Another object is to provide anti-friction elements at both sides of the cam elements of the said tool.

Another object is to provide a longitudinally-shifting change-motion member and actuating means therefor.

Other objects are to simplify the construction, provide a dual-purpose tool having no interior interchangeable parts to become lost or mislaid, together with other objects and advantages that will hereinafter appear and be particularly pointed out in the annexed claim.

Referring to the accompanying drawings:

Figure 1 is an elevation of a tool embodying my invention.

Fig. 2 is a central longitudinal sectional view.

Fig. 3 is a detached elevational view of the change-motion member.

Fig. 4 is an end view of the clutch-journal.

Fig. 5 is an end view of the driven cam.

Fig. 6 is a top view of the tang end of a percussive bit.

Fig. 7 shows the face of my hammer.

Similar reference figures refer to similar parts throughout the different views.

Referring in detail to the drawings; the numeral 1 denotes the cylindrical casing of the tool which also forms the take-hold for the operator. Screwthreaded to the said casing at the upper end is the bearing 2, said bearing journaling the shaft 3 at the points 4—4 and being provided with the ample oil-retaining element 5, and having the inwardly-projecting annular portion 6 upon which is pressed the inner member 7 of an anti-friction element, the outer member 8 thereof being free for rotation against the abutting surface of the driving cam 9.

Suitably conformed to co-operate as a supplemental member to the cam 9 is the driven cam 10, both of which are ground so as to be a nice fit within the upper end of said casing 1.

The cam 10 is rigidly secured to the shaft 11, the cam 9 being secured to the shaft 3. The shaft 11 is preferably of round section on the body thereof but it is of square section from the lower part 11a thereof, which extends through the rotary clutch-member 15 and on down to the hammer member 12 which is secured thereto, preferably by screwthreading; the said member being adapted to function as a hammer when reciprocated and as a bit-stock when rotated.

Surrounding the said hammer and with internal room for either the revolution or reciprocation thereof is the extension 13 which is adapted to hold bits in alinement when in operation, the lower portion of said extension being provided with the slot 21 which is crimped together at the points 22—22 so as to hold the bits against falling out, said points being suitably counterbored at 23 to facilitate the insertion of the bits.

The inner end of the extension 13 being provided with the internally-threaded coupling portion 24 which screws on tight against the lower end of the casing 1, thereby forming the seat 25 for the lower face of the clutch-member 15 (well shown in Fig. 10) to work against when rotating in the recess 14 that is counterbored in the lower end of the casing 1.

Nicely fitted within the body of the casing 1 is the change-motion member 16 which is provided with the clutch members 17—17.
that are adapted to co-operate with the complementary members 18–18 on the rotary clutch-members 15.—well shown in Figs. 3 and 4 respectively. Said member 16 being adapted for longitudinal movement for a certain predetermined length of stroke, (for a purpose to be explained) and furnished on the upper end with anti-friction means as 19 for the purpose of reducing friction between said member 16 and the contacting surface 20 of the driven cam 10 when said member is traversed to the right for the full distance by reversing the cranks 26–26 by means of the thumbs-nuts 27–27.

Disposed around the shaft 11–11p, between the clutch member 15 and the side 20 of the cam 10, and in the annular space between said shaft and the inner wall of the member 16 is the coil spring 28 which is inserted under considerable compression. The said casing is provided with the oiling means 29 and the bearing 2, with oiling means 30.

The member 16 is not turnable within the casing 1, being locked against rotation by the presence of the cranks 26 in the slots 26p, as is well shown in Figs. 2 and 3. The square shaft-portion 11p is adapted for free endwise movement in the clutch member 15, as shown in Fig. 4.

An important feature of the present invention is the novel construction of my hammer face taken in conjunction with its counterpart on the upper ends of my percussive bits, as follows:

As shown in Fig. 6 a half-round head 34 is raised on the outer circumference of the said bit, having a complementary groove 32 sunk in the face of the hammer, Fig. 7. Said hammer is further provided with the central hole 31 having therein one flat side 33.

Preparatory to the use of the tool it is assumed that the requisite amount of suitable lubricant has been inserted into the tool by the removal and return of the respective screws 29 and 30, thus providing for the continuous lubrication of all the working parts of said tool so as to reduce the co-efficient of friction which would otherwise be high in a tool of this character, particularly so with relation to the working faces of the cams 9 and 10 which in the present instance run in oil.

Assuming now that a percussive bit as 33 has been forced into the extension 13 through the counterbored opening 23 which yields sufficiently to admit said bit and yet grips it with sufficient tightness to hold from falling out; and assuming that suitable rotative power is present to revolve the shaft 3 by attachment thereto at the eye 3p and in a clockwise direction; then, with the parts arranged as shown in Fig. 2 the rapid rotation of the shaft 3 will drive the cam 9 against the cam 10 in such a manner as to apply a gliding forward movement to the shaft 11–11p alternated with sudden impulses when the steeper cam-inclines as 9 and 10 come in contact during the course of revolution.

In this position, with the member 16 engaging the rotary clutch-member 15 the latter is held against rotation whilst the spring 28 exerts a strong expansive pressure between the upper surface of the member 15 and the lower surface 20 of the cam 10. Unable to rotate, the shaft 11–11p reciprocates rapidly, being driven in one direction by the cam 10 and in the other by the spring 28, for, inasmuch as the said square portion 11p cannot turn in its counterpart square hole in the member 15 said shaft is compelled to move in the manner described which causes the hammer 12 to beat with great rapidity on the head of the drill bit, Fig. 6. Ordinarily, drill-heads to be hammered on have convex surfaces, but in the present case, having the hole 31 in the center of my hammer face which has to be protected from being marred or distorted from its true shape I have provided the aforesaid head 34 on the said drill-head and the groove 32 on said hammer face which now function so that the wear comes on these parts alone as the central portion of the drill-head 34 does not come in contact with the hammer, a construction which preserves the heads of the bits and saves the said hole intact.

Now, with the tool in operation as a percussive instrument I find that it is unnecessary to have means incorporated therein for regulating the strength of the blows delivered as my spring 28 is adjusted to throw the hammer 12 up instantly and the force with which the drill strikes is in proportion to the distance the tool is held away from the work.

Assuming now that it is desirable to exchange the percussive drill for a rotary boring bit, all that it requires is to pull the present drill out of the tool and insert a boring bit having a flat on the tang thereof corresponding to the flat 35 in the hammer 12, and then turn the thumbs-nuts 27 through a half circle. This has the effect of throwing the member 16 out of engagement with the member 15 which is now free for revolution, and also throws the anti-friction means 19 in contact with the under surface 20 of the cam 10 thereby locking both cam members 9 and 10 together so that they turn as one, in unison with the the member 15, from which it is clear that the change has been made from percussive to rotary actuation without any dismemberment of the tool per se or any interchange of parts thereof.

I do not confine myself to the exact details of construction of my tool as specifically described herein, it being but one embodiment of the same that my invention may present in practice, it is to be understood that the
The invention may be modified and embodied in various other forms without departing from the spirit thereof, or the scope of the appended claim.

I claim:

In a tool of the class specified, a casing, a driving cam within the casing, an internal shaft concentrically disposed within the casing, said shaft carrying a complementary cam at the upper end thereof and a hammer bit-stock at the lower end, means to yieldingly keep the cams in contact, a revoluble clutch member journaled in the casing with an axial perforation therethru and being adapted to center the lower portion of said shaft, said shaft being unturnable in the perforation, but free for axial displacement, clutch means on said clutch member a non-revoluble axially-displaceable change-motion member within the casing adapted to contact either with the complementary cam or the clutch member, complemental clutch means carried by said change member and adapted to arrest the revoluble movement of said clutch member when engaged therewith, and an anti-friction means adapted to reduce the co-efficient of friction between said change member and the complementary cam afore-said. 

In testimony whereof I have hereunto set my hand this 29th day of June, 1927.

GEORGE MAEHREN.