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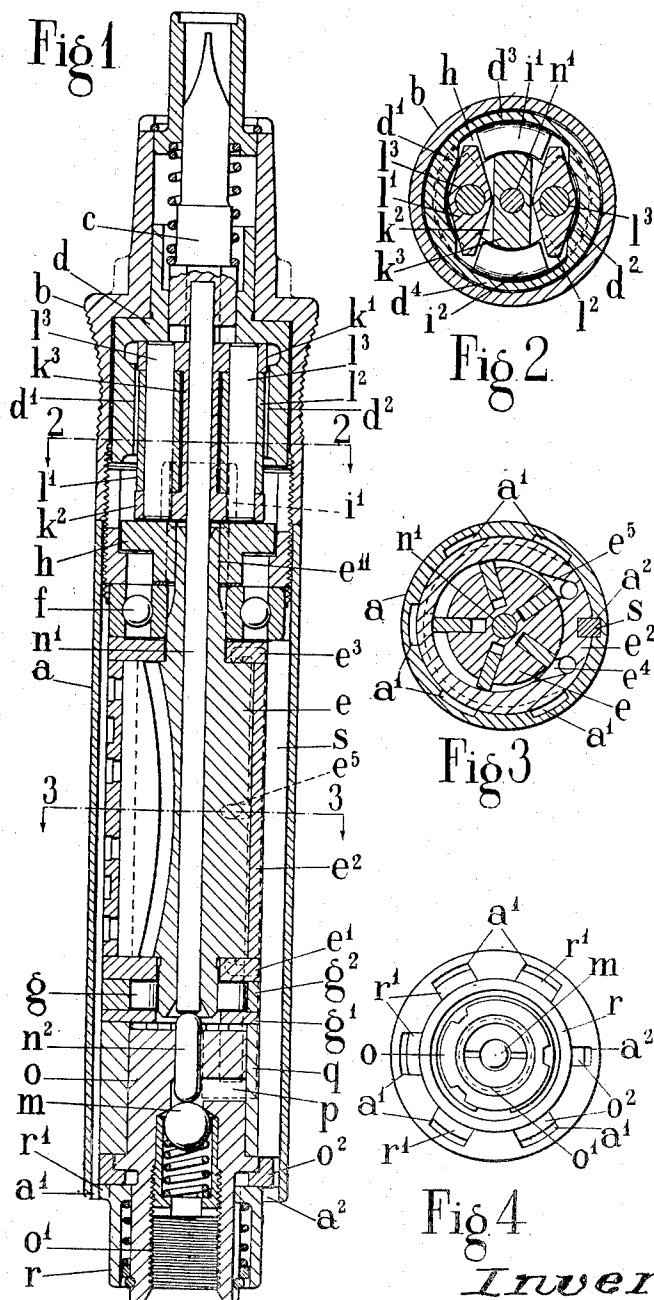
G. H. WEBB

2,591,323

POWER-OPERATED IMPACT WRENCH

Filed Feb. 14, 1949

2 SHEETS—SHEET 1



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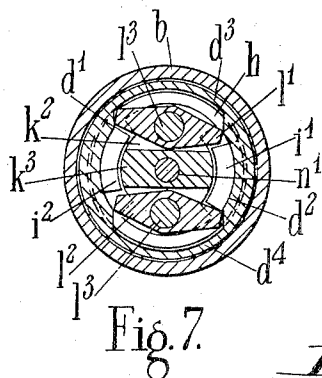
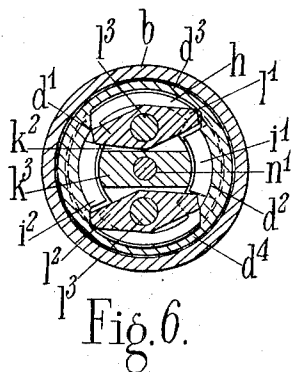
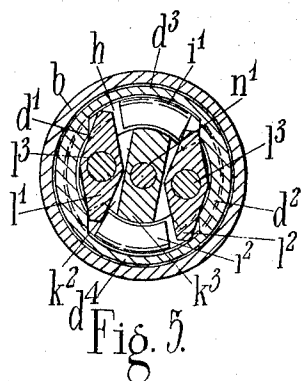
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2 SHEETS—SHEET 2



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POWER-OPERATED IMPACT WRENCH

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1 Claim. (Cl. 81—52.3)

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This invention relates to power-operated impact wrenches, screw-drivers and like tools, of the kind comprising relatively movable anvil and hammer members with means for automatically clutching and de-clutching such members as required in the operation of the tool.

The object of the present invention is to provide a compact, readily portable, and easily manipulatable tool of the above character comprising relatively few parts and in which the wear upon the parts is reduced to a minimum.

The invention consists in an impact wrench of the kind referred to in which the hammer assembly rotates within the anvil or tool-head.

The invention also consists in an impact wrench of the kind referred to adapted to be driven by a pneumatic motor and in which the valve controlling the direction of rotation of the tool-head is adjusted by movement of the hose by which compressed air is led to the tool.

Further features of the invention will be apparent from the description given hereafter.

The accompanying drawings illustrate one convenient form of tool in accordance with the invention.

Figure 1 is a longitudinal sectional elevation of the tool.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is an underneath end view of Figure 1, and

Figures 5, 6, and 7 are cross sectional views similar to Figure 2 and showing the hammer assembly and anvil in various relative positions in the cycle of operations.

In carrying my invention into effect in one convenient manner as, for example, in its application to a screw-driver, I form my improved impact tool with a cylindrical casing *a* of convenient size so that it may be readily held in the hand by the operator, and conveniently the casing is terminated by a screw cap member *b* which may be fluted or otherwise formed to permit of the tool being securely held in the hand.

The screw-driver bit *c* (or box spanner or other tool to be operated) is removably held in the anvil cup or tool-head *d* so as to be rotatable with the latter.

Within the casing *a* I provide a pneumatic motor *e* of suitable form, and splined or otherwise secured upon the end of the rotor spindle *e'* (which is suitably supported in the bearings *fg*) is a driving cam formed from a disc *h* having two axial lugs or fingers *i*¹*i*² thereon arranged diametrically opposite one another, the lugs or

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fingers being sector-shaped in plan and having inner and outer cylindrical faces as clearly seen in Figure 2.

Engaged by the driving cam is a hammer assembly comprising end plates *k*¹*k*² connected by a central longitudinal web *k*³ and in the recesses formed by the web and the end plates I arrange two hammer members *l*¹*l*² loosely pivoted upon pins *l*³ passing through the end plates. The hammer members are of substantially double triangular shape in section as seen in Figure 2 and are arranged so that they rock freely in the carrier, and the whole hammer assembly is arranged within the tool-head or anvil *d* which is of cylindrical shape externally and is arranged to be freely rotatable within the end cap *b* above referred to.

The anvil is provided with internal cams *d*¹*d*², the end portions of which form the impact surfaces against which the hammers are made to impact and also with cylindrical track portions *d*³*d*⁴ separated by a distance such that the end members *k*¹ and *k*² of the hammer assembly may just rotate freely within them. The outer end plate *k*¹ of the hammer assembly is cylindrical but the inner plate *k*² is formed with recesses shaped to receive the axial lugs or fingers *i*¹*i*² of the driving cam and allow restricted rotational movement therebetween. The arrangement is such that the hammer members *l*¹*l*² are urged to perform a rocking motion upon the pivots *l*³ with relative rotational movement between the carrier and the anvil *d* in either direction. In the initial tightening of a screw or nut, the cams *i*¹*i*² cause the hammer members to engage the ends of the cams *d*¹*d*² as shown in Figure 6 and the anvil and hammer assembly rotate in unison. The impact mechanism comes into operation when the screw or nut is seated and the movement of the anvil is stopped. Due to the consequent overrunning of the carrier caused by the driving cam, as seen from Figure 7, the fingers *i*¹*i*² of the latter disengage the hammer members *l*¹*l*² from the end portions of the cams *d*¹*d*², and the carrier is swung through 180°.

As the hammer members pass the cams *d*¹*d*² during this relative movement between the hammer assembly and the anvil, the hammers are urged to rock about their pivots by the said cams such that the leading edge of each hammer is caused to move radially outwardly towards the cylindrical track portions *d*³ and *d*⁴ into the positions shown in Figure 5, so that the hammers are in a position to strike the impact surfaces on the cams *d*¹ and *d*² when, by the said relative move-

ment between the hammer assembly and the anvil the position of Figure 6 is arrived at. The cycle of movement is repeated by the fingers 1^1 and 1^2 catching up on the hammers and releasing them from the anvil as shown in Figure 7.

For the purpose of supplying compressed air to the motor and for controlling the feed of the air so that the motor may be made to rotate in one direction or the other as required, I provide a spring-pressed air valve m which is adapted to be opened when the tool is pressed into contact with the work, the motion being transmitted to the valve by a rod n' which passes down through the rotating parts of the mechanism and co-operates with a pin n^2 slidable in the member o carrying the air valve, which member has an internally threaded portion o' for connection to the hose by which the compressed air is led to the tool.

The member o is furnished with radial ports p which are adapted to co-operate with radial and axial ports in a sleeve q , the axial ports in the sleeve being aligned with similar ports in the roller retaining plate g' , roller race g^2 , rear end plate e' of the motor cylinder e^2 , wall of the cylinder e^2 and cylinder front plate e^3 . The arrangement is such that by rotating the member o the air may be led to one or other of the motor inlet ports e^4 , e^5 (Figure 3) to determine direction of rotation of the motor. The rotation of the member o on the bearing washer o^2 is effected by rotating the hose conveying the compressed air to the tool and such rotation is permitted by withdrawal of the spring-pressed rotation control sleeve r which is keyed or otherwise slidably secured upon the member o so as to be rotatable therewith when withdrawn. Normally the member r is prevented from rotation by engagement of keys r' thereon in slots a' in the end of the casing a , there being in the construction shown five of such slots a' but only four keys r' . There is also a sixth slot a^2 which is of smaller dimensions than the slots a^1 and by reason of this arrangement the valve o can be made to assume only one or other of two positions according to the required direction of rotation of the motor.

To complete the tool I provide a longitudinal key s which keys the sleeve q cylinder e^2 and cylinder end plates e' and e^3 of the motor and the plates g^1 and race g^2 of the roller bearing to the casing a .

It will be understood that the invention is not to be limited to the details of construction hereinbefore given by way of example as such details may be varied according to the purpose for which the impact tool is to be used. Moreover, an electrical or mechanical drive may be substituted for the pneumatic drive above referred to with consequential variation in the details which will be evident to those skilled in the art.

I claim:

15 A portable machine tool of the character described, including a casing, a hollow cylindrical shaped tool carrying anvil member rotatably mounted adjacent one end of the casing, a carrier mounted for rotation within and coaxially of 20 the hollow anvil member, hammer members pivoted upon the carrier, the axes of the pivots of the hammer members being parallel with the axis of rotation of said carrier, a driving member within the casing for imparting rotation to the 25 carrier, cam means on the anvil to engage the hammer members with the latter, cam means on the driving member to disengage the same and said cam means coacting so that the hammer members are urged to perform a rocking motion 30 upon the pivots with relative rotational movement between the carrier and the anvil member in either direction.

GEORGE HENRY WEBB.

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