July 22, 1952 E. G. BOICE 2,603,997

FLUID ACTUATED MOTOR AND GEAR OPERATED SOCKET

Filed May 3, 1950

Fig. 1

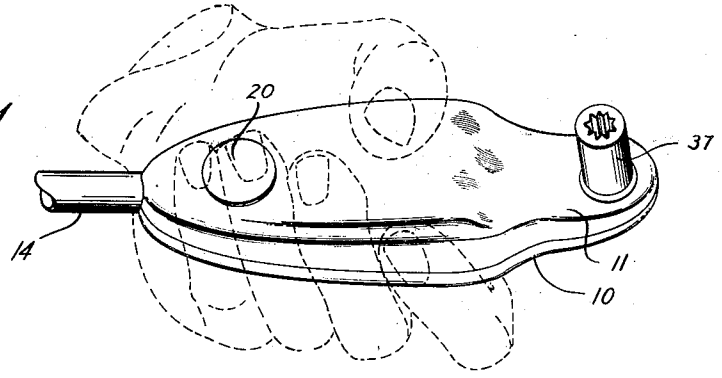


Fig. 2

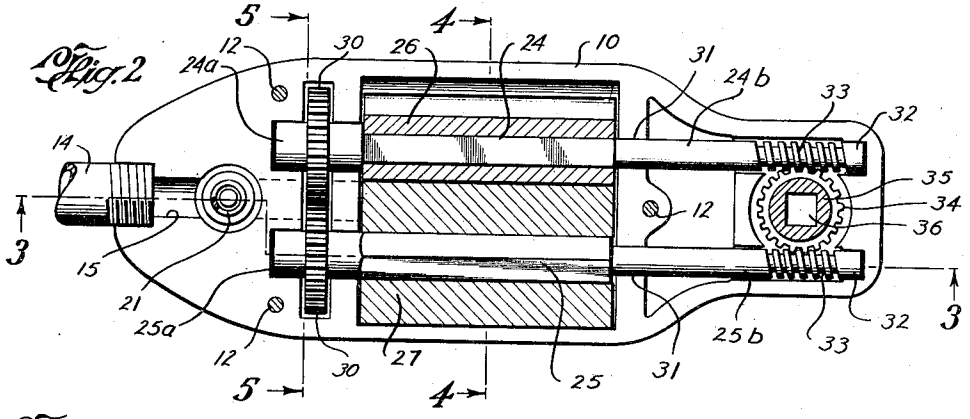


Fig. 3

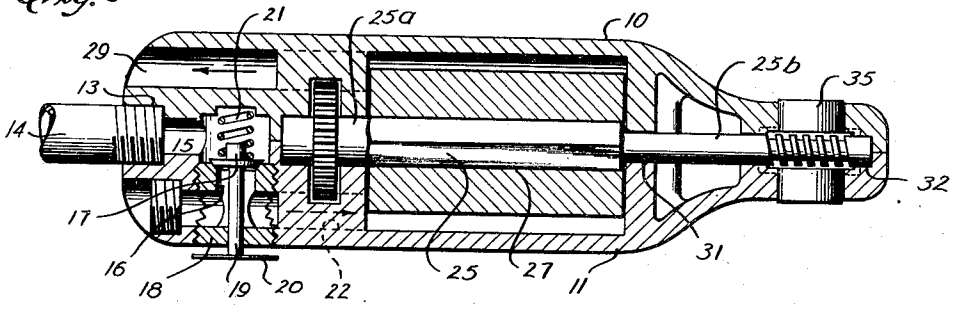


Fig. 4

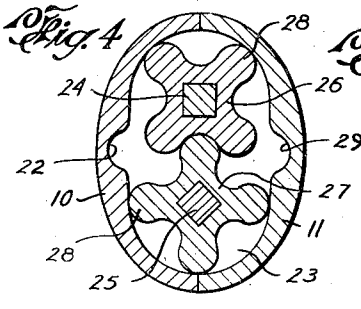
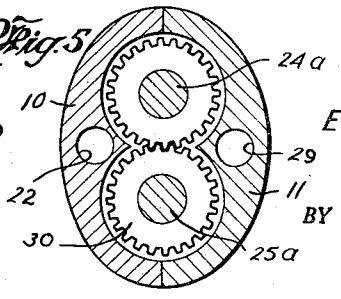


Fig. 5



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FLUID ACTUATED MOTOR AND GEAR OPERATED SOCKET WRENCH

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4 Claims. (Cl. 81—57)

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This invention relates broadly to fluid actuated tools, but more particularly to a small portable pneumatic tool of a size calculated to fit in the hand of the operator.

One object of this invention is to produce a small pneumatic hand wrench of simple and light construction, shaped to fit comfortably in the hand of the operator.

Another object of this invention is to design such tool with a minimum number of parts, preferably made of die castings or molded to the finished size, thereby requiring very little machining and reducing its manufacturing cost.

Another object of this invention is to make the tool housing of material having good bearing characteristics, thereby enabling movable parts to be journaled in the housing without necessitating the use of special bearings such as ball bearings or the like.

Another object of this invention is to produce such a tool with driving elements arranged and disposed in a manner causing them to act as a speed governor under certain conditions of operation.

The invention embodies further characterizing features largely of a constructional nature and therefore more easily explained with the aid of the accompanying drawings, in which:

Figure 1 is a diagrammatic sketch of the tool in perspective, showing how it fits in the hand of the operator.

Figure 2 is an enlarged longitudinal view, partly in section, of the tool shown in Figure 1.

Figure 3 is a longitudinal sectional view taken on line 3—3 in Figure 2.

Figure 4 is a cross-sectional view taken on line 4—4 in Figure 2, and

Figure 5 is a cross-sectional view taken on line 5—5 in Figure 2.

Referring to the drawings, wherein similar characters of reference designate corresponding parts, it will be seen that the tool housing consists of two half sections 10 and 11, held by three screws 12. These two sections are substantially identical and are preferably made of die castings from aluminum alloy material so that they do not require any machining.

The interior of the housing forms, in one end thereof, a threaded connection 13 adapted to receive one end of a fluid conveying conduit 14. From this connection motive fluid will flow longitudinally through a central passage 15 and then laterally through a port 16, which port is controlled by a throttle valve 17 mounted in a

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removable screwed in plug 18. The valve 17 has an integral stem 19 which extends to the exterior of the housing 11, where it is terminated by a button or disk 20 on which manual pressure may be exerted for opening the valve against a closing spring 21. From the port 16, motive fluid will flow through the longitudinal passage 22 into a motor chamber 23.

Motor chamber 23 occupies the central portion of the housing, and is of oval shaped cross section as clearly shown in Figure 4. In it are mounted on two parallel shafts 24 and 25 two driving elements or rotors 26 and 27 which extend the full length of the motor chamber and are each provided with four equally spaced teeth or lobes 28. The lobes of one element mesh with the lobes of the other in a manner affording a fluid tight joint between the two elements, while the lobes of each element engage the adjacent concave wall of the motor chamber as clearly shown in Figure 4. When pressure fluid from the passage 22 is admitted into the motor chamber, it will exert pressure on the teeth or lobes of the driving elements and cause element 26 to rotate clockwise in Figure 4 and element 27 counterclockwise. Since this type of gear motor is well known in the art, no further explanation is thought necessary other than pointing out that from the motor chamber 23 motive fluid is free to exhaust through exhaust port 29, which opens to the atmosphere adjacent the connection 13.

In the motor chamber 23 the two shafts 24 and 25 are of polygonal cross section, and have enlarged cylindrical rear end portions 24*a* and 25*a* journaled within the housing. Intermediate its ends, each enlarged end portion has a spur gear 30 mounted thereon for rotation therewith and in mesh with the spur gear of the other end portion.

From the motor chamber 23, the shafts 24 and 25 also extend toward the right in the drawing to form front cylindrical end portions 24*b* and 25*b*. These front end portions are journaled within the tool housing at a place 31, which is adjacent the motor chamber 23, and again at their extreme end 32 which is longitudinal spaced from 31. Adjacent its extreme end 32, each shaft is formed with a worm 33 meshing with a worm gear 34. The worm gear is formed intermediate the ends of a cylindrical socket 35 which extends transversely between the worms 33 and has both end portions journaled in the tool housing as clearly shown in Figure 3. Through the socket extends a square hole 36 adapted to re-

ceive a socket adapter such as 37 shown in Figure 1.

In practice, the driving elements 26 and 27 are also used as a speed governor responsive to centrifugal force for limiting the speed of the tool. To that end the driving elements are molded of resilient material such as neopreme or the like having about 60 durometer hardness, or of a plastic having similar resiliency and hardness. By providing the proper fit between the lobe shaped teeth 28 and the inner wall of the motor chamber, it will be understood that when the speed creates enough centrifugal force, the lobes 28 will be pressed against the inner wall of the motor chamber by virtue of the resiliency of the driving elements, thereby acting as a friction break or governor for preventing excessive speed of the tool. During this action, any resulting heat will immediately be absorbed by the motive fluid, preferably compressed air, flowing through the motor chamber. While both elements or rotors 26 and 27 are preferably made of this resiliently deformable material, it is not necessary that both rotors be made of the same material. If at least one of them is made of resiliently deformable material, its bearing against the inner wall of the motor chamber may be sufficient to check the speed of the tool.

It will of course be understood that the rotation of the shafts 24 and 25 in opposite directions is, through the worms 33, transmitted to the worm gear 34 and socket or driven member 35 in one direction. Since the socket extends through the tool housing and is open at both ends, it will also be understood that either end can be applied to the work such as bolts, nuts, screws and the like.

The meshing spur gears 30 mounted on the shaft end portions 24*a* and 25*a* will maintain the driving elements 26 and 27 in proper lead relationship and the worms 33 in correct pitch relationship with the worm gear 34.

The details of structure and arrangement of parts shown and described may be variously changed and modified without departing from the spirit and scope of the invention.

I claim:

1. A fluid actuated portable tool consisting of a housing, a pair of parallel shafts extending longitudinally of said housing, said housing forming longitudinally spaced bearings for said shafts, a motor chamber in said housing having motive fluid admitted therein said shafts extending longitudinally through said chamber, a driving element in said chamber mounted on each of said shafts for rotation therewith, interengaging means on both elements responsive to the motive fluid in said chamber for effecting rotation of said elements and shafts, a worm on each shaft adjacent one end thereof, a socket including a worm gear extending between said worms transversely thereof and in driven relationship therewith, and meshing gears on said shafts maintaining said worms in correct pitch relationship with said worm gear.

2. A fluid motor consisting of a housing, a motor chamber having motive fluid admitted therein, a pair of driving elements in said chamber, interengaging teeth on said elements in contact with the wall of said chamber, said elements being rotated in opposite directions by virtue of the motive fluid in said chamber acting on said teeth, said elements and teeth being made of resilient material enabling said teeth to exert pressure on the wall of said chamber by virtue of the centrifugal force of said elements when their rotation reaches a certain maximum, thereby checking the speed of said elements.

3. A fluid actuated portable tool consisting of a housing, a pair of parallel shafts extending longitudinally of said housing, a motor chamber in said housing having motive fluid admitted therein, a driving element in said chamber mounted on each of said shafts for rotation therewith, interengaging means on said elements responsive to the motive fluid in said chamber for effecting rotation of said elements and shafts, said elements being made of a material resiliently deformable by virtue of their centrifugal force causing them to bear against the wall of said chamber for checking their rotary speed, a socket extending between said shafts transversely thereof, and rotation transmitting means between said shafts and socket.

4. In a rotary fluid motor which includes a housing having a chamber with motive fluid admitted therein and a rotor element in said chamber rotated by the action of the motive fluid thereon; the improvement which consists of making said element of a material resiliently deformable by virtue of the centrifugal force of said element to cause it to bear against the wall of said chamber for checking its rotary speed.

ELVIN G. BOICE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
692,135	Kline et al.	Jan. 28, 1902
2,130,111	Whitney et al.	Sept. 13, 1938
2,244,446	Clark	June 3, 1941
2,482,387	Veneman	Sept. 20, 1949
2,532,027	Maddox	Nov. 28, 1950