April 20, 1937. C. HERRERO 2,077,693

FLUID OPERATED TOOL

Filed May 20, 1935

FIG. 1

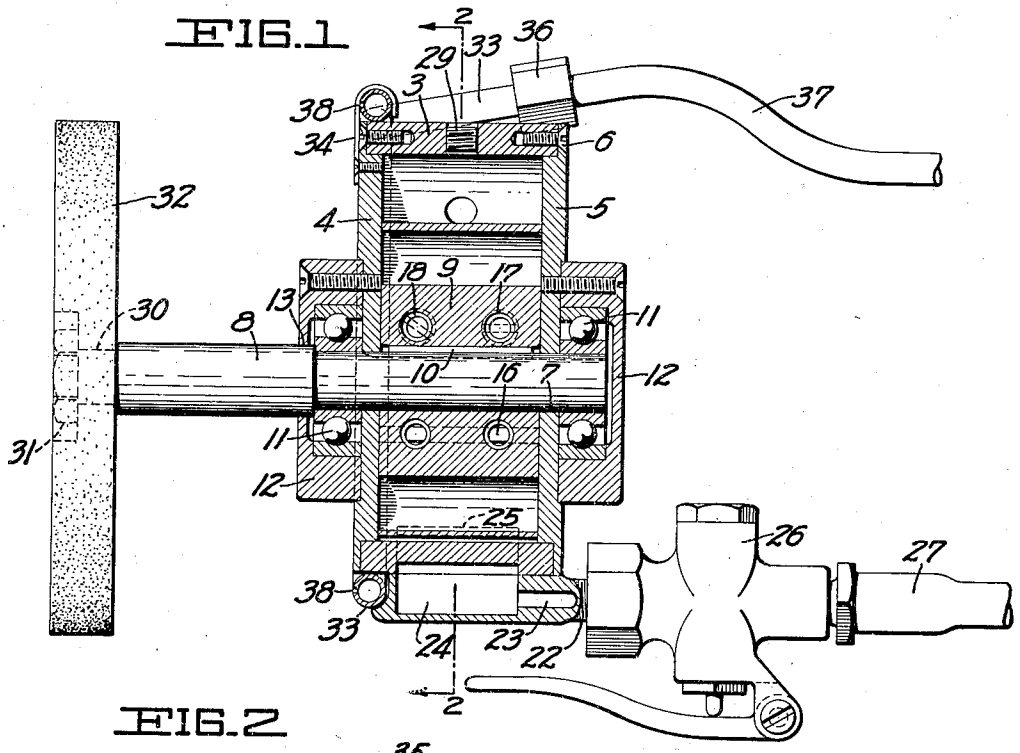
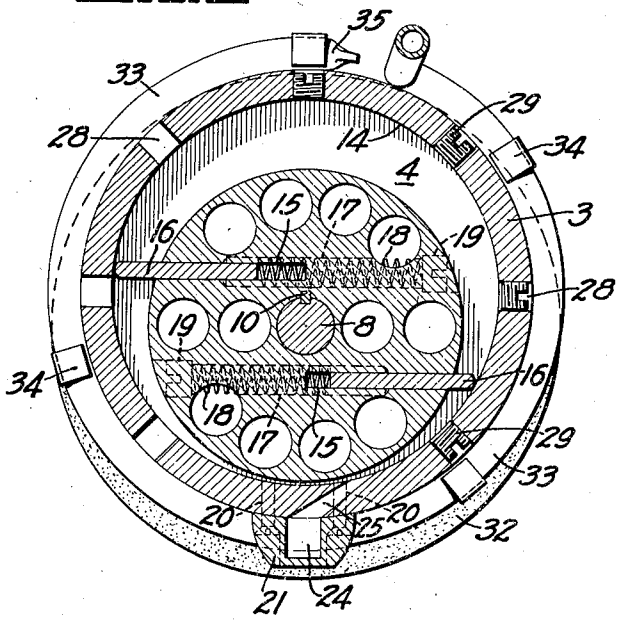


FIG. 2



INVENTOR
Charles Herrero
BY
Harry C. Schroeder
ATTORNEY

Patented Apr. 20, 1937 2,077,693

UNITED STATES PATENT OFFICE

2,077,693

FLUID OPERATED TOOL

Charles Herrero, Oakland, Calif., assignor of one-fourth to George W. Keenan and one-fourth to Melbourne W. Bezanson, both of Oakland, Calif.

Application May 20, 1935, Serial No. 22,401

1 Claim. (Cl. 51—170)

This invention relates to a tool having a fluid driven motor for producing rotary motion.

An object of the invention is to provide in such a tool a small, light-weight motor which may be used and controlled with one hand.

Another object of the invention is to provide means for varying the rotary speed of the motor other than by variation of the fluid pressure or by manipulation of the throttle valve.

Referring to the drawing:

Figure 1 is a longitudinal sectional view, partly in elevation, of a tool constructed according to the principles of the invention.

Figure 2 is a cross sectional view taken in a plane indicated by the line 2—2 of Figure 1.

In detail, the tool of this invention comprises a motor having a cylindrical housing 3 provided at each end with cover plates 4 and 5 which are secured to the housing by means of screws 6. Each of the cover plates is provided with an aperture 7, offset from the center thereof, through which passes a shaft 8 carrying a cylindrical rotor 9 which is secured to the shaft by a key 10. Suitable ball-bearings 11 are provided, for journaling the shaft, and are secured to the cover plates by bearing caps 12, one of which is provided with a central aperture 13 through which the shaft passes. Due to the offset positioning of the apertures 7, with respect to the centers of the cover plates, the periphery of the rotor 9, as will be seen in Figure 2, is disposed closely adjacent the inner cylindrical surface 14 of the housing 3.

The rotor is provided with a pair of substantially radially extending slots 15 in each of which is slidably disposed a piston blade 16 having a rounded outer end which engages the surface 14. A pair of bores 17 are formed in alinement with each of the blades 16 and a spring 18 is positioned in each bore; one end of the spring contacting a screw plug 19 tapped into the bore adjacent the periphery of the rotor, and the other end contacting the end of the blade and urging it outwardly in the slot into engagement with the housing surface 14.

Secured, by screws 20, to the outer surface of the housing, is a block 21 provided with a nipple 22 having a central bore 23 communicating with a recess 24 formed in the block which opens into a jet passage 25 formed in the housing wall and disposed at an angle with the surface 14. A throttle valve 26 is screwed to the nipple 22 at one end and at the other end is attached to a conduit 27 which leads to any suitable source of fluid under pressure.

The wall of the housing, as will be seen in Figure 2, is provided with a plurality of peripherally spaced apertures 28 several of which are tapped and provided with screw plugs 29.

In operation, fluid, preferably compressed air, is admitted to the recess 24, by depressing the throttle valve handle, and is expanded, through the jet 25, against the face of the blade 16 whereupon the blade is caused to move through the annular chamber, formed by the periphery of the rotor 9, the housing surface 14, and the inner surfaces of both cover plates 4 and 5, thereby causing rotation of the shaft 8. Due to the very small gap between the periphery of the rotor 9 and the surface 14 of the housing, which actually is only one or two-thousandths of an inch, at the point of minimum spacing therebetween, comparatively little of the compressed air will pass therebetween to act on the blade approaching the jet 25, with the result that the majority of the force of the expanding air will be exerted on the blade receding from the jet.

The function of the plugged apertures 28 is to provide means for regulating the speed of the motor independently of that which could be caused by varying the air pressure at the source, or by manipulating the throttle valve to allow a greater or lesser volume of air to pass therethrough.

It will be seen, in Figure 2, that the blade, which, at the instant, is receiving the force of the expanding air, must travel around counterclockwise until it passes the first open aperture 28 before the air behind the blade will be exhausted to the atmosphere at which time the second blade will have passed beyond the jet and will be receiving its impelling force from the air. In this condition the piston blades are operating at maximum stroke and consequently the motor is developing maximum torque and running at its highest speed.

Let us now remove the screw plug 29 from the aperture 28 nearest the jet 25. As soon as the blade has passed the open aperture some of the air driving the blade will be "bled off" to the atmosphere resulting in a reduction of pressure behind the blade and a consequent lessening of the torque and the rotational speed of the motor. The removal of successive plugs 29 will proportionately reduce the motor torque and speed. It is obviously necessary that the combined areas of the several bleeding apertures be considerably less than the area of the jet opening, otherwise too great a volume of the compressed air will be released to the atmosphere with the result that

insufficient pressure will be left available to drive the motor.

The device of this invention finds use in shops devoted to the finishing of vehicle bodies particularly in the phases of preparing surfaces to receive paint coatings, the "rubbing" operation between coatings, and the finishing and final polishing operations.

The outer end of the shaft 8 is provided with a shank 30, of reduced diameter, upon which may be secured, by means of a nut 31, anyone of a number of different rotary devices used for the purposes outlined above which is generally indicated by an abrasive wheel 32.

This wheel, which is of rubber composition having a very fine abrasive material imbedded therein, is particularly useful in rubbing down or lightly abrading the finish of surfaces preparatory to recoating, or in "feather-edging" the edges of denuded spots on the surface.

It will be seen that by wrapping cloth or chamois about the wheel the device may be used for polishing.

It is often desirable to use the motor to drive a rotary brush in washing of automobiles or other vehicles, the brush being connected to the shaft in place of the wheel 32 by the simple operation of removing and replacing the nut 31.

When the brush is used it is contemplated to direct a series of jets of water both on the brush and on the surface so that dirt or other substances stuck to the surface may be softened and thereafter be more readily removed by the brush. To accomplish this a circularly shaped tube 33 is secured about the outer surface of the housing, by means of clips 34 secured to the cover plate 4, and has one end 35 thereof pinched closed and the other end thereof provided with a coupling 36 for attaching the tube to a supply conduit 37. A plurality of jet apertures 38 are pierced in the wall of the tube directed, parallel with the axis of the shaft 8, toward the brush, or the tool being used with the motor, and through which the water mentioned above may be discharged, or through which air may be directed, when abrading wheels are used, for cooling both the surface being abraded and the wheel and for blowing away the dust caused by the abrading.

The majority of the parts of the device, with the exception of the shaft, may be made of aluminum, or an aluminum alloy, thereby rendering it extremely light in weight and enabling it to be handled by one hand of the operator without causing him undue fatigue.

What is claimed is:

In combination, a fluid operated motor comprising a housing having a central bore therein and plates closing each end of said bore to provide a cylindrical chamber within said housing, said housing having an inlet port, through which fluid may be admitted to said chamber, and a plurality of outlet ports spaced circumferentially about the periphery of said chamber from said inlet port through which said fluid may be discharged from said chamber, a shaft journaled in each of said plates and extending through said housing, said shaft being offset axially with respect to the axis of said housing bore, a cylindrical rotor fixed to said shaft within said chamber, said rotor having a portion of its periphery lying closely adjacent the periphery of said housing bore, a plurality of vanes resiliently mounted in, and extending substantially radially from, said rotor, said vanes being in contact, at their outer ends, with the periphery of said bore and movable, when said rotor is rotated, into the path of said fluid entering said chamber through said inlet port, plugs removably secured in a plurality of said outlet ports whereby, upon removal of said plugs, the rapidity of discharge of said fluid from said chamber may be controlled, an abrasive tool mounted for rotation with said shaft, and an annular conduit to which fluid under pressure may be admitted, mounted on and concentrically with said housing, said conduit having a plurality of openings therein for projecting the fluid contained therein on to said abrasive tool.

CHARLES HERRERO.