Dec. 27 1927. 1,653,750

J. J. N. VAN HAMERSVELD

GEARED REDUCTION FLUID PRESSURE MOTOR

Filed July 12. 1926 2 Sheets-Sheet 1

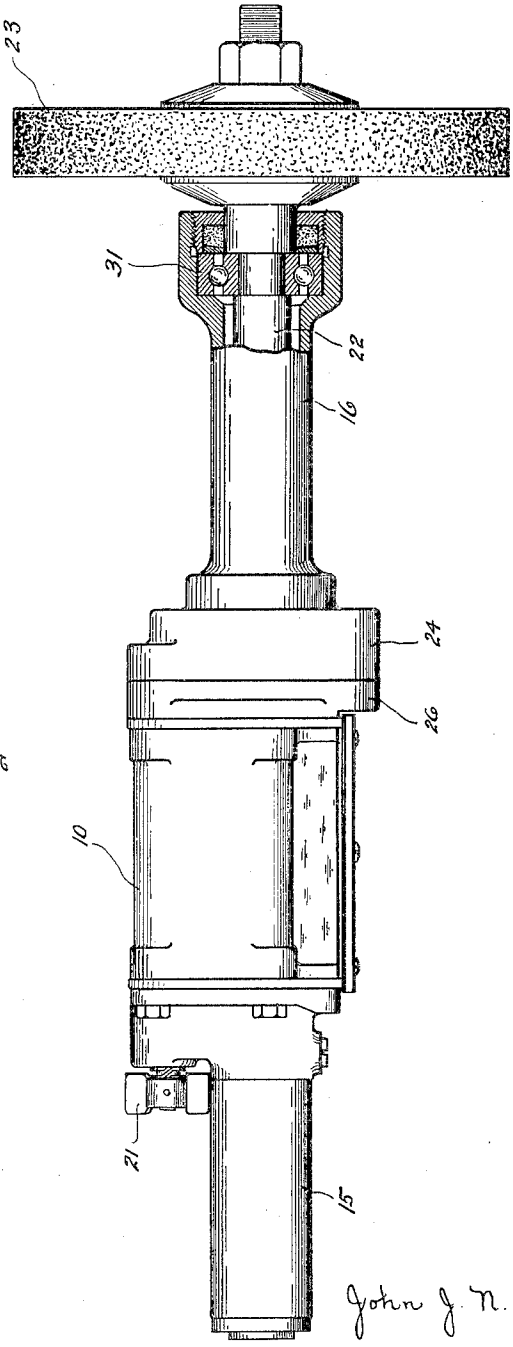


Fig. 1

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GEARED REDUCTION FLUID PRESSURE MOTOR

Filed July 12 1926 2 Sheets-Sheet 2

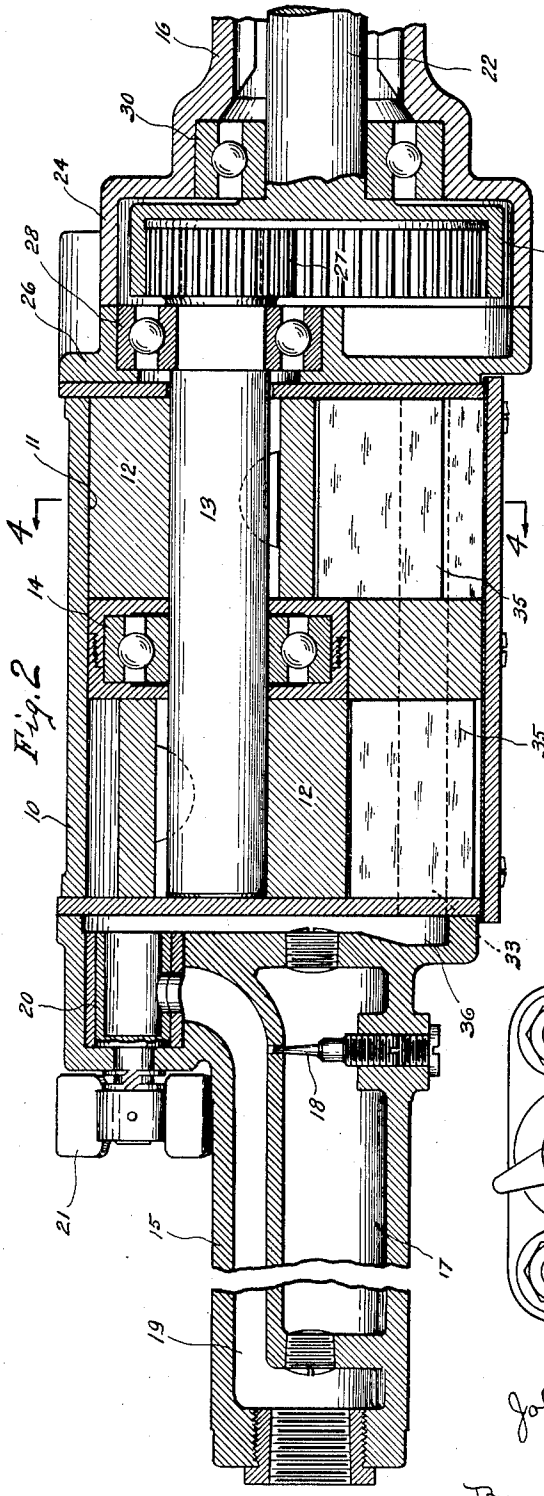


Fig. 2

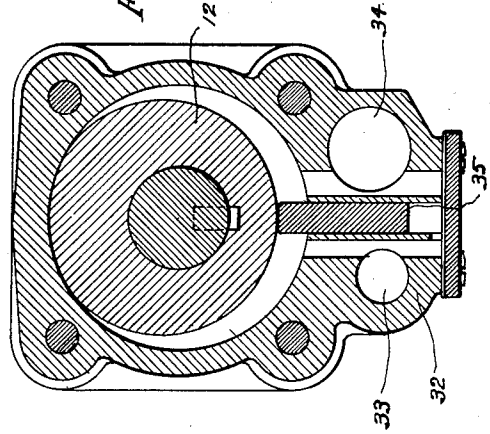


Fig. 4

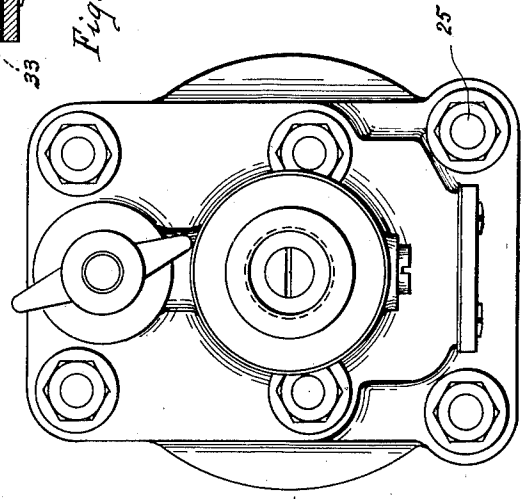


Fig. 3

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UNITED STATES PATENT OFFICE.

JOHN J. N. VAN HAMERSVELD, OF CLEVELAND HEIGHTS, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE ROTOR AIR TOOL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

GEARED-REDUCTION FLUID-PRESSURE MOTOR.

Application filed July 12, 1926. Serial No. 121,814.

This invention relates to a geared reduction fluid pressure motor and is an improvement over the direct drive motor shown in a prior application Serial No. 70,642, filed November 21, 1925. The motor shown in the prior application has two handles which are in line with each other and which project from opposite ends of the motor proper. One of these handles has a passageway for the motive fluid and a control valve. The other handle is hollow and the spindle carrying the rotors extends through it, the outer end of the spindle being adapted to be provided with a grinding wheel or other suitable tool. It is a feature of this motor that it can be operated, controlled and held to the work very conveniently and these advantages are in large measure derived from the fact that two oppositely disposed handles which carry, respectively, the control valve and the tool spindle are directly opposite each other.

The object of the present invention is to provide a geared reduction motor without sacrificing any of the advantages of the handle arrangement of the prior construction. Further, the invention aims in this connection to provide a geared reduction having parts which are well supported and occupy little space, and which at the same time enable the work spindle, though out of alignment with the motor spindle, to be extended as before through one of the handles arranged in line with the handle which is at the opposite end of the motor and carries the control valve.

The invention may be briefly summarized as consisting in certain novel details of construction, and combinations and arrangements of parts which will be described in this specification and set forth in the appended claims.

In the accompanying sheets of drawings, Fig. 1 is a side elevation of my improved geared reduction fluid pressure motor; Fig. 2 is a longitudinal sectional view of the same on an enlarged scale with certain parts broken away; Fig. 3 is an end view looking toward the left-hand end of Fig. 2; and Fig. 4 is a transverse sectional view of the same substantially along the line 4—4 of Fig. 2.

Referring now to the drawings 10 represents the cylinder of the motor consisting preferably of a casting having a cylindrical bore 11 which is engaged by two rotors 12 keyed or otherwise secured to a motor spindle 13 which, in this instance, like the motor in the prior application has a center bearing 14. At opposite ends of the motor are two handles 15 and 16 which, as in the prior construction, are straight and are in line with each other. One of these handles has a lubricating chamber 17 from which lubricant is supplied to the air passing into the motor through a port controlled by a needle valve 18. Additionally, this same handle has an air passageway 19 extending from the free end of the handle to a valve 20, the stem of the valve having at its outer end a lever 21 within convenient reach of the fingers of the hand grasping this handle. The other handle 16 has a work spindle 22 extending centrally through it, this work spindle having at its outer end a grinding wheel or other suitable tool 23.

Between the motor spindle 13 and the work spindle 22, my improved gear reduction is provided, the gears of this reduction being in a housing 24 secured by a series of bolts (the ends of which are shown at 25 in Fig. 3) to a bracket 26 which in fact forms a part of the housing and is secured to the adjacent end of the cylinder 10. Two gears only are employed in this reduction, one being a pinion 27 secured to the outer end of the motor spindle 13. Just inside of this pinion a ball-bearing 28 is provided for the outer end of motor shaft 13, the outer race of this bearing being fitted into a suitably recessed part of the bracket 26. This pinion engages the teeth of an internal gear 29 which is preferably formed integral with the inner end of the work spindle 22, the latter being supported at its inner end in the housing 24 (which forms an integral part of the handle 16) by a ball-bearing 30 arranged just inside of the internal gear 29. The work spindle is supported at its outer end by a ball-bearing 31, shown in Fig. 1, this outer bearing being arranged in the outer end of the handle 16 which is slightly enlarged at this point to accommodate the bearing.

In the construction illustrated in the prior application, the air passes directly from the valve 20 into an upper extension of the cylinder, this extension having inlet and exhaust passageways extending lengthwise there-

through, the inlet passageway communicating directly with the valve, and the extension further accommodates radially movable blades arranged between the inlet and exhaust passageways and the inner edges engaging, respectively, the peripheries of the two eccentrically arranged rotors. This construction permits the two handles to be arranged in alignment with each other, the motor spindle and the work spindle being formed in one piece and being extended through the handle which is arranged between the work tool and the motor.

This precise oppositely disposed arrangement of the handles is obtained notwithstanding the fact that a geared reduction is employed necessitating (if the geared reduction is to be of the most simplified and efficient form) the provision of a work spindle not only separate from the motor spindle but out of alignment with respect thereto. The accomplishment of this requires changes in the arrangement of the motor and in the manner of supplying the motive fluid to the cylinders with respect to the arrangement or construction illustrated in the prior application. The change in the motor itself is its inversion which brings to the bottom of the cylinder the extension here designated 32, which extension is provided with the longitudinally extending inlet passageway 33 and exhaust passageway 34 between which are radially movable blades 35, the inner edges of which are held in engagement with the peripheries of the eccentric rotors 12.

As the valve is at the top of the structure while the inlet passageway 33 is at the bottom, the new arrangement of the cylinder with respect to the valve has made necessary that there be provided at the inner end of the handle 15 a special air passageway 36 by which the air is conducted from the inner end of the valve 20 down to one end of the inlet passageway 33. This rearrangement offsets upwardly the work spindle with respect to the handle 15 permitting the insertion between the spindles 13 and 22 of the reduction gearing with the displacements of the axes of the spindles 13 and 22 just sufficient to accommodate the gearing with the proper amount of speed reduction, which in practice is substantially 2½ to 1, and to admit of the two handles being in alignment.

It is to be noted in conclusion that the reduction gearing and the housing to accommodate it occupy very little space and add very little to the size of the tool. Additionally, the drive is very direct inasmuch as no idle gears are employed and the feature of rigidity and freedom of vibration is obtained to maximum degree, especially by reason of the manner of supporting the outer end of the motor spindle 13 by the ball-bearing arranged next to the driving pinion 27 and the inner end of the work spindle 22 by the ball-bearing 30 arranged next to the driven internal gear 29.

Having thus described my invention, I claim:

1. In a fluid pressure rotary motor tool, a cylinder, one or more rotors arranged therein, a motor spindle carrying the same, a pair of aligned handles extending from opposite ends of the cylinder, one handle having a fluid passageway and a control valve, a work spindle axially displaced from the motor spindle and extending through and mounted in the other handle, reduction gearing connecting the two spindles and a housing enclosing the reduction gearing and formed on the inner end of the second handle.

2. In a fluid pressure rotary motor tool, a cylinder, one or more rotors arranged therein, a motor spindle carrying the same, two handles arranged in alignment with each other and extending from opposite ends of the cylinder, one handle having a fluid passageway and a control valve, a work spindle extending through the other handle, the two spindles being axially displaced with reference to each other, reduction gearing between the two spindles, a bearing for the outer end of the motor spindle adjacent one of the gears, a bearing for the inner end of the work spindle arranged adjacent another of said gears, and a housing for said bearings and gears constituting an extension of the inner end of the second handle.

3. In a fluid pressure rotary motor tool, a cylinder, one or more rotors arranged therein, a motor spindle carrying the same, two handles arranged in alignment with each other and extending from opposite ends of the cylinder, one handle having a fluid passageway and a control valve, a work spindle extending through the other handle, the two spindles being axially displaced with reference to each other, reduction gearing between the two spindles, a bearing for the outer end of the motor spindle adjacent one of the gears, a bearing for the inner end of the work spindle arranged adjacent another of said gears, and a housing for said bearings and gears constituting an extension of the inner end of the second handle, said housing being formed partly by a bracket secured to the end of the cylinder and partly by a part integral with said second handle.

4. A fluid pressure rotary motor tool, comprising a cylinder, a rotor therein, a motor spindle carrying the same, two handles arranged at opposite ends of the cylinder in alignment with each other, one having an air passageway and a control valve, a work spindle extending through and having a bearing in the other handle and a gear re-

duction between said spindles comprising a pinion on the motor spindle, and an internal gear on the work spindle engaged directly by said pinion.

5. A fluid pressure rotary motor tool comprising a cylinder, a rotor therein, a motor spindle carrying the rotor, handles at opposite ends of the cylinder in alignment with each other, a work spindle extending through and journaled in one of the handles, the motor spindle having a pinion at its outer end and having a supporting bearing between the pinion and the cylinder, an internal gear on the work spindle directly engaging said pinion, said work spindle having a bearing in the handle through which it extends which bearing is located adjacent to and on the outer side of said internal gear.

6. A fluid pressure rotary motor tool, comprising a cylinder having a rotor therein, a motor spindle carrying the rotor, a work spindle projecting from one end of the cylinder, a geared reduction between said spindles, a handle at the end of the cylinder opposite that from which the work spindle projects, said handle having a control valve, the cylinder having an extension which is disposed oppositely with respect to said valve and is provided with an inlet passageway, and a passageway extending crosswise of the motor and connecting the control valve with said inlet passageway in the oppositely disposed extension.

In testimony whereof, I hereunto affix my signature.

JOHN J. N. VAN HAMERSVELD.