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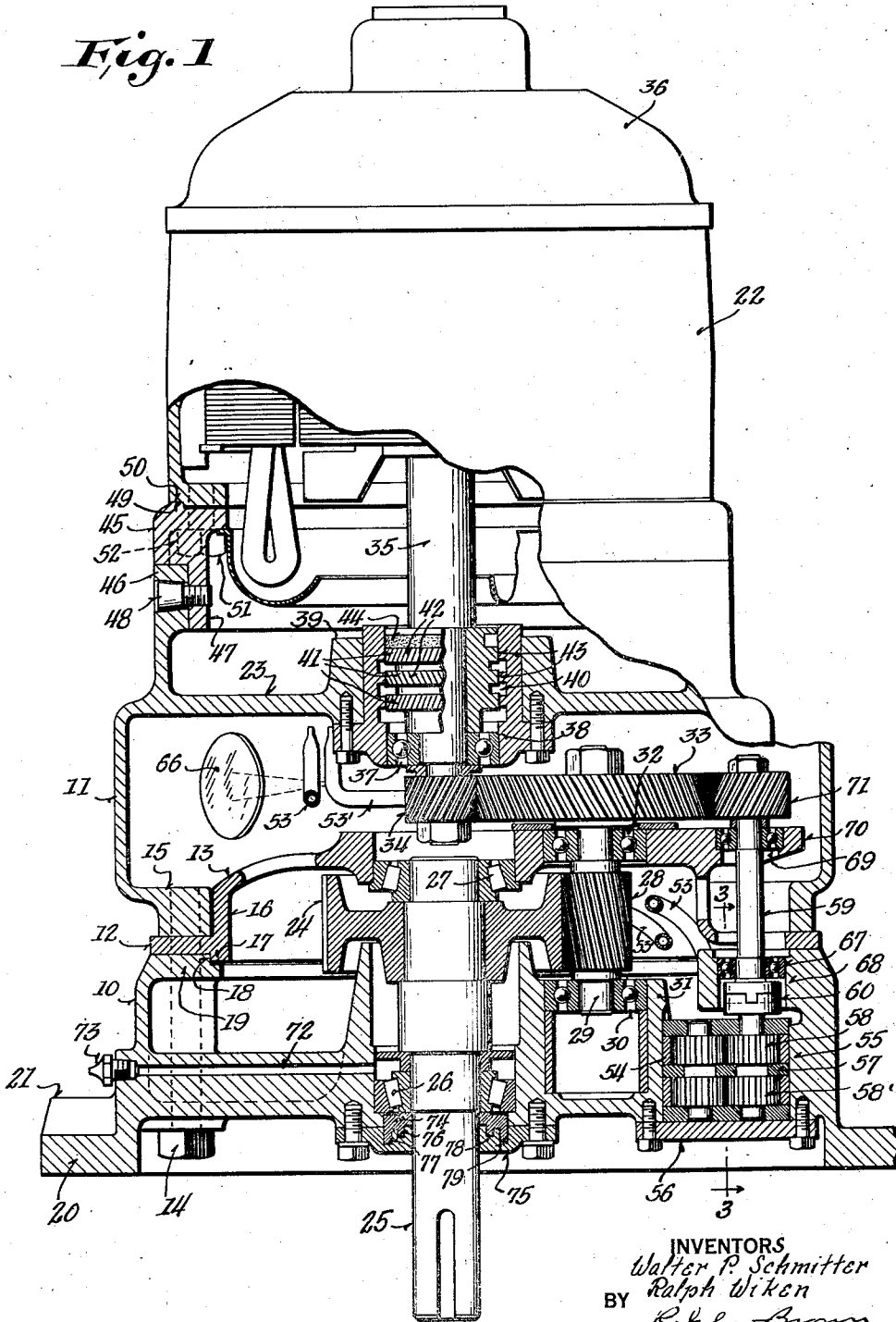
W. P. SCHMITTER ET AL

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VERTICAL-GEARED MOTOR

Filed Sept. 20, 1934

2 Sheets-Sheet 1



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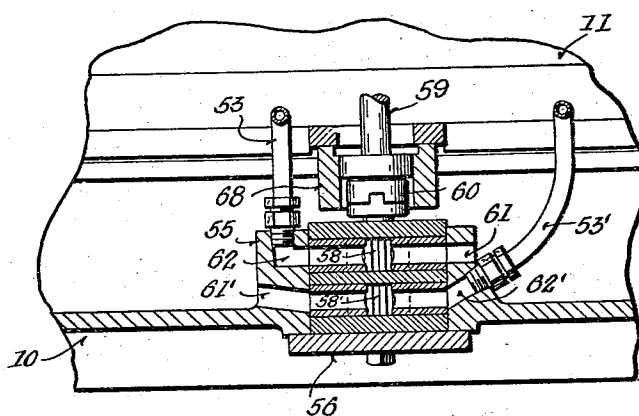
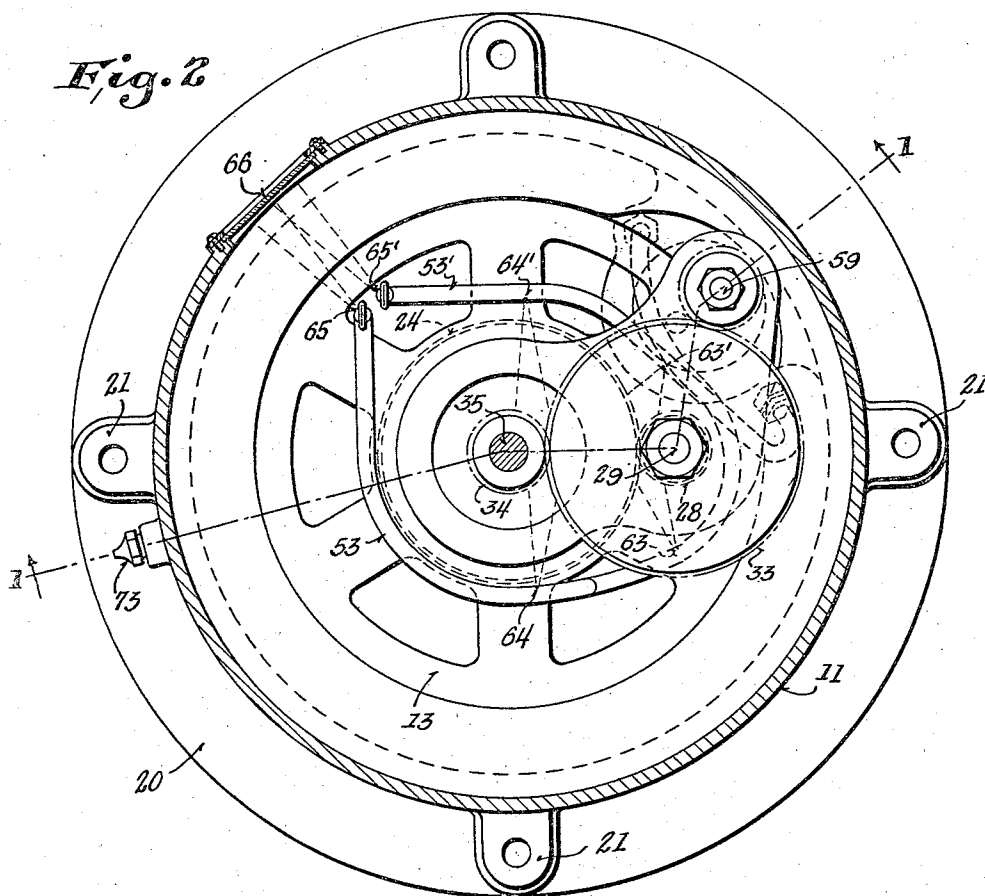
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VERTICAL GEARED MOTOR

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2 Claims. (Cl. 184—6)

This invention relates to vertical type geared electric motors.

An object of the present invention is to improve the construction and operation of devices of the type mentioned.

More specific objects and advantages will appear from the following description of an illustrative embodiment of the present invention.

In the accompanying drawings:

Figure 1 is a view, partly in elevation and partly in section, of a vertical geared motor constructed in accordance with the present invention. The sectional portion of this view is taken along the broken line 1—1 of Fig. 2.

Fig. 2 is a horizontal sectional view.

Fig. 3 is a vertical sectional view along the line 3—3 of Figs. 1 and 2.

The geared motor shown comprises a gear housing having a hollow circular base section 10, constituting a lubricant reservoir, and a hollow circular upper section 11 separably mounted on the base section with the peripheral flange 12 of a spider 13 interposed therebetween. The sections are releasably joined by appropriate means such as a plurality of screws, one of which is shown at 14, which extend upwardly through the base section and into the thickened bottom rim 15 of the upper section.

The spider 13 is provided with an upright portion 16 which extends throughout the major portion of its periphery and which is closely fitted within the rim 15 of the upper portion to accurately position the same concentrically thereof. The spider 13 is also provided with a circular shoulder 17 which is closely fitted within a groove 18 formed in the top flange 19 of the base section to effect an accurate centering of the spider and base section. The upper and lower housing sections are thus accurately centered and aligned.

The base section 10 is provided with a depressed peripheral mounting flange 20 having a plurality of bolt receiving lugs 21. The base section and spider 13 together constitute a rigid support for a speed reduction gear set contained in the housing, while the upper section 11 merely serves to enclose the gears and to support the driving motor 22, the upper section having a top wall 23 which separates the motor from the gears.

The gear set shown comprises a low speed gear 24 carried by a power take-off shaft 25 which projects downwardly through the center of the base section 10. Shaft 25 is journaled in a lower anti-friction bearing 26, mounted in the bottom of the base section, and an upper anti-friction bearing 27 mounted in the center of the spider 13.

The gear 24 meshes with a pinion 28 carried by a counter-shaft 29. The counter-shaft is journaled at its lower end in an anti-friction bearing 30, mounted in a hollow boss 31 formed in the base section, and an anti-friction bearing 32, mounted in the spider 13, supports the upper end of the counter-shaft. A gear 33, fixed to the projecting upper end of the counter-shaft, meshes with and is driven by a pinion 34, fixed to and carried by the lower end of the rotor shaft 35 of the motor 22.

The motor shaft 35 is aligned with the shaft 25. It is supported at its upper end in the usual manner in the upper end head 36 of the motor and at its lower end it is journaled in an anti-friction bearing 37, mounted in a cartridge 38 which is removably fixed in a hollow boss 39 formed centrally of the top housing wall 23. The bearing 37 is arranged adjacent the pinion 34 so as to directly sustain the radial load imposed thereon and so as to receive an ample supply of lubricant splashed thereon from the interior of the housing.

A remarkably effective lubricant seal 40 is mounted upon the motor shaft 35 immediately above the bearing 37. It comprises a sleeve fixed to rotate with the shaft and having three spaced circular flanges 41 thereon having oppositely inclined spiral grooves 42 formed on their peripheries which coact with circular lands 43 on the interior of the cartridge to discourage the upward passage of lubricant therebetween. A felt ring 44, seated in a channel in the uppermost flanges, contacts the interior of the cartridge to form a vapor-proof seal.

The motor 22 is of standard construction, unmodified except for slight changes to accommodate its shaft to the pinion 34, bearing 37, and seal 40, and except that its usual lower end head has been removed to accommodate an adapter ring 45 through which it is fitted to the gear housing. In this instance the adapter ring 45 is seated upon an upstanding flange 46 formed on the upper housing section 11 and is provided with a depending portion 47 reduced to enter and snugly fit within the flange 46. The adapter is releasably secured to the flange 46 by appropriate means such as a plurality of screws, one of which is shown at 48. The adapter is also provided with an upstanding circular shoulder 49 closely fitted within a groove 50 ordinarily provided in the stator frame of the motor. The adapter is thus interlocked with the housing flange 46 and the motor to accurately center and align the latter with respect to the housing so

as to assure a proper working relation between the pinion 34 and gear 33.

The adapter 45 is releasably attached to the motor by suitable means, such as screws 51, arranged in recesses 52 formed in the adapter, and upon removing the screws 48, the motor may be readily withdrawn, carrying with it the adapter 45, shaft 35 and pinion 34. The motor may thus be removed and replaced without disturbing the shafts of the gear set, and by the use of variously shaped adapters, motors of other dimensions, speeds, and types may be substituted.

It will also be noted that upon removal of the upper housing section 11, the gear 34 is accessible for inspection and replacement and gears of other sizes may be readily substituted therefor to change the gear ratio. Further changes in gear ratio may be had by replacing the gear 24 and pinion 28 by gears and pinions of other sizes, which may be readily accomplished after removing the spider 13. The shaft 25 may thus be operated at any of a vast number of speeds by the various gear ratios and motor speeds thus available.

The gears and pinions are lubricated by oil sprayed thereon from one of two pipes 53 or 53' supplied from a pump arranged in the base section 10. The pump shown comprises a cylindrical housing 54 fitted in a hollow boss 55 provided in the base section and seated upon a plate 56 externally and removably attached to the bottom of the base section. The pump housing is divided into upper and lower compartments by a horizontal partition 57, each compartment housing a pair of intermeshing gears 58 or 58' which form a gear pump of a well known type. Both pairs of gears are connected for rotation in unison and are driven from a vertical shaft 59 through a separable coupling 60.

The pump gears 58 in the upper compartment are open to the bath of oil in the base section 10 through a port 61 at one side of the boss 55, and a port 62 at the other side of the boss 55 provides communication between the upper compartment and the pipe 53. Similarly the pump gears 58 in the lower compartment are open to the bath of oil through a port 61' at said other side of the boss 55, and a port 62' provides communication between the lower pump compartment and the pipe 53'. The arrangement is such that, when the pump drive shaft 59 is driven in one direction, oil entering the port 61 is forced by the gears 58 into the pipe 53; and when the shaft 59 is oppositely driven, oil entering the port 61' is forced by the gears 58' into the pipe 53'.

Pipe 53 is provided with discharge apertures 63 and 64 arranged to direct oil sprays into the mesh points of the gear 24 and pinion 28 and of the gear 33 and pinion 34, respectively; and pipe 53' is provided with discharge apertures 63' and 64' arranged to direct oil sprays into the same mesh points but from the opposite sides thereof, as indicated particularly in Fig. 2. Additional discharge apertures 65 and 65' in the pipes 53 and 53' are arranged to direct similar oil sprays against a tell-tale window 66 provided in the side of the housing so as to provide a ready means for determining by observation whether the oil spray system is functioning.

The pump drive shaft 59 is journaled at its lower end in a bearing 67, seated in an appropriate bracket 68 formed in the housing base 10. It extends upwardly through the spider 13 and is journaled at its upper end in a bearing 69, supported in a bracket 70 formed on the spider.

A pinion 71, fixed to the upper end of shaft 59, meshes with and is driven by the gear 33.

It will be noted that since the motor driven pinion 34 also meshes with the gear 33, the peripheral speed of the pump driving pinion 71 is always equal to that of the pinion 34, and consequently the speed of the pump is wholly independent of the gear ratio between the motor and the countershaft 29. This is an important advantage in that an adequate speed and capacity of the pump is thus assured regardless of changes in gear ratio between the motor and countershaft. In fact the pinion 71 is preferably the same size as the pinion 34, so that the pump speed is always equal to the motor speed. Whenever the gear 33 and pinion 34 are replaced by a gear and pinion of other sizes, to change the gear ratio between the motor and countershaft, the pinion 71 is also replaced by a pinion of the same size as the substitute pinion 34.

It will be further noted that in the arrangement shown, the pump driving pinion 71 always rotates in the same direction as the pinion 34, so that whenever the operation of the motor and gear set is reversed the pump also reverses, so that when the motor and its shaft 35 are rotating clockwise (Fig. 2) the pump operates to force oil through the pipe 53' to spray oil into the engaging side of the mesh points of the gears and pinions, and when the motor and gears are rotating in an opposite direction the pump forces oil through pipe 53 to spray oil into what is then the engaging side of the mesh points of the gears and pinions.

The several shaft bearings receive an adequate supply of oil from the sprays thus formed, except the lower bearing 26 of the shaft 25. Bearing 26 is purposely shielded from these sprays and from the bath of oil in the base section 10 by an upstanding surrounding sleeve which projects upwardly from the bottom of the base section to a point well above the bath of oil therein and preferably to a point where its upper open end is effectively covered by the gear 24. By this arrangement, loss of oil from the reservoir along the downwardly projecting shaft 25 is avoided.

The bearing 26 is separately lubricated preferably by a light grease supplied thereto through an appropriate passage 72, which in this instance extends through the side of the base section 10 and is equipped with a grease gun fitting 73 of a well known type. A lubricant seal 74, fixed to the shaft 25, coacts with a closer plate 75 to retain this lubricant in the bearing, the plate 75 being releasably fixed to the bottom of the base section.

The seal shown has proven to be unusually effective for the purpose. It comprises a disk having a plurality of concentric circular flanges 76 and 77 depending therefrom and projecting loosely into corresponding grooves 78 and 79 formed in the plate 75. The outer flange 77 is the deepest and any lubricant that may find its way to the bottom of this flange is kept from creeping beneath it by centrifugal force set up by the rotation of this flange with the shaft 25. Should any lubricant ultimately work its way inwardly beneath this flange, it would have to climb out of the groove 79 against the force of gravity before it could possibly reach the next inner flange 76, and should it reach the latter it would again have to creep against centrifugal force and against the force of gravity before it could reach the shaft 25 and escape along it through the plate 75.

It has been found in actual use that with lubricant retained in the bearing 26 in the manner described, the bearing may be operated continuously for months without requiring additional lubricant.

Various changes may be made in the embodiment of the invention hereinabove specifically described without departing from or sacrificing the advantages of the invention as defined in the appended claims.

We claim:

1. In a geared motor comprising a vertical housing having mounting means at the lower end thereof, a motor mounted at the top of said housing, a vertical shaft projecting through the bottom of said housing, and gearing in said housing through which said shaft is driven from said motor, the combination of a lubricant reservoir in the bottom of said housing, a pump in said housing driven from said motor and supplied from said reservoir, said pump having two separate impeller chambers and separate impelling

means therein alternatively effective in accordance with the direction of operation of said motor, and separate conduits separately connected with said two impeller chambers respectively for lubricating said gearing.

2. In a geared motor comprising a vertical housing having an opening and mounting means at the lower end thereof, a motor mounted at the top of said housing, a vertical shaft journaled in and projecting through said opening, and gearing in said housing for driving said shaft from said motor, the combination of a pump-energized lubricating system within said housing for lubricating said gearing, and a vertical member surrounding said opening, said gearing including a gear on said shaft having a rim surrounding and extending below the top of said member to prevent escape of lubricant from said system through said member and opening.

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