April 29, 1958 W. P. SCHMITTER 2,832,230

VERTICAL REDUCER

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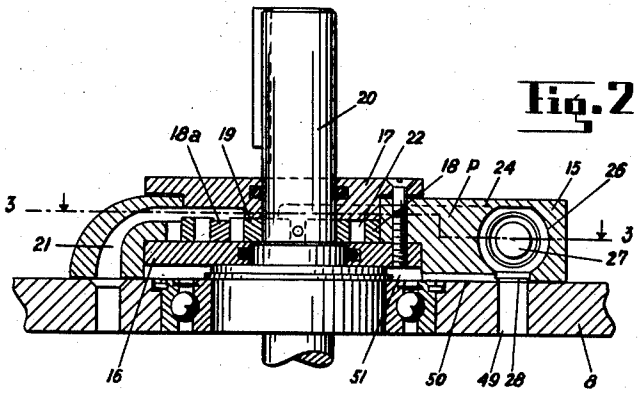
Fig. 2



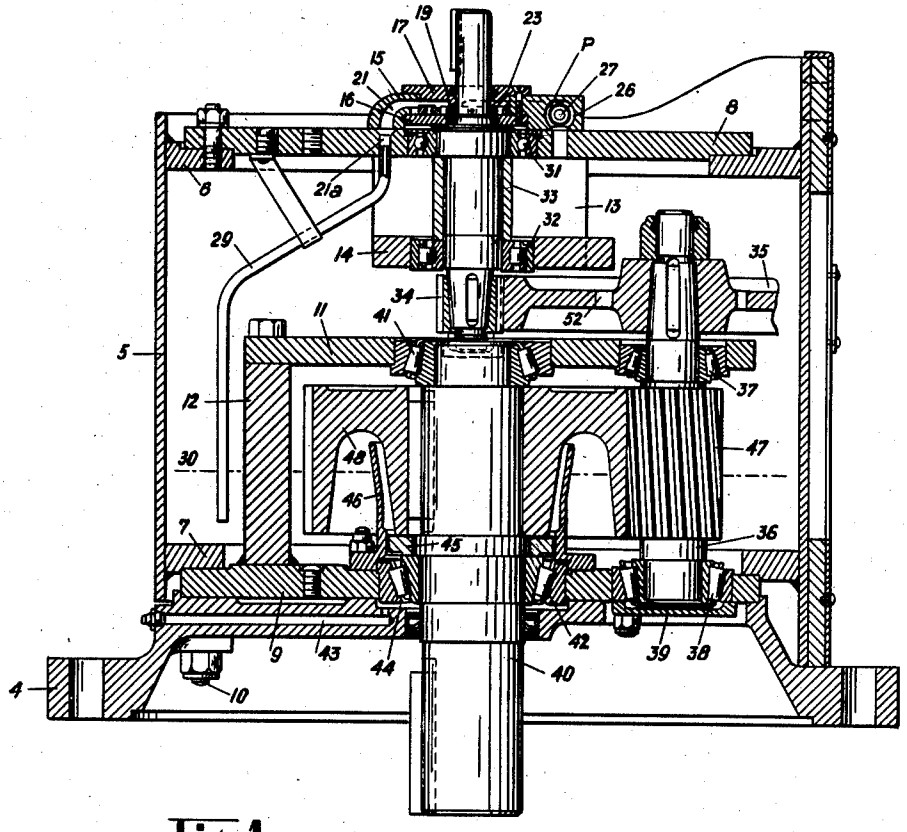


Fig. 1

INVENTOR.
Walter P. SCHMITTER

BY

Charles & French
Atty's.

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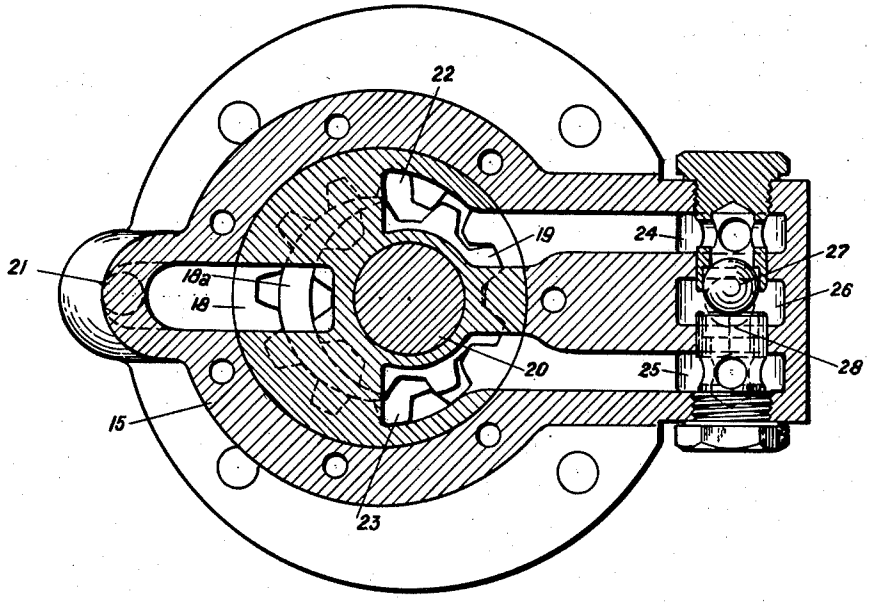

Fig. 3.

INVENTOR.
Walter P. SCHMITTER

BY

Charles & French
Attys.

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2,832,230

VERTICAL REDUCER

Walter P. Schmitter, Wauwatosa, Wis., assignor to The Falk Corporation, Milwaukee, Wis., a corporation of Wisconsin

Application October 10, 1957, Serial No. 689,286

4 Claims. (Cl. 74—467)

The invention relates to speed reducers and more particularly to a vertically disposed speed reducer.

For satisfactory operation, the running parts of a speed reducer should be kept lubricated and the main object of this invention is to provide a vertically disposed speed reducer constructed and arranged to provide efficient lubrication to the gears and shafting thereof. More particularly, the invention resides in incorporating a gear pump in the top plate of the reducer unit with an intake for the pump connected with a body of lubricant in the gear housing and with a discharge of the oil into the upper portion of the housing to lubricate other parts of the unit operating above the body of the lubricant.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a vertical sectional view through a speed reducer embodying the invention;

Fig. 2 is an enlarged sectional view of parts shown in Fig. 1;

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 2.

Referring to Fig. 1, the speed reducer selected for illustration includes a housing formed by a bottom mounting and support member 4, a cylindrical metal side shell 5 having upper and lower metal rings 6 and 7 welded thereto, a top plate or panel 8 suitably bolted to the top ring 6, and a bottom plate or panel 9 which is clamped by stud bolts 10, one being shown, between the bottom ring 7 and the upper surface of the member 4, these parts forming an oil-tight housing. An auxiliary panel 11 is bolted to post 12, welded to the panel 9. The top panel 8 has a depending portion 13 offset from its center provided with a laterally extending ledge or shelf 14.

An oil circulating pump P is mounted on the top of the top panel 8. Any suitable oil pump of compact construction may be used, and for illustration I show a gear type pump including a main housing 15, end plates 16 and 17 secured to the housing on opposite sides thereof, an eccentrically disposed ring gear 18, a displacement pinion 19 meshing with the ring gear and a crescent-shaped baffle 18*a*. The pinion 19 is suitably keyed to the upper end portion of a drive shaft 20 which also drives the speed reducer unit. The pump housing has an intake passage 21 and oppositely disposed discharge passages 22 and 23 which communicate, respectively, with passages 24 and 25 leading to opposite ends of a valve chamber 26 with a ball valve 27 working in said chamber 26 and adapted to close one or the other of said passages depending upon the direction of rotation of the shaft 20. With the above construction, as the pinion 19 is revolved and moves into mesh with the ring gear 18, the oil between these intermeshing gears is forced out into one or the other of the passages 22, 24 or 23 and 25 past the valve 27 and into a discharge passage 28. The intake passage 21 connects by a passage 21*a* in the panel 8 with

an intake pipe 29 extending down into the housing to a point below the normal oil level line 30 therein.

The drive shaft 20 is journalled in a bearing 31 mounted centrally of the panel 8 and a bearing 32 mounted in the ledge 14, there being a spacer sleeve 33 interposed between a shouldered portion of the shaft and the bearing 32. Beyond the shelf or ledge 14 the shaft 20 has a pinion 34 keyed thereto and meshing with a large gear 35 suitably secured and keyed to a transmission shaft 36.

The transmission shaft 36 is journalled in a tapered roller bearing 37 journalled in the panel 11 and in a tapered roller bearing 38 in the lower panel 9 which has a cap plate 39 indicated as bolted to it.

A driven shaft 40, having an exposed lower end for keyed connection with the part, such as an agitator, not shown, or other mechanism, to be driven is journalled in a tapered roller bearing 41 in the panel 11 and in a tapered roller bearing 42 in the panel 9.

The tapered roller bearing 42 is preferably separately lubricated by suitable lubricant grease, introduced by a suitable grease gun into the then open passage 43 in the support member 14 which connects with a recess 44 in said member in communication with said bearing. To retain the grease about the bearing 43, a sealing or slinger ring 45 is mounted above the same to rotate therewith. Oil from the housing is prevented from getting into this bearing by a ring guard 46 secured to the panel 9 and extending above the oil level 30.

The shaft 36 has a pinion 47 formed integral therewith or secured thereto meshing with a large gear 48 suitably keyed to the shaft 40 and held with the ring 45 between the inner races of the bearings 41 and 42. With the above construction rotation of the drive shaft 20 acts through the intermeshing gears 34 and 35 to provide one speed reduction to the transmission shaft 36, and the intermeshing gears 47 and 48 provides another speed reduction to the driven shaft 40, it being noted that the pinions 34 and 47 are smaller diameter gears. As the shaft 20 rotates, the pump P is driven through the displacement pinion 19 to raise oil through the pipe 29, passages 21*a* and 21 to the pump gears which then act to discharge this oil to one or the other of the outlet passages in the pump housing to the pump discharge passage 28 which connects with a discharge opening 49 in the panel 8 and with a duct or passage 50 leading to a recess 51 above the bearing 8 to supply lubricant to this bearing. Lubricant from the opening 49 then flows down onto and over the shelf 14 to lubricate the bearing 32 and the gears below the same and overflows onto the top of the panel 11 to lubricate the bearing 41 and also some of the lubricant from said shelf falls on the top surface of the web of the gear 35 which has a series of radially disposed openings 52 therein to allow oil to flow therethrough onto the panel 11 adjacent the bearing 37 to lubricate that bearing and also the gears 47 and 48 below the same. The lower bearing 38 for the shaft 36 rotates in the oil bath provided in the housing as above described. Thus all the gears and the bearings for their shafts are provided with a circulatory source of lubricant except the separately lubricated bearing 42.

It is to be noted that the shaft 20 is disposed above and axially alined with the driven shaft 40 and that the shelf or ledge 14 may be used as a support for an additional transmission shaft to provide for another reduction gear train between the shaft 20 and the shaft 38 in some instances.

I desire it to be understood that this invention is not to be limited to any particular form or arrangement of parts except in so far as such limitations are included in the appended claims.

What I claim as my invention is:

1. In a speed reducer unit, the combination of a vertically disposed housing having closures at opposite ends thereof and providing a sealed enclosure, a drive shaft journalled in the upper portion of said housing, a driven shaft journalled in the lower portion of said housing and reduction gear drive connections between said shafts, a gear type lubricant pump mounted on the top of the upper closure and having one of its gears mounted on said drive shaft and having an intake passage and a discharge passage extending through said top closure, a conduit extending from said intake passage to the lower portion of said housing below the level of a bath of lubricant therein, said discharge passage opening into the upper end of said housing to furnish lubricant to those parts of the reducer disposed above said oil level.

2. The speed reducer unit as defined in claim 1, wherein the drive shaft is journalled in spaced bearings carried by said upper closure and the upper one of said bearings is furnished with lubricant from said discharge passage by a conduit connecting said discharge passage with said bearing.

3. The speed reducer unit as defined in claim 1, wherein the drive shaft is journalled in spaced bearings, one of which is mounted on a shelf depending from the main portion of said top closure, and the discharge passage is disposed above a portion of said shelf.

4. In a speed reducer unit, the combination of a vertically disposed housing having closures at opposite ends thereof and providing a sealed enclosure, the upper end of said enclosures carrying spaced bearings, one of said bearings being mounted in a shelf depending from the main portion of said upper enclosure, a drive shaft projecting at its upper end from said upper enclosure and at its lower end below said shelf, a pinion mounted on the lower of said shafts, said lower closure having a panel member supported above the same in spaced relation thereto, sets of parallelly disposed bearings in said lower closure and said panel member, a transmission shaft journalled in one of said sets of bearings, and a driven shaft journalled in the other of said sets of bearings and having an extended end for connection with a part to be driven, a gear on said driven shaft between its bearings, said transmission shaft provided with a gear meshing with said pinion to provide a first reduction and with a pinion meshing with the gear on said driven shaft to provide another reduction, a gear type oil pump mounted on the top of said upper closure and having one of its gears direct connected to said drive shaft and having an intake passage and a discharge passage extending through said top closure, a conduit extending from said intake passage to the lower portion of said housing below the level of a path of lubricant therein, said discharge passage opening into the upper end of said housing above said shelf, the gear on said transmission shaft being mounted to revolve in the space between said shelf and panel and provided with openings permitting the passage of lubricant on said shelf to the upper portion of said panel to supply lubricant to the bearings disposed therein.

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U. S. DEPARTMENT OF COMMERCE

PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,832,230 Walter P. Schmitter April 29, 1958

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 30, after "upper", strike out "end"; column 4, line 20, for "path" read -- bath --.

Signed and sealed this 17th day of June 1958.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON

Commissioner of Patents