July 23, 1935. E. E. GREVE 2,009,176

OILBATH ROTARY

Filed March 19, 1931 2 Sheets-Sheet 1

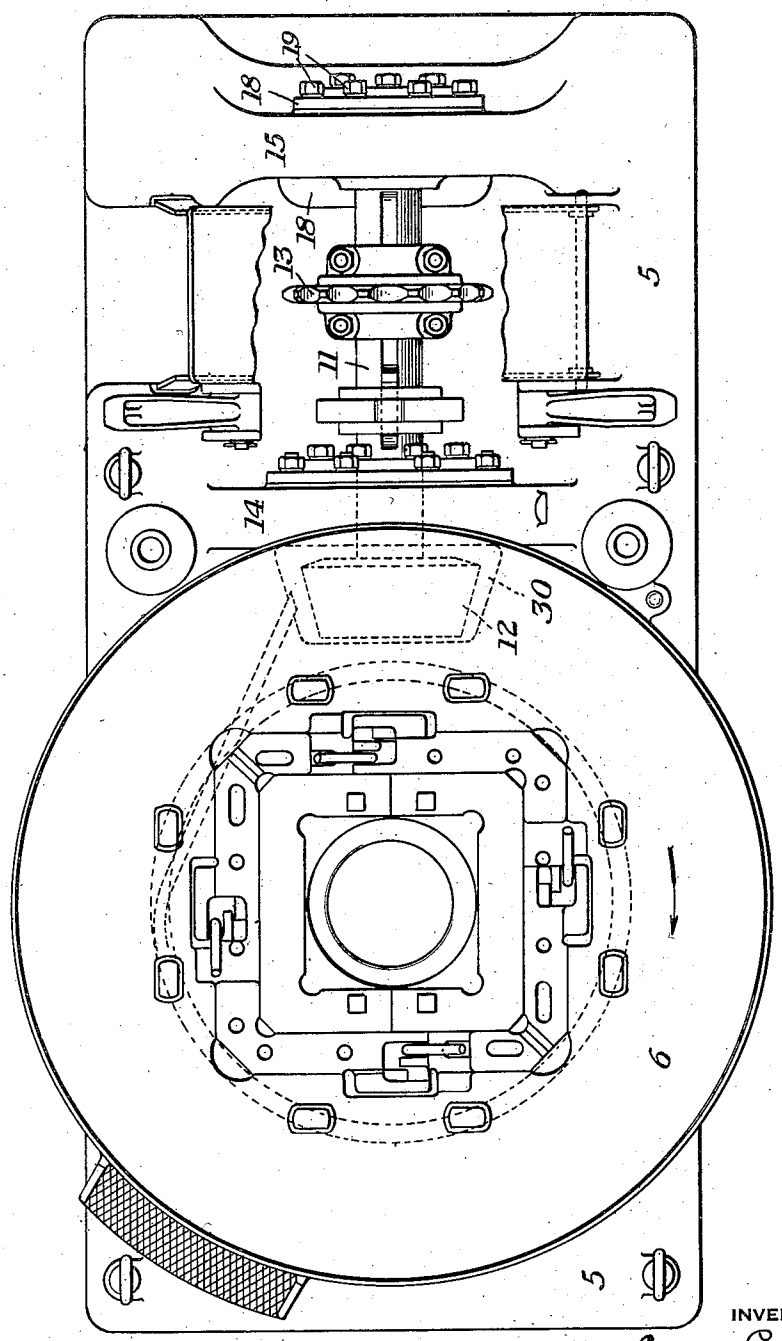

Fig. 1.

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Filed March 19, 1931 2 Sheets-Sheet 2

Fig. 2.

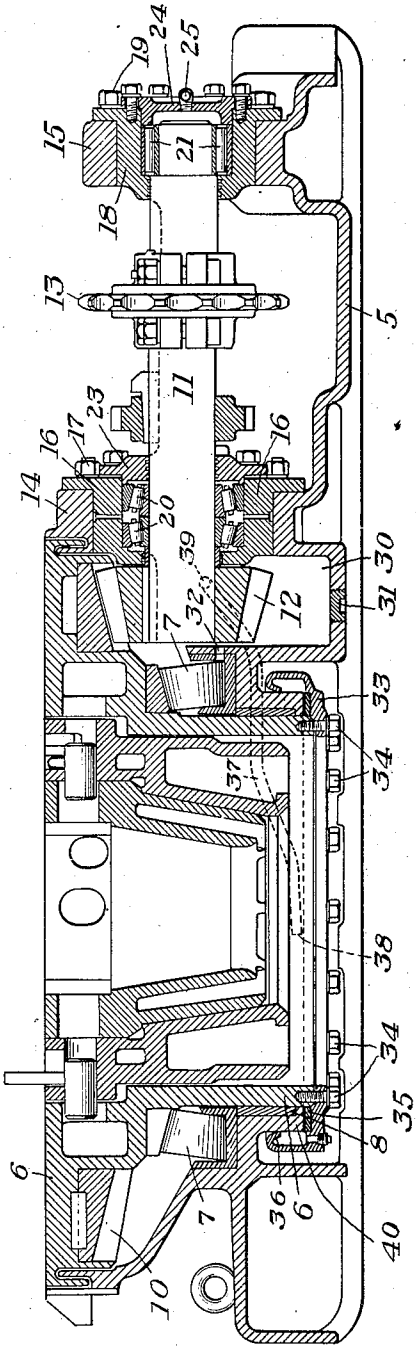
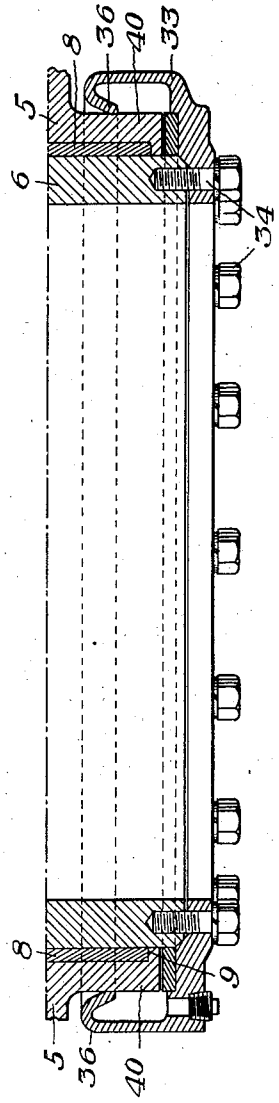


Fig. 3.



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OILBATH ROTARY

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11 Claims. (Cl. 184—6)

This invention relates to an improved rotary which may be used in oil well drilling operations, so constructed that the bearings are preserved in accurate alinement without the necessity for shimming, and in which an arrangement is provided for lubricating parts of the rotary.

One object of my invention is to provide an improved rotary in which parts subject to wear are either disposed in a lubricant reservoir or are freely supplied with lubricant. A further object of my invention is to provide an improved rotary having a lubricant reservoir, and an arrangement for returning to such reservoir the oil used for lubricating a lower bearing in the rotary. Another object of my invention is to provide an improved construction of rotary in which the bearings for the drive shaft for the rotary are carried by standards formed integrally with the base. Further objects will become apparent in the course of the ensuing description, and will be more particularly pointed out in the accompanying drawings.

In the drawings in which I have shown, not as limiting my invention but merely for the purposes of illustrating the same, one operative embodiment which my invention may assume,

Fig. 1 is a plan view of an oil bath rotary with a guard broken away to show in full the driving sprocket;

Fig. 2 is a central vertical section taken on the axis of the drive shaft for the rotary;

Fig. 3 is a vertical section on the axis of the rotary showing the oil receiving means for the lower bearing of the rotary, this view being on a larger scale than the other two figures.

It is very desirable, on account of the extremely heavy loads involved, that all moving, wearing parts of the rotary be liberally supplied with lubricant. One of the most troublesome parts of a rotary to lubricate is the portion which extends down through the base. In all previous constructions with which I am familiar, it has not been possible to freely lubricate this depending portion without considerable expense due to loss of the lubricant employed at this point. This is due to the fact that in these previous constructions the lubricant supplied to lubricate the bearing at th's point passes on through and is lost. In accordance with my invention, I collect the oil used for lubricating this portion of the rotary and return the same to a reservoir in the base.

In the embodiment disclosed in the drawings, the base 5 rotatably supports a gear ring 6. It will be noted that the gear ring extends downwardly through an opening in the base 5, the lower end of the ring 6 being at or slightly below the lower extremity of the opening. The weight or mass carried by the gear ring 6 is principally taken up by an antifriction bearing 7 which may be of any suitable type. In the preferred embodiment illustrated, the bearing 7 is a roller bearing with cone-shaped rollers. A lower bearing in the form of a bushing 8 is provided in the lower portion of the opening in the base 5. This bushing rests against a shoulder 9 in the base 5.

The gear ring is provided with gear teeth 10; and the gear ring is arranged to be driven from a shaft 11 by a bevel pinion 12 secured on the inner end of the shaft 11. A sprocket 13 is provided, as is customary, this sprocket being secured to the shaft 11 so that a sprocket chain connected to a suitable source of power may drive the shaft 11. In order to preserve accurate alinement of the bearings for the shaft 11, I provide bearing standards 14 and 15, these standards being formed integrally with the base 5. A bearing housing 16 is secured by securing means 17 in the bearing standard 14, and a bearing housing 18 is similarly secured by securing means 19 in the bearing standard 15. The shaft 11 is rotatably mounted in roller bearings 20 and 21 disposed within the bearing housings 16 and 18 respectively. It will be noted that by incorporating the bearing standards 14 and 15 as integral parts of the base 5, accurate alinement of the bearings is ensured. Because of this integral structure, the necessity for shimming is eliminated and, therefore, this arrangement has marked advantages over prior constructions in which such shimming was necessary.

In order to properly lubricate my improved rotary, I have packed the roller bearings 20 and 21 on the pinion shaft with grease, the end of the roller bearing 20 being enclosed by a removable ring 23, and the end of the roller bearing 21 being enclosed by a cap plate 24. Grease may be forced into the bearing 21 by the use of a nipple 25 extending through the plate 24. A similar arrangement, not shown, is provided for the bearing 20.

In order to amply lubricate the parts of the rotary subject to wear, I provide in the base 5 a lubricant reservoir 30, this reservoir having a drain plug 31. The pinion 12 is disposed in the lubricant reservoir 30 with the lower portion thereof dipping below the level of the lubricant therein. Accordingly, as the teeth of the pinion 12 mesh with teeth 10 on the gear ring this lubricant is carried up to the gear teeth 10. From these gear teeth the lubricant flows down-

wardly into the roller bearing 7. From the roller bearing 7, a portion of the lubricant returns through an opening 32 into the lubricant reservoir 30. Another portion of the lubricant makes its way down the outer wall of the gear ring 6 to the bushing 8. In prior constructions known to me, the lubricant supplied to the bearing at this portion of the rotary escaped and was lost. I provide means for collecting the lubricant supplied to the bushing 8, and for returning the same to the lubricant reservoir 30. I attach to the lower end of the gear ring 6 an annular sump 33 by means of screws 34. I provide a thrust ring plate 35 between the sump 33 and the annular lower flange 40 surrounding the opening in the base 5. The lubricant passing through the bearing between the gear ring 6 and the bushing 8 is collected in the sump 33 and protected therein from grit or foreign matter by an overhanging flange 36 of the annular sump 33. Within the base 5 I provide a passageway 37 having its lower portion 38 within the flange 40, and communicating with the space within the sump 33, and its upper end 39 communicating with the lubricant reservoir 30. As the gear ring 6 rotates, the sump 33 is carried around with the same. As the lubricant accumulates in the sump 33, it is carried around by the same by friction with the inner wall of the sump 33. This rotation of the lubricant carries some of the same into the passage 37; and as more of the lubricant is caused to flow into the lower end 38, lubricant is discharged from the upper end 39 into the reservoir 30.

It will be apparent, therefore, that I have provided an annular oil collector below the lower bearing for returning lubricant to the chamber 30. It will also be noted that lubricant is supplied to the bushing 8 only so long as rotation of the gear ring 6 continues; and that lubricant will be carried up the passage 37 due to rotation of the sump 33 so long as the gear ring is rotated. The advantage of my improved rotary, having the feature of collecting oil from the lower bearing and returning the same to a lubricant reservoir in the base, is apparent both from the point of view of ample lubrication of the parts subject to wear, and the saving in lubricant.

While I have illustrated and described one specific form of rotary and one arrangement for supplying lubricant to the parts of the same which are subject to wear, it will be understood that the invention is not restricted to the particular construction and arrangement shown, but may be variously modified within the contemplation of the invention and under the scope of the following claims.

I claim:

1. In a rotary, a base having an opening through the same, annular bearing co-axial with said opening, a lubricant reservoir to supply oil to said bearing and to receive the returned oil from the outer edge thereof, a gear ring rotatably mounted in said bearing, means below said bearing for receiving oil passed from said reservoir through the bearing, and means for returning oil from the oil receiving means to said reservoir.

2. In a rotary, a base having an opening through the same, a gear ring rotatably mounted in a bearing surrounding the opening, a pinion for driving said gear ring, said base providing a lubricant chamber in which said pinion is disposed, and means for receiving lubricant passed through the bearing and for returning said lubricant to the lubricant chamber including an oil sump carried by the gear ring to rotate therewith, and a passageway extending from the lubricant chamber in the base to the space enclosed by the sump.

3. In a rotary, a base having an opening through the same and a lubricant chamber adjacent said opening, a bearing coaxial with said opening, a gear ring rotatably mounted in said bearing, a pinion rotatably mounted within said lubricant chamber and meshing with said gear ring to drive the same, and means for receiving oil passed through the bearing and for returning the same to the lubricant reservoir comprising an annular oil collector below said bearing rotating with said gear ring, and a passageway in the base communicating at one end with the space enclosed by the annular collector for conducting lubricant to the lubricant reservoir in the base.

4. In a rotary, a base having an opening through the same and bearing standards formed integrally therewith, a gear ring rotatably mounted in said opening, a shaft rotatably mounted in bearings in said bearing standards, a pinion on the inner end of said shaft for driving said gear ring, a bearing for journalling said gear ring in the opening in the base said base having a lubricant reservoir enclosing the gear on the inner end of said shaft, said bearing receiving lubricant carried to the pinion ring by said gear from said reservoir, and an annular oil collector below said bearing for receiving oil passed through the bearing and over the inner edge thereof, and means for returning oil from said collector to said lubricant reservoir.

5. A rotary comprising a base having a vertical shaft receiving opening, a supporting bearing encircling said opening and a positioning bearing in said opening, a gear ring rotatably mounted on and in said bearings respectively, an oil reservoir at the outer edge of said bearing, a pinion dipping into said reservoir and meshing with said gear ring to distribute oil from said reservoir to said supporting bearing at the outer edge thereof, and means for receiving lubricant passing through said bearings to and over the inner edge thereof and returning it to said oil reservoir.

6. A rotary comprising a base having an opening, a bearing encircling said opening, a gear ring rotatably mounted on said bearing, a lubricant chamber in said base, means to supply lubricant from said chamber to and through said bearing and over the inner edge thereof and means to collect the lubricant overflowing the inner edge of said bearing and to return said lubricant to said chamber.

7. A rotary comprising a base, an annular bearing, said base having an opening substantially concentric with said bearing, a lubricant chamber in said base, means for supplying lubricant from said chamber to and through said bearing and past the inner edge thereof, and means for collecting lubricant overflowing the inner side of said bearing and returning it to said lubricant chamber.

8. A rotary comprising a stationary base having a lubricant chamber therein, a bearing mounted on said base, said base having an opening concentric with said bearing, means for carrying lubricant from said lubricant chamber to said bearing and permitting said lubricant to flow back from said bearing to said chamber from the outer edge of said bearing and to overflow

the inner edge of said bearing, and means to collect lubricant overflowing the inner edge of said bearing and to return it to said lubricant chamber.

9. A rotary comprising a stationary base having an opening therethrough, a bearing on the inner surface of said opening, a gear ring rotatably mounted and centered in said bearing, an annular thrust bearing for said gear ring co-axial with and surrounding said opening, a lubricant reservoir to supply lubricant to said thrust bearing and to receive the returning lubricant from the outer edge thereof, and to permit overflow of lubricant over the inner edge thereof to said bearing within said opening, means below the bearing in said opening for receiving oil passing therethrough from the inner edge of said thrust bearing, and means for returning said lubricant from said lubricant receiving means to said reservoir.

10. A rotary comprising a base having an opening therethrough, a thrust bearing surrounding said opening, a gear ring rotatably mounted on said thrust bearing, a lubricant reservoir encircling said thrust bearing, means to supply lubricant from said reservoir to said thrust bearing to overflow the inner and outer edges thereof, an oil sump below the inner edge of said bearing to receive oil overflowing the inner edge thereof, and means to return said overflow oil to said reservoir to be recirculated to said bearing.

11. A rotary comprising a base having a vertical shaft receiving opening, a thrust bearing encircling said opening, a gear ring rotatably mounted on said thrust bearing, an oil reservoir surrounding said bearing, a driving pinion meshing with said gear ring and dipping into said oil reservoir to distribute lubricant to said bearing, said bearing having inner and outer edges over which said lubricant overflows, and means for receiving oil passed from the oil reservoir through said thrust bearing and over the inner edge thereof and returning said lubricant to said reservoir.

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