April 8, 1930. J. L. PERKINS ET AL 1,754,040

OIL CIRCULATING SYSTEM

Filed Sept. 20, 1928

FIG. 1

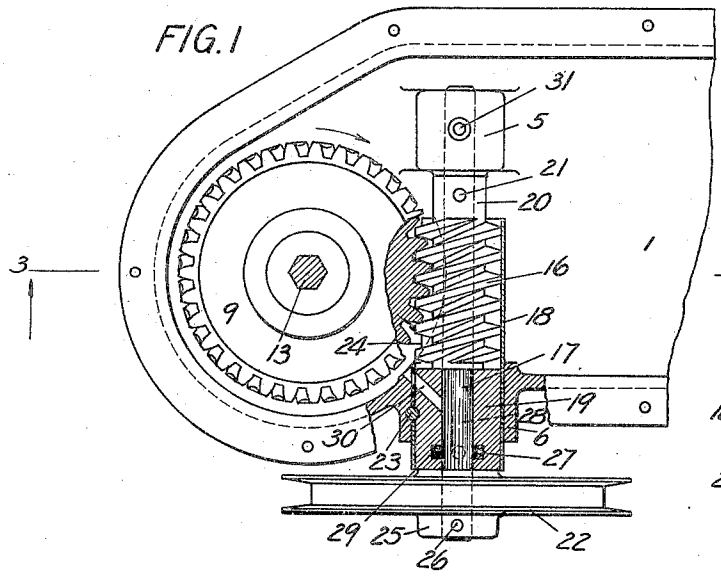


FIG. 2

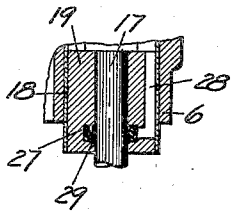


FIG. 3

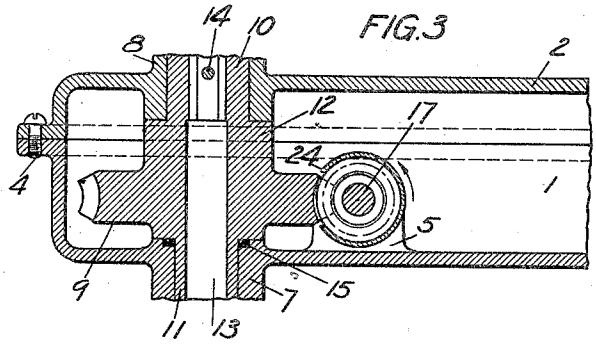
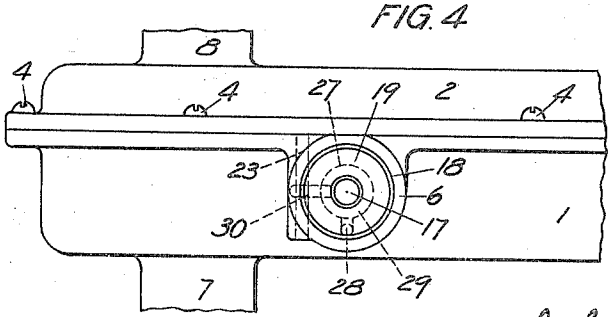


FIG. 4



INVENTORS

Julian L. Perkins,

Hiram L. Crabb,

BY Frank A. Cutter,

ATTORNEY.

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UNITED STATES PATENT OFFICE

JULIAN L. PERKINS, OF WEST SPRINGFIELD, AND HIRAM D. CROFT, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNORS TO PERKINS MACHINE AND GEAR COMPANY, OF WEST SPRINGFIELD, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

OIL-CIRCULATING SYSTEM

Application filed September 20, 1928. Serial No. 307,256.

Our invention relates to improvements in systems of or means for lubricating with lubricants, in a more or less fluid state, intermeshing driving and driven members of the spiral or similar type; and the primary object of our invention is to provide a system of this character whereby the lubricating medium is circulated by the action of the driving spiral member when in motion, and applied in a most thorough manner to the interengaging parts or teeth of both spiral members, and to the driving member shaft and its main bearing, with the result that uniform lubrication is obtained, undue friction and wear are obviated, great efficiency is attained, and waste is prevented.

The system is simple and its application or installation in no way impairs the mechanism with which it is directly associated.

Other objects and advantages will appear in the course of the following description.

We attain the objects and secure the advantages of our invention by the means illustrated in the accompanying drawings, in which—

Figure 1 is a top plan, in partial section, of transmission mechanism equipped with the oil-circulating system, illustrating a practical embodiment of the same, the cover of the case being removed; Fig. 2, a fragmentary, sectional detail of certain of the parts and members; Fig. 3, a vertical section through said mechanism, taken on lines 3—3, looking in the direction of the associated arrow, in Fig. 1, and, Fig. 4, a front elevation of said mechanism.

Similar reference characters designate similar parts throughout the several views.

The arrows in Figs. 1 and 3 indicate the directions of the associated revolving members when in action.

It is to be understood that the mechanism to which our system is here applied is merely typical of mechanisms to which said system may and is well adapted to be applied.

At 1 is represented a horizontal case which is provided on top with a cover 2 secured in place by means of screws 4. This case may be of any necessary length, depending on the character of the machine with which the system is employed, and here the right-hand end portion is broken off. The lubricant is placed in the case 1 to a depth sufficient to enable the same to be circulated in the most efficient manner.

On the floor of the case 1, adjacent to but apart from the back side thereof, is an integral, horizontal bearing 5, and in the front side of said case is an integral, horizontal bearing 6, the axes of these bearings being in the same straight line, which line is at right-angles to the central, longitudinal, vertical plane of the case. The location of the bearing 5 inside of the case 1 is important, because of the completeness and thoroughness with which the same can be lubricated, as will hereinafter more clearly appear.

There is an integral, vertical bearing 7 in the floor of the casing 1, between the left-hand end of said casing and the vertical plane in which the axes of the bearings 5 and 6 are located, and the cover 2 is provided directly above said first-named bearing with an integral, vertical bearing 8.

A worm-wheel 9 has upper and under trunnions 10 and 11, respectively, through which and the hub (12) of said worm-wheel extends a shaft 13, the upper portion of said shaft being hexagonal in cross section, and pinned at 14 to said upper trunnion. The trunnions 10 and 11 are respectively journaled in the bearings 8 and 7. A packing-ring 15 may be introduced between contiguous surfaces of the bearing 7 and the hub 12.

A worm 16 is mounted on a horizontal shaft 17, and partially inclosed in a cylindrical conduit or shell 18, within which shell at the front end of said worm is a cylindrical bearing block 19. The worm 16 has at the rear end a hub 20 that is pinned at 21 to the shaft 17. The shaft 17 projects beyond the rear end of the hub 20 into the bearing 5, wherein this projecting part of said shaft is journaled. The forward terminal of the shaft 17 is journaled in the block 19, and protrudes from the front end of said block to receive thereon and have secured thereto the direct driving member, which may be a pulley, as 22. The forward terminal of the shaft 18 is received in the bearing 6, and a pin 23 pass-

ing down through the left-hand side of said bearing and engaging portions of the shell 8 and the block 19, as best shown in the first view, securely holds said shell in place in said bearing and said block in place in said shell.

The block 19 extends from the front end of the worm 16 to the inner face of the hub of the pulley 22, and the shell 18 extends from the rear end of said worm to the front end of said block. A portion of the left-hand side of the shell 18 is cut away, as represented at 24, to permit the worm and worm-wheel teeth to intermesh.

The shaft 17, and with it the worm 16, is held against endwise movement by the bearing 5, the rigidly held block 19, and the pulley 22, the hub, as 25, of said pulley being pinned, as at 26 to said shaft adjacent to the outer end thereof.

Power applied to the pulley 22 causes the shaft 17 and the worm 16 to revolve, and the latter causes the worm-wheel 19 and the shaft 13 to revolve.

Within the block 19, a short distance in from the front end thereof, is a groove 27 encircling the shaft 17 and opening into the bore in said block for said shaft, and also within said block and leading down from the bottom of said groove and then rearwardly to the inner end of the block is a passage 28—see Fig. 2. The bottom of the passage 28 is formed by the shell 18. Absorbent material in the form of a ring 29 encircles the shaft 17 in the groove 27. An oblique passage on a horizontal plane, as a whole indicated by the numeral 30, extends from the bore in the block 19 for the shaft 17 through said block, the shell 18, and the inner part of the bearing 6. The passage 30 opens at one end and into the shaft bore in the block 19, at a point between the worm 16 and the packing-ring 29, and at the other end into the casing 1 at a point adjacent to the intermeshing worm and worm-wheel teeth.

When the worm 16 is in motion a certain amount of suction is created thereby, or it acts as a spiral conveyer, and thereby causes the lubricant to be drawn through the passage 30 to the shaft 17, where said lubricant coats the portion of said shaft which is in the block 19 and the sides of the bore therein for said shaft in a most thorough and complete manner, to saturate the ring 29, to move down into the passage 28 and rearwardly in said last-named passage and inside of the shell 18 onto the worm teeth, which teeth, be it noted, run in contact with said shell, and onto the worm-wheel teeth where and as they are contacted with by said worm teeth, and finally to pass out of the rear or inner end of the shell back into the case 1. The movement of the lubricant is not, of course, divided into cycles, as might possibly be inferred from the foregoing explanation, but is practically continuous.

The ring 29 is provided for the purpose of preventing the lubricant from escaping through the groove 27 into the passage while the shaft 17 is idle, and thereby possibly leaving that portion of the shaft which is in the block 19 insufficiently lubricated when again set in motion. This ring of absorbent material is not, however, necessary in all or perhaps even in most cases, and may be omitted. In this event the operation of the system is perhaps even more effectual, and certainly is more lively and speedy. The character of the mechanism and the nature and consistency of the lubricant are the factors which determine whether or not the ring 29 shall be used.

Due to the exposure on three, and even four, if the level of the lubricant be above the top of the bearing 5, sides of said bearing to said lubricant, the bore in said bearing for the shaft 17, and the part of said shaft in said bore, are thoroughly and completely lubricated at all times. Lubricant from the case 1 can enter the bearing 5 at either end, work through the same, and leave at the other end, returning to the mass in the case. To facilitate the entrance of the lubricant to the interior of the bearing 5, an opening 31 may be made in the top of said bearing.

The term "oil" as herein used is intended to cover and include any lubricant or lubricating material capable of being utilized with our system.

More or less change, in addition to these hereinbefore specifically pointed out, may be made in our system, without departing from the spirit of our invention, or exceeding the scope of what is claimed.

We claim:

1. In an oil-circulating system, a container for lubricant, a bearing member supported by said container, a conduit leading from said member, a shaft with one terminal journaled in said member, the latter having therein passages opening into the shaft passage and into said container and said conduit, a spiral driving member mounted on and secured to said shaft within said conduit, and a driven member intermeshing with said driving member.

2. In an oil-circulating system, a container for lubricant, a bearing member supported by said container, a conduit leading from said member, a shaft with one terminal journaled in said member, the latter having therein an annular groove opening into the shaft passage, and passages opening into said groove, and into said container and said conduit, a spiral driving member mounted on and secured to said shaft within said conduit, and a driven member intermeshing with said driving member.

3. In an oil-circulating system, a container

for lubricant, a bearing member supported by said container, a conduit leading from said member, a shaft with one terminal journaled in said member, the latter having therein an annular groove opening into the shaft passage, and passages opening into said groove and into said container and said conduit, absorbent material in said groove, a spiral driving member mounted on and secured to said shaft within said conduit, and a driven member intermeshing with said driving member.

4. An oil-circulating system comprising a container for lubricant, intermeshing driving and driven spiral members in said container, said driving member being mounted on and secured to a shaft that is journaled in a bearing in which are passages leading from the outside of said container to the shaft passage, and from said shaft passage to the outside of said bearing member, and a conduit around said driving member and into which one of said first-named passages opens, whereby the action of said driving member, when in motion, causes the lubricant to pass into said bearing member to said shaft, and to pass out of said bearing member and through and out of said conduit back into said container.

5. In an oil-circulating system, a case, for lubricant, provided with bearings, a shell extending into one of said bearings, a bearing block and a worm in said shell, means to secure said shell and block to said case, a shaft, for said worm, journaled in the other of said bearings and in said block, the latter having passages therein, one of which passages leads from the interior of said case to the shaft bore in said block, and the other leads from said bore to said shell, and a worm-wheel intermeshing with said worm.

6. In an oil-circulating system, a case, for lubricant, provided with bearings, a shell extending into one of said bearings, a bearing block and a worm in said shell, means to secure said shell and block to said case, a shaft, for said worm, journaled in the other of said bearings and in said block, the latter having therein an annular groove opening into the shaft passage, and passages opening into said groove and into said case at two points, one of which points is through said conduit, and a worm-wheel intermeshing with said worm.

7. In an oil-circulating system, a case, for lubricant, provided with bearings, a shell extending into one of said bearings, a bearing block and a worm in said shell, means to secure said shell and block in said case, a shaft, for said worm, journaled in the other of said bearings and in said block, the latter having an annular groove which opens into the bore therein for said shaft, and passages one leading from the interior of said case to said groove, and the other leading from said groove to said shell, absorbent material in said groove, and a worm-wheel intermeshing with said worm.

8. In an oil-circulating system, a case, for lubricant, provided with bearings, a shell extending into one of said bearings, a bearing block and a worm in said shell, means to secure said shell and block to said case, a shaft, for said worm, journaled in the other of said bearings and in said block, the latter having passages therein, one of which passages leads from the interior of said case to the shaft bore in said block, and the other leads from said bore to said shell, and a worm-wheel intermeshing with said worm, said shell having an opening therein adjacent to the inter-engaging portions of the worm and worm-wheel teeth.

JULIAN L. PERKINS.
HIRAM D. CROFT.