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LUBRICATING SYSTEM FOR WASHING MACHINES

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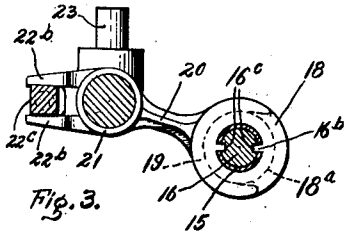


Fig. 3.

Fig. 1.

Fig. 2.

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LUBRICATING SYSTEM FOR WASHING MACHINES.

Application filed May 27, 1924. Serial No. 716,252.

To all whom it may concern:

Be it known that I, GEORGE E. RANDLES, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Lubricating Systems for Washing Machines, of which the following is a specification.

The present invention relates to washing machines and particularly to washing machines of the general type of that shown in my application Serial No. 591,400, filed September 29, 1922, now Patent No. 1,520,886, dated Dec. 30, 1924, wherein all the operating mechanism for the machine is entirely enclosed in a casing or housing upon which the tub is supported.

Washing machines of this type are used generally in private homes and are operated for the most part by women and it is especially desirable for this reason that the mechanism require as little attention as possible, particularly as to lubricating the parts contained in the enclosing casing or housing.

The object of my present invention is to provide an improved construction and arrangement for lubricating the operating mechansim of a washing machine of this general character, and for a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the drawing, Fig. 1 is a sectional view of a washing machine provided with a lubricating system embodying my invention; Fig. 2 is a detail view on a smaller scale of certain parts, and Fig. 3 is a detail sectional view taken on line 3—3, Fig. 1.

Referring to the drawing, 1 indicates the tub of a washing machine, 2 the casing or housing which encloses the operating mechanism for the washing machine, and 3 the supporting legs. Only a portion of the machine is shown in the drawings, the right hand side and the top of the tub being broken away. Casing or housing 3 comprises a deeper portion 4 which is defined by side walls 5 and a bottom wall 6, and a shallower portion 7 which is defined by side walls 8 and a bottom wall 9. In the shallower portion 7 of the housing, the walls are shaped to provide a depression 10 and in this depression are suitable bearings 11 in which a driving shaft 12 is journaled. Shaft 12 is driven by a suitable motor (not shown), which may be attached directly to housing 2.

The washing machine illustrated is of the suction cup or bell type. The suction cups are indicated at 13. They are carried by a yoke 14 which is suitably attached to the upper end of a reciprocating plunger rod 15. Plunger rod 15 extends down through a hollow post 15^a in tub 1 and passes through a suitable stuffing box 17 into the deeper portion 4 of housing 2. The lower end of plunger rod 15 is tubular and it slides on a vertical guide post 16 pivotally supported in a socket 16^a on a wall of housing 2, the arrangement being such that guide post 16 can turn on its axis. Guide post 16 is connected to plunger rod 15 by keys 16^b which slide in keyways 16^c in post 16. Fastened on the lower end of plunger rod 15 is a plunger rod spool 18 provided with a groove 18^a in which is located the furcations 19 of a yoke 20. Yoke 20 is carried by a cross head 21 which is in the form of a sleeve and which slides on a vertical guide post 22 supported in walls of the casing as indicated at 22^a. Yoke 21 has fingers 22^b which engage a vertical guide post 22^c and serve to keep the cross head from turning.

On the lower end of cross head 21 is a crank pin 23 which is connected by a link 24 to a crank pin 25 on the end of a crank arm 26. Crank arm 26 is carried on the overhung end of a tubular shaft 27 which is journaled in a bearing 28. Bearing 28 is supported by a web 29 which extends across the housing and forms one of the walls of depression 10. Journaled inside tubular shaft 27 and in an adjacent bearing 30 is a shaft 31 on which is mounted a worm wheel 32 which meshes with a driving worm 32^a on shaft 12. Worm wheel 32 is fixed to shaft 31 by a pin 33. Shaft 27 is held between the hub of worm wheel 32 and a head 34 on the end of shaft 31. On the left hand end of shaft 31 as seen in the drawing, is a bevel gear wheel 35 which meshes with a bevel gear wheel 36 journaled in a socket 37 in housing 2. Bevel gear wheel 35 is fastened to shaft 31 by a pin 38 so that it turns with the shaft. Attached to bevel gear 36 is a shaft 39 which is the shaft which drives the wringer of the washing machine, (not shown), this being a known arrangement.

On shaft 27 is a clutch comprising a clutch collar 40 and a clutch pin 41 attached to the clutch collar and adapted to engage openings 42 in the web of worm wheel 32. Clutch collar 40 is attached to shaft 27 by a key 43 which causes the clutch to turn with the shaft but permits it to slide axially thereon to move pin 41 out of and into openings 42. The mechanism for operating the clutch is not illustrated for it forms no part of the present invention. A suitable arrangement for operating it is particularly shown and described in my co-pending application Sr. No. 716,254, filed of even date herewith.

Formed integral with crank arm 26 and shaft 27 is a gear wheel 44 which meshes with a gear wheel 45 pivoted on a stud 46 attached to a wall of housing 2. Projecting from the face of gear wheel 45 is an actuating pin 47 and a locking segment 48. These cooperate with actuating slots 49 and locking slots 50 formed in the periphery of a disk 51. Disk 51 forms what may be termed a star wheel. Disk 51 is fastened on a transverse shaft 52 journaled in suitable bearings 53 and 54 in the housing walls. Shaft 52 is connected to the lower end of guide post 16 by suitable spiral gearing as is indicated at 55 so that whenever shaft 52 is turned it turns post 16 in socket 16a.

The operation of the washing mechanism is as follows:—when the motor which is connected to shaft 12 is running, worm 32a which is fixed on shaft 12 drives worm wheel 32, and this in turn drives shaft 31. Whenever shaft 31 is turning, bevel gear wheel 35 drives bevel gear wheel 36 and the wringer shaft 39 so that at any time the wringer may be operated by connecting it to shaft 39 by its usual reversing gearing as is well understood in this art. If the clutch is in its extreme right hand position, i. e., "out" position, so that clutch pin 41 is not in an opening 42, then shaft 31 turns in shaft 27 as a bearing and shaft 27 remains stationary. However, when the clutch is in "in" position, as shown in the drawing, pin 41 being in an opening 42, then shaft 27 is connected to shaft 31 and turns with it. This turns crank 26 and through link 24 reciprocates cross head 21 on its guide post 22 and hence plunger rod 15 through the yoke connection 20. The reciprocation of plunger rod 15 actuates the suction cups or bells 13 up and down to perform the washing of the material in the tub in the well-understood manner.

In a washing machine of this type it is desirable that the suction cups or bells be given a step by step turning movement and this function is performed by the mechanism comprising gear wheels 44 and 45, star wheel 51, shaft 52, spiral gearing 55 and guide post 16. Gear wheel 44 turns with crank arm 26 and each time the crank arm and gear wheel make one revolution, gear wheel 44 turns gear wheel 45 one revolution. During the major portion of the revolution of gear wheel 45, locking segment 48 lies in one of the locking slots 50 of star wheel 51, locking it against turning movement. As locking segment 48 leaves a slot 50, actuating pin 47 engages the adjacent actuating slot 49 and turns star wheel 51 through a definite angle. When pin 47 leaves the slot 49, segment 48 engages the next locking slot 50 to again lock star wheel 51 against movement. When star wheel 51 turns, it turns shaft 52 through the same angle and this, through spiral gearing 55, turns guide post 16, plunger rod 15 and suction cups 13 through a corresponding angle. The arrangement is such that the suction cups are given this turning movement at the top of the stroke while they are above the materials in the tub which are being washed. During the remaining portion of the stroke they are locked against turning movement by the locking segment 48.

The washing machine mechanism described is substantially the same as that disclosed and claimed in my above-mentioned patent, and I will now describe my improved lubricating system as applied to this particular machine although it will be understood that it is not necessarily limited thereto.

According to my invention I provide an oil catcher or scraper comprising a block 56 attached to the top of bearing 28 by suitable screws 57, and carried by block 56 is a scraper member 58 which is pressed yieldingly into engagement with the side edge of gear wheel 44 by a spring 59 located in a socket 60 in the block. In bearing 28 directly below scraper member 58 is a small well or passage 61 which catches oil scraped off the side edge of gear wheel 44 by the scraper member and conveys it to an annular chamber 62 surrounding shaft 31. Shaft 31 is provided with an axially-extending passage 63 or, in other words, it is made hollow, and passage 63 is connected to annular chamber 62 by a suitable number of holes 64. Crank arm 26 is provided with a passage 65 which is connected to passage 63 in shaft 31 by holes 66 and to a chamber 67 in crank pin 25 by a hole 68. In crank pin 25 are oil holes 69. In the web 29 which supports bearing 28 are one or more holes 70 and in the web which supports bearing 30 are one or more holes 71. Also in the web of worm wheel 32 are spaced curved slots 72, and in shaft 31 is a hole 73 in line with bearing 30.

When the machine is to be put into service, a suitable quantity of lubricating oil is poured into the casing or housing 2, being preferably poured into the shallower portion 7. For example, it may be poured

down the frame tube 74 through which wringer drive shaft 39 extends. The oil will run through opening 71 in the web which supports bearing 30 into depression 10, and after filling depression 10 up to the level of opening 70 in web 29 will run through such opening to the botom of the deeper portion 4 of housing 2, establishing an oil level therein as indicated at 75. This oil level is such that star wheel 51 dips down into the oil and also such that the lower end of cross head 21 and crank pin 23 dip into it when at the bottom of their stroke.

Now, when the machine is running, star wheel 51 carries oil up on its periphery and some of this oil is transferred to gear wheel 45 and from gear wheel 45 to gear wheel 44, thus efficiently lubricating the meshing parts of these elements. Some oil will accumulate on the side edge of gear wheel 44 and this will be caught by the scraper member 58 and be scraped off by it and directed into the well or passage 61. From here the oil will flow to annular chamber 62 and from this chamber the major portion of the oil will pass through holes 64 to the axially-extending passage 63 in shaft 31. Some of the oil from chamber 62 will find its way to the bearing surfaces between shaft 27 and bearing 28 and between shaft 27 and shaft 31 as is indicated by the arrows, and also to the clutch for lubricating these parts.

Some of the oil from passage 63 will flow through hole 66 to the passage 65 in crank arm 26 and will be carried by centrifugal force through this passage to crank pin 25 to lubricate it and a small portion will be fed through hole 73 to lubricate bearing 30, the paths the oil follows being indicated by arrows. The remaining portion of the oil from passage 63 will flow out of the open end of the passage onto bevel gear wheels 35 and 36 to lubricate them and from there it will flow along bottom wall 9 through opening 71 to the depression 10. From depression 10 the oil overflows through hole or holes 70 back to the bottom of casing portion 4.

There is thus established a continuous circulation of oil to all these surfaces requiring lubrication and it will be seen that this is accomplished without providing any additional parts or mechanism except the scraper member 58. This means that the lubrication is effected without complicating the mechanism and without adding to it any parts which are costly or which are in any way likely to get out of order. Also the arrangement insures that the engaging surfaces of the worm drive comprising worm 32^a and worm wheel 32 are always submerged in oil.

Crank pin 23 is lubricated thoroughly because upon each stroke of the crosshead, it is carried beneath the oil level in the bottom of casing portion 4. The cross head is lubricated likewise because its lower end is carried down into the lubricant upon each stroke. The flow of oil to these parts is indicated by arrows. Also the reciprocation of the cross head serves to carry lubricant to guide post 16 and to spiral gearing 55, and also to splash lubricant onto these parts.

Thus it will be seen that all the mechanism is thoroughly lubricated and that the oil is kept in continuous circulation to the various parts requiring lubrication, the engaging surfaces of the worm and worm wheel being submerged always in a bath of oil.

The lubricating system herein disclosed and claimed has certain features in common with that disclosed and claimed in my before-mentioned patent and may be considered as being in the nature or an improvement over such system.

In accordance with the provisions of the Patent Statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. In a washing machine, the combination of a housing, a horizontal shaft journaled therein at a higher level, said shaft having an axially-extending passage in it, actuating mechanism connected with the shaft, said actuating mechanism including a rotating part which extends to a level above the axial passage in said shaft and a part which extends to a lower level, an oil scraper member associated with said rotating part at a level above said axial passage, a passage for conveying oil from the scraper member to the passage in the shaft, and conduit means for conveying oil from said passage in the shaft to surfaces requiring lubrication.

2. In a washing machine, the combination of a housing adapted to contain lubricant in its lower portion, a horizontal shaft journaled therein at a higher level, said shaft having an axially-extending passage in it, a gearing for driving the shaft, walls defining a depression in which at least the engaging surfaces of said gearing is located, an actuating train connected to said shaft and extending towards the bottom of the housing, an oil scraper member associated with said train at a level above said shaft, a conduit for conveying oil from said scraper to the passage in said shaft, and a conduit for conveying oil from said passage to the depression in which the gearing is located.

3. In a washing machine, a housing hav-

ing a shallower portion and a deeper portion, a web extending transversely across said shallower portion and provided with an opening defining an oil level in the shallower portion, a shaft journaled in the shallower portion and provided with an axially-extending passage, rotating mechanism connected to said shaft and depending into the deeper portion of the housing, an oil scraper associated with said rotating mechanism and located at a level above said shaft, and conduit means for conveying oil from said scraper to the axially-extending passage in said shaft from whence it is distributed to parts requiring lubrication and to the shallower portion of the housing so as to build up an oil level in front of said web.

4. In a washing machine, the combination of a housing, a horizontal shaft journaled therein and provided with an axially-extending passage, crank arm on said shaft, a crank pin on said crank arm, said arm being provided with a conduit leading to the crank pin, a rotating element connected to the shaft, an oil scraper for scraping oil off said rotating element, and conduit means for conveying oil from the oil scraper to the passage in said shaft and from thence to the conduit in said crank arm.

5. In a washing machine, a housing adapted to contain a supply of lubricant in its lower portion, a shaft journaled in the housing adjacent its upper end, said shaft having an axially-extending passage, operating mechanism in the housing, said mechanism including a gear wheel on said hollow shaft and a portion which dips into lubricant in the housing, a scraper member associated with said gear wheel at a level above that of the shaft to which said gear wheel is connected, means defining a passage for conveying lubricant from the scraper member to the passage in the shaft, and means providing conduits for conveying lubricant from the passage in the shaft to parts requiring lubrication.

In witness whereof, I have hereunto set my hand, this 23rd day of May, 1924.

GEORGE E. RANDLES.