United States Patent

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[33] **Japan**
[31] **43/75869 and 43/84388**

[54] **COMPACT LUBRICATING PUMP AND ENGINE ARRANGEMENT FOR AN OUTBOARD MOTOR**
12 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **184/6 Y,** 123/179 SE
[51] **Int. Cl.** **F01m 1/02**
[50] **Field of Search** ..... 184/6 Y, 6; 115/17, 18; 123/179 M, 179 O

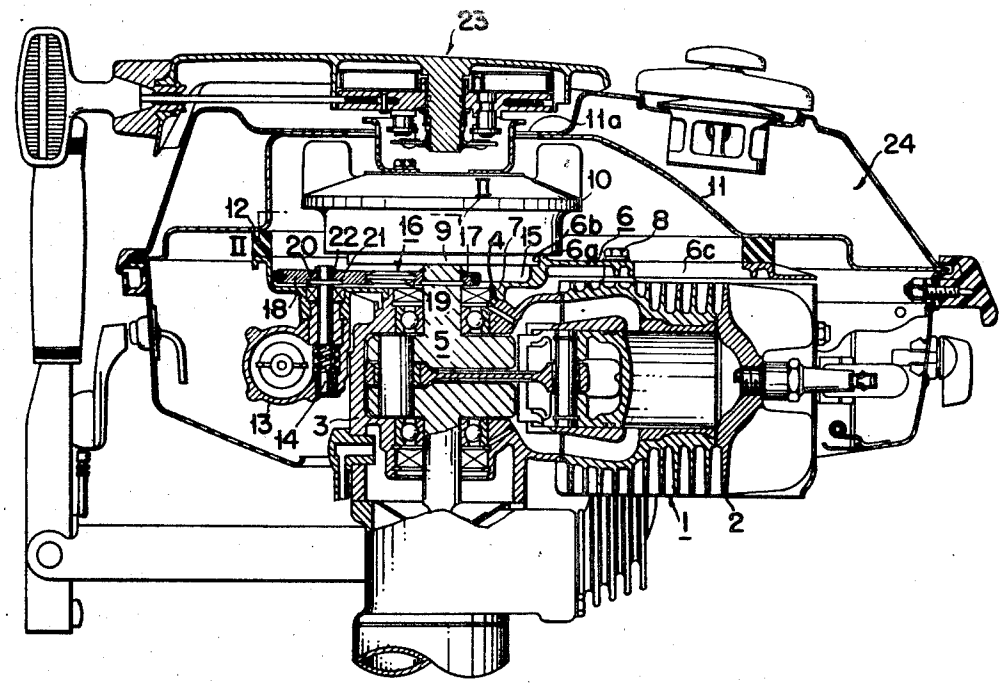
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ABSTRACT: An outboard motor wherein the fitting arrangement of a lubricating pump for lubricating an internal combustion engine is so designed to be simple and compact and a transmission gear mechanism for connecting the crankshaft of an engine to said pump is saved from the deposition of water drops or water scales by said arrangement.

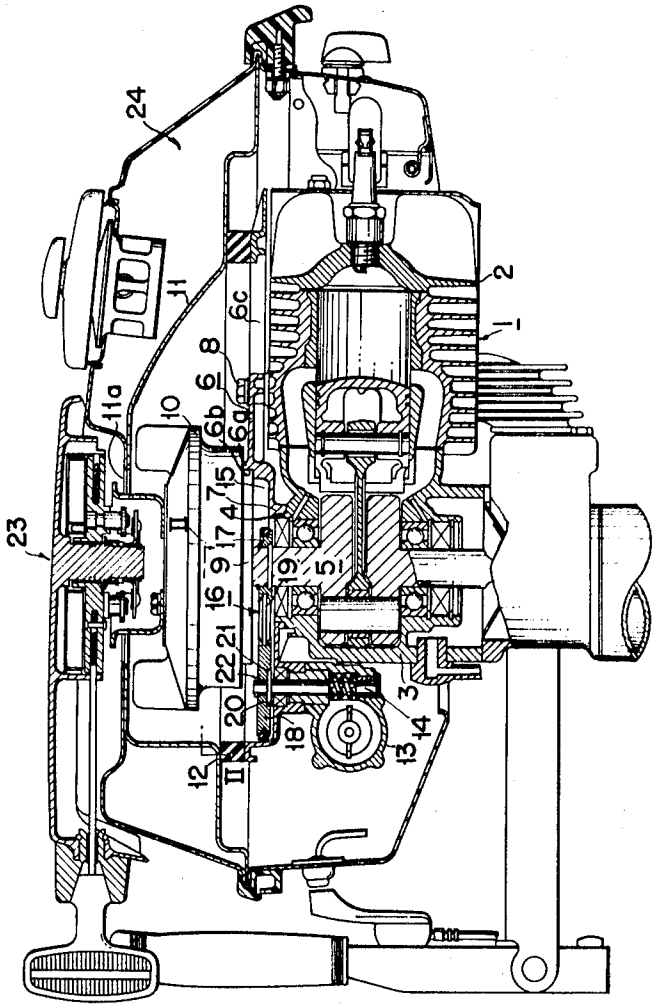


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FIG. 1



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FIG. 2

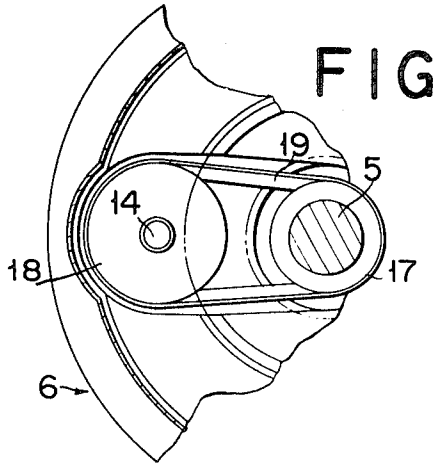
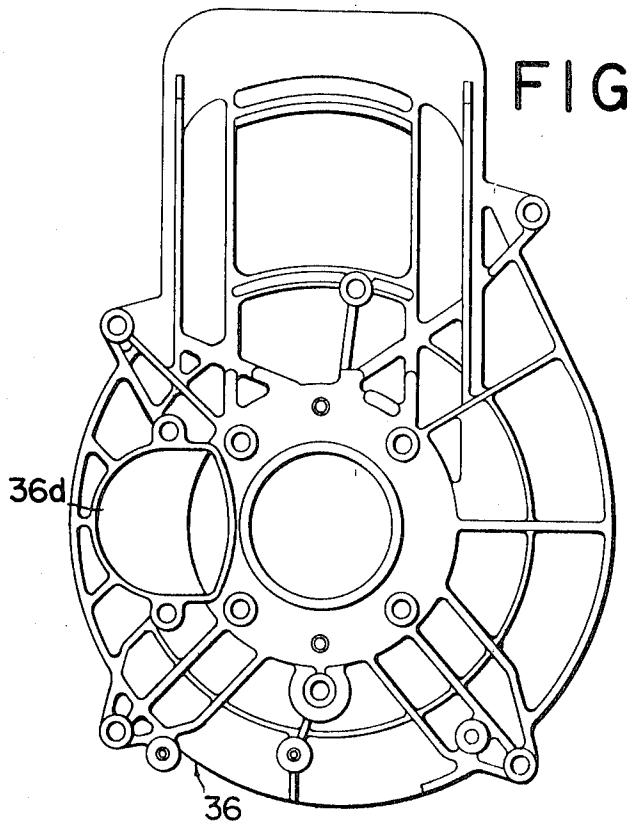


FIG. 4

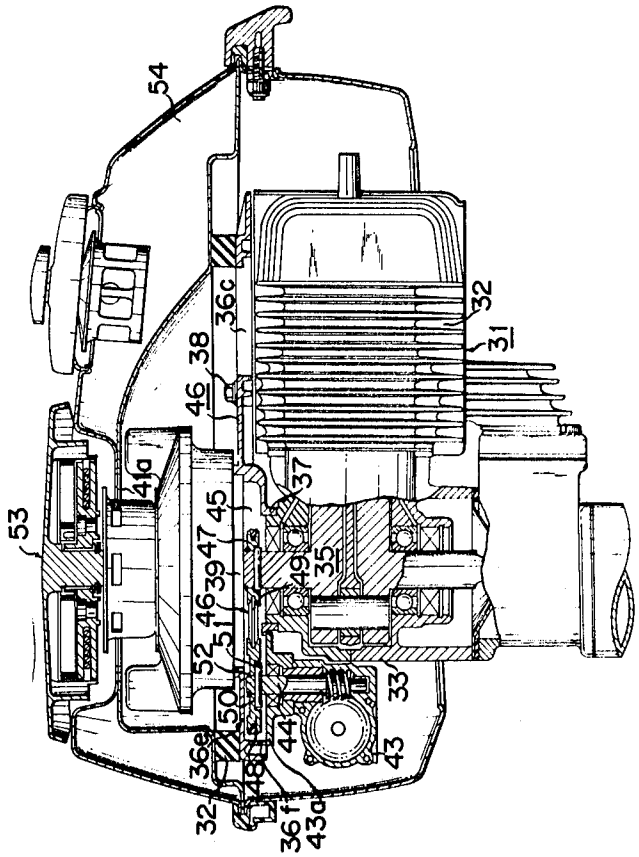


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FIG. 3



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FIG. 5

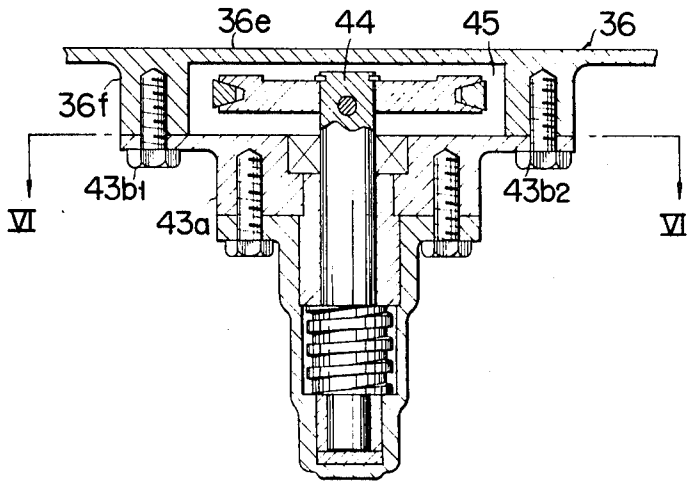
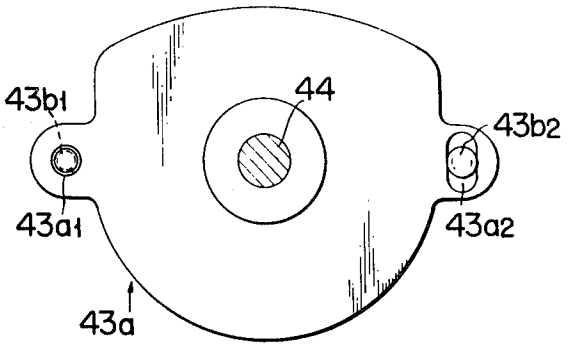


FIG. 6



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COMPACT LUBRICATING PUMP AND ENGINE ARRANGEMENT FOR AN OUTBOARD MOTOR

This invention relates to an outboard motor provided with a lubricating pump.

A principal object of the invention is to provide a simple and compact arrangement which enables the lubricating pump to be fitted with high precision and also prevents water drops or water scales from being deposited on a transmission gear mechanism for connecting the crankshaft of an engine to said pump.

Another object of the invention is to provide a transmission gear mechanism requiring substantially no lubrication.

Other objects and advantages of the invention will be apparent from the following description when taken in connection with reference to the appended drawings, in which:

FIG. 1 is a fractional longitudinal section of a power head according to an embodiment of the invention;

FIG. 2 is a fractional sectional view on line II—II of FIG. 1;

FIG. 3 is a fractional elevation, with part broken away, of a power head according to another embodiment of the invention;

FIG. 4 is a bottom view of the mounting plate of FIG. 3;

FIG. 5 is a sectional view on line V—V of FIG. 3; and

FIG. 6 is a sectional view on line VI—VI of FIG. 5.

Referring to FIG. 1, the engine is of two-cycle internal combustion type, the housing 1 of which mainly comprises a cylinder 2 and crankcase 3. The crankcase 3 supports a vertical crankshaft 5 rotatably, and is provided with a circular collar 4 concentric with the crankshaft 5. The mounting plate 6 has a hub 7 whose bore is fitted with the circular collar 4, and is fixed to the engine housing 1 by bolts 8. The mounting plate 6 is provided with a circular projection 6*a* and a stepped bore 6 *b* formed coaxially with the hub 7. And a stator plate 9 for supporting the stator of a magneto is fitted into the stepped bore 6 *b*. To the upper end of the crankshaft 5 whose lower end is connected to a propeller (not shown) is fitted a rotary member 10 whose periphery faces the circular projection 6*a* at a slight space. This rotary member 10 is so adapted as to be concurrently used as the rotor of the magneto, the rotor of a blower for air cooling the engine and the fly wheel of the engine.

To this end, the blower casing 11 is fitted substantially airtight to the periphery of the mounting plate 6 by the medium of a gasket 12, so that the air sucked in through the upper inlet opening 11*a* of the blower casing 11 is ejected out of an outlet opening 6*c* perforated in the mounting plate 6 to cool the cylinder 2. Under that portion of the mounting plate 6 which extends outward from the crankcase 3 is disposed a lubricating pump assembly 13. The driven shaft 14 of the lubricating pump is set parallel to the crankshaft 5, one end of which projects to the upper side of the mounting plate 6 or into the blower casing 11. Since the mounted plate 6 is mounted on the engine housing 1 with high precision from the necessity of being fitted with a magneto stator, the lubricating pump assembly 13 fitted to the mounting plate 6 can be naturally fixed with precise relation to the crankshaft 5 carried by the engine housing 1. A suitable lubricating pump for the purpose of the present invention will be the type disclosed in the U.S. Pat. No. 3,302,752. Between the mounting plate 6 and stator plate 9 is allowed a void space 15, where there is disposed a transmission gear mechanism 16 for connecting the crankshaft 5 and driven shaft 14. This transmission gear mechanism 16 preferably consists of, as shown in FIG. 2, driving pulley or wheel member 17 fitted to the crankshaft 5 through an axial bore, driven pulley 18 fitted to the driven shaft 14 similarly and a V-belt 19 stretched over them. On the bottom side of each of the pulleys 17 and 18 is formed a groove 20 extending from the axial bore in the radial direction. Into the groove 20 is releaseably inserted an engaging member or pin 21 fitted to each of the shafts 5 and 14. On the upper side of each pulley is provided a retaining ring 22 engaged with each shaft so as to prevent the pulley from coming off, so that the transmission gear mechanism 16 is securely received in the aforesaid narrow space 15. The numerals 23 and 24 of FIG. 1 represent a starter and fuel tank respectively.

The difference between the foregoing embodiment and the other embodiment jointly illustrated by FIGS. 3 to 6 lies in the construction of the mounting plate. Accordingly, there will be described hereinafter only said difference, and the same parts of the latter embodiment as those of the preceding one are indicated by adding a number of 30 to the respective numerals given in the figures associated with the former embodiment.

According to said latter embodiment of the invention, there is an opening 36*d* in the mounting plate 36 which is perforated (see FIG. 4), and there is attached to a lubricating pump assembly 43 a flange 43*a* (see FIG. 6) which is so disposed as to cover the opening 36*d*. In one of the lugs of the flange 43*a* is formed a round aperture $43a_1$ and in the other lug an elongated aperture $43a_2$. The flange 43*a* is fitted to the mounting plate 36 by bolts $43b_1$ and $43b_2$ passing through said apertures $43a_1$ and $43a_2$ (see FIG. 5). When the bolts are loosened, the flange 43*a* can rotate about the bolt $43b_1$ to vary the axial distance between the shafts 35 and 44, thus allowing the tension of a transmission belt 49 to be adjusted. The mounting plate 36 has an upper wall 36*e* facing the opening 36*d* and a sidewall 36*f* surrounding the transmission gear mechanism 46. These walls 36*e* and 36*f*, the stator plate 39 of the magneto and the flange 43*a* of the lubricating pump constitute a substantially airtight chamber 45, in which there is received said transmission gear mechanism.

What is claimed is:

1. A lubricating device for an outboard motor comprising an engine having a driving shaft for driving a propeller, a mounting plate fixed to the upper part of an engine housing and a rotary member fitted to the upper end of said driving shaft penetrating the mounting plate with a prescribed clearance allowed between said rotary member and mounting member; said device comprising a lubricating pump having a driven shaft and fitted to said mounting plate and a transmission gear mechanism positioned in said clearance with its driving and driven wheel member fitted to both shafts for their coupling.

2. The outboard motor according to claim 1 wherein the mounting plate is fabricated into a substantially hollow form and the transmission gear mechanism is received in said hollow interior to be sealed airtight.

3. The outboard motor according to claim 1 wherein the transmission gear mechanism, together with the rotary member, is substantially enclosed in the casing of said rotary member.

4. The outboard motor according to claim 1 wherein the transmission gear mechanism consists of pulleys fitted to the driven shaft of the lubricating pump and the driving shaft of the engine respectively and a transmission belt stretched across the pulleys.

5. The outboard motor according to claim 4 wherein at least one of the pulleys is provided on one side with a groove extending from its axial bore in the radial direction, there is fitted into the groove an engaging member projecting from the periphery of the corresponding shaft, and there is detachably engaged a retaining ring on the other side of the pulley so as to prevent the pulley from coming off.

6. The outboard motor according to claim 4 wherein the lubricating pump is movably fitted to the mounting plate so as to allow the tension of the transmission belt to be adjusted as required.

7. An outboard motor comprising:

a. an engine including an engine housing and a driving shaft for driving a propeller;

b. mounting plate fixed to the upper part of the engine housing, said driving shaft penetrating said mounting plate;

c. a driving shaft upper end, extending out from said mounting plate;

d. a rotary member, spaced from said mounting plate fitted to said upper end of said driving shaft;

e. a lubricating pump, including a driven shaft, fitted to the mounting plate; and

f. a transmission gear mechanism, positioned in said space between the mounting plate and the rotary member functionally connecting the driven shaft of the lubricating pump and the driving shaft of the engine.

8. The outboard motor according to claim 7, wherein the mounting plate is substantially hollow and airtight and the transmission gear mechanism is disposed in said hollow airtight interior.

9. The outboard motor according to claim 7, wherein said rotary member includes a casing, and the transmission gear mechanism, together with the rotary member, is substantially enclosed in said casing of said rotary member.

10. The outboard motor according to claim 7, wherein the transmission gear mechanism consists of pulleys fitted to the driven shaft of the lubricating pump and the driving shaft of the engine respectively and a transmission belt is stretched between said pulleys.

11. The outboard motor according to claim 10, wherein at least one of the pulleys includes:

a. a groove on one side thereof, extending from said pulley axial bore in the radial direction;

b. an engaging member, fitted into said groove projecting from the periphery of the corresponding shaft; and

c. a retaining ring detachably engaged on the other side of said pulley so as to prevent the pulley from coming off.

12. The outboard motor according to claim 10, wherein the lubricating pump is movably fitted to the mounting plate so as to allow the tension of the transmission belt to be adjusted as required.