May 5, 1931. F. T. IRGENS ET AL 1,803,618

TIMER MOUNTING AND DRIVE

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FIG. 1.

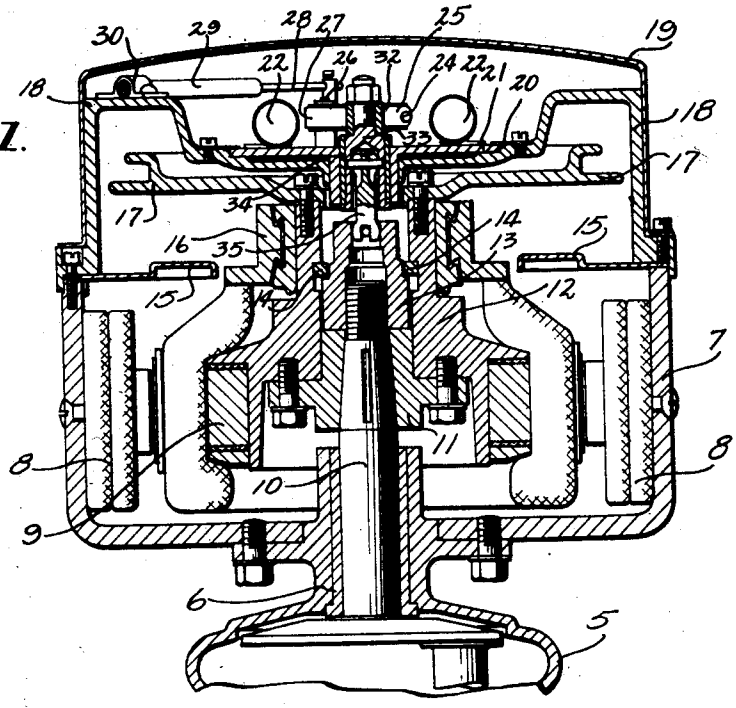

FIG. 2.

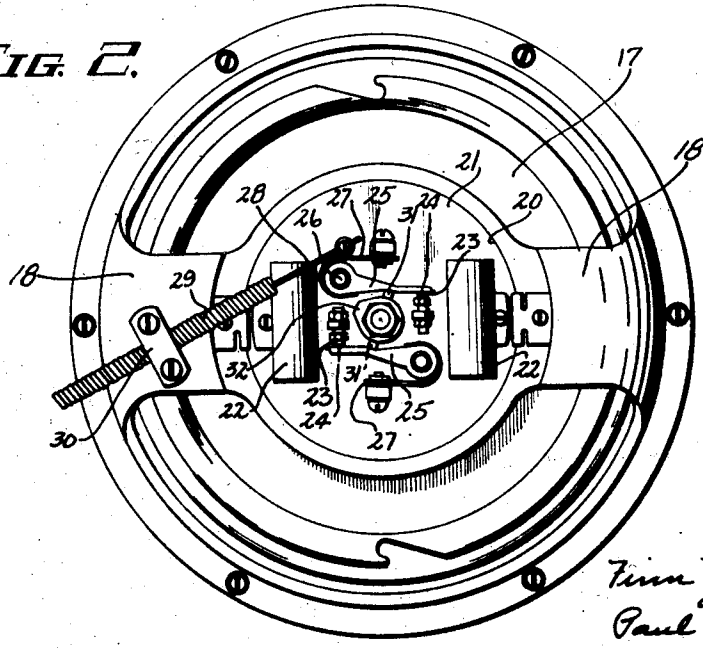

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FIG. 3.

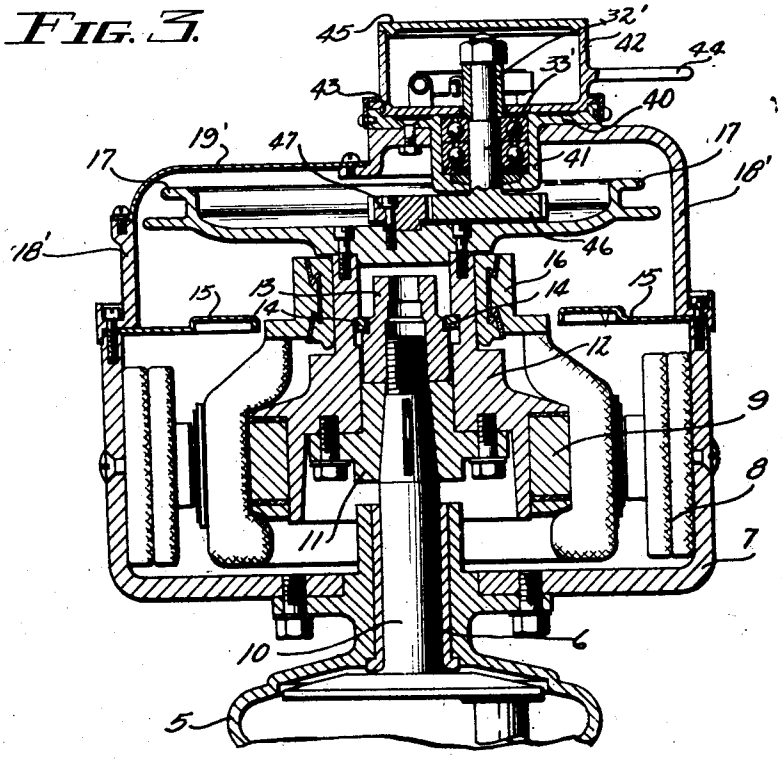
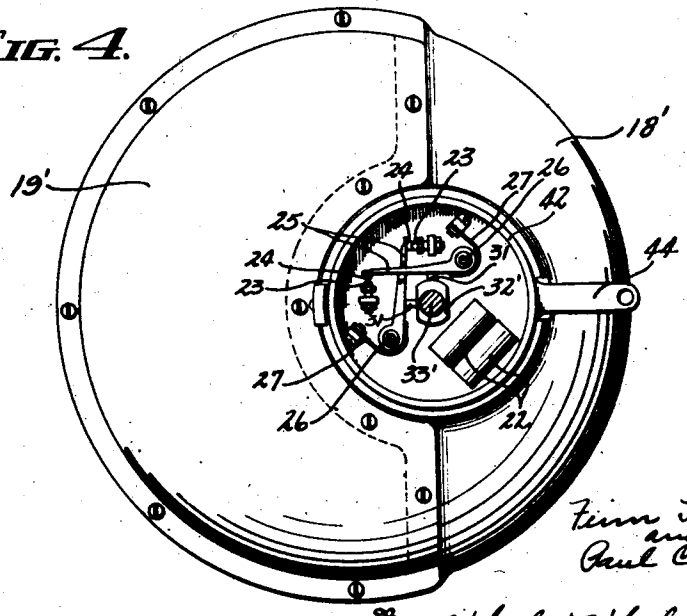


FIG. 4.



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Patented May 5, 1931 1,803,618

UNITED STATES PATENT OFFICE

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TIMER MOUNTING AND DRIVE

Application filed June 19, 1930. Serial No. 462,379.

This invention relates to improvements in timer mountings and drives, with particular reference to the type of engines used in outboard motor practice.

In an outboard motor the cylinders are usually horizontal and the crank shaft vertical. The crank shaft projects above the crank case to receive the armature of an electric starting motor, or a rope starter disk, or both. A supplemental bearing for the end of the shaft remote from the crank case adds a great deal of expense and complicates the mounting of the starting motor. Yet without such a bearing there is sufficient displacement of the crank shaft or the motor armature shaft to affect seriously the accuracy of a timer wherein the moving timer parts take a position from the crank shaft by a direct mounting thereon.

Accordingly, it is the primary object of the present invention to provide a timer mounting in which the moving parts are provided with a bearing entirely distinct from that of the vertical crank shaft of an outboard motor, and are flexibly coupled thereto without increase in weight or expense which would be necessary to provide a bearing for the shaft itself.

More particularly stated, it is our purpose to provide a bracket upon which the normally stationary portions of a timer are adjustable in a rotatable way, and in which the movable part of the timer is journaled for rotation independently of forces acting to distort the motor shaft, a suitable flexible coupling being provided between the motor shaft and the timer, which in certain instances, may be used to reduce the speed of timer operation. The invention is peculiarly adapted for use in electrically started outboard organizations in which the length of crank shaft projecting above its bearing is unusually long and the lateral strains thereon are unusually severe.

In the drawings:

Figure 1 shows a vertical axial section through a device embodying this invention.

Figure 2 is a plan view of the timer shown in Fig. 1 with the top of the casing removed.

Figure 3 is an axial section through a modified device embodying this invention.

Figure 4 is a plan view thereof, with the timer cap removed.

Like parts are identified by the same reference characters throughout the several views.

The outboard motor engine crank case 5 is provided with a bearing 6 upon which is bolted the field housing 7 for an electric starting motor having a field 8 secured to the housing and an armature 9 mounted on the tapered end of crank shaft 10. An adapter 11 is bolted to the fitting 12 which carries the armature and thereby adapts such fitting for the particular crank shaft 10 employed. The adapter is held in place by a special nut 13 disclosed and claimed in the co-pending companion application of Finn T. Irgens entitled "Armature nut and puller". This nut is shouldered to engage a split ring 14 fitted into a groove undercut in fitting 12, whereby the unscrewing of nut 13 is adapted to act through fitting 12 to withdraw the adapter 11 from the tapered end of shaft 10 and thereby to effect the dismounting of the armature from said shaft.

An annular closure 15 for the motor casing is provided with an opening through which the commutator 16 of the motor projects. A rope starter pulley at 17 is screwed to the fitting 12 above the commutator for emergency use. It is surmounted by the timer bracket 18, and the motor and timer are both housed within the cover 19.

In accordance with the present invention the bracket 18 is provided with a recessed seat 20 for a rotatably adjustable disk 21 upon which are mounted the condensers 22 and the relatively fixed contacts 23, movable contact 24, cam follower levers 25, fulcrum pins 26 for such levers, and the springs 27 which normally maintain the contacts closed. A Bowden wire 28, of which the sheath 29 is anchored at 30 to the bracket 18, serves as a control to determine the angular position of the disk or plate 21 which carries the timer parts. Obviously, the rotation of this disk in its bearing seat 20 will determine the position of cam followers 31 with respect to the

operative faces of cam 32, and will thereby determine the timing of the ignition in the usual way.

An important feature of the invention consists in the fact that the timer cam 32 is carried by the short length of shafting 33 journaled in a sleeve 34 of disk or plate 21 and flexibly connected by means of coupling 35 with a cross pin in nut 13.

This permits the timer assembly to be separated unitarily by mere axial movement from the starting motor when the bracket 18 is unscrewed. The withdrawal of an armature is thus facilitated very greatly as compared with the use of any other timer drive or mounting.

It will be obvious that the arrangement is such that the timer cam is flexibly and detachably connected to receive motion from the crank shaft 10 without being in any way subject to the lateral deflection or distortion of such shaft. At the same time the whole timer mechanism is so readily removable from the motor housing as to offer practically no obstacle to repair or replacement of the armature, and the expense which would otherwise be involved in providing an adequately rigid bearing for the end of the crank shaft is also avoided.

Similar results are obtained in the use of the construction shown in Figs. 3 and 4, in which the bracket 18′ carries a socketed bearing member 40 having a depending sleeve 41 provided with anti-friction bearings for the timer shaft 33′.

The timer shell 42 is rotatable in the socket of plate 40, being guided in its rotative adjustment by the annular flange 43 at the margin of said plate. A handle 44 is adapted to receive a connection for manipulating the timer, and a removable cover 45 is provided for the timer mechanism.

Instead of being provided with a link coupler connecting it to the crank shaft, the timer shaft 33′ carries a gear 46 which meshes with a pinion 47 mounted on the starter disk 17. If the pinion and gear are so made as to have a 1 to 2 ratio, the timer shaft 33′ and the cam 32′ carried thereby, will operate at one half crank shaft speed, thereby requiring a different arrangement of the timer mechanism from that shown in Fig. 2.

In the Fig. 4 construction the condensers 22 are closely associated and the cam follower arms 25 cross each other to provide cam followers 31 at 90 degrees separation angularly about the axis of cam 32′. The cam itself is provided with two noses whereby its operation at one half crank shaft speed will nevertheless produce the required number of makes and breaks of the two sets of contact points 23 and 24.

In the construction shown in Figs. 3 and 4, like that shown in Figs. 1 and 2, the timer shaft is provided with a bracket bearing entirely distinct from any crank shaft bearing, and the coupling between pinion 47 and gear 46 is equivalent to the flexible link connection shown in Fig. 1, inasmuch as it provides for the transmission of crank shaft rotation to the timer shaft with sufficient flexibility to relieve the timer shaft and the timer shaft bearing of crank shaft deflection. In both the constructions the timer shaft is journaled co-axially with the rotatably adjustable parts upon which the breaker points are located, and thereby the essential timing relation is preserved at all times.

We claim:

1. The combination with an engine crank shaft and a crank casing providing a bearing therefor, of a bracket rigidly connected with said casing, a rotatably adjustable timer support mounted on said bracket, and a timer shaft journaled co-axially with said support in a position determined by said bracket and flexibly coupled to said crank shaft to receive motion therefrom at a point spaced from said bearing.

2. In a device of the character described, the combination with a crank shaft and a crank case provided with a crank shaft bearing, of starting means mounted on the end of the crank shaft projecting beyond said bearing, a bracket extending around said starting means and rigidly connected with the crank case, a timer mounting journaled for rotative adjustment upon said bracket, a timer cam rotatably mounted co-axially with the bearing upon which said mounting is rotatably adjustable, and motion transmitting connections operatively connecting said crank shaft and cam and including flexible coupling means adapted to permit said crank shaft to yield in accordance with the requirements of said starting means and without affecting the relation of said cam to said timer mounting.

3. In a device of the character described, the combination of a crank shaft and a crank case provided with a crank shaft bearing, of a starting device for said crank shaft including a part detachably applied thereto, a bracket extending about said part and detachably connected with said crank case, timing mechanism including a rotatably adjustable contact mounted and a co-axially rotatable timer cam supported upon said bracket, and flexible motion transmitting connections between said crank shaft and said cam including coupling means adapted to operate said cam without transmitting crank shaft deflection thereto, said coupling means being freely engageable and disengageable in a direction longitudinally of the crank shaft, whereby to permit the bodily unitary removal of said bracket and the timing mechanism carried thereby for the disengagement of said part from said crank shaft.

4. In a device of the character described, the combination with a crank shaft and crank

case provided with a crank shaft bearing, of a starting motor including a part mounted on said crank shaft, a timer removably connected with said crank case and disposed beyond said starting motor, and a coupling connecting said timer with said crank shaft and freely engageable and disengageable in an axial direction, whereby to facilitate the bodily removal of said timer.

5. In an outboard motor, the combination with a crank case provided with a crank shaft bearing and a crank shaft projecting from said bearing, of a starting motor housing mounted on said crank case about the projecting end of the crank shaft and provided with a field secured to said housing, an armature removably connected with the crank shaft within said housing, a bracket connected with said housing and extending across a portion of said armature, timer mechanism mounted in said bracket and including breaker points, and a timer cam journaled for rotation with respect to said bracket, and motion transmitting connections between said shaft and said timer cam, including a coupling part connected with said cam, and a coupling part connected with said armature, said parts being flexibly engaged in the normal position of said bracket, and freely disengaged in an axial direction whereby to permit the unitary removal of said bracket and timer.

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