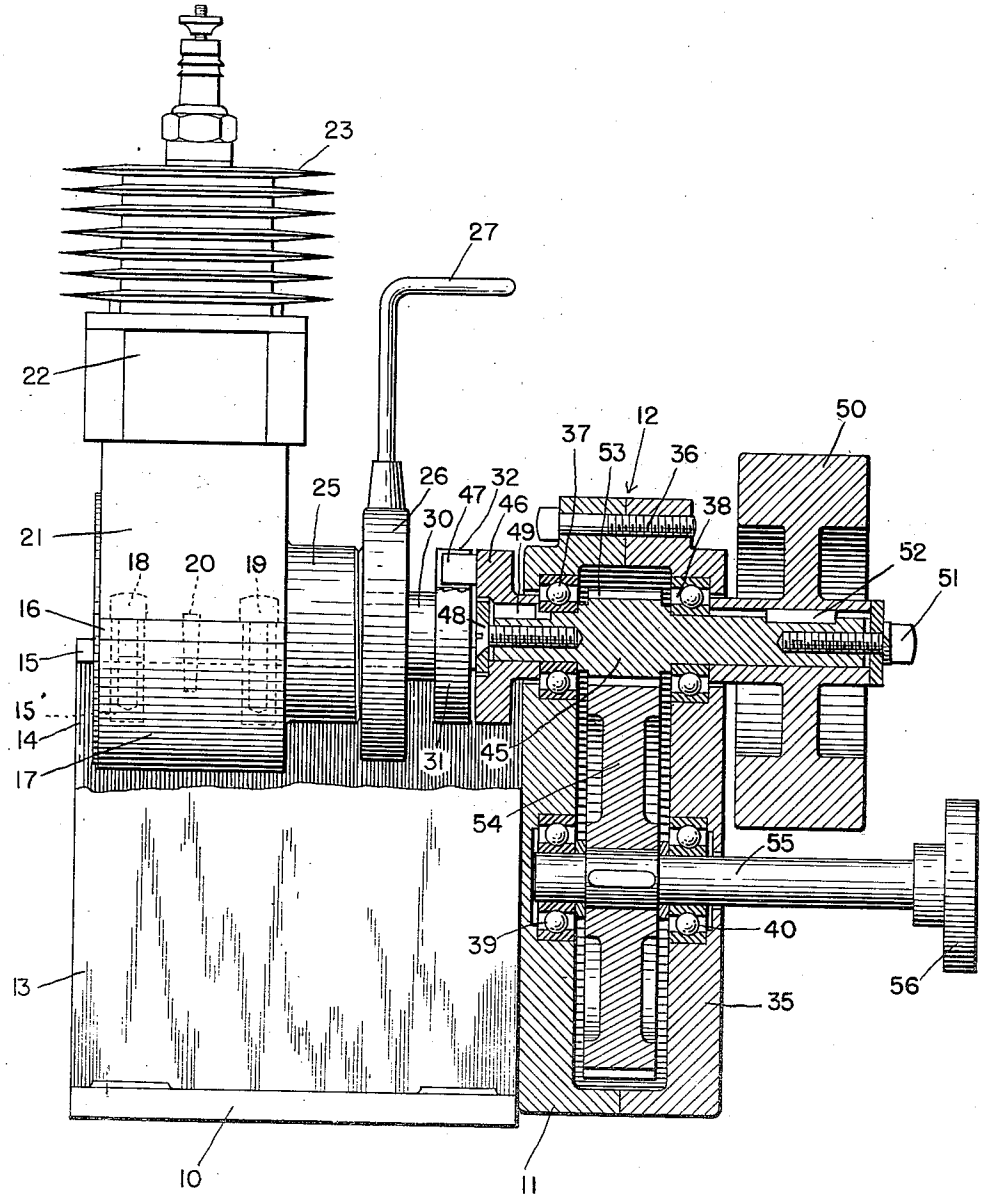
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INTERNAL-COMBUSTION ENGINE

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INTERNAL-COMBUSTION ENGINE

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3 Claims. (Cl. 121—194)

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The present invention relates to internal combustion engines. More particularly, it is concerned with relatively small, lightweight engines of the type employed in small boats. Although not confined to marine use, the invention has particular utility in that field.

A primary object of the invention is to provide an internal combustion engine in which the parts thereof most likely to become worn in use and, therefore, to require repair, may be removed as a unit from the place where the engine is installed and separated from the remaining elements of the engine, without disturbing the latter.

It is well-known that internal combustion engines are comprised of rapidly moving, reciprocating parts, such as pistons, connecting rods and bearings, which become worn in use, requiring repair and replacement, and other parts, such as rotatable shafts, bearings, gears, flywheels and the like which seldom if ever require attention. It is the primary object of the invention to so design the engine as to separate the relatively light and relatively quickly wearing parts from the heavier, long-lived parts, so that the former, as a unitary assembly may be removed from the latter for repair and replacement, without disturbing the latter assembly.

Engines constructed in accordance with the present invention have particular utility in connection with small boats and the like situated in remote places, far distant from repair facilities. The worn prime mover assembly of an engine of this type, consisting of the cylinder, piston, connecting rod, crank shaft and crank case may be readily removed from the supporting base, gear box, flywheel and drive shaft, and shipped to the repair shop while, if desired, a spare assembly may be quite readily mounted in place, for cooperation with the other assembly, to the end that the boat need not be out of service.

In the accompanying drawing, an embodiment of the invention is shown, somewhat diagrammatically, in order to illustrate the principles of the invention, and it must be understood that the invention is not limited to the details thereof.

The single figure of the drawing is a side elevation and partial vertical section, with certain parts broken away, showing a single cylinder two-cycle engine in accordance with the invention.

A base casting 10 may be formed as an integral part of or be attached to one-half 11 of a reduction gear housing 12, and may include a pair of parallel upwardly projecting side frame members 13 and 14, having inwardly turned upper marginal flanges 15, upon which the laterally projecting flange 16 of a unitary engine crank case 17 may be bolted, by four bolts, two on each side, as indicated at 18 and 19, extending into threaded bores formed in bosses 15', integral with flanges 15. The position of the crank case with respect to the base may be accurately determined by dowel pins 20.

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The engine further comprises an upper crank case section 21 and a cylinder 22, which may include air cooling fins 23 as is well understood in the art.

The constructional details of the crank case, cylinder, piston, connecting rod and crank shaft, and the bearings associated therewith form no part of the present invention and, therefore, are not illustrated in the accompanying drawing.

A cylindrical enlargement 25, projecting rearwardly from the crank case may support the circular casing 26 of the ignition timer of a well-known type. By shifting the timer handle 27, circumferentially around the axis of the extension, the speed of the engine may be controlled, as well as its direction of rotation.

A coupling 30, fixed on the end of the engine crank shaft includes an enlarged, integral disk 31, having a socket 32 formed in its periphery and extending entirely through the disk.

Any suitable form of carburetor may be employed, as is well understood in the art, and may be mounted upon the crank case 17 of the engine or, if desired, upon the base 10.

The reduction gear housing 12 includes a second section 35, secured by screws 36 to the first section 11, and the two sections are shaped to receive two pairs of aligned ball bearing assemblies 37, 38, 39, 40. A stub shaft 45, journalled in the bearings 37, 38 carries on its forward end a coupling element 46 having a projection 47, received in the socket 32 in nicely fitting relation. The coupling element may be secured to the shaft 45 by a suitable screw 48 and key 49.

A flywheel 50, mounted on the rear end of the stub shaft 45, is secured in place by a cap screw 51 and key 52.

The shaft 45, intermediate its ends is formed with a relatively small spur gear section 53, in mesh with a larger gear 54, fixed on a shaft 55, journalled in the bearings 39 and 40. The shaft 55 may be connected by a coupling 56 to the propeller shaft of the boat or to any other power take-off device.

As a result of this construction, the heavy parts of the engine and the parts least subject to damaging wear, such as the reduction gear hous-

ing, reduction gears, the bearings therefor, the flywheel and the power take-off shaft are all substantially permanently mounted in the boat or other place where they are adapted to operate. Hence, they constitute a substantially permanently mounted assembly.

The other, lighter parts, which are subject to wear and which must be repaired from time to time are readily removable, as a unitary assembly, from the supporting base, by simply removing the four attaching bolts, two of which are shown at 18 and 19, removing the dowels 20, and separating the coupling elements 31 and 46. The carburetor and similar parts may be removed with the removable assembly or left upon the base, depending upon the manner in which they are mounted.

The invention is not confined to single cylinder two-cycle engines, but includes all types coming within the scope of the appended claims and their equivalents.

I claim:

1. An internal combustion engine comprising two unitary assemblies, one assembly comprising a cylinder, a piston, a crank case, and a crank shaft permanently journalled in said case and the other assembly comprising a reduction gear casing, shafts journalled in the casing and projecting outwardly therefrom and a flywheel on an outwardly projecting portion of one of said shafts; and readily separable and connectible coupling means on the crank shaft and an outwardly projecting portion of the last-mentioned shaft, whereby the first assembly may be removed from the second for repair or replacement by a similar assembly, without disturbing the second assembly.

2. An internal combustion engine comprising a fixed base, two unitary assemblies mounted on the base and readily separable and connectible coupling means for said assemblies, one assembly comprising a cylinder, a piston, a crank case, and a crank shaft journalled in the crank case, all removably mounted on the base, and the other assembly comprising a reduction gear housing, a stub shaft journalled in the housing, with its ends projecting therefrom, in axial alignment with said crank shaft, a flywheel on the end of said stub shaft remote from the first assembly, a second shaft journalled in the housing and intermeshing gears on the stub shaft and the second shaft, said coupling means comprising interengaging elements on the stub shaft and crank shaft respectively, disposed between the adjacent ends of the crank case and the gear housing, whereby the first assembly may be removed as a unit from the base for repair and replacement, without disturbing the second assembly.

3. An internal combustion engine comprising a base and two unitary, readily separable assemblies, one assembly comprising a cylinder, a piston, a crank case, a crank shaft journalled therein, an ignition timer, and a coupling element on one end of the crank shaft, the other assembly comprising a reduction gear housing substantially permanently secured to said base, a gear shaft journalled in said housing in alignment with the crank shaft and having its ends projecting outside of the housing, a coupling element on one end of the gear shaft in interengaging relation with the first-mentioned coupling element, a flywheel on the other end of the gear shaft, a second gear shaft journalled in the housing, offset from the first, and intermeshing reduction gears on the gear shafts, whereby the first assembly may be readily removed as a unit from the base for repair and replacement, without disturbing the second assembly.

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