

[54] NEUTRAL START ONLY MECHANISM  
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74/850

[56]                      References Cited

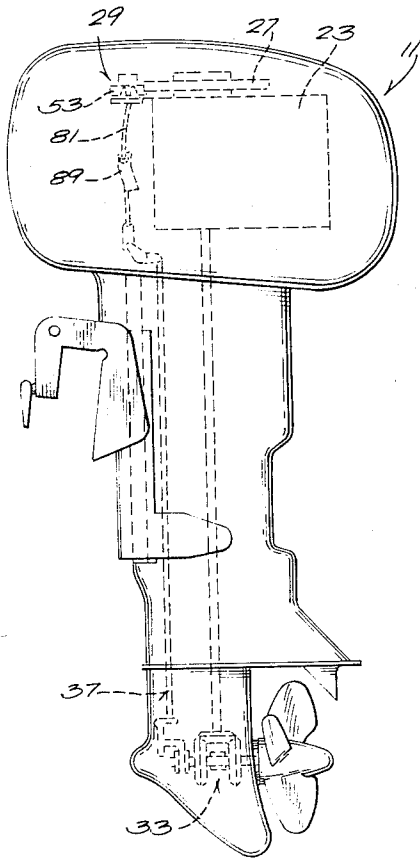
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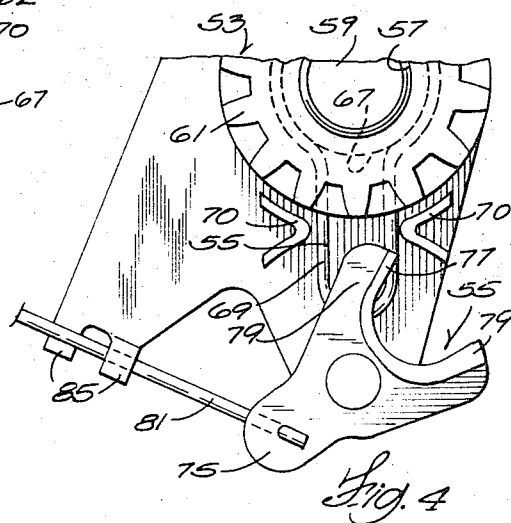
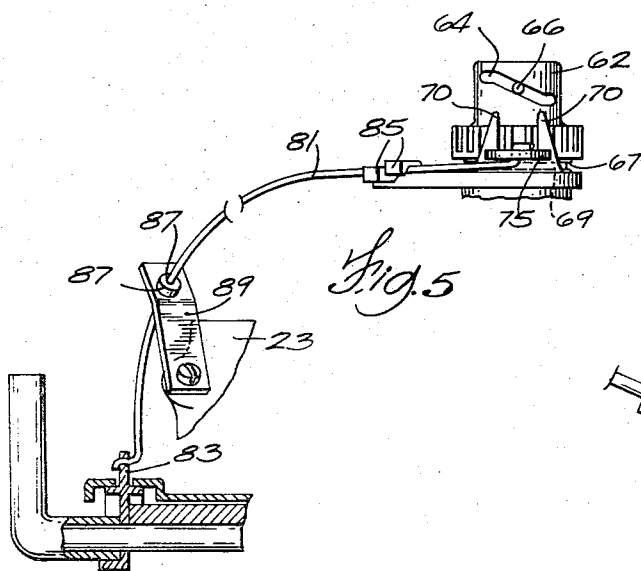
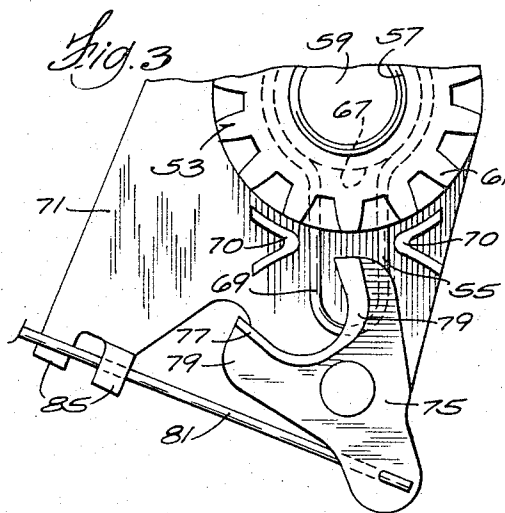
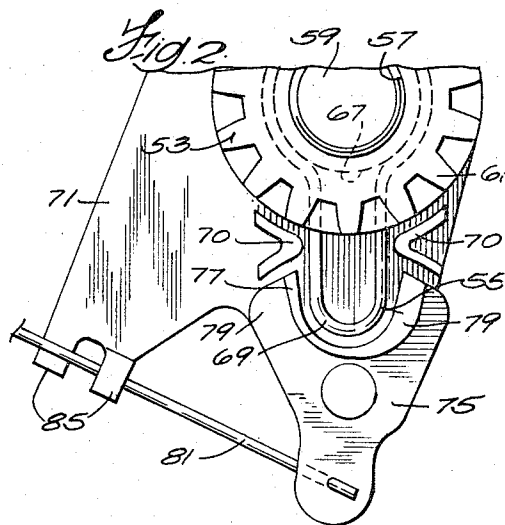
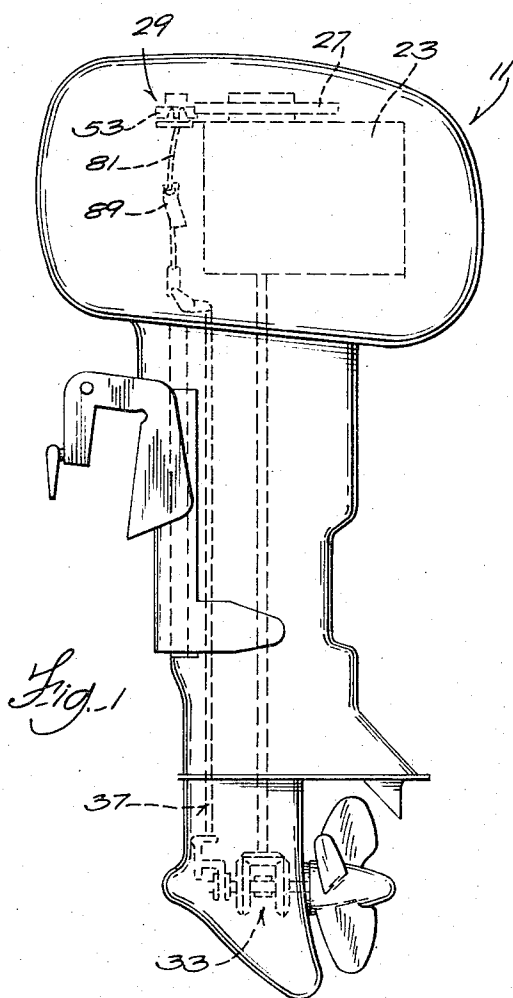
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Attorney—Robert E. Clemency et al.

[57]                      ABSTRACT

Disclosed herein is an engine including a reversing clutch and a starter pinion, together with a clutch actuating member movable relative to a neutral position, means for causing axial movement of the starter pinion toward a starting gear engaging position in response to rotation of a drive member and including a spring and means connecting the spring to the starter pinion for releasably and frictionally restraining rotary movement of the starter pinion and for common movement of the spring with the starter pinion axially of the axis of starter pinion rotary movement, a blocking element pivotally movable relative to a position blocking movement of the spring end therefore of the starter pinion in the direction toward the starting gear engaging position, and means connecting the clutch actuating member to the blocking element for displacing the blocking element to the blocking position when the clutch actuating member is moved from the neutral position.

2 Claims, 5 Drawing Figures





## NEUTRAL START ONLY MECHANISM

## BACKGROUND OF THE INVENTION

The invention relates to internal combustion engines and to starting mechanisms therefore. More particularly, the invention relates to marine propulsion devices, such as outboard motors, including an engine starting mechanism and a reversing clutch. Still more particularly, the invention relates to arrangements for preventing engine starting operation when a reversing

clutch is not in neutral. Attention is directed to the U.S. Pike et al. Pat. No. 2,938,511, issued May 31, 1960. Attention is also directed to the U.S. Berry et al application Ser. No. 156,227, filed June 24, 1971, and to the U.S. Niebur et al. application Ser. No. 250,041, filed May 3, 1972, both commonly assigned with this application. Both of the Niebur and Berry et al applications disclose prior arrangements for preventing engine starting operation when a clutch is displaced from neutral.

## SUMMARY OF THE INVENTION

The invention provides a movably mounted blocking member which, in response to movement of a clutch from neutral, is displaced to a position blocking movement of a starter pinion in the direction toward a starting gear engaging position whereby to prevent engine starting operation.

More particularly, in accordance with the invention, the movable blocking member is pivotally mounted and is located, when the clutch is not in neutral, in a position blocking movement of a friction spring which is arranged, with respect to the starter pinion, for common movement with the starter pinion toward the starting gear engaging position and for releasably and frictionally restraining rotary movement of the starter pinion.

Also in accordance with the invention, the clutch is connected to the blocking member by a wire or other semi-flexible push-pull connection between a clutch actuating member and the blocking member.

One of the principal objects of the invention is the provision of a marine propulsion device including a blocking member which is movable into a position blocking movement of a starter pinion in the direction toward a starting gear engaging position in response to clutch movement from a neutral condition.

Another of the principal objects of the invention is the provision of an engine starting mechanism including a blocking member movable into a position blocking movement of a starter spring so as to thereby block movement of a starter pinion toward the starting gear.

Other objects and advantages of the invention will become known by reference to the following description and claims and accompanying drawings.

## DRAWINGS

FIG. 1 is a side elevational view of an outboard motor embodying various of the features of the invention.

FIG. 2 is an enlarged view of a portion of the engine starting mechanism embodied in the outboard motor shown in FIG. 1, with the components shown in the position when the clutch is in neutral.

FIG. 3 is a view similar to FIG. 2 with the components shown in the position when the clutch is in forward drive.

FIG. 4 is a view similar to FIG. 3 with the components shown in the position when the clutch is in reverse drive.

FIG. 5 is a fragmentary view of the mounting of the clutch actuating member embodied in the outboard motor shown in FIG. 1.

Before explaining the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts set forth in the following general description or illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

## GENERAL DESCRIPTION

Shown in the drawings is an outboard motor 11 which includes an engine 23 having a rotatably mounted starting gear 27 which can be part of a flywheel. Supported by the engine 23 is an engine starting mechanism 29 including a starter pinion 53 mounted on the engine 23 for rotary movement and for movement along the axis of rotary movement relative to a position engaging the starting gear 27.

Also included in the outboard motor is a clutch or reversing transmission 33 which is controlled through a suitable linkage 37 from a clutch actuating member 51 which is mounted for pivotal movement relative to the engine 23 and relative to a central neutral position.

Means are provided for causing axial movement of the starter pinion 53 toward the starting gear engaging position in response to rotation of an actuating or drive shaft 59 and including a friction spring 55 and means connecting the friction spring 55 to the starter pinion 53 for common movement of the friction spring 55 with the starter pinion 53 axially of the axis of starter pinion rotary movement and for frictionally restraining rotary movement of the starter pinion 53.

More specifically, while other arrangements can be employed, in the disclosed construction, the starter pinion 53 is constructed in a manner similar to the starter pinion disclosed in the Niebur and Peters application Ser. No. 250,041 which is incorporated herein by reference. Still more specifically, as in the Niebur patent application, the starter pinion 53 includes a central bore 57 and is mounted on a drive or actuating shaft 59 which is rotatably supported by the engine 23 which extends through the bore 57, and which can be rotated either by extension of a pull rope, or by a rewind spring, or by other means as shown, for instance, in the U.S. Pike Pat. No. 2,983,511, issued May 31, 1960. In this regard, the starter pinion 53 also includes a pinion portion 61, a hub portion 62 including one or more cam slots 64 which extend in inclined relation to the axis of starter pinion rotation and which respectively receive a pin 66 extending fixedly from the actuating shaft 59 so as to cause axial travel of the starter pinion 53 relative to the actuating shaft 59 in response to relative rotation therebetween. At its base, the starter pinion 53 includes an annular groove 67 which is engaged by the before mentioned friction spring 55 to frictionally restrain relative rotation therebetween and to frictionally restrain rotation of the starter pinion 53 and also to provide for common axial movement of the friction spring 55 with the starter pinion 53.

In accordance with the invention, means are provided for preventing rotary movement of the friction spring. While other arrangements can be employed, in the disclosed construction, the friction spring 55 includes an extending portion 69 which projects between two spaced and opposing lugs or projections or guide posts 70 on a bracket 71 which is supported by the engine 23, whereby 23, whereby movement of the friction spring 55 is restrained and so as to thereby also releasably and frictionally restrain starter pinion rotary movement and thereby to also cause axial movement of the starter pinion 53 toward the starter gear engaging position in response to rotation of the actuating shaft in the proper direction.

In accordance with the invention, there is provided a blocking element 75 movable relative to a blocking position preventing movement of the starter pinion 53 in the direction toward the starting gear engaging position, together with means for displacing the blocking element to the blocking position when the clutch 33 is out of the neutral condition.

While other constructions can be employed, in the illustrated construction, the blocking element 75 is pivotally mounted on the supporting bracket 71 and includes a U-shaped portion 77 which is formed by opposed and spaced wings 79 and which, when the components are in neutral position as shown in FIG. 2, is located in a centered position to receive and permit travel therein of the outermost part of the extending portion 69 of the friction spring during movement of the friction spring 55 accompanying movement of the starter pinion 53 to the starting gear engaging position. However, when the blocking element 75 is pivoted from its centered position, one of the opposed wings 79 moves into a position overlying the outermost part of the extending portion 69 of the friction spring 55 to prevent movement of the friction spring 55 in the direction toward the starting gear 27, and consequently, to prevent movement of the starter pinion 53 in the direction toward the starting gear 27, notwithstanding rotation of the actuating shaft 59 in the proper direction. In this regard, the frictional engagement between the friction spring 55 and the starter pinion 53 permits relative rotation therebetween.

While other constructions can be employed, in the illustrated construction, the means for displacing the blocking element to its blocking position comprises a semi-flexible push-pull element or wire 81 which, at one end, is connected to a portion of the blocking element 75 and, at its other end, is connected to a lever 83 having common rotary movement with the clutch actuating member 51. The push-pull element or wire 81 is guided for movement by guides 85 formed on the bracket 71. In addition, another guide 87 in the form of an axially bored rubber bushing or grommet mounted on a bracket 89 supported from the engine 23

can be employed.

In operation, whenever the clutch actuating member 51 is displaced from its neutral position, such movement causes movement of the wire 81 so as to shift the blocking element 75 from its centered position (FIG. 2) into blocking position (either of FIGS. 3 or 4) to thereby prevent movement of the friction spring 55 in the direction axially of the starter pinion rotational axis and thereby also to prevent axial movement of the starter pinion 53 in the direction toward the starting gear 27, notwithstanding rotation of the actuating shaft 59. As a consequence, engine starting operation is permitted only when the clutch or reversing transmission 33 is in neutral condition. Return of the clutch actuating member 51 to neutral position causes corresponding movement of the wire 81 which, in turn, will return the blocking element 75 to its centered position.

Various of the features of the invention are set forth in the following claims.

What is claimed is:

1. An engine including a rotary starting gear, a clutch movable relative to a neutral position, a starter pinion having therein an annular groove, means mounting said starter pinion on said engine for rotary movement and for movement along the axis of rotary movement relative to a position engaging said starting gear, means for causing axial movement of said starter pinion toward said starting gear engaging position and including a friction spring engaged in said annular groove in said starter pinion so as to have common axial movement with said starter pinion and arranged to permit frictionally restrained relative movement between said spring and said starter pinion, said spring including an extending portion, a bracket supported by said engine and including means engageable with said extending portion for preventing rotation of said spring and for affording movement of said spring in common with said starting pinion in the direction toward the starting gear engaging position, and a blocking element connected to said clutch and mounted on said bracket for pivotal movement in response to movement of said clutch relative to the neutral position, said blocking element including a portion defining a U-shaped opening located, when said clutch is in neutral position, in position to permit movement of said spring through said opening and with said starter pinion in the direction toward the starting gear engaging position, and located, when said clutch is displaced from the neutral position, in position to block movement of said spring with said starter pinion in the direction toward the starting gear engaging position.

2. An engine in accordance with claim 1 wherein said clutch includes a clutch actuating member and further including a push-pull element extending between said blocking element and said clutch actuating member.

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