Mar. 27, 1923. 1,449,865

J. MAAS

ENGINE STARTER

Filed Dec. 30, 1921 2 sheets sheet 1

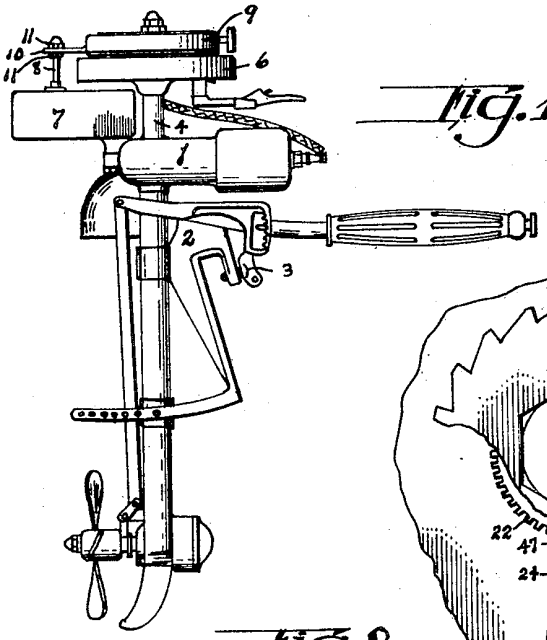

Fig. 1.

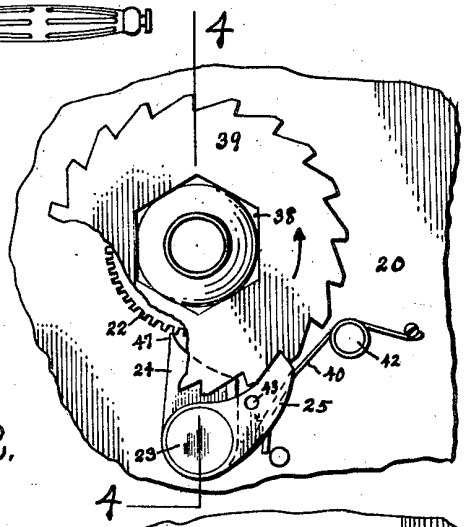

Fig. 2.

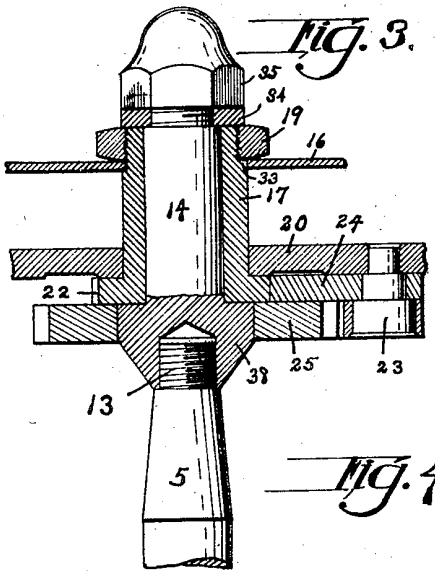

Fig. 3.

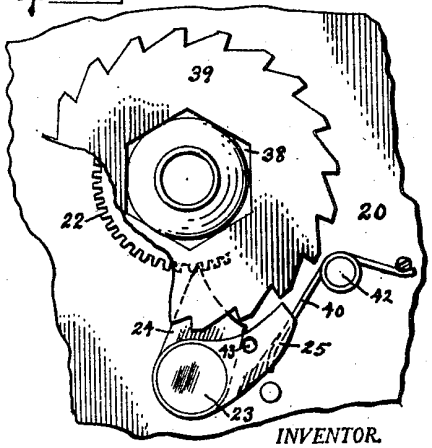

Fig. 4.

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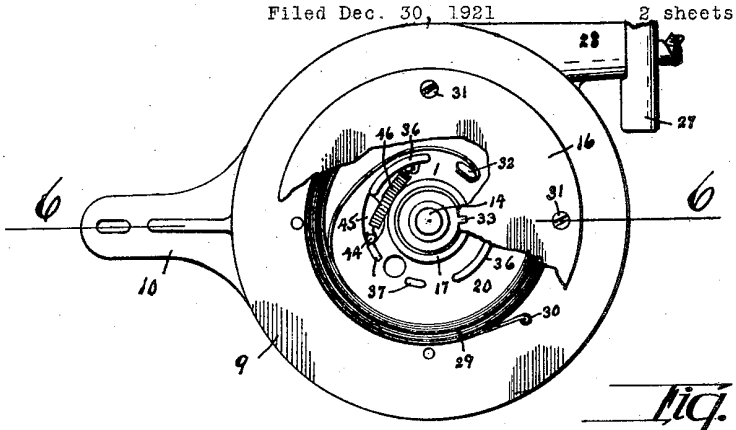

fig. 5.

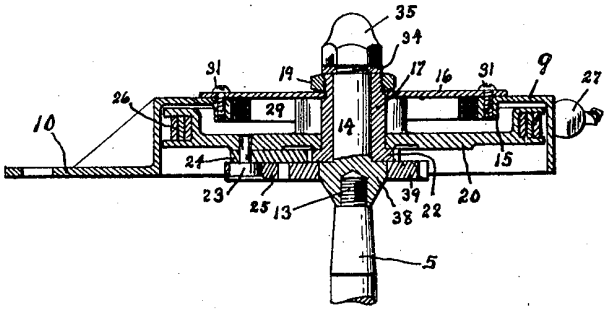

fig. 6.

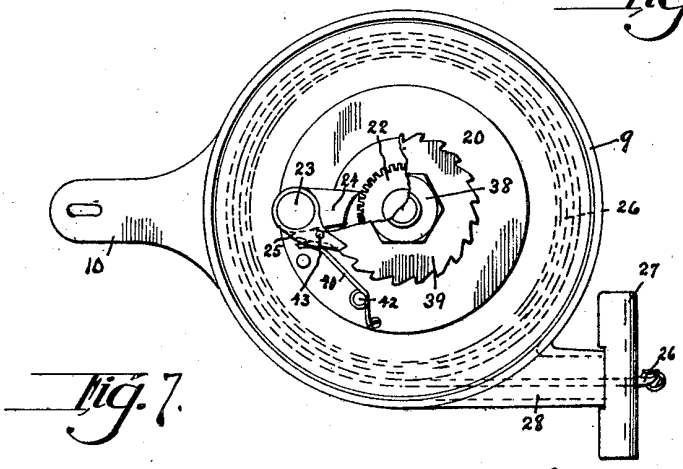

fig. 7.

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UNITED STATES PATENT OFFICE.

JULIUS MAAS, OF DETROIT, MICHIGAN, ASSIGNOR TO CAILLE BROTHERS COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

ENGINE STARTER.

Application filed December 30, 1921. Serial No. 526,002.

To all whom it may concern:

Be it known that I, JULIUS MAAS, a citizen of the United States, and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Engine Starter, of which the following is a specification.

This invention relates to manually operated means for starting small internal combustion engines, and especially to starting devices for engines which are adapted to be hung over the sterns of small boats and are therefore somewhat difficult to start by turning the fly wheel, and its object is to provide a device of this character which is disconnected from the crank shaft of the engine at the instant the direction of rotation of the shaft is reversed.

This invention consists, in combination with a crank shaft and a ratchet wheel connected thereto, of a pawl carrier rotatable about the axis of the crank shaft and a pawl mounted thereon to engage the ratchet, manually operable means to turn the pawl carrier, and means connected to the pawl and in engagement with a stationary member to disengage the pawl from the ratchet wheel when the rotation of the crank shaft is reversed.

It also consists in a cylindrical member mounted coaxially with the crank shaft and having a circumferential series of projections, and a pivoted dog having a point adapted to enter these projections and swing across the line connecting its pivot and the line of the crank shaft and adapted to lift the pawl out of engagement with the ratchet wheel when the pawl moves backward.

It also consists in a spring to return the pawl carrier to normal position.

It further consists in the details of construction illustrated in the accompanying drawing and particularly pointed out in the claim.

In the accompanying drawing, Fig. 1 is an elevation of a two cycle engine equipped with this improved starting device, the engine being of the "out-board motor" type, that is, an engine designed to be attached to the stern of a row-boat and having propelling mechanism connected to its shaft. Fig. 2 is a bottom plan of the middle portion of this improved starting device with the operating pawl in engagement with the ratchet wheel. Fig. 3 is a similar view with the operating pawl disengaged. Fig. 4 is a section on the line 4—4 of Fig. 2. Fig. 5 is a plan of this device with part of the top plate broken away. Fig. 6 is a section on the line 6—6 of Fig. 5. Fig. 7 is a bottom plan of this starting device.

Similar reference characters refer to like parts throughout the several views.

Internal combustion engines are provided with spark plugs to ignite the fuel and means are usually provided to "time" the spark. In order to obtain the best results when the engine is running at high speed, the fuel is ignited before the compression stroke is completed. When engines are being turned over by hand, this ignition before the completion of the compression stroke sometimes causes the engines to turn backward, which is not only liable to break the starting mechanism but also to injure the operator. The present device serves to disconnect the starting mechanism substantially instantaneously should the engine reverse itself.

In Fig. 1 the engine 1 is shown mounted on a frame 2 adapted to be secured to the stern of a row-boat by means of a screw 3. A tube 4 extends upward from the engine and surrounds the crank shaft 5. A fly-wheel 6 may be attached to the shaft if desired. The fuel reservoir 7 is shown attached to the engine 1 and supports a post 8 to which the stationary portion or body 9 of the starter is attached by means of the arm 10 and nuts 11. Any other desired means may be employed to support the starter. As shown in Fig. 4, the crank shaft 5 may have its outer end 13 threaded and screwed into the stub shaft 14.

The starter consists of a body 9 having a central opening surrounded by an inwardly extending flange 15, (see Fig. 6) a cover plate 16 extending over this opening and secured to the body by means of the screws 31, a sleeve 17 secured in the cover plate by means of a nut 19, an oscillating carrier plate 20 rotatably mounted on the sleeve 17 and normally supported by the circular member 22 provided with a circumferential ring of projections which is at the lower end of the sleeve 17, a pin 23 mounted on the carrier 20 on which the dog 24 and pawl 25 are mounted, a flexible band 26, preferably a leather strap, mounted in a circumferential groove in the carrier 20 and a han-

dle 27 at the outer end thereof, the body 1 being provided with a tangential guide 28 (see Fig. 5) for this band 26, and a clock spring 29 connecting to the body at 30 and to a pin 32 on the pawl carrier.

The sleeve 17 has a small key 33 at its upper end which extends into a notch in the cover plate 16 and the sleeve is prevented from rotating thereby. The stub shaft 14 has a washer 34 and nut 35 at its upper end which hold it in position. It is freely rotatable in the sleeve 17. The carrier plate 20 has a circular series of projections 36 and 37 around which the spring 29 is wound when the band 26 is pulled out. The spring 29 may be attached to any one of the projections 37.

The lower end of the shaft 14 is preferably formed into a hexagon 38 on which a ratchet wheel 39 is mounted, this wheel being engaged by the pawl 25 and being preferably of hard steel. A spring 40 mounted on a pin 42 on the carrier plate 20 normally holds the pawl toward the ratchet wheel, the pawl being grooved to receive the free end of this spring. A pin 43 on this pawl extends into the plane of the dog 24. The dog 24 has a pin 44 extending through a hole 45 in the carrier plate (Fig. 5) and a spring 46 on the opposite side of the carrier plate normally pulls the dog toward the position shown in Fig. 3, that is, the spring holds the point 47 of the dog against the teeth of the member 22.

The parts are normally in the position shown in Fig. 3, the pawl 25 out of engagement with the ratchet wheel 25. When the band 26 is drawn out, the carrier 20 and pawl 25 move around the member 22 in the direction of the arrow in Fig. 2 and the spring 40 presses the pawl 25 into engagement with the teeth of the ratchet wheel 39 while the point 47 of the dog 24 enters the space between two projections of the member 22 and is swung back to the position shown in Fig. 2. While the band 26 is drawn out, the shaft 5 is rotated by the pawl 25.

When the handle 27 is released and the band 26 is rewound by the spring 29, the spring 46 immediately pulls the point 47 of the dog 24 into the space between two projections of the member 22 so that continued reverse movement of the carrier 20 causes the dog to swing against the pin 43 of the pawl 25 and move it out of engagement with the ratchet wheel 39, this position being held during the entire return movement of the carrier plate.

Should a back-fire occur while the band is being pulled out, which suddenly reverses the rotation of the shaft 14 and the ratchet wheel 39, the immediate result would be a reverse travel of the pin 23. As the point 47 of the dog is always held against the member 22 by the spring 46, this reverse movement causes the dog to move from the position shown in Fig. 2 to that of Fig. 3, and disengages the pawl 25 from the ratchet wheel.

It is obvious that any other means may be employed to connect the ratchet wheel 39 to the stub shaft 14, and that the control member 22 may have any other form than that of a gear so long as the dog 24 may be swung thereby.

The other details and the proportions of the parts may all be changed by those skilled in the art without departing from the spirit of my invention as set forth in the following claim.

I claim:—

In a starting device for internal combustion engines, the combination of a ratchet wheel connected to the crank shaft of the engine, a pawl carrier rotatable about the axis of said shaft, a pivot mounted on the pawl carrier, a pawl mounted on said pivot and adapted to engage the ratchet wheel, a spring to hold the pawl inward to cause such engagement when the pawl carrier is turned in its operative direction, and means for moving the pawl outward when the pawl carrier rotates in the reverse direction comprising a cylindrical member co-axial with the crank shaft and having a series of circumferential projections, and a dog mounted on said pivot adjacent the pawl and having a connection therewith and adapted to be swung by said projections to release the pawl from the ratchet wheel when the pawl carrier rotates in said reverse direction.

JULIUS MAAS.