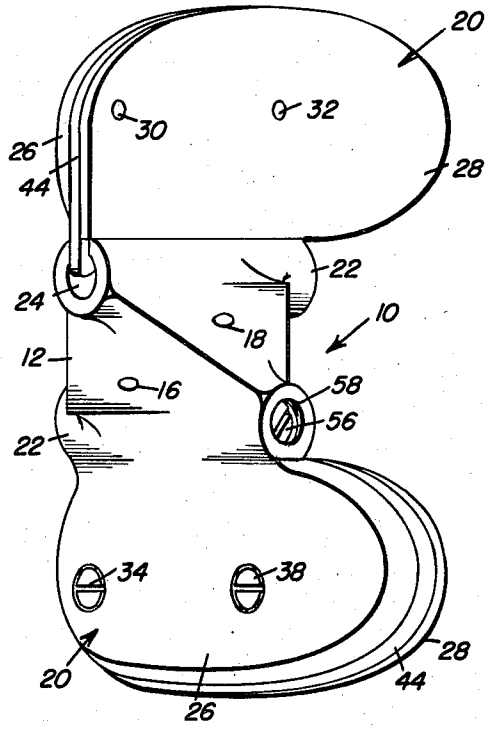
May 5, 1959 L. A. HEINTZELMAN 2,885,012

CENTRIFUGALLY ACTUATED VARIABLE SIZE PROPELLER

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Fig. 1



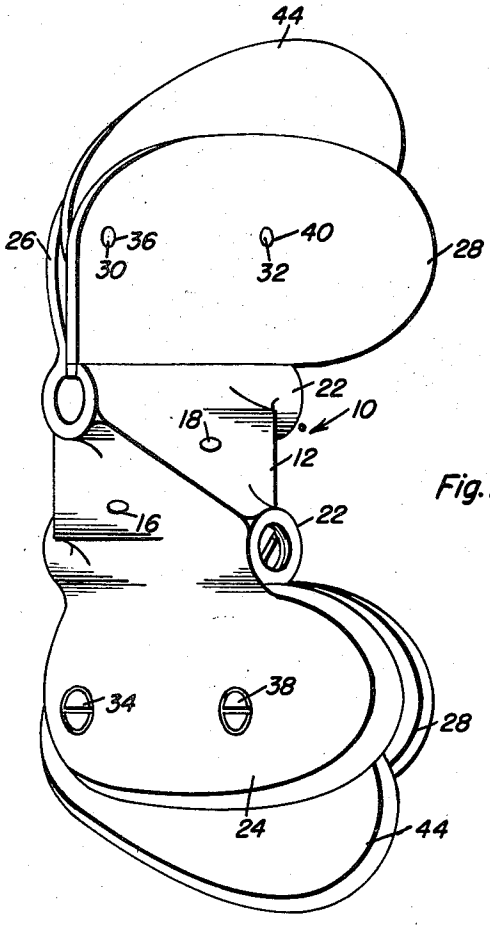


Fig. 2

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CENTRIFUGALLY ACTUATED VARIABLE SIZE PROPELLER

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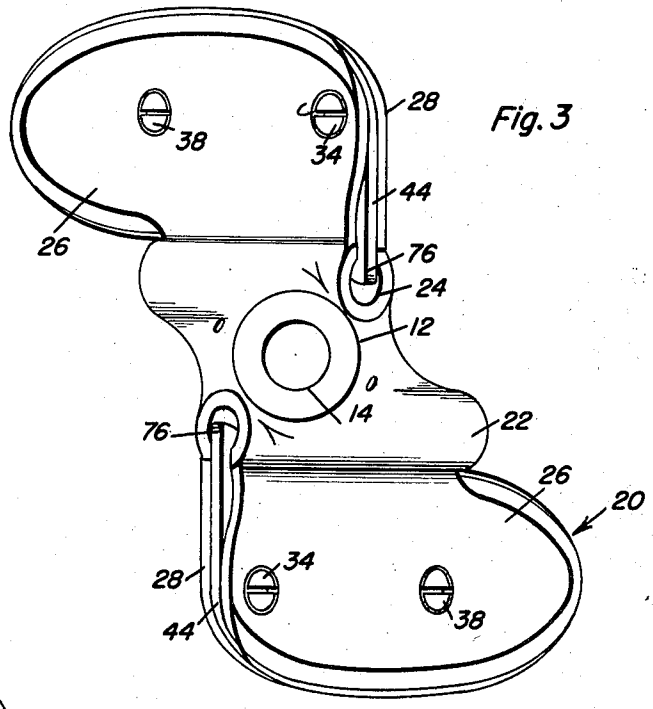


Fig. 3

Fig. 6

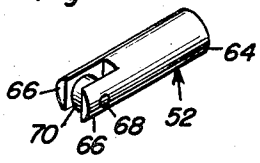
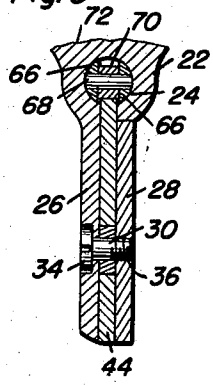


Fig. 5



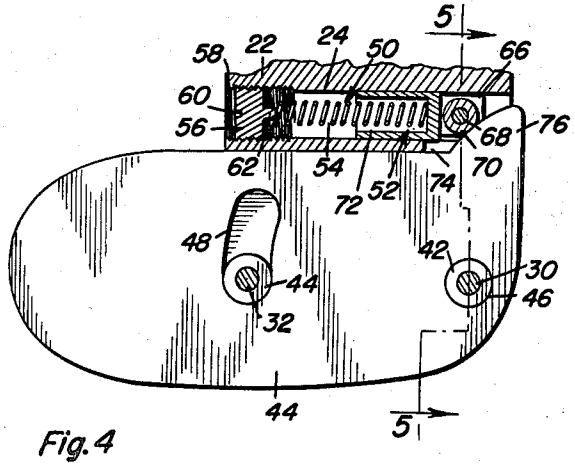


Fig. 4

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2,885,012

Patented May 5, 1959

2,885,012

CENTRIFUGALLY ACTUATED VARIABLE SIZE PROPELLER

Leo A. Heintzelman, Grandville, Mich.

Application November 1, 1957, Serial No. 693,908

5 Claims. (Cl. 170—160.11)

This invention relates in general to new and useful improvements in propellers, and more particularly to a boat propeller of the type which is variable in size and which is centrifugally actuated.

Boat engines, particularly outboard motor boat engines are designed to produce a maximum horsepower at a relative great speed. However, since the propellers of these engines are turning water and thereby their rotation is resisted, a considerable length of time is required for the engine to reach its optimum operating speed.

It is therefore the primary object of this invention to provide a propeller for boats, particularly of the type which utilize outboard motors, the propeller being provided with blades which are extensible and which are initially contracted, whereby the initial resistance to rotation of the propeller is much less than the final resistance of the propeller rotation so that the outboard motor may rapidly accelerate to its optimum speed.

Another object of this invention is to provide an improved propeller for boats, and more particularly a propeller for outboard motors, the propeller including blades which have extensible sections whereby the size of the propeller may be increased during the operation thereof.

Still another object of this invention is to provide an improved propeller for use with outboard motors and the like, the propeller including a plurality of blades, each of the blades including extensible sections which are urged outwardly by centrifugal forces during the operation of the propeller and which are provided with spring return means engaging the propeller sections for the purpose of normally retaining the propeller sections in retracted positions and retarding their outward swinging against the centrifugal forces so that the outward swinging of the propeller sections increase as the speed of rotation of the propeller increases.

A further object of this invention is to provide an improved propeller for outboard motors, the propeller including a hub having extending outwardly therefrom a plurality of blades, each of the blades including a pivotally mounted blade section which swings outwardly due to centrifugal forces to increase the area of the blades, there being engaged with each of the swinging blade sections adjustable spring means for controlling the amount of centrifugal force necessary to swing the blade section outwardly.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view of the propeller which is the subject of this invention and shows the blade sections thereof in a retracted position;

Figure 2 is a view similar to Figure 1 and shows the pivotally mounted blade sections in their extended positions;

Figure 3 is a rear elevational view of the propeller of Figure 1;

Figure 4 is an enlarged rotated sectional view taken through one of the blades of the propeller and shows the details of mounting of the pivotally mounted blade section and the means which resists the outward swinging thereof;

Figure 5 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 5—5 of Figure 4 and shows further the details of construction of the blade; and

Figure 6 is an enlarged rotated perspective view of the follower of the spring means for retaining the blade section in its retracted position.

Referring now to the drawings in detail, it will be seen that there is illustrated the propeller which is the subject of this invention, the propeller being referred to in general by the reference numeral 10. The propeller 10 includes a central hub 12 which may be of any design and which has a tapered bore 14 therethrough for receiving the tapered end of a drive shaft. Extending transversely through the hub 12 are bores 16 and 18 for the reception of pins which will lock the propeller 10 on a drive shaft. The purpose of the two bores 16 and 18 is that a position of the pin receiving bores and shafts vary depending upon the make of outboard motor and thus by providing the two bores 16 and 18, the propeller 10 may be adapted to several makes of outboard motors.

Radiating outwardly from the hub 12 at the desired angle is a pair of blades which are referred to in general by the reference numeral 20. The blades 20 are identical and a pitch of the blades 20 is determined by the angular relationship thereof with respect to the hub 12. It is to be understood that the pitch of the blades 20 is fixed.

As is best shown in Figures 3 and 5, each of the blades 20 includes a tubular base portion 22 which is formed integral with the hub 12. The tubular base portion 22 has extending therethrough a bore 24.

Formed integral with the tubular base portion 22 is a fixed outer blade section 26. The outer blade section 26 is of the size desired for low speed operation of an outboard motor for which the propeller 10 is intended.

Disposed in spaced parallel relation with respect to the fixed outer blade section 26 is a second outer blade section 28. The outer blade section 28 is secured to the outer blade section 26 in fixed relation by means of a pair of longitudinally spaced screws 30 and 32. The screw 30 has an enlarged head 34 which is countersunk in the outer blade section 26 and which is threadedly engaged in a bore 36 in the outer blade section 28. The screw 32 is provided with a similarly enlarged head 38 which is countersunk and has the opposite end thereof threadedly engaged in a bore 40, as is best shown in Figure 2.

The outer blade section 28 is spaced from the outer blade section 26 by means of a pair of circular spacers 42 and 44 which are mounted on intermediate portions of the screws 30 and 32. This leaves sufficient space between the outer blade sections 26 and 28 for the mounting of an intermediate blade section 44. The intermediate blade section 44 conforms generally to the outline of the outer blade sections 26 and 28 and is pivotally mounted on a screw 30 by means of the spacer 42, intermediate blade section 44 having a circular bore 46 therethrough of a size to receive the spacer 42, as is best shown in Figure 5. At this time it is pointed out that the size and shape of the blade sections 26, 28 and 44 may be any which is desired for the most efficient operation of the outboard motor or other boat engine at low speeds.

As is best shown in Figure 4, the intermediate blade section **44** also is provided with an arcuate slot **48** remote from the bore **46**. The arcuate slot **48** is of a size to have received therein the spacer **44**. The spacer **44** also functions as a stop member in that it limits the outward pivoting of the intermediate blade section **44** to that required for a maximum blade size.

Referring once again to Figure 4 in particular, it will be seen that mounted in the bore **24** in the tubular base portion **22** are spring means which are referred to in general by the reference numeral **50** and which resist the outward pivoting of the intermediate blade section **44**. The spring means **50** includes a follower **52**, an intermediate spring **54** and a stop member **56**. The stop member **56** is externally threaded and is threadedly engaged in a threaded end portion **58** of the bore **24**. The stop member **56** is provided with a screw driver receiving slot **60** to adjust the position thereof. It is also to be noted that the stop member is provided with a projecting end portion **62** which receives one end of the spring **54** and centers the spring **54**.

As is best shown in Figure 6, the follower **52** includes an elongated member **64** which is bifurcated at one end to form a pair of spaced ears **66**. Disposed between the ears **66** is a roller **70** which is mounted on a transverse shaft **68** which extends between the ears **66**. Also, as is shown in Figure 5, the member **64** is provided with an internal bore **72** which receives the end of the spring **54** remote from the stop member **56**.

The tubular base portion **22** is provided with a slot **74** at one end thereof which communicates the bore **24** with the space between the outer blade sections **26** and **28**. The intermediate blade section **44** is provided with a finger **76** at one corner thereof, which finger projects up through the slot **74** into one end of the bore **24**. The finger **76** passes between the ear **66** and engages the roller **70**, as is best shown in Figure 4. It is to be understood that the spring **54** is initially compressed and thus urges the follower **52** against the finger **76** so as to resist outward swinging of the intermediate blade section **44**.

In the operation of the propeller **10**, when the propeller **10** is turning at a slow rate of speed, the propeller appears as is illustrated in Figures 1 and 3. Thus the outboard motor or other type or marine engine to which the propeller **10** is attached may turn without too much load thereon. This permits rapid acceleration of the outboard motor or other marine engine if it is so desired. As the speed of the rotation of the propeller increases, centrifugal force will act upon the blade sections **44** and urge them outwardly with the resultant additional compression of the springs **54**. By adjusting the stop member **56**, the rate of outward swinging of the blade sections **44** may be controlled. Also, by using the proper spring **54** and the proper positioning of the stop member **56**, the outward swinging of the blade sections **44** may be limited to that required to produce a propeller which will allow the engine to operate at its maximum power without any loss of such power. Of course, the spacer **44** in its function as a stop member will restrict outward movement of the blade sections **44** beyond that which is desired under any circumstances.

From the foregoing, it will be readily apparent that when an outboard motor or similar marine engine is provided with a propeller, such as the propeller **10**, the initial resistance to the rotation of the propeller is relatively low and as a result the propeller and the outboard engine to which it is attached may be rapidly accelerated towards the maximum efficient rotational speed. As the speed of the propeller **10** increases, the blade sections **44** are swung outwardly by centrifugal force so that when the propeller **10** reaches an optimum speed of rotation, the blade sections **44** have swung outwardly a maximum distance to produce a propeller which has the proper blade area for the outboard engine for which it is designed.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. An adjustable size propeller comprising a hub, a plurality of blades radiating from said hub, each of said blades including a base portion and a pair of spaced parallel outer blade sections extending outwardly from said base portion, an intermediate blade section disposed intermediate said outer blade sections and normally disposed within the confines of said outer blade section, a pivot pin pivotally connecting said intermediate blade section to at least one of said outer blade sections, and spring means disposed within said base portion engaging and resisting outward movement of said intermediate blade section due to centrifugal force thereon, said base portion being tubular, said spring means including a follower engaging said intermediate blade, a spring having one end engaging said follower, a stop member disposed within said base portion and engaging the other end of said spring.

2. An adjustable size propeller comprising a hub, a plurality of blades radiating from said hub, each of said blades including a base portion and a pair of spaced parallel outer blade sections extending outwardly from said base portion, an intermediate blade section disposed intermediate said outer blade sections and normally disposed within the confines of said outer blade section, a pivot pin pivotally connecting said intermediate blade section to at least one of said outer blade sections, and spring means disposed within said base portion engaging and resisting outward movement of said intermediate blade section due to centrifugal force thereon, said base portion being tubular, said spring means including a follower engaging said intermediate blade, a spring having one end engaging said follower, a stop member disposed within said base portion and engaging the other end of said spring, said intermediate blade section including a finger projecting into said base portion.

3. An adjustable size propeller comprising a hub, a plurality of blades radiating from said hub, each of said blades including a base portion and a pair of spaced parallel outer blade sections extending outwardly from said blade portion, an intermediate blade section disposed intermediate said outer blade sections and normally disposed within the confines of said outer blade section, a pivot pin pivotally connecting said intermediate blade section to at least one of said outer blade sections, and spring means disposed within said base portion engaging and resisting outward movement of said intermediate blade section due to centrifugal force thereon, said base portion being tubular, said spring means including a follower engaging said intermediate blade, a spring having one end engaging said follower, a stop member disposed within said base portion and engaging the other end of said spring, means adjustably mounting said stop member in said base portion.

4. An adjustable size propeller comprising a hub, a plurality of blades radiating from said hub, each of said blades including a base portion and a pair of spaced parallel outer blade sections extending outwardly from said blade portion, an intermediate blade section disposed intermediate said outer blade sections and normally disposed within the confines of said outer blade section, a pivot pin pivotally connecting said intermediate blade section to at least one of said outer blade sections, and spring means disposed within said base portion engaging and resisting outward movement of said intermediate blade section due to centrifugal force thereon, said base portion being tubular, said spring means including a follower

engaging said intermediate blade, a spring having one end engaging said follower, a stop member disposed within said base portion and engaging the other end of said spring, means adjustably mounting said stop member in said base portion, said intermediate blade section including a finger projecting into said base portion.

5. An adjustable size propeller comprising a hub, a plurality of blades radiating from said hub, each of said blades including a base portion and a pair of spaced parellel outer blade sections extending outwardly from said blade portion, an intermediate blade section disposed intermediate said outer blade sections and normally disposed within the confines of said outer blade section, a pivot pin pivotally connecting said intermediate blade section to at least one of said outer blade sections, and spring means disposed within said base portion engaging and resisting outward movement of said intermediate blade section due to centrifugal force thereon, said base portion being tubular, said spring means including a

follower engaging said intermediate blade, a spring having one end engaging said follower, a stop member disposed within said base portion and engaging the other end of said spring, means adjustably mounting said stop member in said base portion, stop means carried by one of said outer blade sections for engagement with said intermediate blade to limit pivoting of said intermediate blade section.

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