M. PHILLIPS.

CATAMARAN.

APPLICATION FILED AUG. 27, 1909.

1,009,564.

Patented Nov. 21, 1911.

5 SHEETS—SHEET 1.

Fig. 1.

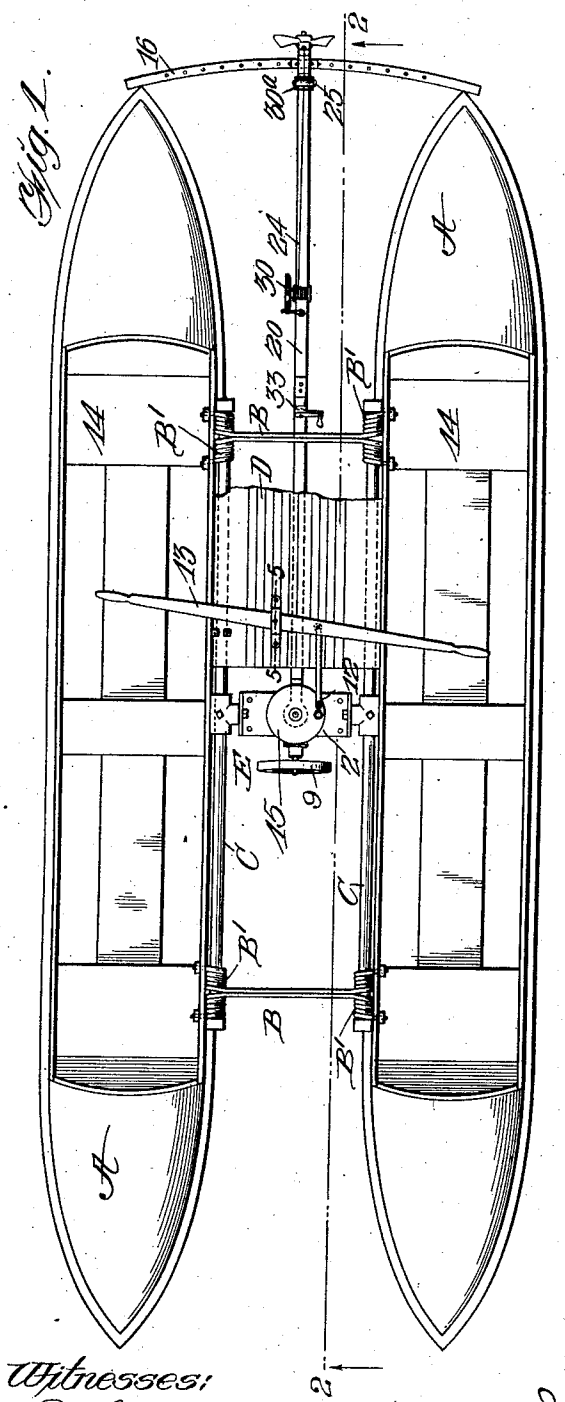
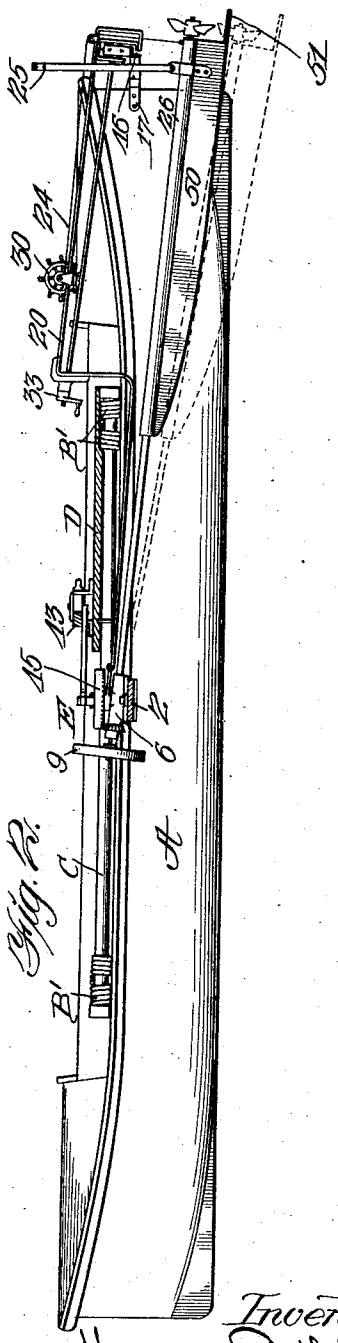


Fig. 2.



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5 SHEETS—SHEET 2.

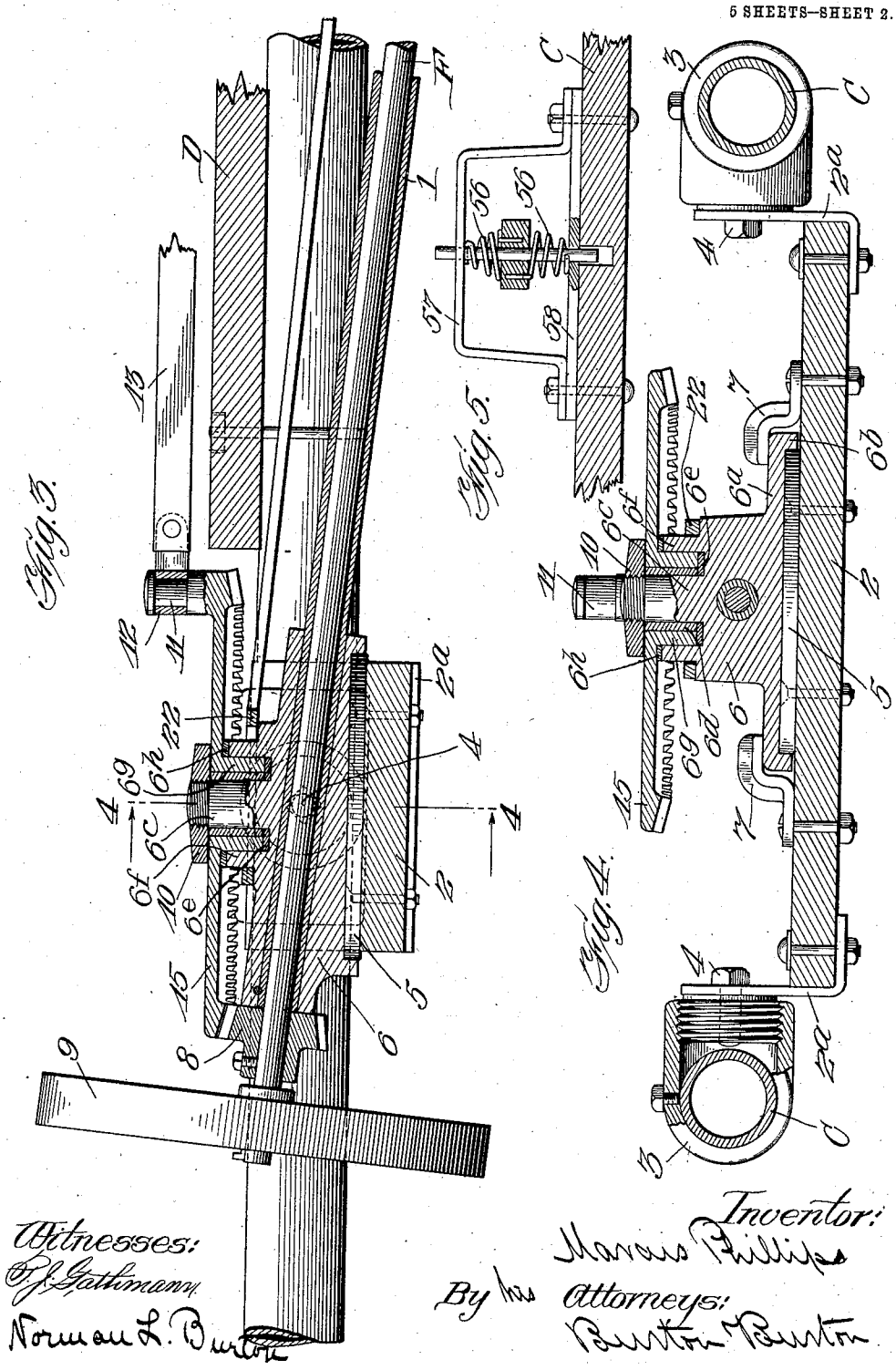

Fig. 3.

Fig. 5.

Fig. 4.

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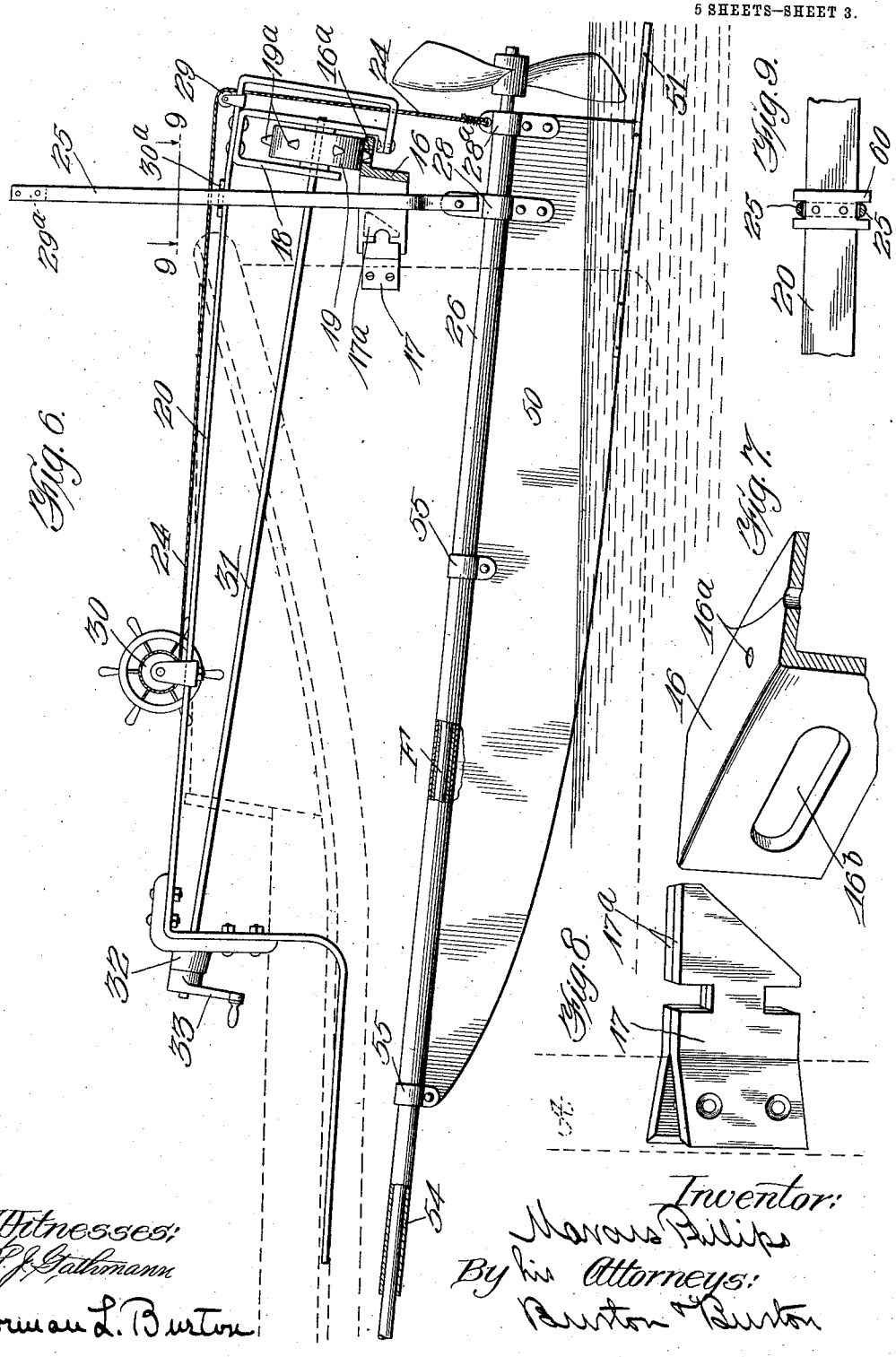
5 SHEETS—SHEET 3.



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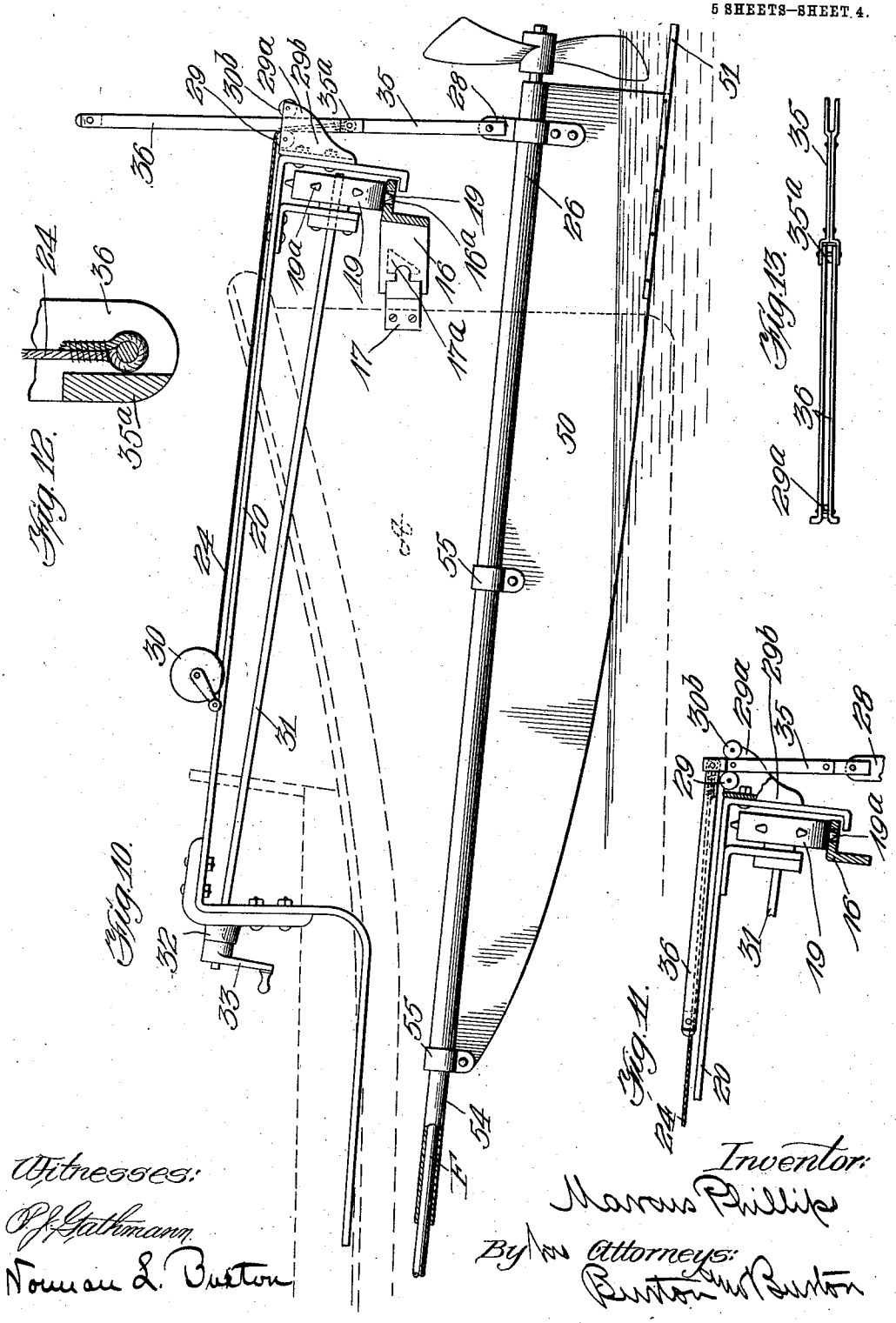
5 SHEETS—SHEET 4.



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5 SHEETS—SHEET 5.

Fig. 14.

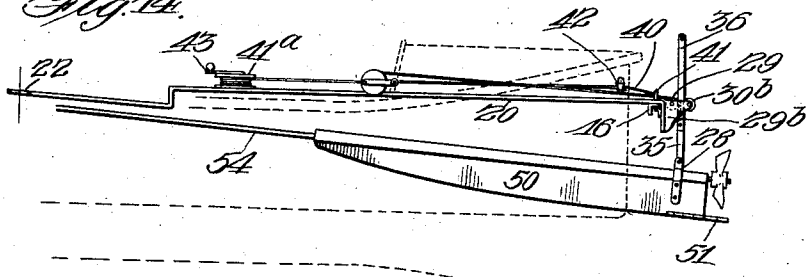


Fig. 15.

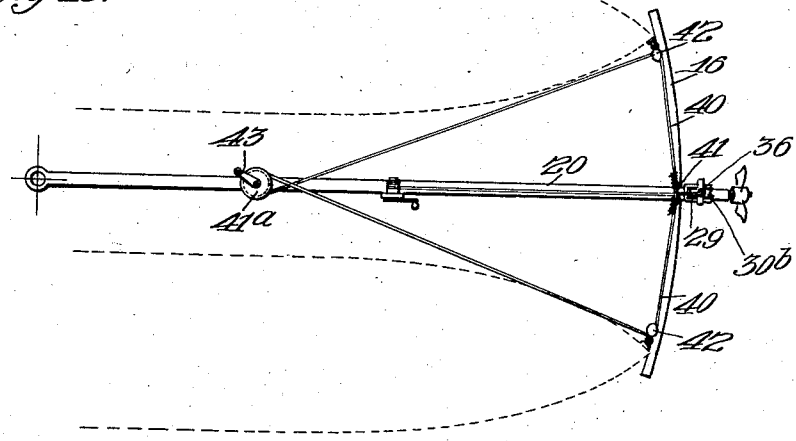


Fig. 17.

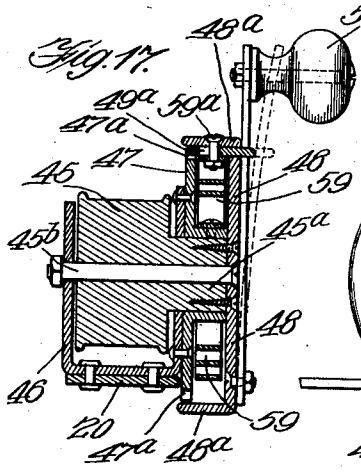


Fig. 16.

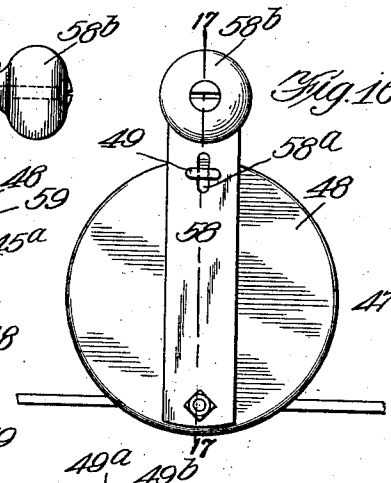
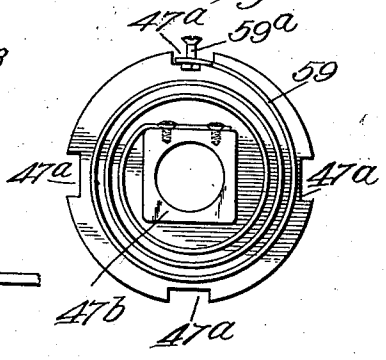


Fig. 18.



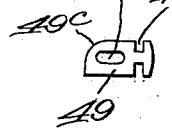


Fig. 19.

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UNITED STATES PATENT OFFICE.

MARCUS PHILLIPS, OF CHICAGO, ILLINOIS.

CATAMARAN.

1,009,564. Specification of Letters Patent. Patented Nov. 21, 1911.

Application filed August 27, 1909. Serial No. 514,861.

To all whom it may concern:

Be it known that I, MARCUS PHILLIPS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Catamarans, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide in a catamaran or boat having two hulls, novel means for propulsion and steering.

It consists in the features of construction shown and described as indicated in the claims.

In the drawings:—Figure 1 is a plan view of a catamaran equipped with this invention. Fig. 2 is a fore-and-aft vertical section at the line 2—2 on Fig. 1. Fig. 3 is a detail vertical section on a large scale taken axially with respect to the propeller shaft. Fig. 4 is a vertical section at the line 4—4 on Fig. 3. Fig. 5 is a detail section at the line 5—5 on Fig. 1 on an enlarged scale. Fig. 6 is a side elevation of the propeller and adjusting devices for the same. Fig. 7 is a partly sectional perspective view of one end portion of a track bar from which the outer end bearing of the propeller shaft is suspended between the hulls, section being made in vertical fore-and-aft plane through one of the apertures provided for engagement of a propeller adjusting device. Fig. 8 is a perspective view of one of the brackets by which the bar shown in Fig. 7 is connected to the hulls. Fig. 9 is a detail section at the line 9—9 on Fig. 6. Fig. 10 is a view similar to Fig. 6, showing a modification of the means of raising and lowering the propeller. Fig. 11 is a detail view of the upper rear corner of the device shown in Fig. 10, parts being shown at a different position. Fig. 12 is a detail section of the fastening for the cable by which the propeller shaft is raised and lowered, section being made in the plane of the axis of the cable at said fastening. Fig. 13 is an edge view of a folding link by which the propeller shaft outer bearing is suspended from the operating cable. Fig. 14 is a side elevation of a modified form of a device for adjusting the propeller horizontally. Fig. 15 is a plan view of the same. Fig. 16 is a front elevation of the device for winding up the lifting cable. Fig. 17 is a section on the line 17—17 of Fig. 16. Fig. 18 is an elevation of the same with the operating handle and cover plate removed. Fig. 19 is an elevation of a locking dog pertaining to said device.

The invention herein shown is in the drawings represented as applied to a catamaran of the general character and structure which is shown and described in my pending application, Serial No. 454,698, filed in the United States Patent Office, September 25, 1908. This catamaran comprises two boat hulls A, A, which are flexibly connected together and held and spaced apart a certain distance by means of the spring couplings B, B, which, as described in my said application, are made of spring steel rod, each coiled to form at the ends coils B^1, B^1 wound in opposite directions and serving as pivot eyes for engaging the longitudinal rods C, C, which extend along the inner or proximate sides of the two hulls and constitute means for supporting the interval between the two hulls A, A, a platform D, and a motor which is in general and as a whole indicated by the letter E.

In the drawings the motor shown is a hand operated motor, but, as will be understood from the hereinafter contained description of the operation of the structure, any motor of suitable size and general character for driving a fore-and-aft propeller shaft, may be mounted in like position and perform the functions of the motor in the invention herein shown. The motor illustrated is of the simplest type and is selected for description in order to present the invention in its most generic phase, having only the elements essential to any motor which would serve the purpose of the invention. The essentials of such motor are that it shall contain a fore-and-aft bearing indicated in the drawings at 1 for a propeller shaft F and means for rotating such shaft. It is essential also to the operation of the invention for certain of the purposes for which it is designed that the propeller shaft should be so mounted and connected that it may be swung transversely in the interval between the two boat hulls and also raised and lowered in that interval. Preferably, this is accomplished by having the motor itself mounted so that it can be turned about a vertical axis for swinging the propeller shaft bearing transversely and also so that it may be rocked vertically about a

transverse axis for swinging the propeller shaft in a vertical plane for raising and lowering it.

As illustrated in the drawings, the motor frame comprises a base bar 2 which extends transversely in the interval between the two hulls, such base bar being provided at its ends with hangers 2^a by which it is pivotally suspended from slides 3—3 which are in the form of pipe T's, having the cross of the T mounted for sliding on the longitudinal rods C, by pivot bolts 4 by which hangers 2^a of the bar 3 are pivotally connected to the said slides taking into the short stems of the T's, respectively. On this base bar there is mounted a turntable 5. On this turn-table there is mounted the propeller shaft bearing 6, which is provided with a horizontal disk flange 6^a, having a peripheral downwardly extending lip 6^b, which fits about and receives the turn table 5 and is thereby centered upon it. Z-shaped retaining clips 7, 7, are provided bolted to the base bar and overhanging the margin of the disk flange 6^a of the shaft bearing for retaining the latter in engagement with the turn table and free to be turned about the vertical axis thereof. The propeller shaft bearing extends in a direction inclined down rearwardly, with respect to the plane of the turn table which is substantially horizontal: and at its forward end said shaft has fast upon it a beveled pinion 8 by which it may be rotated, and, preferably, in front of the pinion a fly wheel 9 for keeping its rotation steady when in operation. For meshing with the pinion 8 and rotating the propeller shaft there may be provided, as illustrated, a horizontal crown beveled gear 15 with its gear rim facing downward for engaging the upper side of the pinion. In order that this horizontal beveled gear may be rotated in a simple manner and without requiring any upwardly extending shaft and bearing therefor and crank above the same, I provide the bearing for said crown beveled gear, as shown in Figs. 3 and 4, by means of a central upwardly projecting stud 6^c at the axis of the disk flange 6^a and therefore at the axis of the turn table, the crown gear wheel having its hub projecting downwardly from its web and of suitable length, corresponding to that of the stud, to obtain sufficiently extended bearing thereon to render the wheel steady in its rotation in its horizontal plane.

As illustrated, the stud 6^c has a steel bushing sleeve 6^d which forms the immediate bearing of the gear wheel, and to take the downward thrust of the end of the gear hub an annular steel wearing plate 6^e is provided around the base of the stud. For further and more efficiently steadying the gear wheel and maintaining it horizontally in its rotation and keeping it well meshed with the pinion 8, I prefer to form the upper end of the post, of which the stud 6^c is the central part, with an annular upstanding flange 6^f concentric with the stud and spaced off therefrom a sufficient distance to accommodate within it the hub 6^g and, as additional safeguard, the top of this annular flange is provided with an annular wearing plate 6^h on which the web of the gear wheel rests and turns as the end of its hub rests and turns on the annular wearing plate 6^e. The upper end of the stud 6^c is threaded and receives a wide-flanged retaining nut 10 which overhangs the web of the gear wheel, and by its breadth further assists in keeping the wheel running true about its axis. At its end the gear wheel is provided with an upstanding crank wrist 11 to which a pitman ring 12 is connected, extending thence to a horizontal operating lever 13 which is fulcrumed in any convenient manner on the platform C which extends across between the two hulls, said lever extending in both directions transversely from it, fulcrumed so as to overhang both of the hulls and be accessible for operation by an occupant of either of them.

As illustrated, each of the hulls contains an operator's seat 14 suitably positioned for enabling the occupant to operate the lever 13 while facing forward. For sustaining the propeller shaft F in suitable position at the rear or outer end, there is carried on the stern ends of the two boat hulls a track bar 16 which, in view of the purpose of having the propeller shaft swung transversely in the interval between the boat hulls, is curved about the axis of the driving gear wheel 15, that is of the stud 6^c. In view of the flexible connection of the two hulls designed and operating to permit them to rock somewhat independently of each other about their pivotal spring connections, which would cause a change of distance between their stern ends, it is necessary to connect this track bar 16 to the hulls slidingly so as to permit it longitudinal movement, that is, movement transverse to the length of the hulls, and also pivotally as necessary to accommodate the rocking movement of the hulls. The particular connection employed is illustrated in Figs. 7 and 8, which also show the preferred form of this track bar which is an angle iron bent in the proper curve indicated, and having in its vertical web elongated slots 16^b which are engaged by the T-shape terminals 17^a of the brackets 17, which are fastened, respectively, to the side of the hulls (see Fig. 6) and protrude rearwardly for engagement of their said T-shape heads in the slots of the track bar. It will be understood that the brackets are first engaged with the slots and afterward bolted onto the hulls. On this track bar there is mount-

ed a carriage 18 which, preferably, rides on the track bar by means of a wheel 19 journaled in the carriage. From the top of the carriage a controlling bar 20 extends forwardly and terminates in a ring 22 encompassing the annular flange 6^f for pivoting the bar about the axis of the gear wheel 15. From the carriage in the form shown in Fig. 6 there is suspended by means of a cable 24 and checked against dropping too low by means of a bar 25, the outer or rear end bearing 26 of the propeller shaft F. The cable which is fastened at its end to a clip 28^a embracing said bearing 26 extends thence up over a guide pulley 29 at the top of the carriage and rearwardly about said guide pulley to a windlass or drum 30 mounted on the bar 20 at a point intermediate the carriage and the motor, and within reach of the operator seated on seat 14 in either of the hulls; and suitable means may be provided for winding the cable about the drum and for locking it against unwinding. In Fig. 6 there is shown a spoked hand wheel for this purpose. For swinging the propeller shaft horizontally from right to left to adjust it parallel or obliquely in either direction, with respect to the hulls, the wheel 19 is provided with a shaft 31 extending rearwardly along the direction of the controlling bar 20 and under the same, to a bearing 32 which is conveniently provided at the angle formed by a downward bend in said bar, as seen in Figs. 6 and 10, forward of which bearing it is provided with a crank 33 for rotating the shaft and thereby the wheel 19. Preferably, the track bar 16 is a rack bar also; that is, it is provided with means for the engagement therewith of the wheel 19, which is toothed for that purpose, the teeth 19^a engaging the apertures 16^a in the horizontal flange of said track bar. This engagement, aside from facilitating the lateral propulsion of the rear bearing of the propeller shaft tends to prevent the said shaft from being disturbed or shifted from the position to which it may be adjusted along the track bar 16. Usually, it will not be necessary to provide any means for restraining the rotating of the shaft 31 when the carrying wheel 19 is engaged in the manner described with its track. In the absence of any check to prevent such result, the propeller could swing down to vertical position or until it dragged on the bottom of the stream, and to prevent this result and limit the descent of the rear end of the propeller shaft to proper operative position of the propeller is the purpose of the check bar 25. As illustrated, the check bar is made in the form of a loop by means of two bars which are spaced apart so as to embrace between them the bar 20, being at their lower ends fastened to a clip 28 which is attached to the shaft bearing and at their upper ends spaced apart by a block 29^a which stops on the bar 20 at the lowest position. A plate 60, which is riveted on the top of the bar 20 and projects both sides of the bar, is notched to engage the two members of said check bar 25, as seen in Fig. 9, to retain it in substantially erect position.

In the form shown in Figs. 10 and 11, instead of extending the cable 24 down to the clip 28 for fastening it to the shaft bearing and providing in addition the check bar 25, as above described, I have shown a jointed and folding check and lifting bar 35—36 having its two members jointed together at 35^a (see Fig. 13), the cable 24 being attached at the joint between the two members and extending thence up over its guide pulley 29, which is in that case mounted between two bracket ends 29^A, between which the check and lifting bar is guided, being retained between them by an outer roller 30^b mounted between the bracket ends 29^B. The length of the lower member 35 of this lifting bar is such that when the joint at which the cable is attached is above the guide pulley 29 far enough to permit the upper member 36 to be folded down forward on top of the bar 20, as seen in Fig. 11, the propeller is entirely out of the water, and at the highest position to which it can be or ever need be lifted, and at this position the weight of the said upper member 36 is sufficient to hold it elevated without other means of locking it, as shown in Fig. 11. The specific construction of the two-membered lifting and check bar 35—36 may be clearly understood from Fig. 13, each member comprising two flat bars, those of the lower member 35 being riveted together at the middle portion of length and spread at their ends to form forks which engage, respectively, the clip 28 and the upper member whose two bars are spaced apart sufficiently to accommodate between them the cable 24, the upper ends of said two bars being folded outward to engage on the top of the bracket ends 29^B for stopping the descent of the propeller shaft at the lowest position to which it is intended to allow it to drop.

In Figs. 14 and 15 there is shown a different device for swinging the propeller shaft laterally to vary its angular relation to the hulls. This device comprises a cable 40 attached at both ends to an eye 41 at the end of the bar 20 and extending intermediate around a vertical windlass 41^a mounted on the bar at a distance forward of the rear end and from said windlass running around guide pulleys 42—42 on the track bar 16 near the ends thereof, that is, substantially at the rear ends of the respective hulls. The cable is preferably wound several times around the vertical windlass 41^a so that it is engaged

thereby without danger of slipping as the windlass is rotated. The windlass is provided with a suitable crank handle 43 for rotating it in either direction at will to swing the bar 20 and thereby carry the propeller laterally in either direction. In this form the propeller shaft is suspended, raised and lowered and checked in the same manner and by devices entirely similar to those shown in Figs. 10 and 11 and already described, and which are indicated in Figs. 14 and 15 by the same letters as are applied to the corresponding parts in Figs. 10 and 11.

In Figs. 16, 17 and 18 I have shown in approximately true proportions, a device for winding up the lifting cable 24, said device being shown very much exaggerated in proportion to the remainder of the structure in Fig. 10. This device consists of a windlass 45 journaled between the arms of a U shaped bracket 46 mounted on the bar 20. On one of the arms of the bracket there is made fast a disk 47 having four peripheral notches 47^a. The windlass 45 has an axle extension 45^a reduced in diameter and protruding through the arm of the bracket on which the disk is mounted and through said bracket thereby containing a bearing on one end and on the end of said axle extension there is made fast a cover or cup shaped disk 48 whose flange 48^a encompasses the periphery of the notched disk 47. A bolt 45^b extends at the center through the cover disk 48 and through the windlass containing a bearing in the opposite arm of the bracket for affording adequate support to the windlass. 49 is a dog slotted at 49^a for mounting on a short bolt 59^a by which the dog is positioned on the inner side of the flange 48^a of the cup disk 48 said disk having a slot through its web immediately adjacent to the flange which permits the dog to extend through and project beyond the outer surface of the disk or outer cover where it is engaged with a handle bar, 58 which is a flat strip of thin metal bolted at one end to the web of the cup disk and extending diametrically across it as seen in Fig. 16, and having a longitudinal slot 58^a through which the head of the dog 49 may be entered, the latter being notched back of the head at 49^b so that it may be turned in the slot or rather so that the handle may be turned on the dog after it has been inserted through the slot, the handle bar being swung around and bolted to the disk after such engagement to the dog has been effected. The handle bar 58 normally lies flat on the face of the cover or cup disk 48 and tends to hold the dog thrust inward into engagement with one of the notches 47^a but the handle may be sprung out to the position of the dotted line Fig. 17 in disengaged position so that the dog may be rotated, the handle 58 being sprung out and provided with a handle 58^b for rotation of the windlass. The corner of the dog which stands foremost in the rotation of the windlass for winding up the cable is beveled or round as seen at 49^c for riding out of the notches 47^a, the opposite edge being shouldered for engaging notches to prevent rotation of the windlass. When the fin encounters an obstruction and rides up over it lifting the propeller wheel as hereinafter described it is desirable that the slack thereby thrown into the lifting cable 24 should be taken care of to prevent the cable from being thrown off the guide plate 29 or becoming otherwise disarranged and for that purpose I prefer to provide a resilient take-up device which consists of a coiled flat spring 59 having its inner end secured to one side of an exterior square hub 47^b with which the disk 47 is provided; said hub projects within the cavity of the cup disk or cover 48, the outer end of the spring being attached to the flange 48^a of the cup, said attachment being effected by the bolt 59^a on which the dog 49 is mounted. This spring is only stiff enough to lift the cable but not strong enough to lift the propeller, and will yield and permit the windlass to rotate, thus letting down the propeller after it has been lifted as above described.

It will be understood that the catamaran can be steered by adjusting the propeller within the range of its lateral swing, that is, so that it shall be parallel with the hulls for direct longitudinal travel, either backward or forward and obliquely in either direction for turning. This result will be obtained by virtue of the direction of push or pull which the propeller gives to the vessel and independently of any other steering expedient of the nature of the rudder which may be employed. I prefer to associate with the laterally adjustable propeller shaft a rudder fin 50 depending from the shaft bearing, such fin being wide enough to guard the entire radius of the propeller and having projecting from its rear lower corner an arm or shoe 51 which extends under the propeller. This device operates not only as a rudder, partaking of the lateral swinging movement of the propeller shaft and so having the parallel or oblique direction of the shaft, but it also operates as a guard for the propeller and as a means for causing the latter to rise over any obstruction or shallow in the bed of the stream; and to facilitate this function the rudder fin 50 is narrowed toward the forward end, its lower edge being oblique and preferably slightly curved, as shown, so that upon encountering any obstruction or shoal the propeller is lifted, the lower edge of the rudder fin riding up on the obstruction, the flexible connection of the propeller shaft with its support to the bar 20 permitting it to be thus lifted

and to fall as soon as the obstruction is passed; thus making it possible to navigate the vessel in the shallowest water in which the hulls can float, while at the same time taking advantage of greater depth, where it exists, for submersion of the propeller.

In view of the desirably extended length of the rudder fin 50, which may be as much as one-fourth the length of the hulls, and for other reasons which will appear, I provide for the rear or outer bearing of the propeller shaft a tube 54 which extends the entire length of the shaft; and as its forward end becomes a lining or bushing in the shaft bearing 6, as seen in Figs. 3 and 4, it will be understood that the diameter of the shaft may be less than the interior diameter of the tube, bearings being afforded by bushings for reducing friction, and this is particularly desirable in view of the length of the shaft and tube which renders them liable to spring in service. This tube, 54, affords very efficient means for carrying the rudder fin, 50, which is secured rigidly thereto by clips, 55, clasping the tube. The clips which afford connection for the lifting and check bars described are also similarly formed to clasp the rudder fin for securing it to the propeller shaft bearing.

In view of the rocking to which the hulls are subject on rough water and the flexible connection between them and between each of them and the motor supports, it is desirable to provide means for accommodating the operating lever, 13, to this rocking so that the operator seated in either hull and operating the lever may not be compelled to change the plane of swing of the lever constantly with the rocking of the boat. A device for this purpose is shown in Fig. 5 consisting in mounting the lever on its pivot between two cushioning springs, 56—56, one above and the other below it, stopped respectively on the bottom and top plates, 57—57, of the lever fulcrum support.

I claim:—

1. In combination with a water craft having two transversely connected and laterally separated hulls, a propeller having its shaft extending longitudinally in the interval between the hulls pivotally mounted at its forward end for vertical and horizontal swinging at its rear end; a bearing for the rear end of the shaft; a carrier for the same supported on the rear ends of the hulls, and upwardly yielding connection from such carrier to said bearing, said carrier being movable laterally at will and means for so moving it.

2. In combination with a water craft having two transversely connected and laterally separated hulls, flexible connections between the hulls comprising longitudinally extending pivotal bars adjacent to the hulls respectively; a motor pivotally mounted on said longitudinal bars for vertical oscillation; a propeller shaft extending from the motor longitudinally in the interval between the hulls; a rear bearing for the propeller shaft and a support for such bearing on the rear ends of the hulls.

3. In combination with a water craft having two laterally separated and transversely connected hulls; a motor carried thereby; a propeller having its shaft actuated by the motor and extending longitudinally in the interval between the hulls; means for swinging the propeller shaft in said interval; a track bar mounted on the rear end of the hulls; a carriage mounted for traveling on the track bars and connections by which the rear end of the propeller shaft is suspended from said carriage.

4. In combination with a water craft having two laterally separated and transversely connected hulls, a motor carried thereby; a propeller having its shaft actuated by the motor and extending longitudinally in the interval between the hulls; means for swinging the propeller shaft in said interval; a track bar carried by the hulls at their rear ends curved about the pivot of such lateral swinging movement of the shaft; a carriage and a carrying wheel therefor mounted for traveling on the curved track bar; an operating shaft for such wheel extending toward said pivot, and means for rotating such shaft at will.

5. In combination with a water craft having two laterally separated and transversely connected hulls, a motor carried thereby; a propeller having its shaft actuated by the motor and extending longitudinally in the interval between the hulls; means for swinging the propeller shaft in said interval; a track bar carried by the hulls at their rear ends curved about the pivot of such lateral swinging movement of the shaft; a carriage and a carrying wheel therefor mounted for traveling on the curved track bar; an operating shaft for the wheel extending toward said pivot; means for rotating such shaft at will and means by which the rear end of the propeller shaft is suspended from such carriage.

6. In combination with a water craft having two longitudinally connected hulls, a motor carried thereby; a propeller having its shaft actuated by the motor and extending longitudinally in the interval between the hulls; means for swinging the propeller shaft laterally in said interval; a track bar mounted on the rear ends of the hulls; a carriage mounted for traveling on the track bar; a radius bar extending from the carriage and pivotally mounted about the axis of such laterally swinging movement, and connection by which the rear end of the propeller shaft is suspended from such carriage.

7. In combination with a water craft having two transversely connected and laterally separated hulls, a motor mounted intermediate the hulls; a propeller having a shaft-bearing on the motor; a propeller shaft extending longitudinally therefrom in the interval between the hulls, the motor being mounted for vertical and also for lateral swinging of the propeller-shaft-bearing; a track bar carried by the hulls at their rear ends; a carriage mounted for traveling on the track bar; a radius bar extending from the carriage to and pivotally connected at the pivot of the horizontally swinging movement of the motor; a cable by which the rear end of the propeller shaft is suspended from such carriage; guides for said cable on the radius bar, and means mounted on such radius bar for winding the cable.

8. In combination with a water craft having two transversely connected and laterally separated hulls; a propeller having a shaft bearing mounted intermediate the hulls, the shaft of such propeller extending from said bearing longitudinally in the interval between the hulls, such bearing being pivoted for vertical and also for lateral swinging of the propeller shaft; a track bar carried by the hulls at their rear ends; a carriage mounted for traveling on the track bar; a radius bar extending to and pivoted about the axis of the horizontal swinging movement of the shaft bearing; a rear bearing for the propeller shaft; a cable by which it is suspended from said carriage; a guide for the cable on the carriage, the cable extending therefrom along the radius bar, and means mounted on the radius bar for winding the cable.

9. In combination with a water craft having two transversely connected and laterally separated hulls, a propeller shaft-bearing mounted intermediate the hulls, the propeller shaft extending from said bearing longitudinally in the interval between the hulls, the said shaft-bearing being pivoted for vertical and also for lateral swinging of the shaft; a track bar carried by the hulls at the rear end, curved about the pivot of the horizontal movement of the shaft bearing; a carriage and a carrying wheel therefor mounted for traveling on the curved bar; a radius bar from the carriage extending to and pivoted about the axis of said horizontal swinging movement; an operating shaft for said wheel mounted on the radius bar and extending there-along toward said pivot; means for rotating said shaft, and means by which the rear end of the propeller shaft is suspended from the carriage.

10. In combination with a water craft having two flexibly connected and laterally separated hulls, a motor carried thereby; a propeller having its shaft operated by the motor and extending longitudinally in the interval between the hulls; a track bar mounted on the rear ends of the hulls with limited freedom of longitudinal movement relatively thereto, and means by which the rear end of the propeller shaft is suspended from said track bar.

11. In combination with a water craft having two flexibly connected and laterally separated hulls, longitudinally extending pivotal bars adjacent to the hulls respectively; a propeller shaft-bearing pivotally mounted on said longitudinal bars for vertical oscillation; a propeller shaft extending from such bearing longitudinally between the hulls; a bar mounted on the hulls at their rear ends with limited freedom of longitudinal movement relatively thereto, and means by which the rear end of the propeller shaft is suspended from such bar.

12. In combination with a water craft having two transversely connected and laterally separated hulls; a propeller shaft-bearing mounted pivotally intermediate the hulls for lateral and vertical swinging; a tube extending from such bearing rearward; the propeller shaft provided with a rear end bearing in the rear end portion of the tube; a bar supported upon the rear ends of the hulls, and means by which the rear end of the tube is suspended from such bar.

13. In combination with a water craft having two transversely connected and laterally separated hulls; a propeller having its shaft extending longitudinally in the interval between the hulls pivotally carried at its forward part for swinging laterally at its rear end in said interval; a bar carried by the rear end of the hulls; a carriage mounted for traveling on such bar; a radius-bar from the carriage extending to and pivoted about the axis of the lateral swinging movement of the shaft; means by which the rear end of the shaft is suspended from such carrier, and a check bar from said rear end portion of the shaft for limiting the downward movement of said rear end of the shaft.

14. In combination with a water craft having two transversely connected and laterally separated hulls; a propeller having its shaft extending longitudinally in the interval between the hulls; a bearing for said shaft pivotally mounted intermediate the hulls for swinging laterally in said interval; a gear wheel journaled on the shaft-bearing coaxially with the pivot of said bearing; a pinion on the shaft driven by said gear wheel, and means for rotating the gear wheel; a gear wheel journaled on the shaft bearing coaxially with the pivot of said bearing; a pinion on the shaft driven by said gear wheel, and means for rotating the gear wheel.

15. In combination with the two flexibly connected and laterally separated hulls; an intermediately-positioned propeller shaft-bearing flexibly connected to both hulls; a propeller shaft journaled in such bearing; means for rotating the shaft comprising a horizontally vibrating operating lever; a support for its fulcrum flexibly connected to both hulls, and springs between which such lever is positioned on its fulcrum.

16. In combination with two flexibly connected and laterally separated hulls; longitudinal pivotal bars adjacent to their proximate sides respectively; a propeller shaft-bearing mounted on such bars; means for driving such shaft comprising a horizontally vibrating operating lever whose fulcrum is also supported on said pivotal bars, and a spring between which such lever is positioned on its fulcrum.

17. In combination with a water craft having two transversely connected and laterally separated hulls; a propeller shaft-bearing mounted pivotally intermediate the hulls for lateral swinging; a tube extending from such bearing rearward; a propeller shaft provided with a rear-end bearing in the rear-end portion of the tube; means for supporting such tube from the rear-end portion of the hulls with freedom of the lateral movement, and a rudder fin rigid with the tube.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 16th day of August, 1909.

MARCUS PHILLIPS.

Witnesses:
NORMAN L. BURTON,
M. GERTRUDE ADY.