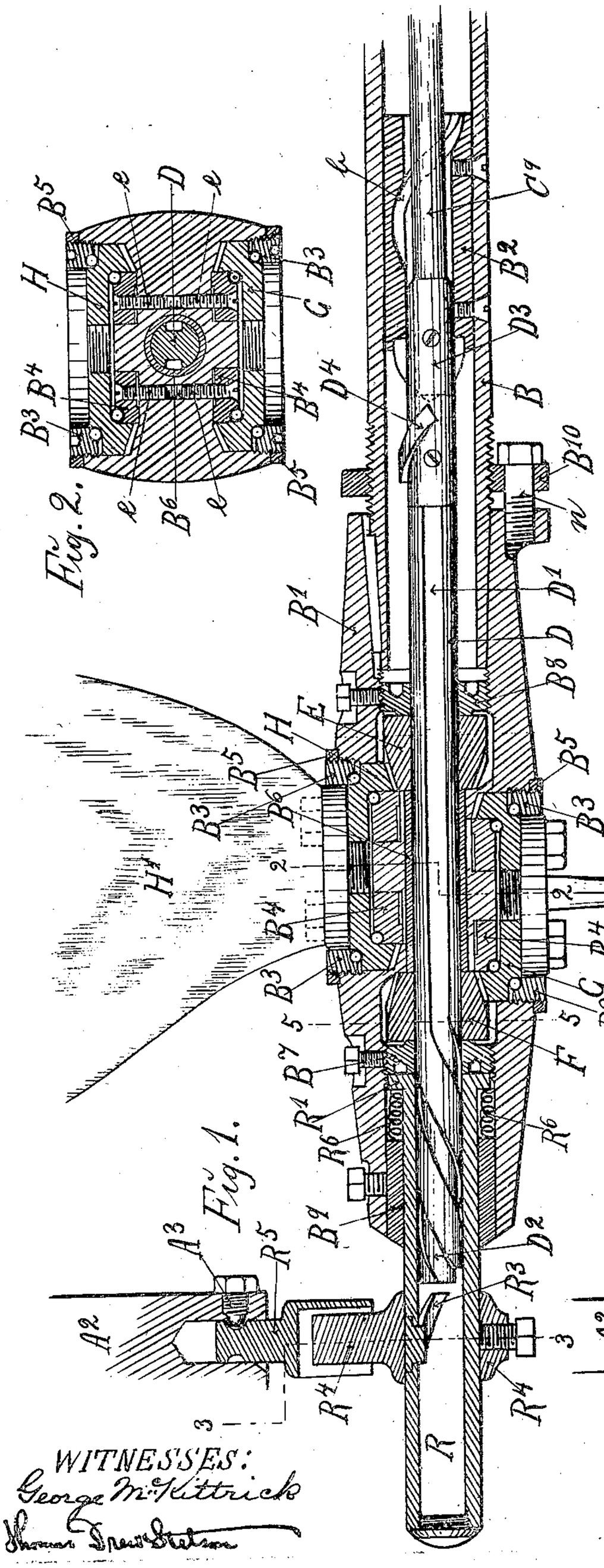
No. 812,450. PATENTED FEB. 13, 1906.

D. W. RANTINE.

UNIVERSAL PROPELLING MECHANISM.

APPLICATION FILED MAR. 26, 1905.

2 SHEETS—SHEET 1.



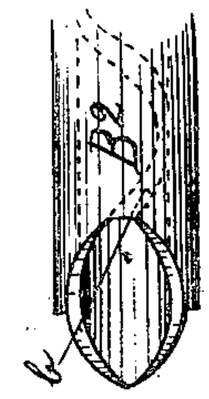


Fig. 6.

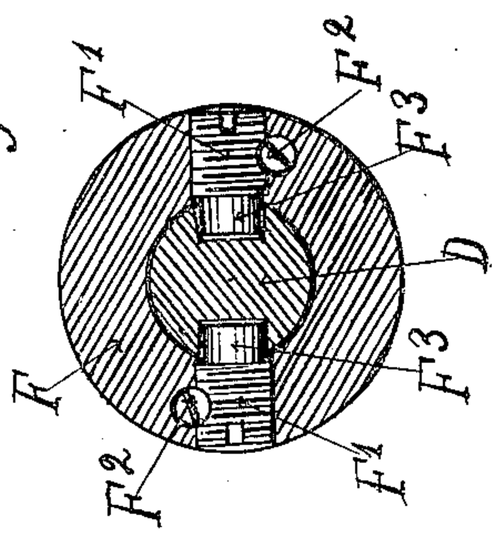


Fig. 5.

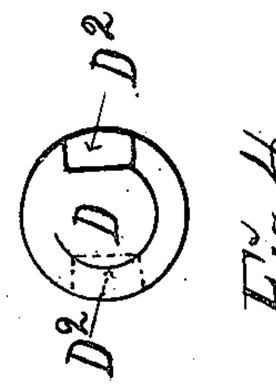


Fig. 4.

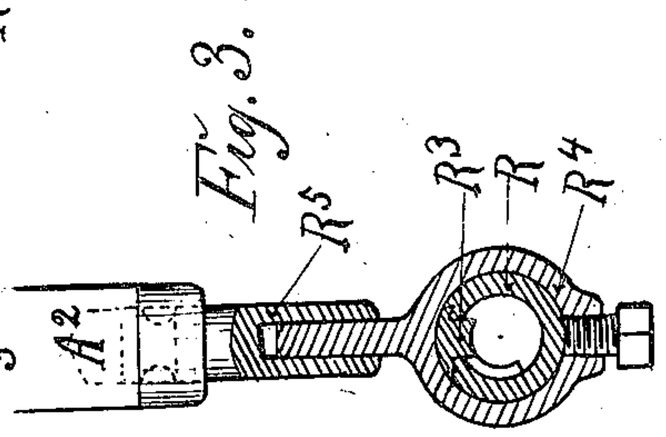


Fig. 3.

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No. 812,450. PATENTED FEB. 13, 1906.

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UNIVERSAL PROPELLING MECHANISM.

APPLICATION FILED MAR. 28, 1905.

2 SHEETS—SHEET 2.

Fig. 7.

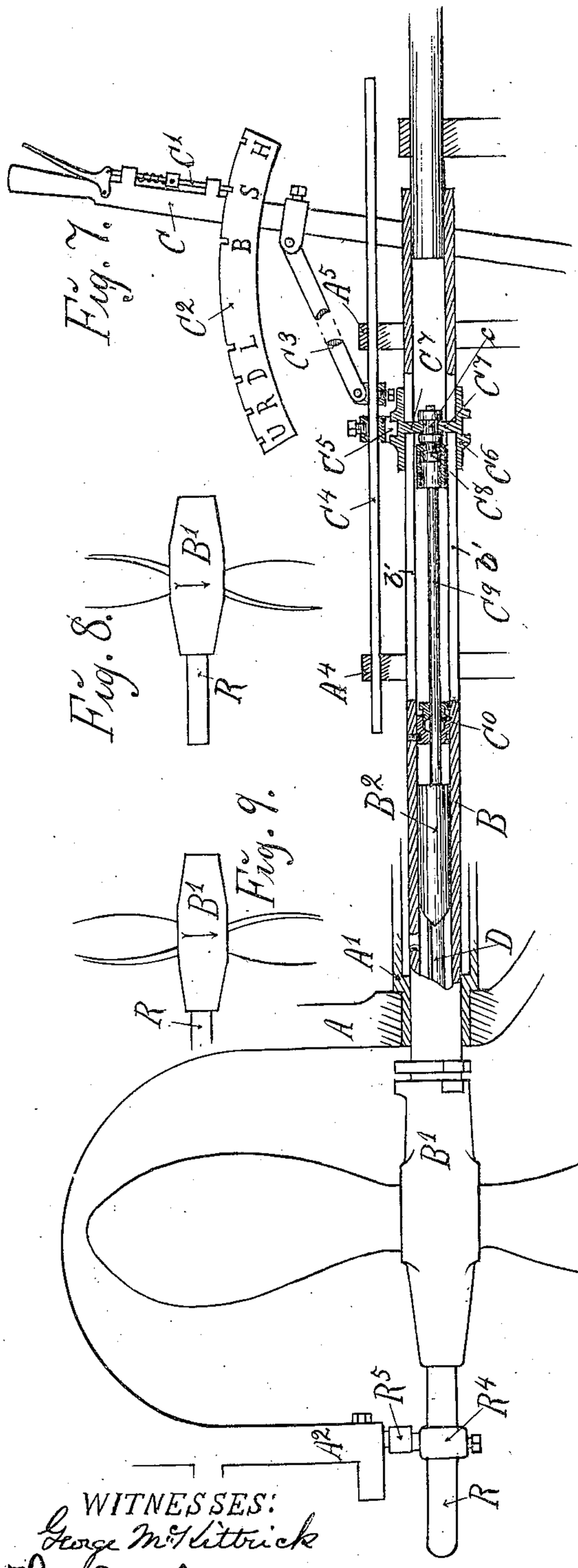


Fig. 8.

Fig. 9.

Fig. 10.

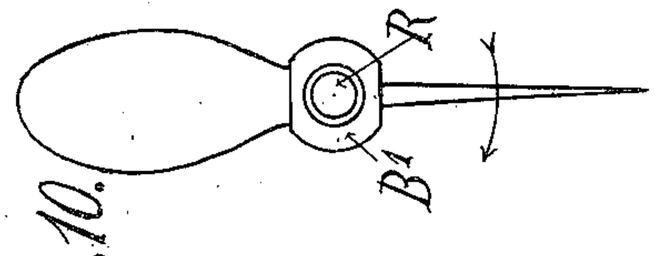


Fig. 11.

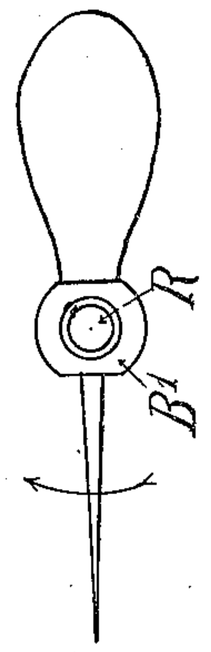


Fig. 12.

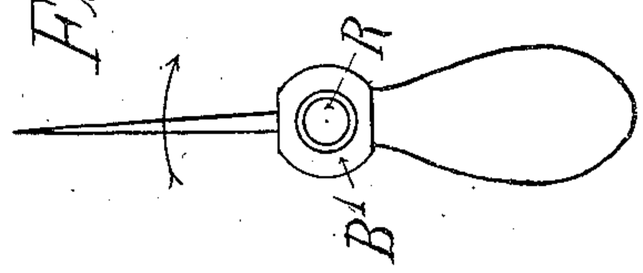
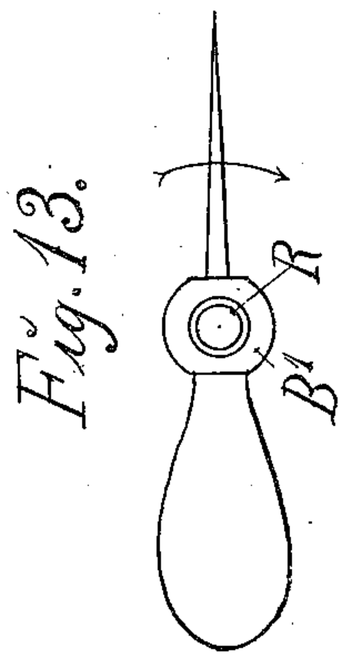


Fig. 13.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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UNIVERSAL PROPELLING MECHANISM.

No. 812,450. Specification of Letters Patent. Patented Feb. 13, 1906.

Application filed March 28, 1905. Serial No. 252,501.

To all whom it may concern:

Be it known that I, DANIEL W. RANTINE, a citizen of the United States of America, residing in the borough of Brooklyn, in the city and State of New York, have invented a certain new and useful Universal Propelling Mechanism, of which the following is a full and complete specification, such as will enable those skilled in the art to which it appertains to make and use the same.

My invention involves an apparatus to perform what I term "universal propelling." It may be used in propelling ahead, backward, upward, downward, and laterally to either side; also, for steering purposes, if desired.

I have provided a tubular propeller-head secured to a tubular main propeller-shaft and a grooved interior shaft within the said propeller-head and main shaft and revoluble propeller-blades, which may be changed in their angles relatively to the main propeller-shaft and to the vessel. The changes of the angle of the propeller-blades are effected by turning and shifting endwise the said grooved interior shaft, as required. For ahead or back propelling or for sailing the grooved interior shaft is held in a safety connection to the tubular main shaft by what I term the "main lock" and geared therewith. The said interior shaft is provided with means by which it is held from turning. I term this a "stern-lock." The main shaft and the propeller may be turned continuously around while the interior shaft is thus held, and by so doing the propeller-blades will be revolved in their respective places with the peculiarity that they act on the water edgewise, and consequently ineffectively, and in the opposite portion of each revolution they act against the water flatwise, and consequently forcibly. This style of propelling I term the "lateral" propelling.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part.

Similar parts are referred to by similar letters throughout.

Figure 1 is a sectional side elevation of the propeller A portion of the propeller-shaft and a portion of the stern-lock holder or post is shown therewith. Fig. 2 is a cross-section on the line 2 2 in Fig. 1; but the propeller-blades are not shown. Fig. 3 is in line 3 3 in Fig. 1, showing in section the stern-lock shell and adjacent parts. Fig. 4 is a rear end view of the grooved interior shaft on a large scale. Fig. 5 is on the same scale. It is a section on line 5 5 in Fig. 1, showing in section the bevel-gear and the grooved interior shaft within. Fig. 6 is a side elevation of the projecting end of the grooved tubular part serving in the main lock. Fig. 7 is a longitudinal side elevation of the entire apparatus, showing in section a part of the tubular main shaft and a part of the stern-tube and frame. The propeller-blades are in feathered position for sailing. In Fig. 8 is seen how the propeller-blades are set in ahead propelling. In Fig. 9 is seen the blades set at the proper angle for back propelling. Figs. 10, 11, 12, and 13 represent rear end views of the propeller-head and the stern-lock shell and the blades as they act in different directions in the lateral and upright propelling. In Fig. 10 the blade action turns the vessel to the left. In Fig. 11 the propelling is downward, in Fig. 12 turning to the right, and in Fig. 13 is upward.

Figs. 1 and 7 show the entire apparatus and a portion A of the stern-frame adjacent to the stern-tube A′, also the stern-lock holder or post A^2. Within the stern-tube is used the ordinary lubricating means and journals and stuffing-boxes (not shown) around the tubular main shaft B. The rear end of the shaft B is tapered, and the propeller-head B′ is secured over the tapered end by keys and bolts *n*, which are arranged to strongly fasten the propeller-head to a coupling ring or flange B^{10}, which latter is mounted on a threaded portion of the propeller-shaft. The propeller-head is provided with two nearly opposite blade-recesses for holding blade-gears G and H, one in each recess. The blades H′ and G′ are secured on the blade-gears with bolts and also each by a screw-threaded center shank. Within the propeller-head is mounted the supplemental internal shaft D, having liberty both to turn and to slide endwise as shall be required. This shaft D has two opposite grooves which extend rearward, one portion D′ being straight and another portion D^2 helical, as shown, to the left. On the straight-grooved portion is slidably feathered the bevel-gear E and is operated by the straight grooves D′ only. Another bevel-gear F is also slidably mounted on this said interior shaft and is operated by either of the different grooves, the straight or the helical. The gear F is made serviceable by having a set of interior studs F′ (see Fig. 5) fixed to the gear and held therein by the cross screws or pins F^2. The smooth

round ends F^3 of the studs extend to the grooves of the shaft D. The interior of the gear F is so formed that it may slide on either of the different portions of the grooves, but will have to turn with the said shaft D′ in either condition. The gears E and F are held with freedom to turn within the propeller-head by the threaded smooth-faced set-rings B^7 and B^8, and a tubular distance-piece B^6 keeps them the proper distance apart. The interior shaft D is shifted endwise by the operator from inside of the vessel by means of the lever C. (Shown in Fig. 7.) The lever is connected by the bar C^3 and by the adjacent parts to the shifter-bar C^4, which latter is carried in the racks A^4 A^5, and a yoke C^5 is secured to the bar C^4 and the sleeve C^6, being mounted on the tubular main shaft B and connected to the yoke C^5 with the ordinary devices. (Not shown.) Two fingers C^7 extend through the slots *b′* in the main shaft B from the sleeve C^6 to the groove *c* in the swivel C^8, which latter is connected to the shifter-rod C^9. This rod is joined to the interior shaft D by the tubular main lock part D^3. A stuffing-box C^{10} is provided around the rod C^9 to retain the lubricating-oil within the shaft B. All these shift parts, including the interior shaft D, may be held in fixed positions by the pointer rod or catch C′, carried by the lever C and provided with a spring which presses it toward the predetermined notches in the sector C^2. Any action of the propeller which is obtained by shifting the lever is indicated by the letters below the notch in which the catch C′ is set. "H" is for ahead, "S" indicates sailing, "B" backward, "L" for left, "D" for down, "R" for right, and "U" is upward propelling. The blade-recess, which holds the blade-gear H and the blade therewith, is farther forward than the other recess which holds the blade-gear G and the blade therewith. This difference in location of the recesses allows an independent operation for each blade, allowing the blade-gear H to coact with the bevel-gear E and the other blade-gear G to coact with the bevel-gear F. Within the blade-recesses are removably fixed bearing-cones B^4 (see Figs. 1 and 2) with screws *e* and by the center studs to the propeller-head. The blade-gears are mounted over these cones and bearing cups or rings B^3 over the blade-gears. The blade-gears have bearing-runways corresponding to bearing-runways in the said cones and cups. The cups are removably secured to the propeller-head by screw-threads and by threaded lock-rings B^5. Forward of the propeller-head is secured within the tubular main shaft B the projective end main-lock bushing B^2, (see Figs. 1 and 6,) which has an interior helical groove *b* to correspond to a helical pointed ridge or thread D^4, carried on a tubular piece D^3, which is rigidly secured to the interior shaft D. By drawing the shaft D so far in that the ridge D^4 will come within the groove *b* the interior shaft and the main shaft will be locked together, and any further endwise shifting of the interior shaft in this helical main locking engagement will turn the said shaft D and the bevel-gears E and F, and therewith the blade-gears and blades, to any desired angles for ahead and back propelling or set the blades feathering for sailing. The ridge D^4 and the groove *b* constitute a right-hand screw and are guided to engagement with each other by their inclining sides, which begin from projecting points. The other mode of propelling (lateral propelling) is accomplished by the aid of a combination of devices called the "stern-lock." The body or shell R of this stern-lock is tubular in form and is partly carried within the rear end of the propeller-head, having a flange R′ secured to its inner end. An added piece or stop-ring B^9 is removably secured to the propeller-head, and a spring R^6 is placed between the stop-ring and the flange R′ to keep the lock-shell R in a uniform position to slide a little back and forth in case the rear end of the interior shaft D is suddenly pressed against the helical interior ridge R^3, which is located within the said lock-shell R. (Seen in Figs. 1 and 3.) This helical ridge R^3 is the coacting member to the only open helical groove D^2 on the rear end of the interior shaft D. (See Fig. 4.) To the lock-shell R is secured a dog R^4, which reaches to a slot of a slot-pin R^5, which is held by a screw A^3 to a holder-post A^2, but allowing liberty for the said holder to turn. The aim of the dog, the slot-pin, and the holder is to keep the stern-lock shell from turning and the bevel-gears E and F therewith, while the interior shaft D has engaged the service of the stern-lock. The bevel-gears E and F being held stationary while the blade-gears H and G are revolved with the propeller, having each twice as many teeth as their opposing bevel-gear, the propeller-blades will act in a manner suitable for the lateral propelling, which may be set to any direction by shifting the interior shaft D endwise in its helical stern-lock engagement.

The operation is easily understood. Remembering that the interior shaft D has a full control of the propeller-blades, and by an endwise shifting of this said interior shaft the said propeller-blades may be conditioned for any of the different actions preferred. In the first instance the interior shaft is drawn far in, the main lock engaging the pointed ridge D^4 far within the groove *b*. The propeller-blades have the angles shown in Fig. 8, suitable for propelling ahead, the revolving direction assumed to be as shown by the arrows on the drawings. The thrusting farther out of the shaft D will move the ridge D^4 half-way in the groove *b* for sailing. The propeller-blades are set in the plane of the main

shaft, as seen in Fig. 7. A further movement rearward of the internal shaft D will set the blades, as seen in Fig. 9, suitable for back propelling. A certain shifting rearward of shaft D will open the main lock, and both of the bevel-gears E and F are now operated by the straight grooves D′ and the blades have the suitable angle for the lateral propelling, as seen in Fig. 1. To attain this last-named condition, the shaft D is thrust so far out as to engage the service of the stern-lock by the open groove D^2 to the interior ridge R^3 of the stern-lock shell. This open groove D^2 is a left-hand thread, and in this first engagement with the stern-lock the propeller-blades will act, as seen in Fig. 10, to propel or turn the vessel to the left.

Figs. 10, 11, 12, and 13, as stated before, are rear end views of the propeller. The arrows crossing the acting blades show the revolving direction of the propeller. By shifting the shaft D farther rearward a downward propelling is effected, as seen in Fig. 11. For turning the vessel to the right the said shaft D is thrust farther out and the blades will act as seen in Fig. 12. A still further movement rearward of the shaft D will attain upward propelling, as shown in Fig. 13.

All the different locking engagements may be opened and renewed by shifting the interior shaft to the proper extent in the proper directions.

The entire apparatus is durable and simple in construction, and in operation modifications may be made. The invention may be used alone or duplicated. Parts may be made of any desired length or strength to suit various kinds and classes of vessels without departing from the principle or sacrificing the advantages of the invention, an important use being in submarine vessels. Any suitable means and power may be employed to revolve the main shaft and also to shift the interior shaft.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a universal propeller, the combination of a tubular propeller-head secured to a tubular main propeller-shaft, a supplemental threaded or grooved slidable interior shaft within the said tubular propeller-head and main shaft; revoluble propeller-blades, and a main lock and a stern-lock; said propeller-head having blade-recesses, and blade-gears within the said recesses and held therein by threaded bearing-cups and bearing-cones removably secured to the propeller-head within the said recesses, the cups being held by screw-threads and by the threaded lock-rings and the said cones with screws and by a center stud therewith; said cups and cones having bearing-runways and opposing bearing-runways in the blade-gears, the said blade-gears having each a screwed center hole to receive and hold the screw-threaded center from the propeller-blades which are also fastened with bolts on the said blade-gears; said supplemental interior shaft having straight grooves which extend to become helical grooves having one direction in their certain helical tend; said main lock being tubular in form and having a helical open interior groove and secured within to the said tubular main shaft; and a pointed helical ridge secured on the said interior shaft, arranged to coact with the said open groove of the tubular main lock part, the said helical pointed ridge and said open helical groove having an opposite direction in their certain helical tend, from the aforesaid helical grooves on the said supplemental interior shaft; all the said ridge and said grooves capable of adjusting and holding the said propeller-blades and the said interior shaft as required and geared in connection with the main shaft; said supplemental shaft being connected to a swivel-rod and to a swivel therewith, said swivel preferably connected to a shifter-yoke which is secured to a longitudinal shifter-bar, connected to and shifted by a lever and the whole shifter and parts connected therewith capable of being shifted and held to effect the desired changes of the propeller-blades; said supplemental shaft having one bevel-gear slidable feathered, and operated by the aforesaid straight grooves; another bevel-gear mounted also slidable on this said supplemental shaft and having circular interior studs extending to the said grooves of the said supplemental shaft, and being operated by either the helical or straight portions of the grooves of this said interior shaft; one of the said bevel-gears in mesh with one of the said blade-gears and the other said bevel-gear in mesh with the other of the said blade-gears; said blade-gears having twice the number of teeth as the number of teeth on their said opposing bevel-gears; said bevel-gears having between them a tubular distance-piece and two threaded set-rings provided to keep them toward the said distance-piece with freedom to revolve and mesh with the said blade-gears; subjoined to the said propeller-head is the aforesaid stern-lock which consists of a tubular lock-shell with a flange thereon a stop-ring removably secured to the propeller-head, and a spring between the said flange and the said stop-ring being set therein to release and prevent the breaking of the parts and to get a quick action of the parts effecting the engagement between the said stern-lock and the said interior shaft; within the said stern-lock shell is provided an engaging member which may be a helical ridge or groove and a corresponding helical ridge or groove or an engaging member being provided on the rear end of the said interior shaft; the purpose of the stern-lock is to hold the said interior shaft from turning, while the said tubular propeller-head and main shaft may be continuously revolved,

thereby developing the lateral propelling, which may be set to any direction by suitably shifting the said interior shaft, further into the helical stern-lock engagement; said stern-lock shell having a dog which coacts with a slot of a slot-pin, said slot-pin being preferably connected to a holder-post which also may be used for a rudder-post, the purpose of the said holder-post slot-pin and dog is to hold the stern-lock and parts connected therewith from turning, substantially as shown and described for purposes specified.

2. The combination in a universal propeller, a tubular propeller-head secured to a tubular main shaft, a supplemental threaded or grooved slidable interior shaft within the said tubular propeller-head and main shaft, revoluble propeller-blades and a main lock and a stern-lock; said main lock involving two opposing projecting points the sides of which incline to form a helical ridge and a helical groove and the said helical ridge coacting with the said helical groove whereby the said supplemental interior shaft may be shifted to a helical safety engagement with the said tubular main shaft and geared in connection therewith with liberty to move endwise to effect the required changes of the angle of the propeller-blades, and the said interior shaft being free to release its helical main-lock engagement and slide to receive the stern-lock engagement consisting of members for holding the said interior shaft from turning while the said tubular main shaft and propeller is revolved, thereby developing a lateral propelling, the said members involving a helical ridge or groove and a member which may be engaged to coact with the last-named helical ridge or groove to obtain the said lateral propelling in any directions preferred, and means whereby the said engagements and the parts performing the operation may be opened and renewed to obtain a greater merit in universal propelling.

Signed at New York, in the county of New York and State of New York, this 25th day of March, A. D. 1905.

DANIEL W. RANTINE.

Witnesses:
F. A. CHICKERING,
GEORGE MCKITTRICK.