No. 817,728. PATENTED APR. 10, 1906.

F. M. SPAULDING.

REVERSIBLE PROPELLER WHEEL.

APPLICATION FILED MAR. 16, 1904.

2 SHEETS—SHEET 1.

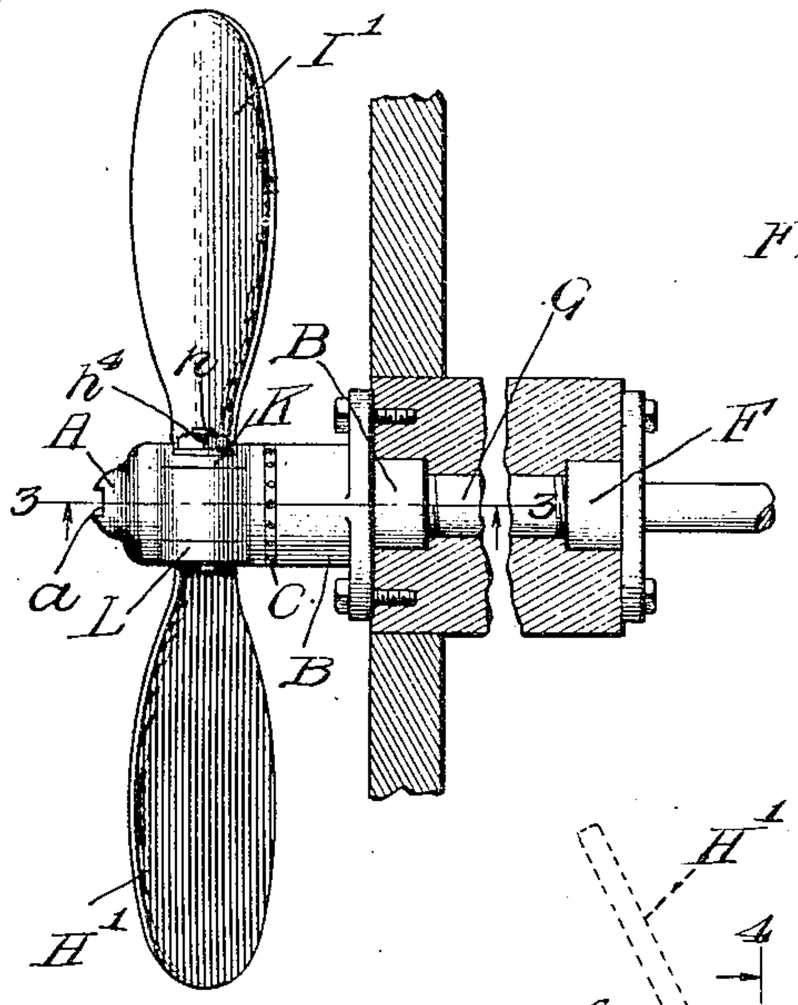

Fig. 1.

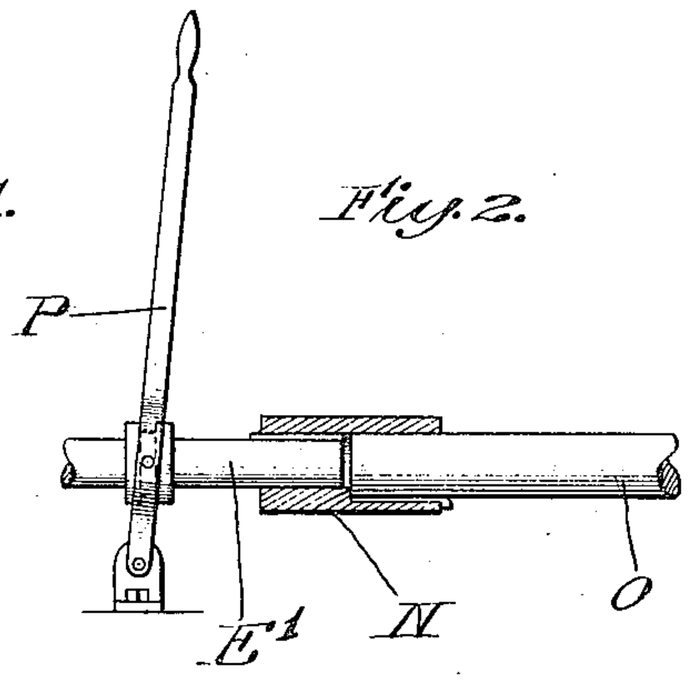

Fig. 2.

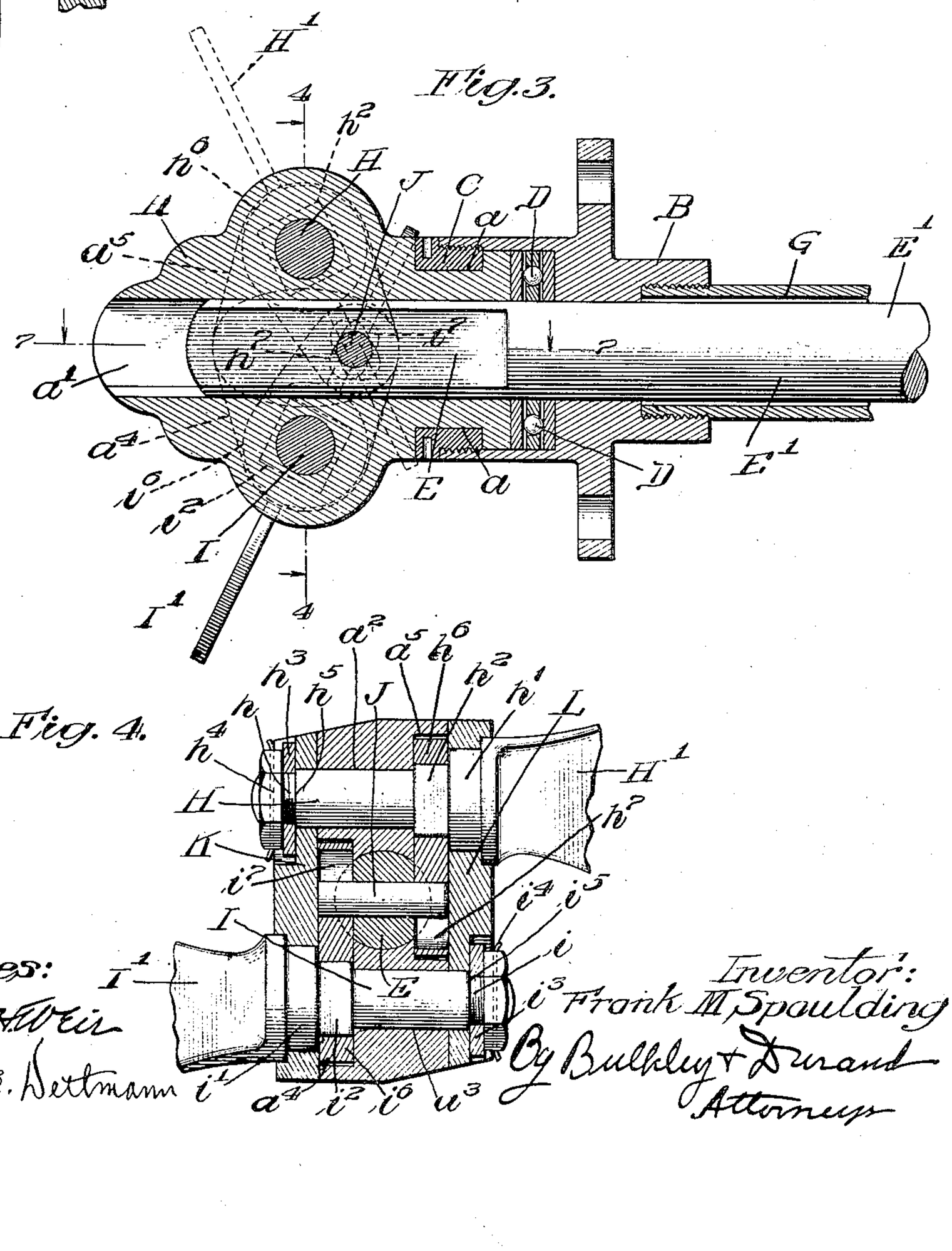

Fig. 3.

Fig. 4.

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2 SHEETS—SHEET 2.

Fig. 5.

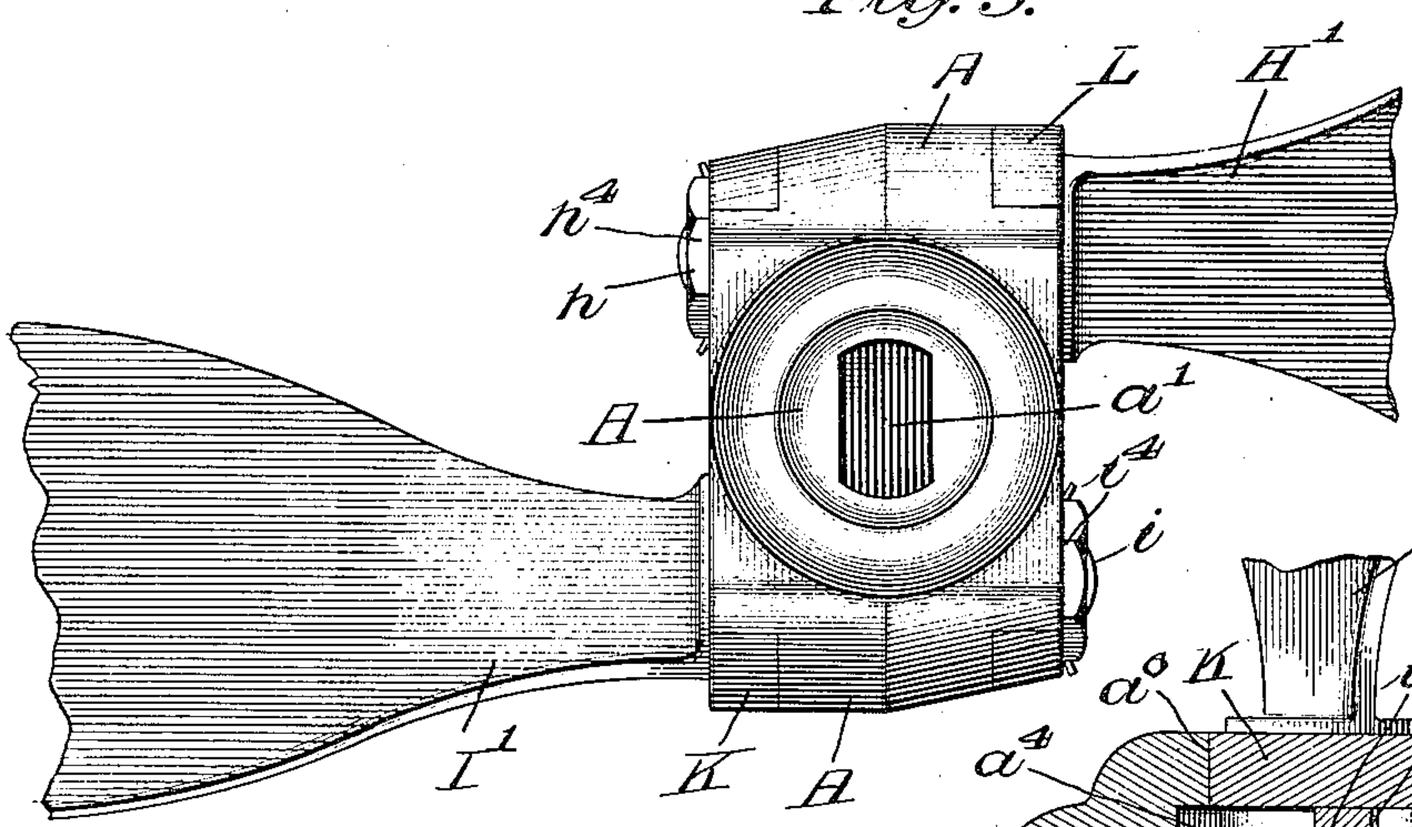


Fig. 7.

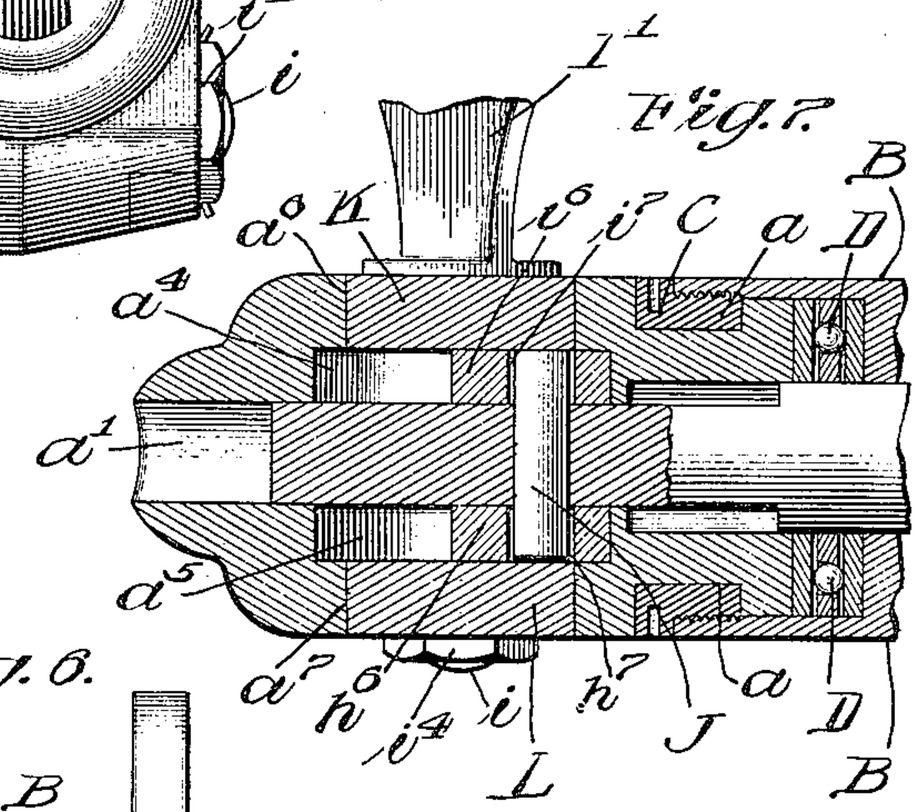
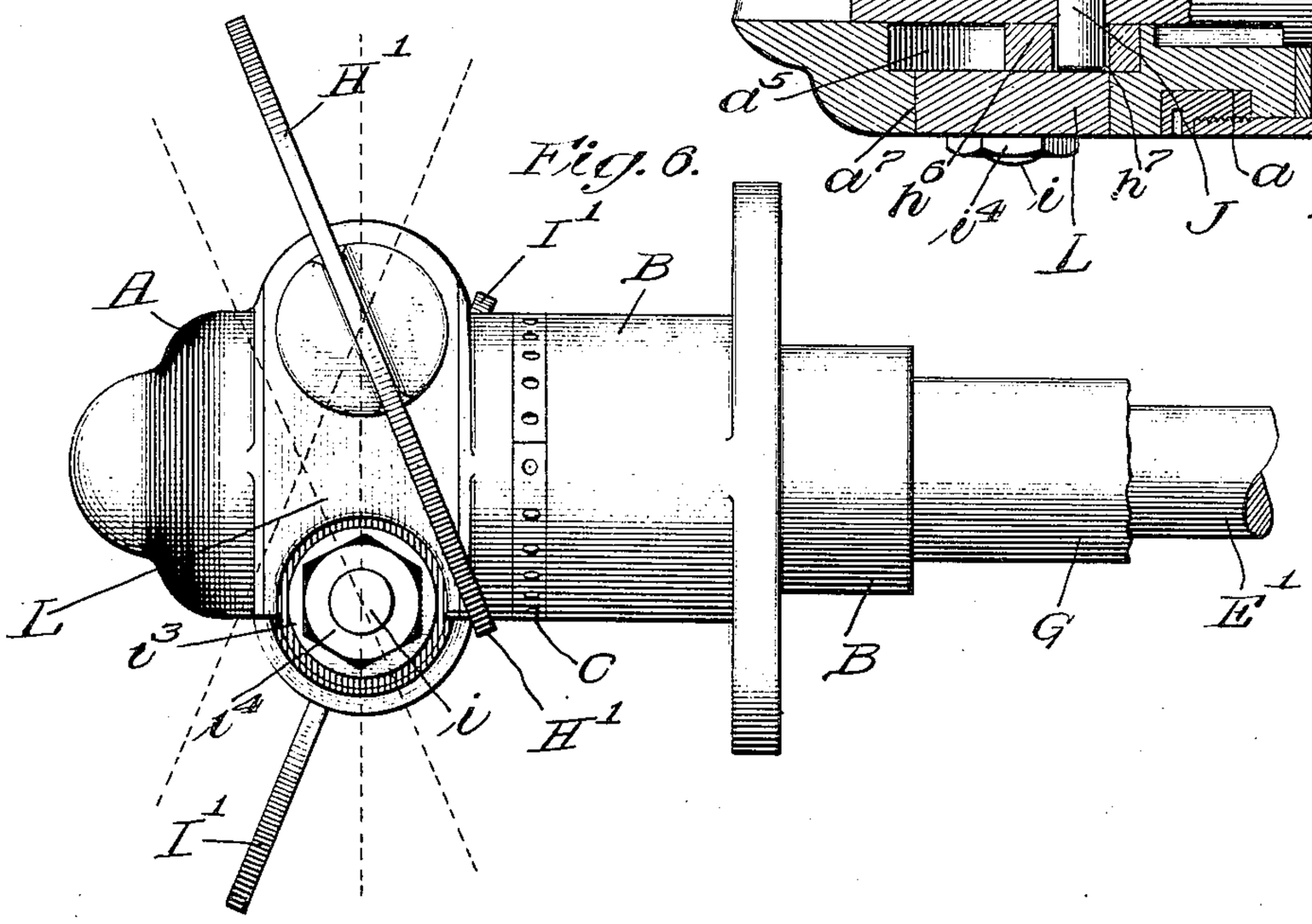


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANK M. SPAULDING, OF ST. JOSEPH, MICHIGAN, ASSIGNOR TO WILLIAM H. HULL, OF ST. JOSEPH, MICHIGAN.

REVERSIBLE PROPELLER-WHEEL.

No. 817,728. Specification of Letters Patent. Patented April 10, 1906.

Application filed March 16, 1904. Serial No. 198,398.

To all whom it may concern:

Be it known that I, FRANK M. SPAULDING, a citizen of the United States of America, and a resident of St. Joseph, Michigan, have invented a certain new and useful Improvement in Reversible Propeller-Wheels, of which the following is a specification.

My invention contemplates an improvement in reversible propeller-wheels of that particular type in which the reversal or angular adjustment of the propeller-blades is effected by a longitudinal shift or adjustment on the part of the propeller-wheel shaft.

Generally stated, the object of my invention is to provide a simple, comparatively cheap, and highly-efficient propeller-wheel of the aforestated character.

A special object is the provision of a propeller-wheel characterized by an improved construction and arrangement of parts whereby the connections between the propeller-blades and the longitudinally-adjustable propeller-wheel shaft are effectively concealed or covered in such manner as to practically preclude all possibility of weeds or sand or other things becoming entangled or lodged in the wheel to an extent to in any way interfere with the reversal or adjustment of the blades or the efficiency of the wheel while in operation.

Another object is to provide an improved construction and arrangement in a propeller-wheel of this particular type whereby the thrust of the propeller-wheel will be sustained entirely by the stern-post or rear structure of the boat rather than by the engine-shaft.

A further object is the provision of an improved construction and arrangement in a propeller-wheel of this particular type whereby the propeller-blades may be easily and quickly removed or adjusted in place and whereby repair and substitution of parts may be made with ease and facility.

It is also an object to provide certain details and features of improvement tending to increase the general efficiency and serviceability of a reversible propeller-wheel of this particular type.

To the foregoing and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a plan of a propeller-wheel embodying the principles of my invention, showing also the rear portion of the boat structure in which the bearings for the propeller-wheel shaft are mounted. Fig. 2 is a side elevation of a portion of the propeller-shaft and of a hand-lever for shifting said shaft, the view also showing the sleeve or coupling for connecting the end-to-end portions of the propeller-wheel and engine-shafts. Fig. 3 is an enlarged longitudinal section on line 3 3 in Fig. 1. Fig. 4 is a cross-section on line 4 4 in Fig. 3. Fig. 5 is a rear end view of the hub portion of the wheel, the blades being broken away for convenience of illustration. Fig. 6 is an enlarged side elevation of the wheel shown in Fig. 1. Fig. 7 is a longitudinal section on line 7 7 in Fig. 3.

As thus illustrated my improved reversible propeller-wheel comprises a rotary hub or head A, held against axial movement by the thrust-bearing B. Said thrust-bearing is adapted to be secured to the stern structure of the boat and has its outer end internally threaded to receive a split ring C, the latter being externally threaded and seated in a circumferentially-extending groove *a* in the hub. The thrust of the propeller-wheel when the boat is running ahead is preferably sustained by a suitable ball-bearing D interposed, as illustrated, between the inner end of the hub and the thrust-bearing. Thus, as stated, the hub A can rotate relatively to the thrust-bearing B; but the provision of the split ring or collar C prevents the hub from shifting axially—that is to say, the hub is axially stationary. The said hub is provided with a longitudinal bore *a'*, preferably flattened for the greater part of its length, so as to receive the flattened outer end portion E of the propeller-wheel shaft E'. It will be seen that the said shaft is mounted for longitudinal adjustment in the thrust-bearing B and in the stuffing-box F, the said stuffing-box or gland and the thrust-bearing being connected by the tube G. The hub A is also preferably provided at opposite sides of the shaft with openings a^2 and a^3, adapted to receive, respectively, the stems H and I of the oppositely-arranged propeller-blades H' and I'. These stems are preferably formed with threaded end portions *h* and *i*, with cylindric portions *h'* and *i'*, and with intermediate

squared portions h^2 and i^2. When the blades are in place, as illustrated, the said stems are held against axial shift in their respective sockets by washers h^3 and i^3 and nuts h^4 and i^4. As illustrated, these nuts may be screwed down tightly against the shoulders h^5 and i^5, formed on the two stems. Preferably the hub is also provided with oppositely-arranged recesses a^4 and a^5, and in these recesses are seated the crank-arms h^6 and i^6. It will be observed that the said crank-arms are removably fitted upon the squared portions of the propeller-blade stems and that these crank-arms are provided at their ends with slots h^7 and i^7. A pin J extends transversely through the shaft portion E, the ends of this pin engaging in the said slots in the crank-arms. The cover-plates K and L are provided with openings to receive the portions h' and i' of the said stems and also with smaller openings to receive the cylindric end portions of said stems. With this arrangement the said cover-plates are clamped in place by the said stems and nuts, the stems acting as clamping-bolts. Thus applied the said cover-plates effectively cover or conceal the slotted ends of the crank-arms and also cover the ends of the pin J. As illustrated, these two cover-plates are fitted in grooves or recesses a^6 and a^7, formed in the hub. With this arrangement it will be seen that a longitudinal shift or adjustment on the part of the propeller-wheel shaft serves to adjust or change the angularity of the blades. In the drawings the propeller-wheel shaft is shown adjusted inwardly. By adjusting the shaft outwardly it is obvious that the position of the blades will be reversed. In this way the boat can be propelled in either direction. Furthermore, it will be seen that the construction of the hub and adjacent parts is such that the adjusting connections are not exposed, and there are no projecting or exposed parts. Consequently weeds, sand, and other things are not liable to become entangled or lodged in the wheel, at least to an extent to interfere with its efficiency or operation. Again, and notwithstanding the improved character of the wheel, the thrust of the propeller is sustained by the stern structure of the boat, rather than by the engine-shaft. It will be understood, however, that the improved construction can be employed either with or without a thrust-bearing. In addition my improved construction makes it possible to easily and quickly remove the blades in case a blade becomes broken or impaired by usage, and in so doing it is unnecessary to remove any of the other parts. Now another thing: By providing the propeller-wheel shaft with a flattened end portion and by fitting this flattened end portion for sliding movement in a flattened bore in the hub the pin J is relieved of considerable strain, the movable adjusting-arms on the blade-stems can be effectively inclosed and arranged to work flatwise upon the shaft, and the structure as a whole is rendered strong and rigid and yet easy of adjustment or manipulation. Also, as illustrated, and with the provision of the slots h^7 and i^7, which extend lengthwise of the adjusting-arms on the blade-stems, and with the provision of the longitudinally-adjustable propeller-shaft adapted to slide in the rotary and axially-stationary wheel-hub, it is possible to advantageously employ a coupling N for connecting the end-to-end portions of the propeller-wheel shaft E′ and the engine-shaft O, it being understood that this coupling is preferably keyed to both shafts, but slidable relatively to both shafts. With this arrangement and combination a hand-lever P, as shown in Fig. 2, can be employed for shifting the propeller-wheel shaft, and thereby reversing the propeller-blades, and, as previously stated, the thrust of the wheel is sustained by the stern structure of the boat rather than by the engine-shaft.

It will be seen that the axes about which the blades are adjusted or reversed are non-coincident with each other and located at opposite sides of the axis of the wheel—that is, the axis about which the wheel rotates. Also, as shown, said axes of adjustment have a fixed relation to each other and to the axis of the wheel.

What I claim as my invention is—

1. A reversible propeller-wheel comprising a thrust-bearing, a rotary hub, a split ring screwed into the thrust-bearing and seated in a groove in said hub, blades adjustably mounted on said hub, and a longitudinally-adjustable shaft suitably connected for adjusting said blades.

2. A reversible propeller-wheel comprising a rotary hub, a thrust-bearing, a ball-bearing interposed between the hub and the thrust-bearing, blades adjustably mounted on the hub and provided with slotted crank-arms, and a longitudinally-adjustable shaft provided with a pin engaging and working in the slots of said arms.

3. The combination of a rotary but axially-stationary hub, blades adjustably mounted on said hub, the stems of said blades being provided with crank-arms and each crank-arm having a longitudinally-extending slot; an endwise-adjustable shaft provided with a pin engaging and working in said slots and adapted to rotate said hub and slide longitudinally therein; a bearing in which said propeller-wheel shaft is mounted and which sustains the thrust of the propeller-wheel; an engine-shaft having a telescoping connection with the end of said propeller-wheel shaft; and manually-operated means for shifting said propeller-wheel shaft endwise for the purpose of reversing the said blades.

4. The combination of a rotary but axially-stationary hub, a thrust-bearing in which

said hub is mounted for rotation, propeller-wheel blades adjustably mounted on said hub and provided with slotted crank-arms, a propeller-wheel shaft provided with a flattened end portion engaging said hub, said flattened end portion being provided with a pin engaging and working in the slots of said arms, an engine-shaft telescopically coupled to the end of the propeller-wheel shaft, and means for shifting said propeller-wheel shaft endwise to reverse said blades.

5. A reversible propeller-wheel comprising a rotary hub, blades adjustably mounted upon said hub and provided with crank-arms having slots, a longitudinally-adjustable shaft provided with a pin working in said slots, and oppositely-arranged cover-plates secured to said hub and covering said crank-arms, the axes about which said blades are adjusted or reversed being non-coincident with each other and located at opposite sides of the axis about which the wheel rotates.

6. A reversible propeller-wheel comprising a rotary hub, blades adjustably mounted on said hub, a longitudinally-adjustable shaft, the hub being held against axial movement, slotted crank-arm connections between the shaft and blades, and a pair of cover-plates removably secured to said hub and inclosing or covering said connections, the axes about which said blades are adjusted or reversed being non-coincident with each other and located at opposite sides of the axis about which the wheel rotates.

7. A reversible propeller-wheel comprising a thrust-bearing, a rotary hub, a split ring screwed into the thrust-bearing and seated in a groove in said hub, blades adjustably mounted on said hub, and a longitudinally-adjustable shaft suitably connected for adjusting said blades, the axes about which said blades are adjusted or reversed being non-coincident with each other and located at opposite sides of the axis about which the wheel rotates.

8. A reversible propeller-wheel comprising a rotary hub, blades adjustably mounted upon said hub and provided with crank-arms having slots, a longitudinally-adjustable shaft provided with a pin working in said slots, and oppositely-arranged cover-plates secured to said hub and covering said crank-arms, whereby said blades are adjustable or reversible about axes which are non-coincident with each other and which have a fixed relation to each other and to the axis about which the wheel rotates.

9. A reversible propeller-wheel comprising a rotary hub, blades adjustably mounted on said hub, a longitudinally-adjustable shaft, the hub being held against axial movement, slotted crank-arm connections between the shaft and blades, and a pair of cover-plates removably secured to said hub and inclosing or covering said connections, whereby said blades are adjustable or reversible about axes which are non-coincident with each other and which have a fixed relation to each other and to the axis about which the wheel rotates.

10. A reversible propeller-wheel comprising a thrust-bearing, a rotary hub, a split ring screwed into the thrust-bearing and seated in a groove in said hub, blades adjustably mounted on said hub, and a longitudinally-adjustable shaft suitably connected for adjusting said blades, whereby said blades are adjustable or reversible about axes which are non-coincident with each other and which have a fixed relation to each other and to the axis about which the wheel rotates.

Signed by me at St. Joseph, Berrien county, Michigan, this 20th day of February, 1904.

FRANK M. SPAULDING.

Witnesses:

LOUIS S. SCHULZ,

FRANK L. PIXLEY.