(No Model.) 3 Sheets—Sheet 1.

C. B. WATTLES.

SCREW PROPELLER.

No. 484,382. Patented Oct. 11, 1892.

Fig. 2.

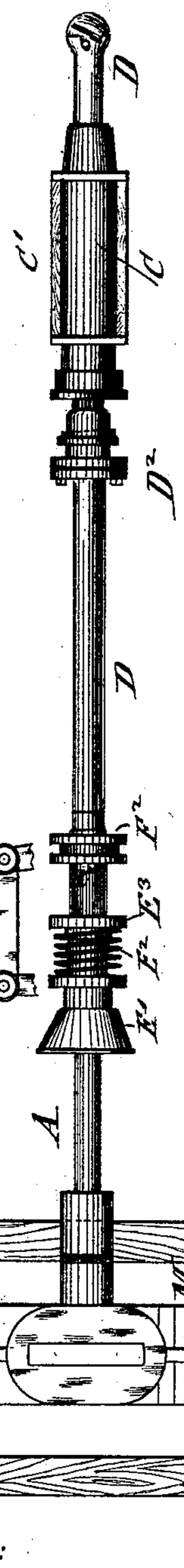
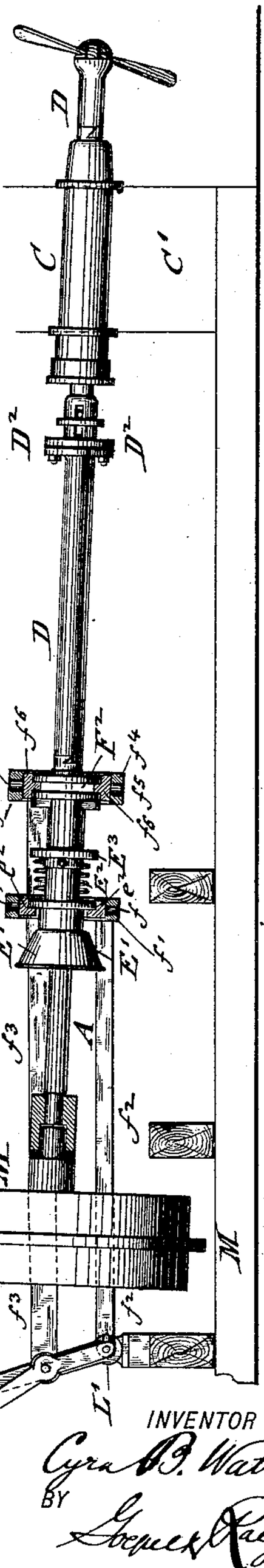


Fig. 1.



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(No Model.)

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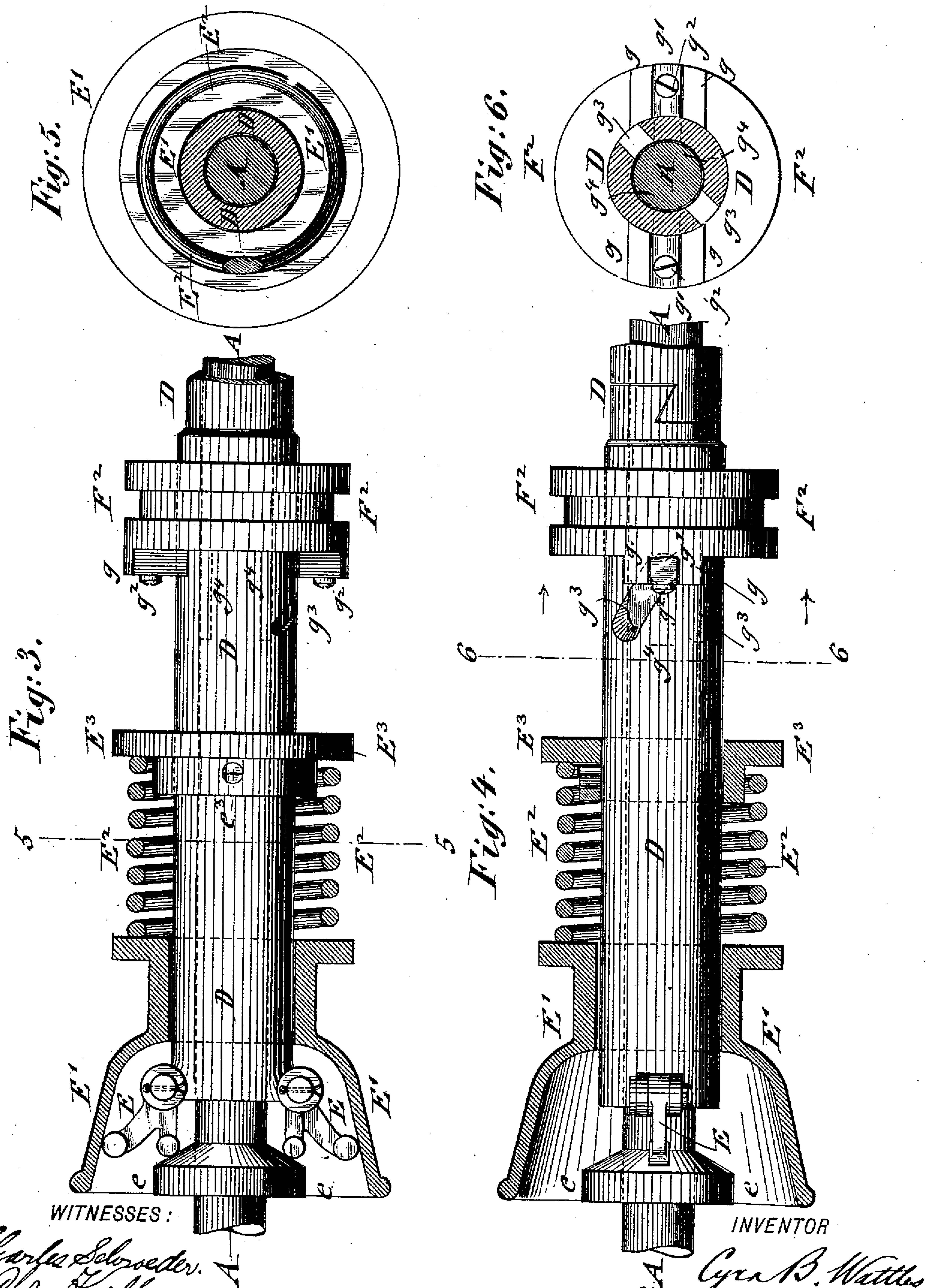

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C. B. WATTLES.

SCREW PROPELLER.

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Fig: 7.

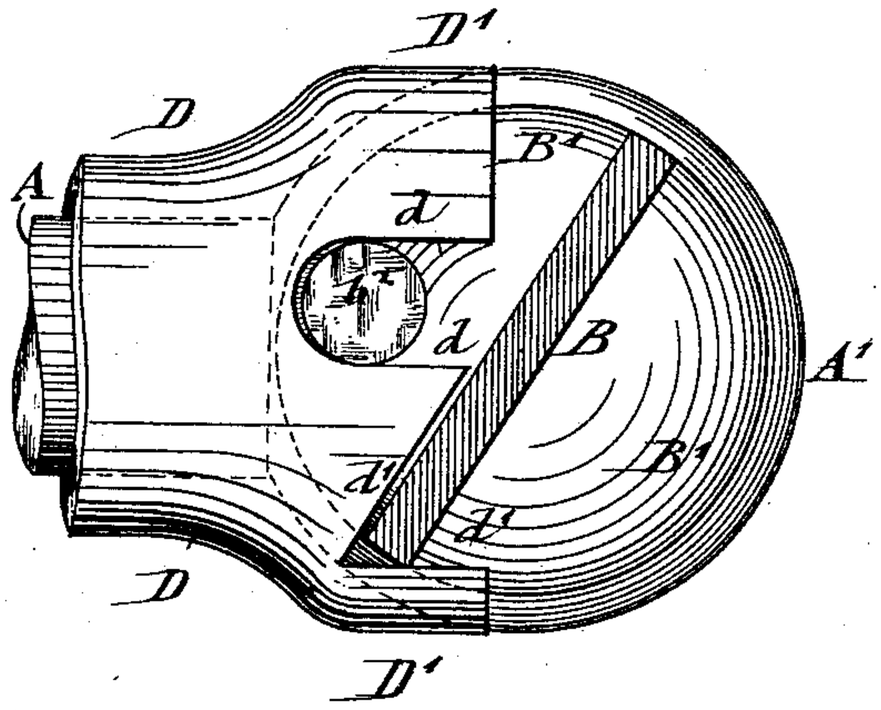


Fig: 8.

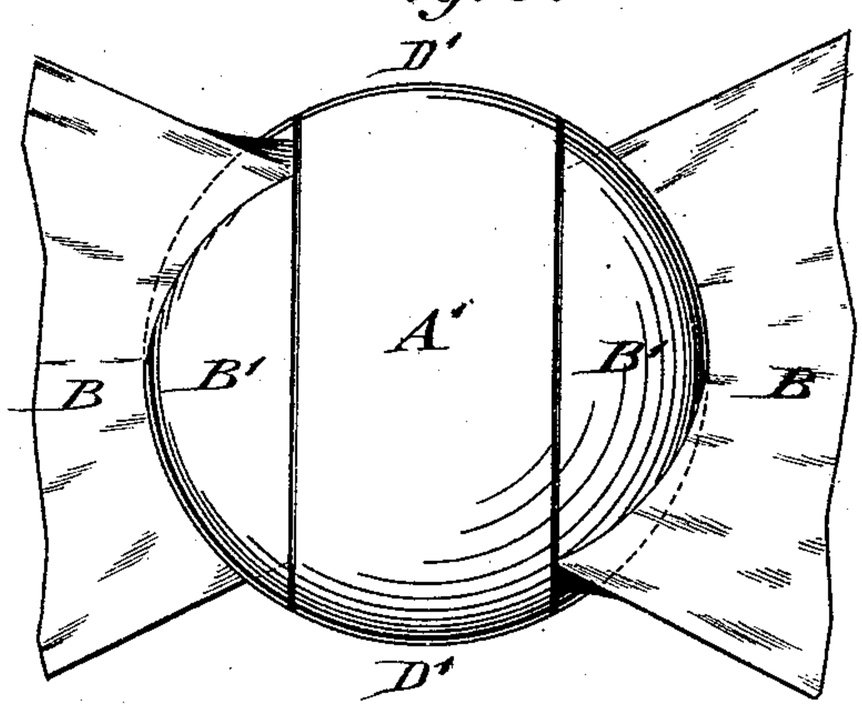


Fig: 9.

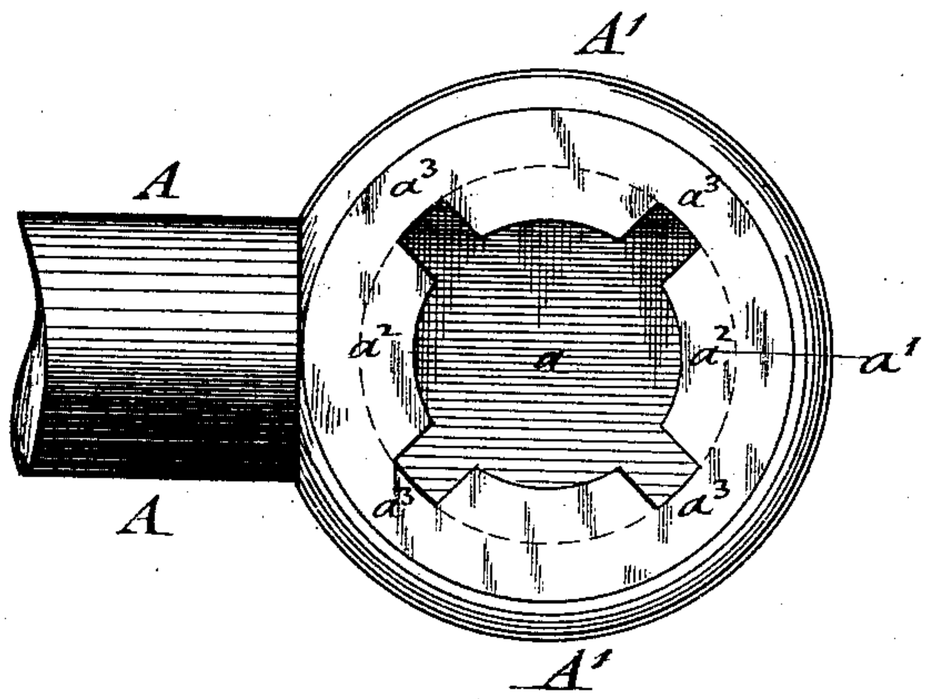


Fig: 10.

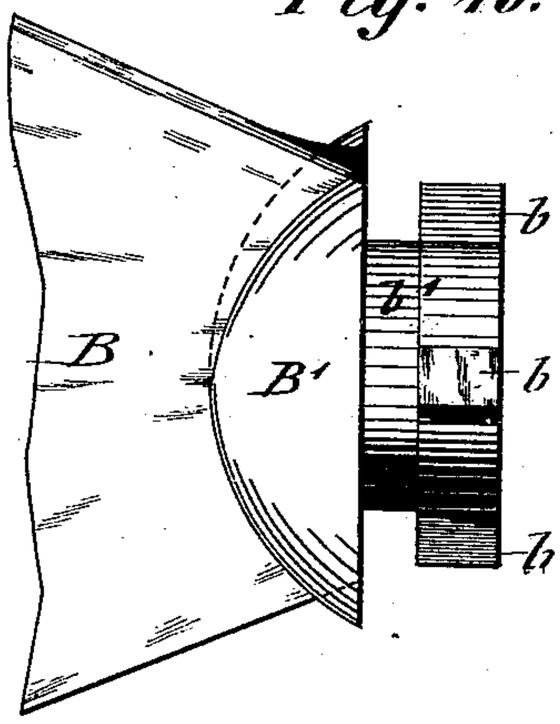
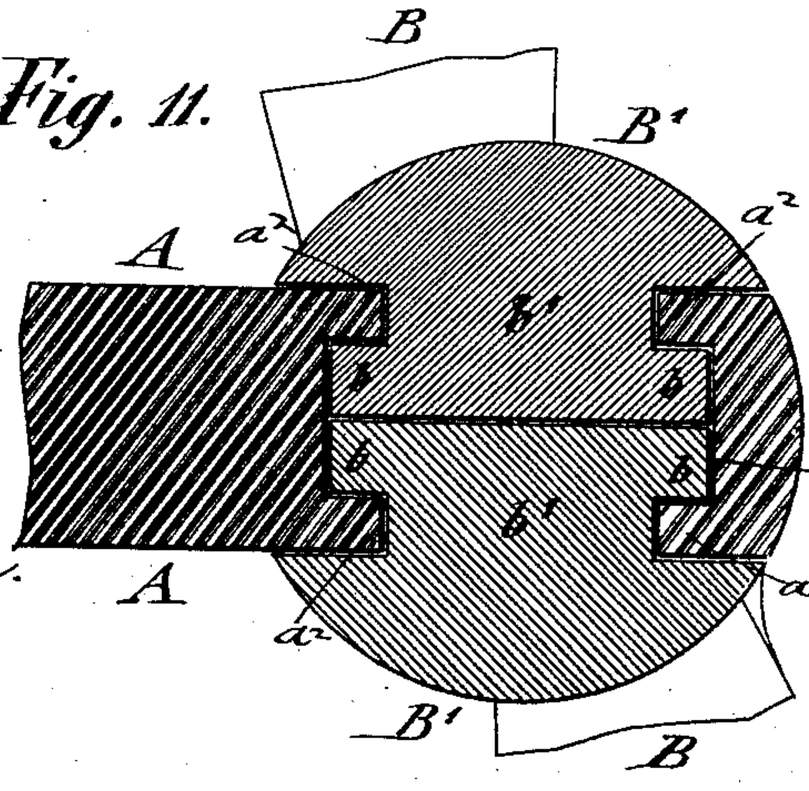


Fig. 11.



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UNITED STATES PATENT OFFICE.

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SCREW-PROPELLER.

SPECIFICATION forming part of Letters Patent No. 484,382, dated October 11, 1892.

Application filed March 29, 1892. Serial No. 426,953. (No model.)

To all whom it may concern:

Be it known that I, CYRA B. WATTLES, a citizen of the United States, and a resident of the city of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Screw-Propellers, of which the following is a specification.

This invention relates to certain improvements in screw-propellers of that class in which the blades can be set to different angles onto the propeller-shaft, so that the vessel can be propelled, stopped, or reversed without reversing or stopping the engine; and the invention consists, primarily, of a screw-propeller the blades of which are supported in bearings at the outer end of the shaft and which are set by the axial motion imparted to a tubular sleeve arranged on the propeller-shaft without changing the direction of motion of said shaft, and, secondarily, of means by which the shiftable sleeve on the propeller-shaft and the adjustable propeller-blades are firmly and positively locked in position after the adjustment of the blade is accomplished.

My invention consists, further, of certain details in the construction of the locking device by which the actuating-sleeve located on the propeller-shaft is locked or released, as will be fully described hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation, partly in section, of the operating-gear of my improved screw-propeller with adjustable blades. Fig. 2 is a plan of Fig. 1 with some of the parts broken away. Fig. 3 is a sectional side elevation of the locking mechanism by which the actuating sleeve of the propeller-blades is locked in position. Fig. 4 is also a sectional side elevation of the locking mechanism, taken at right angles to Fig. 3. Fig. 5 is a vertical transverse section on line 5 5, Fig. 3. Fig. 6 is a vertical transverse section on line 6 6, Fig. 4; and Figs. 7 to 11 are details showing the connection of the adjustable propeller-blades with the rear end of the propeller-shaft and the actuating-sleeve for the same.

Similar letters of reference indicate the same parts.

Referring to the drawings, A represents the propeller-shaft, which is provided at its rear end with a ring-shaped enlargement or bearing A′, having a transverse opening a and an interior annular recess a' of larger size than the opening a, as shown clearly in Fig. 11. The flanges a^2, that are formed on the ring-shaped enlargement or bearing A′ at both sides of the interior annular recess a', are provided with radial recesses a^3, through which radial lugs b, that are arranged on short axles or shanks b' at the inner or hub ends B′ of the blades B, are passed, so as to enter into the interior annular cavity a^2 and form a kind of bayonet-lock with the ring-shaped enlargement A′ when the hubs are turned on the axis. The shank b' at the inner end of the propeller-blade B fits into the opening a of the ring-shaped enlargement A′, while lugs b on the shank b' extend into the annular cavity a^2 of the ring-shaped enlargement A′, as shown clearly in Fig. 11. The hubs B′ of the blades B are provided with pins b^2, which are cast integral with the hubs and which are engaged by longitudinal recesses d of the enlarged rear end D′ of an actuating-sleeve D, that extends over the propeller-shaft A. The enlarged rear end D′ of the sleeve D extends nearly to the middle portion of the ring-shaped enlargement A′ and is beveled at its inner edge, so as to fit over the enlargement A′ and the hubs B′, as shown clearly in Figs. 7 and 8. The enlarged end D′ is further provided with inclined notches or recesses d' adjacent to each longitudinal recess d, so as to permit the inner ends of the blades B to swing into said recesses until the sides of the blades abut against the inclined edges of said recesses d', as shown in Fig. 7. The outer corners of the sleeve D at the straight sides of the recesses d' are also beveled off at the inner edges, so as to permit the inner ends of the blades B to move clear of the same when they are adjusted from one angle of inclination to another toward the shaft. The actuating-sleeve D extends through a stern-tube C, which is supported in the stern-post C′ of the vessel, said stern-tube being firmly secured by suitable thrust-rings to the stern-post.

The sleeve D is preferably made of several sections, one section terminating outside of

the stern-tube C, while the second section terminates inside of the same and is connected by a coupling D^2 with the third section of the sleeve, which again is connected with the fourth or innermost section, to the end of which is applied the mechanism for locking the sleeve D to the shaft A. The first or outermost section of the sleeve D is connected with the second section located in the stern-tube by means of a dovetailed interlocking joint, while the third section and the innermost section of the sleeve D are connected by a similar joint, so that by the connection of the coupling between the second and third sections the tubular sleeve D is made in the nature of one continuous tube, through all of which the propeller-shaft A passes, so as to hold them in position. The inner end of the shaft A is coupled to the driving-shaft of a gas, petroleum, or other motor M, as shown in Figs. 1 and 2.

To the inner end of the tubular sleeve D are pivoted locking-dogs E of bell-crank shape, the inner ends of which bear on the beveled face of a collar *e* on the propeller-shaft A, while the outer ends of the dogs press on the inner face of the bell-shaped end of a sliding sleeve E′, which is guided on the main sleeve D and firmly pressed against the dogs E by means of a strong helical spring E^2, which is interposed between the flanged rear end of the sleeve E′ and a fixed collar E^3, that is rigidly secured to the sleeve D by means of set-screws e^3. The flanged end of the sliding sleeve E′ is engaged by a rin shaped collar e^2, which is provided at diametrical points with pins *f*, that are engaged by the recessed ends of a fork *f′* at the end of a fulcrumed lever F, as shown in Fig. 1. The outer end of the lever F is pivoted to a connecting-rod f^2, which latter is again pivoted at its opposite end to a latch L′, which is fulcrumed to the actuating-lever L This lever is connected by a pivot-rod f^3 with a second lever F′, which is fulcrumed, like the first lever, to a fixed point of support and provided at its opposite end with a fork f^4, that engages by its recessed ends diametrical pins f^5 of a slide-ring f^6 of T-shaped cross-section, said ring taking into an annular groove of a collar F^2, that is guided on the sleeve D. The collar F^2 is provided at diametrically-opposite points with parallel lugs *g*, to which are attached keys *g′* by set-screws g^2, said keys extending through inclined slots g^3 of the sleeve D into longitudinal keyways g^4 of the shaft A, as shown in Figs. 4 and 6.

By shifting the collar F^2 on the sleeve D by the lever L and its intermediate connection with the collar the sleeve D is shifted in axial direction on the propeller-shaft A, and thereby by the action of its enlarged rear end D′ on the pins b^2 the propeller-blades B are turned on the propeller-shaft A, so as to set either to a backward angle of inclination or at right angles or to a forward angle of inclination to the shaft, according as the vessel is to be propelled forward or stopped or moved backward. Whenever, therefore, it is desired to change the position of the propeller-blade either from a backward angle of inclination to the propeller-shaft to a forward angle of inclination, so that the motion of the propeller is reversed, or into an intermediate position between the two extreme positions, the latch L′ is taken hold of and moved over toward the lever L, so that by the action of its intermediate connections the bell-shaped sleeve E′ is moved against the spring E^2, and thereby released from the locking-dogs *e*. The tubular sleeve D is thereby free to be axially shifted on the propeller-shaft A, which is accomplished by holding the latch L′ or the lever L and continuing the motion of the lever and latch in the direction of the arrow shown in Fig. 1. By the intermediate mechanism between the lever L and the grooved collar F^2 the shifting of the tubular sleeve D is produced, and consequently the reversing or adjusting of the blades by the action of the enlarged rear end D′ of the sleeve on the projecting pins of the inner ends or hubs of the blades B. As soon as the adjustment or reversing of the propeller-blades is accomplished, the latch L′ is dropped and the bell-shaped sleeve E′ returned by its actuating-spring E^2, so as to act on the dogs and produce thereby the positive locking of the tubular sleeve D to the shaft A, while the lever L remains in the position to which it has been adjusted until it is moved back again for producing another adjusting action on the propeller-blades. When the return motion of the lever L has to be accomplished, the latch L′ has to be moved up to the lever, so as to release the locking mechanism between the bell-shaped sleeve E′ and the collar *e* on the propeller-shaft, which release must always precede any adjusting motion that is to be imparted to the propeller-blades, as without the release of the locking mechanism the blades could not be adjusted or reversed.

Whenever it is desired to slacken speed or to stop the motion of the vessel without slackening or stopping the motion of the engine, the blades are set into an intermediate position between the extreme positions, so that they present a smaller angle of inclination to the shafts or midway between the extreme positions, in which position the blades extend at right angles to the shaft and exert no propelling action on the vessel, as both blades move in a plane at right angles to the propeller-shaft. In this manner means are provided by which not only the motion of the vessel can be quickly reversed, but by which the motion of the vessel can also be slackened or entirely interrupted without interferring in the least with the motion of the motor-engine, which continues to run in one and the same direction and which imparts the same motion to the propeller-shaft independently of the propeller-blades and the means employed for adjusting the same.

The propeller is thereby especially adapted for the use of explosion-engines—such as gas or petroleum engines—which are used for small pleasure-boats and the like, in which it is preferable to run the machine in a continuous direction without reversing or stopping the same.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a propeller-shaft provided with bearings at its rear or outer end, of propeller-blades the hubs of which are supported in said bearings, an actuating-sleeve extending over the shaft, provided with an enlarged end extending partially over the hub of the propeller, means for axially turning said sleeve independently of the motion of the shaft, and means by which the sleeve is connected with the hubs of the blades, so as to adjust the same to different angles of inclination to the shaft without changing the direction of the motion of the shaft, substantially as set forth.

2. The combination of a propeller-shaft provided with bearings at its rear end, propeller-blades the hubs of which are supported in the bearings of the shaft, an actuating-sleeve extending over the propeller-shaft, provided with an enlarged end extending partially over the hub of the propeller, locking mechanism for connecting the inner end of the sleeve with the shaft, and means for connecting the outer end of the sleeve with the hubs of the blades, substantially as described.

3. The combination of a propeller-shaft having a ring-shaped enlargement or bearing at its rear end, propeller-blades the hubs of which are supported in bearings of said enlargement, an actuating-sleeve having an enlarged rear end extending partly over the enlargement of the shaft and over the hubs, and means for connecting the enlarged end of the sleeve with the hubs of the blades, substantially as set forth.

4. The combination of a propeller-shaft having a ring-shaped enlargement or bearing at the rear end, said enlargement being provided with recessed flanges, propeller-blades having hubs with radial lugs for engaging the flanges of the enlargement, and an actuating-sleeve extending over the shaft and having an enlarged rear end provided with recesses for engaging, respectively, pins in the hubs of the shafts and the inner ends or shanks of the blades, substantially as set forth.

5. The combination of a propeller-shaft A, a ring-shaped enlargement or bearing at the rear end of the shaft, said bearing having recessed flanges, propeller-blades the hubs of which are provided with shanks having radial lugs, and an actuating-sleeve on the propeller-shaft, said sleeve having an enlarged rear end provided with recesses for engaging the pins in said hubs and the inner ends or shanks of the blades, the inner edge of the rear end being beveled, so as to fit over the ring-shaped bearing of the shaft and over the hubs of the blades, substantially as set forth.

6. The combination of a propeller-shaft rotating in one direction, an actuating-sleeve on said shaft, a ring-shaped bearing at the rear end of the shaft, propeller-blades having hubs supported in the bearing of the shaft, means for connecting the rear end of the sleeve with the hubs of the blades, a locking mechanism by which the inner end of the sleeve is locked to the propeller-shaft, means for releasing the locking mechanism, and means for shifting the sleeve axially on the shaft on the release of the locking mechanism, so as to adjust the propeller-blades independently of the motion of the propeller-shaft, substantially as set forth.

7. The combination of a propeller-shaft, a sleeve on said shaft, propeller-blades supported on bearings with rear end of the shaft, means for connecting the rear end of the sleeve with the blades, means for shifting the sleeve on the shaft, a locking mechanism connecting the inner end of the sleeve with the shaft, said locking mechanism being composed of a collar on the shaft, dogs pivoted to the sleeves, and a sliding and spring-actuated sleeve having a bell-shaped end engaging the dogs, and a lever mechanism adapted to engage the sliding sleeve, so as to apply its bell-shaped end to or release it from the dogs, substantially as set forth.

8. The combination of a propeller-shaft, a sleeve extending over said shaft, a fixed tapering collar on the shaft near the inner end of the sleeve, bell-crank-shaped dogs pivoted to the inner end of the shaft, a sliding sleeve having a bell-shaped end for engaging the dogs, a fixed collar on the main sleeve, a helical spring interposed between the sliding sleeve and the collar, and a lever mechanism applied to sliding sleeve for applying the same to or releasing it from the locking-dogs, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

CYRA B. WATTLES.

Witnesses:
PAUL GOEPEL,
CHARLES SCHROEDER.