

C. B. WALKER.
SCREW PROPELLER.
APPLICATION FILED JULY 7, 1920.

1,374,786.

Patented Apr. 12, 1921.

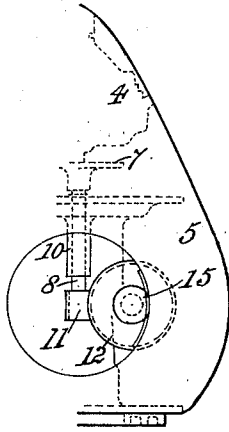


Fig. 3.

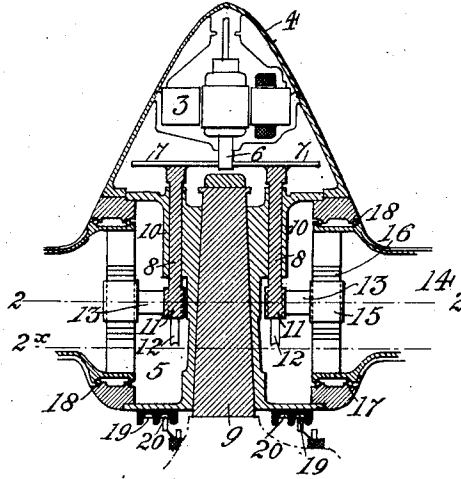


Fig. 1.

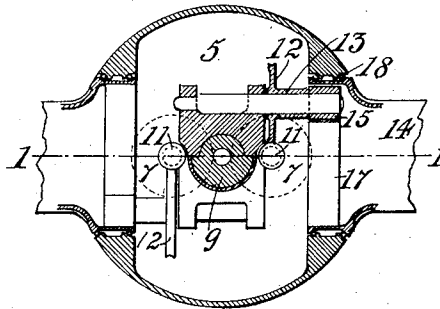


Fig. 2. Inventor:

Charles B. Walker

By Frank Chase Jones

Attorney.

UNITED STATES PATENT OFFICE.

CHARLES BELL WALKER, OF MOSELEY, ENGLAND.

SCREW-PROPELLER.

1,374,786.

Specification of Letters Patent.

Patented Apr. 12, 1921.

Application filed July 7, 1920. Serial No. 394,531.

To all whom it may concern:

Be it known that I, CHARLES BELL WALKER, a subject of the King of Great Britain, and residing at Moseley, in the county of Warwick, England, have invented certain new and useful Improvements in Screw-Propellers, of which the following is a specification.

This invention relates to screw propellers having blades which can be turned about their longitudinal axes to alter their pitch or cause them to be reversed through the medium of an electric motor which is rigidly carried within the boss of the propeller, and has for its object to effect certain improvements therein. The improvements, according to this invention, comprise the means whereby the motion of the motor is transmitted to the blades and also the means by which the blades are mounted in relation to the boss. These improvements are illustrated in the drawings herewith, of which—

Figure 1 is a sectional plan view of the boss of a screw propeller of a navigable vessel, the section being taken in the plane indicated by the line 1—1 of Fig. 2, arranged according to a convenient method of carrying out one of the features of this invention.

Fig. 2 is a transverse sectional view of the boss, the section being taken partly on the line 2—2 of Fig. 1 and partly on the line 2*—2* of Fig. 1; and,

Fig. 3 is a half plan view of the boat, but with the blade axes vertical. The upper blade is omitted to show the parts beneath.

A single reversible electric motor 3 is rigidly carried within the nose 4 of the boss 5 with the axis of its armature coincident with the axis of the boss, and with its commutator end toward the point of the nose. On the other end of the armature shaft is drivingly mounted a relatively small pinion 6 gearing with a pair of planet wheels 7 of relatively large diameter (one for each propeller blade) which are drivingly mounted each upon a shaft 8 which is parallel to the propeller shaft 9 and journaled in bearings 10 which are fixed in relation to the boss. On the other end of each parallel shaft is a worm 11 meshing with the worm wheel 12 drivingly mounted upon the end of a shaft 13 parallel to the axis of the respective blade 14 and having at its outer end a pinion 15 which gears with teeth 16 cut in the interior face of a crown ring 17 mounted rigidly

upon the inner end of the blade 14 or forming an integral part thereof. Each blade is mounted in roller or ball bearings 18 of the boss in a manner to permit of the desired amount of rotation in relation to the boss, to allow of the desired alteration of pitch or of the reversal of the pitch. It will be noticed that the ball bearing 18 is of very large diameter relatively to the boss and the purpose of this is to resist to the greatest extent the bending moment of the blades upon the boss due to their thrust.

According to a convenient arrangement two sets of field coils are provided wound in opposite directions and each connected at one end to one of a pair of slip rings 19, 20, on the propeller shaft. Each field coil is connected at its other end to one of the armature terminals, the other armature terminal being earthed. Thus by connecting a source of current to one of the slip rings, the motor is caused to run in one direction, and alternatively by connecting such source to the other slip ring the motor is caused to run in the opposite direction. By suitably proportioning the gearing, as shown, between the motor and each propeller blade, the motor may be caused to rotate a great number of times for a very small rotation of the blades on their axes, so that the motor may be very small in relation to the propeller, while having sufficient power to operate the blades even when they are under full load. It will now be readily understood, that, except when the motor is running, there is no movement relative to the boss of the parts within it, and that they do not in any way interfere with the main drive of the propeller.

Having fully described my invention, what I claim and desire to secure by Letters Patent is:—

1. Means for altering or reversing the pitch of a screw propeller comprising an electric motor rigidly mounted in the nose of the boss of the propeller and turning as a whole therewith and having its axis disposed in substantially the same direction as the axis of the propeller shaft, a shaft of said motor, a pinion of relatively small diameter on said shaft gearing with a number of pinions of relatively large diameter (one for each propeller blade,) shafts upon which such pinions are mounted, said shafts being parallel to the propeller shaft and turning in bearings which are rigid there-

with, and means by which the motion of such shafts is transmitted to the blades of the propeller to turn them in one or other direction to alter the pitch or to cause them
5 to be reversed.

2. Means for altering or reversing the pitch of a screw propeller comprising an electric motor rigidly mounted in the nose of the boss of the propeller and turning as
10 a whole therewith and having its axis disposed in substantially the same direction as the axis of the propeller shaft, a shaft of said motor, a pinion of relatively small diameter on said shaft gearing with a number
15 of pinions of relatively large diameter (one for each propeller blade) shafts upon which such pinions are mounted, said shafts being parallel to the propeller shaft and turning in bearings which are rigid therewith,
20 worms of relatively small diameter on said parallel shafts, worm wheels of relatively large diameter meshing with said worms, shafts at right angles to the propeller shaft carrying said worm wheels and
25 mounted in bearings which are rigid with the propeller shaft, and means whereby the motion of such shafts is transmitted to the propeller blades to turn them in one or other direction to alter the pitch or to cause them
30 to be reversed.

3. Means for altering or reversing the pitch of a screw propeller comprising an electric motor rigidly mounted in the nose of the boss of the propeller and turning as a
35 whole therewith and having its axis disposed in substantially the same direction as the axis of the propeller shaft, a shaft of said motor, a pinion of relatively small diameter on said shaft gearing with a number
40 of pinions of relatively large diameter (one

for each propeller blade) shafts upon which such pinions are mounted, said shafts being parallel to the propeller shaft and turning in bearings which are rigid therewith,
45 worms of relatively small diameter on said parallel shafts, worm wheels of relatively large diameter meshing with said worms, shafts at right angles to the propeller shaft carrying said worm wheels and mounted in bearings which are rigid with the propeller
50 shaft, pinions carried one upon each said shaft which is at right angles to the propeller shaft and a toothed crown ring integral with each propeller blade gearing with the respective pinion which is carried upon the
55 respective shaft which is at right angles to the propeller shaft.

4. In a screw propeller, means by which the blades thereof may have their pitch altered or be reversed through the medium of
60 an electric motor which is mounted within the boss of the propeller, bearings for the blades arranged to have a considerable width in a direction parallel to the central axis of the propeller and crown wheels attached to
65 the blades and engaging said bearings within said boss, whereby the blades are strongly supported from the boss to resist bending moment in relation thereto due to the thrust of the blades, and transmitting mechanism
70 between said crown wheels and the electric motor.

In witness whereof I have hereunto signed my name this 19th day of June, 1920, in the presence of two subscribing witnesses. 75

CHARLES BELL WALKER.

Witnesses:

CYRIL B. S. KLICKLAW,
ALFRED ERNEST COOMBS.