Oct. 23, 1923. 1,471,870

G. TUST

SHIP PROPELLING DEVICE

Filed March 4, 1922 5 Sheets-Sheet 1

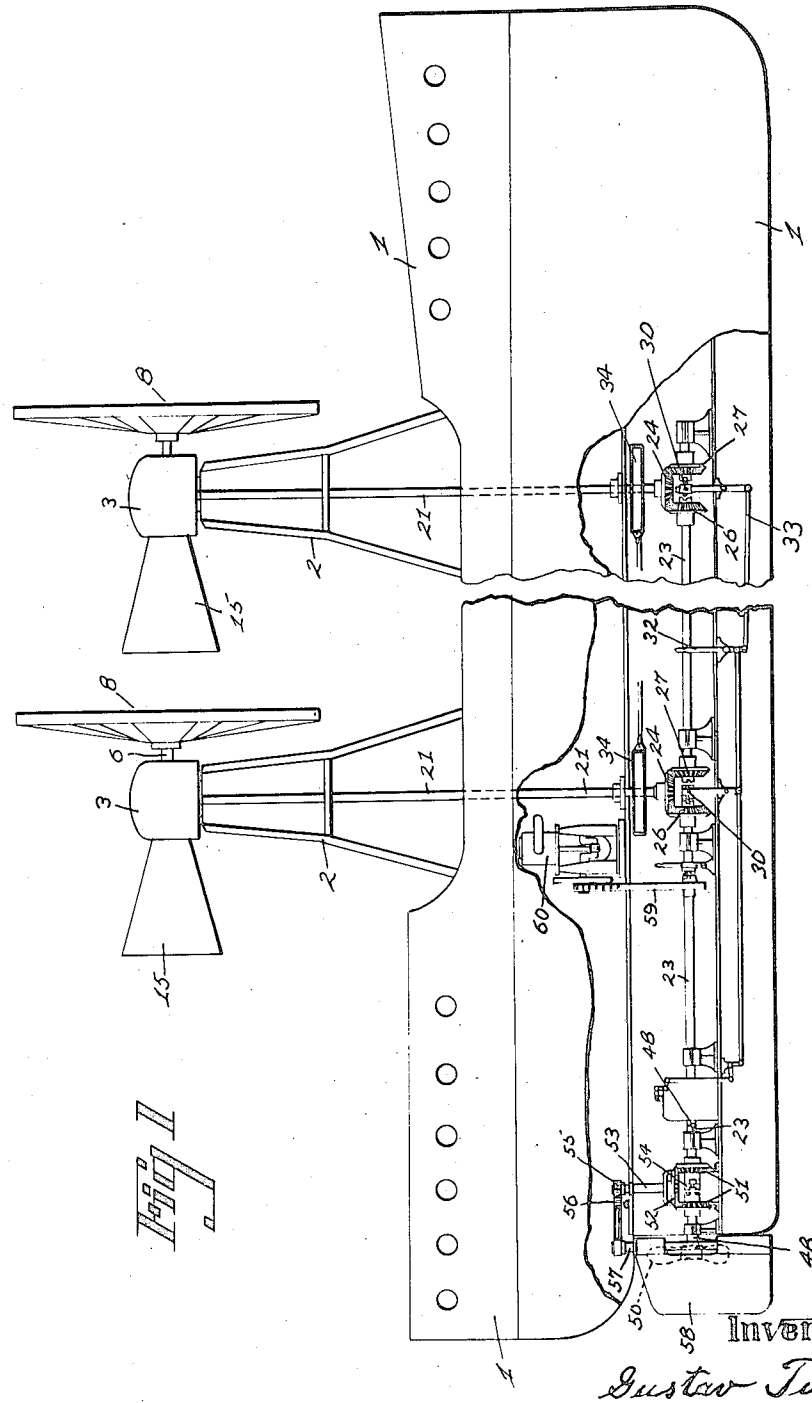


Fig. 1

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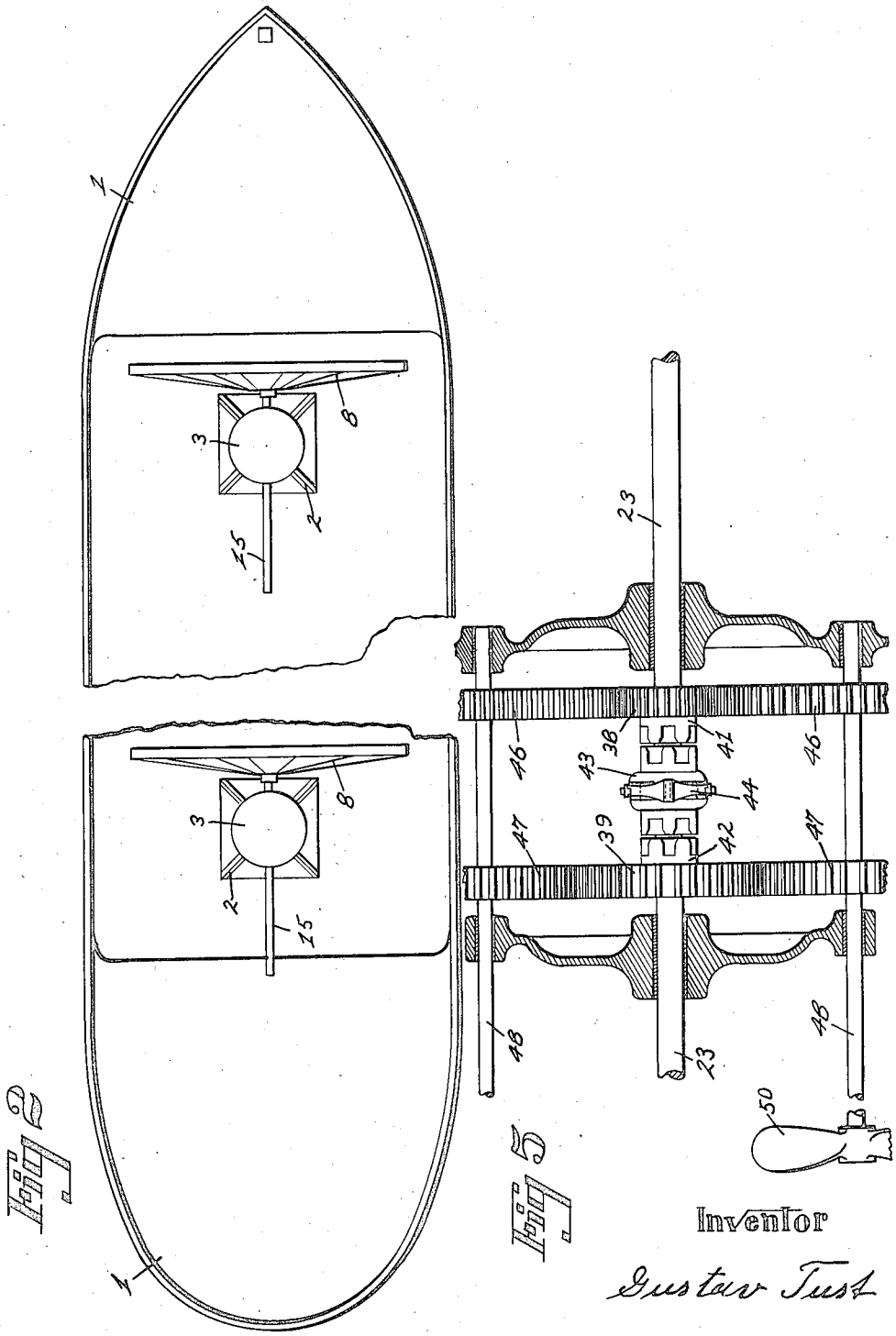


Fig 2

Fig 5

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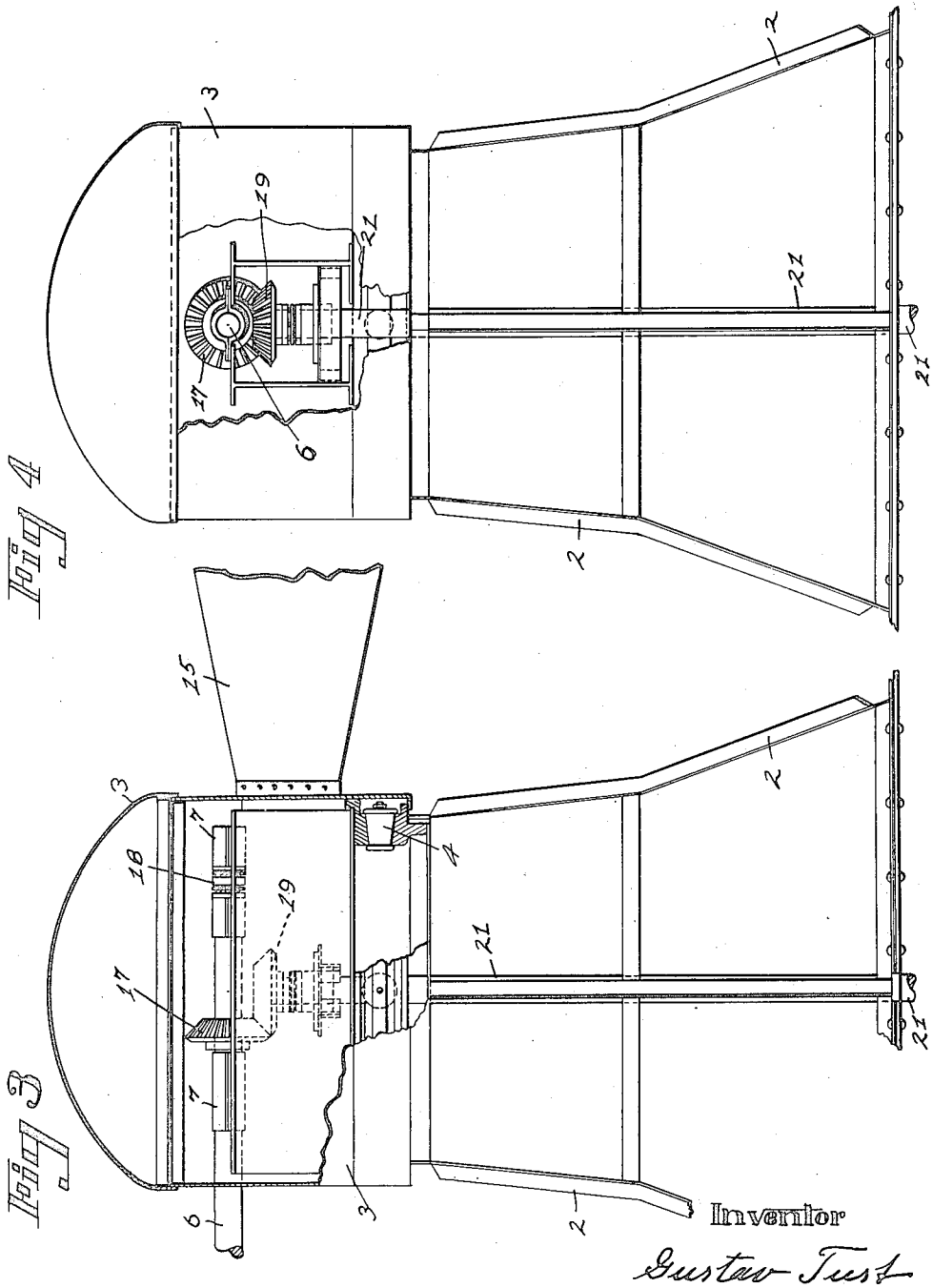
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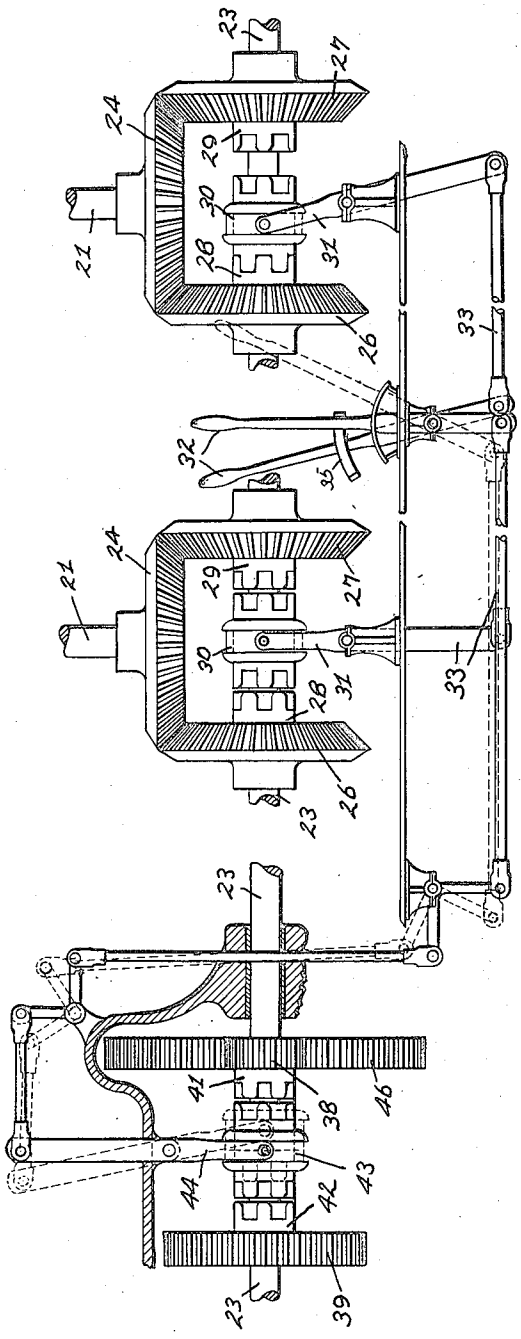


Fig 6

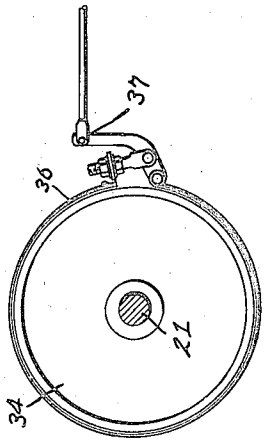


Fig 12

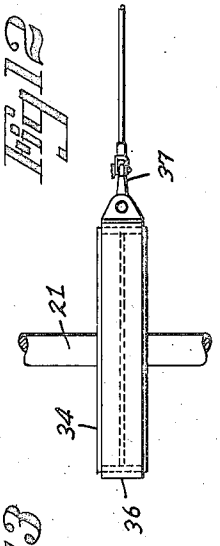


Fig 13

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Fig 9

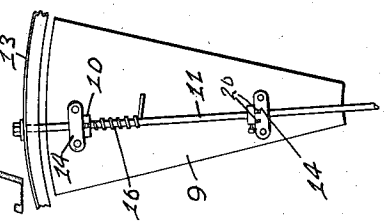
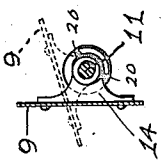


Fig 10



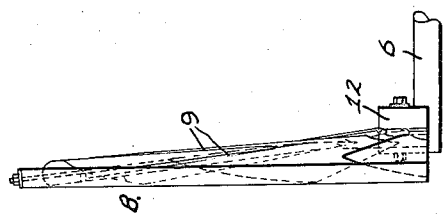


Fig 8

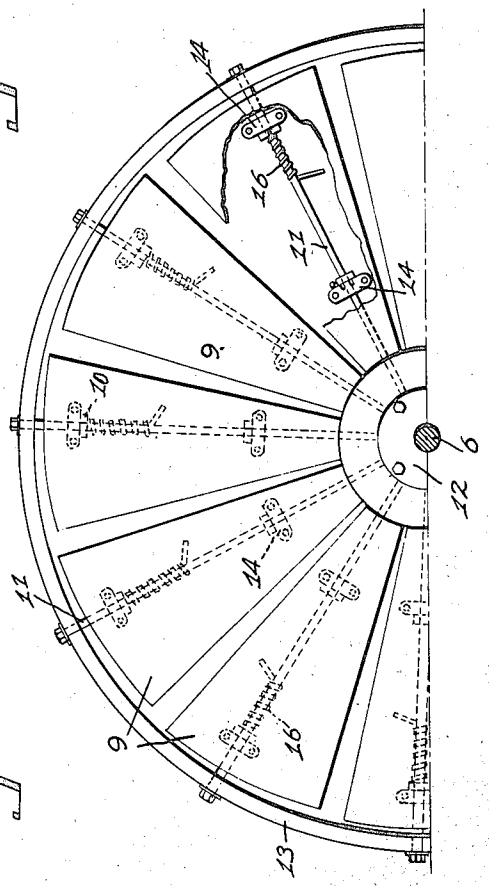
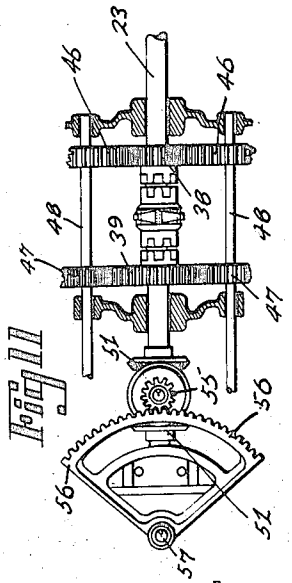


Fig 7

Fig 11



Inventor

Gustav Tust

Patented Oct. 23, 1923. 1,471,870

UNITED STATES PATENT OFFICE.

GUSTAV TUST, OF SAN FRANCISCO, CALIFORNIA.

SHIP-PROPELLING DEVICE.

Application filed March 4, 1922. Serial No. 541,198.

To all whom it may concern:

Be it known that I, GUSTAV TUST, a citizen of Germany, residing in the city of San Francisco, in the county of San Francisco and State of California, have invented a new and useful Improvement in a Ship-Propelling Device, of which the following is a specification.

My invention relates to improvements in propelling means for ships and the like and is particularly directed to an improved means of applying the pressure of wind to propel a ship.

The primary object of my invention is to provide an improved propelling means for ships.

Another object is to provide improved means for applying energy derived from the pressure of currents within the air for the propulsion of a ship.

A further object is to provide a device of the character described having provision of propelling the ship at different speeds.

Another object is to provide improved means for applying energy derived from the wind for propelling a ship in any direction regardless of the direction of the wind.

A still further object is to provide a device adapted to be actuated by wind pressure and provided with means for automatically compensating for variations in said wind pressure to deliver a uniform propelling force.

A still further object is to provide an improved device for applying wind pressure to the propelling of a ship affording flexibility and ease of control.

I accomplish these and other objects by means of the device disclosed in the drawings forming a part of the present specification wherein like characters of reference are used to designate similar parts throughout said specification and drawings and in which Figure 1 is a broken side elevation of a ship equipped with my improved propelling device disclosing the general arrangement and application thereof; Figure 2 is a broken plan view of Fig. 1; Figure 3 is a broken side elevation of the tower and windmill cap, parts being broken away and shown in section to disclose the construction thereof; Figure 4 is a view taken at right angles to Fig. 3; Figure 5 is a broken plan view of the transmission gears; Figure 6 is a broken side elevation of the drive shaft and gearing showing the manner in which the direction and speed is controlled; Figure 7 is a broken front elevation of the windmill; Figure 8 is a side elevation of Fig. 7; Figure 9 is a view of the back of one of the vanes; Figure 10 is a horizontal section of a vane showing the manner in which it is moved to compensate for variation in wind pressure; Figure 11 is a plan view of the steering mechanism; Figure 12 is a horizontal section of a connecting shaft showing the brake drum applied thereto; and Figure 13 is a side elevation of Fig. 12.

Referring to the drawings the numeral 1 is used to designate in general a ship upon the upper deck of which are mounted a plurality of towers 2 preferably built from angle iron sections to decrease air resistance thereagainst. Upon the top of each tower 2 is rotatably mounted a windmill cap 3 carried upon suitable roller bearings 4. Each cap 3 is provided with a horizontally disposed shaft 6 carried upon suitable bearings 7.

Upon the outer end of each shaft 6 is secured a windmill designated in general by the numeral 8 and consisting of a plurality of vanes 9 pivotally mounted upon a like plurality of radial rods 11 secured between a hub 12 and an outer rim 13 by means of suitable bearings 14. A spring 16 is provided upon each rod 11, one end of which is secured to the rod by means of a collar 10, the free end of said spring bearing against the back of the corresponding vane 9 to exert a pressure thereagainst, the purpose of which will hereinafter be more fully described.

A rudder 15 is secured upon each cap upon the side opposite the windmill to direct the windmill toward the wind in the usual manner.

The inner end of each shaft 6 carries a bevel gear 17 and is provided with a suitable thrust bearing 18. The gear 17 meshes with a similar bevel gear 19 secured upon the upper end of a vertically disposed connecting shaft 21 extending downwardly through the tower and the deck of the ship to be connected to a drive shaft 23 by means of a bevel gear 24 meshing with a pair of oppositely faced bevel gears 26 and 27 rotatably mounted upon said drive shaft 23.

Clutch members 28 and 29 are secured upon the adjacent faces of the gears 26 and 27

respectively to be independently engaged by a clutch member 30 feathered upon the drive shaft 23. The clutch member 30 is operated by means of a yoke 31 to engage either of the clutch members 28 and 29 whereby the drive shaft 23 may be rotated in either direction by the connecting shaft 21, said yoke 31 being in turn actuated by a suitable lever 32 connected thereto by a connecting member or members 33.

In the drawings I have illustrated the ship 1 as being provided with two windmills 8, each of which is connected with the drive shaft 23 in the manner above described. Separate levers 32 are providd for the manipulation of the clutch member by which the connecting shafts are operatively connected to the drive shaft, in this manner permitting either of the connecting shafts to be disconnected independently of the other to reduce the amount of power applied to said drive shaft 23, or to permit the operation of either windmill to be interrupted for necessary repair work without interferring with the operation of the other. However, to insure against the possibility of causing one clutch member 29 to engage a member 26 in connection with one connecting shaft 21 and the other clutch member to engage the member 27 in connecting with the other connecting shaft 21, the levers 32 are interconnected as by a link 35 whereby the movement of one lever is limited with respect to the other.

Suitable brake drums 34 are provided upon each connecting shaft 21 whereby the rotation may be retarded or entirely prevented by means of a suitable brake band 36 and actuating connections 37.

The drive shaft 23 is provided with gears 38 and 39 of different diameters upon the adjacent sides of which are secured clutch members 41 and 42 adapted to be engaged by a corresponding clutch member 43 feathered upon the drive shaft 23 and actuated by a yoke 44 whereby either of said clutch members 41 and 42 may be engaged and the corresponding gear 38 or 39 rotated.

Pairs of gears 46 and 47 secured upon parallel propeller shafts 48 mesh with the gears 38 and 39. The outer ends of the propeller shafts 48 extend outwardly through the stern of the ship and are provided with suitable screw propellers 50 operating in the usual manner for propelling the ship through the water.

From the above description it is readily seen that the pressure of air currents against the vanes of the windmills 8 will cause a rotation thereof, which rotation is imparted to the connecting shafts 21 and thence to the drive shafts and the propeller shafts for operating the propeller screws. By means of the clutch member 30 and the oppositely faced bevel gears 26 and 27, the direction of rotation of the drive shaft may be reversed when it is desird to drive the propellers in a reverse direction, and by means of the gears 38 and 39, and their meshing pairs of gears 46 and 47 the speed of rotation of the propellers may me changed at will. In the drawings I have provided for only two speeds but it is clear that additional speeds could be obtained by inserting additional sets of gears of proper ratio to give the desired speed.

The pivotally mounted and spring controlled vanes 9 are arranged to automatically compensate for variations in wind pressure and thus deliver a uniform driving force to the drive shaft 23. The springs 16 are made of a strength such that the normal wind pressure will not displace the vanes about their pivots; however, should the wind pressure become excessive, the excess pressure upon each vane will cause it to be slightly turnd against the pressure of the spring and thus present less surface to the wind. This is accomplished by pivoting the vanes 9 along a line slightly at one side of the center line of the vane, and the springs 16 arranged to exert their pressure in opposition to the greater side of the vane. Thus only so much of the pressure of the wind against the greater side of the vane is carried upon the spring as is in excess of the pressure against the lesser side of the vane. In case of an excessively high wind, the vanes will thus be displaced about the rods 11 to present only a small surface to the wind thereby maintaining the driving force substantially uniform and preventing undue stress upon the driving connections. Pins 20 secured to the rods 11 engage the sides of the bearings 14 to limit the movement of the vanes 9 about the pivot rods 11.

Power from the drive shaft 23 is also utilized in steering the ship. This I accomplish by providing a pair of bevel gears 51 upon the drive shaft 23. A gear 52 mounted upon a shaft 53 is engaged upon opposite sides by the gears 51, said gears 51 being controlled by a suitable clutch 54 operated in a manner similar to the clutches 30 and 43 whereby the shaft 53 may be rotated in either direction. The shaft 53 is also provided with a pinion 55 meshing with a segment gear 56 secured upon the upper end of a rudder shaft 57 carrying a rudder 58 of any suitable construction for steering the ship. When it is desired to alter the course of the ship, the clutch 54 is moved to cause the shaft 53 to be rotated in the desired direction, said shaft operating the pinion 55 and the segment gear 56 to turn the rudder to the desired angle.

Additional mechanism may be driven from the drive shaft 23 to meet the requirements of the ship. This is illustrated in

Fig. 1 of the drawings wherein an air compressor 60 is shown connected to the shaft 23 by a belt 59.

From the above description it is seen that I have provided an improved device wherein I have made provision for the utilizing of wind pressure not only to propel the ship, but for such other power purposes as may be required, the delivery of the power derived from the wind being delivered directly to a main drive shaft from which it may be utilized in any manner desired in the same manner as from the main drive of a power driven ship. Thus the same flexibility of delivery and control of power is available as with other sources of power, and the fact that the ship is propelled by screws operating in the water in the usual manner permits the ship to follow any desired course regardless of the direction of the wind, as even when the ship is headed directly into the wind, the power developed by the windmills will be delivered to the propellers operating within the water to cause a forward movement of the ship.

I claim:

1. A ship propelling device comprising the combination with a ship, of propelling means mounted upon the ship; a drive shaft connected to said propelling means and arranged to drive the same at different speeds; windmills mounted upon the ship and arranged to be rotated by the passage of air currents thereby; a connecting shaft geared to each windmill; gears mounted between the drive shaft and the connecting shafts and arranged to rotate said drive shaft in either direction to propel the ship; a rudder; and means connected to the drive shaft and actuated thereby for moving said rudder in either direction to stear the ship.

2. A ship propelling device comprising the combination with a ship, of propelling means mounted upon said ship; a drive shaft connected to said propelling means to drive the same at different speeds; windmills rotatably and revolubly mounted upon the ship and arranged to be rotated by the passage of air currents thereby said windmills being provided with vanes pivotally mounted and arranged to automatically compensate for variations in the wind pressure to effect a uniform drive; connecting shafts geared between the windmills and the drive shaft to actuate said drive shaft when the windmills are rotated; clutches mounted upon the drive shaft in association with the gears connecting said connecting shafts with the drive shaft; and means for actuating said clutches to cause the drive shaft to be actuated in either direction and to permit the connecting shafts to be independently disconnected as desired.

3. A ship propelling device comprising the combination with a ship, of propelling means mounted upon the ship; a drive shaft connected to said propelling means; windmills mounted upon the ship and arranged to be rotated by the passage of air currents thereby; a connecting shaft geared to each windmill; gears connecting each connecting shaft with the drive shaft; brakes mounted upon each connecting shaft; means for independently operating said brakes to retard movement of their respective shafts; clutches mounted upon the drive shaft in association with the gears connecting the connecting shafts therewith; and means for independently operating said clutches to cause the drive shaft to be actuated in either direction and to permit any connecting shaft to be independently disconnected from said drive shaft.

In witness whereof I hereunto set my signature, this 25th day of February, 1922.

GUSTAV TUST.