

M. REYMOND.
 APPARATUS COMPRISING FANS FOR GENERATING PROGRESSING AND ASCENDING
 MOVEMENTS OF A BODY IN A FLUID MEDIUM.

APPLICATION FILED OCT. 1, 1910.

1,024,226.

Patented Apr. 23, 1912.

2 SHEETS—SHEET 1.

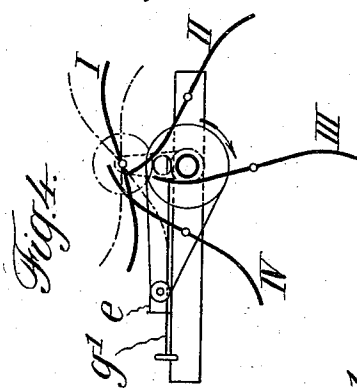


Fig. 1.

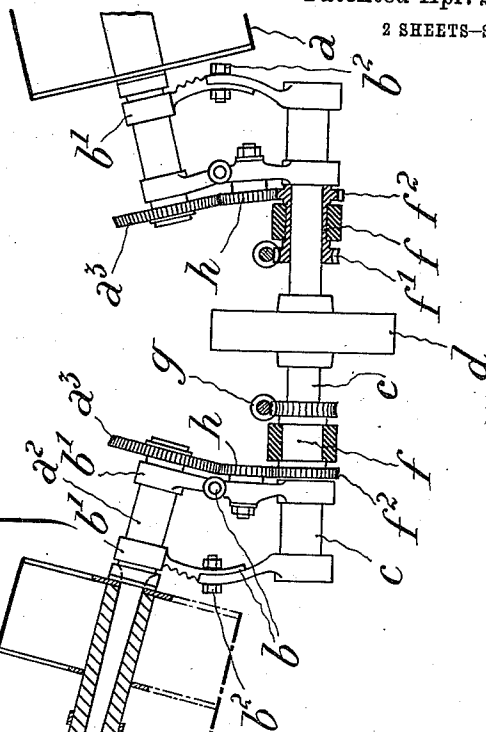
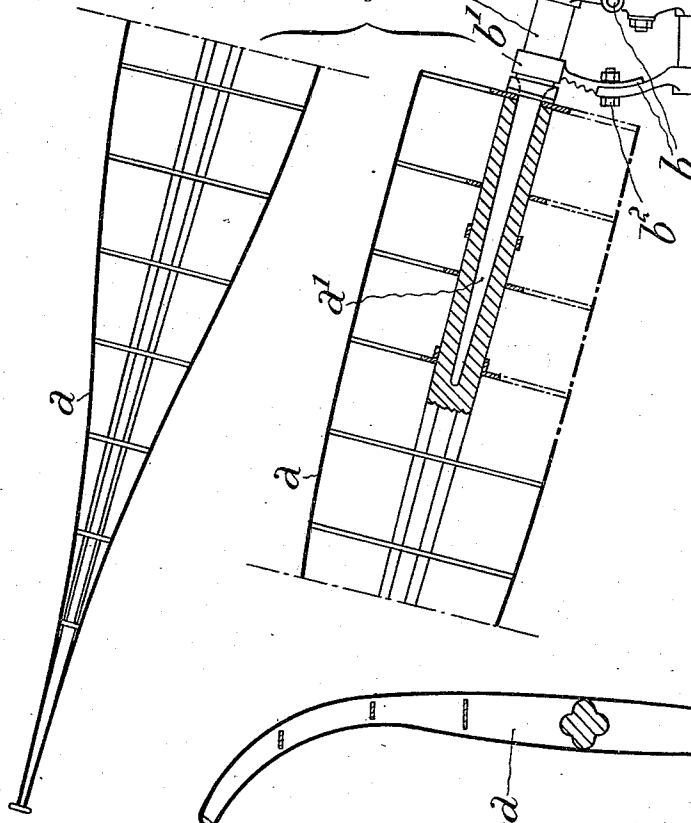


Fig. 3.



Witnesses
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Inventor
 Max Raymond
 by Harold Serrell
 his atty.

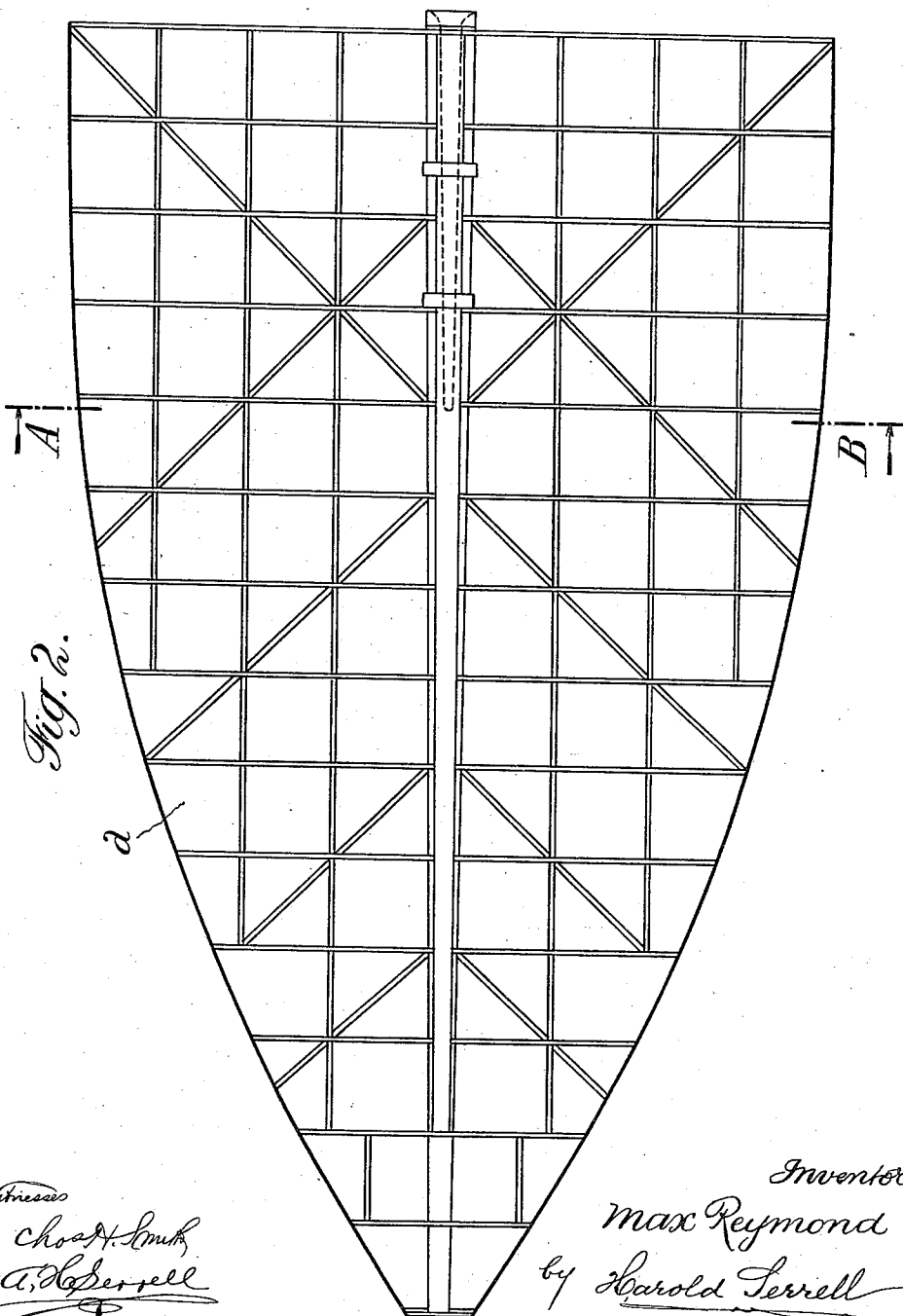
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UNITED STATES PATENT OFFICE.

MAX REYMOND, OF PAYERNE, SWITZERLAND.

APPARATUS COMPRISING FANS FOR GENERATING PROGRESSING AND ASCENDING MOVEMENTS OF A BODY IN A FLUID MEDIUM.

1,024,226.

Specification of Letters Patent.

Patented Apr. 23, 1912.

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To all whom it may concern:

Be it known that I, MAX REYMOND, engineer, citizen of Switzerland, residing at Payerne, Canton of Vaud, in the Confederation of Switzerland, have invented certain new and useful Improvements in Apparatus Comprising Fans for Generating Progressing and Ascending Movements of a Body in a Fluid Medium, of which the following is a specification.

The present invention concerns apparatus comprising movable blades or fans acting as wings or fins on liquid or gaseous fluids as wings or fins to produce a progressing or ascending motion of a body or vehicle of any kind carrying the apparatus.

Said apparatus comprises to that end rotary fans S-shaped in cross section and the parts of which are symmetrical with regard to the rotation axis of the fan. Together with the movement of rotation of the fans on their axis, a rotative movement is imparted to the whole of each fan about the axis of the main shaft carrying the fan or fans, said movements being combined so that the fan rotates on its axis one half of a revolution during each rotation of the fan about the axis of the main shaft. The fan is thus completely turned at each revolution about the axis of the main shaft and both faces of the same alternately act upon the fluid, each during one rotation of the fan about the axis of the main shaft.

To facilitate the understanding of the invention, a constructional embodiment of the same is shown on the annexed drawings in which—

Figure 1 is an end elevation and partially a cross section of the apparatus. Fig. 2 is a plan view of one of the fans of the apparatus a cloth covering the framework of the fan being removed. Fig. 3 is a cross section of the fan on the line A—B of Fig. 2 and Fig. 4 is a diagrammatic figure showing the operation of the apparatus.

On said figures, a designates two fans each of which is carried by a cross sectional shaft a^1 tapering toward one end which end is pointed. Each of the shafts a^1 forms one end of or an extension of a rotating shaft a^2 mounted in bearings b^1 forming the ends of two arms b carried by the main rotating shaft c . Said main shaft c carries a driving pulley d , serving to transmit to the

shaft the action of a motor e (Fig. 4) of any kind whatever. On the shaft c are further loosely mounted two sleeves f forming bearings in which the main shaft is mounted and which are themselves mounted in bearings of the frame of the apparatus. On one end of the sleeves f are formed worm wheels f^1 gearing with worms g . These worms g are mounted at one end of rods g^1 (Fig. 4) provided with hand wheels allowing to rotate the rods g^1 in order to rotate the sleeves f and thus to adjust the position of the fans as will be explained below. Each of the sleeves f further carries a gear wheel f^2 , gearing with a corresponding gear wheel h loosely mounted on a fixed axle or pivot carried by one of the arms b . The wheel h engages with a wheel a^3 carried by one of the shafts a^2 . The fans a comprise a framework made of wood or any other suitable material, rigidly mounted on the shafts a^1 and covered on both faces with cloth or any other suitable material, said fans presenting, as shown in Fig. 3, two exactly similar bent parts, symmetrically arranged with regard to the axis of the shaft a^1 which is also the rotation axis of the fan. The main shaft being rotated by the motor e in the sense of the arrow of Fig. 4 the shaft a^2 of each fan is thereby rotated about the axis of the main shaft. During this movement, the wheels h are turned by the wheels f^2 which are maintained against rotation by the endless screws g . The wheels h are thereby rotated about their own rotation axis and transmit their rotation to the wheels a^3 , the shafts a^2 and the fans themselves. The diameters of the wheels a^3 and f^2 are chosen such that the fans are thus rotated half a turn during each full rotation of the axis of the fan about the main shaft. During each turn of the axis of the fans about the axis of the main shaft, the fan is thus completely reversed the under face of the fan at the beginning of the movement, as shown for example in the position I Fig. 4 forming the upper face of the fan at the end of the movement, and the edge of the fan which forms the forward edge of the same at the beginning of the movement becoming the rearward edge of the same at the end of the movement. During this movement, the fan successively takes the

positions shown at II, III, IV in Fig. 4 and thus exerts during the descending movement and the beginning of the upward movement of the axis of the fan, at first a downward and then a rearward pressure on the fluid medium in which the fan is moving. The fan then is brought back from position IV to the initial position I, a position in which the middle part of the fan is approximately placed tangentially to the direction of the movement of the fan, said movement occurring thus with but little resistance due to the medium in which the fan is moving. The movement of the free end of the fan is during the operation of the apparatus analogous to the movement of the free end of the wing of a bird during flight. During the descending movement of the axis of the fan, the same acts upon the fluid in which it moves in a manner analogous to the wing of a bird during the corresponding period of flight. During the ascending movement of the axis of the fan on the contrary, the movement of backward rotation on itself accomplished by the wing of the bird to come back to its original position is replaced in the apparatus by a continuation of the rotating movement of the fan on itself, in the same sense as during the preceding period, so that at the end of the period, the wing has been completely turned on itself. By adjusting the position of the worms g it is possible to modify as indicated with dotted lines in Fig. 4 the inclination of the fans so as to change their action on the medium according to the direction of movement which it is desired to produce.

As shown in Fig. 1, one of the arms b supporting each of the fans is formed of two parts rotatively connected with each other, and the other arm supporting the same fan is formed of two bent parts having their center of curvature on the rotating axis of the link connection of the two parts of the other arm, and said bent parts of the second arm are connected together by means of a bolt b^2 . The teeth of the gears h and a^3 are such, and the distance between the pivotal point on which the member a^2 turns and the centers of these gears is such, that the arms b may be adjusted within certain limits to vary the inclination of the axes of either or both fans to the main or drive shaft with the teeth of the gears still in mesh. This construction permits an adjustment of the inclination of the axis of the fans with regard to the axis of the main shaft and the placing of the same in a position parallel to the axis of the main shaft if desired so as to obtain a better action of the fans on the medium according to the purpose of the apparatus and the fluid in which the fans move. The same may for instance be used for producing the move-

ment of a vehicle in a medium such as air or water, the screws g allowing the action of the fans on the medium during the operation of the apparatus.

Instead of being carried by solid shafts mounted in the arms b , the fans could be mounted in any other well known manner, for example on hollow shafts rotatively mounted on a fixed axle carried by the main shaft.

Instead of the wheel h , any other well known means could be employed for connecting the fans to the pieces serving as fixed parts to generate the rotative movement of the fans on themselves and to allow the adjustment of the inclination of the same. For instance, the shaft of each fan could carry a toothed wheel gearing with another wheel rigidly connected with the wheel h and placed on the same shaft as said wheel. It will also be understood that several fans could be mounted on a same support carried by the main shaft and several pairs of fans placed at several points in a vehicle could be employed to produce the movement of the same.

According to the purposes for which the apparatus is to be employed, the fans may be constructed in any manner and be formed of any material whatever that is to say the same may be solid or hollow, made of wood, metal or any other material or of sheets of rigid or flexible material carried by a framework such as the framework shown on the drawing or of any other type whatever. The wheels producing the rotation of the fans on themselves could further be shaped so as to produce a movement with variable speed of the fans or any other well known mechanism could be employed, to produce a rotation with variable speed of the fans on themselves.

I claim as my invention:

1. A propelling apparatus comprising a main shaft, a fan shaft, a fan connected to the fan shaft, means secured to the main shaft and in which the fan shaft is journaled, the said means being adjustable to vary the inclination of the fan shaft relatively to the main shaft, and means connecting the main and fan shafts in such a manner that the fan shaft and its fan are turned half a revolution every time the main shaft is turned a complete revolution.

2. A propelling apparatus comprising a main shaft, a fan shaft, a fan connected to the fan shaft, adjustable arms secured at one end to the said main shaft, bearings at the opposite ends of said adjustable arms and in which the said fan shaft is journaled, and means connecting the main and fan shafts in such a manner that the fan shaft and its fan are turned half a revolution every time the main shaft is turned a complete revolution.

3. A propelling apparatus comprising a main shaft, a fan shaft, a fan connected to the fan shaft, adjustable arms secured at one end to the said main shaft, bearings at 5 the opposite ends of said adjustable arms and in which the said fan shaft is journaled, a sleeve loosely mounted on the said main shaft, a gear connected to the said sleeve, other gears connecting the aforesaid gears with the said fan shaft, and means for holding the said sleeve in position during the revolution of the main shaft.

4. A propelling apparatus comprising a main shaft, a fan shaft, a fan connected to the fan shaft, adjustable arms secured at one end to the said main shaft, bearings at the opposite ends of the said adjustable arms and in which the said fan shaft is journaled, a sleeve loosely mounted on the said main shaft, a gear connected to the said sleeve, other gears connecting the aforesaid gears with the fan shaft, and means for holding the said sleeve stationary during the turning of the main shaft and also for adjusting the 25 position of the said sleeve relatively to the main shaft.

5. A propelling apparatus comprising a main shaft, a fan shaft, a fan connected to the fan shaft, adjustable arms secured at 30 one end to the said main shaft, bearings at the opposite ends of the said adjustable arms and in which the said fan shaft is journaled, a sleeve loosely mounted in the said main shaft, a gear connected to the said sleeve, 35 other gears connecting the aforesaid gears with the fan shaft, a worm wheel connected to the said sleeve and a worm meshing with the said worm wheel to hold the sleeve stationary during the turning of the main shaft 40 and also to adjust the position of the said sleeve relatively to that of the main shaft.

6. A propelling apparatus comprising a main shaft, a fan shaft, an S-shaped fan connected at one end to the said fan shaft, 45 the other end of the fan being free, adjustable arms secured at one end to the said main shaft, bearings at the opposite ends of said adjustable arms and in which the said fan shaft is journaled, and means connect- 50 ing the main and fan shafts in such a manner that the fan shaft and its fan are turned

half a revolution every time the main shaft is turned a complete revolution.

7. A propelling apparatus comprising a main shaft, a fan shaft, an S-shaped fan 55 connected at one end to the said fan shaft, the other end of the fan being free, adjustable arms secured at one end to the said main shaft, bearings at the opposite ends of said adjustable arms and in which the said 60 fan shaft is journaled, a sleeve loosely mounted on the said main shaft, a gear connected to the said sleeve, other gears connecting the aforesaid gears with the said fan shaft, and means for holding the said sleeve 65 in position during the revolution of the main shaft.

8. A propelling apparatus comprising a main shaft, a fan shaft, an S-shaped fan connected at one end to said fan shaft, the 70 other end of the fan being free and the fan gradually increasing in width from its free end to the end at which it is connected to the fan shaft, adjustable arms secured at one end to the said main shaft, bearings at the 75 opposite ends of the said adjustable arms and in which the said fan shaft is journaled, a sleeve loosely mounted on the said main shaft, a gear connected to the said sleeve, other gears connecting the aforesaid gears 80 with the fan shaft, and means for holding the said sleeve stationary during the turning of the main shaft and also for adjusting the position of the said sleeve relatively to the main shaft. 85

9. A propelling apparatus comprising a drive shaft, a fan shaft in angular relation with the drive shaft, a fan S-shaped in cross section and having a free end and secured at its other end to said fan shaft, means for 90 connecting the drive shaft and fan shaft so that the fan is turned through half a revolution for one revolution of the drive shaft, and means for adjusting the angular relation of the fan shaft with the drive shaft. 95

In testimony whereof I have affixed my signature in presence of two witnesses.

MAX REYMOND.

Witnesses:

GEO. GIFFORD,
ARNOLD ZUBER.