

H. GUNDERSEN.

FLYING MACHINE.

APPLICATION FILED MAY 31, 1911.

Patented Aug. 1, 1911.

3 SHEETS—SHEET 1.

999,715.

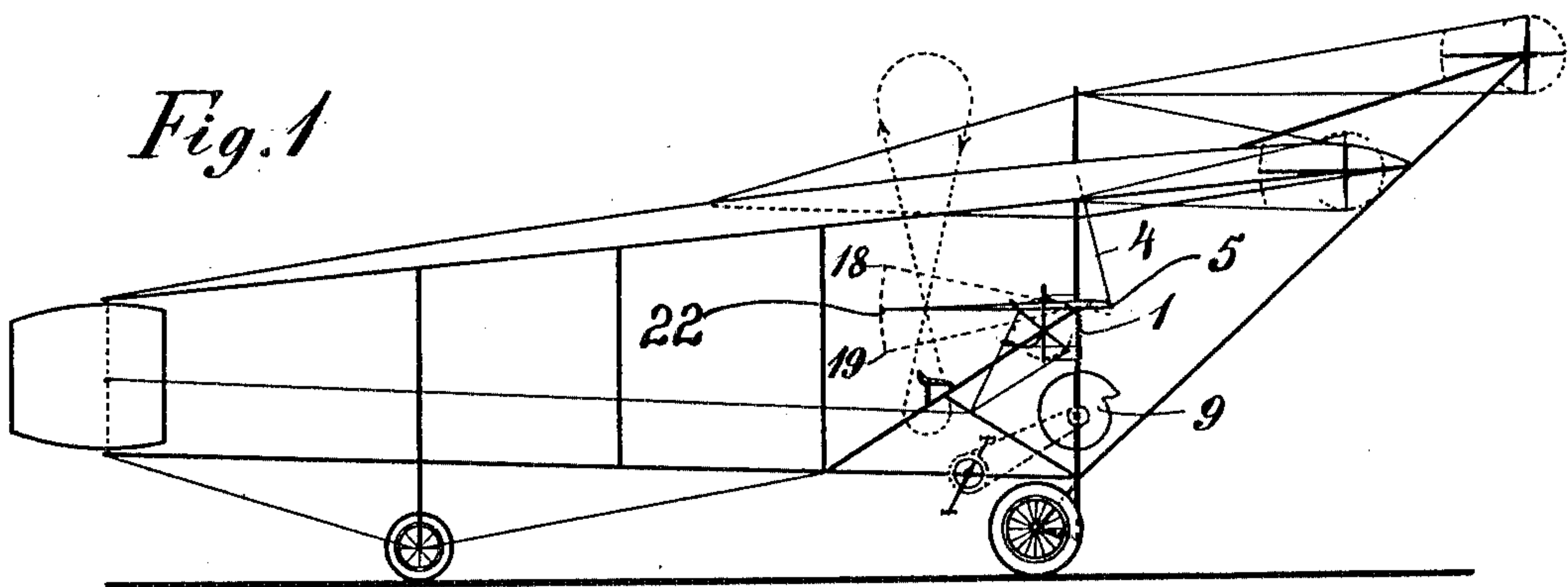
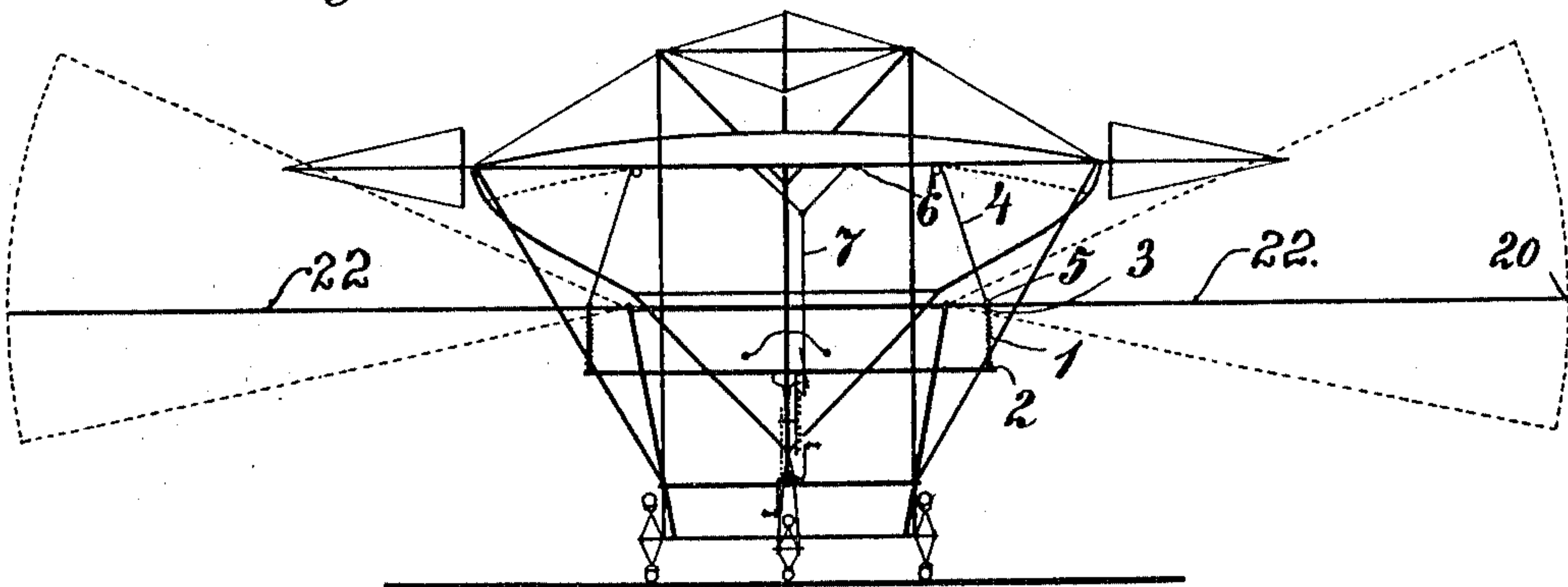


Fig. 2



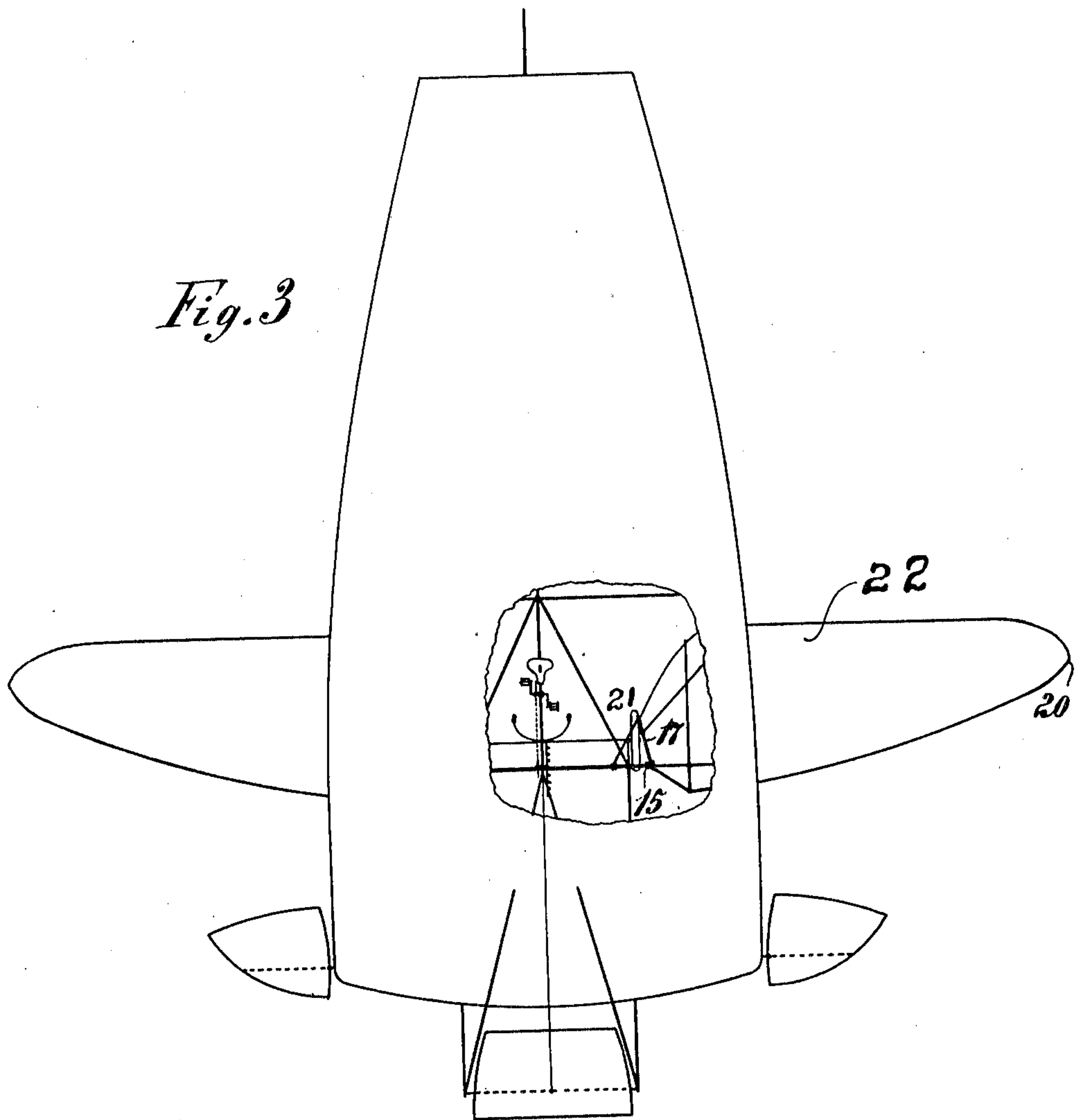
Witnesses:
E. Hurley
C. J. Rubin

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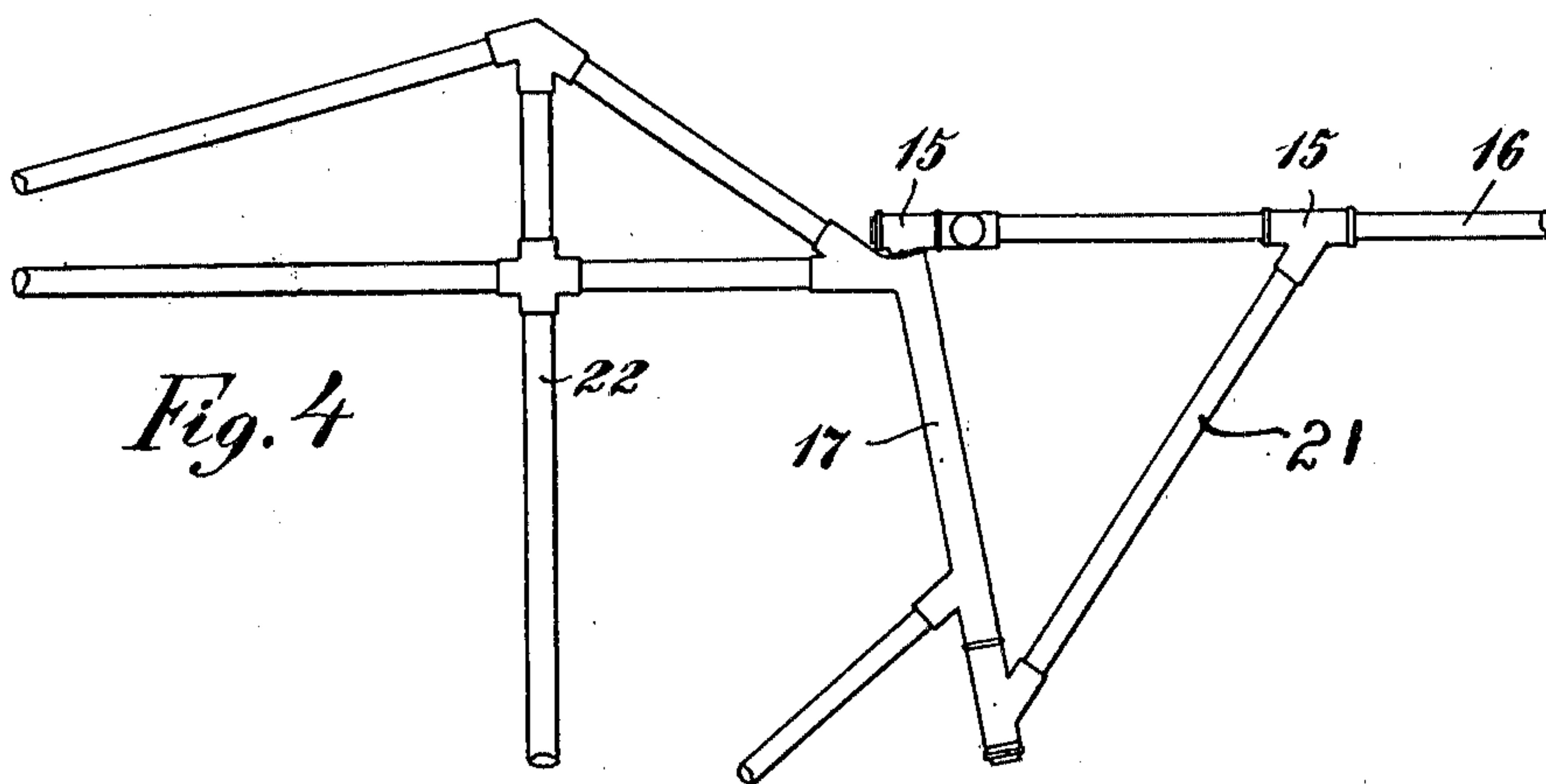
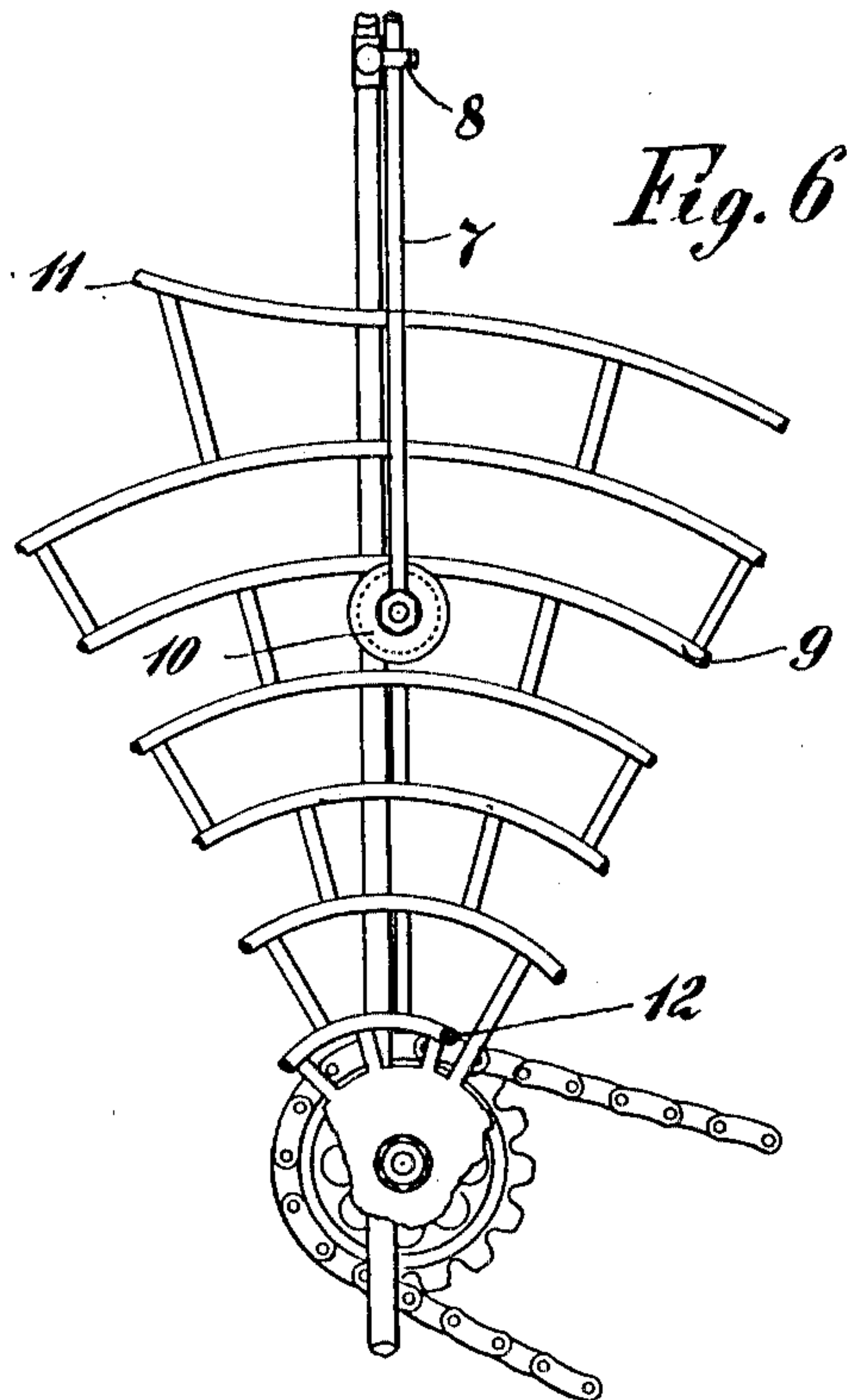
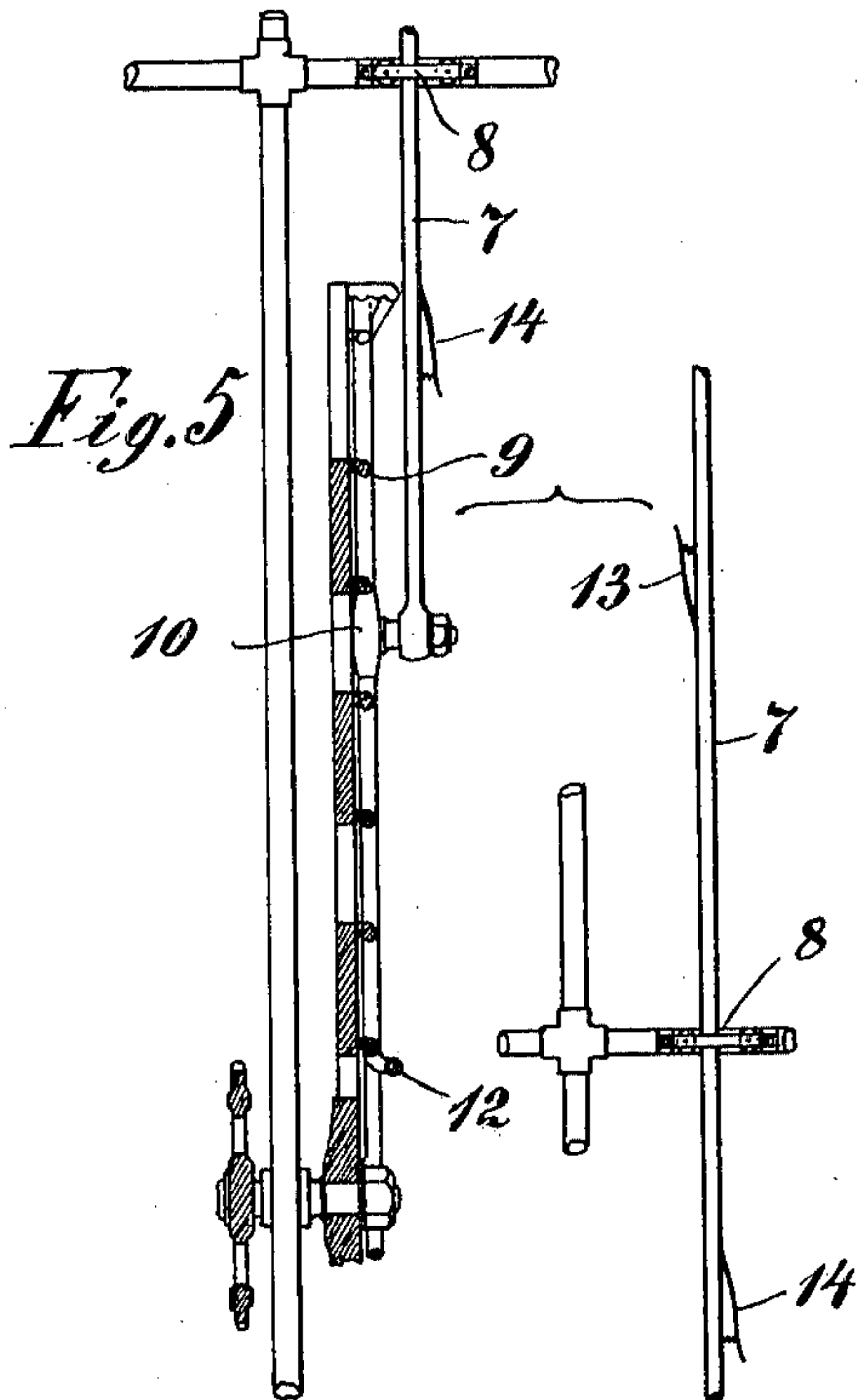
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8 SHEETS—SHEET 3.

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UNITED STATES PATENT OFFICE.

HANS GUNDERSEN, OF FREDRIKSHALD, NORWAY.

FLYING-MACHINE.

999,715.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed May 31, 1911. Serial No. 630,451.

To all whom it may concern:

Be it known that I, HANS GUNDERSEN, a subject of the King of Norway, residing at the city of Fredrikshald, in Norway, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in flying machines of the type propelled by means of power driven wings, which are attached to the structure of the machine by double hinges and to which is imparted a flapping motion by means of spring power.

The essential features of my invention consist in the disposition on the wings of the points of attachment of the means for operating the latter and the disposition of the double hinges for connecting the wings to the structure of the machine, so as to obtain a motion of the wings like that of the wings of a bird, and a further feature consists in the construction of a mechanism for transmitting power from the motor to the means for performing the upward motion to the wings.

On the appended drawing Figure 1 is a side elevation of my improved flying-machine, Fig. 2 is a front elevation, Fig. 3 is a top view of the machine, Fig. 4 is a detail plan view of the hinge, Fig. 5 is a central vertical section through a portion of the power transmitting means, Fig. 6 is a fragmentary view in elevation of a portion of the power transmitting means, only a segment of the spiral wheel being shown.

The machine, which is mounted on wheels, has a structure built of the best kind of material combining lightness with sufficient strength, and is provided with wings 22 and guiding and steering planes (horizontal and vertical).

The means for performing the down stroke of the wing 22 consists of a powerful coil spring 1, which is fastened to the structure of the machine at 2 and to the wing at 3.

The means for performing the up stroke of the wing consists of a cord or wire 4, which is fastened to the wing at 5 and is carried over guiderolls 6 and connected to a rod 7 which is guided in the structure of the machine at 8. To perform the downward pull of the said rod for producing the up-stroke of the wing I make use of a specially constructed device consisting of a

spiral path 9, diagrammatically represented in Fig. 1, which is journaled in the frame of the machine and is rotated by any suitable means; said spiral 9 engages a wheel 10 mounted on the bottom end of the said rod 7. In Fig. 6, only a segment of the spiral wheel 9 is shown, it being understood that the race starting at point 11 is continuous until it reaches the point 12. During each revolution of the said spiral the wheel 10 is caught at the entrance end 11 of the spiral and driven toward the center 12 where it is released, the power spring 1 then being allowed to perform the down stroke of the wing. The rod 7 is provided with springs 13, 14 which engage the guide 8 so as to move the wheel 10 out of engagement with the center and into engagement with the entrance of the spiral. The spiral is to be operated by a motor-cycle by means of chain gear.

The double hinge for connecting the wings 22 to the frame of the machine comprises a frame structure 21 which is pivoted to the frame work 16, at 15, to turn about the longitudinal axis of the wing, the frame structure of the wings 22 being pivoted to the frame structure 21 upon an axis 17 transverse to the wings, whereby the wings are allowed to have a flapping or beating motion. The co-acting pivot points 15 and 17 allow the wings to have a compound movement which is the resultant of the flapping movement and movement about the longitudinal axis of the wing, which causes the center of pressure to move in a curve line during the stroke, and give the wings a propulsive effect similar to those of the bird.

It should be noted that the points of attachment 3 and 5 of the power spring and of the cord are situated on the foremost half of the wings. By the disposition of said points and by the double hinge I obtain an automatic turning of the wing at the beginning of each motion upward and downward, said turning being caused by the resistance of the air acting on the rear half of the area of the wings, so as to give the wing a rearward slanting position during the up stroke so that the wing shall act like a kite, while during the down stroke the wing assumes a forward slanting position so as to exert a powerful action on the air upward and rearward for producing the lifting and propulsion of the machine.

The operation of the machine is the following: By each revolution of the spiral 9 the wheel 10 is moved toward the center 12 exerting a pull in the rod 7 and in the wire so as to move the wing 22 up into position 18 causing the power spring 1 to be stretched; on the release of the wheel 10 at the center 12 the wing is by the spring 1 imparted a flapping motion into position 19. During the upstroke the point 20 of the wing describes an S; and during the downstroke said point describes a reversed S, the path of the point 20; during a complete upward and downward movement of the wing, describing a figure 8, as shown in dotted lines in Fig. 1.

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

20 In a flying machine, the combination with the body portion thereof, of a set of wings, means hinging said wings with said body

portion, and means actuating said wings, said actuating means comprising, springs for actuating said wings downwardly, a wheel having a spiral race, means for rotating said wheel, a longitudinally movable member provided with a roller adapted to travel in the said race, means for shifting the said roller in the said race at the beginning thereof, to produce movement of the said movable member, means freeing said roller from the said race to permit return thereof, with the rod, to the starting point of the said race, and means operatively connecting said movable member and said wings to actuate the same upwardly.

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

HANS GUNDERSEN.

Witnesses:

H. P. NORLOFF,
ERIC MÖLLER.