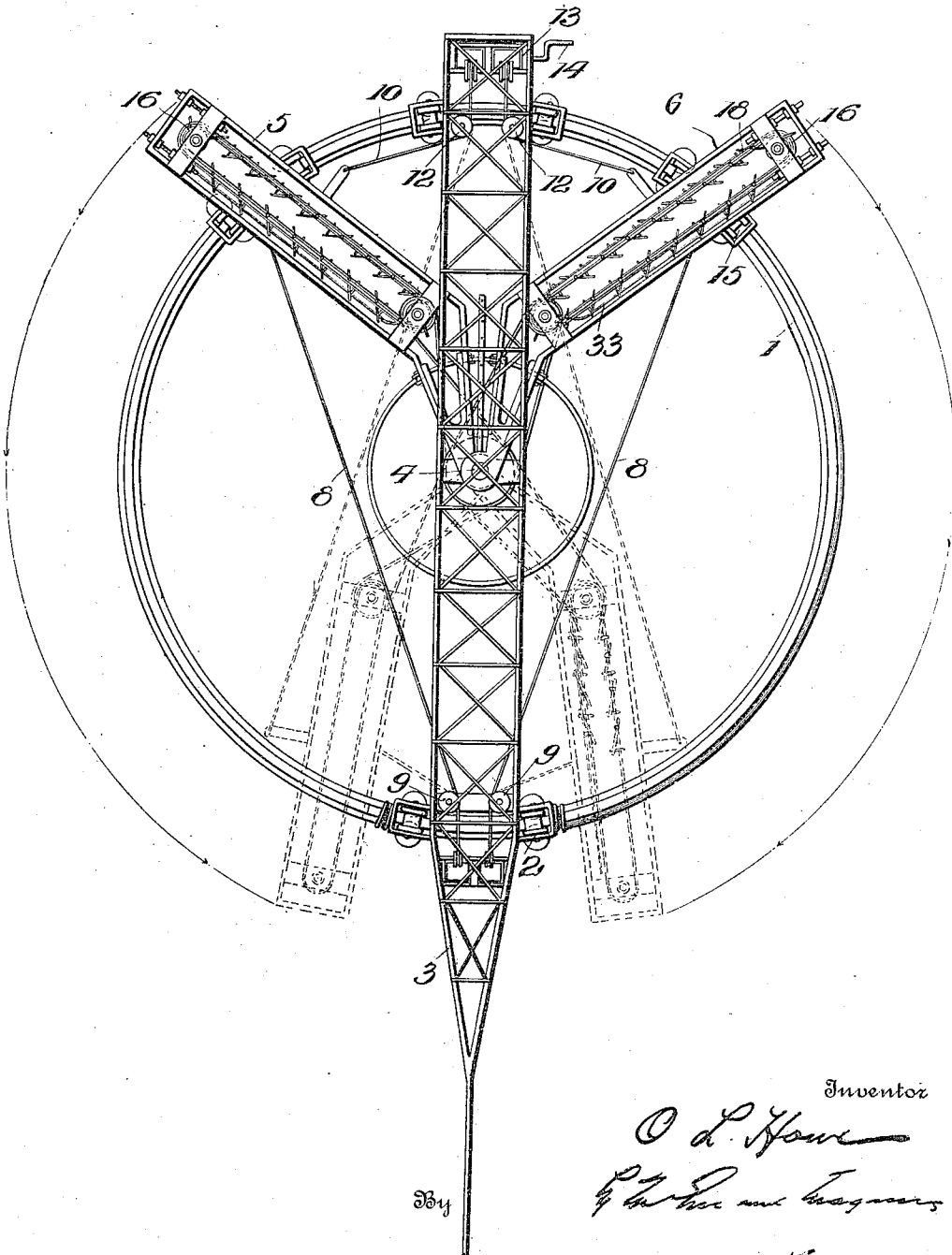


1,266,472.

O. L. HOWE.
AIR MOTOR.
APPLICATION FILED MAR. 31, 1916.

Patented May 14, 1918.
3 SHEETS—SHEET 1.

FIG. 1.



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Wm. H. ...

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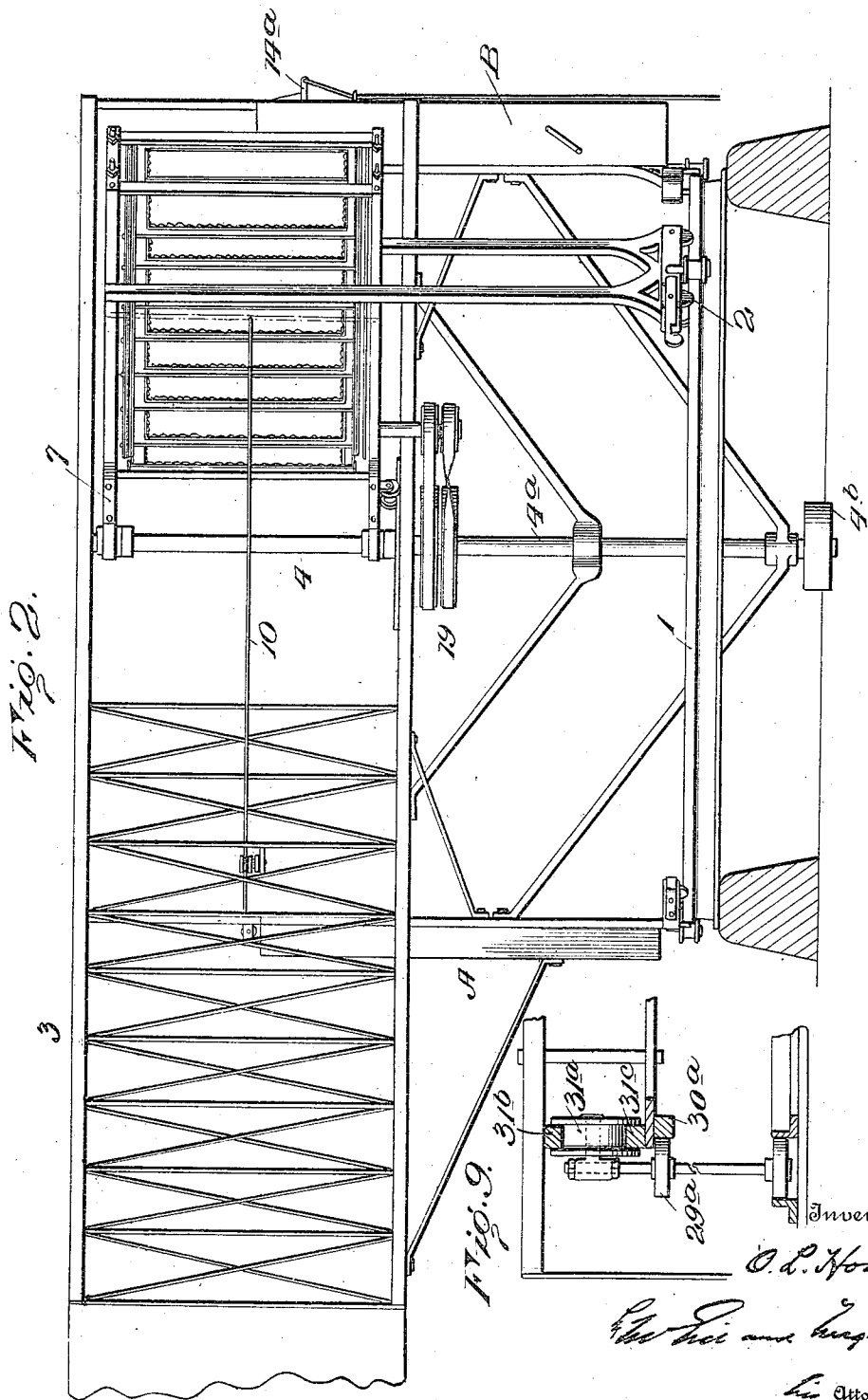
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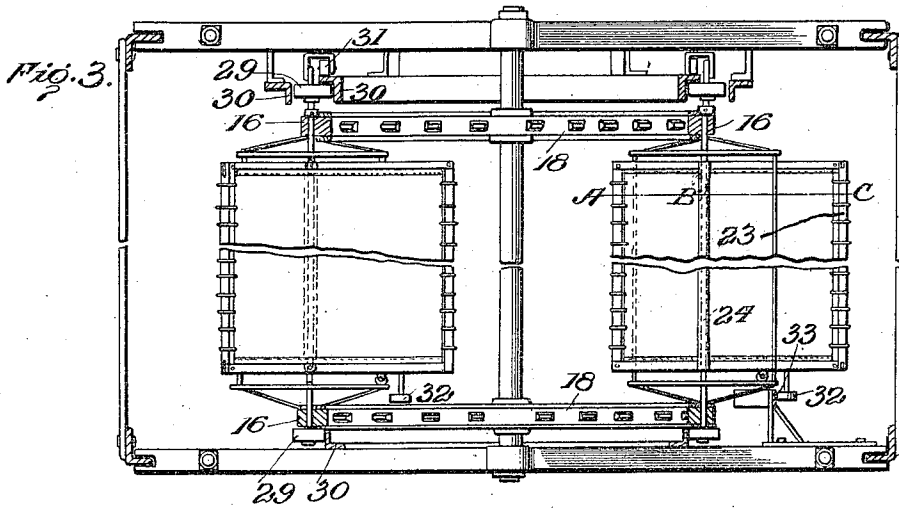
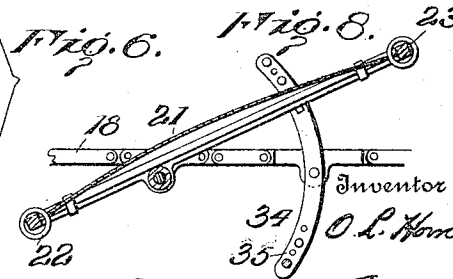
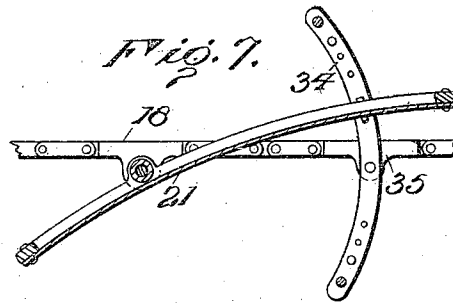
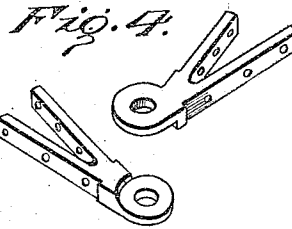
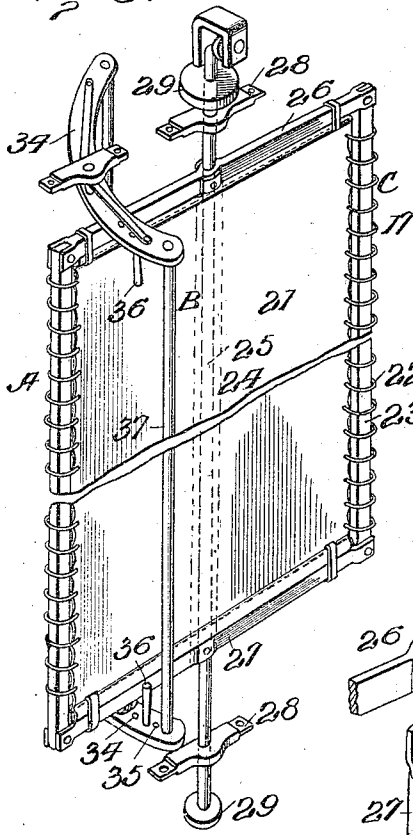


Fig. 5.



Inventor

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[Signature]

Attorney

UNITED STATES PATENT OFFICE.

OLAF L. HOWE, OF MISSOULA, MONTANA.

AIR-MOTOR.

1,266,472.

Specification of Letters Patent.

Patented May 14, 1918.

Application filed March 31, 1916. Serial No. 87,943.

To all whom it may concern:

Be it known that I, OLAF L. HOWE, of Missoula, in the county of Missoula and State of Montana, have invented certain new and useful Improvements in Air-Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention provides certain improvements in air motors and especially in the type of motor shown in my pending application for patent filed May 17, 1915, Serial No. 28,779.

In the apparatus covered by said application a plurality of vane frames are mounted on an endless carrier and each frame is equipped with a series of vanes which are pivoted in the frame and free to turn to render them effective or ineffective to operate the motor.

The present improvements contemplate a series of vanes directly mounted on carriers and each vane equipped with adjusting means, while improved means are provided for rendering the vanes ineffective. The arrangement of the carriers is such that they will be automatically thrown out of operative position in the event of excessive force striking the vanes.

In the drawings, Figure 1 is a plan view; Fig. 2 a side elevation; Fig. 3 a cross sectional view of one of the vane carriers; Fig. 4 details of the manner of mounting the vane carriers; Fig. 5 a perspective of one of the vanes, and Figs. 6, 7, 8 are details; Fig. 7 showing a rigid surface 21 and Fig. 8 a canvas surface; Fig. 9 is a slight modification.

Referring to the drawings, I have shown a circular track 1 upon which the entire structure is movable, as well understood in the art, the main frame-work being mounted upon the rollers 2 which are movable over the track, and so connected thereto as to prevent derailment. I employ a rudder 3 which is adapted to be turned by the wind so as to place the parts in the proper position for action according to any direction in which the wind may be blowing.

The rudder is shown mounted upon a central upright rod 4 secured to the frame-work. In line with this rod is a shaft 4^a having a band wheel 4^b from which the power of the motor may be taken off.

By reference to Fig. 1, it will be seen that I have provided a pair of vane carriers 5, 6, each having a bracket 7, shown in detail in Fig. 4 mounted upon the rod 4. Each of these vane carriers is adapted to be rendered inoperative when necessary regardless of the position of the rudder 3. I have shown them in Fig. 1 provided with ropes or cables 8 which extend over pulleys 9 on the rudder 3. These ropes or cables extend downward through the rudder and have suitable weights A secured to them. The tendency of these weights is to move the vane carriers from the full line position of Fig. 1 into the dotted line position. A second pair of ropes or cables 10 are also secured to the carriers and extend over pulleys 12 mounted in the rudder frame and over a drum 13 mounted in the frame and having an operating handle 14. A weight B (Fig. 2) is attached to each of the cables 10, these weights counterbalancing the weights A so as to hold the carriers in operative position. When it is desired to positively render the motor ineffective the handle 14 may be operated to turn the vane carriers 5, 6, into the dotted line position indicated in Fig. 1. When the carriers are in the full line position of Fig. 1 and the wind velocity becomes greater than desired for the operation of the motor this force will automatically turn the carriers, overcoming the resistance of weight B, into the dotted line position, the weight B being lifted and held by the trip 14^a which may thereafter be readily released to allow the weight to return to normal position. When thus disposed the vanes will not offer resistance to the wind and the motor will be inoperative. I have shown each of the vane carriers equipped with rollers 15 adapted to travel on the track 1 when the vane carriers move to the operative or inoperative position.

Each of the vanes consists of a swiveled element free to turn within certain limits, the bodily advance of the vanes collectively effecting the rotation of the shaft 4^a. I have shown each of the vane carriers 5, 6, equipped with sprockets 16 above and beneath the series of vanes 17. The corresponding pairs of these sprockets are connected by chains 18. The inner sprocket of each of the carriers operates the sprocket 19 keyed upon the shaft 4^a through the medium of chains 20.

In Figs. 5 to 8 I have shown appropriate

constructions of the vanes 17. Figs. 5 and 8 show vanes having surfaces of canvas 21 like sails, the fabric being held by rings 22 on side pieces 23. Located between the cross pieces 26 of each of the vanes is a vertically disposed tube 24 through which passes a rod 25 forming a swivel mounting for the vane. The tubes are mounted in the cross pieces and to one side of the center thereof by the forked members 27, Fig. 6. The rod 25 is fixedly secured to links of the chain 18 as at 28. As shown in Fig. 3, rollers 29 on the rods 25 above and beneath the vane engage track surfaces 30 to form a bearing surface and maintain the vanes in steady position. As also shown in Fig. 3 an additional bearing at the top may be provided by vertically disposed rollers 31 mounted above rollers 29 and engaging the track surface, the track being shown in the form of an angular plate which affords surfaces for both rollers 29 and 31 and track 30 duplicated, that is, at both the inner and outer sides of the roller. In Fig. 9 is shown a slightly modified form of this feature, where the upper track 30^a is only on the inside of roller 29^a and the roller 31^a has a double flange and engages upper and lower tracks 31^b and 31^c. This form is equally effective in holding the vane as against lateral displacement.

To prevent a vane in its ineffective position from being so far turned by the wind as to render it a retarding influence, I have shown in Fig. 3 a roller 32 adapted to engage a track 33.

On each of the chains 18 at the point of location of a vane I have shown an arc shaped plate 34 (Fig. 5) formed with a series of holes 35 adapted to receive pins 36. These pins may be placed in any of the holes to regulate the swing of the vanes, the pins acting as stops. I have shown the opposite plates 34 connected by rods 37.

To insure the air acting upon the vanes so as to tend to advance them and the chains 18 in the proper direction I mount the vanes in an "off center" position, that is between its fulcrum point and the outer edge each vane is wider at one side than at the other. As indicated in Figs. 3 and 5 the line A, B, is the narrower side and line B, C, is the wider side, the latter being the one acted upon by the wind and supported by the parts 23, 26.

It is understood that in the operation of the motor the rudder 3 will move according to the direction of the wind and each of the vane carriers 5, 6, will be directly in the path of the air, with the result that as the air currents strike the vanes mounted between chains 18 such vanes will be carried forward and around the inner sprockets 16,

the motion thus created being communicated to the central shaft 4^a. As the vanes pass around the inner sprockets they will be automatically turned about their pivots by the force of the air current striking against that surface B, C, of the vane offering the greater resistance. The vanes will accordingly be practically parallel with the currents on the return flight being again automatically thrown broadside to the wind as they round the outer sprockets 16 of the carriers.

I claim as my invention:

1. In an air motor, a track, a frame movable on said track, a rudder responsive to the direction of the wind and forming part of said frame, a plurality of vane carriers, means for maintaining said vane carriers in positions to resist the air force, and means for automatically moving said carriers to ineffective positions when the air velocity reaches a predetermined point.

2. In an air motor, a track, a frame movable on said track, a rudder responsive to the direction of the wind and forming part of said frame, a plurality of vane carriers, ropes connecting said carriers with said rudder, and weights at each end of said ropes.

3. In an air motor, a track, a frame movable on said track, a rudder responsive to the direction of the wind and forming part of said frame, a vane carrier, and means for maintaining said carrier in operative position relatively to said rudder, said carrier having a plurality of vanes pivotally mounted thereon, and means for limiting the movement of said vanes to maintain them in their effective positions.

4. In an air motor, a track, a frame movable on said track, a rudder responsive to the direction of the wind and forming part of said frame, a vane carrier, and means for maintaining said carrier in operative position relatively to said rudder, said carrier having a plurality of vanes pivotally mounted thereon, means for limiting the movement of said vanes to maintain them in their effective positions, and guides for said vanes.

5. In an air motor, an endless carrier comprising upper and lower flights of chains, a vertically disposed rod secured to said chains, a vane fulcrumed on said rod, a track, a roller on said vane normally out of contact with said track but adapted to engage the same to limit the swing of the vane.

In testimony whereof, I have signed this specification.

OLAF L. HOWE.