

(No Model.)

M. KELLY.
Atmospheric Propeller.

No. 231,812.

Patented Aug. 31, 1880.

Fig. 1.

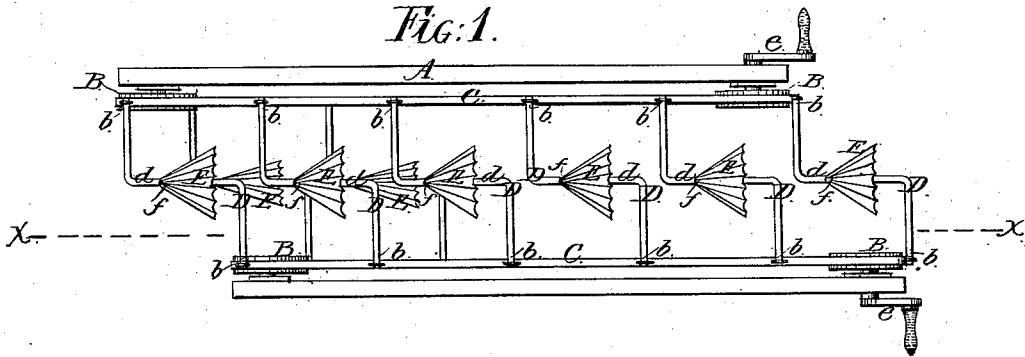


Fig. 2.

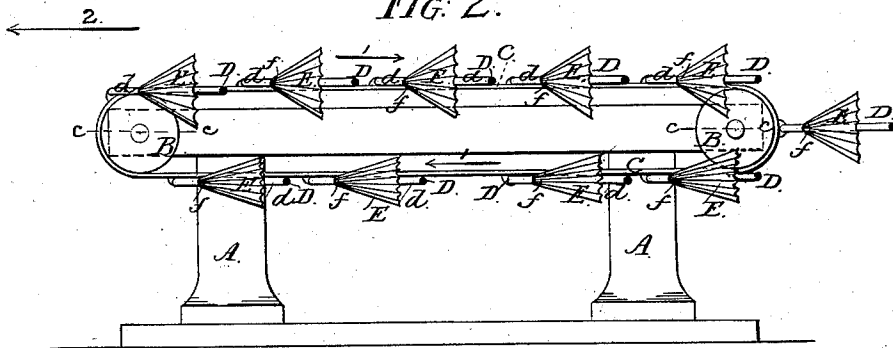


Fig. 3.

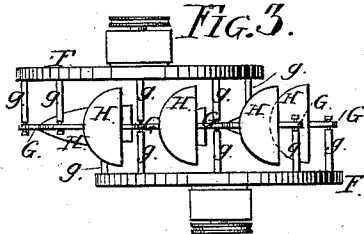


Fig. 5.

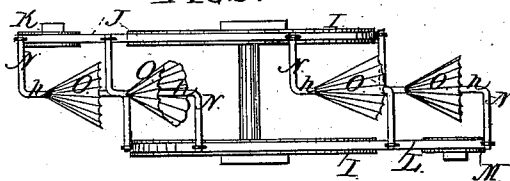


Fig. 4.

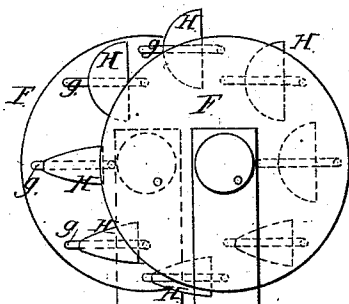
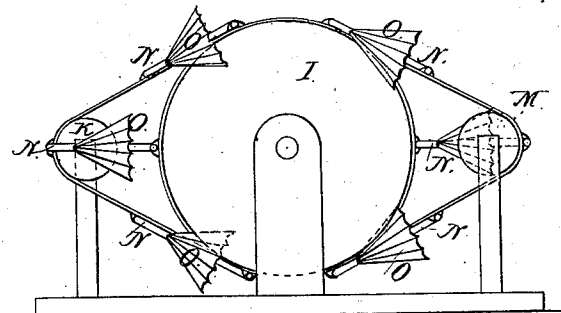


Fig. 6.



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MICHAEL KELLY, OF NEW YORK, N. Y.

ATMOSPHERIC PROPELLER.

SPECIFICATION forming part of Letters Patent No. 231,812, dated August 31, 1880.

Application filed March 18, 1880. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL KELLY, of New York, in the county and State of New York, have invented a new and Improved Atmospheric Propeller, of which the following is a specification.

My invention relates to improvements in the manner of connecting the propellers of atmospheric motors with the mechanical devices through which the power is conveyed to the propellers; and the object of the invention is to arrange the Z-shafts and like mechanism to which they are attached so as to reduce the friction between the operative parts of the motor.

The invention consists of propellers formed preferably like parachutes or hemispheres, (preferably to open and close by the action of the air,) which are attached to Z-shaped shafts which have their ends attached directly to the mechanism through which the power is conveyed, so that when in operation both ends of the shafts of the propellers are driven directly by the motive power without the use of grooves or other guides.

The invention further consists of details of construction, which will be fully described farther on in the specification.

In the accompanying drawings, Figure 1 represents a plan of my improved motor. Fig. 2 represents a vertical longitudinal section of the same, taken on line *xx* of Fig. 1. Fig. 3 represents a plan, and Fig. 4 a side elevation, of a modified construction and arrangement of the apparatus. Fig. 5 represents a plan, and Fig. 6 a side elevation, of another modification of the apparatus embodying my invention.

Referring to the drawings, the frame-work of the apparatus is designated by the letter A. To the side plates of the frame, on the inside, are journaled, on short shafts held in bearings in the said side plates, pulley-wheels B B B B, two on each side, in line with each other. It will be observed that the pulley-wheels on opposite sides are out of line with each other.

C C represent endless belts running over the pulleys B B on each side.

D represents Z-shaped shafts applied transversely of the apparatus, and having their ends *b b* attached directly to the running belts B

B, so that they are driven and guided directly by the said belts. The shafts D are placed at equal intervals the entire length of the belts C C. The middle portion, *d*, of the shafts D is of the same length as the distance from the outside periphery of the wheel B on one side to the outside periphery of the wheel B on the opposite side at the same end of the apparatus, and on the line of the horizontal diameter indicated by the dotted line *c c* in Fig. 2.

The same proportion must be maintained between the length of the longitudinal portions *d* of the Z-shaped shafts D and the outside peripheries of the oppositely-placed pulley-wheels B at both ends of the machine for the following object: When the belts C C are revolved over their supporting-pulleys B by cranks *e*, applied to the shafts of the pulleys or by other power communicated to the said pulleys, if the opposite pulleys were in line with each other, the shafts D would be reversed in position in passing from the upper side of the pulleys to the lower side; but, for a purpose which will be presently referred to, it is essential that the shafts retain their position both above and below and in passing around the pulleys. By placing the pulleys on one side in advance or out of line with those on the opposite side, and making the shafts D Z-shaped, this object is attained, as when the two ends of the shafts pass around the pulleys B they sink from the upper sides or tops of the said pulleys simultaneously and without turning—in other words, maintaining their position in a horizontal plane.

On the longitudinal parts *d* of the shafts D are fixed conical propellers E, made preferably similar to parachutes or umbrellas—that is, the shaft *d* passes through their central smaller ends, *f*, and they are fixed to the shafts at these points, while their sides are arranged to spread out to a certain extent to form hollow cones or hemispheres, and also to collapse against the shaft *d* in a manner precisely like the opening and closing of an umbrella. One of these expansible and collapsible propellers E is fixed to each of the shafts D on the part *d*, so that they are in line with each other, and all point in the same direction. In other words, the small closed ends *f* of the propellers are all toward the same end of the appa-

ratus, while the open ends are toward the opposite end.

By the arrangement of the belts, pulleys, and shafts D, hereinbefore described, so as to maintain the shafts D in the same relative position in passing with the belts from the upper sides of the pulleys to the lower sides of the same, and vice versa, I am enabled to retain the propellers E in a fixed relation to the direction in which the belts revolve. For example, suppose the pulleys to revolve so as to move the belts in the direction of the arrows 1. On the upper part of the belt the open or expansible ends of the propellers are in advance, but below the pulleys the closed ends *f* of the propellers are in advance.

In Fig. 2 the relative positions of the propellers at different points on the belts are clearly shown at one end of the apparatus. One of the propellers E is seen between the upper sides of the pulleys, with the expansible end open, the propeller in advance of this one is seen descending from the upper to the lower side, while a third one has passed down below. In all it will be observed the same relative positions are maintained, the expansible or open ends point in the same direction in whatever position they occupy with relation to the pulleys, and the closed ends point in the opposite direction. If the belt be revolved in the opposite direction, the lower propellers will have the open or expansible ends in advance, and the upper ones will have the closed ends in that position. Thus constructed and arranged, if the apparatus be applied to a vessel, canal-boat, railway-car, or any other movable object which it is desired to propel, the operation will be substantially as follows: A suitable power is applied to turn the pulleys B B, &c., and revolve the belts C C at the required speed, and if the apparatus be applied to a canal-boat this power may be supplied by a small engine. The apparatus should be arranged so that the smaller closed ends will point toward the front end or bow of the boat and the open or expansible ends toward the stern. If the boat is to be propelled in the direction of the large arrow 2, the belt is revolved in the direction, say, of the arrows 1. (This is not essential, however, as it may be revolved in the reverse direction if desired.)

The propellers E, when moving in an opposite direction to that in which the boat is to be moved, present their open or expansible ends to the air, and they are immediately distended by the resistance which the air offers, like an umbrella or a parachute, as shown in the drawings. When thus distended and drawn against the air by the movement of the belts they present a broadly-extended opposing surface to the air, which resists their pressure, and thereby, owing to the resistance which the air offers to the movement of the distended propellers in one direction, the boat or other vehicle to which the apparatus is applied is caused to move in the opposite direction—viz.,

that indicated by the arrow 2. As soon as the propellers E change their direction, or when the direction of their movement coincides with the direction in which the boat or other vehicle is moving, the resistance that the air offers to their motion is changed to the closed end *f*, and the effect is to collapse the propellers, as shown in Fig. 2, whereby less resistance is offered to their motion; yet it is not necessary that the propellers collapse, as their pointed or convex ends offer least resistance.

In this way a propulsive force is obtained, using the air as a resisting medium, in which the propeller E, formed so as to present a hollow conical surface to the air, gathers the air within it, and acts against it as a body, with the effect of giving a forward propulsive motion to the boat or other movable object to which it is attached; but when the closed ends of the propellers E are turned in the direction of the motion they considerably reduce the surface which acts against the air, and as they present the outside of a conical surface to the air the tendency is to throw the air off, and thus very much lessen its resistance.

In Figs. 3 and 4 is shown one modification of my invention. In this two wheels, F F, of equal diameter, are hung in suitable standards in such a way as to throw their axes out of line with each other. From the faces of the wheels F F pins or rods *g* project toward each other, said pins being arranged on the faces of the wheels in circles concentric to the peripheries of the wheels, and at equal intervals apart. The pins *g* of one wheel F are joined or connected with the pins *g* of the opposite wheel by bands or straps G, on which are fixed hollow hemispheres H, all facing in the same direction. The length of the straps or bands G equals the distance from the axis of one of the wheels F to the axis of the other wheel F, as is more clearly shown in Fig. 4. The pins *g* and the straps or bands G correspond to the shafts D of Figs. 1 and 2, and the hollow hemispheres H correspond to the propellers E, acting in the same manner precisely against the air as a resisting medium. When the open end presenting the hollow side to the air is turned in a direction opposite to that which the movable object to which it is applied is intended to move, the hemispheres act against the air, gathering it in the hollow portion, and acting against it with a propulsive force; but when the said hemispheres descend below the axial line of the wheels F, and move in the same direction as the object, they present their convex sides to the air, and may be arranged to collapse, so as to present as little surface as possible to resist the motion.

These propellers may be of any suitable shape—pyramidal, hemispherical, conical, or equivalent—in form.

In Figs. 5 and 6 is shown another modification. This consists of two large wheels, I I, on the same axis. From one wheel I an endless belt, J, runs to a small belt-pulley, K, at

one end of the apparatus, and from the opposite wheel I a second belt, L, runs to another belt-pulley, M, at the opposite end of the apparatus. The two belts J L are connected
 5 by Z-shaped shafts N, carrying parachute-shaped propellers O, which act like the similar propellers E, presenting an expansible end in the direction opposite to that in which the object is intended to move, and a closed end
 10 in the other direction.

The longitudinal portions h of the shafts N correspond in length to the distance between the peripheries of the larger wheels, I I, on each side at the horizontal diameter and the
 15 outer peripheries of the smaller belt-pulleys, K M, so that when in motion and one of the ends of one of the shafts N reaches the line of the horizontal diameter of one of the wheels I the opposite end of the said shaft is at the
 20 same moment in line with the horizontal diameter of, say, the small pulley-wheel, M, which is in line with the opposite wheel I. Thus the two ends of the shafts N pass simultaneously around the corresponding parts of the
 25 peripheries of the larger wheels, I I, and opposite smaller pulleys, K M, whereby the propellers O are at all times held in the same position relatively to the belts J L, the open or expansible ends always pointing in the same
 30 direction whatever the position of the belts.

In all of the arrangements of the motor above described it will be observed that the ends of the Z-shafts, to which the propellers are applied, are attached directly to the device through which the power is conveyed.
 35 By this direct connection friction is avoided, and the shafts receive the direct force of the power. Thus they are operated with as much ease as the devices to which they are attached.
 40 No grooves or other guides are necessary, as the ends are carried around with the belts or wheels to which they are attached, and they are maintained in position and guided by the pulleys over which the belts run in the one case, and by the arrangement of the wheels to which
 45 they are attached in the other case.

The motor above described is applicable to the propulsion of canal-boats, (in which connection it is especially valuable, as the agitation of the water and the resulting washing
 50 of the banks is entirely avoided;) also, to the running of railway-cars, the propulsion of vessels, and to the operation of fire-escapes, in which case the propellers should be arranged
 55 to move vertically, so as to exert a lifting force; also, to the propulsion of aerial conveyances of all kinds.

The propellers may be made of any suitable material, and if it is not desired to have them

collapsible and expansible the material may be either flexible or rigid, as preferred.

I am aware that duck-foot propellers which are reciprocated or oscillated are old. I never, however, knew of a hollow or collapsible propeller being constructed so that it can be rotated continuously, and so that during one half of the rotation it would act and during the other half it would not act upon the air as a propeller. By my invention the hollow side of the propeller is always held in the same vertical plane
 70 by means of the Z-shaped shafts, which arrangement shortens the run at one end of the shaft at the forward end of the machine and shortens the run of the other end of the shaft at the back end of the machine. By this means
 75 the Z-shaped shaft is always held in substantially the same plane and the open end of the propeller always at right angles thereto while revolving.

I am aware that flat buckets have been applied to Z-shaped shafts whose middle straight parts connect with chains, so as to revolve without changing sides; but heretofore the ends of such shafts have been confined in grooves or guides, and not attached directly to the device through which the power is conveyed to the propellers, thus causing a great amount of friction, which is avoided by the arrangement which I have herein described; nor are such flat buckets applicable for use in the air, to
 90 which my invention is intended to apply.

I claim—

1. In combination with the hollow propellers, the Z-shaped shafts or bars having their crank ends attached directly to the belts through
 95 which the power is conveyed, so as to be guided and driven and have their run shortened, each at one end, directly by the power, without the use of guides, substantially as herein shown and described.

2. The hollow propellers E, in combination with the Z-shaped shafts D, endless belts C, connecting with the crank ends of the shafts, and pulleys B B B B, substantially as described.

3. In combination with the hollow propellers, the Z-shaped shafts or bars having their crank ends attached directly to the disks through which the power is conveyed, so as to be guided and driven and have their run shortened, each at one end, directly by the power, without the
 110 use of guides, substantially as herein shown and described.

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