

No. 726,344.

PATENTED APR. 28, 1903.

J. A. RAND & W. H. CASTLES.  
MOTOR WHEEL.

APPLICATION FILED AUG. 22, 1902.

NO MODEL.

Fig. 1.

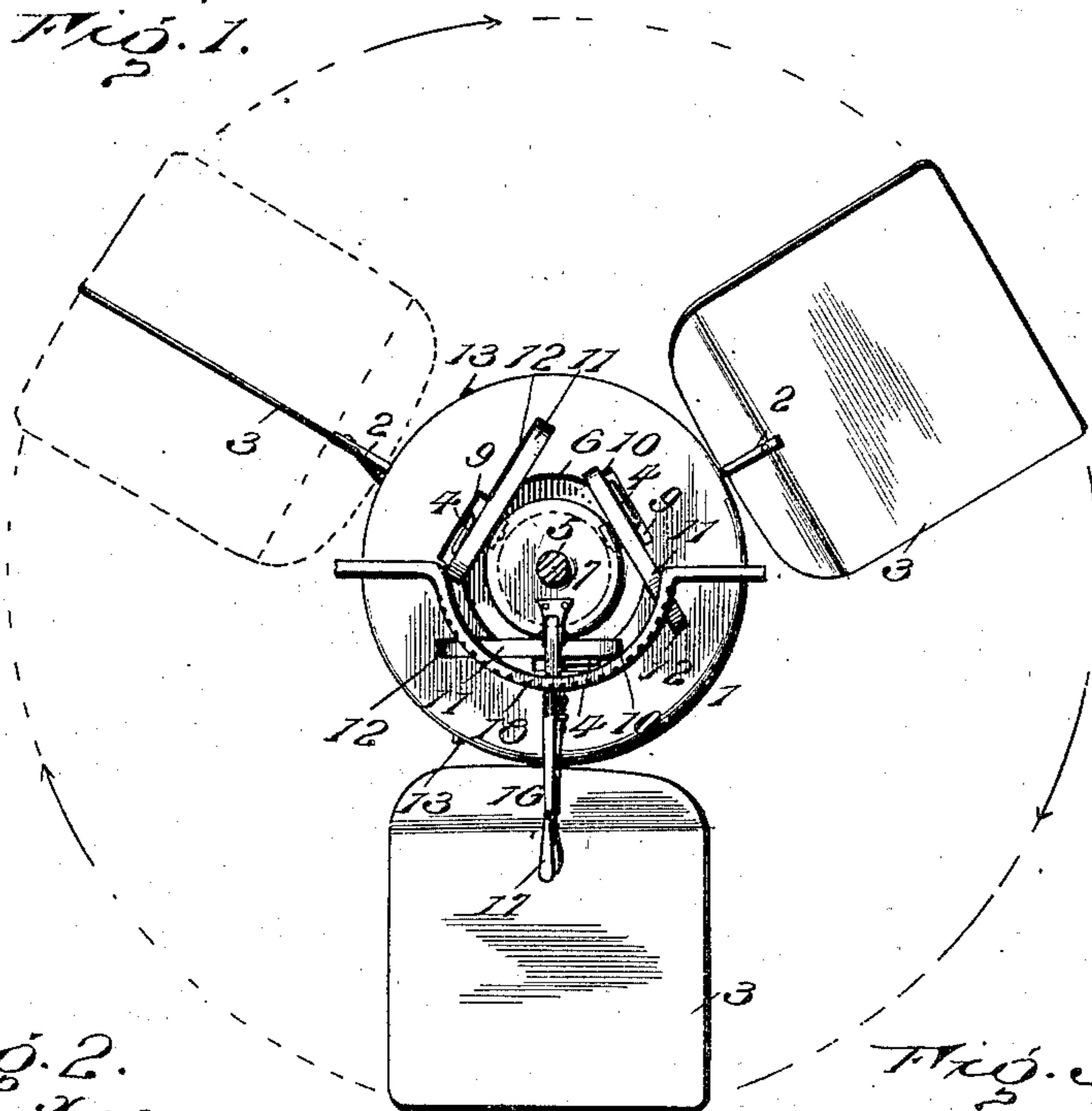


Fig. 2.

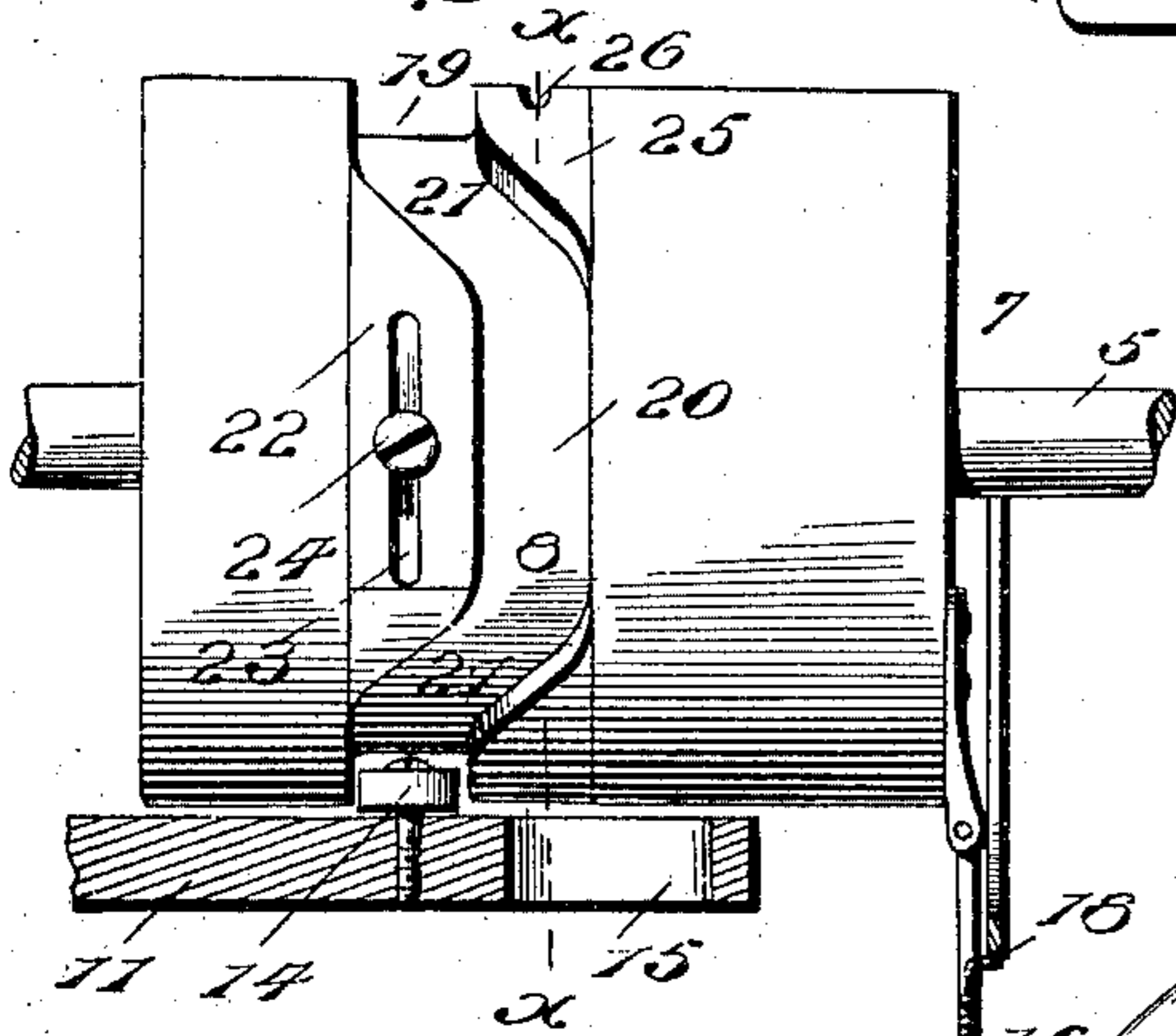


Fig. 3.

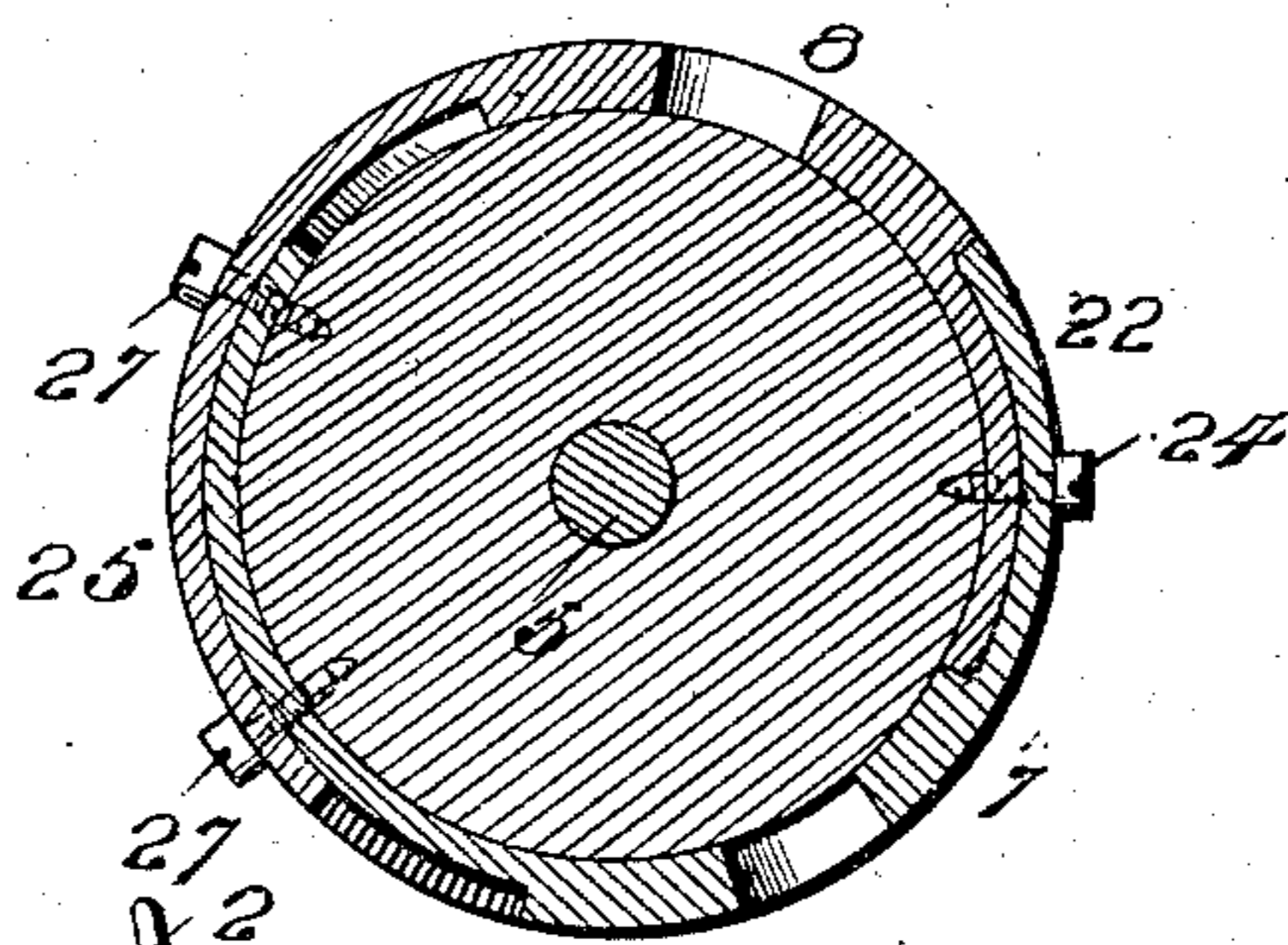
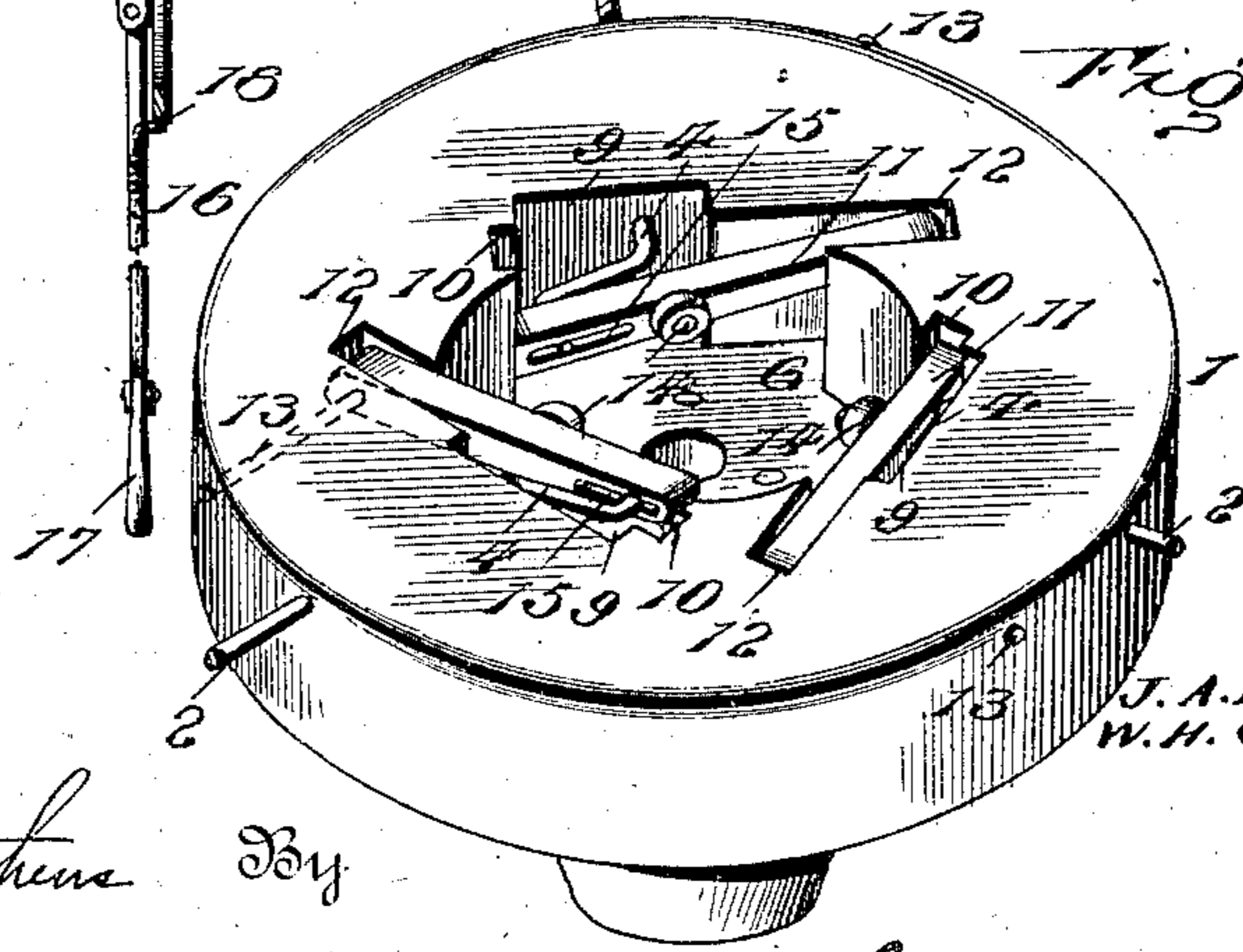


Fig. 4.



Witnesses

Gen. M. Matthews  
George Watt

By

Inventors

J. A. Rand.  
W. H. Castles.

R. L. Blaney, Attorneys.

# UNITED STATES PATENT OFFICE.

JACKSON A. RAND, OF HICKORYGROVE, AND WILLIAM H. CASTLES, OF  
MAYHEWS STATION, MISSISSIPPI.

## MOTOR-WHEEL.

SPECIFICATION forming part of Letters Patent No. 726,344, dated April 28, 1903.

Application filed August 22, 1902. Serial No. 120,716. (No model.)

*To all whom it may concern:*

Be it known that we, JACKSON A. RAND, residing at Hickorygrove, in the county of Oktibbeha, and WILLIAM H. CASTLES, residing at Mayhews Station, in the county of Lowndes, State of Mississippi, citizens of the United States, have invented certain new and useful Improvements in Motor-Wheels, of which the following is a specification.

10 This invention provides a wheel having blades or wings either to receive the force expended by a current of air or water or to impact against such medium for imparting propulsive movement to a vehicle or carrier of  
15 any make or design.

An essential feature of the invention is the provision of novel means to effect a feathering of the blades or wings, whereby a maximum percentage of power is utilized in either  
20 capacity of the wheel. The blades or wings are mounted so as to turn to present either a maximum or a minimum amount of surface, and the actuating means for effecting a shifting of said blades or wings consist of a cam,  
25 said cam being shiftable to admit of turning the blades or wings into and out of action at any determinate point in their rotation and said cam being adjustable to admit of holding the blades or wings in or out of action  
30 for any distance of their travel.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to  
35 be had to the following description and drawings hereto attached.

While the essential and characteristic features of the invention are susceptible of modification, still the preferred embodiment of  
40 the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a front view of a wheel embodying the essential features of the invention. Fig. 2 is a side view of the actuator,  
45 showing the means for holding it in an adjusted position and illustrating an oscillatory lever in cooperative relation, said lever being in section. Fig. 3 is a transverse section of the actuator about on the line X X of Fig. 2.  
50 Fig. 4 is a perspective view of the hub por-

tion of the wheel, showing the shaft and oscillatory levers in place.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same  
55 reference characters.

The wheel comprises a hub 1, radially-disposed shafts 2, and blades or wings 3, the shafts 2 being journaled in a peripheral portion of the hub 1 and having the blades or  
60 wings 3 secured to their outer ends and provided at their inner ends with cranks 4. The blades or wings 3 may be of any pattern and constructed of any material and are secured to the outer ends of the shafts 2 in any se-  
65 lected way found most advantageous, according to the size and specific use of the device. As shown, the blades or wings are rigidly attached to the shafts midway of their edges, so as to present a like amount of surface  
70 upon each side of the axis of the respective shafts.

The wheel is secured to the shaft 5, so as to rotate therewith, and is centrally recessed in one side, as shown at 6, to receive the actuator 7, consisting of a circular element or  
75 pulley provided in its periphery with a cam-groove 8. Depressions 9 are formed in the peripheral wall of the recess 6 at points to receive the cranks 4, and notches 10 are pro-  
80 vided in one wall of the depressions 9 to receive the free ends of the oscillatory levers 11. Other notches 12 extend outward from the opposite walls of the depressions 9 and receive the pivot-pins of the oscillatory levers  
85 11, which are secured therein by means of pins 13. An oscillatory lever 11 is provided for each blade or wing and has a tangential arrangement with reference to the actuator 7. A roller 14 is applied to each oscillatory  
90 lever and enters the cam-groove 8 and in conjunction therewith causes an oscillation of said levers as the wheel rotates. Each of the levers 11 is provided near its free end with a longitudinal slot 15 to receive the crank 4  
95 of the respective shafts, so as to cause said shafts to rock and turn the blades or wings to a position either at a right angle to the plane of movement of the wheel or parallel therewith.

The actuator is fixed with reference to the wheel and is coaxial therewith and is adapted to be turned to any angular position to admit of throwing the blades or wings into and out of operative position at any point in their travel or revolution. Any means may be provided to effect an adjustment of the actuator and secure the same in an adjusted position, and, as shown, a lever 16, extended from the actuator, is provided with a hand-latch 17 to engage with a tooth of the toothed cogs 18. The cam-groove 8, formed in the circumference of the actuator, comprises, essentially, parallel portions 19 and 20 and offset portions 21. The parts 19 and 20 are relatively straight, whereas the parts 21 are oppositely inclined. When the rollers 14 are traveling in the part 20 of the cam-groove, the blades or wings occupy a position at a right angle to the plane of movement of the wheel, and when the rollers travel in the part 19 said blades or wings occupy a position parallel with the plane of movement of the wheel. By varying the length of the parts 19 and 20 the blades or wings occupy one or the other of their extreme positions for a greater or less distance during the revolution of the wheel. To effect this result, the parts bordering upon the cam-groove are adapted to be lengthened and shortened. The part 22 is composed of corresponding members having their inner end portions longitudinally slotted, as shown at 23, to receive a clamp-screw 24, by means of which the overlapped portions are secured in an adjusted position and the said part 22 held to the actuator. The outer end portions of the members comprising the part 22 are oppositely inclined and extend the full depth of the cam-groove, so as to engage with the roller 14 and distribute the wear so as to prolong the period of usefulness of the cooperating parts. The part 25, arranged at the opposite side of the cam-groove 8, is constructed in a similar manner to the part 22, being composed of companion members longitudinally slotted, as shown at 26, and held in an adjusted position and to the actuator by means of clamp-screws 27. When the part 22 is shortened, the part 25 is correspondingly lengthened, and vice versa, this being necessary in order to preserve a uniform width between corresponding inclined edges of the parts 22 and 25. When the device is used as a propeller, the wheel is positively driven, and the blades or wings beating against the resisting medium impart a propulsive movement to the carrier or craft equipped with the device. When used as a motor, the blades or wings receive the force of the medium impacting thereagainst, thereby causing positive rotation of the wheel from which the power may be taken in any well-known manner. In either application or use of the wheel the blades or wings are turned so as to present a minimum amount of resistance when loss of power would re-

sult if said blades were not turned. The adjustment of the actuator to any angular position admits of turning the blades or wings into and out of an operative position at any point in the revolution of the wheel and the lengthening and shortening of the straight portions 19 and 20 of the cam-groove 8 admits of holding the blades or wings either in or out of action for a greater or less distance during a revolution.

Having thus described the invention, what is claimed as new is—

1. In a wheel of the character described, an actuator mounted coaxially with the wheel, a hub encircling the said actuator, shafts journaled to the peripheral portions of the hub and having cranks at their inner ends and blades or wings at their outer ends, levers disposed intermediate the actuator and hub and positively connected to the aforesaid cranks, and means carried by the actuator adapted to engage means upon the levers whereby same are oscillated, substantially as set forth.

2. In a wheel of the character specified, a hub, an actuator coaxially mounted with reference to the hub and provided with a cam-groove, shafts journaled to peripheral portions of the hub and provided at their outer ends with blades or wings and having cranks at their inner ends, and oscillatory levers pivoted to the hub and tangentially arranged with reference to the actuator and having projecting portions to enter the cam-groove thereof, said levers having longitudinal slots to receive the aforementioned cranks, substantially as set forth.

3. In a wheel of the character described, a hub provided with a central recess, depressions in the peripheral wall of said recess, shafts journaled in the peripheral portions of the hubs and provided at their outer ends with blades or wings and at their inner ends with cranks adapted to operate in the said depressions, an actuator extended into the central recess of the hub and provided with a cam-groove, and oscillatory levers having a tangential arrangement with reference to the actuator and grouped around the central recess of the hub and extended across the open sides of the depressions communicating with said recess, said levers having the aforementioned cranks connected therewith and provided with projecting parts to enter the cam-groove of the actuator, substantially as set forth.

4. In a wheel of the character described, the combination with shafts provided with blades or wings, an actuator for turning said shafts and provided with a cam-groove having relatively straight portions separated by oppositely-inclined offset portions, and means for varying the circumferential distance between the said oppositely-inclined offset portions for lengthening and shortening the straight portions of the cam-groove to hold the blades or wings in a given position for a greater or less

distance during a revolution of the wheel, substantially as set forth.

5 In a wheel of the character described, the combination with shafts provided with blades or wings, an actuator for turning said shafts and provided with a cam-groove, coöperating parts arranged upon opposite sides of the cam-groove, each of said parts being composed of complementary members slidably related to  
10 admit of said parts being lengthened and shortened, and means for securing the members in an adjusted position to one another and to the actuator, substantially as set forth.

6 In a wheel of the character described, the combination with shafts provided with blades or wings and cranks, of an actuator having a cam-groove for coöperation with the aforesaid cranks to effect a turning of the blades or

wings, offset portions provided upon the cam-groove, means for turning the actuator to  
20 effect a shifting of the blades at any point in their travel, and means for varying the circumferential distance between the said oppositely-inclined offset portions for lengthening and shortening the parts of the cam-  
25 groove separated by the offset portions so as to hold the blades in a given position for a greater or less distance during a revolution of the wheel, substantially as specified.

In testimony whereof we affix our signatures in presence of two witnesses.

JACKSON A. RAND. [L. S.]

WILLIAM H. CASTLES. [L. S.]

Witnesses:

GENEVIEVE MATTHEWS,  
V. B. HILLYARD.