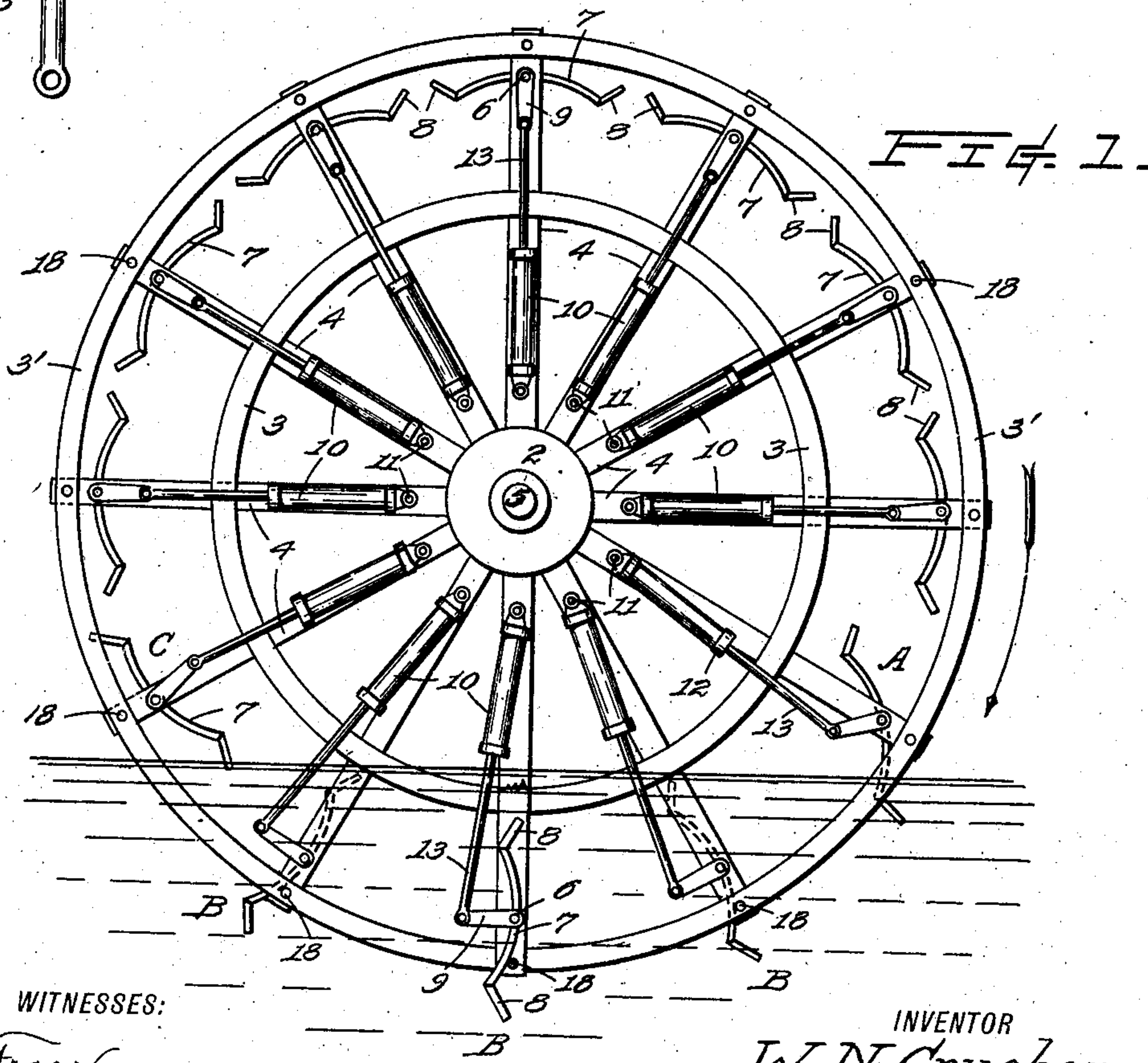
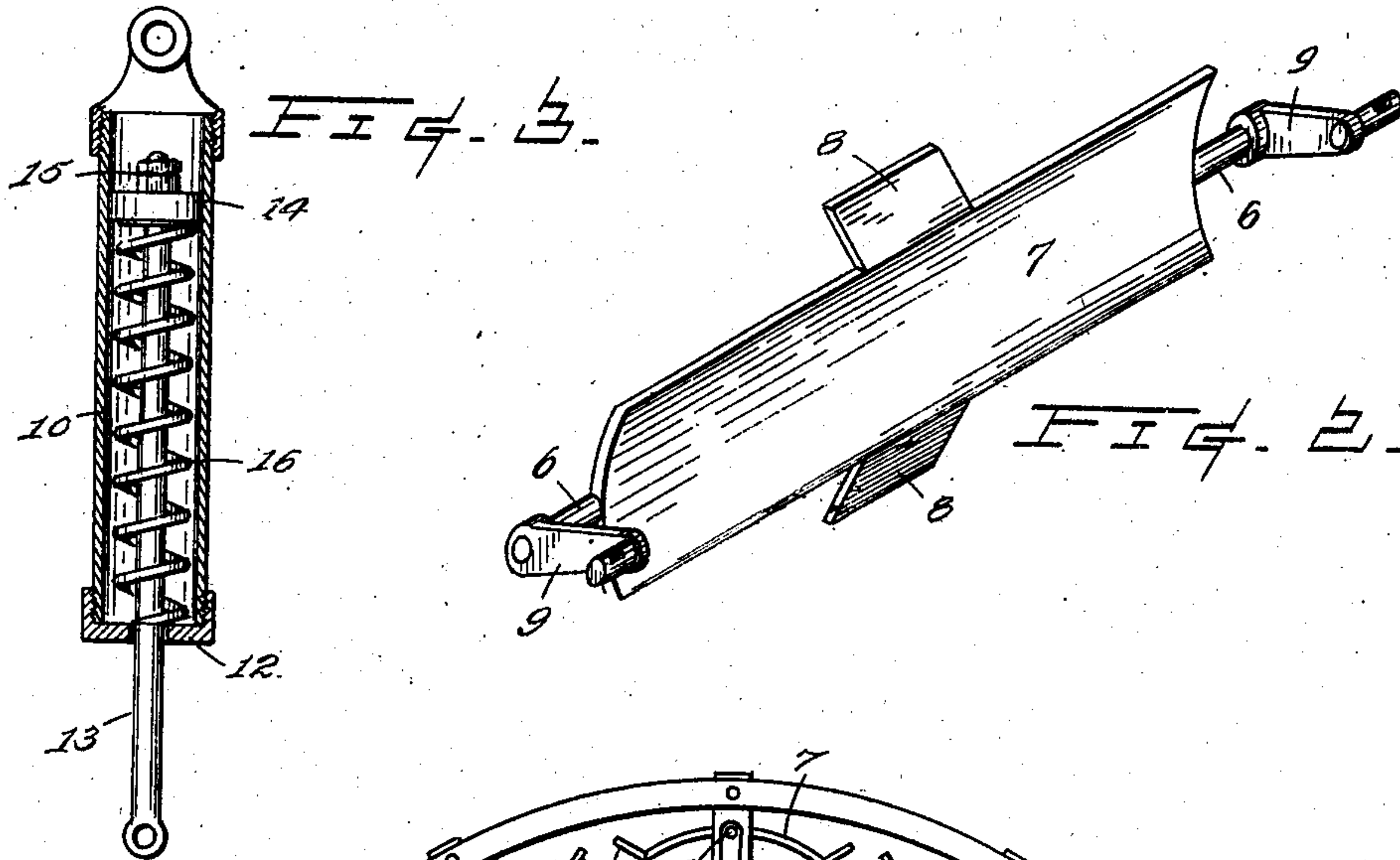


No. 827,216.

PATENTED JULY 31, 1906.

W. N. CRUCHON.  
FEATHERING PADDLE WHEEL.  
APPLICATION FILED OCT. 2, 1905.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

WILLIAM N. CRUCHON, OF SEATTLE, WASHINGTON.

## FEATHERING PADDLE-WHEEL.

No. 827,216.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed October 2, 1905. Serial No. 280,945.

*To all whom it may concern:*

Be it known that I, WILLIAM N. CRUCHON, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Feathering Paddle-Wheels, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a side elevation of a paddle-wheel embodying my improvements. Fig. 2 is an enlarged perspective view of a detached paddle or bucket; and Fig. 3 is a detail sectional view of one of the spring-containing cylinders, shown on a larger scale than in Fig. 1.

This invention relates to paddle-wheels used for propelling marine vessels, and more particularly to that class designated as "feathering-wheels." Its object is to effect improvements in the construction of paddle-wheels whereby vessels provided with wheels embodying my improvements may be propelled with less power than has been hitherto necessary and can operate equally well in either rotary direction.

The invention, stated in general terms, consists in the peculiarly-constructed buckets provided with means for automatically moving them as they enter the water into their most effective positions and supplementary means for returning them to their normal inoperative positions upon emerging from the water.

In the illustrated embodiment of my invention the reference-numeral 2 designates a center plate, and 3 3' concentric wrought-iron rings, which are connected with the center plate by radial arms 4. All of the aforesaid parts of a wheel are in duplicate and are further connected by transverse stay-rods (not shown) and form the wheel-frame, which is mounted upon a paddle-shaft 5, as ordinary.

Pivotally mounted in and between each pair of the wheel-arms in proximity of their outer ends, as by gudgeons 6, are the buckets 7. These buckets, desirably, are of arc shape in cross-section, and from their opposite edges protrude lateral wings 8, which are disposed in planes radially of the curvatures of the respective buckets and centrally of their lengths. The gudgeons of each bucket exteriorly of the respective arms are formed or provided with cranks 9, arranged in planes also radial of the buckets and directed toward their centers of curvature.

Two vibratile cylinders 10 are provided for each said bucket and are suspended at or near their inner ends to the outer sides of the arms, as by pivotal pins 11. Extending axially of each cylinder and through an aperture in the outer head 12 thereof (see Fig. 3) is a drag-rod 13, which is connected to one of said gudgeon-cranks. A disk or piston 14 is provided within each of the cylinders and is adjustably attached to its rod by nuts 15, registering with screw-threads formed thereon. Interposed between the disk and the said outer head of each cylinder is a helical spring 16, tending to press the rod inwardly or toward the wheel-axis, and thereby move and resiliently maintain the several buckets in a plane concentric of the wheel, as shown in the upper portion of Fig. 1. As the wheel is rotated in either direction the advance wings of the revolving buckets strike the water and effect the turning of the buckets until they come in contact with the stop-rods 18, provided in the wheel-arms, and are held thereagainst by the dynamic force of the water until the buckets are emerged, when said springs assert themselves to return the buckets to their normal inoperative positions. When the buckets are successively tilted by their advance wings striking the water, they are reliably held in such tilted positions by reason of their outer wings then moving at a greater velocity than the others nearer the wheel-axis, and should the buckets when passing through the water be accidentally tilted out of their proper positions the outer wings are thereby brought to present an increasingly effective area to the direct action of the fluid, while the inner wings present a diminishing area, causing a greater difference between the opposing action, and are consequently returned to their former positions through the unbalanced pressures acting upon the bucket-wings.

The operation of the invention will be best understood from an inspection of Fig. 1, wherein the uppermost buckets are represented in their normal positions, the bucket A at the right-hand side striking the water, and thereby being tilted into a position similar to that assumed by the previously-immersed buckets B, while the bucket C, having left the water, is being returned by the action of its springs to the initial position. The springs must be of such strength as to be capable of returning the buckets to their concentric positions, yet not sufficient to over-



come the controlling action of the water, and to furnish means for regulating the tension of the springs to fulfil this requirement the aforesaid adjustable nuts are provided. The  
5 buckets, as before mentioned, operate equally well when revolving in either direction and will accommodate themselves to any contingency.

Various changes in the form and arrangement of the hereinbefore-described details may obviously be resorted to without departing from the essential features of my invention or sacrificing its usefulness.

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

1. The combination with the wheel-frame, of paddle-buckets pivotally connected thereto, said buckets being severally provided with  
20 two oppositely disposed and inclined wings, the springs, the connections between said springs and buckets, and the stops for limiting the tilting movements of the buckets, substantially as described.

25 2. The combination in a paddle-wheel, of the tiltable buckets each provided with two oppositely-inclined wings, the cranks, the drag-rods, springs acting to maintain the buckets in a plane concentric of the paddle-

wheel and means to adjust the tension of the  
springs, substantially as described. 30

3. The combination in a paddle-wheel, of the tiltable buckets each provided with two oppositely-inclined wings, the cranks, the drag-rods, springs acting to maintain the  
35 buckets in a plane concentric of the paddle-wheel, means to adjust the tension of the springs, and means to limit the tilting of the buckets, substantially as described.

4. In a paddle-wheel, a bucket of curved  
40 transverse form provided with end gudgeons and oppositely-inclined wings extending from the opposite edges of the bucket intermediate of its length, substantially as described.

5. In a paddle-wheel, the combination of  
45 a bucket pivotally connected thereto, means carried by the buckets for tilting the same as said means come in contact with the water, and spring-actuated means for returning said  
50 bucket to its normal position after it has emerged from the water, substantially as described.

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

WILLIAM N. CRUCHON.

Witnesses:

PIERRE BARNES.

W. H. BENNETT.