

No. 817,711.

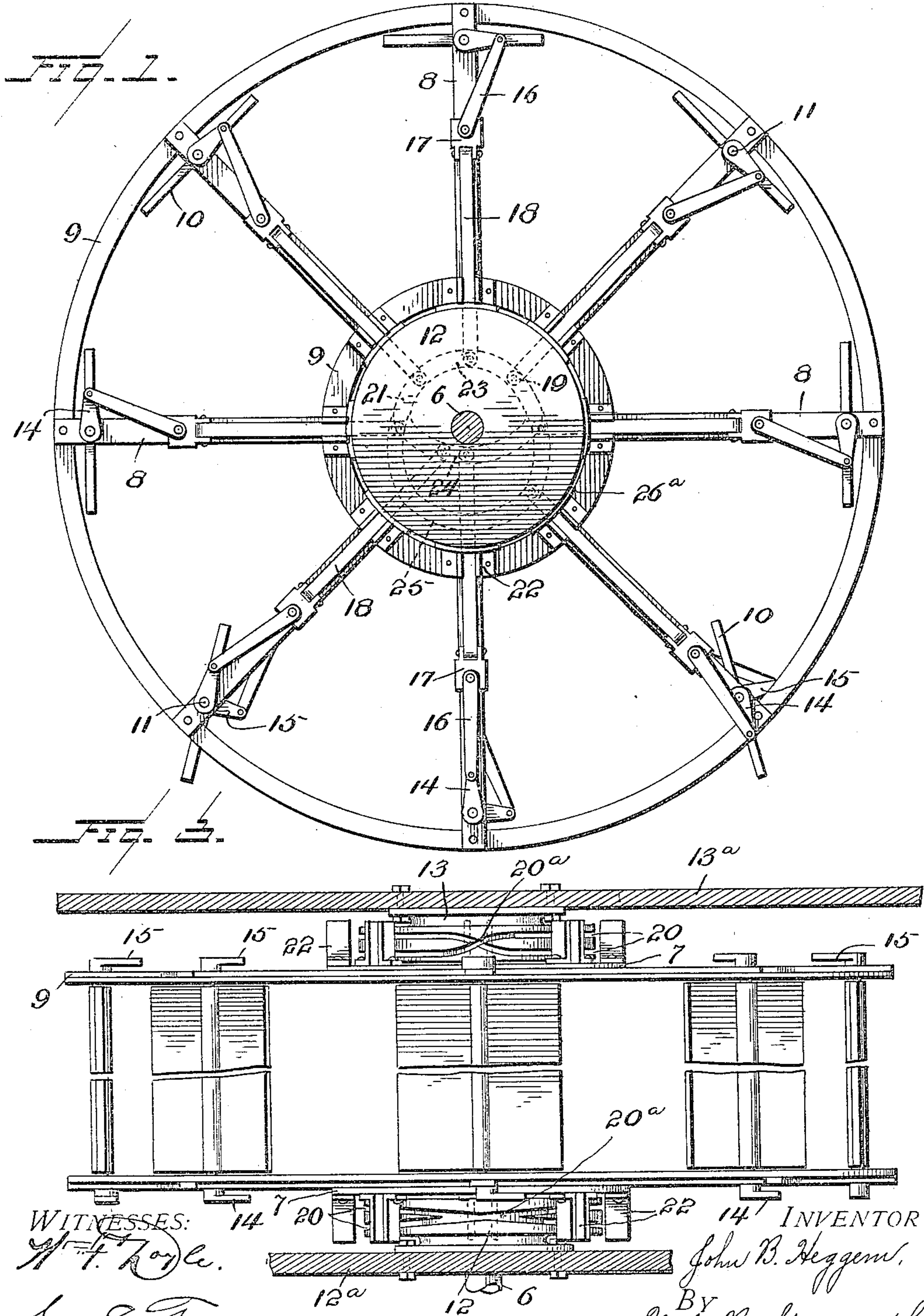
PATENTED APR. 10, 1906.

J. B. HEGGEM.

PADDLE WHEEL.

APPLICATION FILED FEB. 13, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

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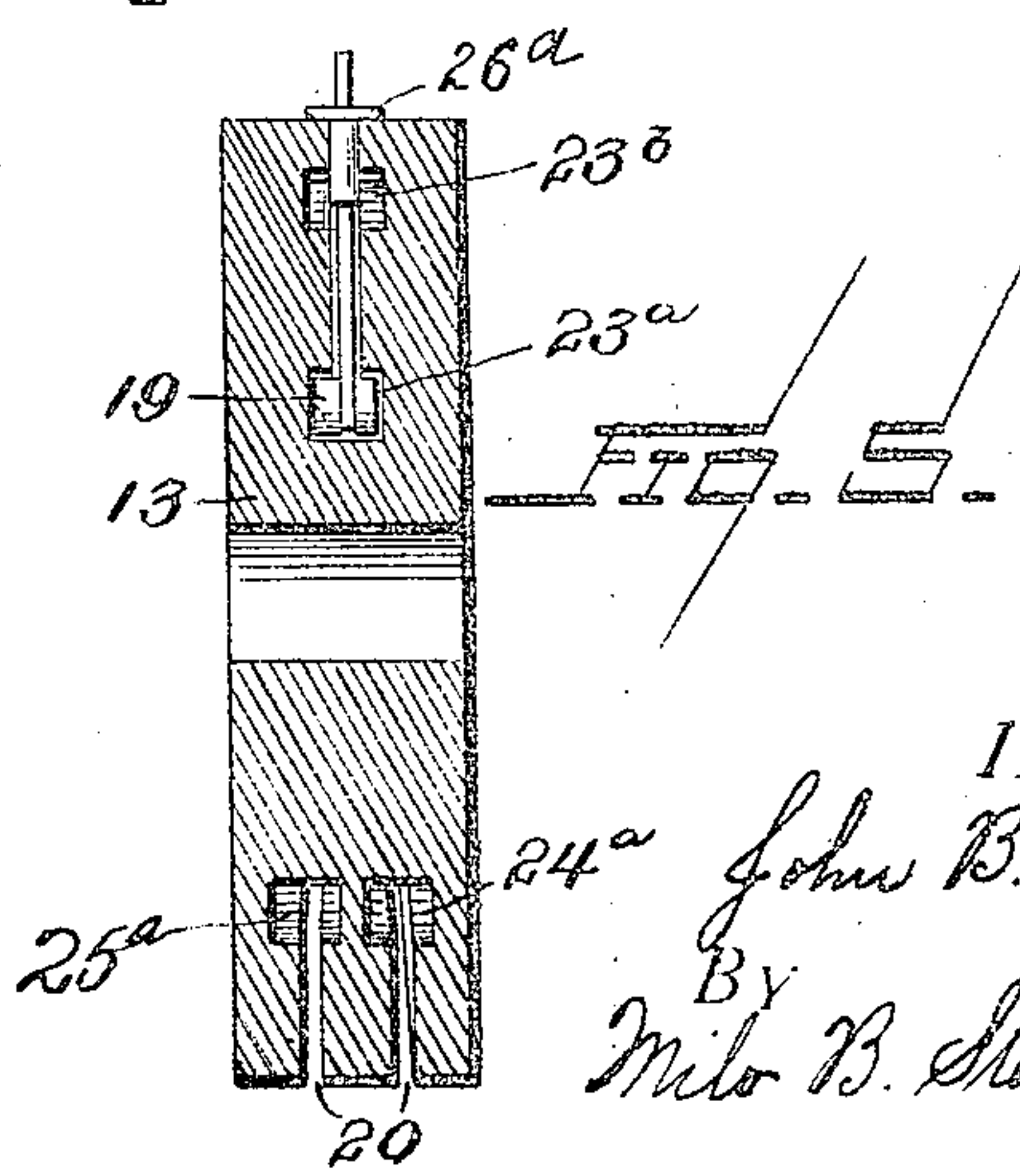
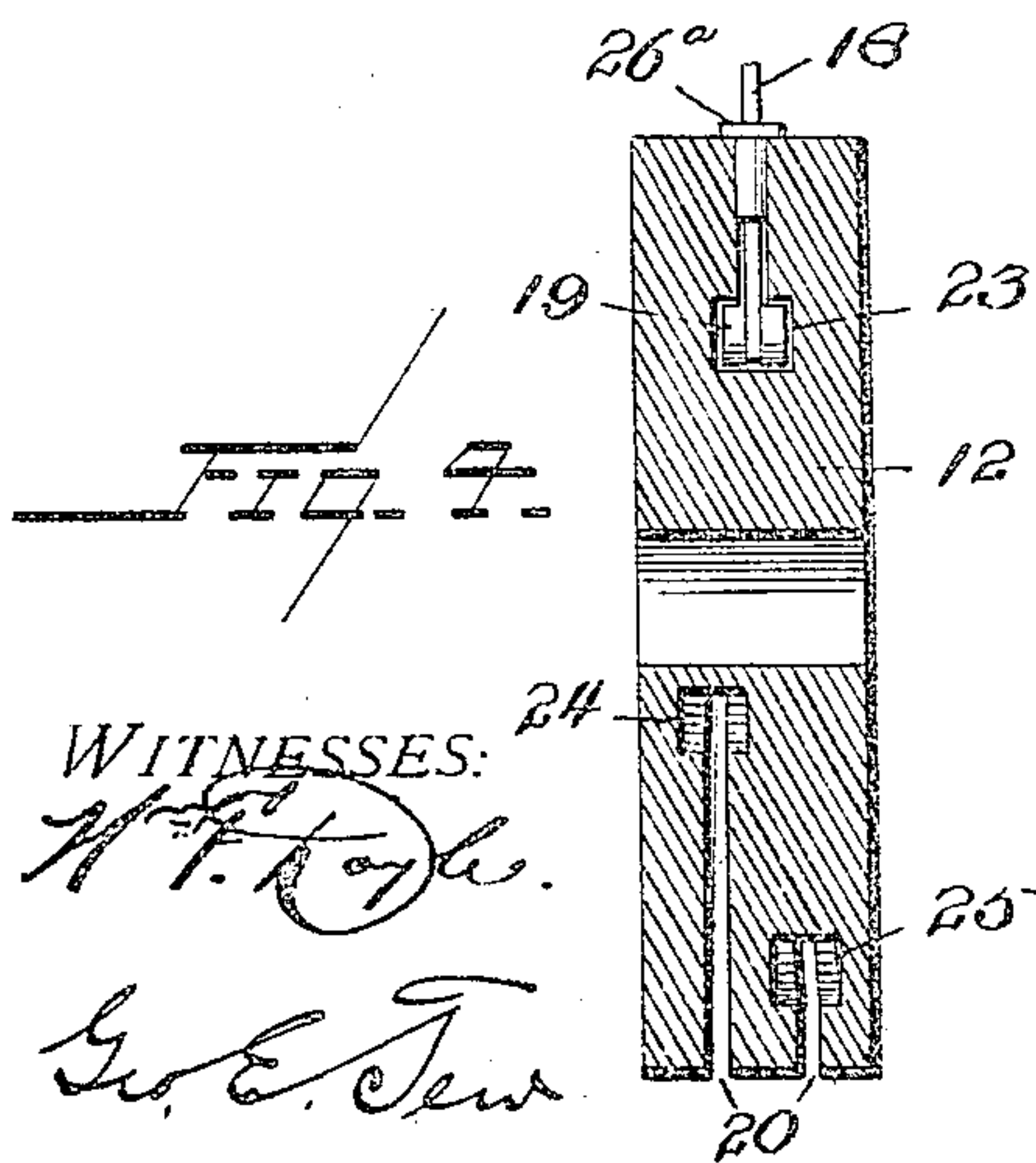
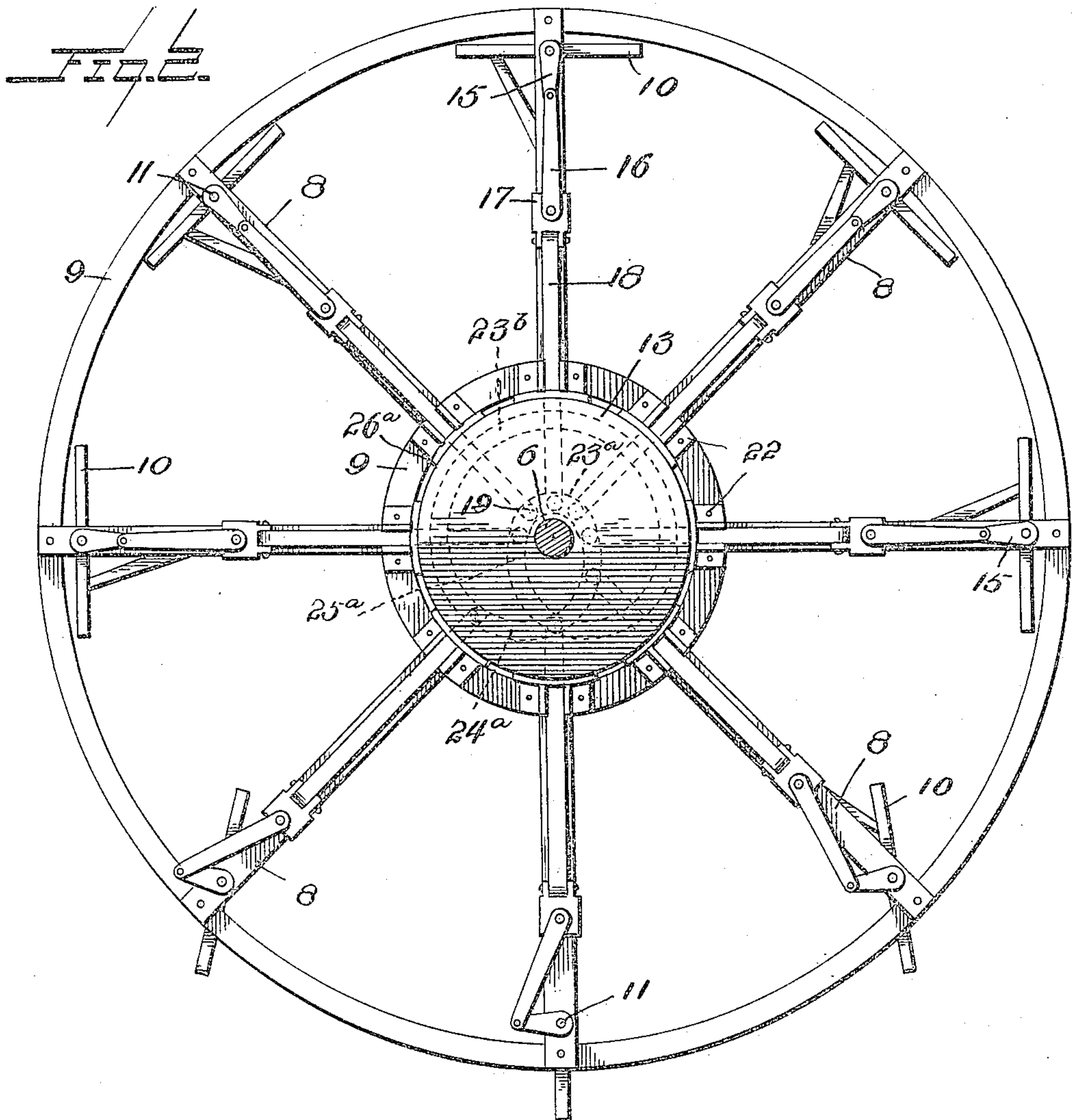
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# UNITED STATES PATENT OFFICE.

JOHN B. HEGGEM, OF CHICAGO, ILLINOIS.

## PADDLE-WHEEL.

No. 817,711.

Specification of Letters Patent.

Patented April 10, 1906.

Application filed February 13, 1905. Serial No. 245,372.

*To all whom it may concern:*

Be it known that I, JOHN B. HEGGEM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Paddle-Wheels, of which the following is a specification.

This invention is a feathering paddle-wheel characterized particularly by the fact that the paddles enter and leave the water edgewise, whence the name, and, furthermore, by the fact that during the entire travel of the paddles through the air they are presented edgewise thereto, whereby the air-resistance is reduced to the least amount possible.

It is known that paddle-wheels have heretofore been constructed in which the paddles enter and leave the water vertically; but this invention goes further than this by providing means for keeping the paddles in an edgewise position with respect to the line of rotation when out of the water. This result is effected by the use of compound or double cams, which operate on the paddles through crank-arm connections.

To avoid the possibility of a dead-center, there are two cranks on each paddle, one at each end, and the cranks are set on quarters with respect to each other, the cams being necessarily compound or "halved" with respect to each other, as more fully described hereinafter.

In the accompanying drawings, Figure 1 is an elevation of one side of the wheel; and Fig. 2 is an elevation of the other side, the outlines of the cams being indicated in dotted lines. Fig. 3 is a plan view. Fig. 4 is a central vertical section of one cam, and Fig. 5 is a central vertical section of the other.

Referring specifically to the drawings, the wheel-shaft is indicated at 6. The framework of the wheel consists of centers 7, radial arms 8, and inner and outer rings 9. The paddles are indicated at 10, capable of complete rotation on pivots 11, which find bearings in the ends of the arms 8. The pivots are set at the middle line of the paddles.

The two circular cam-blocks are indicated at 12 and 13, respectively. The former is secured to the side of the vessel, (indicated at 12<sup>a</sup>), and the latter is secured to the inside of the outer wall of the paddle-box, (indicated at 13<sup>a</sup>.) The main shaft 6 extends through the center of the cam-blocks.

Each paddle has crank-arms projecting

therefrom. The arm at one end is in line with the paddle, as indicated at 14, but the arm 15 at the other end is at right angles thereto. The crank-arms are connected by rods 16 to blocks 17, which are slidable radially upon the arms 8, being connected to rods 18, which are actuated by the cams. The rods have antifriction-rollers 19, which travel in the cam-grooves.

Each cam is compound or double, having circumferential slots 20, which lead to the cam-grooves 21. The rods 18 extend through the slots to connection with the rollers which travel in the grooves. The rods are carried with the wheel, being held between lugs 22, projecting from the arms 8. These lugs preserve the radial alinement and movement of the rods.

The slot and cam-groove extends twice around each cam, the slot crossing at the top, as indicated in Fig. 3 at 20<sup>a</sup>. Owing to the set of the cranks at quarters with each other, this construction is essential to produce the result desired, the shape of the cam-grooves being such that the paddles make one complete rotation on their own axis to every two complete rotations of the wheel. The cams are necessarily so generated that the "quarter" relation of the opposite cranks with respect to each other is preserved at all times, while holding the paddles vertically when in the water and circumferentially or edgewise while in the air. To this end the portions of the cam-groove in the block 12 are true circles in the upper half—that is, the half above a horizontal line through the center, as indicated at 23—and their radius is such that the rods 18 hold the paddles edgewise, as shown in Fig. 1. Corresponding to the portions of the cam-groove in the block 12 are the portions 23<sup>a</sup> and 23<sup>b</sup> of the cam-groove in the opposite block 13. These portions are true semicircles, the radius of the former being half that of the parts 23 and the radius of the latter being twice that of said parts. It will be appreciated that the cranks at the respective ends will cooperate both when the rollers in the block 13 are traveling in the part 23<sup>a</sup> and also when they are traveling in the part 23<sup>b</sup>, the only difference being that the cranks will be thrown oppositely.

In the lower half of the block the cam-grooves are so generated that the paddles stand vertically or substantially so. This produces in the cam 12 a portion 24 gradually approaching half the radius of the portion 23



and a portion 25 gradually approaching twice the radius and in the cam 13 produces portions 24<sup>a</sup> and 25<sup>a</sup>, corresponding to the portions 24 and 25 in the cam 12, the relative  
5 cam-lines being regular with an angularity corresponding to the angular difference of the cranks.

By the construction shown and described the paddles remain substantially perpendicular to the water while immersed, having the  
10 advantage in that respect of feathering-wheels, and also remain at a right angle to the radius during the whole of their travel in the air, thus reducing the resistance to a  
15 minimum.

To enable the rods 18 to safely pass the crossing 20<sup>a</sup>, each rod has sleeved thereon a shoe, the flanges 26<sup>a</sup> of which travel on the periphery of the cam-blocks. The rods 18  
20 slide freely within the shoe to accommodate the radial movement.

What I claim as new, and desire to secure by Letters Patent, is—

In a paddle-wheel, the combination with a frame, having pivoted paddles provided with  
25 cranks at their ends set at quarters with each other, of blocks fixed to the frame of the vessel at each side of the wheel, each block having a crossed cam-groove extending around  
30 the wheel-axis and shaped to accord with the different angularity of the cranks, and radially-movable rods at each side of the wheel, the inner ends of which travel in the grooves and the outer ends of which are connected to  
35 the cranks.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN B. HEGGEM

Witnesses:

SIGMA FELTSKOG,  
H. G. BATCHELOR.