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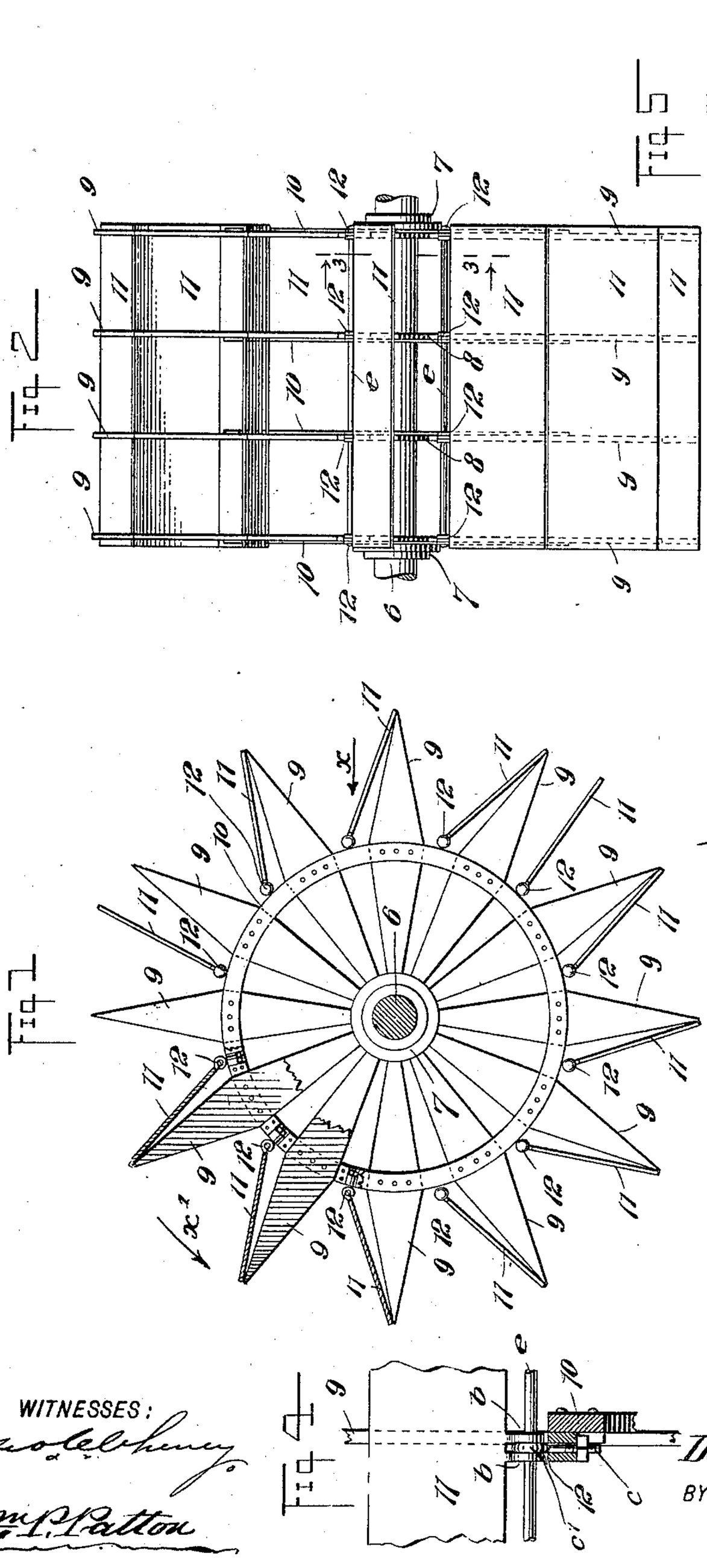
D. W. HORTON.

SELF FEATHERING PADDLE WHEEL.

(Application filed Mar. 19, 1901.)

(No Model.)



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DAVID W. HORTON, OF PETERSBURG, INDIANA.

SELF-FEATHERING PADDLE-WHEEL.

SPECIFICATION forming part of Letters Patent No. 688,643, dated December 10, 1901.

Application filed March 19, 1901. Serial No. 51,857. (No model.)

To all whom it may concern:

Be it known that I, DAVID W. HORTON, a citizen of the United States, and a resident of Petersburg, in the county of Pike and State of Indiana, have invented a new and Improved Self-Feathering Paddle-Wheel, of which the following is a full, clear, and exact description.

The object of this invention is to provide novel features of construction for a paddle-wheel adapted to propel vessels which render the wheel very effective in service, obviate resistance to entrance of the paddle-blades into the water and emergence therefrom, and also permit the improved wheel to operate with equal facility and advantage when rotated in either direction for forward or rearward propulsion of the boat.

The invention consists in the novel construction and combination of parts, as is hereinafter described, and defined in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a partly-sectional end view of the improved paddle-wheel and a transverse sectional view of a supporting-shaft therefor. Fig. 2 is a side elevation of the wheel seen in the direction of the arrow *x* in Fig. 1. Fig. 3 is an enlarged transverse sectional view of novel details substantially on the line 3 3 in Fig. 2. Fig. 4 is a fragmentary transverse sectional view of details substantially on the line 4 4 in Fig. 3, and Fig. 5 is a side view of a portion of one paddle-blade of modified construction.

In the drawings, 6 represents a shaft whereon the paddle-wheel is secured and rotated therewith. The shaft 6, which is shown broken away at each end, in complete form extends beyond the wheel, at each end thereof, to provide a journal for support of the shaft and wheel, and exterior of the journals a driving-crank is affixed on each extremity of the shaft. The provision of the journals and cranks being common to this class of wheels, they have been omitted from the drawings.

At a suitable distance apart, which may define the width of the paddle-wheel, two similar hub-collars 7 are affixed upon the shaft 6, and intermediately of said hub-collars any preferred number of hub-rings 8 are secured upon the driving-shaft at equal distances apart. From each collar 7 and ring 8 a like number of arms 9 project radially at proper intervals of separation, the arms on said collars and hub-rings being disposed in rows transversely of the wheel. As shown, the arms 9 are substantially lozenge-shaped edgewise and have parallel sides, the peculiar form of the arms giving them great strength for their weight. At a point where the arms are of greatest breadth, which may be near their center of length, a circular stay-ring 10 is secured thereto concentric with the shaft 6. From the point of connection between each arm 9 and a respective stay-ring 10 to which it is attached a portion of said arm, which projects radially from the outer edge of the stay-ring, is tapered on the edges, so as to render the free ends narrow and give said edges all a like inclination. As the number of arms 9 is equal on each hub-collar 7 and intermediate hub-ring 8 and like arms on each of said parts are disposed oppositely across the wheel, it will be seen that the respective inclined edges on the projections of the arms beyond the stay-rings 10 will occupy the same inclined plane, and thus afford proper support to the paddle-blades, as will now be more particularly described.

The paddle-blades 11 are equal in number to the number of arms 9 which are fixed upon each stay-ring 10, and, as shown in Figs. 4 and 5, each paddle-blade may be formed either of a single plate of metal or other material or be constructed of a number of blade-sections *a*, which are held together edgewise to afford proper breadth for the paddle-blade, either method of manufacture being available. Near the outer ends of each paddle-blade 11 a hinge-joint 12 is provided, and at suitable points between said hinge-joints like hinge-joints are furnished to rockably connect the adjacent edge of each paddle-blade 11 with a respective stay-ring 10. One available construction for the hinge-joints 12 is clearly shown in Fig. 4 and consists of two spaced ears *b*, formed or secured upon the lower edge of the paddle-blade 11, and a bolt *c*, having a laterally-flattened head *c'*, that is introduced between the ears *b*, the bolt-body passing down

through a perforation in the stay-ring 10 or a lug thereon and secured by a nut or other means. In Fig. 5 the ears *b* of each hinge-joint are extensions from one end of a flat-leaf plate *b'*, the latter being secured transversely upon the blade-sections *a* by rivets or bolts, and it is to be understood that the paddle-blades, which may each be of one piece or several sections, as described, can be constructed either of wood or metal plates, as may be preferred.

It being understood that a pair of ears *b* is formed on the edge of a paddle-blade opposite each stay-ring 10 for the reception of the complementary hinge-leaves *c'*, formed by the heads of the bolts *c*, it will be seen that if said leaves and ears on the plurality of hinges are centrally perforated so as to aline their perforations a single pintle-rod *e* may be utilized for the loose connection of the members of each hinge-joint 12 on a paddle-blade 11. For effective service the hinge-joints 12, which engage with each paddle-blade 11, should be located centrally between the inclined edges of adjacent arms 9, as shown in Figs. 1 and 3, so that the blades may each receive inclination in either direction to dip forwardly or in the direction of the arrow *x'* or incline in a direction oppositely therefrom. Obviously the degree of rocking movement of each blade 11 will be defined by their contact with the inclined edges of the portions of the arms 9 that project exterior of the stay-rings 10.

It will be seen that in operation the paddle-blades 11, when they successively pass the center of the wheel while it is rotating in the direction of the arrow *x'*, will be adapted to incline forwardly, and thus be presented at or near a right angle to the surface of the water in which the wheel is partially immersed. This will adapt the blade that is approaching the water to enter it edgewise, and thus dip therein with a minimum of resistance. When fully immersed, the pressure of the paddle-blade upon the water and the measurable immobility of the latter when subjected to the sudden impact of the blade will rock the blade rearwardly until it impinges upon the arms 9 that are immediately behind it. The successive rearward rocking movement of the blades 11 will adapt each blade when it is fully immersed to engage with the water throughout the area of the blade, and therefor exert maximum pressure thereon. It will also be evident that each paddle-blade 11 by its rearward inclination will be so relatively disposed as to adapt it to leave the water edgewise, so that the paddle-blades are accurately feathered while entering the water and also while leaving it, which will obviate any tendency had by wheels of ordinary construction to lift a mass of water, which would impede the effective operation of the water-wheel and correspondingly retard the progressive movement of the vessel it is to propel.

It will be seen that by the described construction the improved paddle-wheel is adapted for effective operation when rotated in either direction and that the blades thereof will feather equally well if the wheel is revolved toward or from the direction indicated by the arrow *x'* in Fig. 1. It is also apparent that the features of improvement hereinbefore described are well adapted for application upon steamboat paddle-wheels and will by their superior action greatly aid the propulsion of the boat.

In defining my invention with greater clearness I would state that I am aware that it is not new to provide feathering paddle-wheels in which the paddles are hinged at their inner edges and are adapted to swing to either side of their radial position and be held in such positions by stops, and I do not claim this broadly.

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

1. A feathering paddle-wheel comprising a central shaft having rigid collars, a series of radial arms secured to the collars at their inner ends, said arms being made widest at or near the middle and converging therefrom outwardly and also inwardly, circular stay-rings bolted to the radial arms at their widest parts, and a series of paddle-blades hinged to the stay-rings between the radial arms and adapted to be supported against the inclined face of either of the extensions of the arms substantially as and for the purpose described.

2. A feathering paddle-wheel comprising a central shaft having rigid collars, a series of radial arms secured to the collars at their inner ends, said arms being made widest at or near the middle and converging therefrom outwardly and also inwardly, circular stay-rings bolted to the radial arms at their widest parts, a set of eyebolts fastened to said rings in position between the extensions of the radial arms, and a series of paddle-blades with perforated lugs, and axial rods passing through the eyebolts and the perforated lugs of the blades to form a hinge connection substantially as shown and described.

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

DAVID W. HORTON.

Witnesses:
WALTER COLEMAN,
MARY HORTON.