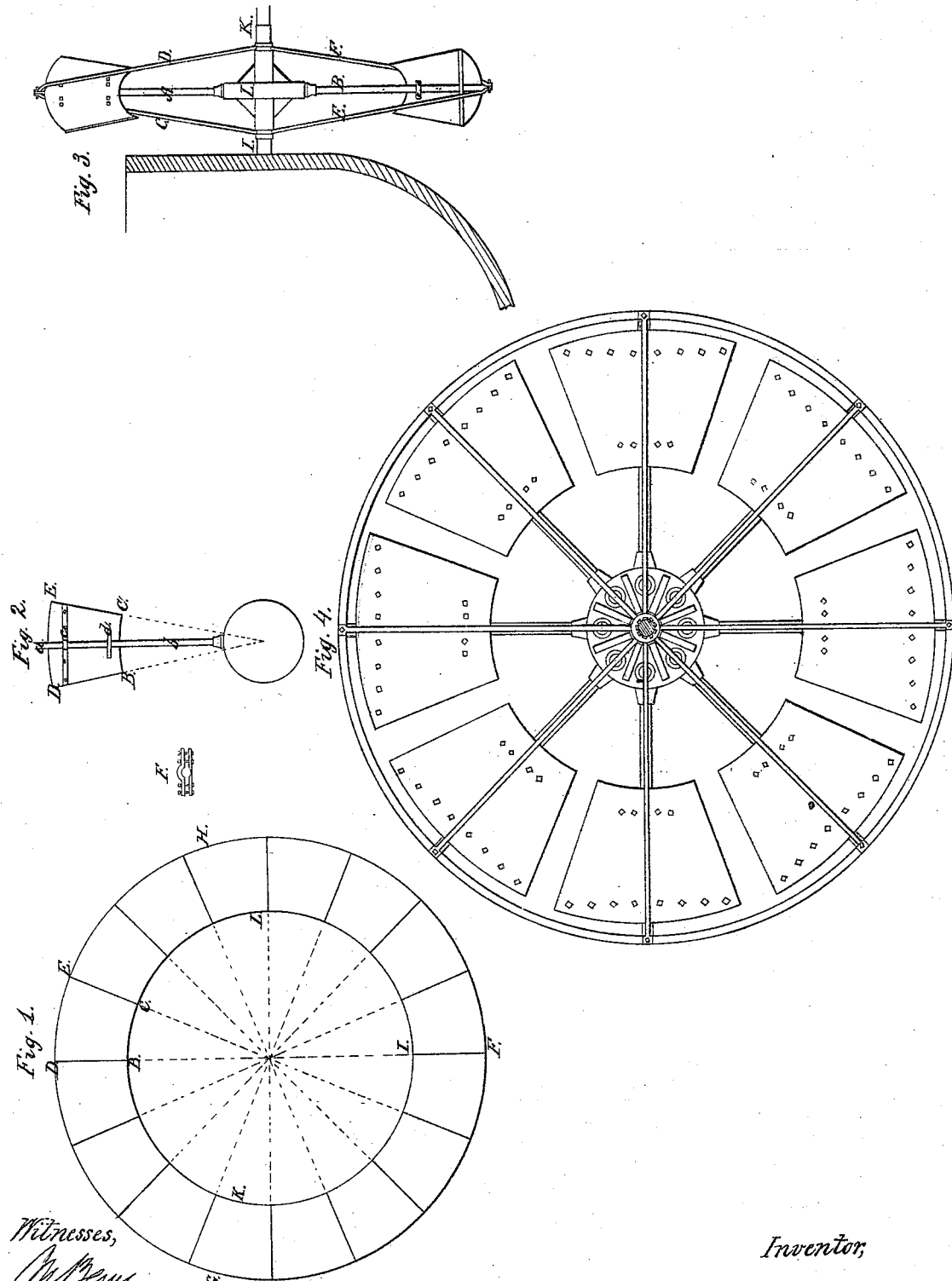


*F. W. Stevens.*  
*Paddle Wheel.*

*N<sup>o</sup> 1,771*

*Patented Sept. 5, 1840.*



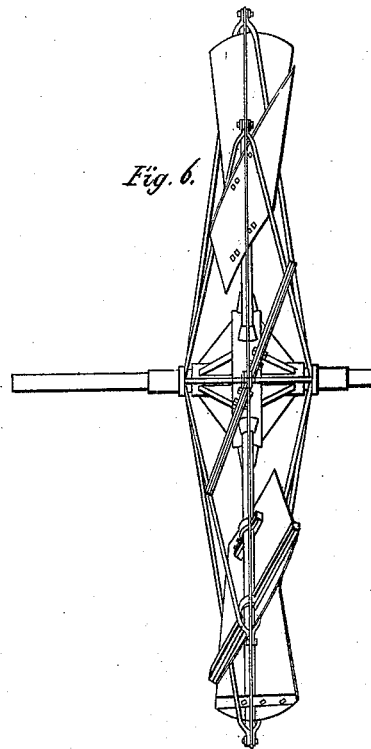
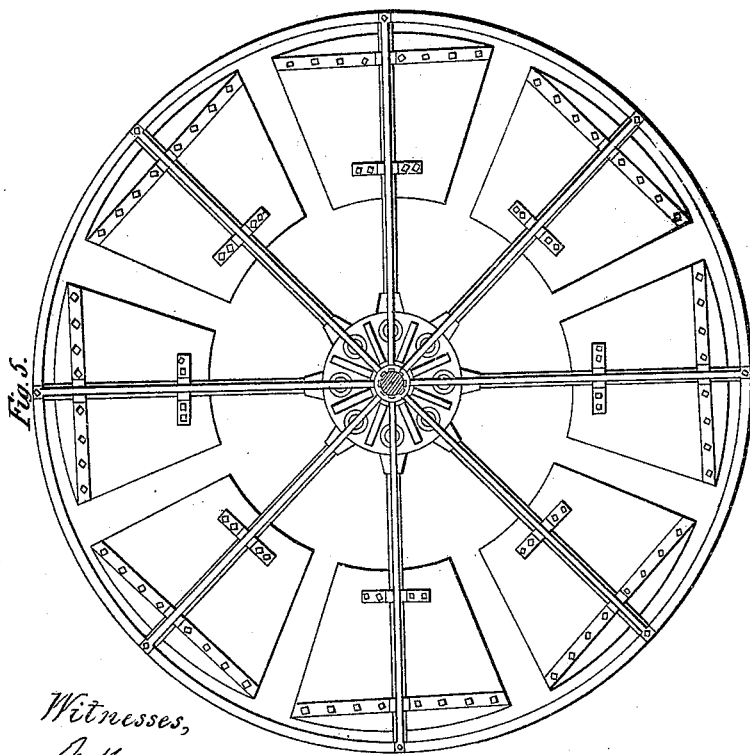
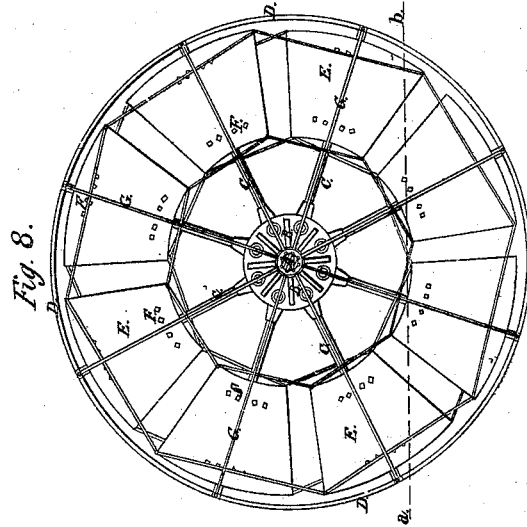
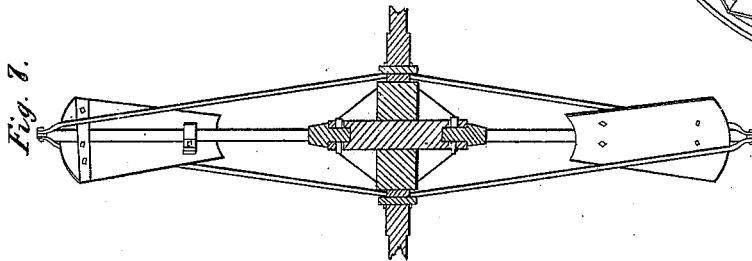
Witnesses,  
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Inventor,  
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F. W. Stevens.  
Paddle Wheel.

N<sup>o</sup>. 1771.

Patented Sep. 5, 1840.



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# UNITED STATES PATENT OFFICE.

FRANCIS W. STEVENS, OF CHIGWELL, ENGLAND.

IMPROVEMENT IN INCLINED FLOAT PADDLE-WHEELS FOR PROPELLING BOATS, &c.

Specification forming part of Letters Patent No. 1,771, dated September 5, 1840.

*To all whom it may concern:*

Be it known that I, FRANCIS WORRELL STEVENS, school-master, a subject of the Queen of Great Britain, and now residing at Chigwell, in the county of Essex, in the said Kingdom, have invented or discovered a new and useful Invention of Certain Improvements in Apparatus for Propelling Boats and other Vessels on Water; and I do hereby declare that the following is a full and exact description thereof.

My invention appertains to certain improvements in the arrangement and construction of paddle-wheels for steam-vessels; and its objects are to obtain the means of apportioning, adjusting, or regulating the propelling-surface of the floats or boards to the power of the engine and speed of the vessel, and also to gain the most effectual shape or figure of propelling-surface of such floats, boards, or propelling-surfaces, and my improvements chiefly apply to the floats or boards or propelling-surfaces, which I place at an angle of about fifty-five degrees to the axis of the wheel, and when in a vertical position make an angle of about thirty-five degrees with the keel of the vessel, and as I am aware that many different arrangements and constructions of paddle-wheels furnished with oblique paddles or floats have heretofore been used, I shall proceed to describe my improvements and point out what I consider the novelty of my invention, referring to the drawings hereunto annexed the better to illustrate the same.

The first object of my improvements I attain by placing the several floats, boards, or propelling-surfaces upon round radial arms which will allow of the several paddles or floats being shifted into different angles or positions to the axis of the wheel, so as to accommodate or adjust the propelling-surface offered to the resistance of the water to the power of the engine or the best effect produced thereby in propelling the vessel through the water, and when so adjusted I fix or secure the several floats or propelling-surfaces first by fastening the connections of the floats, boards, or propelling-surfaces to the arms, and then connecting the edges of the several paddles or floats one to the other firmly by means

of rings or rods placed either diagonally or longitudinally, or both, so as to convert them into one secure and complete paddle-wheel, and the second object is obtained by a peculiar shape or figure of the float, board, or propelling-surface, all of which will be better understood by the following description thereof.

My invention consists in the arrangement and construction of what are commonly called the "floats" or "paddles" or "propelling-surfaces," which may be made or formed of iron, copper, wood, or other suitable material. The floats or paddles are placed obliquely in the frame-work of the wheel and enter the water edgewise and extend from the circumference to about a third or more of the radius and resemble the fans or sails of a windmill or a smoke-jack, and the floats or boards are secured to the shaft by being placed upon radial arms, and my improved wheels take a much greater dip in the water than the common paddle-wheel, being immersed about one-half their radius or a little more. The floats are wide near the circumference and narrow toward the center, or of the form of the segment of a sector, although they may be made of any other form or figure and have either a flat or a curvilinear form given them. They are shaped as segments of two concentric circles, the inner one of which being at about one-third of the distance of the radius of the greater circle. The diameter of the wheel will depend upon the power of the engine and the height of the shaft from the water, which in new vessels or engines would be advantageous to being as much lower as my improved wheel takes a greater dip in the water. The angle at which these floats or paddles are placed will also depend upon the size of the wheel and power of the engine, and will generally be about twenty-five to thirty-five degrees. They are so contrived that the angle may be lessened or increased to suit the power of the engine and then firmly fixed, so as to possess unyielding strength and solidity. The floats, fans, or paddles being thus arranged and secured enter the water with little or no resistance like vertical oars striking the water at a point obliquely, and on arriving in a vertical position make

an acute angle of about thirty-five degrees with the keel of the vessel and their inner edges at the same time pointing to the stern, and on emerging therefrom cast the tail-water at a corresponding angle or away from the side of the vessel, so that she makes her way in still water, and thus avoids being retarded by the rapidity of the water which is usually thrown against her sides by the common paddle. By the floats or paddles entering edgewise or like an oar that tremulous motion usually experienced in steamboats fitted with ordinary paddle-wheels is avoided, and my improved paddle-wheels will continue to work smoothly, even when suddenly plunged up to the boss by a heavy sea, all of which will be better understood by reference to the accompanying drawings, which I will now proceed to describe.

In the drawings, let G H F, Figure 1, represent the outer circle and I K L a smaller or the inner circle of the propelling surfaces or floats, which circles are concentric to each other, and the space included between them—*i. e.*, the depth of the floats—may be divided into any number of equal parts, according to the diameter of the wheel and the intended width of the wheel. I have taken sixteen. Thus D E B C will be a segment or portion of the sector A D E, and D E B C will be the part of a ring or sector which will form one of the floats, paddles, or propelling-surfaces.

Let D E B C, Fig. 2, represent one of the said floats, fans, or paddles detached, and which I propose to make of sheet-iron or copper or wood of sufficient strength for the purpose intended, which float or propeller is supported on the arm *a b* by means of clamps *c d*, which are securely held by screw-bolts and nuts. F represents one of such clamps detached, which when the screw-bolts are loosened admit of the adjustment of the float to any angle or any position along the arm *a b*.

Fig. 3 represents the manner in which the radial arms are supported when placed in the boss L on the shaft I K. A and B are two of such arms supported by the iron rods C D and E F, each of which is secured to the shaft by iron rings or a small boss firmly keyed on the shaft. L is a strong boss having brackets or flanges on either side to give it strength.

Fig. 4 is a side view or elevation of one of my improved paddle-wheels separate or detached from the vessel having only eight floats. Fig. 5 is a similar representation of the other or reverse side to Fig. 4. Fig. 6 is an edge view, and Fig. 7 a section taken vertically through the same. In all these figures the outer rings or rods which connect the several paddles or propellers together are removed in order the better to show the various parts, and the floats or propelling-sur-

faces are shown of a greater depth than one-third the radius of the wheel.

Fig. 8 shows the complete wheel when the floats or propelling-surfaces have been adjusted to the required position and secured by rods (or rings) passing from one to the other, and represents the left or larboard paddle-wheel, and the floats on arriving in a vertical position form an acute angle with the keel pointing to the stern of the vessel, and *a b* is the water-line or depth of immersion of the wheel, which in this instance is about half the radius. A is the shaft or axle of the wheel, and B the boss or nave securely fastened to the shaft in any convenient manner. C C C are radial arms fastened onto the boss by screws or otherwise. The outer extremities of these arms are connected together by means of the ring D D.

The paddles or floats are secured in their proper position by rods passing from the corners of one paddle to another, or the same may be done by means of rings connected to the corners of all the paddles. E E E are the several floats or propelling-surfaces fastened onto the several radial arms by screw-clamps or other fastenings at F F, and by loosening these screws or fastenings the various floats or surfaces can be shifted to any required position along the arms and to any angle to the axis best suited to the engine and speed of the vessel. G G are other radial arms, stays, or braces passing from the ring D to the boss on the shaft for the better securing of the ring D to the axis and strengthening the wheels.

The wheel is fixed on the ordinary shaft, which shaft is at right angles with the wheel and the vessel.

The object of these improvements is to avoid the usual lift of backwater and that blow with which a horizontal rectangular float strikes the water, and to attain that smoothness in the action of the engine, whatever the sudden immersion of the wheel may be, and to avoid tremor, to increase the speed of the vessel, to enable a vessel to take a heavy burden without affecting the working of the engine or diminishing the speed of the vessel, and by the general combination of such arrangement to effect a reduction in the width of paddle-wheels and consequently of the paddle-boxes.

Having described my improvements and the manner of carrying the same into effect, I would in conclusion remark that from the foregoing description and the accompanying drawings it will be readily understood that by this arrangement the wheel is enabled to take a greater dip or work in a denser medium than the common paddle, and the speed of the wheel and consequently the engine may be regulated by an alteration of the an-

gle of the floats, and thus alter the actual propelling-surface offered to the resistance of the water.

In conclusion I would remark that I claim—

The arrangement of the wheel and of the floats or propellers by which their adjustment is effected, in the manner and for the purposes before described.

In witness whereof I, the said FRANCIS WORRELL STEVENS, have hereunto set my

hand and seal this 13th day of May, in the year of our Lord, 1840.

F. W. STEVENS. [L. S.]

Witnesses:

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J. W. MOFFATT,  
*Clerk to the above.*