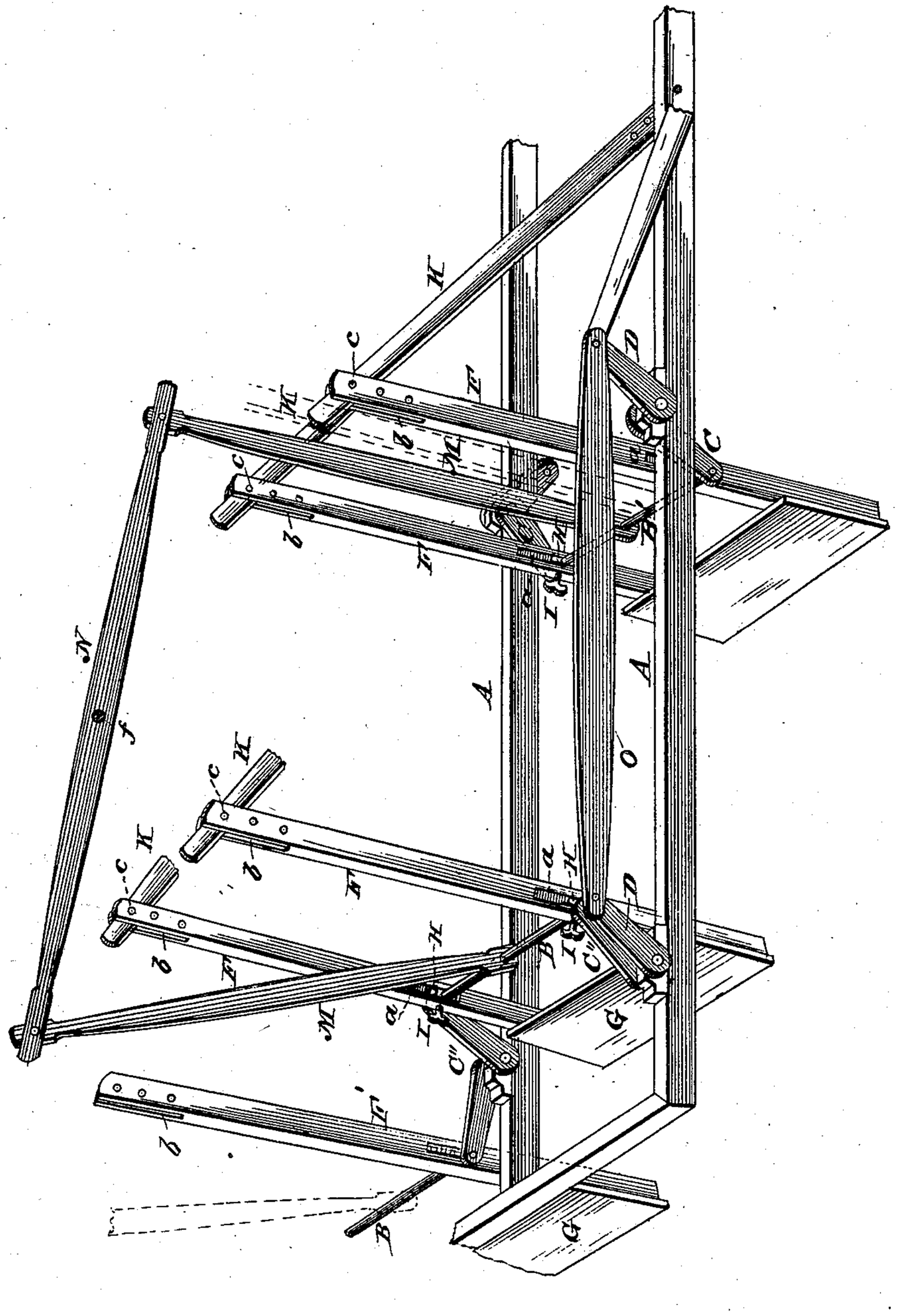
(No Model.) 2 Sheets—Sheet 1.

J. I. LENGSFIELD.

CRANK PADDLE.

No. 254,030. Patented Feb. 21, 1882.

Fig. 1.



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

J. I. LENGSFIELD.

CRANK PADDLE.

No. 254,030. Patented Feb. 21, 1882.

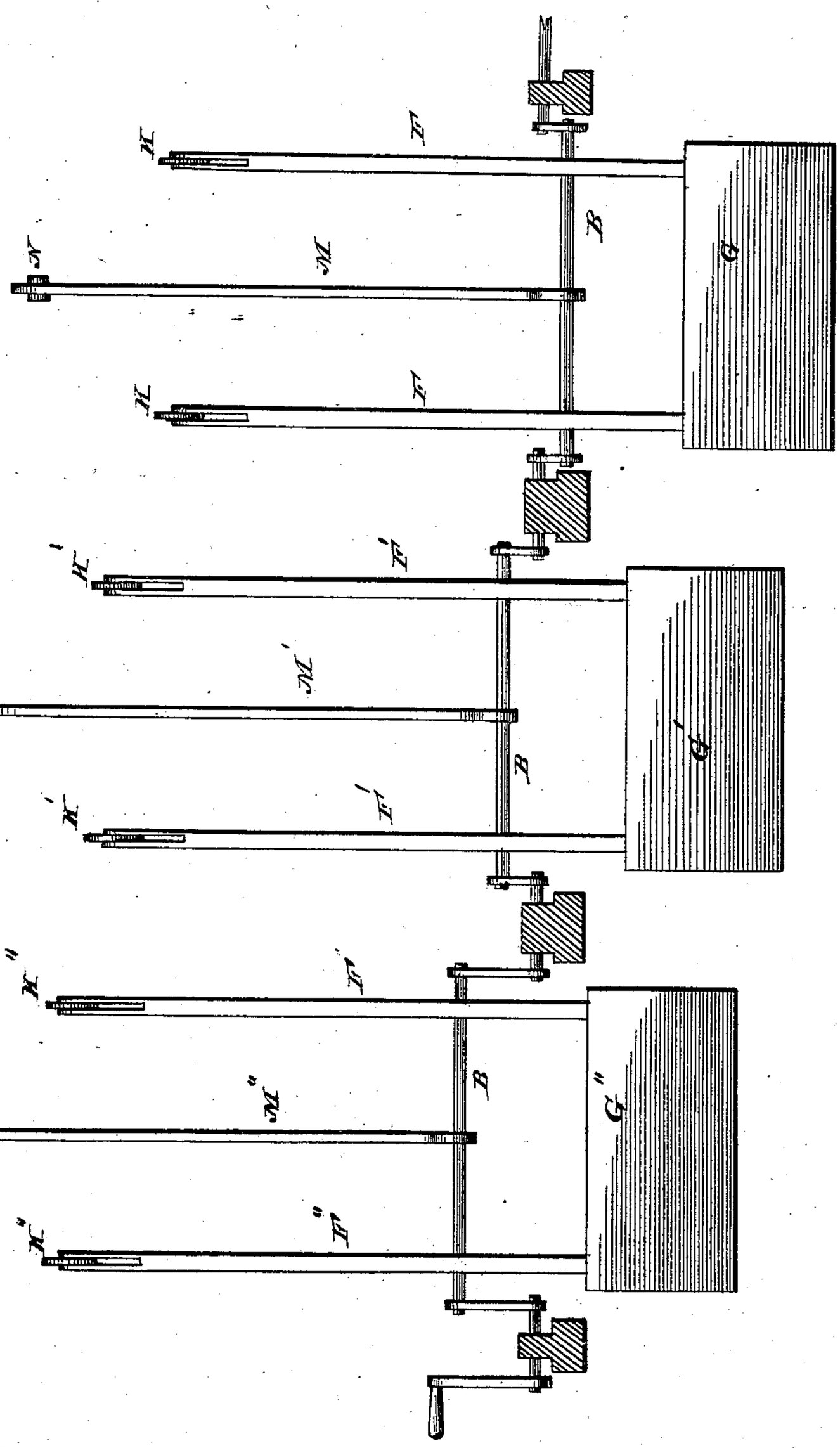

Fig. 2.

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UNITED STATES PATENT OFFICE.

JULIUS I. LENGSFIELD, OF GREENVILLE, MISSISSIPPI, ASSIGNOR TO WILLIAM A. POLLOCK, OF SAME PLACE.

CRANK-PADDLE.

SPECIFICATION forming part of Letters Patent No. 254,030, dated February 21, 1882.

Application filed September 7, 1881. (No model.)

To all whom it may concern:

Be it known that I, JULIUS I. LENGSFIELD, of Greenville, in the county of Washington and State of Mississippi, have invented a new and useful Improvement in Propellers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents, in perspective, a pair of paddles, of which there may be three sets. Fig. 2 is an end view of three sets of paddles, as shown in Fig. 1.

My invention relates to that class of propellers in which paddles are made to describe an elliptical path.

The object of my invention is to construct a propeller in which, first, the paddles shall enter and leave the water in or near a perpendicular line, and thus avoid the striking and lifting of said water; second, the paddles shall be so arranged as to propel the vessel continuously; third, the depth of the stroke shall be adjustable; and, fourth, the construction shall be simple.

The invention consists in the peculiar means for carrying out said objects, as will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, (see Fig. 1,) A represents the frame of the propeller, and B B′ the driving-shafts. Connected to B B′ are the cranks C C″, having bearings in said frame, and set at an angle to each other. Journaled upon the crank-shafts are the paddle uprights or supports F, bearing upon their lower extremities the paddles G. Said uprights are provided with longitudinal slots *a*, formed near the paddles, in which are contained journal-boxes H, for the crank-shafts sliding in said slots and fixed in position by set-screws I. The upper extremities of said uprights are also provided with slots *b*, in which are fastened by bolts *c* the oscillating connecting-bars K, said bars being adjustable in said slots. By this construction the depth of the stroke may be regulated and the angle at which the paddles enter and leave the water adjusted. To the crank-shafts are loosely attached the rods M, whose upper extremities are secured to the ends of the walking-beam N, having a fixed fulcrum, *f*. Said walking-beam serves to distribute the strain and secure regularity of motion.

O is a rod connecting the cranks D D, and transmitting the force from one of the driving-shafts to the next.

The pair or gang of paddles shown in Fig. 1 are arranged in triplicate series side by side, as in Fig. 2, with the crank-shafts B B′ extended through the series, and their cranks so relatively arranged as to cause the paddles of the different sets to act alternately to make a continuous pull on the water.

The operation of my invention is as follows: The driving-shafts B B′ (see Fig. 1) being put in motion, the cranks are revolved and the crank-shafts describe a circle, while the paddles having their uprights pivoted to the oscillating bars K, as well as to the shafts, describe an elliptical path, entering and leaving the water at the extremities of the long diameter of their described ellipses, which long diameter is horizontal, the rods M, walking-beam N, and rod O of each gang transmitting the power from one paddle to the next, where a like motion is produced. The cranks B B′ of each gang being set at different angles causes the stroke of the paddles of that gang to be made in succession, while the cranks of the several gangs are likewise relatively arranged to perform the same result of a successive pull in the water, as shown in Fig. 2.

If it is desired to change the depth of the stroke, the shafts and oscillating bars are correspondingly adjusted in their slots, while if it be wished to change the angle at which the paddles enter and leave the water either the shafts or oscillating bars may be singly adjusted, or both may be reversely adjusted.

It will be seen that by my construction little or no power is lost by the striking of the paddles against the water or lifting the water on the upstroke.

Among the advantages accruing from the use of my invention, the following may be mentioned, to wit:

First. The buckets or paddles enter the water perpendicularly and traverse the arc of an ellipse with their faces or superficial area au-

tomatically adjusted vertically to the line of motion.

Second. The buckets may be adjusted to enter the water at any angle desired, whereby the least resistance is encountered to the immersion (which may be to any depth) of the paddles.

Third. Increased value or resisting power of weight of water is gained as a greater depth is attained, by which the "slip" (or the greater relative velocity of the paddles to that of the boat propelled) may be reduced to the minimum.

Fourth. The paddles or buckets describe independent paths through the water, whereby the displacement and counter-currents or "dead-water" formed by continuous buckets immediately preceding each other are avoided.

Fifth. By presenting a vertical face to the resistance of the water, and also by the independent action of the paddles, the paddle-surface is at all times of full value.

Sixth. By the deep submersion of a vertical paddle-surface the formation of strong surface-currents counter to the line of motion of the boat, and the consequent displacement of water and lowering of the after end of the boat in a trough, are avoided.

Seventh. A smooth motion, a steady and continuous application of power with the least possible disturbance of water, and an avoidance of all unnecessary strain and derangement of machinery and wear of boat are gained.

Eighth. A higher rate of velocity may be given to the paddles without a corresponding loss of power, thus permitting the use of a short-stroke engine.

Ninth. The buckets have a correspondingly longer stroke in the water than buckets that describe the arc of a circle.

Tenth. Simplicity of construction and adjustment, facilitating the ready and quick replacement of broken or defective buckets or timbers.

Eleventh. The ordinary length of shaft between bearings is reduced, while the strain is equally distributed throughout the shaft.

Twelfth. The dip and draft of water of the buckets may be readily adjusted to the speed and draft of laden and unladen boats.

Thirteenth. Any required paddle-surface may be attained and calculations accurately made and the dimensions ascertained for any given horse-power, with the resulting speed. Only approximate calculations and practical tests can be applied to wheels and propellers of other designs.

Having thus described my invention, what I claim is—

1. The combination, with the two crank-shafts B B′, arranged at different angles, as described, and the paddle-uprights F, journaled therein, of the connecting-rods M M, attached respectively to the two crank-shafts, and the walking-beam N, jointed to the upper ends of said connecting-rods, as described.

2. The combination, with the crank-shaft B, of the paddle-uprights F, having slots *a*, the sliding block H, carrying the crank-shaft and made adjustable in said slot, and the oscillating rods K, as set forth, and for the purpose described.

JULIUS ISAAC LENGSFIELD.

Witnesses:

JOHN N. MUSNER,

GRAFTON BAKER, Jr.