(No Model.) 4 Sheets—Sheet 1.

E. COURTRIGHT.

MOTOR AND PUMP.

No. 457,303. Patented Aug. 4, 1891.

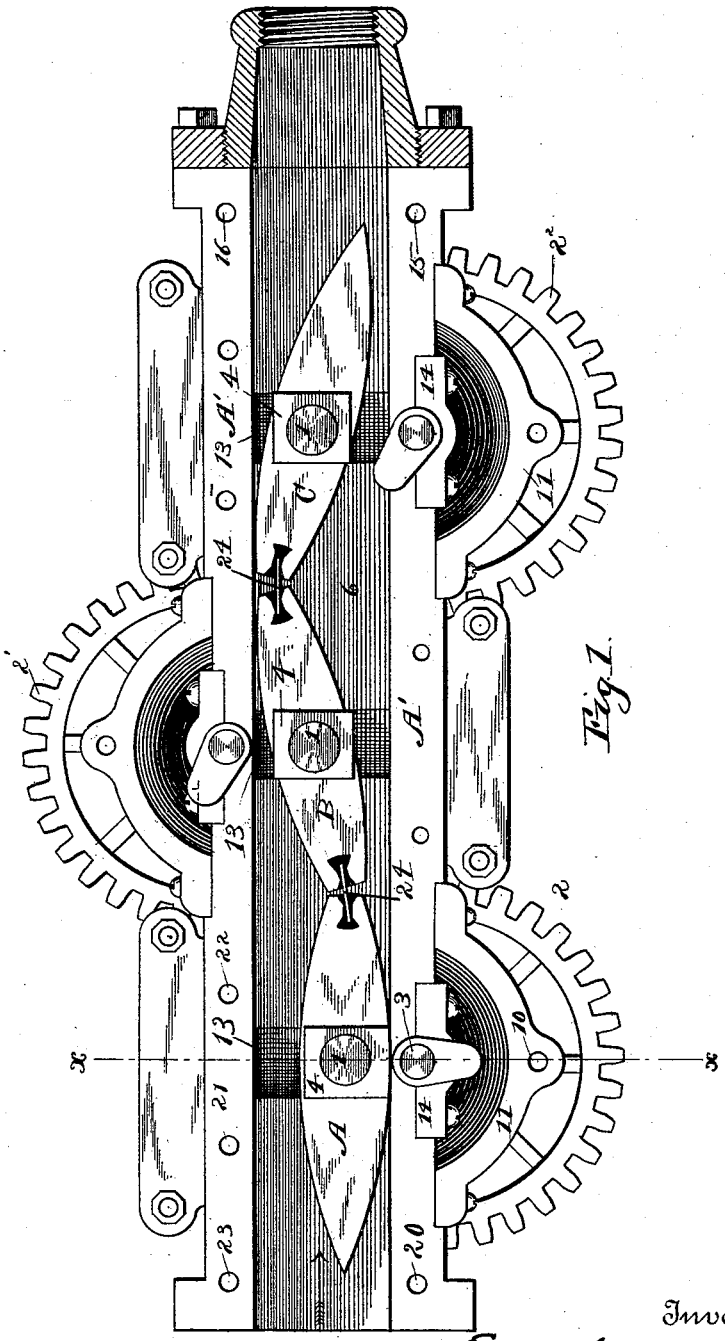

Fig. 1.

Witnesses

A. V. Graham.

J. A. Rutherford.

Inventor

Edgar Courtright.

By his Attorney

Edward Taggart

(No Model.) 4 Sheets—Sheet 2.

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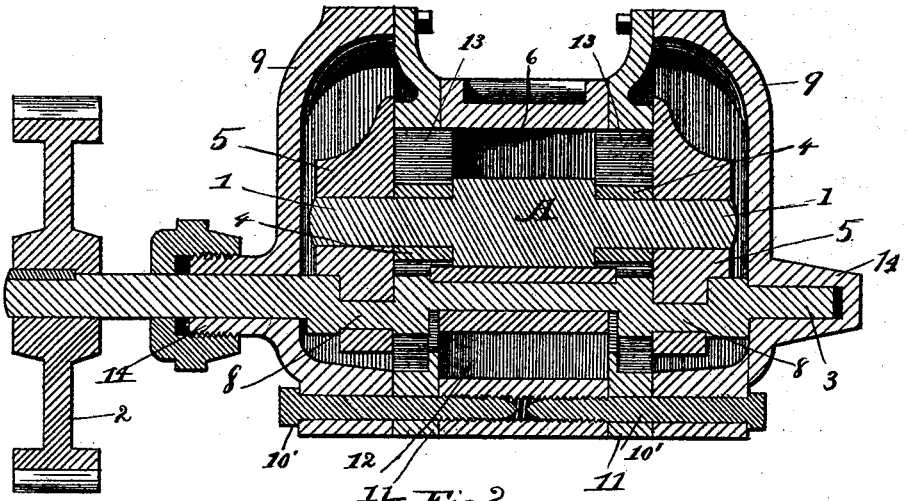

Fig. 2.

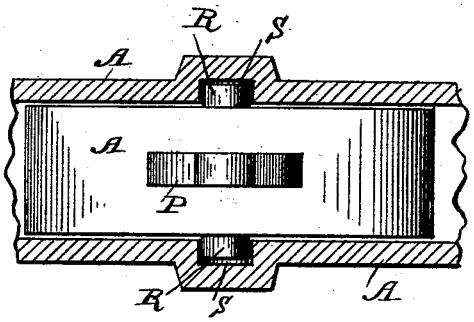

Fig. 6.

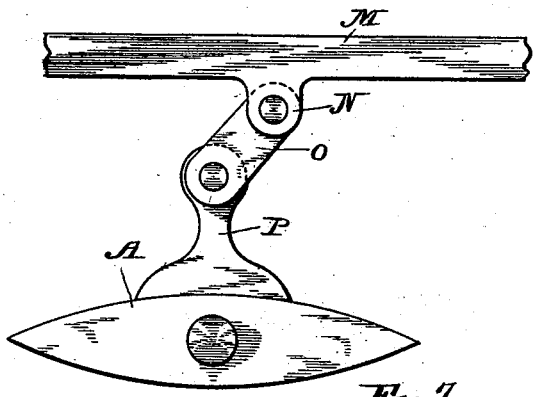

Fig. 7.

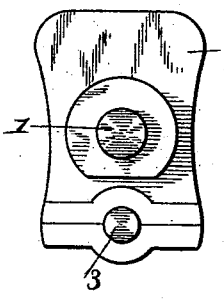

Fig. 4.

Witnesses

A. V. Cushman.

J. H. Rutherford.

Inventor

Edgar Courtright

By his Attorney

Edward Taggart.

(No Model.) 4 Sheets—Sheet 3

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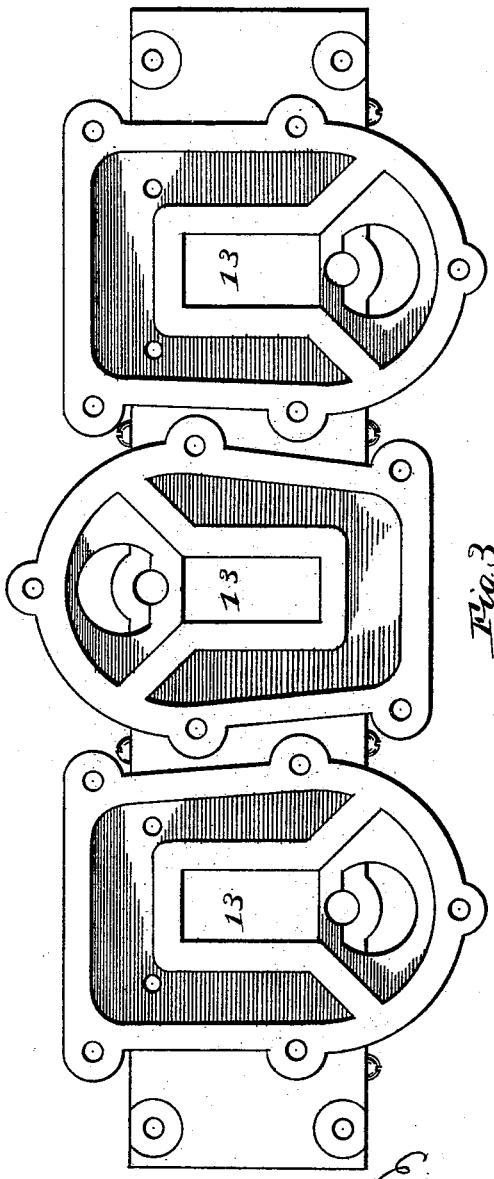

Fig 3.

Witnesses
A. V. Cushman.
J. A. Rutherford.

Inventor
Edgar Courtright
By his Attorney
Edward Taggart

(No Model.) 4 Sheets—Sheet 4.

E. COURTRIGHT.

MOTOR AND PUMP.

No. 457,303. Patented Aug. 4, 1891.

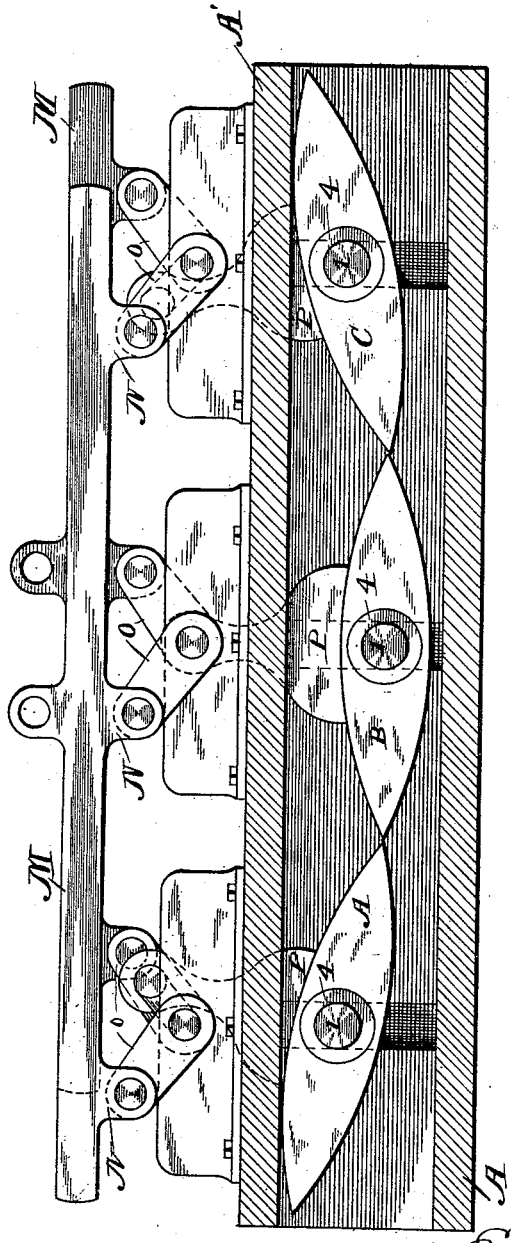

Fig. 5.

Witnesses

A. V. Cushman.

J. A. Rutherford.

Inventor

Edgar Courtright.

By his Attorney

Edward Taggart.

UNITED STATES PATENT OFFICE.

EDGAR COURTRIGHT, OF ST. IGNACE, MICHIGAN, ASSIGNOR OF THREE-FOURTHS TO JOHN B. BROOKS, EDGAR E. BROOKS, MICHAEL F. STELLWAGEN, CHARLES KYNOCH, JAMES CONNONS, AND THOMAS I. EVERETT, ALL OF SAME PLACE.

MOTOR AND PUMP.

SPECIFICATION forming part of Letters Patent No. 457,303, dated August 4, 1891.

Application filed June 5, 1890. Serial No. 354,359. (No model.)

To all whom it may concern:

Be it known that I, EDGAR COURTRIGHT, a citizen of the United States, residing at the city of St. Ignace, in the county of Mackinac and State of Michigan, have invented certain new and useful Improvements in Motors and Pumps, of which the following is a specification.

This invention relates to the arrangement of a series of paddles or buckets within a trunk or tube preferably rectangular in cross-section, each of said paddles oscillating upon a pivot supported in such a manner that the pivot will have a sliding or reciprocating motion in a direct line, thereby giving a double motion to each paddle, and the whole working together either as a motor-power for the purpose of running machinery of any ordinary kind, or the whole worked by means of some external power, converting the device into a pump.

The object of the invention is to form a cheap and effective motor which can be used in connection with water or other fluid, and which also may be used as a pump and for other purposes. These objects are accomplished by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view showing the arrangement of the paddles within the trunk and the connecting-wheels, which are operated by the movement of the paddles in order to convey the power to any suitable machinery. Fig. 2 is a transverse sectional view on line *x x* of Fig. 1, looking in the direction shown by the arrow. Fig. 3 is a side elevation of one of the outer plates with the hoods removed for the purpose of showing the internal construction. Fig. 4 is a detached view of the pitman which connects the paddle with the crank-shaft of the wheels. Fig. 5 is a longitudinal section of a modified form of my invention. Fig. 6 is a sectional view of the case through the center of the journal-boxes which support the paddles in the modified form and showing a plan view of the paddle. Fig. 7 is a side elevation of a paddle, its pitman, crank, and a portion of one of the side bars or rods which connect together the several paddles. In the modified form I use a connecting rod or bar on each side, each paddle being connected to the bar at each side.

Similar letters and figures refer to similar parts throughout the several views.

A′ represents the supporting frame or conduit, within which the paddles are moved. The paddles are shown by A, B, and C. In the form shown in Fig. 1 each paddle is provided with a journal at either side, which journals are shown by 1 1 1. These journals turn in sliding boxes, the boxes being shown by 4 4 4. The sliding boxes have a vertical motion or reciprocating motion in a straight line, which in the example of my invention shown in Fig. 1 is caused by the movement of the boxes 4 in the grooves 13 13, &c. It will be understood that each paddle has a box 4 at each end and two grooves 13, within which such boxes move.

Referring now to Fig. 2, 5 5 represent two pitmen connecting the journals of the paddle to the crank 8 8 on the main shaft 3 of the cog-wheel 2. 6 represents the space through which the central portion of the paddle oscillates in its vertical movement, which is in width equal to the internal diameter of the tube. The cranks have such a throw as to move the paddle from the top to the bottom, or from one side to the opposite side of the tube. The position of the slide-support is shown by 4 4, as stated above, within the way or groove 13. The paddle B is connected to the paddles A and C by means of a check-plate at either end, which check-plate is shown by 24 24, the object of the check-plate being to make a water-tight valve or packing in cases where my invention is used as a water-motor under great pressure, where it is desirable to obtain the entire force of the water or steam without waste. Each cog-wheel turns with a shaft 3, supported in suitable journal-boxes 14. These cog-wheels mesh together so as to revolve in unison, being operated by the connecting-pitman 5 5, &c.

Fig. 3 shows the plate which covers one side of the trunk, having the hoods 9 removed in order to show the internal arrangement of the parts, and in order to show the position of the plate shown in Fig. 1 I have indicated the bolt-holes 20 23 21 22, &c., also 16 and 15. It will be understood from this that the plate is placed upon what would be the front of Fig. 1, provided Fig. 1 was complete, with the exception of said plate.

12 shows the space allowed for the revolution of the crank and the movement of the pitman connection.

10′ shows the bolt which connects the hood 9 on either side.

2 2′ 2 show the cog-wheels.

In Fig. 1 I have shown the device in section; but it will be understood that the cog-wheels 2 2′ 2 mesh with each other, so as to revolve together.

11 is a portion of the plate shown in cross-section in Fig. 2. In Fig. 1 it shows the inside of the opposite plate, or the one at the other side of the view.

In the modified form shown in Fig. 5 the paddles A B C have no check-plate, such form being designed more particularly for a motor when used in the current of a stream where it is not as necessary to obtain the force of all the water which may be caused to flow through the trunk. This form of my invention uses connecting-bars M M, one at either side, each bar being provided with a series of lugs N N and a crank O, connecting the same to the pitman P, said pitman P being rigidly connected to the paddle or bucket.

In Fig. 6 I have shown a section of a portion of the side walls of the trunk, the same being cut longitudinally through the center of the journals which support the paddle, *a* showing the side portions of the frame, A showing the paddle, and S S showing the grooves in which the journals R R of the paddle rest. These grooves are vertical, and the paddle being connected, as shown in Fig. 7, by means of the pitman P, the crank O, and the lug N to the side bar M the movement of the paddle is such as to move the connection through a circle, the side bars forming merely a connection in order to unite the power produced by the paddles. The paddle A oscillates upon its journals and at the same time has a reciprocating motion within the longitudinal grooves or journal-boxes, the movement being precisely the same as in the form shown in Fig. 1. The connection by means of the crank and bars is another form of utilizing the power caused by the oscillating and reciprocating motion of the paddles in the trunk, and the modified form is preferred only in cases where it is unnecessary to utilize the entire power of the water or other substance which operates the motor.

The operation of my invention is as follows: Let the paddle A, as shown in Fig. 1, be located at its lower position, the water passing in above the paddle. Paddle B will then be pressed downward, the slides 4 4 moving down in the grooves 13 and the end of the paddle B most remote from paddle A turning down at the same time. This downward movement of the paddle operates through the pitmen 5 5 upon the cranks 8 8 of the shaft and cog-wheels 2′. As the paddle B moves down and oscillates, the water rushes through, operating not only upon paddle B to press it downward, but also to oscillate the paddle C, turning the end which is connected to paddle B downward until it reaches substantially a horizontal position, and at the same time the paddle C moves downward in the groove until it assumes the position shown in Fig. 1 by A, thus operating upon the main shaft of wheel 2. While the paddle C is moving down the paddle B oscillates upon its journals, turns the end of the paddle A which is connected to B upward, and when the paddle C has reached its horizontal position the paddle A is tilted into the position shown by C in Fig. 1 and is ready to begin its upward stroke and is moved by the power of the water bodily upward, acting through the pitmen and cranks upon the shaft 3.

In Fig. 1 let the left hand represent the upstream end. Commencing with the upstream end I have lettered the paddles A, B, and C. The cranks always turn in the overstroke toward the upstream and under in the direction of the moving current, the cranks being pivotally connected with their respective pitmen. The journals of the paddles travel in their respective ways, thus causing the reciprocating motion as the paddle oscillates, thus giving compound movement to the paddles as the cranks rotate, always presenting an obstructing angle to the upstream, the upstream end of the paddles always being horizontally in advance in their vertical travel. Thus the upstream ends of the paddles always reach the opposite side of the trunk first. The cranks, being set at angles of one hundred and twenty degrees apart, causes the downstream end of the paddle C to leave the trunk at exactly the same time that the upstream end of paddle A reaches it. In this position the water in the chamber formed above the paddles, having exerted its entire force against the paddles, is discharged downstream.

In the form shown in Fig. 1 I desire to have the paddles move as closely to the walls of the trunk as possible to make a water-tight packing. The circular form of the upper and lower surfaces of the paddles also makes a comparatively tight joint as the paddles turn or roll, as it were, in contact with the upper and lower walls of the trunk.

In using my invention as a pump the power can be applied to one of the cog-wheels, or in the modified form shown to one of the side bars, when the motion of the paddles will throw the water or other fluid through the

trunk and form a pump; but when used as a motor the fluid is passed through the trunk, giving the movement above described.

Having thus described my invention, what I claim to have invented, and desire to secure by Letters Patent, is—

1. In a motor, the combination, with a trunk or chamber constituting a water-way, of a series of centrally-pivoted paddles arranged within said trunk or chamber in line with each other, each paddle adapted to have an oscillating and vertically-reciprocating motion, and mechanism, substantially as described, for connecting the journals of said paddles, substantially as and for the purposes specified.

2. In a motor, the combination of three or more paddles, each paddle turning upon a journal and having a reciprocating motion substantially at right angles to the movement of the fluid which operates the same, and mechanism, substantially as described, for connecting the journals of said paddles, the whole adapted to convey the reciprocating motion of the paddles to a rotating shaft, substantially as described.

3. In a motor of the class described, the combination, with a series of oscillating paddles arranged within a trunk or chamber, of a series of rectangular check-plates 24, connecting the adjoining edges of the paddles, substantially as specified.

4. In a motor of the class described, the combination of a trunk or chamber constituting a water-way, a series of oscillating paddles arranged in said trunk, each paddle having journals mounted in vertically-reciprocating journals, and mechanism, substantially as described, for connecting the journals of said paddles and adapted to convey power to or from a rotary shaft, substantially as described.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

EDGAR COURTRIGHT. [L. S.]

Witnesses:

ARTHUR C. DENISON,

HARRY P. VAN WAGNER.