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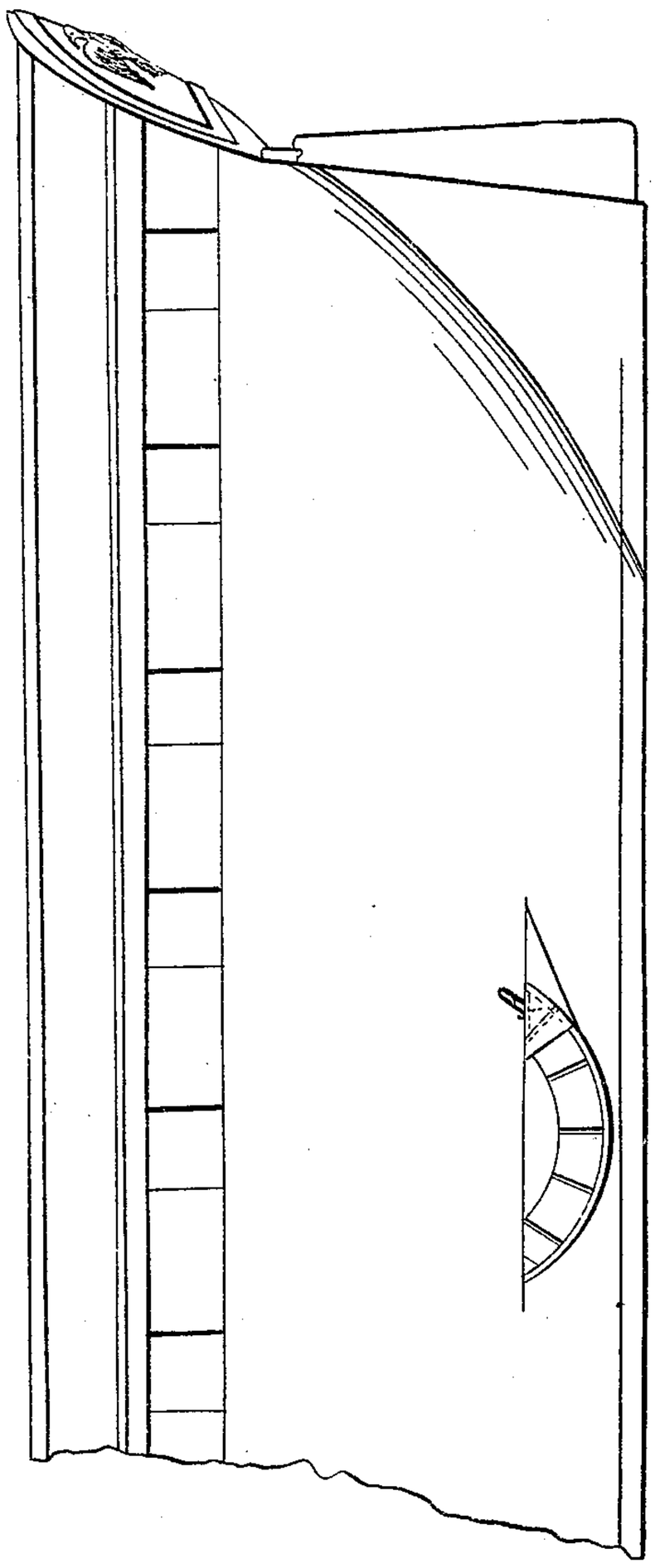
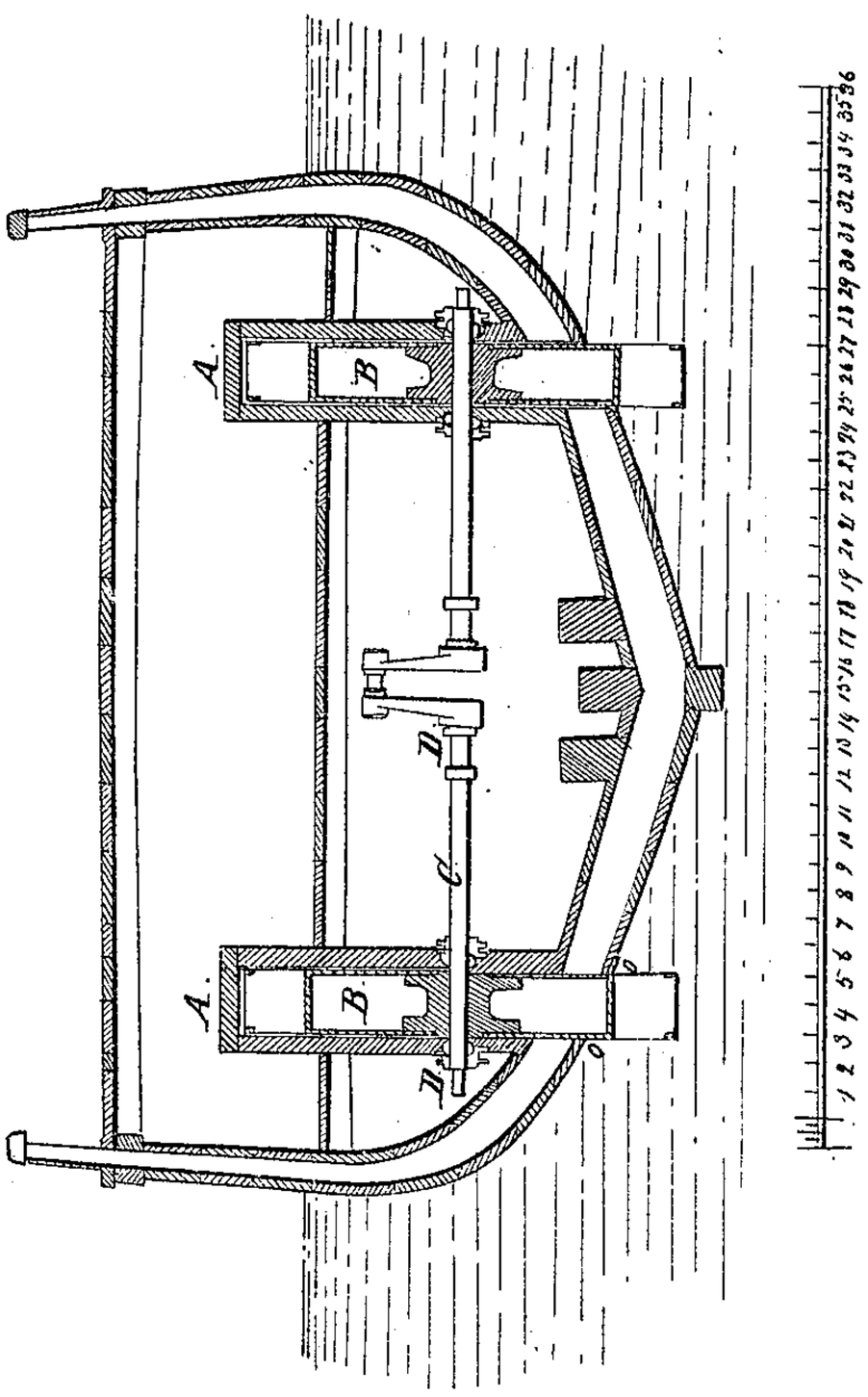
E. F. Aldrich,

Paddle Wheel.

No. 5634. Patented June 13. 1848.





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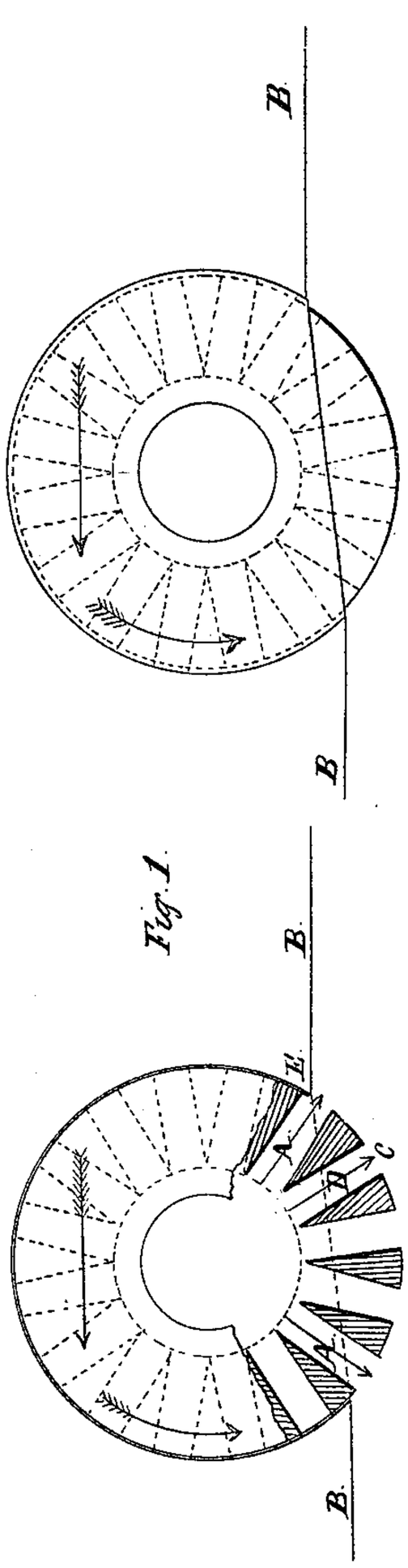
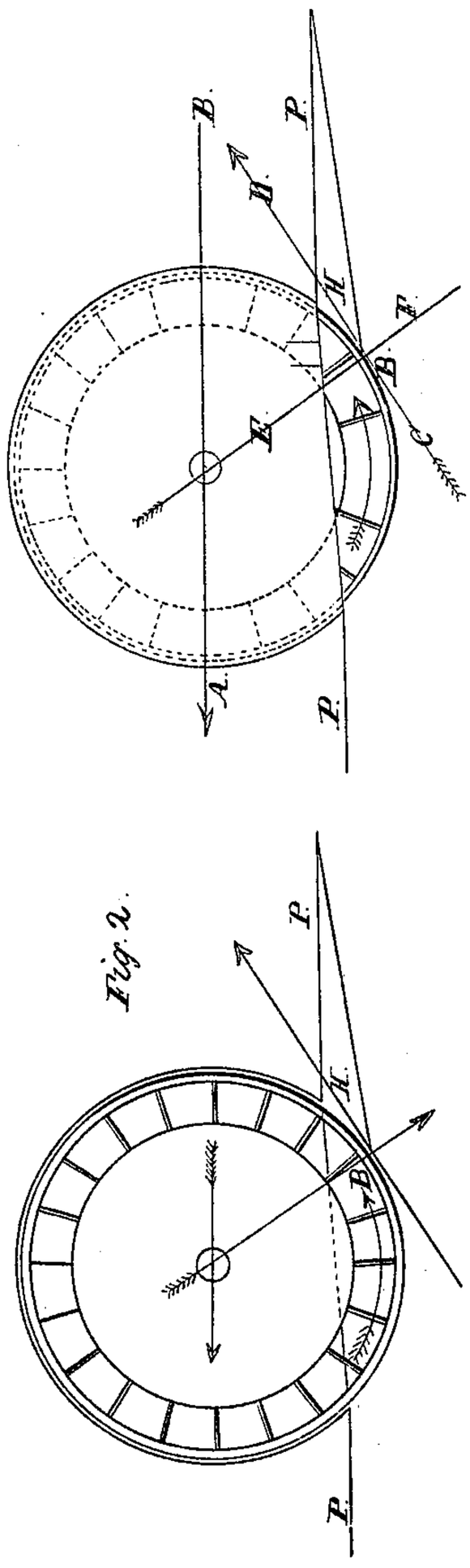
E. F. Aldrich,

Paddle Wheel.

No. 5634. Patented June 13. 1848.





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E. F. Aldrich,

Paddle Wheel.

No. 5,634. Patented June 13. 1848.

Fig. 2

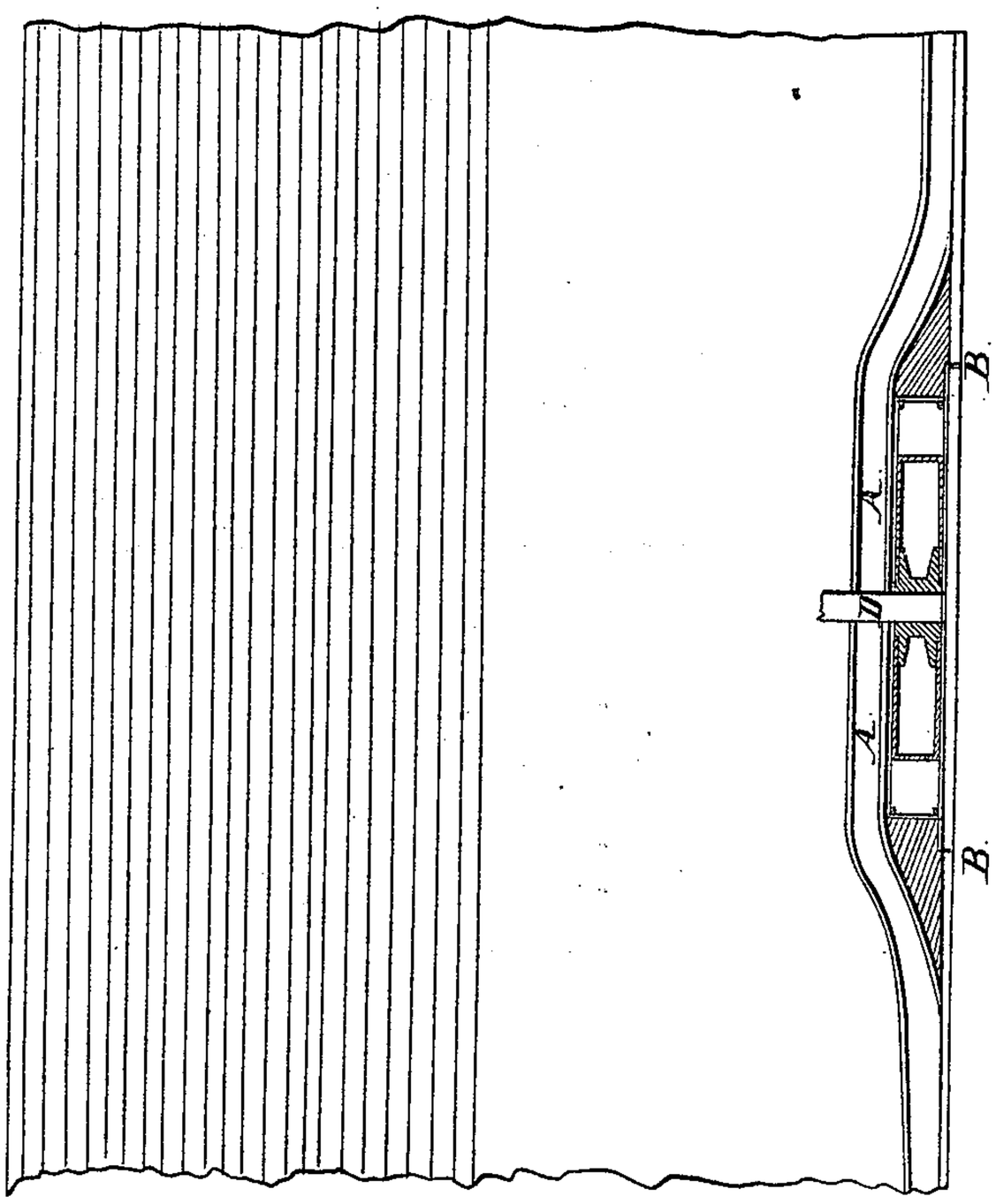
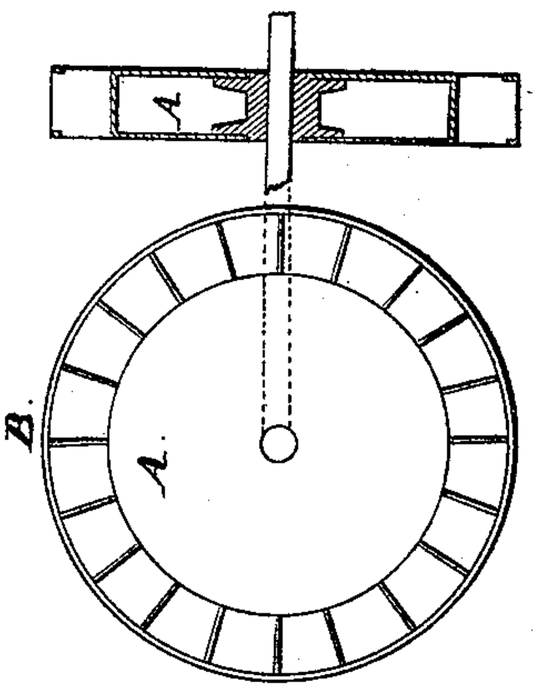


Fig. 1.



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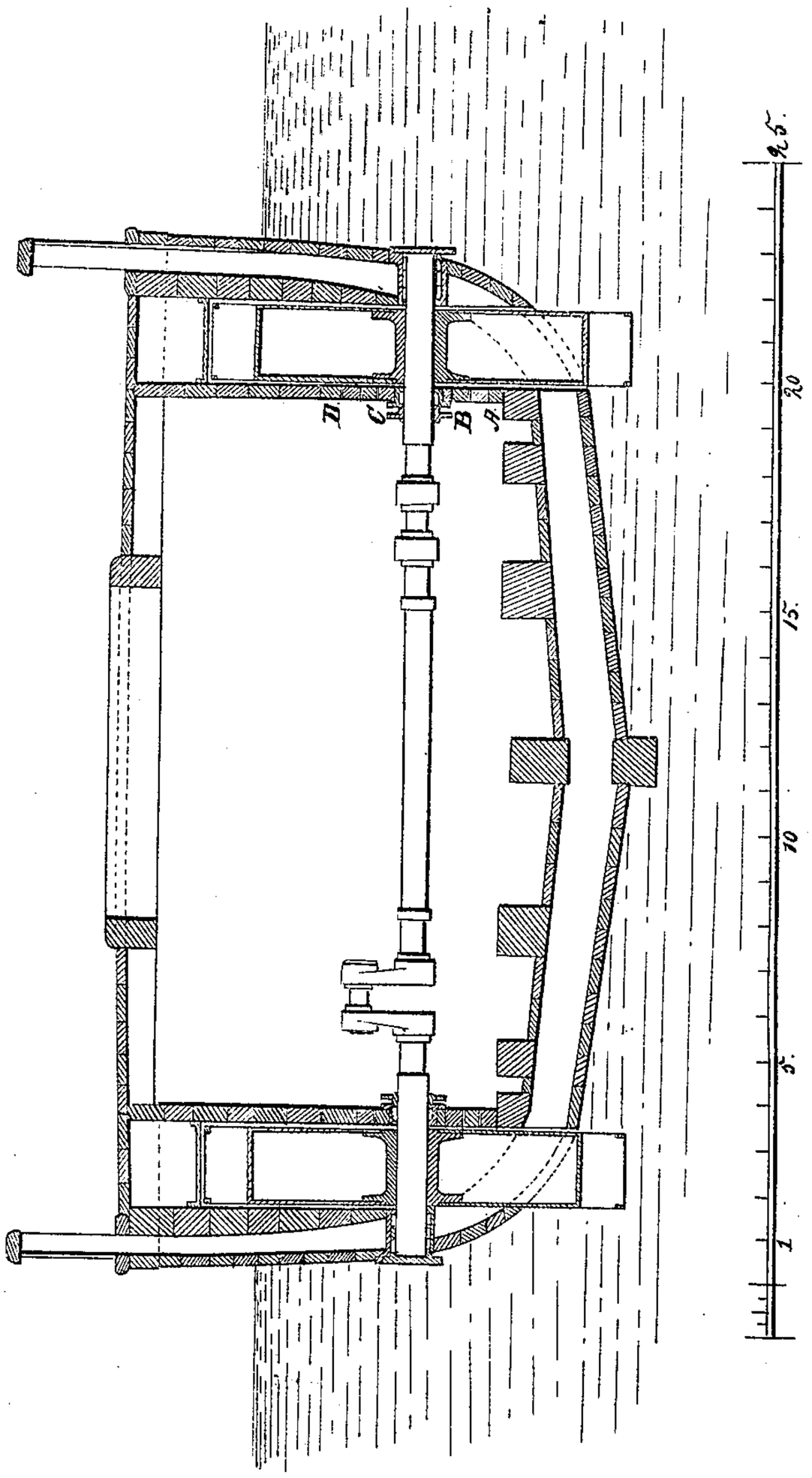
E. F. Hatch,

Paddle Wheel.

No. 5634. Patented June 13. 1848.



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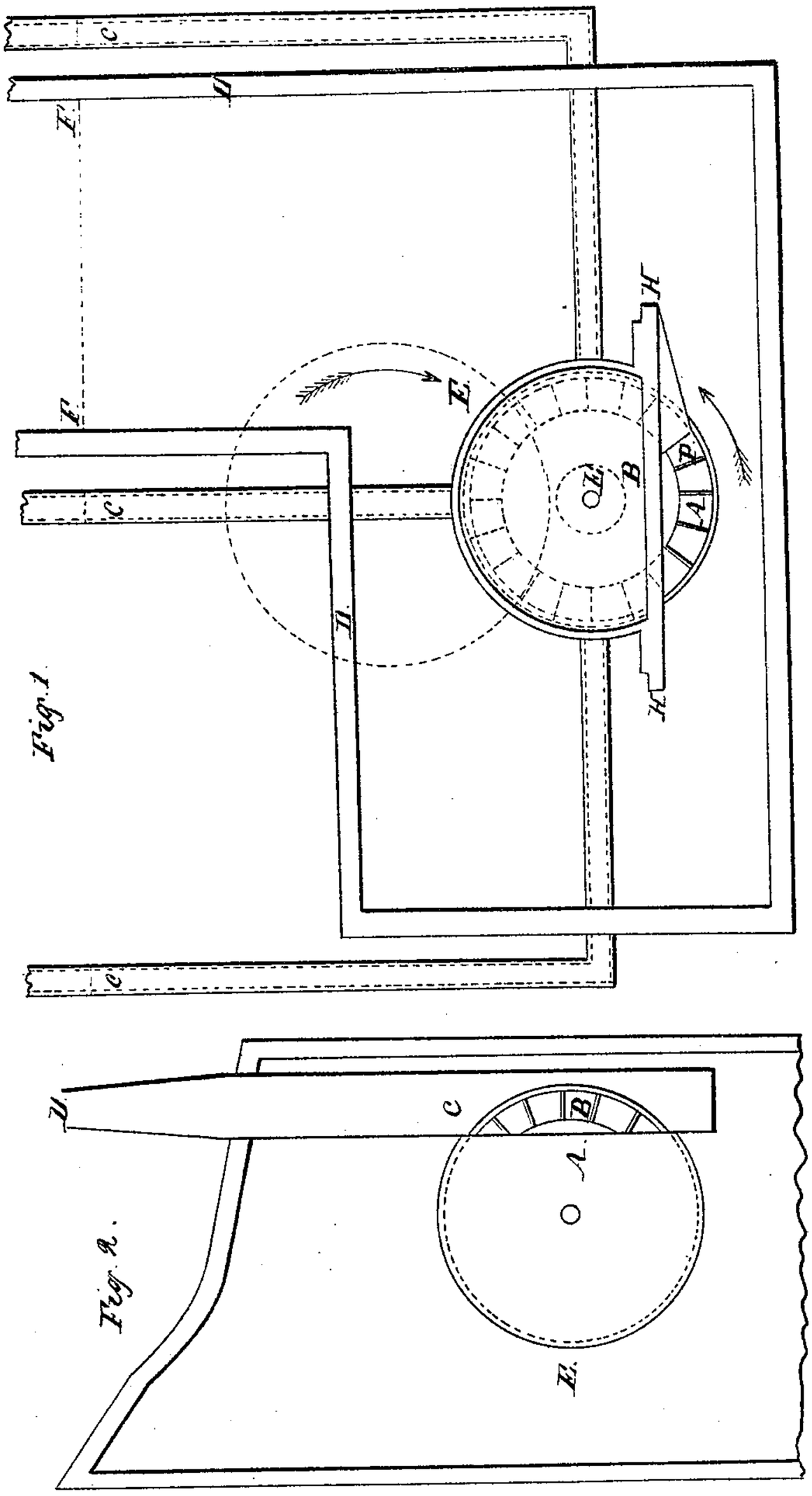
E. F. Aldrich,

Paddle Wheel.

No. 5,634. Patented June 13. 1848.



UNITED STATES PATENT OFFICE.

ELISHA F. ALDRICH, OF NEW YORK, N. Y.

PROPELLING VESSELS.

Specification of Letters Patent No. 5,634, dated June 13, 1848.

To all whom it may concern:

Be it known that I, ELISHA F. ALDRICH, of the city, county, and State of New York, have invented a new and useful Improvement in Propelling Steam Vessels; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Plate III, Figure 1, will represent a side and sectional view of a wheel, A; the center portion is constructed of metal, with as little material as is necessary to give the required strength; the floats are bolted or otherwise fastened to the center portion; B, represents a rim fastened to the floats to give them strength to resist the pressure. The wheel should be made true upon the sides, and the center portion water tight.

Wheels thus constructed are made to revolve within the vessel as represented upon Plate I, or outside of the vessel as shown at Fig. 2. Plate III, a portion of the wheels passing below the bottom when placed within the vessel, and below the cases when placed outside of the same. Plate I, will represent a transverse section and side elevation of the vessel at the wheels, placed about one third from the stern; A A, the cases; B B, the wheels; C, the shaft; D D, the bearings; E E, the kelsons for the reception of the engine, one or more being used. By placing the wheels in this manner all the bearings of the shaft are kept from the water, and so arranged as to be accessible by the engineers; the tops of the cases at A A, are so constructed, as to be easily taken off, to repair the wheels in case of accident or to un-ship the floats. After the wheels are arranged in their places, pieces of metal or wood are put upon the sides and fastened to the vessel at *o o*, and fitted as close as possible to the wheels and not rub, in order to prevent water from passing up into the cases when the wheels are in motion; end bearings and set screws can be used if required to adjust the wheels in case any straining of the vessel in launching or otherwise should cause the wheels to rub at the point where they pass through the vessel. When the wheels are placed outside of the vessel, which is supposed to be constructed of wood, the timbers at, or about midship, are made to fall in gradually to a sufficient distance to form recesses for the reception of the wheels; the planking is bent into said recesses, after which the cases are fitted to their places, and so constructed that the wheels are accessible from the top, and if required they can be raised up, or taken out of the cases altogether.

Plate III, Fig. 2, will represent a plan view of the vessel at the wheels, when constructed as heretofore described. The timbers at A A, are perpendicular from the point where they round off to form the bottom of the vessel, to the deck if required; the coverings of the wheels upon the outside form the lines of the vessel, and are bolted on at B B, so as to be taken off. The bearings of the shaft can be in the side of the vessel at D. Wheels for the largest and fastest vessels will be from two to two and a half feet upon the face. It is considered unnecessary to have any outside bearings to the shaft when properly constructed. This mode of construction may have advantages for iron vessels; there is however no objection to its being used for vessels constructed of wood.

Plate II, represents a transverse section of the steamer Virginia as constructed upon the plans heretofore described.

Plate IV, Fig. 1, represents a side view of a wheel and case placed in a box made water tight; this experimental machine was constructed to satisfy the undersigned as to the result that would be produced. A represents the wheel; B, the case; D D, the box in which the case and wheel are placed; E E, will represent a wheel and pinion outside of the box D, for the purpose of giving motion to the wheel A; C C C, will represent glass tubes which pass through the box D, and open into the case B. As soon as the wheel receives a given number of revolutions, the water in the tubes will begin to descend, and by an increase of motion the water will be entirely taken out of the tubes and case in which the wheel revolves; the level of the water will stand as much higher in the box at F F, as will be indicated by the quantity contained in the tubes and case when no motion is given to the wheel. The water having been forced or drawn out of the tubes and case by the centrifugal force generated in the water between the floats of the wheel. Again, let the tubes be closed at the top, the wheel set in motion, and if the speed is sufficiently great to create centrifugal force or pressure in the water, greater than the

pressure of the atmosphere and hydro column, the water will be taken out of the case and tubes as heretofore stated, and a vacuum will be formed within them.

Where the wheel passes through the platform H H, (which may represent the bottom of a vessel,) it is made to run close upon the sides and circumference, and as the floats pass the line P, no more water can pass between them from the sides and at right angles to their motion, and if the centrifugal force in the water between the floats, is sufficient to project it from them after they pass the line P, and before they shut into the case at *o*, the space between the floats will pass up into the case free of water; the gravity of the water in the tubes will cause it to descend into the space made empty by the action of the centrifugal force; as soon as this force is greater than the external pressure, the water in the tubes will begin to descend, and both they and the case will soon be free of water.

Plate IV, Fig. 2, represents the wheel and case placed wholly within the vessel; A the case, B, the wheel, C a pipe which passes out at the stern of the vessel and in which that portion of the wheel at B is free to act upon the water, the pipe is open at D, but in order to illustrate, suppose it closed at that point by a valve opening outward, and the water pumped out of it and the case and a vacuum formed within them. Supposing the pipe to be ten feet below the surface at D, there would be a pressure at that point of twenty pounds the square inch, caused by the pressure of the atmosphere and hydro column, these two pressures are equal to a column of water forty feet high. The maximum velocity that water will receive in flowing into a vacuum under any given pressure, will be equal to the velocity that a falling body will acquire after having fallen through a distance equal to the height of water; this velocity will be very nearly represented by 8 times the square root of the height, if however the pipe at D should be opened instanti, the vessel being at rest, the water would flow into it with an accelerated velocity, and move through the same spaces in equal times as any other falling body. The pressure at D is equal to a hydro column 40 feet high, which would give a maximum velocity of about 51 feet a second that water will acquire by the pressure of a column 40 feet in height; it will therefore be seen, that if the vessel had a motion of 51 feet a second, and the pipe at D should be opened, a vacuum would be formed by the forward motion of the vessel alone, the wheel having no circular motion. Again, suppose the air to be admitted into the top of the case at E, the pipe at D 10 feet below the surface of water, and the vessel had a forward motion of $17\frac{1}{4}$ miles an hour the water would be drawn out of the case and pipe.

Plate V, Fig. 1, represents a wheel with an opening at the center; spaces or tubes A A, pass from the circumference of the center opening to the circumference of the wheel, which is incased as heretofore described, except that portion below the line B B, the wheel to make 34 revolutions a minute, and is supposed to be attached to the side of a vessel as has been described and represented at Plate III, Fig. 2, the vessel has attained a velocity of 15 feet a second or $10\frac{1}{5}$ miles an hour, the centrifugal force of the water at the circumference of the wheel will be three times its weight, or three times the force of gravity; when the tubes arrive at C, the velocity of the water in them in the direction of radius, will be equal to the motion of the circumference of the wheel or 28 feet a second, let the water be stopped instantly at D, that no further supply can be received from the center, the water in the tube from D to C will have a momentum of 28 feet a second in the direction of radius, and a centrifugal force of three times the force of gravity at the circumference; these forces, when the motion of the vessel is taken into consideration, will be sufficient to project the water from the tube and the space from C to D will pass up into the case at E, free of water, consequently a vacuum will be formed in the tube from C to D.

The foregoing illustrations have been made in order to make the utility and importance of my improvement more clear to the understanding, that the quantity of motion acquired by the water between the floats in the direction of radius, which added to the centrifugal force, when taken in connection with the motion of the vessel, will be sufficient to project the water from the floats, and by which, a vacuum will be formed in the cases in which the wheels revolve.

Plate V, Fig. 2 represents a side view of a wheel and case as used and as represented upon plate 1, the line P P, the bottom of the vessel or case; H H, represents what I shall denominate a cut-off, placed upon both sides of the wheel, and covering from 15 to 25 degrees of its circumference on the sides, in order that when the floats arrive at B, no more water is permitted to pass between them from the sides of the wheel and at right angles to their motion, the wheel being open on the circumference from B to V; this cut-off is represented at H, upon the side elevation of the vessel Plate I.

The vessel and wheel are moving in the direction of the line A B at the rate of 15 feet a second, the motion of the circumference of the wheel in direction of the line C D, is 28 feet a second, the momentum of

the water between the floats in direction of radius as they pass the line E F, will be as the quantity of motion, which is nearly 28 feet a second, consequently the water will be projected from them after they pass into the cut-off at B, and by the time the floats shut into the case at *o;* therefore all that portion of the wheel within the case and above the line P P, will revolve in a vacuum, and that portion below said line will operate upon the water in the most efficient manner to propel the vessel.

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

The application of the cut-off as herein described, which prevents water from passing between the floats at the after part of the wheel, and by the use of which, a vacuum is formed in the cases in which the wheels revolve.

ELISHA F. ALDRICH.

Witnesses:

E. S. TOWERRE,

JOHN CORNESS.