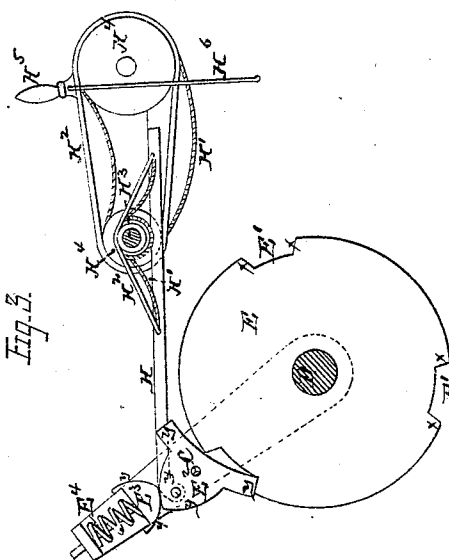
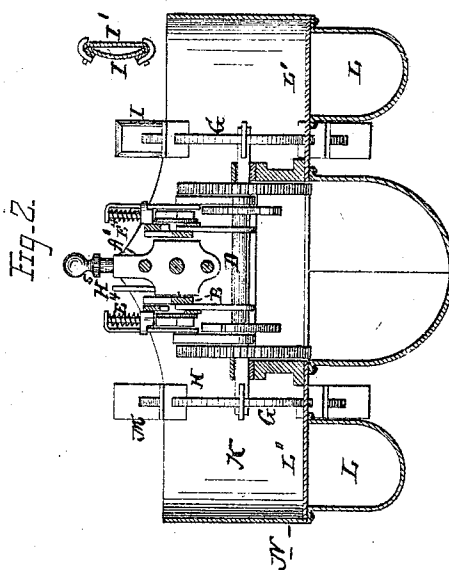
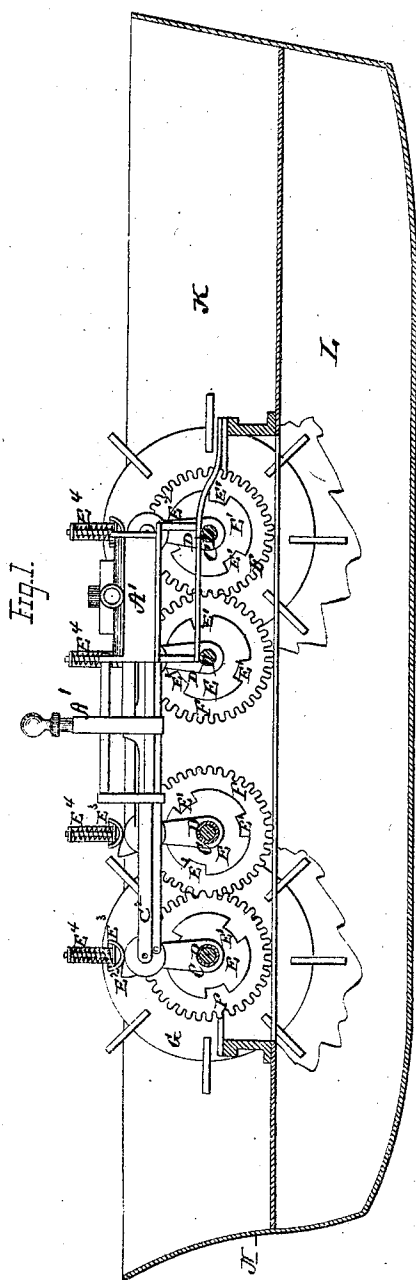


A. JOHNSON.
Propelling Canal-Boats.

No. 136,064.

Patented Feb. 18, 1873.



Witnesses:
E. Hutchinson
C. L. Ewert.

Inventor.
A. Johnson
per
H. Anderson
Attorneys.

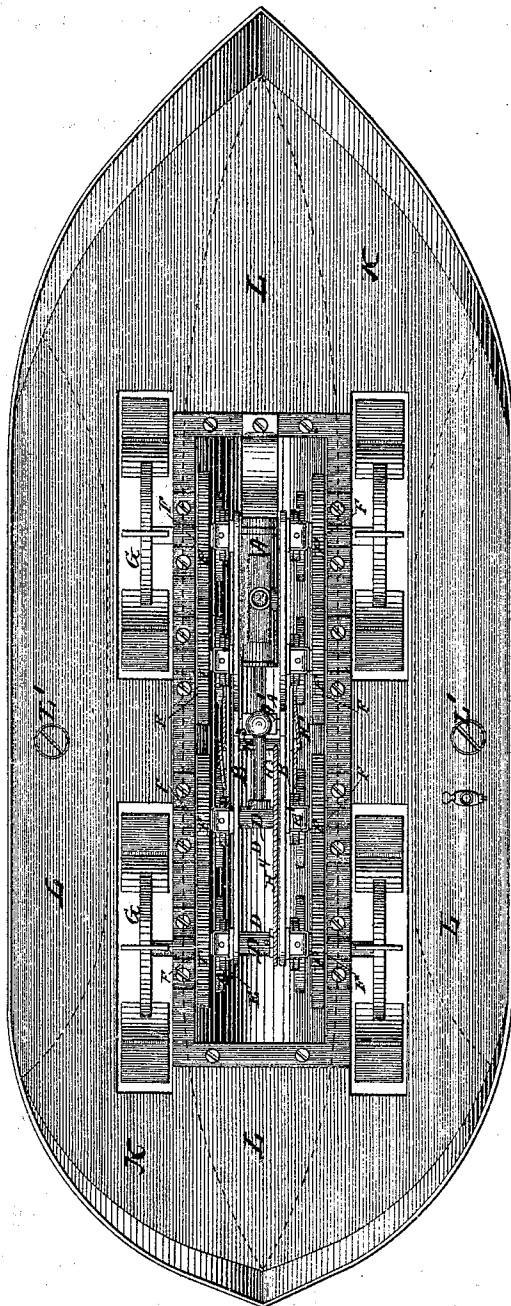
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Fig. 4.



Witnesses:
per *E. Hutchinson*
C. L. Ewert

Inventor.
Asa Johnson
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UNITED STATES PATENT OFFICE.

ASA JOHNSON, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF HIS RIGHT TO WM. H. JOHNSON, OF NEW YORK CITY.

IMPROVEMENT IN PROPELLING CANAL-BOATS.

Specification forming part of Letters Patent No. 136,064, dated February 18, 1873.

To all whom it may concern:

Be it known that I, ASA JOHNSON, of Brooklyn, in the county of Kings and in the State of New York, have invented certain new and useful Improvements in the Mode of Propelling Canal-Boats; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon making a part of this specification.

The nature of my invention consists in the construction and arrangement of certain devices for propelling canal-boats, as will be hereinafter fully set forth.

In canal propulsion when in or near port, the necessity for backing and operating the boat requires such means of connection between the engine and the paddle-wheel shaft that there can be no dead-point. My invention consists in the employment of certain mechanism to accomplish this result.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a longitudinal vertical section of my canal-boat. Fig. 2 is a cross-section of the same. Fig. 3 is a detached view, showing the device for reversing the motion; and Fig. 4 is a plan view of the entire canal-boat.

The same letters refer to the same parts in all the figures.

The engine consists of the ordinary cylinder A, with piston and cross-head A'. The cross-head A' carries the connections B B, which also carry the arms C C and C' C', by means of the bolts C² C². The arms C C' work freely on the shafts D D or sleeves D' D', and between each pair of arms C C' are the ratchet-wheels E E, in which are notches E¹, so made that they may be driven either way at will by double-faced pawls E² E², which work on bolts C² C², which are governed and kept in their proper position by sliding catches E³ E³ and springs E⁴ E⁴, which are all on arms C' C', and by the arms C C' are kept in proper position to work

well. The ratchet-wheels E E are secured to and carry the shafts D D or sleeves D' D', whichever plan is preferred. Said shafts D D or sleeves D' D' carry the gear F F and paddles G G; and by the gear-wheels F F the ratchet-wheels E E are both and all kept moving at the same time, in the proper direction to bring around the notches E¹ in all the wheels at the proper time to allow the pawls E² E² to operate in all the notches of the different wheels as they move around, thereby keeping up a continuous forward movement of the paddle or other wheels that may be placed on the shafts D D in one and the same direction. The motion of the ratchets E E is reversed by reversing the pawls E E, by means of the connections H¹ H¹, springs H² H², shafts H³, wheels H⁴ H⁴, and handle H⁵, which are so arranged as to reverse all the pawls by one and the same motion, the handle H⁵ being held in place by spring H⁶. The wheels H⁴ H⁴ are made larger than the shafts H³, so that the springs H², in more immediate connection with the handle H⁵, shall control those wound around the shaft H³, and keep the pawls E² in place while working forward or backward, according as the handle H⁵ may be set at 1 or 2. (See Fig. 3.) By crowding the handle H⁵ beyond the position 1 or 2, the elastic strings will be stretched until the chains 1 come into action and exert a positive pressure on the pawls E², causing them to act as brakes upon the periphery of the ratchets E, when desirable. The profile lines *x* of the working parts of the notches E¹ in the ratchet-wheels, as well as the profile lines of the teeth on the gear-wheels, are made on the same curve as the outer surface of the periphery of the wheels on which they are formed, while the working parts *y* of the pawls E² and sliding catches E³ are formed of parts circles of one-half the diameter of the ratchet-wheels E, thereby causing them all to roll smoothly together, and bear equally together at all points, and make them noiseless. They may be made on any circle that can be struck from one point or end of the tooth or projection to the other; but I prefer to make

them on the circle of the periphery of the wheel or rollers on which they are formed. It is very important that all the profile lines of the teeth or projections on wheels or rollers that are to roll together should be made on one true circle from one point to the other, in order to be round and roll together noiselessly. I shows a manner of constructing a paddle or oar of a concave form. The spring or driving side, being concave, with a rubber or other elastic substance, I¹, stretched across and firmly secured by the rim I², or other suitable manner, to the paddle or oar, by the rubbers giving to the pressure of the paddle against the water, secures the advantages of the concave form while in action, and of its spring to straighten and clear itself quietly when coming out of the water. K shows my boat, the lower part of which forms pontoons, supporters, or compartments L L L, which have light covers J' secured to the openings L'. The form of these supporters is of an oval, wedge, or trout shape, slightly tapering from near the bow, where they are the widest, to the stern, where they come to a thin edge or point. They are made of sheet metal cut and bent the above-mentioned shape, and firmly secured to the bottom of any suitable boat, by means of turning a flange on the upper edge of the supporters, and firmly rivet them to the bottom of the boat, after which the seams are to be soldered or brazed, to make them strong, and the cavity inside perfectly airtight. Then by cutting any desirable size or shaped openings L', with a suitable cover to fit over it, which may be screwed down over it with rubber of any desirable thickness placed under the cover, which, when the covers are screwed down, makes three airtight longitudinal receptacles on the under side of the boat K, which may be used for various purposes. By these longitudinal, oval, wedge, or trout shaped supporters, being constructed and placed as shown in Fig. 4, with the swallow-tail opening at their bow in front of the paddle-wheels G G, the water is allowed to accumulate in front of the wheels sufficient to supply the paddle-wheels with water to propel the boat; and as the space between the supporters diverges each way from the point where the paddle-wheels G G are placed, the space being the narrowest at that point, and being full of water behind the wheels, the water is taken away from in front of the boat and forced back through the narrow space, where the greatest resistance to the paddles is given directly under the wheels—just the point where they have the most power; then, as the space there commences to widen as the boat moves forward, more room is left for the water. As the supporters gradually taper to a thin edge or point, the water gradually closes in against the tapering supporters until it comes to a mere point, and thereby leaves but very little wake behind the boat or swell at the sides, as all the water from the

four paddle-wheels G G passes through the grooves under the boat, where it is required to buoy it up and keep it away from the banks of canal. M shows the paddle-box over the wheels G G. N shows the water-line a little above the level of the floor O or bottom of the boat over the supporters L L L.

Railroad tracks may be arranged longitudinally over the canal for an engine to run on for towing boats; or, in place of paddle-wheels, I may attach ordinary car-wheels to the shafts on the boat, said wheels running on a track laid on the bottom of the canal, or elevated at any height over the same.

The shafts D D, on which the wheels are placed, should be as near on a level with the center of the line of bearing of the boats on the water as possible; and that line is the line on which the connection should be placed, so as to have the draft on a level, straight line with the line on which the boats are to move, as it will require an additional amount of power to tow the boats just in proportion as the angle of draft may vary from that straight line either way, although it is better to have the draft from a little above the line than below or on either side of it; but the nearer the line the better it is.

When I make the boats for tow-boats, I place blocks hollowed out on each side to correspond with and fit over the ends of the rear end of the tow-boat, and the canal-boats with a staple and link or other suitable device for connecting the boats together, same as cars are connected together; or the rear end of the tow-boat, and also the rear end of all the canal-boats, may be made concave to correspond with and fit over the convex form of the forward end of the boat to be towed behind it, thereby forming a circular hinge or joint between each boat to allow them to bend around curves, &c., when connected so closely as to prevent any water from getting between the boats, so that after the channel is once opened by the forward part of the tow-boat K all the rest of the boats behind it follow in the same channel, thereby requiring much less power to tow them than it would if they were not so closely connected by the circular hinges; and by the peculiar construction of my boat K, as described, the construction and arrangement of paddle-wheels, &c., the boat has increased power.

By the use of my double-acting ratchet movement, as described, the whole power of the steam is applied direct on a straight line with the line on which the piston-rod moves to the outer surface of the ratchet-wheels, the same being the long end of the lever. Therefore no power is lost, but the power is increased in proportion to the size of the ratchet-wheels E E.

The application of all the power of the steam direct from the cross-head at the end of the piston-rod to the outer surface of the ratchet-wheels E E being on a direct straight line

with the line on which the piston-rod moves, a great number of boats may be towed with one boat or engine, especially when closely connected, as herein described, so that a very large amount of freight may be carried on one canal during summer; and railroad tracks may also be used as a railroad alone in winter.

By using a double gearing, two shafts, two gear-wheels, two ratchet-wheels, and two pawls for each car or other wheel or shaft to be revolved, I am able to have an equal power with all the pawls, and keep up a continuous motion of the shafts and wheels in one and the same direction; and by all the profile lines of the notches E^1 in the gear-wheels being made on the curve of the outer surface of the wheels and at a suitable angle, and the pawls, sliding catches, springs, &c., being made as described, they will be and are noiseless.

The gear-wheels might be used for ratchet-wheels; but it would not be as well, as they would make more noise, and the teeth would be more liable to break. The same motion may also be obtained by placing two pawls on one lever—one above and one below the bolt—the upper pawl operating on one side of the wheel, and the lower one on the opposite side of the ratchet-wheel, one of their points being turned inward, and the other point turned outward, thereby carrying the wheel in one

and the same direction without the gear-wheels or double ratchet-wheels; but the power would not be equal, neither would they work as well in other respects; therefore I prefer to use the double gearing, as described.

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

1. The combination of the shafts DD , ratchet-wheels $E E$, pawls E^2 , sliding catches E^3 , springs E^4 , and gear-wheels $F F$, substantially as and for the purposes herein set forth.

2. In combination with the arms $C C'$, pawls E^2 , sliding catches E^3 , and springs E^4 , the connections H^2 , shafts H^3 , wheels H^4 , handle H^5 , chains $H^1 H^2$, and spring H^6 , all substantially as and for the purposes herein set forth.

3. The combination, with a canal-boat of usual form, of two or more metal floats or air chambers, constructed substantially as shown, and provided with flanges, whereby said floats may be readily bolted to the bottom of the boat, for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of July, 1871.

ASA JOHNSON.

Witnesses:

E. N. WARFIELD,
SIMON STEIGER.