

UNITED STATES PATENT OFFICE.

ARTHUR BARBARIN AND JOSEPH ALBRECHT, OF NEW ORLEANS, LOUISIANA.

IMPROVEMENT IN HYDRAULIC MOTORS.

Specification forming part of Letters Patent No. 117,504, dated August 1, 1871.

To all whom it may concern:

Be it known that we, ARTHUR BARBARIN and JOSEPH ALBRECHT, M. D., of New Orleans, parish of Orleans and State of Louisiana, have jointly invented certain Improvements in Hydraulic Motors with the view of applying the same to the propulsion of vessels, especially canal-boats, &c., as a substitute for the heavy and costly machines now employed for such purposes.

In the accompanying drawing, Figure 1 is a longitudinal central section of an apparatus made in accordance with our invention. Fig. 2 is a top view of the apparatus removed from the boat. Figs. 3 and 4 are perspective views of detached parts, hereinafter referred to.

Our invention is an improvement upon the tromp (trombe) and upon the Giffard injector, as the present form of those instruments renders them impracticable for forcing vast or broad volumes of water. They answer well for a small jet or jets of water of great velocity, but by increasing their size the circular or annular aperture for the injection of steam must be increased in proportion. This tends to increase the area over the circumference in the proportion of D to D^2 , so that the surface of the column of steam which must come in contact with the water for a rapid condensation, (owing to the great bulk or thickness of the column,) in proportion to its superficial extent, is gradually lessened, which impairs their efficacy. Being familiar with those instruments, we know their defects, and it is to overcome such defects successfully that we have given our injector the form of an elongated parallelogram, Fig. 3, with rounded instead of square or sharp edges *i i*, the steam escaping through a longitudinal slit at the wedge-formed end *J* of the injector, thus enabling us to present to the condensing body of water, against which the steam is projected, a continuous broad and thin flat sheet of steam, instead of an annular or thick cylindrical jet, for a more rapid and complete condensation of the same. By this arrangement we obtain the maximum of power for any quantity of water we may desire to force through, provided that the slit be long enough, and that the water is supplied in sufficient quantity for the capacity of the injector.

An injector of our construction, with a steam-slit of about one-eighth of an inch wide by three feet long, and a water-supply pipe of about three

feet broad by one foot deep, is capable of forcing a volume of three hundred cubic feet of water per second through a discharge-pipe; with an opening of about three feet wide by one foot deep, at a velocity of one hundred feet per second.

As will be seen in our apparatus, we dispense with overflow-pipes, check-valves, &c., employed in the Giffard injector; and to avoid loss of power by suction of water from a distance through the feed-pipes *B* and *B'* into the water-jacket *C*, we may, if desirable, place the said feed-pipes and water-jacket *C* within the vessel in such a manner that the water-jacket shall be near, even with, or below the surface or level of the water upon which the vessel floats, in order that the same shall, automatically, be filled or primed, or nearly so, with water, whether the injector be in use or not.

If air, instead of steam, were forced through the injector, the water could not be pushed forward except by friction; because the volume of the air remaining permanent would prevent the water from presenting itself in front of the orifice of the jet where it should receive its impulse. In this case the flow of air ought to be made intermittent by means of a revolving butterfly-valve or other vibrating means, similar to the exhaust-steam of a locomotive, giving the water the chance to close up or to reach the front of the orifice of escape when each succeeding stroke of air, driven forward, would act as a piston, and leave a partial vacuum behind, to be filled again with a succeeding flow of water ready to receive the next stroke or impulse of air. The same arrangement can advantageously be adapted to steam or other gases. But our invention will be better understood by referring to the annexed drawing forming a part of this specification.

A, Fig. 1, is a main water-channel, composed of several sections, made of any suitable material, and joined together by any suitable water-tight means. This channel, as will be seen, is placed upon the interior bottom of the vessel, extends the whole length thereof, and penetrates through both ends of the vessel with gradually expanding grated openings or throats *a a'* for the purpose of taking in water at one end and discharging it with force at the other. *B* and *B'* are two feed or water-supply pipes, connecting in any suitable water-tight manner with the water-jacket or box *C* and the main channel *A*,

as shown, so as to form part of the same. These pipes, as shown at 1 and 6, are provided with interior self-acting hinged valves or gates, secured as represented in Fig. 1, while the water-jacket C, gradually narrowing at *b* into a contracted water-throat or passage, and gradually expanding from below that point into a two-way channel, *b'* and *b''*, to be joined to the main channel A, as before stated, is provided with an interior gate, *d*, upon the axis of which is secured an outside lever or crank, *d'*, for the purpose of changing the course of the flow of water either to the right or to the left, as the vessel may be required to back or to go ahead.

If to back, the valve *d* and lever *d'* are thrown by hand in the position shown in heavy lines in the drawing. On the steam being admitted through the pipe E into the injector D and allowed to escape through the elongated slit of the injector against the water contained in the jacket or box C, a powerful impulse or momentum is at once communicated or imparted to the water, which, on receiving the same, condenses the steam as rapidly as it receives each impulse of each succeeding flow of steam, thus producing a continuous ram to force the flow of water with velocity and great power from the narrow passage or throat *b* (which narrow passage is to prevent the back action or return of the compressed water into the jacket) into the channel A in the direction of the arrows, and compelling the lifting of the hinged gate 1 by the current of water to free the channel for the discharge of the same through the grates *a*, while the closing of the pipe B at *x'* takes place at the same moment, to prevent the entrance of water into the jacket C through the pipe B, or its suction from the jacket C into the channel A through the same pipe.

For going ahead, the reverse action of the lever takes place.

When the backing of the vessel takes place, as before stated, the feed-pipe B', owing to the fall of its gate 6, supplies the jacket C with water, while the reverse action takes place when the vessel is going ahead.

When the vessel is not in motion both gates 1 and 6 drop, of their own weight, against their respective shoulders *g g'*, which leaves the openings *x x'* of the feed-pipes B B' open to admit water automatically into the water-jacket C, or nearly so, provided that the instrument be placed as before described.

In Fig. 3 it will be perceived that the flat sides of the detached injector are slotted at *k* for the admittance of steam within its chamber, to be discharged through the elongated slit of the wedge-shaped end J of the same, as before stated, when said injector is placed in position, as shown in Fig. 1, to receive the steam from the pipe E. The flat slide P or steam-regulator of the injector, as shown at Fig. 4, is also slotted at *q q*, in order that its upward or downward motion, through the interior vertical grooves *n n'* of the injector, when regulating the flow of steam, may not interrupt the free circulation of the same within the injector.

When in position for action the adjustment of the injector is effected by means of the rack *h*, pinion *h'*, and crank *m*, as shown in the drawing, and the escape of steam through the elongated slot is regulated by means of the corresponding-sized and shaped slide P being raised or lowered at will through the action of the threaded rod *p* and crank *s*. The rounding of the edges *i i* of the elongated injector is to facilitate its rise or descent in adjusting it.

To prevent the escape of steam from the upper part of the chamber F, into which is placed the injector, and from the upper part of the injector itself, through which passes the rod *p* of the regulating-slide P, stuffing-boxes, or their equivalents, are properly secured thereinto.

Although in the drawing the apparatus is represented as placed at the center of the channel A, which channel extends the whole length of the vessel, it will be understood that the instrument may have any other suitable location, and the channel may be of any suitable length or size.

Having thus described our invention, and the manner in which the same is or may be carried into effect, what we claim as new, and desire to secure by Letters Patent, is—

1. An injector, in which there is combined with the surrounding water-conduit a steam-passage, which, at the point where the steam is discharged upon the water, has the form of an elongated parallelogram, so that a continuous broad and thin flat sheet of steam may be projected against the water, substantially as and for the purposes herein shown and described.

2. The water-jacket or box C, provided with the narrowing passage or throat *b*, and a two-way opening or channel, *b'* and *b''*, in combination with the steam-injector, as and for the purposes herein described.

3. The feed-pipes B and B', when connected with the water-jacket C and with the channel A, as described, for the purposes set forth.

4. In an apparatus organized and operating as herein described, the arrangement of the self-acting gates 1 and 6, and shoulders *g* and *g'*, or their equivalents, secured and operating in the manner described, for the purposes herein stated.

5. The reversible interior gate *d*, in connection with the exterior lever *d'*, when the same is applied in the center of the two-way opening or channel *b'* and *b''*, immediately under the narrow or contracted passage *b* of the box C, for the purpose of changing the flow or current of water, as described.

6. The hydraulic motor as a whole, constructed and arranged to operate as herein described.

In testimony whereof we have signed our names to this specification before two subscribing witnesses.

ARTHUR BARBARIN.
JOSEPH ALBRECHT, M. D.

Witnesses:

A. DUCATEL, Jr.,
PAUL DUCATEL.