

(No Model.)

3 Sheets—Sheet 1.

A. M. MALÉ.

Method of and Apparatus for Counterpoising the
Weights of Bodies, &c.

No. 242,668.

Patented June 7. 1881.

Fig. 1.

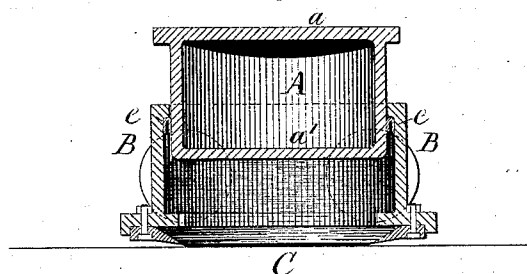
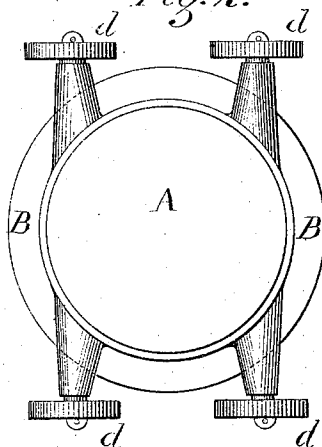


Fig. 2.



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Fig. 3.

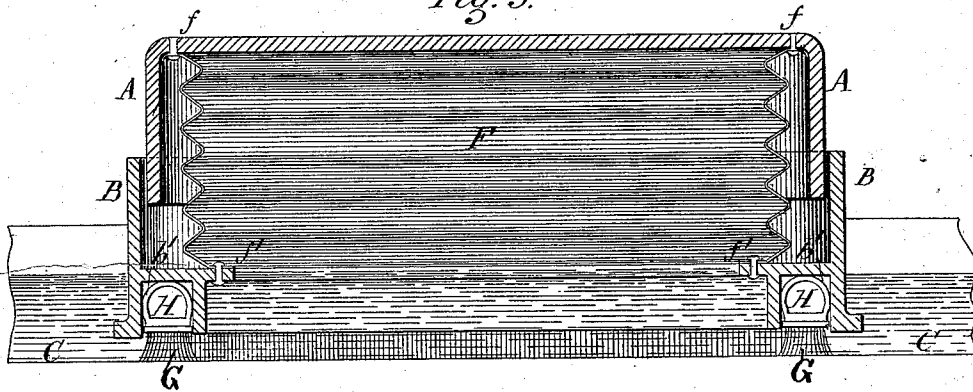
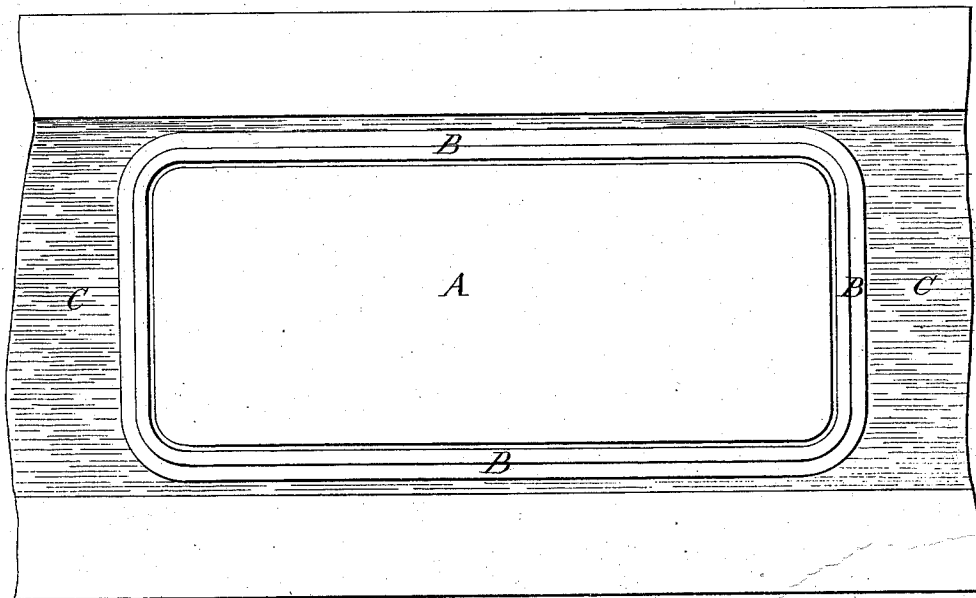


Fig. 4.



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Fig. 5.

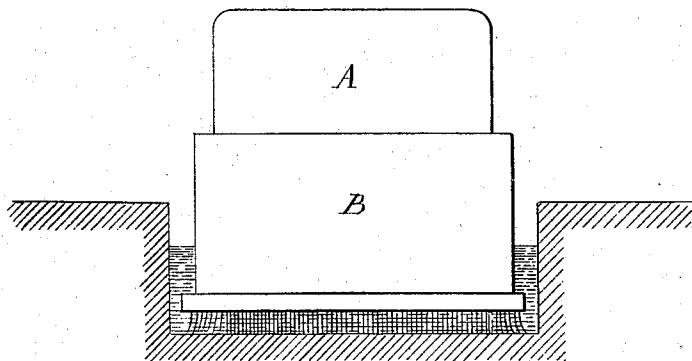


Fig. 6.

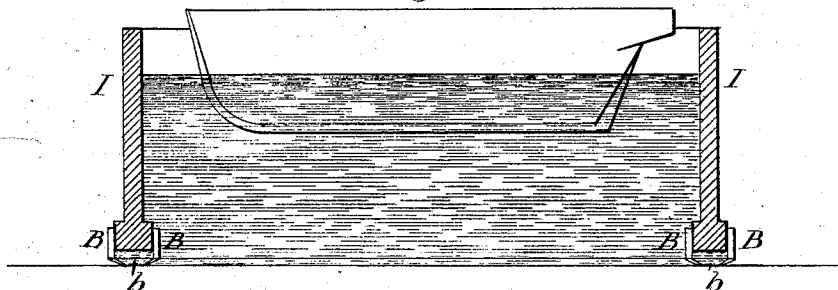
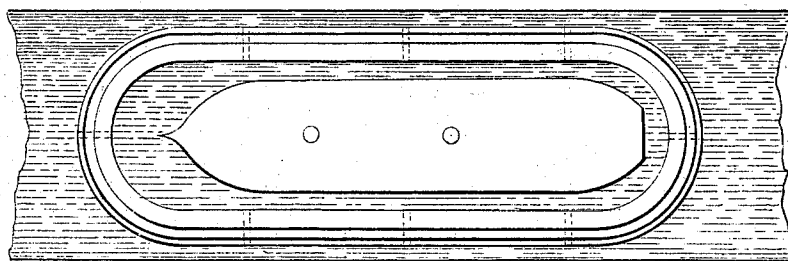


Fig. 7.



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UNITED STATES PATENT OFFICE.

ADOLPHE M. MALÉ, OF FONTENAY-LE-COMTE, VENDÉE, FRANCE.

METHOD OF AND APPARATUS FOR COUNTERPOISING THE WEIGHTS OF BODIES, &c.

SPECIFICATION forming part of Letters Patent No. 242,668, dated June 7, 1881.

Application filed January 20, 1881. (No model.) Patented in France February 18, 1880, and in England June 25, 1880.

To all whom it may concern:

Be it known that I, ADOLPHE MICHEL MALÉ, of Fontenay-le-Comte, Vendée, in the Republic of France, have invented a new and useful Improved Method of and Apparatus for Counterpoising the Weights of Bodies to be Transported by Land or Water, for the purpose of reducing the amount of force necessary for drawing or propelling the same, (for which I have obtained a patent in France, No. 135,203, bearing date February 18, 1880, and a patent in Great Britain, No. 2,119, bearing date June 25, 1880,) of which the following is a specification, reference being had to the accompanying drawings.

This invention consists in an improved method of and apparatus for counterpoising by means of water, air, or gas the weight of bodies to be transported by land or along canals, whereby the amount of force requisite for drawing or propelling the same will be much less than that required when the ordinary means are employed, while at the same time the transport of heavy bodies is greatly facilitated.

The apparatus consists of a frame open at the top and bottom, and within the upper part of which is arranged, in such a way as to work in a water-tight or air-tight manner, a piston or other suitable contrivance (which is hereinafter referred to as the piston) for supporting the body to be transported, or for supporting any receptacle for receiving or containing such body, so that when the frame is arranged on the way or track the piston or other contrivance can rest on and be supported by a cushion or body of water, air, or gas confined between the frame, lower surface of the piston, and that portion of the way or track over which the apparatus is situated. The frame may be constructed of any suitable material and form; but by preference it is made circular, or with parallel sides and rounded at the angles. On the interior of the frame and near the lower edge thereof is formed a projecting ridge, on which the piston rests when it is not supported by the water, air, or gas, or cross-bars may be arranged for effecting the purpose.

The way or track upon which the apparatus is to travel must have an even and smooth surface, and it is essential that the frame should

work along the same in as water-tight or air-tight a manner as possible, any suitable and known means being employed for effecting that object. For instance, the lower part of the frame may be provided with strips of india-rubber or leather, the upper fringe of the strips being secured to the frame, while the lower "feather edge" is kept in contact with the way or track. The said lower edge is by preference shod with steel or hard wood to render it durable; or, instead of the said strips, suitable steam-packing may be employed for the purpose, such as lubricated hemp, asbestos, canvas, and vulcanized fiber, and any of the said materials may be caused to press against the way or track in a water-tight or air-tight manner, either by their own elastic tension or by pressure exerted on them by the water, air, or gas within the frame, or by a greater or less pressure independent of that within the frame. It is desirable that the surface of the way or track be lubricated with water or other material in order to reduce the friction consequent upon the locomotion of the apparatus. The way or track may be level with the surrounding ground, or it may be within a channel cut in the ground or otherwise formed. In the latter case, and also when the way or track is provided with raised sides, the sides of the frame may be dispensed with, the ends of the front and back of the latter and the sides of the piston being caused to work against the sides of the way or track in a water-tight or air-tight manner by any suitable means, the sides of the way or track serving as continuous sides to the frame; and in some cases, in order to reduce the amount of friction, wheels or rollers are mounted horizontally on the apparatus in such a manner that they will bear against the sides of the way or track.

When the sides of the frame are dispensed with, as hereinbefore described, the remaining portions thereof—that is to say, the front and back portions—may be so arranged by means of projecting ribs and grooves or other suitable mechanical contrivances as to be capable of moving vertically independently of each other, so that when the apparatus is ascending an incline the back can be lowered, and when descending the front is lowered, whereby

the piston and body or bodies being transported are always maintained in a horizontal position.

If the apparatus be formed with straight parallel sides the latter can be constructed so as to project into grooves or channels provided at each side of the way, such grooves or channels being, when desired, supplied with water or other lubricating material.

When the apparatus is applied to boats or ships or other vessels in canals, the canal in which they are to travel must be provided with a smooth and even way or track. The frame is arranged to work in a water-tight manner within a groove or recess formed in the bottom of the boat or vessel or in an attachment thereof, so that when it is not intended to employ the apparatus the frame can be drawn entirely within the said groove or recess by means of rods actuated from the interior of the boat or vessel. When the latter is being charged the frame is allowed to drop to a certain extent, so that as the vessel becomes heavier the lower edge of the said frame will rest on the way or track at the bottom of the canal, thus inclosing a certain amount of water, upon which that portion of the bottom of the boat which is inclosed by the said frame bears, the whole of the weight of the boat or vessel and cargo being thereby supported.

From this description it will be seen that in this application of the invention the portion of the vessel inclosed by the frame takes the place and acts in a manner similar to that of the piston hereinbefore referred to. When desired, the cushion of water, air, or gas can be obtained or maintained by forcing the same into the space inclosed by the frame in any suitable manner.

Instead of connecting the frame with the bottom of the vessel, it may be connected in a similar manner to a platform or raft, on which the vessel is placed. When it is desired to transport large vessels a floating-dock or receptacle open at the bottom is provided round the lower edge with a projection, which works, after the manner of a piston, in a frame, substantially as hereinafter described.

I will now proceed to refer to the accompanying drawings, in which the same letters of reference indicate similar parts in the several figures.

Figure 1 is a longitudinal section, and Fig. 2 a plan of the simplest form of the apparatus.

A is the piston, B the frame, and C the way or track. The piston and frame are shown constructed of a circular form. The body or bodies to be transported rest on the upper part, *a*, of the piston. The piston A can be made hollow, as shown in the drawings, in which case it can be used for containing water or compressed air, for the purpose of supplying the place of any water or air escaping from the body or cushion of the same contained by the frame, such supply being effected by valves, force-pumps, or any other suitable and known means.

The apparatus is provided with wheels *ddd*, which, when the apparatus is not in use, are brought into contact with the ground for the purposes of traction.

If desired, the bottom *a'* of the piston may be dispensed with.

In the drawings, cupped leathers *ee* are shown for effecting the working of the piston A within the frame B in a water-tight or air-tight manner.

Fig. 3 is a longitudinal section of an apparatus in which a receptacle, F, composed of any suitable flexible material, such as leather, sheet lead or steel, or corrugated plates, is provided for containing compressed air, such receptacle being connected with the piston and frame, respectively, at *f* and *f'*. The compressed air, or a portion thereof, contained in the receptacle F can be introduced into the upper part of the space inclosed by the frame for the purpose of supplying the place of any water that may escape. In this figure the lower part of the frame is shown provided with an arrangement for effecting a water-tight contact with the way or track. This arrangement consists of a series of bristles, G, mounted on a band, over which and within an enlargement, *b'*, of the frame is arranged a bladder or flexible receptacle, H, containing compressed air, the elasticity of which will always tend to keep the whole of the bristles in contact with the way or track respectively of any slight irregularities on the surface of the latter. The apparatus is shown in this figure arranged in a channel containing water, which materially assists in reducing friction.

Figs. 4 and 5 are respectively plan and end views of the apparatus shown in Fig. 3.

Fig. 6 is a longitudinal section of the floating dock or receptacle for the transport of large vessels. I is the body of the dock or receptacle, which contains the water for floating the vessel, and which is open at the bottom to allow the water to rest on the way or track, thereby reducing the amount of friction when being moved. A is the projection on the lower edge of the dock or receptacle, which projection works, in a manner similar to that of a piston, in a water-tight or air-tight manner, within the frame B, and is supported by the cushion or body of water *b*, contained by the latter. The said cushion or body of water *b* may in some cases be kept supplied from the dock or receptacle by the pressure of the water contained therein through any suitable valve or valves.

Fig. 7 is a plan of Fig. 6.

The action of the apparatus is as follows: The frame and piston having been arranged on the way or track, a quantity of water, air, or gas is forced by any suitable means into the space contained by the frame, thus raising the piston, which will ride on the cushion or body of water, air, or gas thus forced beneath it. As the cushion or body of water, air, or gas will slide along the way or track with little or no resistance, the amount of force required for drawing the whole will be little more than that

required to overcome the friction caused by the contact of the lower edge of the frame with the way or track. When a constant supply of water at a sufficient pressure to support the frame, piston, and load can be placed in communication with the space inclosed by the frame the latter may be connected to the piston, as the whole will then be capable of riding on the body of water thus supplied and maintained.

When desired, a pipe may be laid along the way or track and provided with valves at certain intervals, so that the apparatus can be supplied with water or compressed air or gas at any part of its journey, such water, air, or gas being obtained from reservoirs suitably placed, or a suitable machine for compressing the air can be arranged in connection with the apparatus. When the said pipe is arranged beneath the way, the valves may be opened through the medium of a lever by a projection attached to the piston, so that on the latter descending, owing to the quantity of water, air, or gas beneath decreasing, the said projection will come into contact with the lever and open the valve when the frame is immediately above, and the valve may either be constructed to close automatically or a second projection may be provided for closing the same.

It will be understood that any suitable and known power and method of applying the same may be employed for drawing or propelling the apparatus.

What I claim is—

1. The combination, with the way or track, of a frame and piston or analogous contrivance arranged to inclose a cushion or body of water, air, or gas on an even and smooth way or track in such a manner that the said piston and any desired weight will be supported or counterpoised by the said cushion or body of water, air, or gas, substantially as and for the purposes hereinbefore described and set forth.

2. The method of supporting and counterpoising heavy bodies for the purpose of transportation, consisting in supporting said bodies by a cushion of water or other fluid confined within a movable receptacle, and exerting its pressure both upon the walls of the receptacle and upon a permanent way, over which the receptacle and the confined body of water or other fluid are moved, substantially as specified.

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