(No Model.)

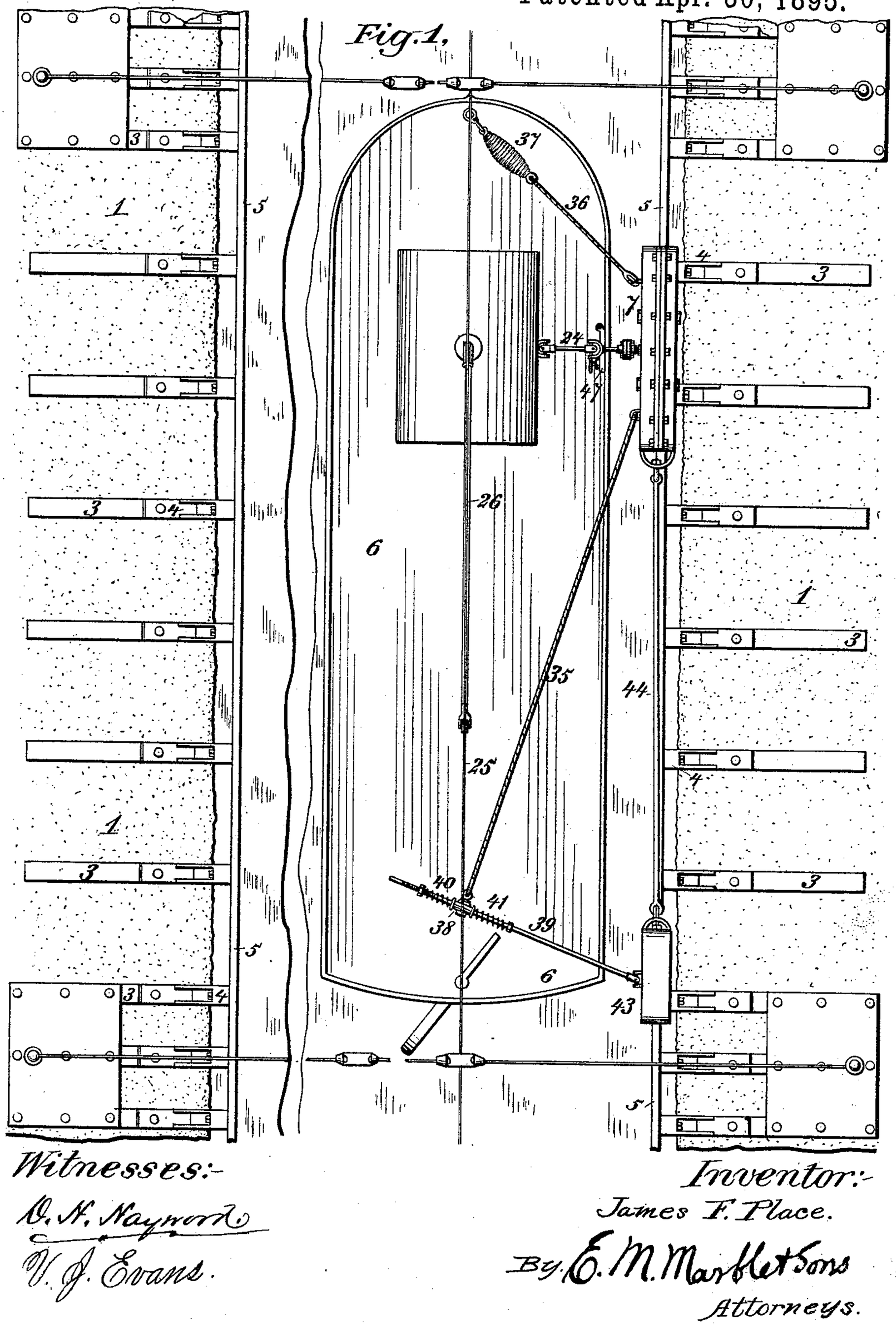
4 Sheets—Sheet 1.

J. F. PLACE.

BOAT PROPULSION.

No. 538,278. Patented Apr. 30, 1895.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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BOAT PROPULSION.

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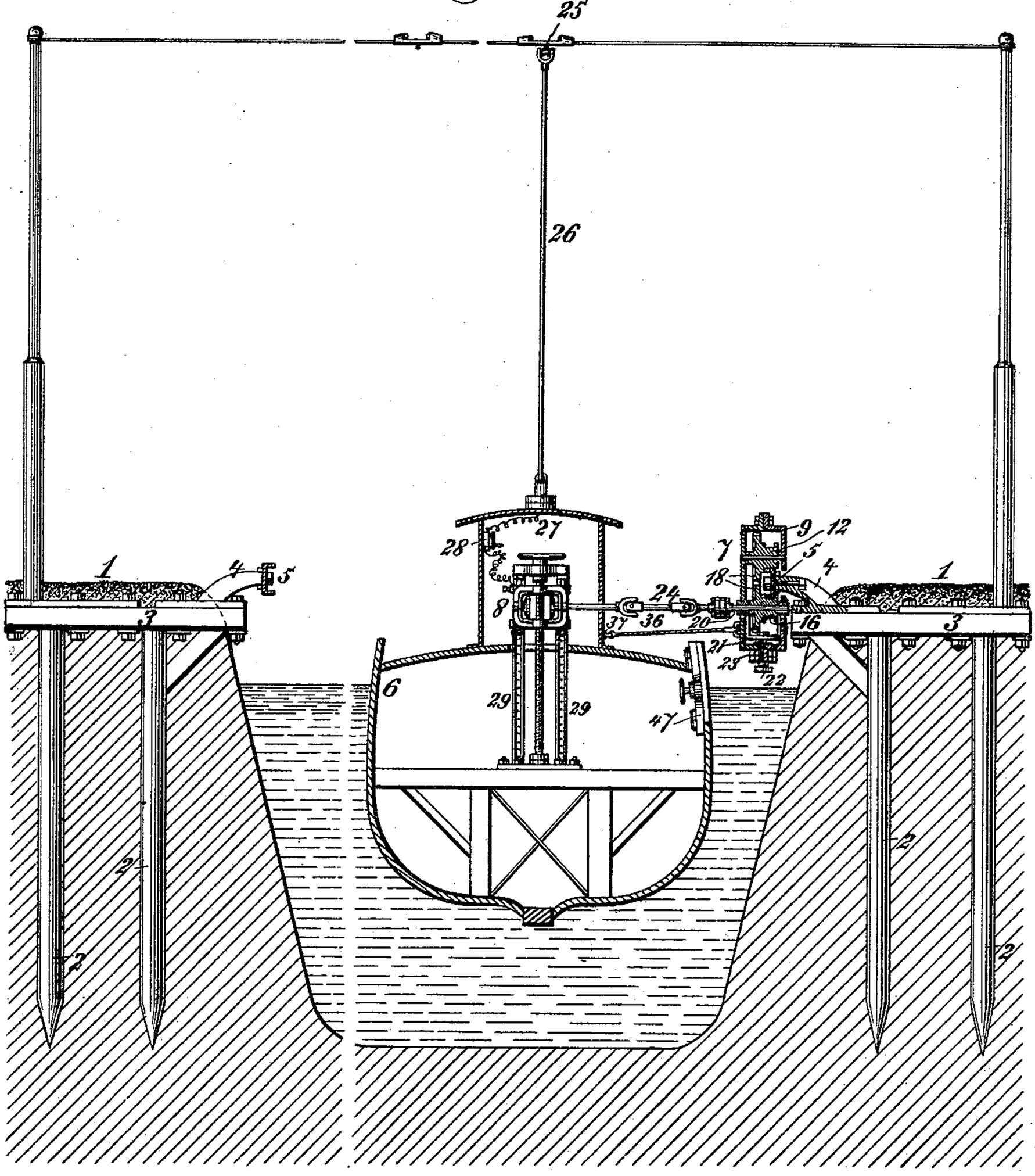
Fig. 2,



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(No Model.) 4 Sheets—Sheet 3.

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BOAT PROPULSION.

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Fig. 4.

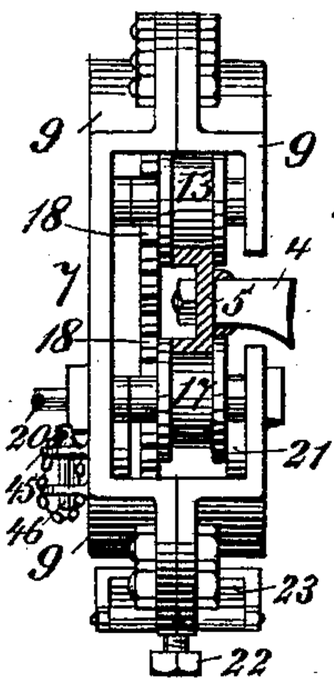


Fig. 3.

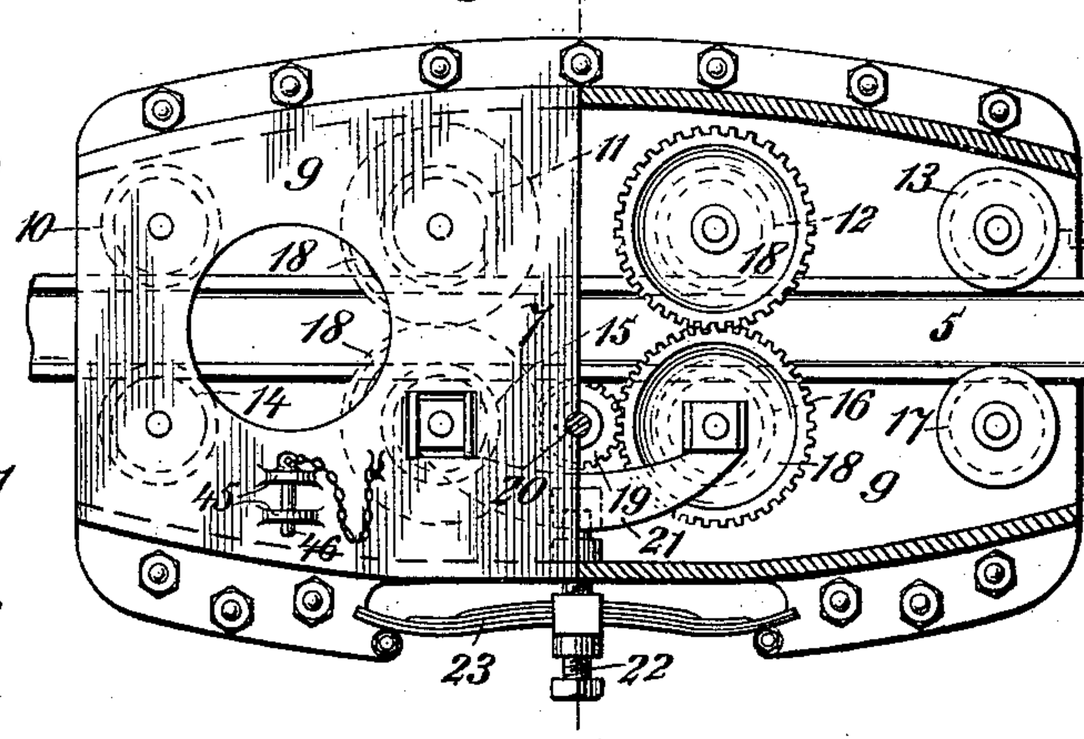


Fig. 5.

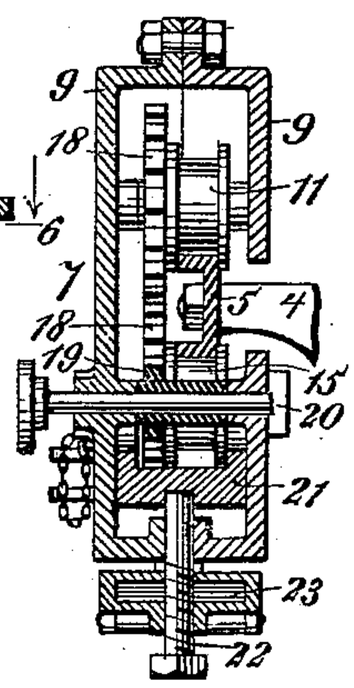


Fig. 7.

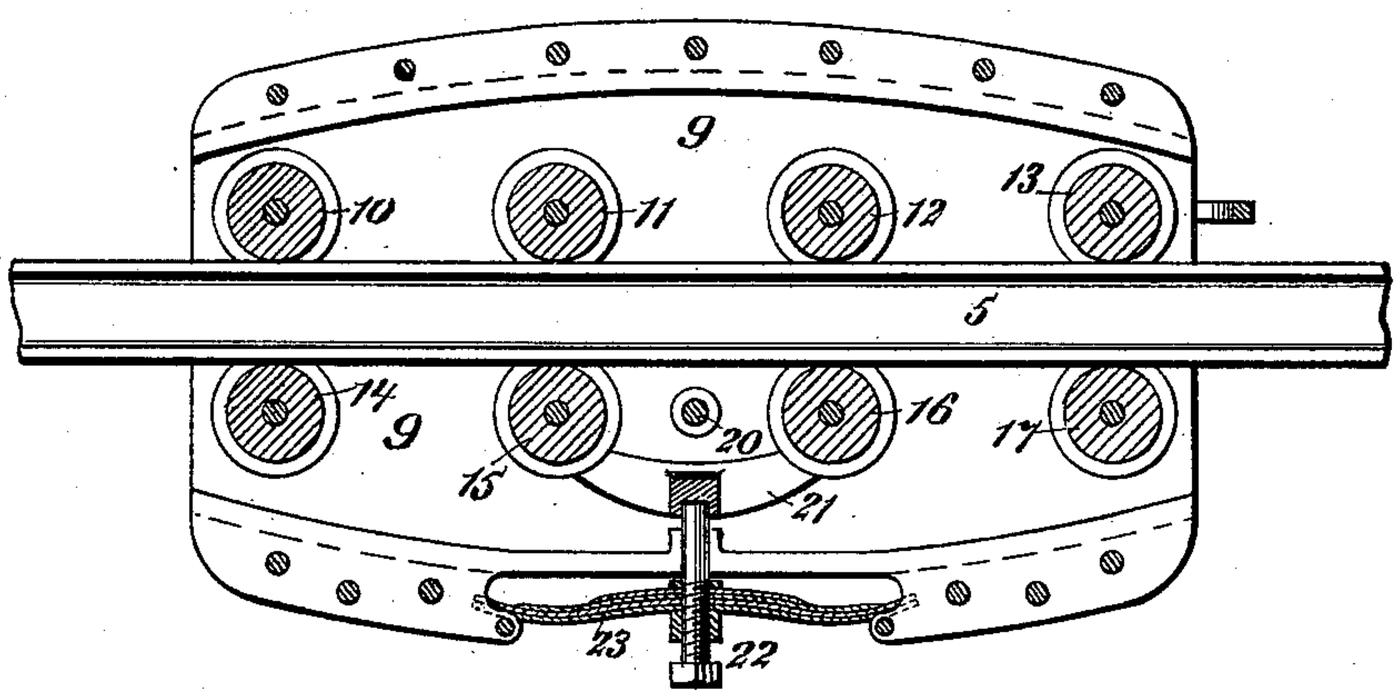
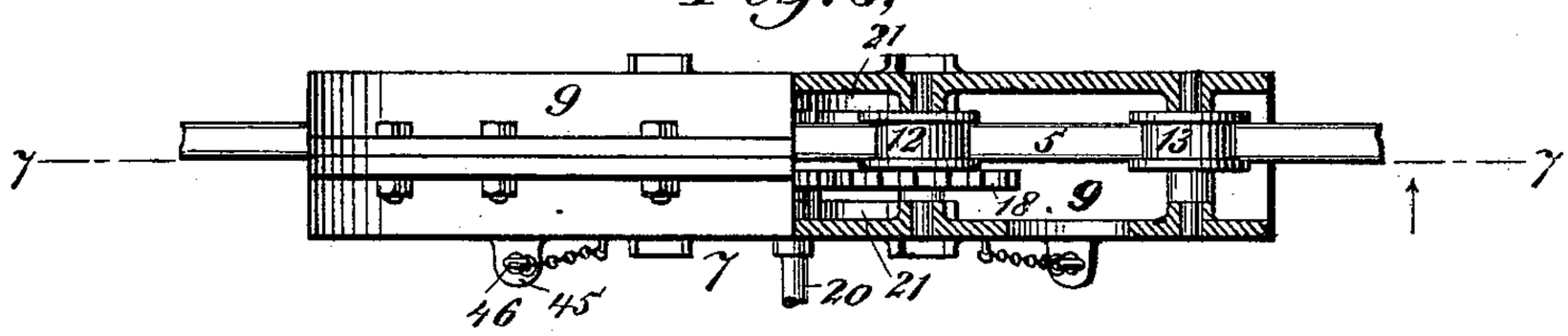


Fig. 6.



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(No Model.) 4 Sheets—Sheet 4.

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BOAT PROPULSION.

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Fig. 9.

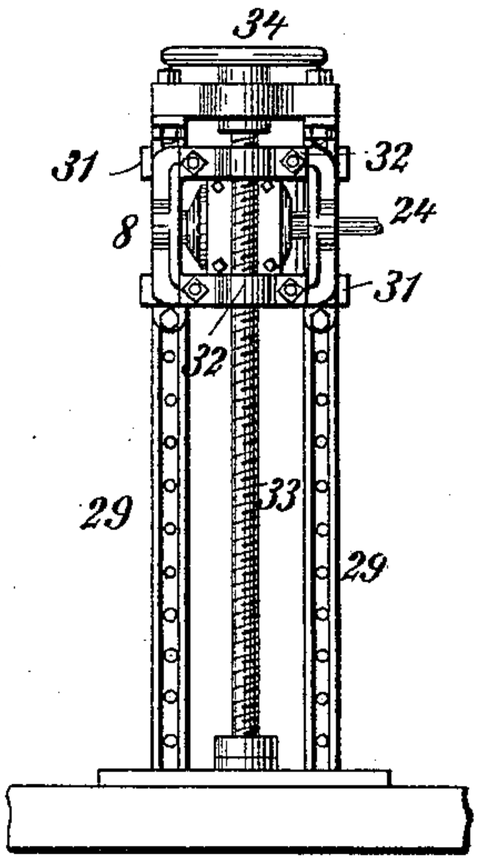


Fig. 8,

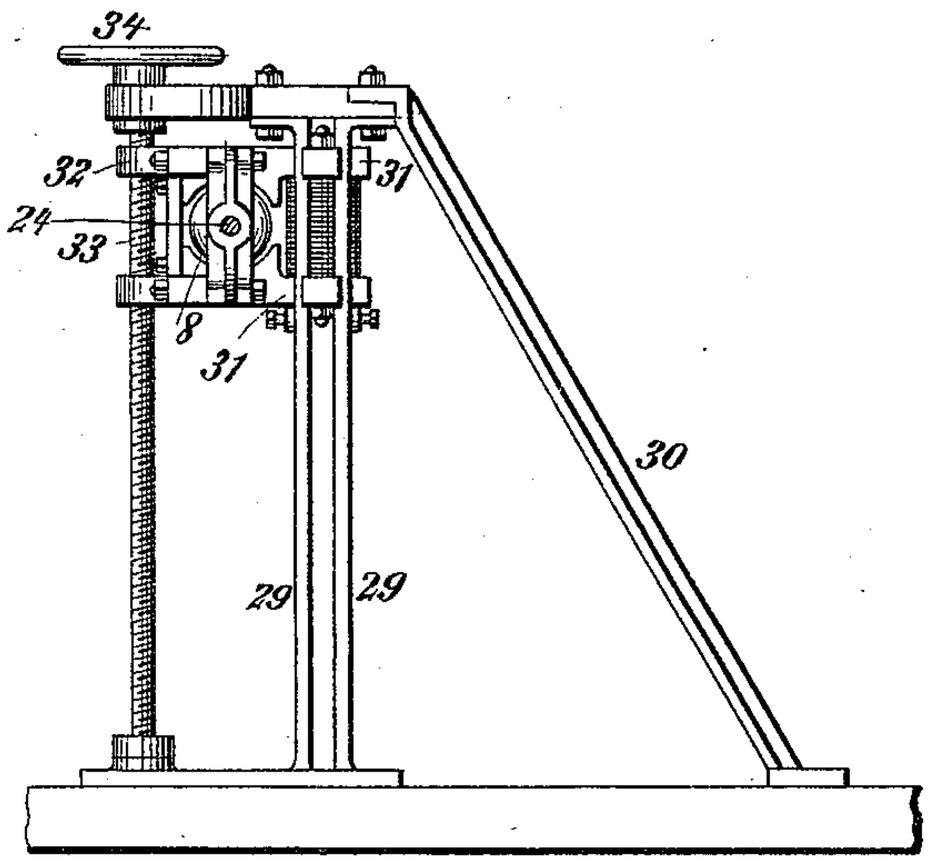


Fig. 11,

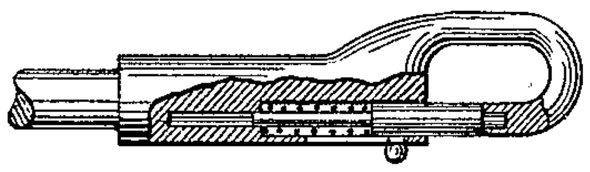


Fig. 12,

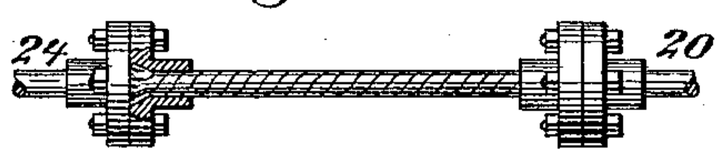
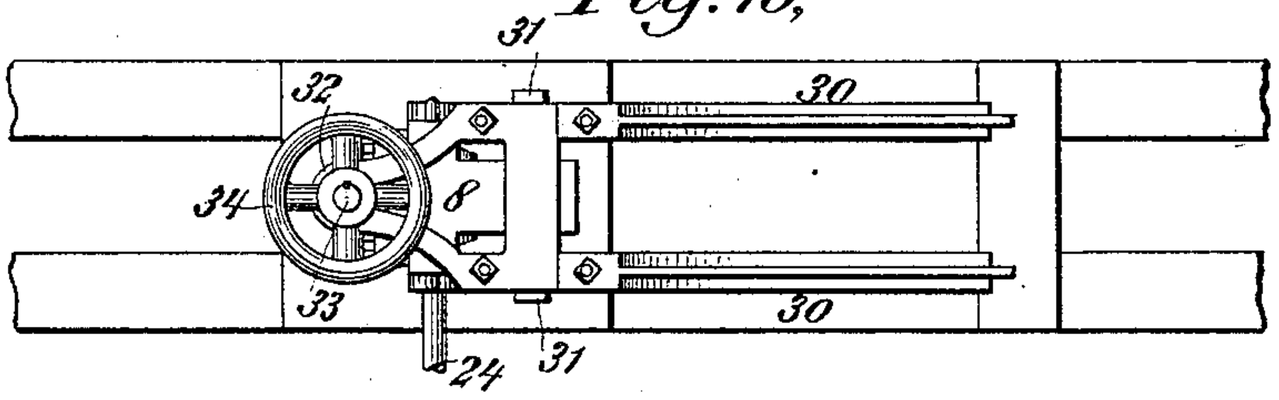


Fig. 10,



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UNITED STATES PATENT OFFICE.

JAMES F. PLACE, OF MONTCLAIR, NEW JERSEY, ASSIGNOR OF ONE-HALF TO CHARLES S. UPTON, OF NEW YORK, N. Y.

BOAT PROPULSION.

SPECIFICATION forming part of Letters Patent No. 538,278, dated April 30, 1895.

Application filed April 23, 1894. Serial No. 508,639. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. PLACE, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Boat Propulsion; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the propulsion of vehicles; and while it may be applied to the propulsion of vehicles upon land, it is more especially intended to be applied to the propulsion of boats upon canals or other waterways.

In my invention, in order to avoid the necessity of using a screw propeller, the boat is towed by a car traveling on a track which may be located upon the bank of the canal or water-way, or may be suspended over such water-way. With a view to making this car as light as possible, so that a light and easily constructed track may be employed, I locate the motor or engine by which the car is propelled upon the boat itself, and provide means for transmitting the motion of this motor to the wheels of the car; and in order to give the car great tractive power, I provide means for causing the wheels thereof to grip the track rails tightly.

I may use many different forms of motors, such, for instance, as steam, gas, or oil engines, or even, under some circumstances, wind motors; but I contemplate particularly the use of electric motors, and in the drawings accompanying this specification such an electric motor is shown.

My invention consists in the novel means used for propelling the vehicle, in the novel construction of the propelling car, in the novel means and mechanism for transmitting motion from the motor to the wheels of said car, in the novel construction of the track upon which the car travels, and in the novel mechanism employed for towing the boat from the car.

The objects of my invention are, first, to provide a light, cheap, and easily constructed track upon which the towing or traction car can travel; second, to provide a car suitable for traveling on the track, and which shall be strong and as light as possible; third, to provide means for causing the wheels of said car to grip the track positively, thereby securing increased tractive power for the car; fourth, to provide means for transmitting the motion of the motor on the vehicle to the wheels of said towing car; fifth, to provide suitable mechanism for causing the motion of the car to propel the vehicle, and, sixth, to make the whole mechanism strong, durable, simple, easy of application to any of the canals and canal boats now in use, and as inexpensive as possible. These objects are attained in the invention herein described and illustrated in the drawings which accompany and form a part of this application, in which the same reference numerals indicate the same or corresponding parts, and in which—

Figure 1 is a plan view showing a portion of a canal with tracks on both sides thereof, a boat within the canal and a towing or traction car therefor on one of the tracks, and a conducting wire and trolley for conveying electric current to an electro-motor on the boat. Fig. 2 is a cross-section of the canal and of the boat therein, showing particularly the position of the motor within the boat and the means for transmitting motion therefrom to the wheels of the traction car. Fig. 3 is a side elevation and partial section of the traction car, the sectional part of the figure showing how the wheels of the car are caused to grip the track rails. Fig. 4 is an end elevation of the traction car; and Fig. 5 is a transverse section of the same on the line 5 5 of Fig. 3. Fig 6 is a plan view and partial section of the traction car, the section being taken on the line 6 of Fig. 3. Fig. 7 is a sectional elevation taken on the line 7 7 of Fig. 6. Fig. 8 is a side elevation of the support for the motor, showing how the position of the motor may be adjusted vertically; and Figs. 9 and 10 are respectively an end elevation and a plan view of the same. Fig. 11 is a detail view of the coupling used for attaching the towing rope or rod to the boat; and Fig. 12 shows a flexible shaft which may be substituted for the shaft with universal joints which transmits motion from the motor to the traction car.

In the drawings, 1 1 are the two banks of the canal. In the banks, at suitable intervals, are driven piles 2, 2, supporting horizontal ties 3, 3. The piles and ties form a framework for supporting the rails upon which the traction cars run; but this framework of course may be constructed in any desired or customary manner. It will ordinarily be buried somewhat below the surface of the earth, as shown, so that the use of the banks of the canal for tow paths may not be interfered with. Secured to the framework are brackets 4, 4, to the ends of which are fastened the rails 5, 5, upon which the traction cars travel. The rail may be of various forms, but the form of rail shown in the drawings seems to be especially suitable. It has a cross-section similar to that of ordinary "channel" iron, the shorter sides forming the tread surfaces of the rail.

6 is a boat within the canal, and may be of any ordinary construction.

7 is the traction car, traveling on the rails 5, by which the boat is propelled. As has been previously outlined, this traction car receives its motion from a suitable motor 8, which will usually be an electric motor, but may be a steam, oil, or gas engine, which motor is located on the boat itself. The traction car is most clearly shown in Figs. 3 to 7 inclusive, to which attention is now directed. The car consists of a frame and casing, 9, in which are journaled wheels 10, 11, 12, and 13, above the rail 5, and wheels 14, 15, 16, and 17, below the rail. Of these wheels, those at the ends, that is, 10, 13, 14, and 17, are guide wheels which keep the car on the track, while 11, 12, 15, and 16 are grip wheels, which may be caused to press against and so to grip the rails, thereby securing increased tractive power for the car. The guide wheels at the ends of the car are provided with flanges which overlap the sides of the rail, and the central or grip wheels will usually be provided with similar flanges, though if desired these wheels may be formed without flanges.

The grip wheels 11 and 15, and 12 and 16, are geared together by spur gears 18, 18, and are thus caused to rotate together. The two lower spur wheels, 18, 18, intermesh with a pinion 19 on a shaft 20. Through this shaft motion is communicated from the motor 8 on the boat to the pinion 19, and so through the gear wheels 18 to the grip wheels, thus causing the car to move forward.

In order to permit the use of a light track, and in order to prevent excessive wear of this track, it is necessary to make the traction car as light as possible; and inasmuch as the weight of the car will not be sufficient ordinarily to give enough tractive force to move a heavily loaded boat, it is necessary to provide special means for obtaining increased tractive power without increasing the weight of the motor. To this end, the journal boxes of the two lower grip wheels 15 and 16 are made vertically movable, and are supported by a yoke 21, seen in Figs. 3, 5, and 7. A screw 22 bears against the bottom of this yoke, and a spring 23 tends to press the screw upward, and so to press the grip wheels 15 and 16 against the bottom of the rail 5. By turning the screw 22 the strength of the pressure against the rail may be adjusted as desired.

Motion is communicated from the shaft of the motor to the pinion shaft 20 of the traction car by means of a shaft 24. In order to make due allowance for inevitable changes in the relative positions of the boat and traction car, this shaft 24 is connected to the motor shaft and to the pinion shaft 20 by means of universal joints, as is shown in Figs. 1 and 2.

In the drawings, the motor shown for propelling the boat is an electric motor, which receives its current from an overhead conducting wire 25 suspended over the canal in the same manner that the conducting wires of electric street railways are usually suspended; but other means of supplying current to the motor may be used if desired. The boat is provided with an ordinary trolley pole 26, and a wire 27, to which may be connected a suitable circuit controller and speed regulator 28 for controlling the speed of the motor, conducts the current from the trolley to the motor. The return circuit may be through the motor shaft, shaft 24, pinion shaft 20, the traction car 7, and the rails 5, in which case an increased tractive power due to the passage of the current through the wheels of the car 7 to the rails will be obtained, or the current may be grounded by connecting the motor with a metallic plate placed on the outside of the boat in contact with the water in the canal.

The relative positions of the motor on the boat and traction car will differ considerably according as the boat is loaded or unloaded. While the universal joints of the shaft 24 will permit of considerable change of position of the motor without interfering materially with the transmission of power, still it is very desirable that the motor and car shall always be as nearly in line as possible, so that too much strain may not be thrown upon the parts of the universal joints. Therefore I do not secure the motor directly to the frame-work of the boat, but secure it to a suitable framework upon which it may be adjusted vertically.

The framework for supporting the motor is shown in Figs. 8, 9, and 10, and consists, essentially, of two vertical guides, 29, secured to the framework of the boat, and provided with suitable braces 30. The pole pieces 31 of the motor are provided with projections adapted to slide on these guides and are arranged to be secured thereto at any desired position by means of bolts or pins passing through the guides 29. To the front side of the pole pieces is secured a plate 32, which must be of some non-magnetic metal such as bronze so that it may not short-circuit the magnetic field, and this plate is provided with projecting lugs through screw-holes in which

passes a vertical screw 33, suitably supported, by turning which the motor may be raised or lowered. In adjusting the position of the motor the bolts securing it to the guides 29 are removed, so as to leave the motor free to slide up and down, and the screw 33 is turned by means of the hand wheel 34 or by other suitable means, raising or lowering the motor until it has reached the desired position. The motor is then bolted to the guides 29 as before.

If desired, suitable gearing connecting the shaft of the motor with the screw 33 may be provided so that the motor may be caused to raise and lower itself.

The apparatus for communicating the motion of the traction car 7 to the boat is best shown in Fig. 1. A rope 35 is secured to the boat, at a point near the stern, and to the rear end of the traction car. This is the towing rope. Another rope 36, to which preferably should be connected a strong spring 37, connects the bow of the boat with the traction car, and performs the double function of preventing the boat from running by the car when the motor is stopped, and of preventing the bow of the boat from swinging outward, which it would otherwise do, since it is towed from the stern.

To prevent the stern of the boat from swinging either inward or outward, there is pivoted to the boat, at a point near the stern, a centrally apertured block 38, through which passes a rod 39. Buffer springs 40 and 41 bear against the ends of the block 38 and against adjustable projections on the rod 39. The rod 39 is connected to a trail car 43 on the rail 5, which trail car is connected with and receives its motion from the traction car 7 by means of a rod 44. If the stern of the boat for any reason commences to swing, one of the springs 40 or 41 will be compressed, thus checking such movement.

The trail car 43 is in general similar to the traction car 7, but is shorter and smaller, having no grip wheels and no connection with any motor.

It will be seen that by the apparatus just described the boat is held parallel to the rails and the relative positions of the boat and traction car remain substantially the same at all times, the car being prevented from running ahead or falling behind the boat. The rod 39 likewise prevents the stern of the boat from swinging inward, and should there ever be a tendency for the bow of the boat to swing inward, the shaft 24 and motor shaft will be able to withstand sufficient thrusting pressure to resist this.

If desired, rigid rods may be substituted for the ropes 35 and 36, in which case it would be impossible for the bow of the boat to swing in.

In order to provide for the ready uncoupling of the ropes or rods 35 and 36, they may be provided, at least at the ends which connect with the boat, with couplings such as shown in Fig. 11, which are opened by pressing backward a sliding pin. This construction is common, and needs no detailed description. At the ends where these ropes or rods connect with the car 7, they will usually be provided with rings which may be placed between lugs 45, 45, projecting from the frame of the car, as shown in Fig. 3, and a coupling pin 46 may then be passed through holes in these lugs and through the ring.

To detach the shaft 24 from the pinion shaft 20, the latter shaft may be provided with any of the ordinary shaft couplings by which a limb of one of the universal joints of the shaft 24 may be connected to said pinion shaft.

If desired, the shaft 24 with universal joints at the ends thereof may be replaced by a flexible shaft of any usual or ordinary construction, such as that shown in Fig. 12. In such case no universal joints are necessary. If a flexible shaft is used, it is necessary that some means be provided for keeping the boat so far out from the bank of the canal that the flexible shaft may be nearly straight at all times. This may be effected by using rigid rods for the connections 35 and 36, as already suggested, or a rod such as 39, with buffer springs, may be placed near the bow of the boat and connected to the traction car 7 in the same manner that the rod 39 is connected with the trail car 43.

Ordinarily it will be desirable to have the rails 5 at nearly the level of the bank of the canal, so as not to interfere with the tow lines of boats pulled by horses. In the drawings I have shown the track so placed. Where the track is placed low down, however, when a boat is unloaded and floats high in the water the motor will have to be lowered considerably below the deck of the boat in order to bring the motor shaft down to the level of the pinion shaft 20. It is necessary, therefore, that there should be an opening in the side of the boat through which the shaft 24 may pass. This opening need not be wide, so that it will not weaken the boat. When the boat is so low down in the water that the shaft 24 may pass above the deck of the boat, this opening in the side of the boat may be closed by a suitable shutter or cover 47, shown in Fig. 2, which may be provided with suitable fastenings to hold it in place and clamp it down firmly so as to prevent the entrance of water.

The operation of my invention is as follows:—In connecting the traction car to the boat, the traction car, with its trail car behind it, is moved up alongside the boat and to a point opposite the motor. The bow and stern lines 36 and 35 are then put in place and the stern rod 39 connected with the trail car. The position of the motor is then adjusted vertically by turning the screw 33, as previously explained, until the motor shaft is in line with the pinion shaft of the traction car, and the shaft 24 is connected to said pinion shaft. By turning the screw 22 the pressure of the grip wheels against the rails is ad-

justed so as to give the required tractive power for pulling the boat. The trolley is then brought into contact with the conducting wire. When the circuit of the motor is completed through the switch 28 the motor shaft is caused to revolve, communicating motion through the shafts 24 and 20, pinion 19, and gear wheels 18 to the grip wheels of the car, thus causing the same to move forward, and pull the boat along. The car may be separated from the boat by reversing the operations just described.

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

1. In a system of boat propulsion, the combination, with a boat upon a water-way, and a track beside said water-way, of a car on said track arranged to move said boat, a motor on said boat, means for adjusting the position of the motor within the boat to correspond with the position of the car, and means for connecting the motor to the car to give movement thereto, substantially as described.

2. In a system of boat propulsion, the combination, with a boat upon a water-way, and a track beside said water-way, of a car on said track arranged to move said boat, a motor on said boat, means for adjusting vertically the position of the motor to bring it in line with the car, and means for connecting the motor to the car to give movement thereto, substantially as described.

3. In a system of boat propulsion, the combination, with a boat upon a water-way, and a track beside said water-way, of a car on said track arranged to move said boat, a motor on said boat, vertical guides for said motor, means for adjusting the position of said motor upon said guides, and means for connecting the motor with the car to give movement thereto, substantially as described.

4. In a system of boat propulsion, the combination, with a boat upon a water-way, and a track beside said water-way, of a car on said track arranged to move said boat, a motor on said boat, vertical guides for said motor, a screw for moving said motor up and down upon said guides, and means for connecting the motor with the car to give movement thereto, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAS. F. PLACE.

Witnesses:
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H. J. KEISER.