No. 739,091. PATENTED SEPT. 15, 1903.

I. H. LARR.

BOAT COUPLING.

APPLICATION FILED DEC. 8, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

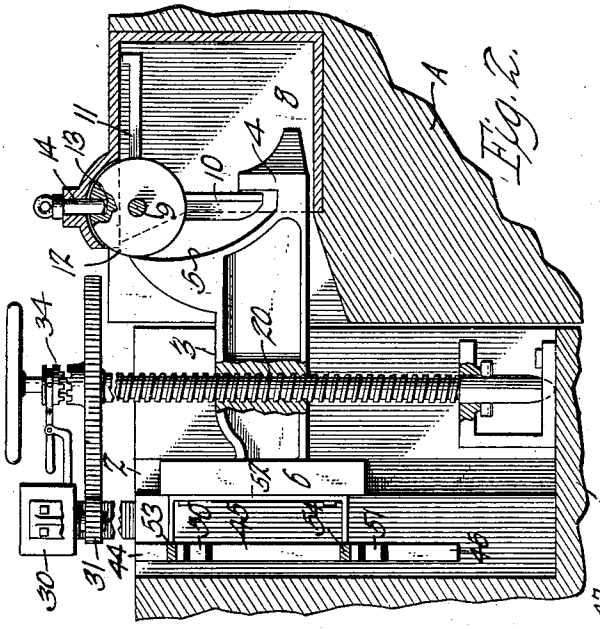


Fig. 2.

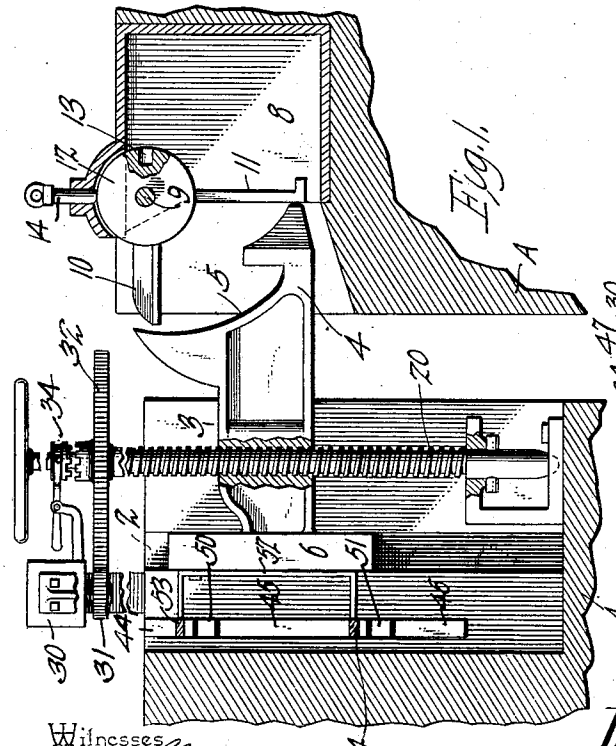


Fig. 1.

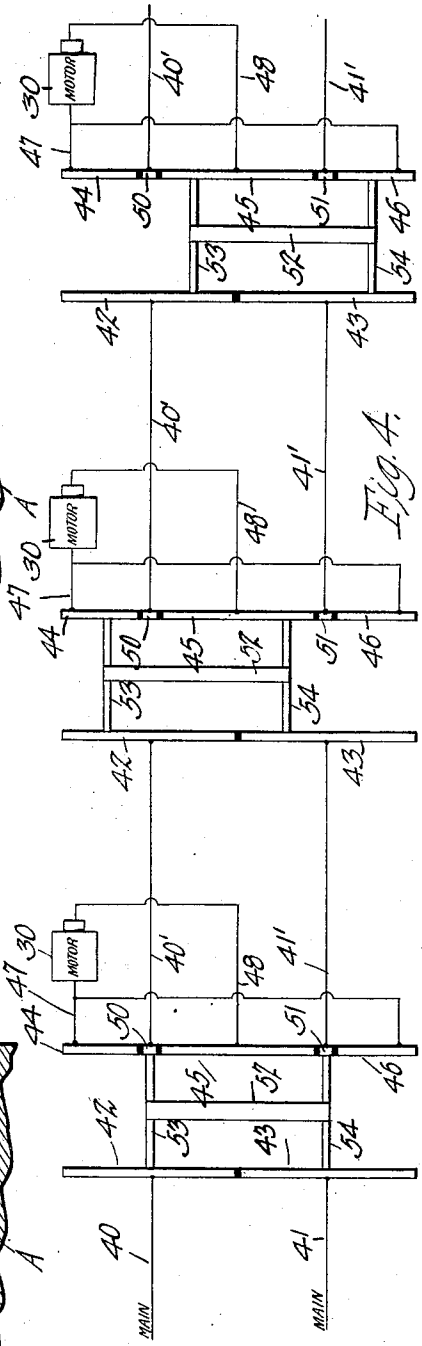


Fig. 4.

Witnesses
E. F. Stewart
Jno. E. Parker

Inventor.
Ira H. Larr,
by Cushman & Co.
Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

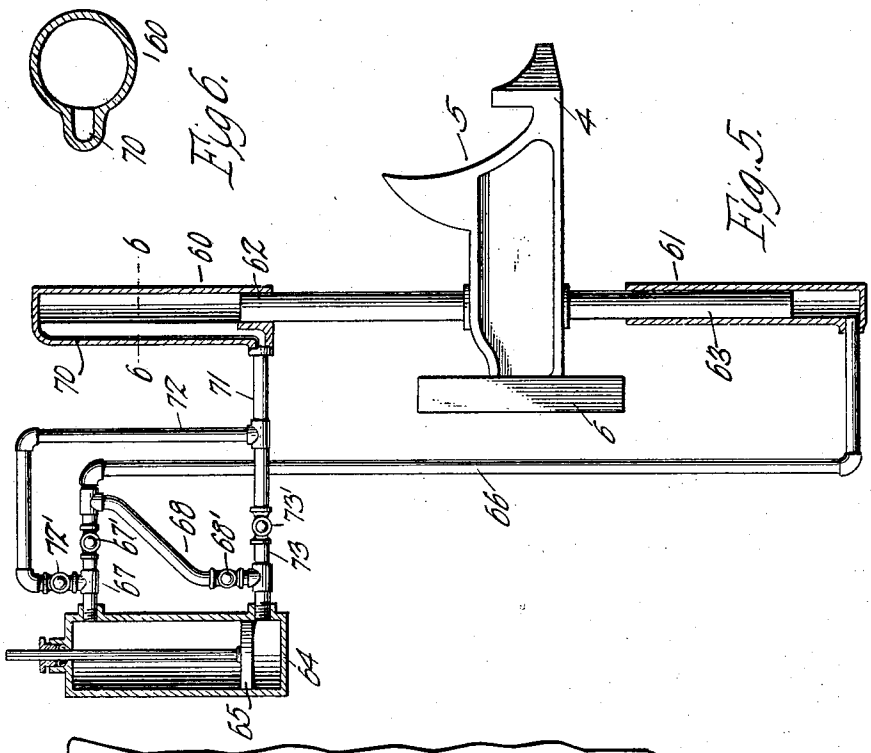
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NO MODEL. 2 SHEETS—SHEET 2.



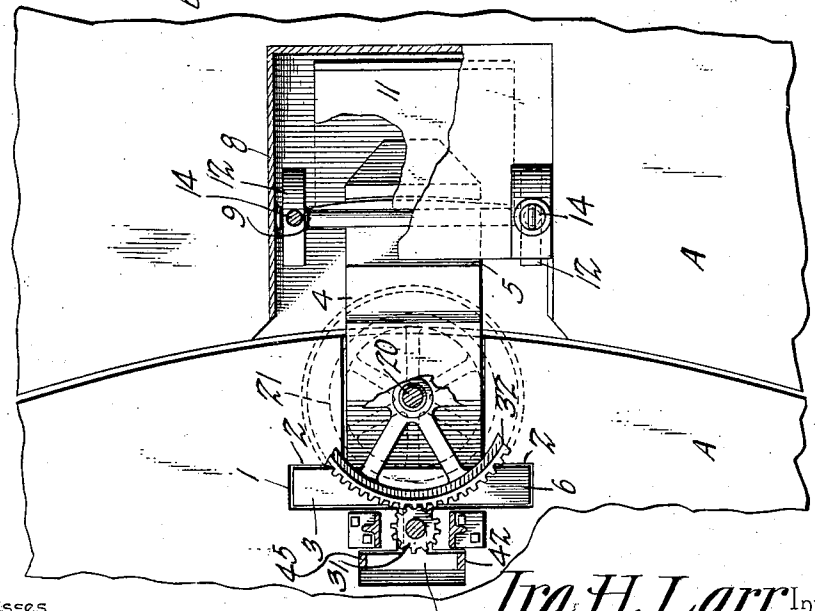


Fig. 3.

Witnesses
E. C. Stewart
Jno. E. Parkins

Ira H. Larr, Inventor.
by Cashow & Co.
Attorneys

THE NORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

No. 739,091. Patented September 15, 1903.

UNITED STATES PATENT OFFICE.

IRA H. LARR, OF SULLIVAN, INDIANA.

BOAT-COUPLING.

SPECIFICATION forming part of Letters Patent No. 739,091, dated September 15, 1903.

Application filed December 8, 1902. Serial No. 134,425. (No model.)

To all whom it may concern:

Be it known that I, IRA H. LARR, a citizen of the United States, residing at Sullivan, in the county of Sullivan and State of Indiana, have invented a new and useful Boat-Coupling, of which the following is a specification.

The invention relates to certain improvements in the construction of boat-trains, and especially in means for assembling and coupling a fleet of towing-boats in the form of a continuous but flexible train arranged behind a steamer or other towing vessel.

One of the principal objects of the invention is to provide means for coupling the towboats one to another in order to permit a limited amount of independent movement, so that the train of boats may follow the course of a winding stream.

A further object of the invention is to provide for the lessening of the resistance of a train of boats in passing through the water, especially where the boats are of unequal draft, by leveling the train of boats, so that all will be of the same draft, and thus form a smooth and practically continuous hull from end to end of the train.

A still further object of the invention is to provide improved means for effecting the leveling operation, whereby the power employed may be utilized to the best advantage by effecting the leveling of the boats in succession by comparatively small motor power, and a still further object of the invention is to provide automatic means whereby on the application of power, such as an electrical current, the leveling operation will start at the first boat and thence be continued in succession through the remaining boats of the train until all assume the same draft.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of a boat-coupling constructed in accordance with my invention and illustrating the coupling members disconnected. Fig. 2 is a similar view showing the coupling members locked together. Fig. 3 is a plan view of the coupling. Fig. 4 is a diagram illustrating the system of power transmission for operating the motors which effect the leveling of the boats. Fig. 5 is a sectional elevation of a modified mechanism for effecting the leveling of the boats. Fig. 6 is a sectional plan view of a hydraulic cylinder on the line 6 6 of Fig. 5.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures in the drawings.

The present invention relates to improvements in boat-trains of that general class described in Letters Patent of the United States granted to me on the 2d day of December, 1902, No. 714,805, and in which a series of boats are arranged in a continuous but flexible train behind a towing vessel, the boats being coupled together to permit a limited degree of independent movement by fitting the convexed bow of one boat into the concaved stern of a preceding boat.

In carrying out the present invention I provide an improved form of coupling for connecting the boats together, the couplings being so arranged as to permit after the coupling operation of the leveling of the boats, so that the draft will be uniform from end to end of the train, and thus offer little resistance to the passage of the train beyond that offered by the towing vessel.

Referring to the drawings, A indicates a number of barges or vessels each having a rounded or convexed bow and a hollow concaved stern. In the bow of each vessel is a vertically-disposed slot 1, of the contour best shown in Fig. 3, the rear or inner end of the slot being laterally extended to form recesses 2 for the reception of extensions of the coupling member 3. The coupling member 3 is provided with a forwardly-extending hook 4, the bill of which is extended in a vertical line, and to the rear of the hook is a curved guard 5, of a construction in some respects similar to that employed in the automatic car-couplers in general use. At the rear end of the coupling member is an enlarged plate 6, fitting within the recesses 2 and serving to resist the pulling strain of the towing vessel.

At the stern of each of the barges is a recess having a lining 8, which forms a metallic casing for the reception of the hook member carried by a following boat. The opposite side walls of the casing 8 are provided with bearing-openings for the reception of a spindle 9, which carries a bar or plate 10, adapted to be engaged by the hook 4, the plate 10 being of much greater width than the hook member and the contact-faces of both being arranged on lines concentric with the curvature of the bow and stern to permit the free sliding of one on the other as the boats are independently moved for steering purposes. The spindle 9 further carries a depending plate or bar 11, counterweighted to overbalance the weight of the plate 10, so that when the coupling member is free the parts will move by gravity to the position shown in Fig. 1, in readiness to receive the hook of the opposite coupling member, the end of the hook engaging the plate 11 and forcing the same inwardly, while the coupling-plate 10 moves from a horizontal to a vertical position into locking engagement with the inner wall of the hook. At each end of the spindle 9 is a disk 12, having a peripheral slot 13, adapted for the reception of a locking-pin 14, the locking-pin being loosely guided in a flanged opening formed in the upper portion of the casing 8 and moving to a locking position within the recess 13 when the disks are rotated to coupling position.

The boats are coupled together by moving one against the other, the width of the casing 8 rendering it a comparatively easy matter to introduce the hook member thereinto, and as the boats come together the hook engages and forces the plate 11 to the rear, while the coupling-plate 10 descends and its rounded outer end is caught by the guard 5 to complete the movement to coupling position. As soon as this position is reached the locking-pins 14 fall by gravity into the recesses 13 of the disks 12 and lock both members of the coupling together. To uncouple, it is merely necessary to withdraw the locking-pins and allow the boats to separate, the superior size of the weight 11 moving the coupling-plate 10 to an approximately horizontal position.

Where a train of barges are coupled together, any unevenness of draft, due to unequal loading, trimming, or other cause, will greatly increase the resistance on the train in its passage through the water, interfering materially with the proper steering of the train and rendering it necessary to employ additional power on the towing vessel. To overcome this difficulty, as well as to provide for the proper coupling of boats of unequal draft, the hook members of the coupling are vertically adjustable in order that they may be properly entered in the casings 8. An adjusting means for this purpose is illustrated in Figs. 1 and 2, wherein 20 designates a threaded spindle having its lower end swiveled in and supported below the hook member of the coupling, the coupling being provided with an internal thread for engaging the threads of the spindle, and at the upper end of said spindle is a hand-wheel 21, which may be turned in either direction to either raise or lower the coupling, as may be necessary.

When the boats are connected together, the hand-wheels 21 may be turned in order to move the coupling members to a central position, so that in boats of like build the connected members shall be at precisely the same distance below the deck and all of the boats of the train will be of equal draft. This operation may be readily effected through the couplings and their adjusting devices by throwing a portion of the weight of a heavy-laden boat on a lighter boat either to the front or rear and the character of the adjusting mechanism may be altered in accordance with the size of the boats and the requirements of use.

In Figs. 1 and 2 I have illustrated an electric motor 30, connected by a pinion 31 and gear-wheel 32 to the screw-spindle 20 for the purpose of effecting the vertical adjustment of the coupling members during a leveling operation. In practice it is preferable to effect the preliminary adjustment prior to the coupling operation by manual power, leaving the heavier work of leveling boats to a power-actuated mechanism, such as an electric motor, and in order that the power mechanism shall not interfere with the movement of the device by hand the shaft or spindle 20 is provided with a clutch member 34, which may be moved by the operator to engage or disengage the gear-wheel 32.

In order to provide for the operation of the motors with a limited amount of power, I preferably arrange the motors in a system, such as shown in Fig. 4, wherein provision is made for the operation of the motors successively, the movement of the motor to adjust the coupling to a central position causing the closing of the circuit to the next succeeding motor of the series, and so on throughout the length of the train.

In the diagram, 40 designates the main wire and 41 the return-wire, these leading from a suitable dynamo or other source of electrical energy placed at a convenient point, as on the tow vessel. The wires 40 and 41 are electrically connected to contact-strips 42 and 43, respectively, disposed in vertical alinement one above the other, a suitable strip or block of insulating material being introduced between their adjacent ends. At a short distance from the contact-strips 42 and 43 and arranged parallel therewith are a number of contact-strips 44, 45, and 46, the strip 44 being permanently connected by a line-wire 47 to one of the binding-posts of the motor 30, from which suitable connections may be made to the field and armature, and the strips 45 and 46 are connected in multiple to the opposite binding-posts of the motor by a wire 48. Between the adjacent ends of the several contact-strips 44, 45, and 46 are small contact-

blocks 50 and 51, insulated from the strips and electrically connected to current-conducting wires 40′ and 41′, which lead to the contact-strips 42 and 43 on the following boat.

To the hook member of the coupling is secured a vertically-disposed rod 52, carrying a pair of switching-strips 53 and 54, which bridge the space between the contact-strips 42 and 43 and the contact-strips 44, 45, and 46. When the hook member of the coupling is in its central position, the switching-strips 53 and 54 will be in the position shown at the left in Fig. 4, and the current from the main line-wires 40 and 41 will pass directly to the contact-blocks 50 and 51 and thence to the current-conducting wires 40′ and 41′ to the switching mechanism of the following boat, and if in this following switching mechanism the coupling is in a central position the circuit will be further extended to the next boat. If the coupling-hook is above its normal position, the switching-strips 53 and 54 will have moved from engagement with the blocks 50 and 51 as to the dotted-line position indicated in Fig. 4, in which case the current from the main wires 40 will pass through the strip 42, strip 53, strip 44, current-conducting wire 47, motor 30, wire 48, strip 45, strip 54, strip 43, and main line-wire 41 back to the source of energy and effecting a movement of the motor in the proper direction of and lowering the coupling-head to its central position, and when this central position is reached the motor will be cut out and the current conducted to the switching mechanism of the following boat. Should the coupling member be sunken below its central position, the current will flow in the opposite direction through the strip 42, strip 53, strip 45, current-conducting wire 48, motor 30, current-conducting wire 47, strip 46, strip 54, strip 43, to current-conducting wire 41, to the source of energy. In this manner the boats may be successively leveled with the application of a comparatively small amount of power and the operation is entirely automatic, the switching mechanism being so arranged as to send the current through the motor in a direction dependent on the position of the coupling.

In some cases hydraulic power may be employed to effect the vertical adjustment of the coupling members, a construction of this character being illustrated in Fig. 5, wherein 60 and 61 designate upper and lower hydraulic cylinders having plungers 62 and 63 connected to the hook member of the coupling. At a point adjacent to the cylinders is a pump-cylinder 64, having a suitable piston 65, operable by hand or power, the pump-cylinder being connected to the lower cylinder 61 by means of a pipe 66, having two branches 67 and 68 leading, respectively, to the top and bottom of the pump-cylinder and provided with valves 67′ and 68′. The upper cylinder 60 is of the peculiar construction best shown in Fig. 6, and comprising a main portion for the reception of the plunger and a connecting parallel portion 70 in communication with the main portion of the cylinder for the entire length thereof. With the lower portion of the passage 70 is connected a pipe 71, having branches 72 and 73 leading, respectively, to the upper and lower portions of the pump-cylinder and provided with valves 72′ and 73′, so that by a proper adjustment of the valves water may be allowed to flow from either cylinder or pump-cylinder and be forced by the movement of the pump-piston into the opposite cylinder, the supply of water being constant and waste prevented.

While water has been described as employed for effecting the movement of the plungers, it is obvious that glycerin or other liquid may be employed for the purpose.

Having thus described the invention, what is claimed is—

1. The combination with a plurality of boats having interfitting bows and sterns arranged on curved lines, of a boat-coupling comprising a pair of interlocking members having contact-faces arranged on curved lines to permit independent movement of the boats to which they are attached.

2. In a boat-coupling, a pair of couplings having engaging members of different width to thereby permit independent movement of the boats to which they are attached.

3. The combination with boats having curved and interfitting ends, of coupling members having their engaging portions curved on lines concentric with the ends of the boats.

4. The combination with a boat, of a coupling-hook arranged at one end, and a pivotally-mounted plate arranged at the opposite end and adapted for locking engagement with the coupling-hook of an adjacent boat.

5. A boat-coupling comprising a hook member on one boat, a pivoted plate carried by an adjacent boat, a bar or plate adapted to be engaged by the hook to move the coupling-plate to locking position, and means for locking said plates in coupled position.

6. The combination in a boat-coupling, of a hook member having a vertically-disposed bill, a casing, a spindle mounted in bearings therein, a pair of plates carried by the spindle and arranged at an angle to each other, and means for locking the spindle and plates in coupled position.

7. The combination in a boat-coupling, of a hook member and casing, a spindle mounted in bearings in the casing, a pair of plates carried by the spindle, one of said plates being counterweighted to move the other to uncoupled position, notched disks secured to said spindle, and vertically-guided pins adapted to engage said notched disks to lock the same in coupled position.

8. The combination with a plurality of boats, of an adjustable leveling member carried by one boat and engaging with an adjacent boat, and means for moving said leveling member positively in opposite directions from a higher

or lower level to a given central position to thereby effect positive vertical movement of the adjacent boat in a direction corresponding with that in which the leveling member is moved.

9. In a boat-coupling, a pair of coupling members and means for automatically moving one of said coupling members to a central or normal position.

10. In a boat-coupling, a pair of coupling members, one of said members being provided with an outer opening, a threaded spindle passing through said opening, a motor connected to the spindle, and a clutching means for engaging and disengaging the motor and spindle.

11. A boat-coupling system comprising vertically-adjustable coupling members, motors connected thereto, a source of electrical energy, current-conductors leading therefrom to the motors, and means under the control of the motors for controlling the course of the current in such manner as to effect a successive operation.

12. In combination with a plurality of boats, of adjustable coupling members connecting the boats, independent motors connected to the coupling members, a source of electrical energy, current-conducting wires leading therefrom, switching mechanism operatively connected to the movable coupling members, contacts forming a part of a switching mechanism and connected to the motor-circuits and the main current-conductors to cut out each motor when its coupling is in normal position and to effect an operable movement of the motor when out of normal position.

13. In combination with a boat having a vertically-disposed slot and laterally-extended recesses at the inner end of the slot, of a coupling member movable in said slot and provided with a laterally-extended plate engaging in the recesses, and a second mating member adapted to engage with said coupling member.

14. The combination with a plurality of boats coupled to form a continuous train, of the couplings, motors connected to the couplings for adjusting purposes, a source of electrical energy, and a circuit including the source of electrical energy and all of said motors.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

IRA H. LARR.

Witnesses:
THEODORE W. D. HUTCHISON,
P. H. BLUE.