J. S. LANE & J. L. MATHEWS.

SYSTEM OF RIVER TRANSPORTATION.

APPLICATION FILED SEPT. 23, 1907.

936,336.

Patented Oct. 12, 1909.

3 SHEETS—SHEET 1.

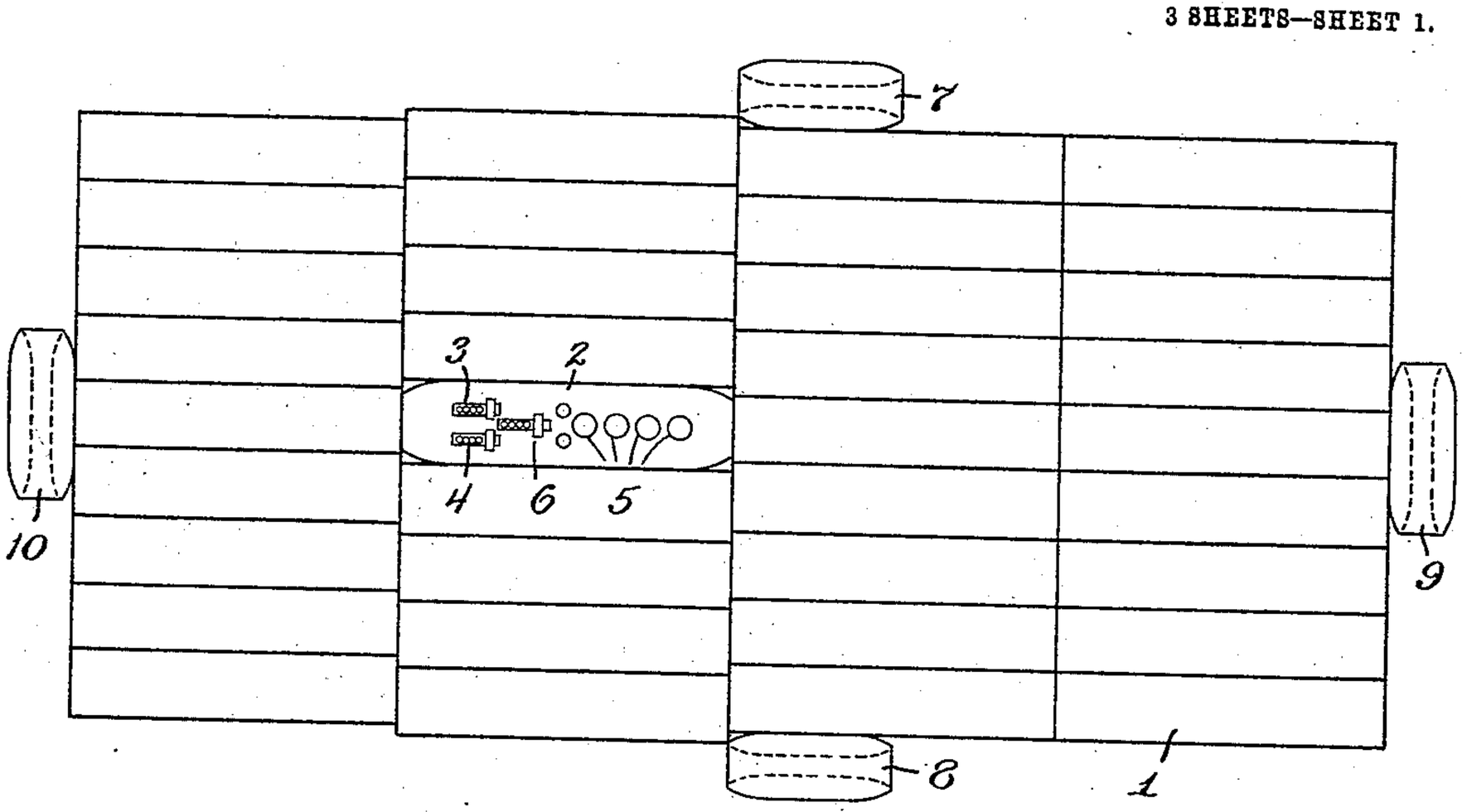

Fig. 1

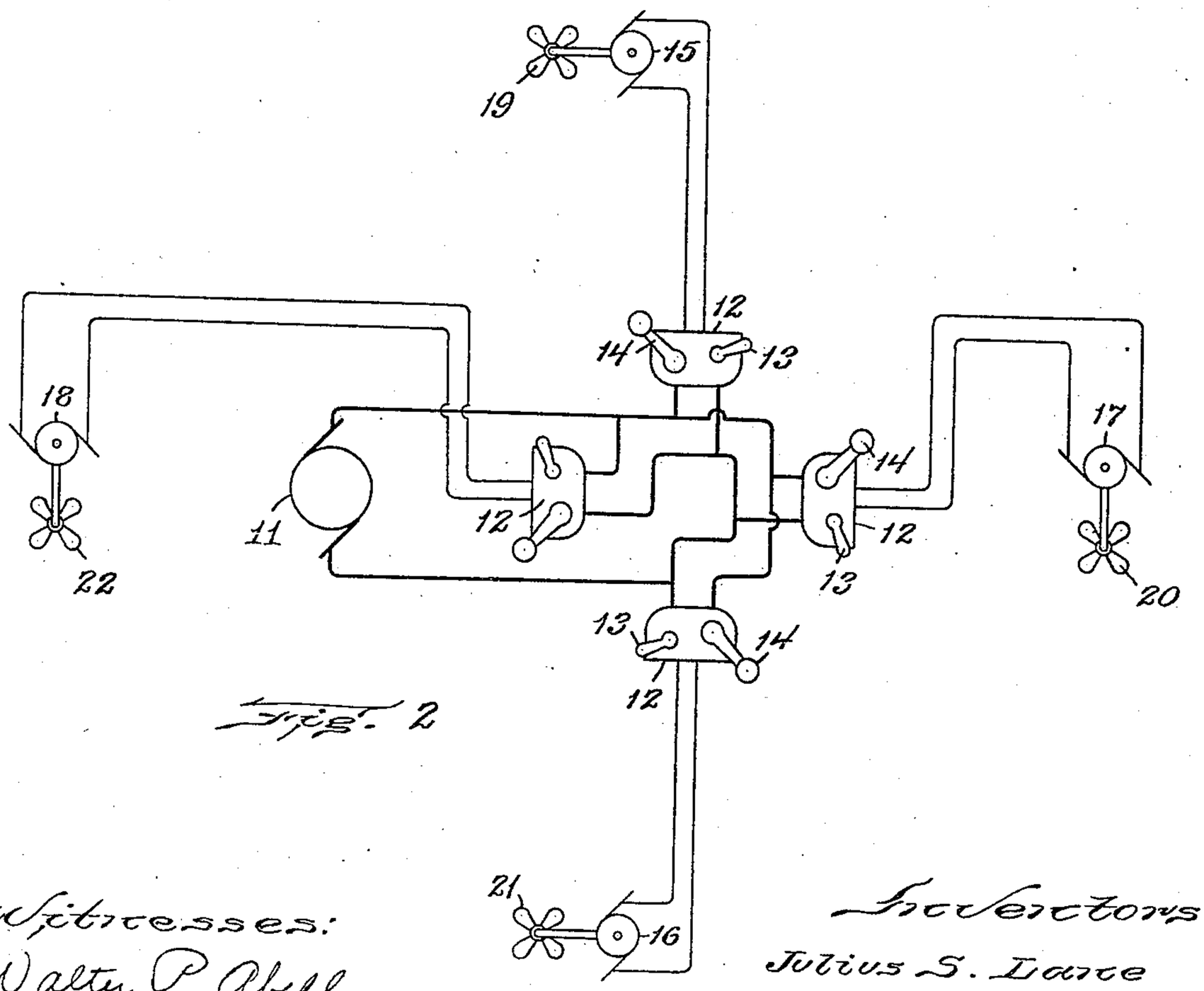

Fig. 2

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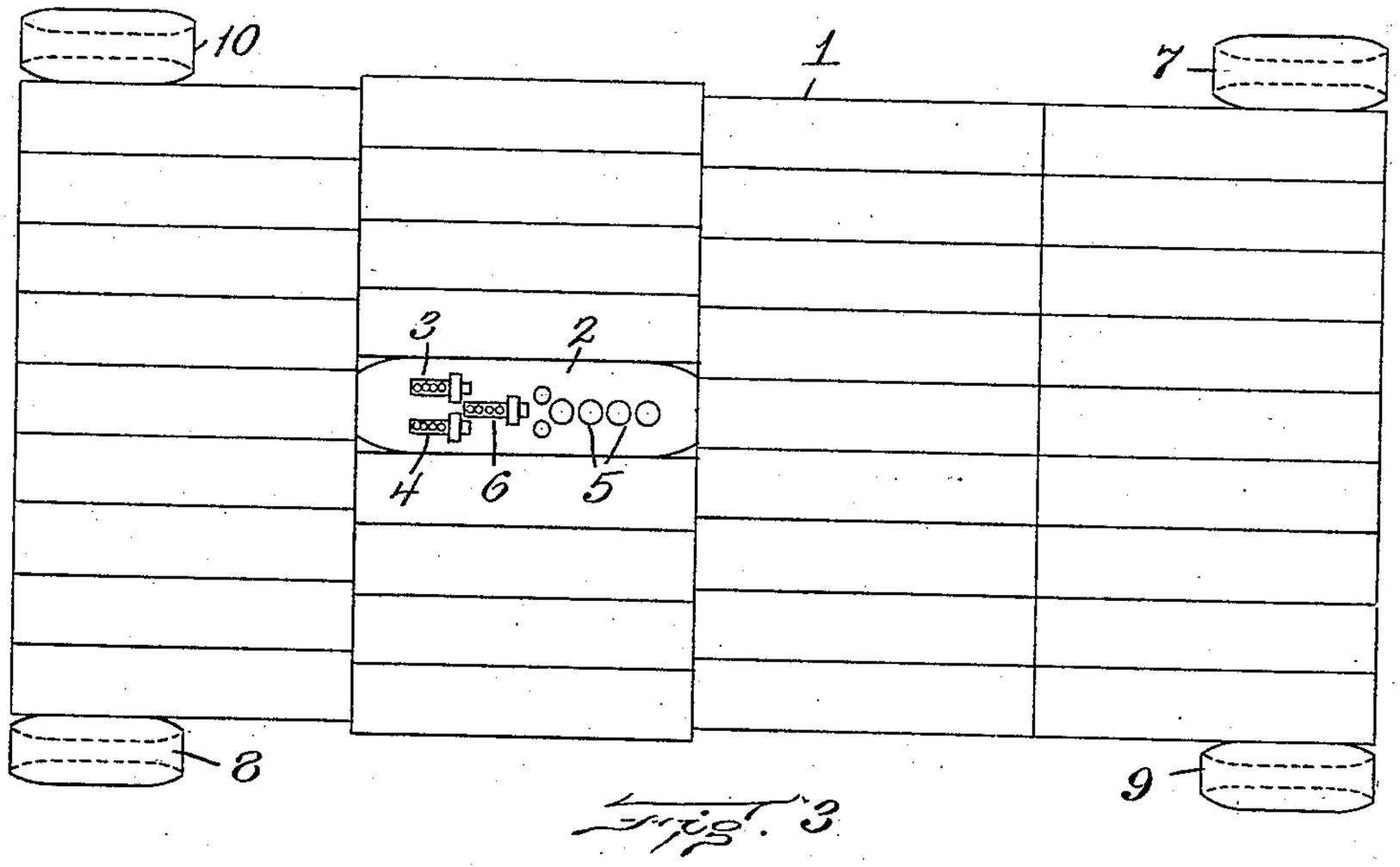

Fig. 3

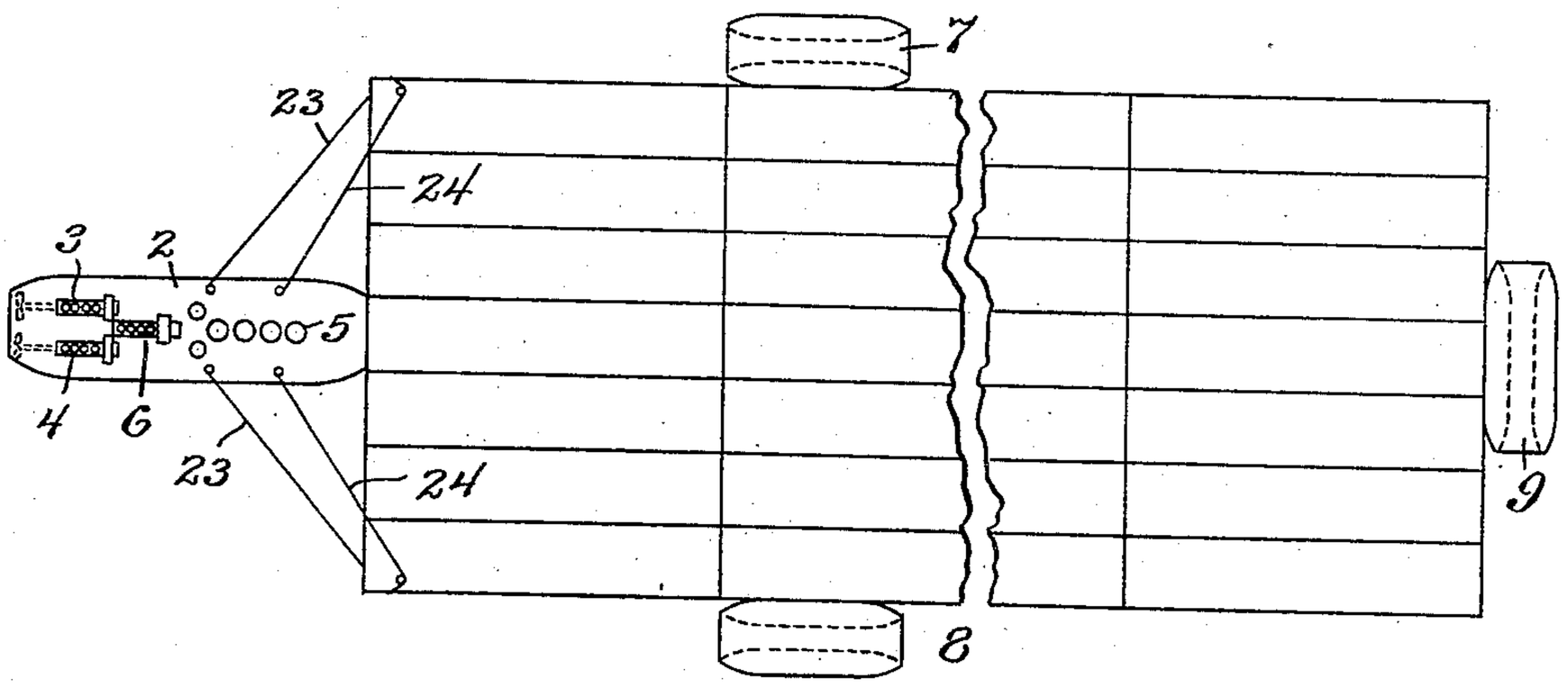

Fig. 4

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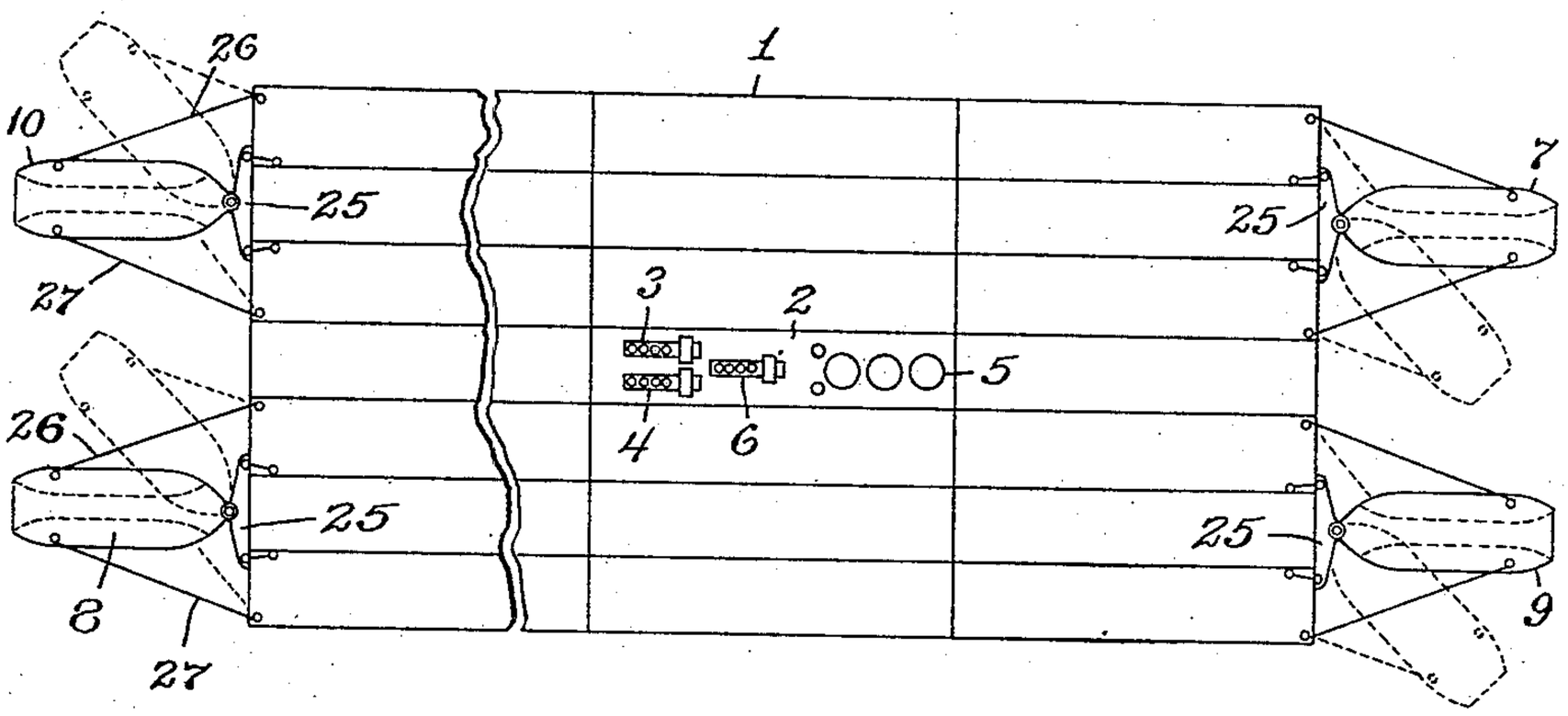
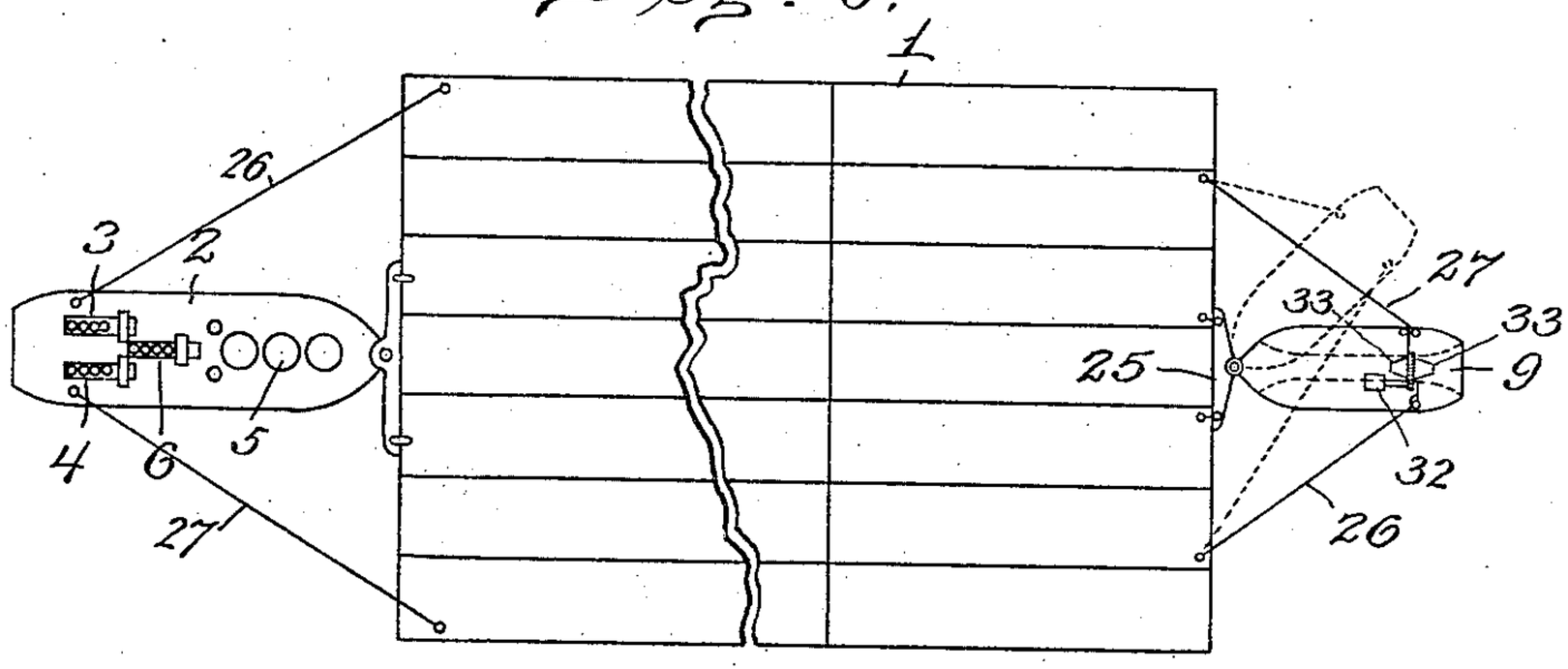


Fig. 5

Fig. 6.



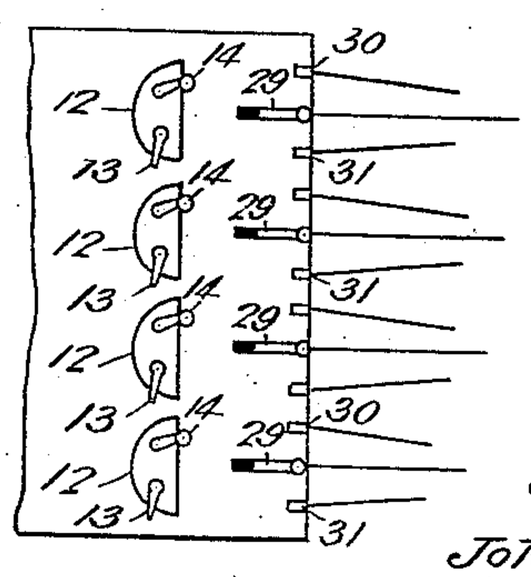


Fig. 7.

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UNITED STATES PATENT OFFICE.

JULIUS S. LANE, OF BROOKLYN, NEW YORK, AND JOHN L. MATHEWS, OF BILLERICA, MASSACHUSETTS.

SYSTEM OF RIVER TRANSPORTATION.

936,336. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed September 23, 1907. Serial No. 394,008.

To all whom it may concern:

Be it known that we, JULIUS S. LANE and JOHN L. MATHEWS, respectively of Brooklyn, in the county of Kings and State of New York, and of Billerica, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Systems of River Transportation, of which the following is a specification.

The object of the present invention is to provide a method and means by which cargoes in vessels may be transported more speedily, more safely and more economically along creeked rivers such as comprise the Mississippi system, than is possible by the use of present existing methods.

It is designed to enable barges, or rafts of boats or barges, to be operated safely and speedily around bends as well as in straight reaches, to move to or from the bank with facility and despatch, to be able to take advantage of favorable currents, and to overcome, without lessening progress, the lateral effect of a cross wind. It is intended, by increasing the factor of safety in transportation, to reduce the insurance cost on cargoes in transit and thus further lower the ton-mile charge for carrying.

It consists in the combination with a gang or fleet of barges rigidly attached to each other, of propelling auxiliaries or units flexibly, yet firmly, attached to the gang in such a way as to attain their greatest efficiency, these auxiliaries being so arranged as to be capable of changing their direction with relation to the axis of the fleet, the power, speed and direction of propulsion, and the heading of the auxiliaries being each independently under the control of the pilot of the fleet from a central pilot-house.

Preferably, we use a unit system consisting in the separation of the several elements of a steam vessel, the power plant, the propelling apparatus, the steering or controlling apparatus and the cargo hold, and the development of each to its highest extent, and their assembly in a fleet for purposes of transportation either with each element separately floated or with two or more of them combined, as circumstances may direct.

For the purposes of the present improvement, steering control is obtained entirely without the usual rudders and steering wheels, by means of the relative change in direction of the axis of one or more propelling auxiliary with regard to the axis of the fleet, this change to be brought about by mechanical means hereinafter described. For this purpose the controlling station may be floated on the same float with the power house or separately, and if desired, as shown hereafter, the power house part of the propelling apparatus and the control station may all be combined on one float, the rest of the propelling power being applied through a single auxiliary under dirigible control.

The present method, which this is chiefly designed to supplant, consists of the combination of fleets and barges, flat boats, or other hulls which are bound, coupled or lashed into a gang or raft, and to which a towboat, usually a stern-wheeled boat, is rigidly attached at the rear. In this combination of tow-boat and barges, the power developing plant is, in its tendency toward economy, hindered by the necessity of its service, which is that it shall provide a large volume of high-pressure steam for the long, slow-acting cylinders of a sternwheel boat; that it shall provide steam for nearly the whole length of stroke; that it must be limited in shape and size to the outlines of a sternwheeled steamboat; and that the engines must be made with long stroke and placed in such a way as to accommodate themselves to the slow revolutions of a sternwheel to which they are, by connecting rods and cranks, attached. The sternwheel itself, in other ways uneconomical, is here reduced to smaller economy by the necessity of mounting it at the rear of a boat which must be deep and full enough at the stern to support this burden, mounting it close enough to accommodate the engine and to prevent too great leverage on the hull, so that water does not readily feed to it from under the hull; and rendering it certain that if considerable draft is employed the sternwheeled boat will "squat" on bars and increase its draft where there is least water. Such a boat is especially weak at backing, and wastes much power between the fire grate and the stern-wheel. The necessary location of the driving apparatus at the stern of the pushing boat, to accommodate the power-generator attached to it, places this driving apparatus where it is generally inefficient, since it can be used only for going ahead or astern directly, except under heavy losses, and gives no ready assistance for turning the

forward end of the tow or even for directly maneuvering the rear end, and none at all for direct sidewise motion. Several recent inventions have been designed to remedy and to improve upon this but without success. Thus one plan is for the assembling of a fleet, with propelling tow-boat rigidly attached in rear, and the use of two auxiliaries flanking the tow near the bow, these auxiliaries being rigidly attached, and having each a screw propeller driven by motor with power from the tow-boat, each screw set at an angle, in the outboard quarter of the auxiliary, so that the two angles offset each other and produce a resultant straight ahead. Many faults occur in this, which the present application is designed to correct, one of them being that one half of the power used is necessarily lost through the opposition of the angular screws, and if the auxiliaries are used only for steering, they are carried the rest of the time as "dead" machinery, a great expense.

Another method, which has application especially to towing on open waters, is designed for the use of a central power-boat and a fleet of cargo boats, each having its own steering and propelling means controlled by a single pilot, this control being obtained on each individually by rudders, and requiring the conveying of power above the water in cables suspended from vessel to vessel. This method of independent vessels is hardly applicable to use in a narrow and crooked channel, where constant changes of direction, and entire and instant control of speed, and ability to stop and reverse are demanded. In any case, it does not conflict with our method in which the barges have no "steering" means.

Without trespassing upon either of these inventions, nor deriving from them, our invention consists in a method of combining the advantages of the present method of handling cargo in rigid fleets of barges, with the greatest freedom of control of direction and progress, while making possible economy in both power generator and driving apparatus in the highest degree. It is designed to be used in connection with an economical central power generating station, separately floated from the cargo, in which power is to be generated by the most modern means without regard to the type of propelling means employed; and it consists of the use, in connection with a fleet of cargo boats bound together into a gang raft, of auxiliary propelling units, drawing their power from the central power station, and so attached to the gang as to be securely a part of it, and yet retain flexibility and dirigibility, this dirigibility, together with the flow of propelling power, being at all times under the control of the pilot of the fleet from a central piloting tower or station.

For the purpose of effecting this secure and flexible attachment, we have designed a pivoted beam connection by which the auxiliaries may be so attached to either forward or rear end of the fleet that they are free to swing their outward ends in a wide angle to either side, this swinging to either side being accomplished without rudders, by means of lines running from the fleet to the auxiliary some distance out from the pivot, these lines passing over the proper winches so that turning upon these winches swings the auxiliary from side to side.

We have so designed this invention that it may be used in its entirety if that be desired, or it may be used in part. That is to say, a regularly equipped propelling tow-boat, having upon its bow a pivot such as we have elsewhere applied to patent, or other turning device, and equipped with side lines, may be used as the power station, having additional generating units to supply an auxiliary of the type heretofore referred to. This tow-boat does not use its rudder, but having side lines also under the pilot's control, for swinging the boat to differing angles in relation with the fleet, while keeping a firm mechanical attachment thereto, may be installed in the rear of the tow, and a single auxiliary with pivot beam be attached at the bow, by which means the pilot may guide his fleet with the greatest accuracy around turns, through bridges, and to and from the bank, controlling the head by means of the dirigible auxiliary. For this purpose we have designed a central piloting tower which may be mounted upon the propelling tow-boat, upon the power station or elsewhere, containing instead of the steering wheel commonly used with rudder-guided steamboats, a series of two or more (preferably four when the whole system is used) electric controlling switches or rheostats, through which power of any amount or direction may be sent to each or all of the auxiliaries; and in addition an equal number of electric switches by means of which power may be sent in either direction through the electric motors driving the winches upon which are wound the side lines of the auxiliaries in order to swing these auxiliaries and thus to guide the fleet in any desired direction. And we have further designed to accomplish this swinging of auxiliaries in several other ways, over which this is preferred.

In the accompanying drawings,—Figure 1 represents a plan view of a fleet or gang of cargo boats and power units upon this unit system, forming a sectional boat on a plan designed for a long journey down river. It consists of a power-station unit, mounted separately from all driving apparatus (though this power-boat may itself be equipped with screws, in tunnels or other-

wise, and made self-propelling or even a towboat), a number of propelling units for using the power there generated, and a large number of separate cargo boats or units lashed together. In this, as in the accompanying figures, illustration is made with the use of producer gas engines and gas producers, which offer an economical means of generating power; but the plan is equally adaptable to other modes of developing power. Fig. 2 represents a diagrammatic view of a system of electrical connections by which all of the propelling units can be controlled, their motors started, stopped, reversed or varied in speed by the use of controlling switches or rheostats mounted in a central pilot-station upon the gang, preferably on the power-boat. Fig. 3 represents a gang of units aggregated similarly to that in Fig. 1, but with a varied arrangement of propelling units more especially suited to upstream towing. Fig. 4 represents a combination of our system with the existing method, in the employ of propelling and guiding units, driving directly ahead or across the line of progress, and supplied with power from a central plant, which, in this case, is combined with a propelling boat in the rear but which may be separately mounted. Fig. 5 represents a further adaptation of Fig. 1, in which a fleet or raft is aggregated, of several cargo units, a power-generating unit, and several propelling units, set to drive equally well either up or down stream. In this view these auxiliaries are equipped with a pivoted end piece by which they may be varied in direction without disturbing their connection with the tow; they are equipped with lines of variable length according to the same arrangement and these ropes are varied either by separate winches or by a single compensated winch, so arranged that, preferably, its operations may be controlled by the pilot in the central pilot station, or they may be controlled on signal from him by an operator on the propelling unit. In this arrangement by swinging one, two or more of the propelling units to one side or the other as desired, the pilot may turn the tow, move it sidewise, or accomplish any other of the maneuvers described under the arrangement in Fig. 1, and this method has the additional advantage of narrowing the tow, and leaving no obstruction on the side to hinder laying against the bank. Fig. 6 represents a combination of the existing method with Fig. 5, in which is shown conventionally the assembly of a number of cargo units, a single power and driving station at the rear, as an ordinary towboat, and connected with and driven by power from this, a single propelling unit (or more than one may be used) at the bow equipped as in Fig. 5 with the pivot and adjustable lines arranged to operate all the time, either straight ahead when no turning is desired, or to either side whither the pilot may desire to swing the tow, thus giving him an extra driver for straight ahead work and a controlling and guiding propeller unit for assistance in passing bridges, laying up at the bank or making turns. Fig. 7 is a diagrammatic view of the electrical lay-out in a pilot or controlling tower, showing the means for governing the direction and speed of the propelling units.

Referring first to Fig. 1, we have shown conventionally the aggregation of a gang composed of several units; a number of barges or cargo-holds; a single power-generating station 2 on which is supposed to be located the pilot or control station (Fig. 2); and a number of propelling units lashed or coupled at bow, stern and both sides. The power-plant may be equipped with any means of generating power; in this case the preferred means, producer gas and electric generators, is indicated, consisting of internal combustion engines 3, 4 and 6 which are coupled to generators and driven by gas from producers 5. Part of this power may be used if desired in driving propelling apparatus in this boat.

Current from the generators connected with engines 3, 4 and 6 is delivered by proper conductors to propelling and controlling units 7, 8, 9 and 10 after passing through a control system such as is shown at Fig. 2. Each of the units 7, 8, 9 and 10 is equipped with one or more motors set to drive screw propellers (though paddles or other driving means may be used). The power is exerted in line with the longitudinal axis of the float upon which the motor is mounted. In descending the river, when the swift current makes it necessary to maneuver quickly to avoid collision with projecting points, bars and bridge piers and when, the barges being impelled at considerable speed by the current, less driving power is needed for progress, it is advisable to arrange the propellers with especial view to maneuvering. This is done, as here shown, by placing two of the craft 9 and 10 at the front and rear so as to exert their pull directly to one side or the other, transversely to the line of direction of the fleet, so that a quick turn or sidewise movement may be made at the will of the pilot. The other two, 7 and 8, may go ahead or astern, fast or slow, as desired. It is obvious that with this arrangement, control is most facile, since by going ahead on the starboard, toward the left at the bow, astern on the port, and toward the right at the stern, the pilot may revolve his tow about its center, and he may achieve any turn between that and progress straight ahead. Thus, being at the bank and desiring to go down stream, instead of the cumbrous process now used and known (in part) as "straightening

out", which requires on an average half an hour backing to draw the tow out from the bank and let the current swing the bow straight down stream, the pilot simply sets the two drivers 9 and 10 revolving to pull the tow out from the bank, and with little delay sets 7 and 8 ahead, so that the tow progresses by a right or left oblique movement into the main channel. If there is a cross wind 7 and 8 continue to run full speed and 9 and 10 are run either occasionally or continually at a slow speed, so as to overcome any side-setting tendency. The manner of turning bends is seen at a glance. And it is evident that in reaches where there is little need of the bow and stern propellers the engine power at the generating station can be reduced, one or more producers allowed to lie idle, and the consumption of fuel thus reduced without losing the facility of control or the speed.

Although the controlling of the power may be done from any point, and even by an assistant on board each auxiliary directed by a pilot, we prefer that the current should pass to a central controlling station which should be in the pilot house on the generating station, but is provided for as a separate unit to be combined in any way preferred. Part of the equipment of this station is shown in Fig. 2. By this wires from dynamo 11 are led to and coupled with variable controllers 12 of any approved make having means 13 for reversing the current and rheostat controllers 14 by which the speed of auxiliary motors can be varied at will. Wires from other dynamos may be coupled into the same system. Wires lead from these controllers to the propelling units which are provided with motors 15, 16, 17 and 18, said motors being arranged to drive propellers 19, 20, 21 and 22 through suitably arranged shafts.

In ascending the current when the speed relative to the bank, bridge piers and bars is not so great, and the need of direct pull ahead for propulsion is greater, it is desirable to arrange all the propelling units so that they can be used for this pull ahead and yet leave them in formation in which they will be useful for maneuvering. Such an arrangement is shown in Fig. 3, where they are arranged on the side of the fleet or gang and so connected with the station (Fig. 2) that the pilot may drive ahead with all of them, make a gentle turn by slowing down or stopping on one side, or make a short turn by reversing on one side while going full ahead on the other. It is evident that this method of propulsion while best used in its entirety, may be combined with the existing methods in a way to attain an advantage proportional with its approach to the entire method. Such a combination is shown in Fig. 4, in which is illustrated the combination of a propelling tow-boat, either stern-wheel, sidewheel, twin-screw or otherwise arranged, carrying additional means for generating power and distributing that power as described herein to the propelling units 7 and 8, arranged to drive ahead or astern, and 9 arranged to drive across the bow, it being designed by this means to provide a way in which the power generated may be at all times economically employed, driving ahead when not actuating the propelling member 9, or member 9 may be used, omitting 7 and 8, or 9 may be omitted and 7 and 8 used.

Fig. 7 represents diagrammatically a pilot or controlling tower, governing the motion and direction of the fleet. In this figure, 12 represents a controller through which is governed the direction and speed of current supplied to the motors turning the propelling devices of the several propelling units. 13 is the reverse handle of an ordinary controller, and 14 is the rotator for turning on and off the power. Power from these controllers is conveyed by wires to the motors 15, etc., (Fig. 2) governing the propellers 21 which drive the fleet ahead or back. In the same figure, 29 is the handle and one terminal of an electric reversing switch, hinged so that it may be thrown into contact with the optional terminals 30 and 31, thus sending power in either direction, as desired, to the connected motor 32, mounted in connection with a winch 33 (in this case shown differentiated to allow for varying speed with which the lines take in and feed out) on which are wound side lines 26 and 27 leading to fastening posts at some distance upon the tow. By throwing the terminal 29 in contact with terminal 30, the pilot may so direct the current and turn motor 32 as to wind up line 26 and unwind with corresponding speed line 27, thus turning the auxiliary about the pivot of the pushing beam 25 and drawing its outer end toward the side of line 26. When the desired angle has been attained, the terminals 29 and 30 are separated and the motor (which is equipped with brake) remains at rest, positively engaged, holding the auxiliary and tow in this altered relation. By now continuing to go ahead through his controller in this position, the pilot tends to turn the whole tow around that way. Or by swinging two of the bow auxiliaries this way and the stern auxiliaries in the corresponding direction by taking in line 27 upon them, he may move the whole fleet diagonally as desired. Or by reversing the propelling power, he may execute the corresponding maneuver.

Fig. 5 represents diagrammatically an entire fleet made up after this system in which the pilot house is supposed to be mounted upon the power-boat. In this, 1 is the fleet

made up of cargo boats; 7 8 9 10 are auxiliary propelling units, attached to the gang of cargo boats by means of the pivoted pushing beam 25 and the side lines 26 and 27; 2 is a power-boat, indicated here as equipped with a producer gas plant and electric generators, 5 being the producer outfit and 3, 4 and 6 three gas engines coupled to generators. The tower indicated in Fig. 7 is preferably mounted upon an upper deck of this vessel, and receives directly the wires bearing the current from these generators. From this tower the current is borne, through the controllers and switches hereinbefore described, to the four auxiliaries. By holding these auxiliaries in position so that their axes coincide with those of the fleet, the pilot may drive his gang straight ahead or astern. By swinging them to one side or the other, in any desired direction, he may execute any desired maneuver. This method of control provides that in these maneuvers there are no important losses of power and no carrying of "dead" apparatus. Every motor is continually working, and its propeller is driving the gang in the direction the pilot desires it to go.

Fig. 6 represents the modification described, in which the power outfit is mounted upon a propelling tow-boat at the rear, also equipped with the pivoted beam 25. This boat contains, as here shown, gas engines 3 and 4 driving twin screws, but may have instead apparatus for stern or side wheel; and in addition gas engine 6 driving an electric generator, supplying power to an auxiliary propelling unit at the bow, number 9, equipped with apparatus for shifting direction from side to side. The propelling power-boat 2 contains also the tower, Fig. 7, through which the pilot controls the speed and direction of propulsion of auxiliary 9, and, by means of the side lines 26 and 27 (on both the auxiliary and the steamboat) and the motor 32 and the winch 33 and reversing switches 29, shifts both boats into their proper angles to guide his fleet as he desires.

The method of handling a tow, fleet or gang of barges by this means, the fleet having been assembled as described in Fig. 5, is as follows: If the tow is lying against the bank or wharf, in a running stream, the pilot will, by means of reversing switches 29 connecting with the motors 32 on the auxiliaries at the rear of the tow 8 and 10, swing them into the position indicated by the dotted lines (Fig. 5). That done, which requires but a moment, he will by means of the handles 13 and 14, direct the power through the controllers to the propelling motors 16 in all four auxiliaries in such a way as to drive the whole tow rearward, the two stern auxiliaries, on account of the angle at which they are set, pulling the stern out into the stream and clearing the bank gradually and safely without involving the head auxiliaries. As soon as the bank is cleared, these auxiliaries are by means of switch 29, again resored to their normal position, as indicated by full lines, or swung as far in the opposite direction. The two head auxiliaries are turned to point down stream and slightly outboard, and the power is reversed, through 13 and 14, driving the propellers, and so the tow ahead in the direction indicated by auxiliaries 7 and 9, the motion being downstream and out from shore. When the center of the channel is reached, the auxiliaries are straightened up to normal position, the tow being similarly straightened, and thenceforth the tow proceeds full speed down the channel, the pilot guiding it by occasionally swinging auxiliaries at either end. He may, if desired to overcome a heavy side wind, set all four pointing slightly toward the wind. He may turn them in proper relations to follow curves. And to come again to the bank, even with the heaviest tow, may reverse in midstream, and pointing the auxiliaries slightly shoreward, place the whole fleet gently against the bank. Progress upstream is correspondingly more simple.

There are many other combinations to which our plan is adaptable, and we therefore do not limit ourselves to the specific details shown herein. Thus the gas from the producers may be sent to engines in the propelling units; steam or compressed air may be similarly distributed from the generating plant; shafting may be employed; and in the driving units any form of propelling appliance may be used, all of which is in conformity with our general plan.

We claim:—

1. A means of transporting cargo by water consisting of a power-generating unit, one or more cargo holds or cargo units, a plurality of propelling units deriving motive power from said power-generating unit, each said unit being floated separately from the others and being assembled into a raft or gang, with means for swinging said propelling units pivotally upon the gang, and a common directing or pilot station for controlling said means by power from the power unit in such manner that the axes of the propelling units may be caused to enter into varying angular relations with the axis of the cargo unit or units, for the purpose of propulsion and control.

2. A means of guiding and controlling rafts of barges or cargo boats, consisting of a power boat and a plurality of auxiliary propelling boats pivotally attached to the raft, with means for swinging each propeller boat about its pivot.

3. A means of guiding and controlling rafts of cargo boats, consisting of a plurality of auxiliary propelling boats pivotally

attached to the raft, with means for altering the direction of the auxiliaries with relation to the raft, and means of altering the direction of propulsion of the auxiliary propelling craft, both said means being operated from a common source of power.

4. A means of guiding and controlling rafts of cargo boats, consisting of auxiliary propelling units pivotally attached to the raft, a common source of power for operating the propelling apparatus and for operating the means by which the dirigible auxiliaries are made to change their direction with relation to the gang, and a common pilot station or tower having means for controlling the amount and direction of power supplied to the propellers of the pivotal auxiliaries and to the mechanism controlling the direction of the pivotal auxiliaries with relation to the raft.

5. A means of transporting cargo by water consisting of a plurality of cargo holds or units, each separately floated united in a gang, a power unit, independently floated and constituting a central generating station, a plurality of driving or propelling units pivotally attached to the gang, drawing their power from the common power unit, means for distributing power from the power unit to each of the propelling units, means in a common station of controlling the amount and direction of power thus supplied from the power-unit to the propelling units, and means for swinging the propelling units, the whole combined and adapted for various groupings of the units so that the propelling units, actuated by the power from the common power unit, as directed through the common controlling means, may propel and control the whole as a gang in any direction and with any character of motion.

6. Means for transporting cargo by water consisting of a plurality of cargo boats in a gang, a power-plant, separately floated, attached to the gang, a plurality of propelling units without steering means, each separately floated, pivotally attached to the gang, means in a common station for swinging the propelling units about their pivots, whereby the direction of progress may be altered, and a common controlling station so placed as to govern the direction of the propelling units.

7. A plurality of cargo boats in a gang, a power-plant separately floated and attached to the gang, a plurality of propelling units without steering means, drawing power from a common power plant, each separately floated and so attached to the gang as to be capable of exerting its power straight ahead in the direction of progress of the whole gang, and variable in its angular relation to the gang of cargo boats, means for varying such angular relation, means for distributing power from the power unit to the propelling units, and a controlling station for governing progress and direction of the gang by regulating the power distributed to the propelling units.

8. Means for transporting cargo by water consisting of a plurality of cargo boats or units in a gang, a power-plant or unit separately floated and attached to the gang, a plurality of propelling units drawing power from the common power unit, each separately floated and attached to the gang, and a common means for swinging said units whereby the propelling power may be applied at varying angles with respect to the axis of the gang, while being always effectively exerted in the direction of progress of the gang.

9. Means for transporting cargo by water consisting of a plurality of cargo boats or cargo units in a gang, a power-generating unit separately floated, attached to the gang, a plurality of propelling units without steering means, drawing power from the common power unit, each separately floated and attached to the gang, means for varying the direction of each propelling unit with regard to the longitudinal axis of the gang, means for distributing power from the common power unit to the propelling units, and a common controlling station for controlling the direction of the propelling units with regard to the longitudinal axis of the gang and for controlling the speed and direction of the propelling action of the propelling units.

10. Means for transporting cargo by water consisting of a plurality of cargo boats, in a gang, a separately floated common power-generating station or unit attached to the gang, one or more propelling units without steering means, each separately floated, attached to the gang so as to be able to vary their direction with relation to the longitudinal axis of the gang, a common controlling station for controlling the direction of the propelling units with relation to the axis of the gang and for controlling the force and direction of the propelling action of the propelling units, means controlled by said station for swinging said units and means for conevying the power for propelling and for altering direction from the common power unit to the propelling units.

11. Means for transporting cargo by water consisting of one or more cargo boats or cargo units, a common power-generating unit separately floated, attached to the gang, one or more propelling units without steering means, each separately floated and rigidly attached to the gang so as to propel parallel with the longitudinal axis of the gang, one or more propelling units pivotally attached to the gang so as to be capable of varying their direction of propulsion with regard

to the longitudinal axis of the gang, and means in a common station for controlling and directing the gang by regulating the strength and direction of the power distributed from the common power unit to the propelling units and means for regulating the direction of the variable propelling units with reference to the longitudinal axis of the gang.

12. A fleet composed of cargo boats bound firmly together in a gang or raft, and propelling units pivotally united thereto, means for swinging said units about the pivot points, a common directing or pilot station, and controlling connections in said station by which the operation of said means for the several units is controlled, together with a common source of power from which said propelling units are driven.

In testimony whereof we have affixed our signatures, in presence of two witnesses.

JULIUS S. LANE.
JOHN L. MATHEWS.

Witnesses:
ARTHUR H. BROWN,
P. W. PEZZETTI.