

No. 714,035.

Patented Nov. 18, 1902.

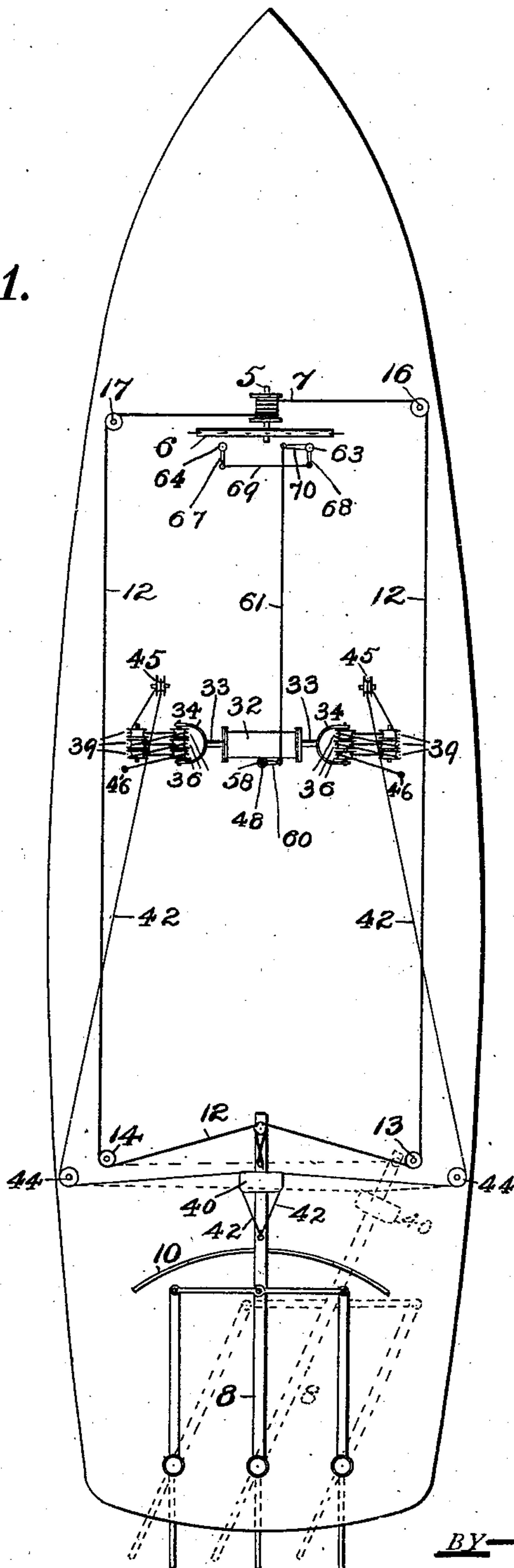
C. ROGERS.  
STEERING APPARATUS FOR BOATS.

(Application filed Aug. 12, 1901.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.



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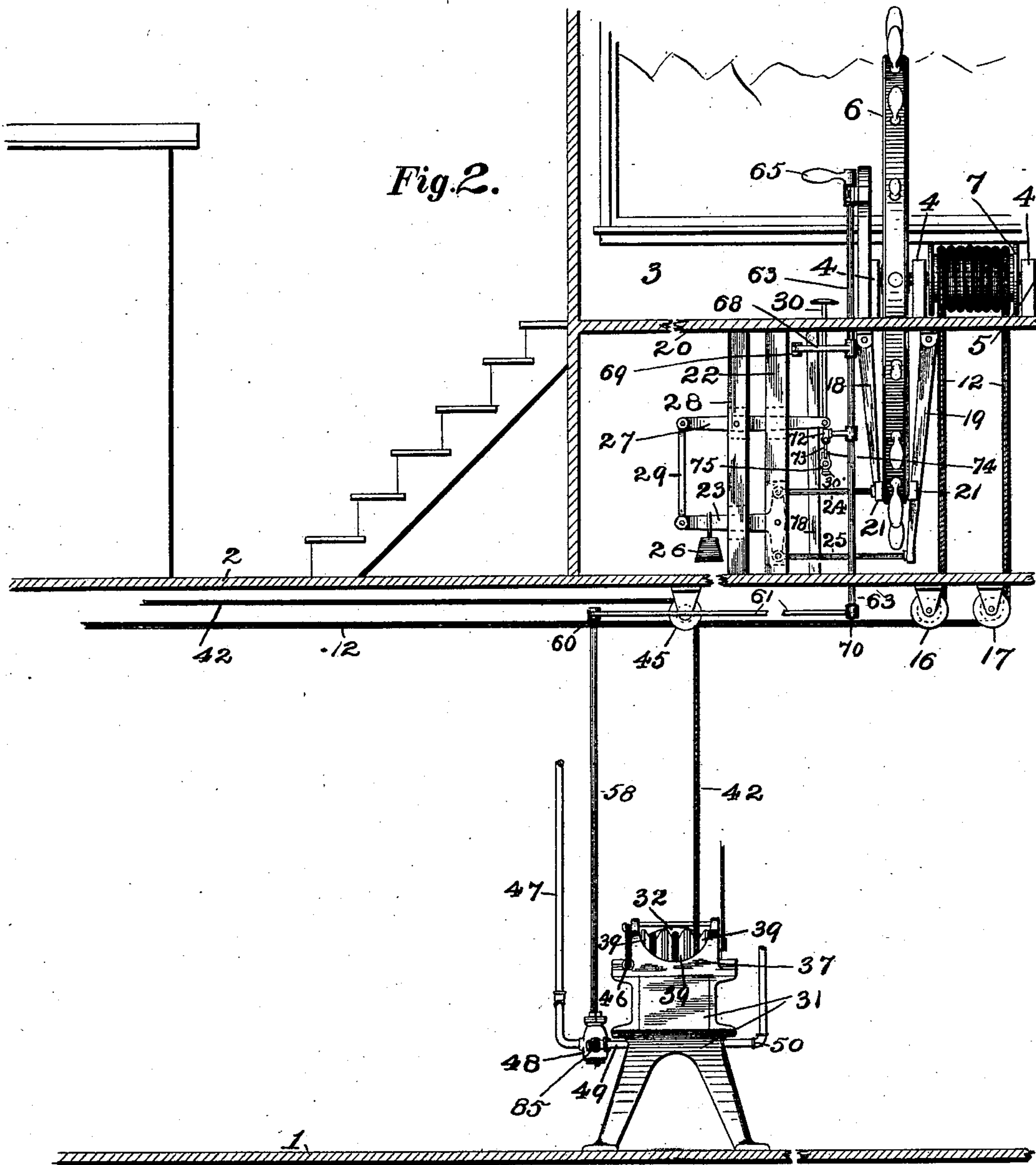
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C. ROGERS.  
STEERING APPARATUS FOR BOATS.

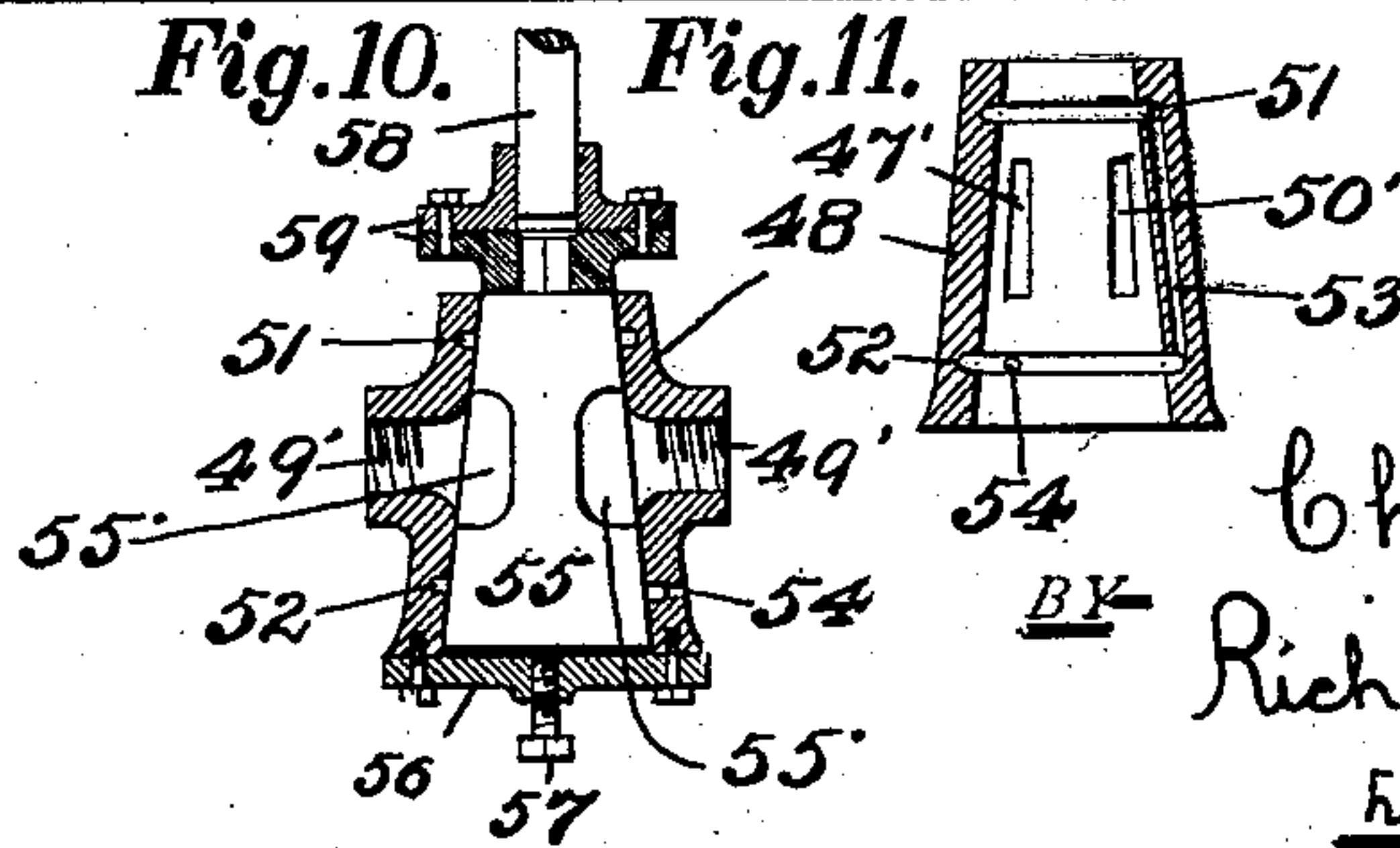
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*Fig. 10.* *Fig. 11.*



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## STEERING APPARATUS FOR BOATS.

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(No Model.)

4 Sheets—Sheet 3.

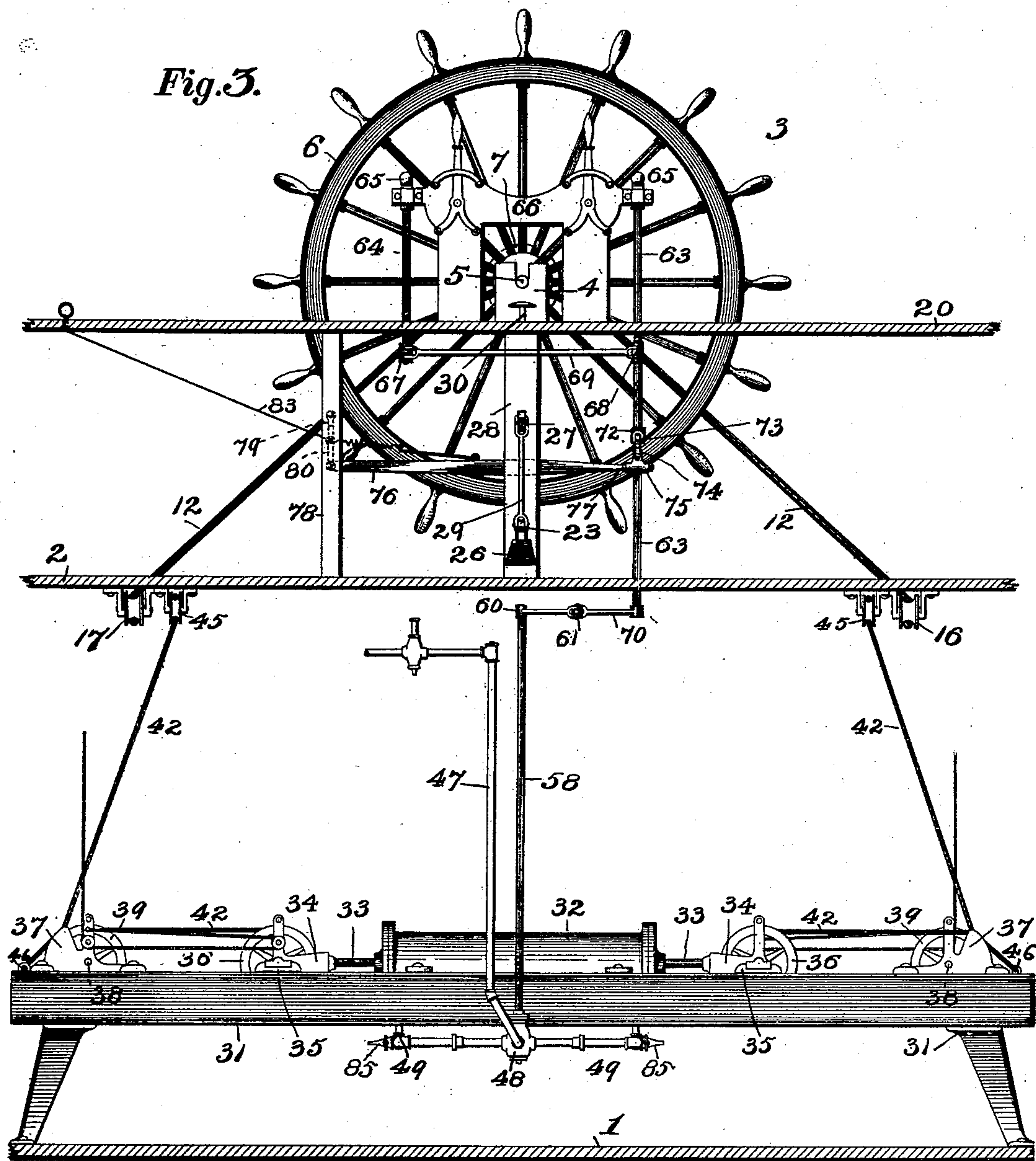
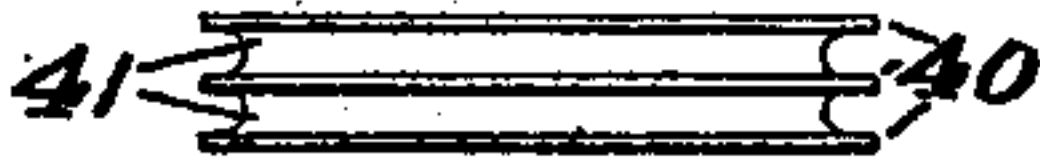
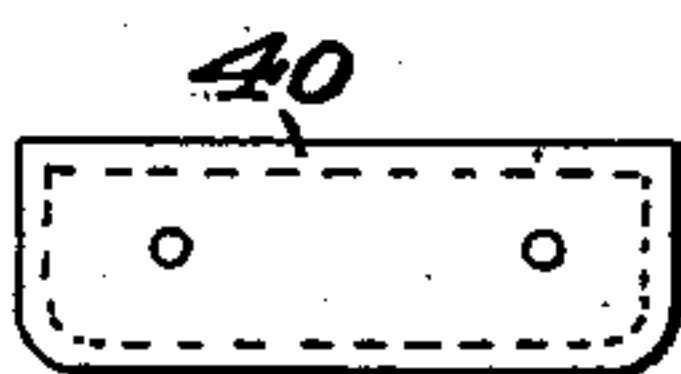


Fig. 12.

Fig. 13.

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STEERING APPARATUS FOR BOATS.

(Application filed Aug. 12, 1901.)

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4 Sheets—Sheet 4.

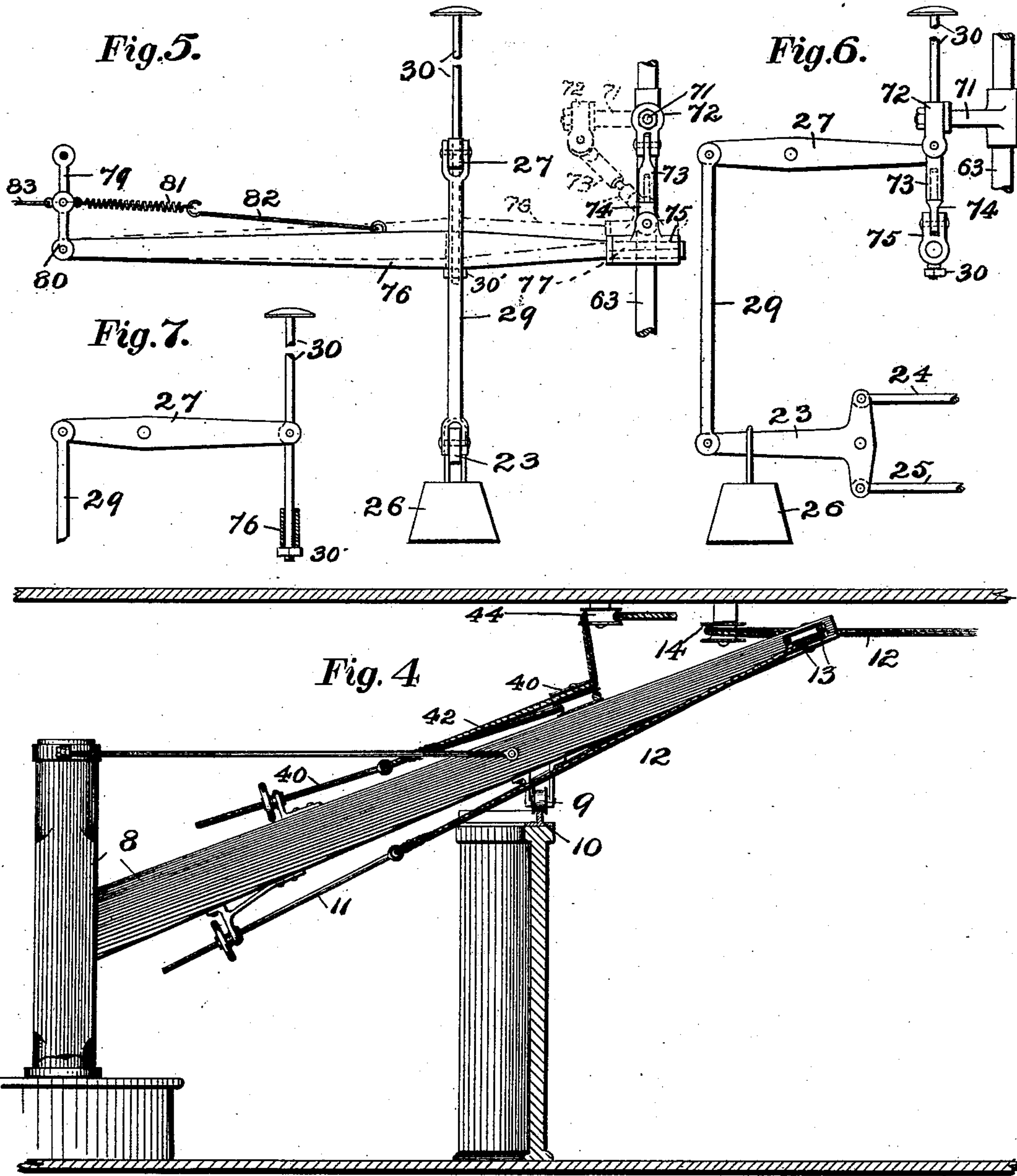
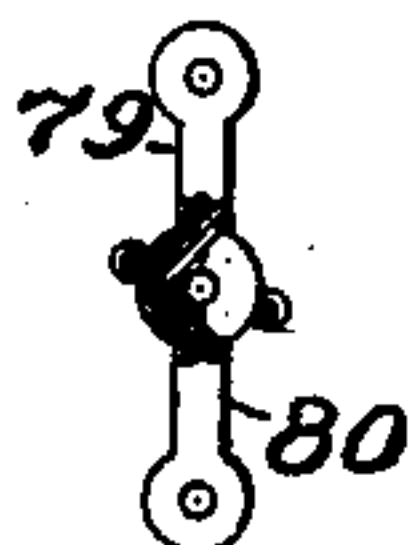
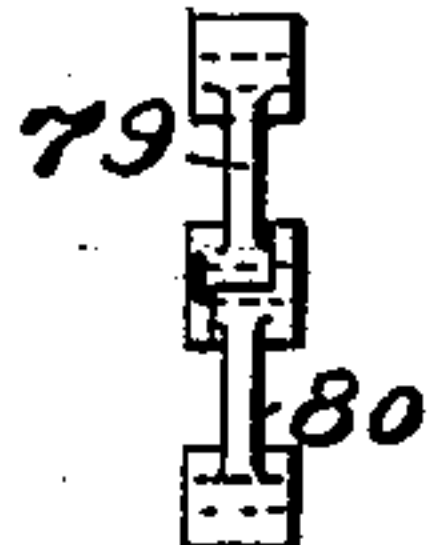


Fig. 8.

Fig. 9.

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# UNITED STATES PATENT OFFICE.

CHARLES ROGERS, OF ALLEGHENY, PENNSYLVANIA.

## STEERING APPARATUS FOR BOATS.

SPECIFICATION forming part of Letters Patent No. 714,035, dated November 18, 1902.

Application filed August 12, 1901. Serial No. 71,732. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES ROGERS, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steering Apparatus for Boats, of which improvement the following is a specification.

This invention relates particularly to improvements in steam steering apparatuses for boats.

In apparatuses heretofore used for steering in the class of steamboats the steam-actuated piston employed to operate the tiller required an unusually long stroke to give the proper tiller movement in both direction. Consequently the cylinder required proportionately greater length to accommodate such movements, thereby occupying considerable valuable space. Again, piston-rods of great length being at all times more or less exposed to variations of atmospheric temperatures become chilled and when in action cause the steam in the cylinder to condense by contact therewith. Further, in the above-mentioned class of apparatuses the usual arrangement of operating the tiller-rope was such that considerable "slack" was occasioned therein during movements thereof, which prevented perfect control of the tiller and caused considerable annoyance. Furthermore, the use of the foot-brake in connection with the pilot-wheel is slow of action and at times is not in convenient position for the pilot to operate when necessity demands its use. Attempts have also been made to provide steering apparatuses with steam-actuated pistons of short stroke; but the mechanism for transmitting motion therefrom to the tiller is complicated, easily disarranged, and therefore unsatisfactory.

The object of my invention is to provide a steering apparatus which will effectually overcome the above and other defects existing in the present form of apparatus.

The invention consists, first, in a steering mechanism comprehending a means for actuating the tiller, which includes a rod operated to control the action of the same, in combination with a braking mechanism having means constantly exerting a tendency to operate the same in one direction, and devices

acting in opposition to said means and operated to overcome the power thereof, said opposing devices being controlled by said rod. Preferably the parts which tend constantly to operate the braking mechanism in one direction are such as automatically to release the same and the parts which act in opposition thereto are such as to set the brakes.

Secondly, the invention consists in certain peculiarities in the construction of parts and in certain novel combinations of elements, substantially as hereinafter described, and particularly pointed out in the subjoined claims.

In the accompanying drawings I have by different views shown means whereby my objects are accomplished, in which views—

Figure 1 is a plan view showing the outlines of a boat-body and the general arrangement of the steering apparatus thereon. Fig. 2 is an enlarged sectional side view through the pilot-house and engine-room at the fore part of the boat, showing part of the apparatus therein. Fig. 3 is a front view of the same. Fig. 4 is a sectional side view of the rear portion of the engine-room, showing the tiller. Fig. 5 is a front view of the brake mechanism enlarged and removed from the boat. Fig. 6 is a side view of the same. Fig. 7 is a side view of a portion of the same. Fig. 8 is a side view of the brake suspension-link. Fig. 9 is a front view of said link, partly in section. Fig. 10 is a vertical side view of the four-way-valve cock employed to control the steam at the cylinder, partly in section. Fig. 11 is a side view of the valve-casing in section. Fig. 12 is a plan view of the tiller-saddle. Fig. 13 is a longitudinal side view of the same.

Further reference to the drawings for a description of the detail parts of said views and their operative arrangement, the numeral 1 represents the first deck of the boat, and 2 the second deck, which second deck has upon its forward part the pilot-house 3. In said pilot-house is secured the bearings 4, in which is mounted a shaft 5, carrying the pilot-wheel 6 and drum 7.

The numeral 8 represents the tiller, which is arranged at the rear of the boat on the first deck. This tiller at its under side is provided with a small wheel 9, which is adapted to



travel upon the elevated radial track 10, and a rod 11, to which is attached the ends of the ropes 12. These ropes pass in opposite directions over the pulleys 13 at the forward end of the tiller, thence over the pulleys 14, 15, 16, and 17, and around the drum of the pilot-wheel.

The pilot-wheel brake consists of a pair of brake-beams 18 and 19, pivotally suspended at their upper ends from the under side of the pilot-house floor 20 or other suitable support, each of which is provided at its lower end with a shoe 21 to engage the sides of the pilot-wheel rim. To an upright beam 22 is pivoted a crank-lever 23, which is connected at its crank end to the said brake-beams by the rods 24 and 25 and is provided at its opposite end with an adjustable weight 26. Another lever 27 is pivoted to an upright beam 28 and is connected at one end to the aforesaid lever 23 by a rod 29 and at its opposite end to a vertical foot-plunger 30, extending down through the pilot-house floor. The weight 26 tends to release the brake-shoes 21 from the pilot-wheel, which tendency is normally resisted by the lever mechanism hereinafter described, which acts in opposition to said weight.

Arranged within the engine-room is a bed-plate 31, upon which is rigidly secured a cylinder 32. A piston-rod 33 extends through said cylinder and has secured thereto within the cylinder a single piston. To the ends of said piston-rod are secured the carriages 34, which are provided at each side with brasses 35 to slide upon the bed-plate. A small shaft extends across each of these carriages, and upon each of said shafts are secured the grooved pulleys 36. At each end of the bed-plate is secured a frame 37, having a shaft 38 mounted therein, upon which are secured grooved pulleys 39.

Upon the tiller is secured a saddle 40, having thereabout the rope-engaging grooves 41. Two cables 42 and 42 are each secured at one end to an adjustable rod 43, which is arranged on the top of said tiller. These cables each pass around the saddle-grooves in opposite directions and are prevented from chafing each other where they cross by the spaced grooves 41, within which they are respectively located. Thence the ropes pass over the overhead pulleys 44, which are secured in position slightly rearward of the saddle, along and over the pulleys 45, thence down and under one of the pulleys 29 on the bed-plate ends, up and over one of the outer pulleys 36 of the piston-rod, thence up and over the same to the central piston-pulley, down over the remaining fixed pulley 39 of the bed-plate, thence up and over the remaining piston-pulley, and extend along to the ends of the bed-plate, where they are secured at 46.

A steam-pipe 47 extends downward from a supply-pipe at about the center of the bed-plate and has connected to the lower end thereof the four-way valve 48, from which

lead the branch pipes 49 to each end of the cylinder and the exhaust-pipe 50. At the point where the said pipes 49 branch from the valve a cock 85 is attached.

The four-way valve, which I prefer to use, but do not claim *per se* herein, consists of a casing 48', having a tapered interior, into which extends the two transverse steam-supply ports 49', from which extend the branch pipes to each end of the cylinder, the main supply-pipe port 27', and the port 50' for connections with the exhaust-pipe. Upon the interior of this valve-casing, near the upper and lower ends thereof, are formed the annular grooves 51 and 52, which are connected by a by-pass or port 53, and at the lower end of said casing, communicating with the said lower annular groove, is formed an exhaust-port 54. Rotatably fitted within said valve-casing is the tapered plug-valve 55, provided with two side ports 55', which ports are capable of registering or non-registering, as desired, with any two ports in the casing when rotated. Across the lower end of this valve-casing is secured a bar 56, which is provided with a set-screw 57. This set-screw is adapted to centrally engage the lower end of the valve and hold the same in operative position and when desired adjusted to take up the wear of the valve. The upper end of the valve is connected to a vertical rod 58 by a coupling 59, which rod is provided at its upper end with a crank 60, to which is connected a rod 61, which rod extends forward to a point beneath the pilot-house.

Extending down through the pilot-house floor and upper deck are the axially-movable vertical rods 63 and 64, each of which is at their upper ends provided with a handle 65, which rods are mounted to a frame 66 in the pilot-house. The rod 64 terminates beneath the pilot-house and is provided with a crank 67, which is connected to a similar crank 68 upon the rod 63 by a rod 69. Another crank 70 is secured to the lower end of the aforesaid rod 63 and is connected to the aforesaid rod 61. Connected with one of said rods, so as to be actuated by movement of either of the same simultaneously with the action of the tiller-actuating mechanism, is the means, hereinabove referred to, which acts in opposition to the weight 26 and causes the brake-shoes 21 to be applied to the pilot-wheel and held there against the tendency of said weight to release them when the tiller is in its normal or inactive position, said means preferably being as follows: To the said rod 63 is secured another crank 71, upon the end of which is loosely secured a strap 72. Pivoted to this strap is the small rod 73, which is provided at its lower end with a vertical opening, into which is loosely fitted a rod or pin 74, said pin having an eye formed within its lower end, to which is pivoted another strap 75. A lever 76 is loosely suspended upon the lower end of the foot-plunger 30 and retained in such position by a nut 30' on said plunger. This le-



ver is provided at one end with a rounded shoulder 77 to loosely engage within an opening in the strap 75, and when in its normal position it holds the foot-plunger 30 downward and prevents the weight from releasing the brake-shoes, being itself held down by the shortening of the connection formed by the members 73 and 74, which members when the parts are in the position stated are telescoped one within the other. The end of lever 76 remote from the strap 75 is pivotally connected to an upright beam 78 by means of a link which is composed of the two members 79 and 80, which are hingedly connected one to the other, each of said members having a shoulder thereon to engage one another and form a knuckle-joint. One of these members is connected to the lever by a spring 81 and rod 82, and the other member is connected to a small rope 83, which extends up through the floor of the pilot-house to a convenient point in reach of the pilot.

In all views the tiller is shown as in its normal or inactive position and the brake set to lock the wheel in such position.

The operation of the steering apparatus and brake, with my improvements thereon, would be as follows: The pilot standing in front of the wheel finds it necessary to operate the tiller in either direction during the course of the boat or in turning grasps one of the handles 65 and moves the same in the desired direction and to whatever degree required. Moving said handle causes the rod 63 to turn correspondingly, thus swinging the crank 71 and strap 72 in a horizontal arc and carrying with the same the upper end of the connection, composed of the telescopic members 73 and 74, causing said connection to assume an inclined position or a position of greater inclination than that previously occupied by it and withdrawing the member 73 from said member 74, thus relieving the pressure on the strap 75 and lever 76 and enabling the weight 26 to act to force said end of the lever upwardly, as shown in dotted lines in Fig. 5, and simultaneously to force the rods 24 and 25 in opposite directions, so as to carry the brakes away from the pilot-wheel. At the same instant that the said handle 65 is turned a corresponding movement is transmitted to the valve 55 through the medium of the connections 58, 60, 61, and 70, admitting steam to the desired end of the cylinder, which steam acts upon the piston, forcing the same outwardly in a direction opposite to the movement of the tiller, causing the distance between the wheels carried by the piston-carriage and those secured to that end of the bed-plate to be shortened and the distance between those at the opposite end of the piston-carriage and bed-plate to be proportionately increased. The movement of the said piston and wheels causes the cable 42, which is attached to or extends from that side of the tiller engaging

the wheels 36 and 39, to be "let out," and the other cable 42, which leads from the opposite side of the tiller around the other wheels 36 and 39, to be proportionately "taken up," thereby operating the tiller in the desired direction. Reversing the movement of the said handle 65 causes the steam to cut off and exhaust from that end of the cylinder and be admitted to the opposite end, and when the handle 65 has been returned to its normal position the steam will again be shut off and exhausted and the brakes applied.

In the absence of steam, as in emergency, the pilot-wheel is rotated by hand to operate the tiller through the medium of the drum 7 and cables 12, in which case an instant release of the brakes is had by pulling upon the rope 83. The pulling of this rope causes the suspension-link members 79 and 80 to move outwardly at their hinged connections in the direction of the pull, thereby shortening the distance between its end connections, permitting the lever 76 to ascend sufficient distance to cause the weight 26 to act in releasing the brakes. When said rope 83 is released, the spring 81 overcomes the action of the weight, restoring the suspension-link to its normal position and setting the brake.

When the pilot-wheel and brake are operated in cases of emergency, as above set forth, the piston and mechanism connecting the same with the tiller would perform the same movements as in the case of steam-supply, and in such case the imprisoned air in the cylinder would be compressed, retarding the movement of the piston, and to avoid such compression the cocks 85 on the steam-supply pipes are opened, permitting the air to freely exhaust.

One important feature of this invention is the means employed to prevent "slack" in the cables 12 during the movements of the tiller, embracing an advantageous arrangement of saddle 40, cables 42, and pulleys, the system of pulleys including two, 44, which are slightly rearward or out of line with the saddle 40 (in accordance to the radius described or limit in the tiller movement) and the parts being so combined that when said tiller is in its normal or inactive position the cables 42 will both engage the entire length of the saddle, and when the said tiller has moved, as indicated by dotted lines at Fig. 1, in either direction one of said cables will bear upon and extend out at an angle from the corner of the saddle and the other bear upon the entire length thereof and extend at a different angle.

Another important feature of my invention is the provision of the annular grooves in the valve-casing and the by-pass and port connected therewith. These grooves being stationed at a point immediately above and below the valve-ports arrest leakage of steam and conduct the same therefrom. By arresting the steam-leakage at this point and con-



ducting the same therefrom the valve may be adjusted to permit a free and easy movement thereof.

Another important feature of my invention is that by the use of a short-stroke piston I am enabled to greatly multiply the movement of the tiller through the medium of the traveling and stationary pulleys and ropes, which in this case is six to one, and by the use of more or less pulleys a proportionately greater or lesser movement may be obtained.

Further features of importance reside in the means of quickly releasing and applying the wheel-brake during steam service and non-service, the means of preventing air compression in the cylinder during emergency or absence of steam service, and means of arresting steam-leakage and conducting the same from the valve, as previously described.

As I have shown and described my improvements in connection with parts which are old in the art of steamboating, only such parts as are contained in my invention will be claimed.

Variation of detail parts or substitution of equivalents therefor combined to effect the same results or change of position would be within the scope of my invention.

Having thus fully shown and described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steering apparatus for boats, the combination of a cylinder adapted to receive and exhaust steam at either end, a piston in said cylinder the rod of which extends through each end of the cylinder, sliding carriages connected with the ends of said rod and partaking of the movements thereof, a plurality of side-by-side piston-pulleys carried by each of said carriages, corresponding series of side-by-side fixed pulleys in alinement with said piston-pulleys, respectively, a tiller, a saddle carried by said tiller, cables extending in opposite directions around said saddle, and systems of pulleys to engage said cables in their passage from said saddle to said fixed pulleys, including for each of said cables a pulley located slightly rearward of said saddle and a pulley beyond said fixed pulleys, said cables passing around said fixed and movable pulleys alternately at each end.

2. In a steering apparatus for boats, the combination with a cylinder adapted to receive and exhaust steam at either end, a piston in said cylinder the rod of which extends through each end thereof, pulleys secured to each end of said rod to travel therewith, and a tiller, of a saddle carried by said tiller and having spaced grooves, cables extending around said saddle and within said grooves, respectively, in opposite directions in their passage from said tiller, and systems of pulleys to engage said cables in their passage from said saddle to the first-mentioned pulleys.

3. In a steering apparatus for boats, the combination with a cylinder adapted to receive and exhaust steam at either end, a piston in said cylinder, the rod of which extends through each end thereof, pulleys secured to each end of said rod to travel therewith, fixed pulleys in alinement with said piston-pulleys, and a tiller, of cables each having one end secured to said tiller, a saddle carried by said tiller and having spaced grooves within which said cables respectively extend in opposite directions in their passage from said tiller, and systems of pulleys to engage said cables in their passage from said saddle to said fixed pulleys, including a pulley for each of said cables located slightly rearward of said saddle, substantially as described and for the purposes set forth.

4. In a steering apparatus for boats, the combination with a cylinder adapted to receive and exhaust steam at either end, a piston in said cylinder the rod of which extends through each end thereof, and pulleys secured to each end of said rod to travel therewith, of a tiller having an adjustable rod thereof, a saddle carried by said tiller, cables each having one of its ends secured to said adjustable rod, said cables extending from said rod around said saddle in opposite directions in their passage from said tiller, and systems of pulleys to engage said cables in their passage from said saddle to said first-mentioned pulleys.

5. In a steering apparatus for boats, the combination with a tiller having an adjustable rod thereon, a saddle connected with said tiller and projecting approximately at right angles therewith, pulleys above said saddle and rearward thereof, a cylinder, a piston in said cylinder the rod of which extends through each end thereof, piston-pulleys connected with the ends of said rod and partaking of the movements thereof, fixed pulleys opposite said piston-pulleys, and cables having their contiguous ends secured to said adjustable rod and extending around said saddle, one of said cables extending from one end of the saddle upward and rearward and over one of the first-mentioned pulleys and thence around one of said fixed pulleys and thence around one of said piston-pulleys and back to said fixed pulley and secured adjacent to the latter, and the other of said cables extending from the other end of said saddle and correspondingly around the other rearward pulley, fixed pulley and piston-pulley and having its end secured adjacent to its fixed pulley.

6. A steering mechanism comprehending in combination with means for actuating the tiller, embracing a rod operated to control the action of the same, a braking mechanism having means by which it is subjected to pressure which tends automatically to release it, and devices for normally overcoming the power of said pressure means, said devices being connected with and actuated by said rod.

7. A steering mechanism comprehending in



combination with means for actuating the tiller, embracing a rod operated to control the action of the same, a braking mechanism having means constantly exerting a tendency to  
5 operate the same in one direction, and devices acting in opposition to said means and operated to overcome the power thereof, said opposing devices being connected with and actuated by said rod.

10 8. In combination with the tiller-actuating means of a steering mechanism, a braking mechanism therefor comprehending a crank-lever, reversely-operated brake-shoes connected therewith and means acting on said  
15 lever and tending to release the brake, and devices acting in opposition to said brake-releasing means and controlled by said tiller-actuating mechanism.

20 9. In combination with the tiller-actuating means of a steering mechanism, a braking mechanism therefor, comprehending a crank-lever, reversely-operated brake-shoes connected therewith and a weight acting on said  
25 lever and tending to release the brake, and devices acting in opposition to said brake-releasing means and controlled by said tiller-actuating mechanism.

30 10. The combination with the tiller, and its actuating mechanism, said tiller-actuating mechanism comprising a valve-controlled engine connected with said tiller, an actuating-rod for the valve of said engine and a pilot-wheel also connected with said tiller, of a  
35 braking mechanism, comprehending a crank-lever, reversely-operated brake-shoes connected therewith to engage opposite sides of the rim of the pilot-wheel and means acting on said lever and tending to release the brake,  
40 and devices acting in opposition to said brake-releasing means and controlled by said valve-actuating rod.

45 11. The combination with the tiller-actuating means of a steering mechanism, and braking mechanisms therefor, having means tending constantly to operate the same in one direction, of a lever acting in opposition to said  
50 means, and devices normally acting on said lever to hold the braking mechanism against the action of said means, said devices being connected with the tiller-actuating means and actuated by movement of the latter to hold and release said lever.

55 12. The combination with a tiller, a valve-controlled engine connected therewith, a pilot-wheel also connected with said tiller, and a brake for said pilot-wheel, of means tending constantly to operate the brake in one direction, an actuating-rod for the valve of  
60 said engine, a lever acting in opposition to said means, and devices normally acting on said lever to hold said brake against the action of said means, said devices being connected with said valve-actuating rod and actuated by movement of the latter to hold and  
65 release said lever.

13. The combination with a tiller and its actuating mechanism, said tiller-actuating

mechanism embracing a valve-controlled engine connected therewith and an actuating-rod for the valve of said engine, of a braking  
70 mechanism, means tending to release the brake, and mechanism acting in opposition to said brake-releasing means, said mechanism comprehending a lever which is depressed to hold the brake, and a connection between  
75 said lever and valve-actuating rod, said connection embracing two members having a slidable connection with each other, a means pivotally connected with one of said members and loosely connected with said lever  
80 and a means by which the other of said members is connected with said valve-actuating rod so as to be actuated thereby to permit the brakes to be released.

85 14. The combination with a tiller, a valve-controlled engine connected therewith, a pilot-wheel also connected with said tiller, braking means for said pilot-wheel having means for operating the same in one direction, and an axially-movable actuating-rod for the  
90 valve of said engine, of a crank carried by said rod, a lever to act in opposition to said brake-operating means, and a connection between said lever and crank, said connection embracing two members having a slidable  
95 connection with each other, one of said members having a pivotal connection with said crank, and a strap pivoted to the lower end of the other of said members and loosely engaged by said lever.

100 15. The combination with a tiller, a pilot-wheel having connection therewith, a steering-engine also connected with said tiller, and actuating-rods for the valve of said engine, said rods being connected to move in  
105 unison, of brake mechanism, embracing shoes to engage said pilot-wheel, pressure-exerting means tending constantly to move the shoes in one direction, and devices acting in opposition to said pressure-exerting means for  
110 normally overcoming the tendency thereof, said devices being controlled by said rods.

115 16. A steering mechanism, embracing, in combination, a tiller, actuating means for said tiller, including a valve-controlled engine, axially-movable rods, controlling the action of said valve and connected to move in  
120 unison, a pilot-wheel also connected with said tiller, brake-shoes engaging opposite sides of said wheel, a weight connected with said brake-shoes and tending to release the same from said wheel, and means controlled by said axially-movable rods and acting in  
125 opposition to said weight, to hold the said shoes normally engaged with said pilot-wheel.

130 17. A steering mechanism, embracing, in combination, a tiller, actuating means for said tiller including a valve-controlled engine, axially-movable rods, controlling the action of said valve, and connected to move in unison, a pilot-wheel also connected with said  
tiller, brake-shoes engaging opposite sides of said wheel, a weight connected with said brake-shoes and tending to release the same



from said wheel, and mechanism acting in opposition to said brake-releasing means, said mechanism comprehending a lever which is depressed to hold the brake, and a connection between said lever and valve-actuating rod, said connection embracing two members having a slidable connection with each other, a means pivotally connected with one of said members and loosely connected with said lever and a means by which the other of said members is connected with said valve-actuating rod so as to be actuated thereby to permit the brakes to be released.

18. In a steering mechanism, the combination with the tiller, and its actuating means, said actuating means including a pilot-wheel, of a braking mechanism for said pilot-wheel, embracing shoes to engage the same, a crank-lever connected with said shoes to operate the same, means engaging said lever and tending to release said shoes from said wheel, a pivoted lever, a foot-plunger connected with one end of said pivoted lever, a rod pivotally connecting the other end of said lever with said crank-lever and means connected with said foot-plunger and controlling the action of said brake-releasing means.

19. In a steering mechanism, the combination with the tiller, and its actuating means, said actuating means including a valve-controlled engine connected with said tiller, an actuating-rod for the valve of said engine and a pilot-wheel also connected with said tiller, of a braking mechanism for said pilot-wheel, embracing shoes to engage the same, a crank-lever connected with said shoes to operate the same, means engaging said lever and tending to release said shoes from said wheel, a pivoted lever, a foot-plunger connected with one end of said pivoted lever, a rod pivotally connecting the other end of said lever with said crank-lever, and means connected with said foot-plunger and controlling the action of said brake-releasing means, said controlling means being connected with and controlled by said valve-actuating rod.

20. In a steering mechanism, the combination with the tiller, and its actuating means, said actuating means including a valve-controlled engine connected with said tiller, an actuating-rod for the valve of said engine and a pilot-wheel also connected with said tiller, of a braking mechanism for said pilot-wheel, embracing shoes to engage the same, a crank-lever connected with said shoes to operate the same, a weight engaging said lever and tending to release said shoes from said wheel, a pivoted lever, a foot-plunger connected with one end of said pivoted lever, a rod pivotally connecting the other end of said lever with said crank-lever, and means connected with said foot-plunger and controlling the action of the weight, said controlling means being connected with and controlled by said valve-actuating rod.

21. The combination with a tiller and its actuating means, said actuating means in-

cluding a valve-controlled engine connected with said tiller, an axially-movable actuating-rod for the valve of said engine and a pilot-wheel also connected with said tiller, of a braking mechanism for said pilot-wheel, embracing shoes to engage the same, a crank-lever connected with said shoes to operate the same, means engaging said lever and tending to release said shoes from said wheel, a pivoted lever, a foot-plunger connected with one end of said pivoted lever, a rod pivotally connecting the other end of said lever with said crank-lever, a lever connected between its ends with said foot-plunger, and means connecting one end of the last-mentioned lever with said valve-actuating rod, said connecting means embracing two members having a slidable connection with each other, a means pivotally connected with one of said members and loosely connected with said lever and a means by which the other of said members is connected with said valve-actuating rod so as to be actuated thereby to permit the brakes to be released.

22. A steering mechanism, embracing, in combination, a tiller, actuating means for said tiller including a valve-controlled engine, actuating-rods for the valve of said engine, said rods being connected to move in unison, a pilot-wheel also connected with said tiller, brake-shoes engaging opposite sides of said wheel, a crank-lever connected with said shoes to operate the same, means engaging said lever and tending to release said shoes from said wheel, a pivoted lever, a foot-plunger connected with one end of said pivoted lever, a rod pivotally connecting the other end of said lever with said crank-lever, and devices for controlling the action of the brake-releasing means, said devices being connected with said foot-plunger and one of the valve-actuating rods, and being controlled by the latter.

23. A steering mechanism, embracing, in combination, a tiller, actuating means for said tiller including a valve-controlled engine, actuating-rods for the valve of said engine, said rods being connected to move in unison, a pilot-wheel also connected with said tiller, brake-shoes engaging opposite sides of said wheel, a crank-lever connected with said shoes to operate the same, means engaging said lever and tending to release said shoes from said wheel, a pivoted lever, a foot-plunger connected with one end of said pivoted lever, a rod pivotally connecting the other end of said lever with said crank-lever, a lever connected between its ends with said foot-plunger, and means connecting one end of the last-mentioned lever with one of said valve-actuating rods, said connecting means embracing two members having a slidable connection with each other, a means pivotally connected with one of said members and loosely connected with said lever and a means by which the other of said members is connected with said valve-actuating rod so as to



be actuated thereby to permit the brake to be released.

24. In a steering mechanism, the combination with a tiller and its actuating means, of  
5 a braking mechanism having means tending to release it, and mechanism controlling the action of said braking mechanism, said controlling mechanism including a lever adapted to be raised and lowered to permit the brake  
10 to be released and to set the same, respectively, and devices controlling the action of said lever including a jointed link by which the first-mentioned lever is pivotally suspended and an operating means connected  
15 with said link.

25. In a steering mechanism, the combination with a tiller and its actuating means, of a braking mechanism having means tending to release it, and mechanism controlling the  
20 action of said braking mechanism, said controlling mechanism including a lever adapted to be raised and lowered to permit the brake to be released and to set the same, respectively, and devices controlling the action of  
25 said lever, including a jointed link by which the first-mentioned lever is pivotally suspended, a spring connecting one member of said jointed link with said first-mentioned lever, and a device connected with said joint-  
30 ed link for turning the same at its joint.

26. In combination with the tiller-actuating means of a steering mechanism, a braking mechanism therefor having means tending to release the same, and devices controlling the  
35 action of said releasing means, said devices being connected with the tiller-actuating mechanism and controlled thereby, and controlling means for said devices independent of said tiller-actuating means.

27. A steering mechanism, embracing, in combination, a tiller, actuating means for said  
40 tiller, including a valve-controlled engine, an actuating-rod for the valve of said engine and a pilot-wheel connected with said tiller, braking mechanism for said pilot-wheel, having means tending to release the same, and controlling mechanism for said braking mechanism, said controlling mechanism being connected with said rod and controlled thereby,  
45 and means for controlling said controlling mechanism independent of the action of said rod.

28. A steering mechanism, embracing, in combination, a tiller, actuating means for said  
55 tiller, including a valve-controlled engine, an actuating-rod for the valve of said engine and a pilot-wheel connected with said tiller, braking mechanism for said pilot-wheel, having means tending to release the same, and controlling mechanism for said braking mechanism, said controlling mechanism including a lever adapted to be raised and lowered to permit the brake to be released and to set the same, respectively, means connecting one end  
60 of said lever with said valve-actuating rod, whereby said rod controls said action of the lever, and an independent controlling means

for said lever embracing a jointed link from which the other end of the lever is pivotally suspended, and an operating means connected  
70 with said link.

29. A steering mechanism, embracing, in combination, a tiller, actuating means for said tiller including a valve-controlled engine, an actuating-rod for the valve of said engine and  
75 a pilot-wheel connected with said tiller, braking mechanism for said pilot-wheel, having means tending to release the same, and controlling mechanism for said braking mechanism, said controlling mechanism including a  
80 lever, means connecting one end of the same with said valve-actuating rod and embracing two members having a slidable connection with each other and respectively connected with said rod and lever, for the purpose speci-  
85 fied, and a separate controlling means for said lever, embracing a jointed link by which the other end of the same is suspended, a spring connecting one member of said link with the lever, and an actuating means con-  
90 nected with said link.

30. In a steering mechanism, the combination with the tiller, and its actuating means, said actuating means including a pilot-wheel, of a braking mechanism for said pilot-wheel  
95 having means tending to release the same, a foot-plunger connected with said braking mechanism, a lever connected with said foot-plunger and controlling the action of said brake-releasing means, and a controlling  
100 means for said lever, embracing a jointed suspending-link therefor, a spring connecting one end of one member of said link with the lever, and an operating device connected with said link.

31. A steering mechanism, embracing, in combination, a tiller, actuating means for said tiller, including a valve-controlled engine, an actuating-rod for the valve of said engine and  
110 a pilot-wheel, braking mechanism for said pilot-wheel, having means tending to release the same, a foot-plunger connected with said braking mechanism, a lever connected with said plunger and adapted to be raised and lowered to permit the brake to be released  
115 and to set the same, respectively, means connecting one end of said lever with said valve-actuating rod, whereby said rod controls said action of the lever, and a separate controlling means for said lever connected with the  
120 other end of the same.

32. A steering mechanism, embracing, in combination, a tiller, actuating means for said tiller, including a valve-controlled engine, an actuating-rod for the valve of said engine, and  
125 a pilot-wheel, braking mechanism for said pilot-wheel, having means tending to release the same, a foot-plunger connected with said braking mechanism, a lever connected with said plunger and adapted to be raised and lowered to permit the brake to be released  
130 and to set the same, respectively, means connecting one end of said lever with said valve-actuating rod, whereby said rod controls said



action of the lever, and a separate controlling means for said lever embracing a jointed suspending-link for the other end of the same, a spring connecting one member of said link with the lever, and an operating device connected with said link.

33. A steering mechanism, embracing, in combination, a tiller, actuating means for said tiller, including a valve-controlled engine, an actuating-rod for the valve of said engine and a pilot-wheel, braking mechanism for said pilot-wheel, having means tending to release the same, a foot-plunger connected with said braking mechanism, a lever connected with said plunger, means connecting one end of the same with said valve-actuating rod and embracing two members having a slidable connection with each other and respectively connected with said rod and lever, and a separate controlling means for said lever, embracing a jointed link by which the other end of the same is suspended, a spring connecting one member of said lever with the lever, and an operating means connected with said link.

34. A steering mechanism, embracing, in combination, a tiller, actuating means for said tiller including a valve-controlled engine, an actuating-rod for the valve of said engine and a pilot-wheel, braking mechanism for said pilot-wheel, comprehending shoes to engage the same, a crank-lever connected with said shoes to operate the same, a weight suspended from said lever and tending to release said shoes from said wheel, a pivoted lever, a foot-plunger connected with one end of said pivoted lever, a rod pivotally connecting the other end of said lever with said crank-lever, a lever connected with said plunger, a jointed link from which one end of the last-mentioned lever is pivotally suspended, a spring connecting the link with said last-mentioned lever, an operating device for said link, and means connecting the other end of said last-mentioned lever with said valve-actuating rod, said connecting means including two members having a slidable relation with each other, means to which one of said members is pivoted and by which it is connected with said valve-actuating rod and means to which the other of said members is pivoted and by which it is connected with said last-mentioned lever.

35. In a steering mechanism, the combination with a tiller, an engine-cylinder adapted to receive and exhaust steam at either end, a piston in said cylinder having its rods projected through opposite ends of the cylinder and each connected with said tiller, a valve controlling the action of said engine, and an actuating-rod for said valve, of a pilot-wheel also connected with said tiller, a braking mechanism having shoes to engage said wheel, means tending to release said shoes from said wheel, and means acting in opposition to said brake-releasing mechanism and controlling the action thereof, said controlling means including a lever which is connected with said braking mechanism and with said valve-actu-

ating rod and is controlled by operation of the latter, means connected with said lever and adapted to further control the same, and actuating devices for the latter means.

36. In a steering mechanism, the combination with a tiller, an engine-cylinder adapted to receive and exhaust steam at either end, a piston in said cylinder having its rods projected through opposite ends of the cylinder and each connected with said tiller, a valve controlling the action of said engine, and an actuating-rod for said valve, of a pilot-wheel also connected with said tiller, a braking mechanism having shoes to engage said wheel, means tending to release said shoes from said wheel, a foot-plunger connected with said braking mechanism, and means acting in opposition to said brake-releasing mechanism and controlling the action thereof, said controlling means including a lever which is connected with said braking mechanism between its ends and has one of its ends connected with said valve-actuating rod so as to be controlled by operation of the latter, and means connected with the other end of said lever and constituting a separate operating means therefor.

37. In a steering mechanism, the combination with the tiller, an engine-cylinder having a piston provided with rods projecting through the ends of the cylinder, and means connecting each of said rods with said tiller, of a four-way valve for admitting and exhausting steam at the ends of the cylinder, said valve having its casing provided with annular grooves arranged above and below the valve-ports to arrest leakage therefrom and means of exhausting said steam-leakage from said grooves, and valve-actuating means extending to the pilot-house.

38. In a steering mechanism, the combination with the tiller, an engine-cylinder having a piston provided with rods projecting through the ends of the cylinder, and means connecting each of said rods with said tiller, of a four-way rotatable valve for admitting and exhausting steam at the ends of the cylinder, said valve having its casing provided with annular grooves arranged above and below the valve-ports and with a port connecting said grooves with each other and an exhaust-orifice communicating with one of said grooves, and an axially-movable valve-actuating means extending to the pilot-house.

39. In a steering mechanism, the combination with the tiller, a steam-steering engine connected therewith, and a valve controlling said engine and having its actuating means extended to the pilot-house, of the emergency-cocks in communication with said engine, and a pilot-wheel also connected with said tiller and adapted to be operated manually.

40. In a steering mechanism, the combination with the tiller, a steam-steering engine connected therewith, a valve controlling said engine and having its actuating means ex-



tended to the pilot-house, and emergency-cocks connected with said engine, of a pilot-wheel also connected with said tiller, a braking mechanism having shoes to engage said  
5 pilot-wheel, said braking mechanism including means tending to release the same and devices controlled by the valve-actuating means for controlling the action of said  
10 brake-releasing means, and a device adapted to be operated manually and connected with said controlling means of the brake-releasing means, for the purpose specified.

41. In a steering mechanism, the combination with the tiller, and an engine having its  
15 piston provided with rods which project oppositely therefrom through both ends of the cylinder, of means connecting both of said rods with said tiller, said connecting means including a saddle secured to the tiller and

arranged transversely of said tiller, pulleys 20 arranged above said saddle and slightly rearward thereof, and cables extending from the tiller and engaging said saddle and pulleys, both of said cables normally engaging the  
25 entire length of the saddle and, when the tiller is adjusted, one of said cables bearing upon and extending at an angle from the corner of the saddle while the other of the same will bear upon the entire length of the saddle and extend therefrom at a different angle 30 from the first-mentioned cable.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

CHARLES ROGERS.

In presence of—

CLARENCE A. WILLIAMS,  
RICHARD S. HARRISON.