

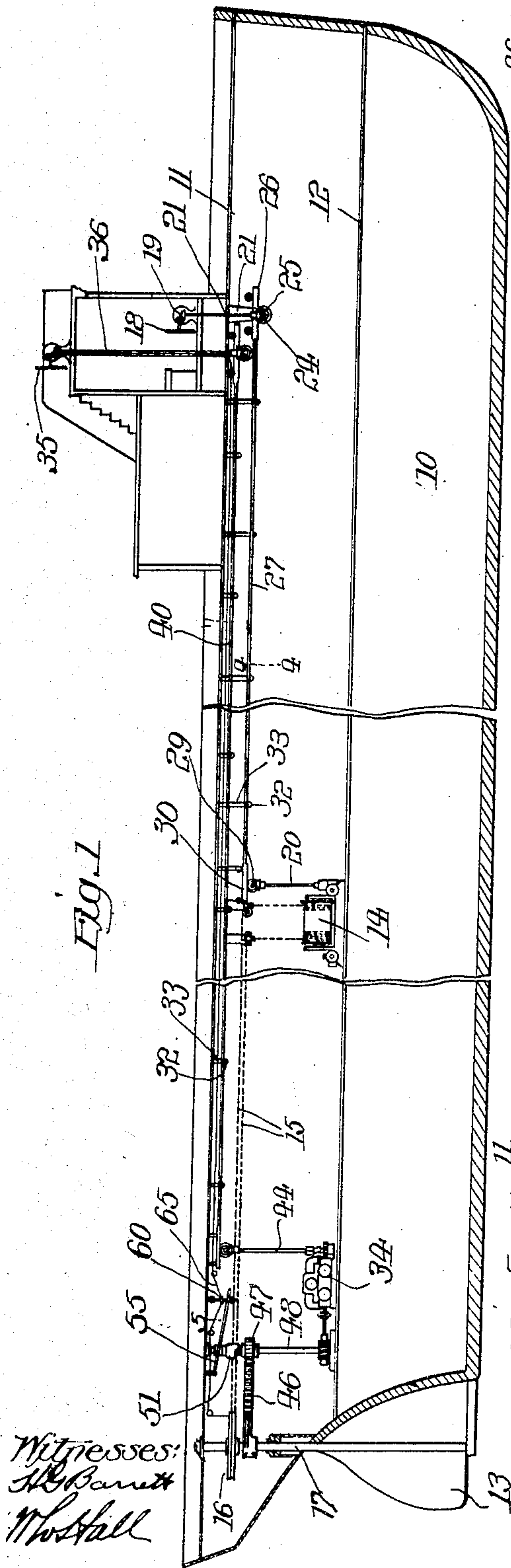
No. 885,312.

PATENTED APR. 21, 1908.

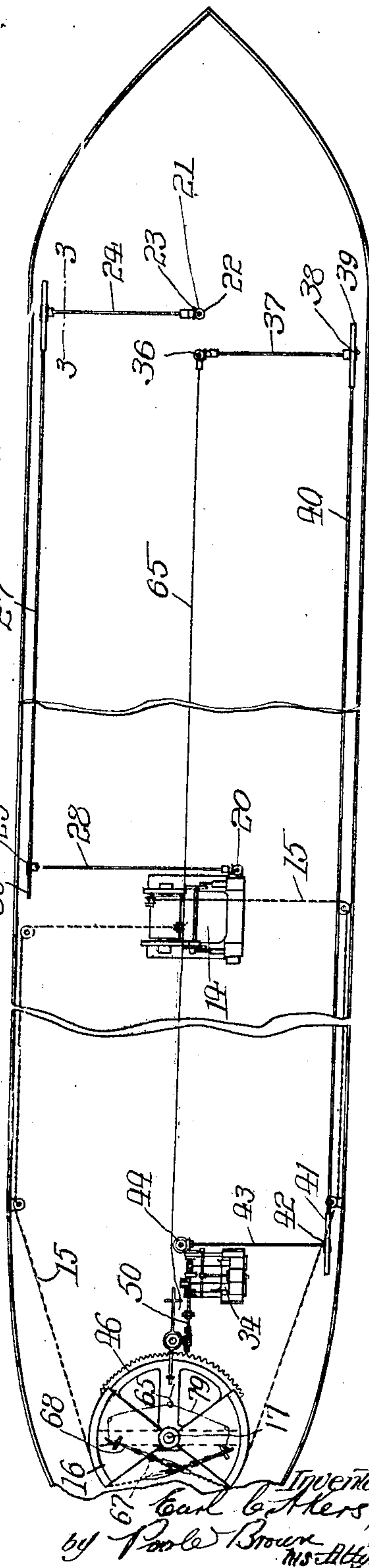
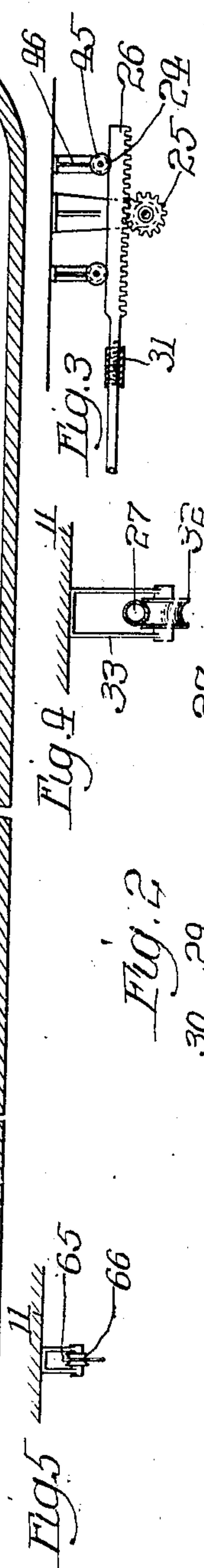
E. C. AKERS.
STEERING GEAR FOR BOATS.

APPLICATION FILED OCT. 2, 1905.

3 SHEETS—SHEET 1.



Witnesses:
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W. Hall



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3 SHEETS—SHEET 2.

Fig. 6.

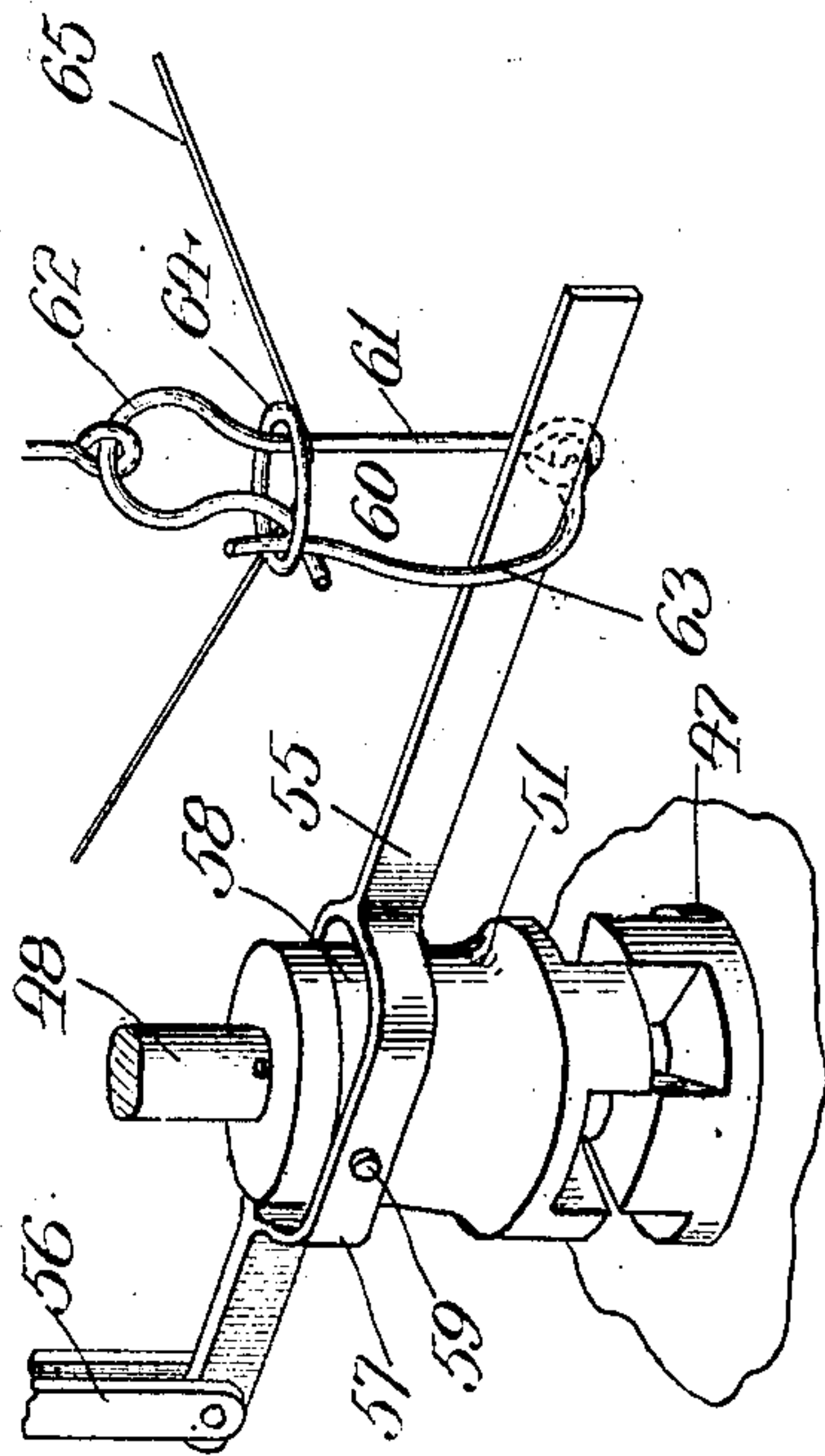
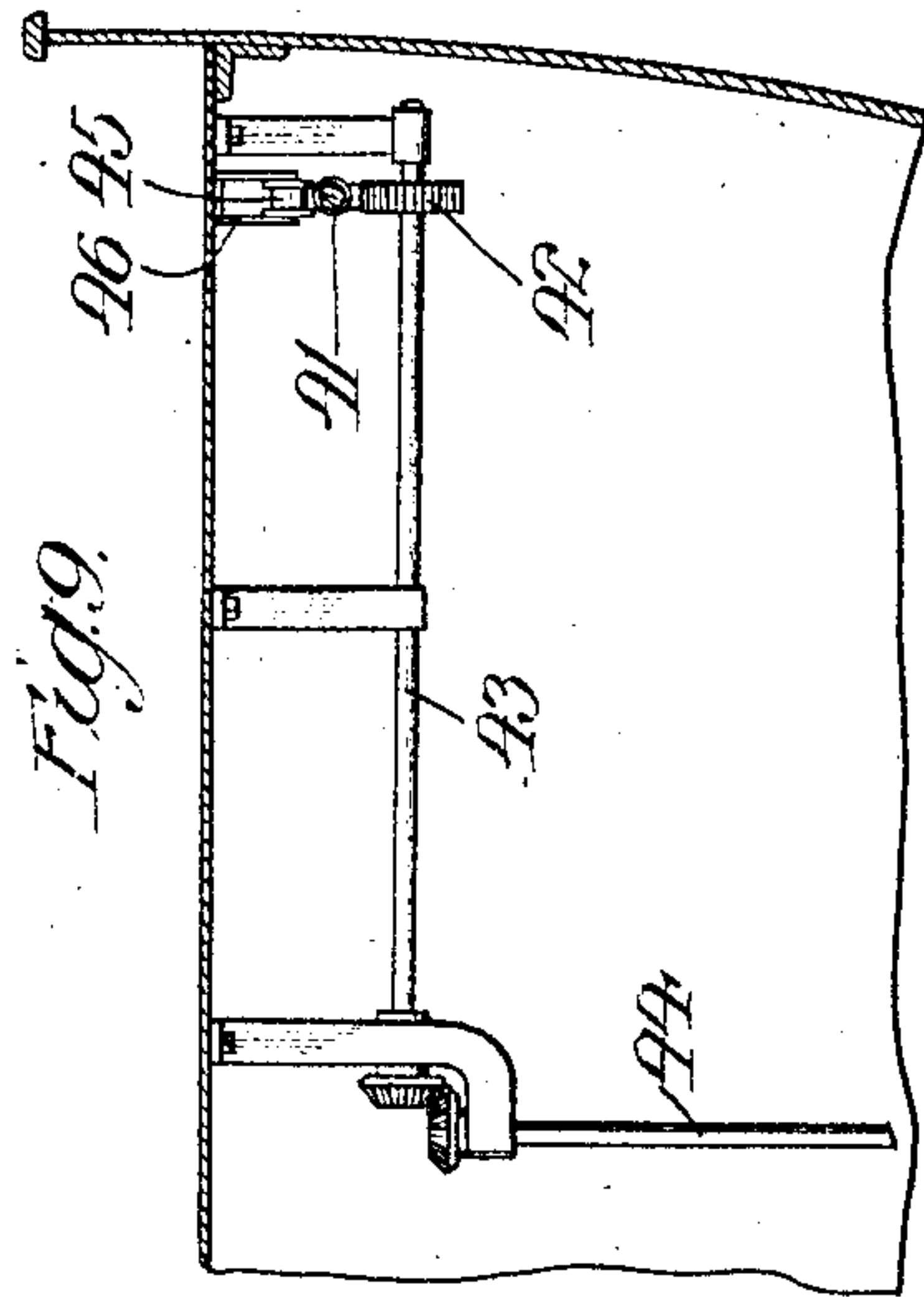
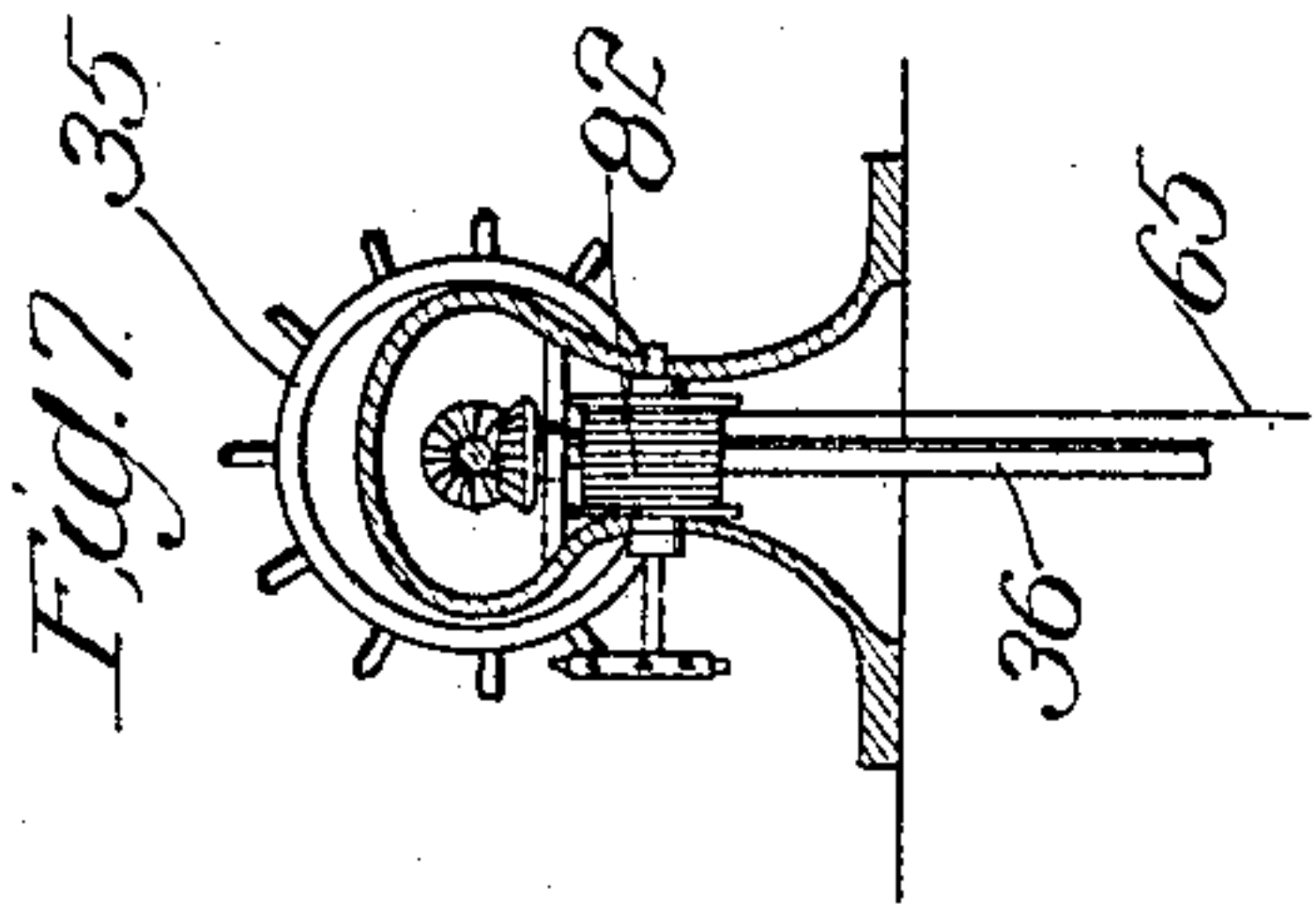
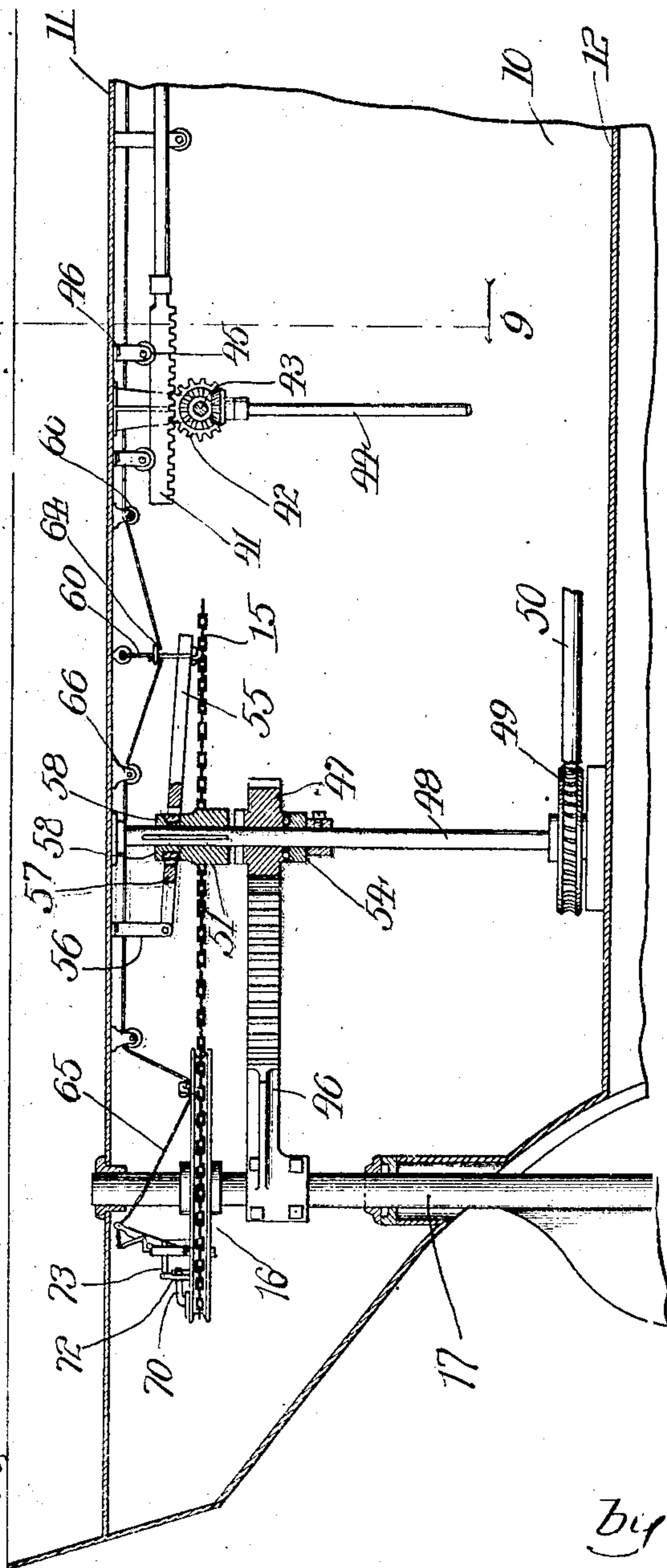


Fig. 8.

Witnesses
H. B. Smith
W. J. Hall

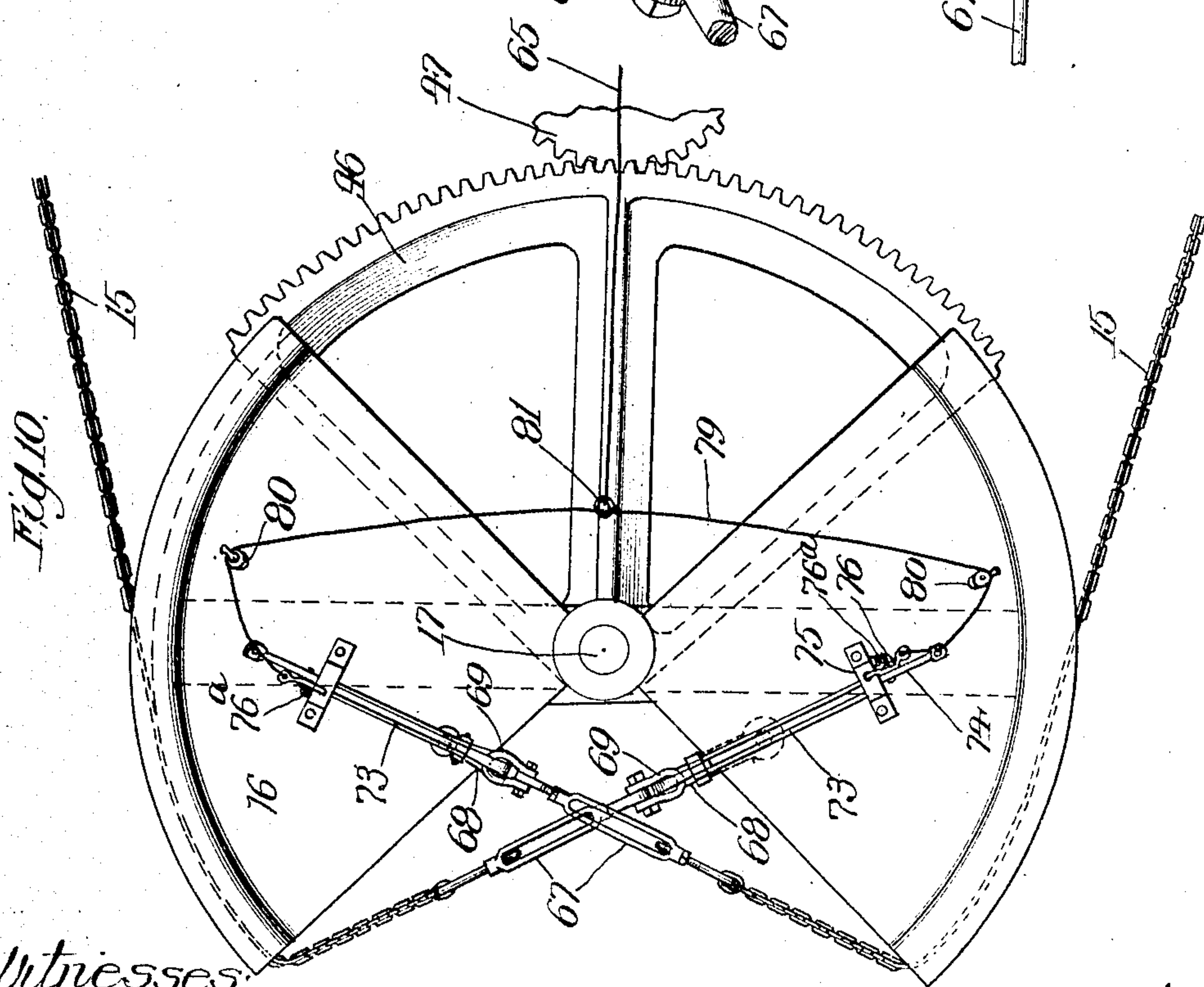
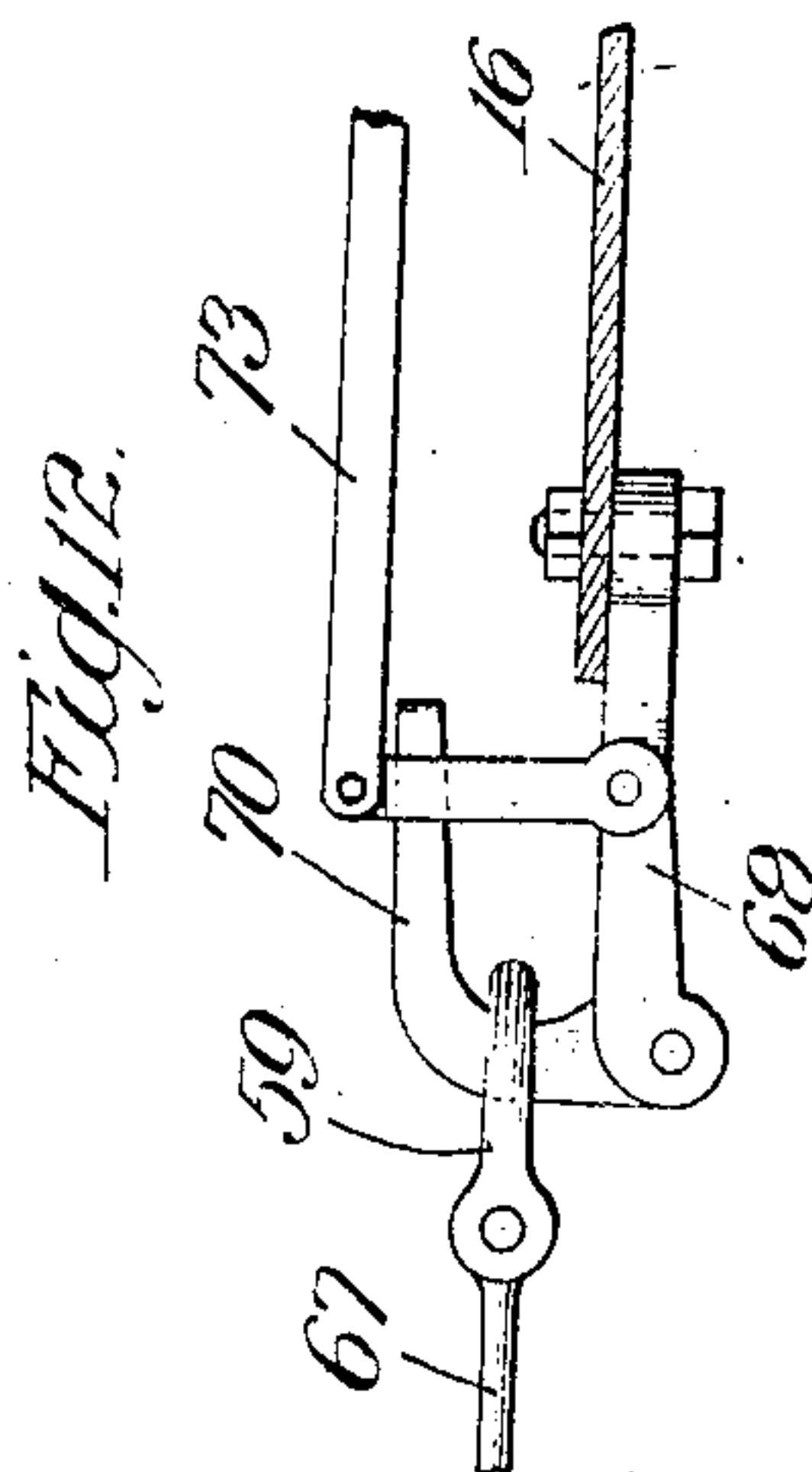
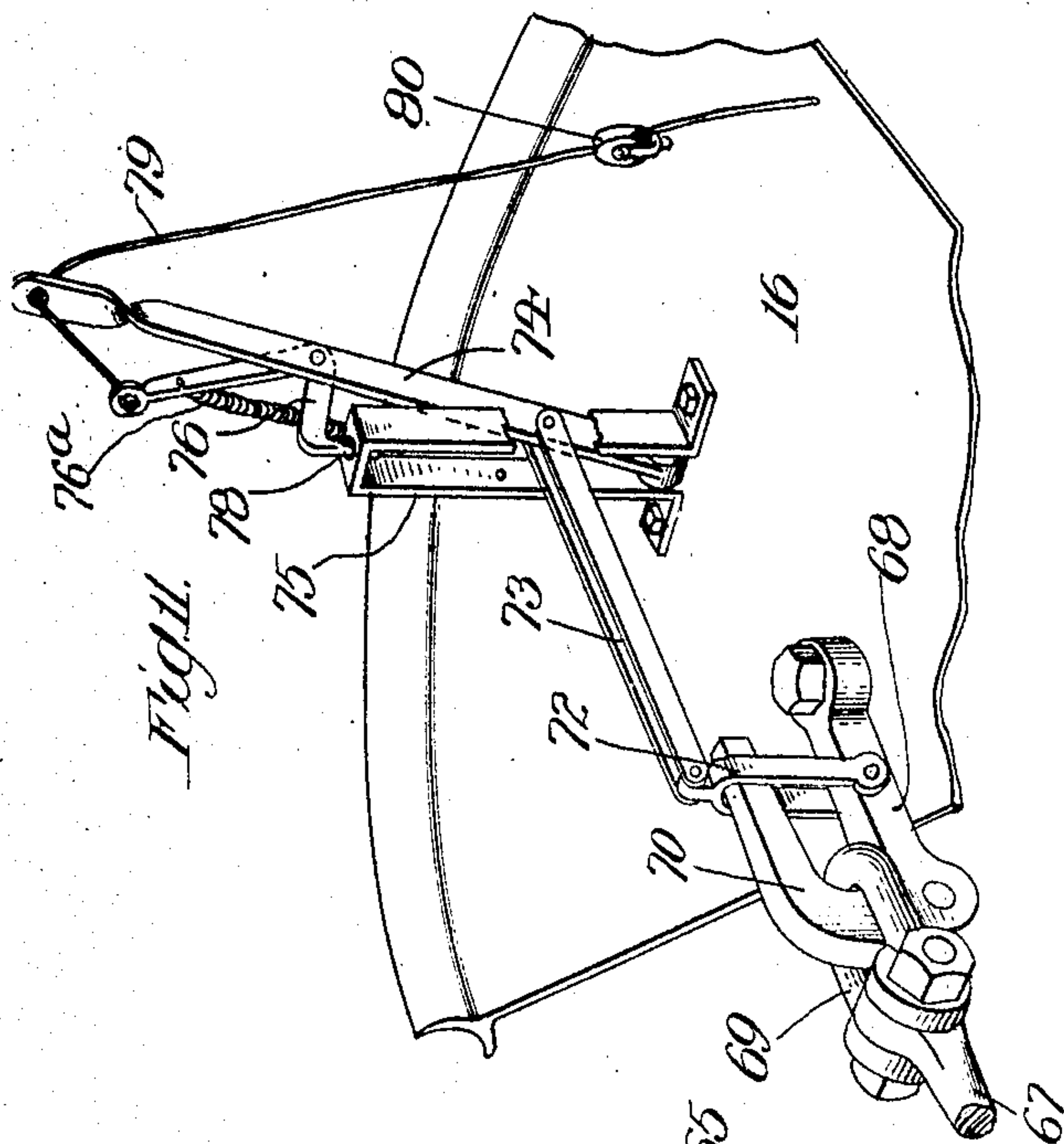
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No. 885,312.

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E. C. AKERS.
STEERING-GEAR FOR BOATS.
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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

EARL C. AKERS, OF PORT HURON, MICHIGAN

STEERING-GEAR FOR BOATS.

No. 885,312.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed October 2, 1905. Serial No. 280,994.

To all whom it may concern:

Be it known that I, EARL C. AKERS, a citizen of the United States, of Port-Huron, in the county of St. Clair and State of Michigan, have invented certain new and useful Improvements in Steering-Gear for Boats; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in power steering gears for boats, and the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

Among the objects of my invention is to provide a steering gear for boats embracing a connection between the steering wheel, usually located at the pilot house, and the rudder, so arranged as to be at all times reliable and efficient to promptly and with certainty transmit power to set in operation the rudder actuating mechanism, and of such character as to unerringly indicate to the person at the steering wheel the position of the rudder, and to maintain the relation of the rudder to the steering wheel, and a mechanism possessing these properties which is extremely simple in its construction, which may be readily installed and which is economical to maintain.

My improved steering gear for boats embraces, in combination with the rudder and the wheel, the latter located at a point distant from the rudder, a mechanism for operating the rudder to turn the same from side to side, and a positively acting connection extending rearwardly from the steering wheel to the starting or controlling device of the rudder actuating mechanism and operating in both directions of its movement to actuate said starting device.

Heretofore, it has been the practice to operate the rudder actuating mechanism from the steering wheel through the medium of chains or cables, there being two of such chains or cables provided, one for transmitting motion to swing the rudder in one direction and the other to swing the rudder in the other direction. A serious objection to this mode of transmitting power to control the rudder actuating mechanism is the lengthening of the chain or cable after some use, due to stretching, to which is added in the use of a

chain the lengthening thereof due to the wear between the links of the chain. For this reason the wheel actuated transmitting device is inaccurate to indicate the position of the rudder to the person at the wheel, and is ineffectual to secure a prompt response of the rudder to the steering movements of the wheel. This defect has been emphasized in later years when applying the chain or cable mechanism to the longer boats, and much ingenuity has been displayed in devising means to overcome the known existing defects. Later attempts have been made to overcome these defects by providing a device in the nature of a hydraulic appliance whereby motion is transmitted rearwardly from the wheel to control the rudder through the medium of a column of liquid. This mechanism, while superior in point of accuracy and promptitude in transmitting motion rearwardly from the wheel, has been found in practice to be subject, in a somewhat less degree, to similar defects found in the prior mechanism, owing to the fact of leakage of fluid from the pipes and past the moving parts of the mechanism, as actuating pistons. Moreover, the latter mechanism is an expensive and complicated one and requires the services of an expert to repair or readjust the same in case of breakage or disarrangement of registration between the rudder and the steering wheel.

My improvement consists in providing a rigid and certain connection between the steering wheel and the rudder actuating mechanism, and its simplest and best form known to me at present is embraced in an inextensible rigid rod that is connected at its forward end with the steering wheel and at its rear end with the controlling device of the rudder actuating mechanism, and is connected at its ends with said parts by means avoiding lost motion. The use of the rigid connection between the steering wheel and rudder actuating mechanism enables the position of the rudder, with respect to the position of the wheel, when once adjusted, to be maintained so that the man at the wheel is able to steer the boat with absolute certainty because he knows the position of the rudder and knows that the rudder will respond accurately and promptly to the movement of the wheel.

A further object of the invention is to provide an improved auxiliary steering gear mechanism and means for operating said

mechanism at a distance from the gear mechanism and rudder to connect said mechanism with the rudder.

In the drawings:—Figure 1 is a diagrammatic, vertical, sectional view of a boat showing the manner of applying my improved steering gear thereto. Fig. 2 is a diagrammatic plan view thereof. Fig. 3 is a detail section, taken on line 3—3 of Fig. 2. Fig. 4 is a detail vertical section, taken on line 4—4 of Fig. 2. Fig. 5 is a detail section taken on line 5—5 of Fig. 1. Fig. 6 is an enlarged vertical section of the stern of the boat showing the parts more intimately associated with an auxiliary steering gear. Fig. 7 illustrates the operating wheel and its stand for the auxiliary gear. Fig. 8 is a perspective view of a portion of the clutch device by which the auxiliary steering gear is operatively connected with the rudder post. Fig. 9 is a detail section, taken on line 9—9 of Fig. 6. Fig. 10 is an enlarged plan view of the main quadrant and the means for connecting the tiller chains therewith, and illustrating also a portion of the auxiliary gear quadrant. Fig. 11 is a perspective view of one side of the main quadrant showing in detail the device for attaching the tiller chains to the quadrant and constructed to release said chains. Fig. 12 is a fragmentary, sectional view of the like parts at the other side of the quadrant.

As shown in said drawings,—10 designates, as a whole, the hull of a typical boat and 11 and 12 the upper and lower decks thereof. The rudder 13 of said boat is operated by an actuating mechanism shown as consisting of a steering engine 14, of any preferred type, located preferably in the engine room abaft midships. Said engine operates the rudder through the medium of tiller chains 15 connected to the usual quadrant 16 which is attached to the upper end of the rudder post 17. The valve mechanism of the main steering engine is operated by the usual hand wheel 18 located in the pilot house 19. The steering wheel 18 is connected with the valve controlling rod or stem 20 of the main steering engine through the medium of mechanism constituting part of my invention and made as follows:

21 designates a vertical rotary shaft extending downwardly from the steering wheel stand through the upper deck 11 and is operatively connected at its upper end with the hand wheel 18 through intermeshing beveled gears. Said shaft 21 is connected at its lower end by beveled gears 22 23 with the inner end of a horizontal rotary shaft 24 extending laterally towards one side or wing of the boat, and rotatively mounted in suitable hangers depending from the upper deck 11. Said horizontal shaft 24 is provided at its outer end with a gear pinion 25 (Fig. 3) which meshes with a horizontal rack 26 car-

ried by or formed on the forward end of a rigid, inextensible connecting rod 27 that extends horizontally aft towards the main steering engine and is operatively connected at its rear end with the valve stem or rod 20 of said engine. The operative connections between said connecting rod and valve rod or stem comprises a horizontal, rotative shaft 28 extending inwardly from the connecting rod to the engine and provided at its outer end with a gear pinion 29 that meshes with a rack 30 carried by the rear end of said connecting rod. The inner end of said rod 28 is connected by suitable beveled gears with the upper end of said valve stem or rod 20. The said connecting rod 27 is made rigid throughout its length and is inextensible so that the single rod transmits motion both fore and aft to operate the valve of the steering engine in both directions from its neutral position. The rod may conveniently be made of sections of pipe or tubes joined by unions 31, as shown in Fig. 3, the union in said figure indicating the connection between the first section of the pipe and the rack bar 26. The said connecting rod 27 is supported intermediate its length and guided by suitable ball bearing sheaves 32 located in any convenient manner at the sides of the vessel. As herein shown, the sheaves are mounted in brackets 33 depending from the upper deck, but may be supported in any other convenient manner.

In the operation of the mechanism described, rotation of the pilot house wheel 18 is communicated to the controlling rod or stem 20 of the main steering engine without lost motion and in both directions through the connecting rod 27, thereby contributing to the accuracy and promptitude of action of the mechanism with a simple, durable and economical mechanism. Moreover, the connecting rod, supported as it is by the sheaves shown, may be operated with little power inasmuch as it does not sag but moves straight through or over its guide sheaves, nor is there a tendency for the connections to stretch under continued use. Moreover, said rigid inextensible connection between the steering wheel and the controlling device of the rudder actuating mechanism enables the position of the rudder to be accurately indicated at the wheel, after the position of the rudder has once been adjusted to that of the wheel, thereby enabling the man at the wheel to be always certain of the position of the rudder as indicated by the position of the wheel relatively to the wheel stand or an indicating device on the wheel stand.

The boat herein shown is provided with an auxiliary or emergency steering gear, normally inoperative to control the rudder and designed to be connected with the rudder at times when the main steering gear becomes inoperative or for any reason is disconnect-

ed from the rudder. Said auxiliary steering gear, when connected with the rudder in a manner hereinafter described, is operated through the medium of an auxiliary steering gear engine or other rudder actuating mechanism 34 located at the stern of the boat on the deck 12, as herein shown, and the throttle valve of said auxiliary steering gear engine is operatively connected with a manual controlling device, herein shown as having the form of a hand wheel 35, located on the bridge of the boat, and the wheel operates the auxiliary engine valve by connecting mechanism made like that described for operating the valve mechanism of the main steering engine.

The operative connections between the bridge controlling device 35 and the auxiliary steering gear engine embraces a vertical shaft 36 operatively connected at its upper end with said hand wheel 35 and extending through the deck 11 and connected at its lower end, near the transverse median line of the boat, by means of suitable beveled gears with a horizontal shaft 37 extending laterally towards the wing of the boat. Said shaft 37 is provided at its outer end with a gear pinion 38 which meshes with a rack 39 attached to or formed on the forward end of a connecting rod 40, like the rod 27 before referred to, that extends aft and is provided at its rear end with a rack bar 41 which meshes with a gear pinion 42 fixed to the outer end of a horizontal, rotary shaft 43 located near the auxiliary steering engine. Said shaft 43 extends inwardly towards the auxiliary steering gear engine 34 and is connected, through the medium of suitable beveled gears, with the controlling rod 44 of the valve mechanism of the auxiliary engine 34. The said connecting rod 40 is supported on and guided by sheaves 32 carried by brackets 33, as shown in Fig. 3, in the same manner as the connecting rod for the main steering gear engine is guided and supported. The mechanism for controlling the throttle valve of the auxiliary steering engine from the hand wheel 35 operates in the same manner as does the like mechanism for the main steering engine before described. That is to say, motion is transmitted from the hand wheel 35 to the auxiliary engine valve mechanism to operate the latter in both directions from a neutral position through the fore and aft movement of said connecting rod 40.

Any suitable means may be employed for maintaining the rack bars 26, 30, 39 and 41 in mesh with their respective gear wheels, as for instance, by means of grooved guide wheels 45 bearing on the upper faces of said bars and carried in suitable brackets 46 depending from the superjacent deck structure, as shown in Figs. 3, 6 and 9.

A further important advantage of the

steering gear described is the economy and ease with which it may be installed and maintained in the boat. The apparatus, being made for the most part of commercial stock, not requiring special tools or machinery for the manufacture thereof, may be built at relatively small expense.

A further advantage of the apparatus is the ease and facility with which it may be adjusted to secure proper and accurate registration of the wheel to the position of the rudder.

The auxiliary steering gear herein shown comprises a geared quadrant 46 fixed to and extending forwardly from the rudder post, and a gear pinion 47 in constant mesh therewith and mounted on a vertical shaft 48 that is given a backward and forward rotary movement from the auxiliary steering engine 34. Said shaft 48 is geared to the auxiliary engine 34 in any suitable manner, as by means of a worm gear 49 at its lower end which meshes with a worm on the crank shaft 50 of said engine. The gear pinion 47 is loosely mounted on the shaft 48 so as to turn freely thereon when the main steering gear is in service. It is designed to be locked to said shaft by means of a clutch embracing, as a part thereof, a sleeve 51 which is splined to the shaft and moves vertically thereon, and the lower end of the sleeve and the upper face of the pinion are formed to constitute the complementary elements of the clutch. The pinion is held in horizontal alinement with the geared quadrant 46 by being supported on a collar 54 fixed to the shaft 48 in any suitable manner. Preferably, roller bearings are interposed between said collar and sleeve. The clutch sleeve 51 is held normally away from the pinion but is released to drop into its clutching position, when the auxiliary gear is to be brought into operation, by the following mechanism:

55 designates a lever which is pivoted at one end to a bracket 56 depending from the upper deck structure, and is formed to provide between its ends a yoke 57 which fits loosely over the upper end of the clutch sleeve. The yoke is pivotally connected with the clutch sleeve through the medium of a collar 58 fitting loosely in an annular groove in the upper end of said clutch sleeve. Said yoke is pivoted to the collar by means of short pins 59 extending through the side members thereof into the collar. This construction permits the clutch sleeve to rotate within the yoke while effecting an attachment therebetween which permits the sleeve to be raised by the lever. The lever extends beyond or forward of said clutch sleeve and is normally held in its raised position through the medium of a latch 60 that is suspended from the upper deck structure in any suitable manner. Said latch consists essentially of a suspended releasing hook, one side mem-

ber 61 of which is provided with a suspending loop 62, and the other side member 63 of which is hinged to the lower end of the member 61 and is designed to swing or drop away therefrom to release the clutch lever 55. The hinged member of the latch is held in its closed position by means of a retaining ring 64 which encircles the two members of the latch when the hinged member is in its closed position, in a manner to hold the same closed; and the hook is released by raising said retaining ring. The free end of the hook 62 is turned laterally outwardly to prevent the ring 64 from sliding too far downwardly on said latch. Said retaining ring is raised, in the present instance, by a cord or cable 65 which extends aft from the bridge through suitable guide sheaves 66 located beneath the deck 11 centrally of the boat (Figs. 2, 5 and 6) and is threaded through the latch beneath the retaining ring and attached at its rear end to a part located in rear of the latch. The latch 60 is located beneath the general level of the sheaves for said cord and tension on said cord, effected by a forward pull thereon, acts to raise the ring and release the hinged part of the hook, thereby releasing the lever and allowing the clutch sleeve to drop into its operative position.

Means are provided for disconnecting the tiller chains from the rudder when the auxiliary gear is brought into service, which is effected in the present instance by releasing the tiller chains 15 from the quadrant of the main steering gear. While the auxiliary steering gear would be operative to steer the boat without casting off the tiller chains from the quadrant yet such release of said chains is desirable in order to avoid injury to the parts and also to relieve the auxiliary gear of the work of unnecessarily carrying and shifting the chains when the latter are not in use.

The tiller chains 15 pass through the grooved rim of the quadrant and, as herein shown, are attached to the quadrant by means of turn buckles 67, each attached to one of the tiller chains in rear of the quadrant, at one side thereof, and extending transversely in rear of the quadrant in crossed relation (Figs. 2 and 10) and attached to the quadrant at the other side thereof. The turn buckles are attached to the quadrant through the medium of releasing hooks 68 fastened to the opposite wings of the quadrant. As herein shown, said turn buckles are provided on their free ends with shackles 69 which engage the hinged or releasing members 70 of said hooks, whereby, when said hinged members are released, the loops fall away from said hooks to release the tiller chains. In the form of quadrant herein shown, the turn buckles 67 cross each other in rear of the quadrant, so that one of said releasing hooks 68 is attached to the upper and the other to the lower side of the quad-

rant, as shown in Figs. 11 and 12. The swinging members of said releasing hooks are locked in their closed positions with the turn buckle shackles engaged therewith by locking devices made as follows:

72 72 designate latches made of inverted U-form and pivoted to the shanks of the hooks in a manner to swing over and away from the hinged members of the hooks. Pivoted to the upper ends of said latches are links 73 (each herein shown as made of two parallel bars fastened on opposite sides of the latch) and said links are pivoted at their rear ends in like manner to vertically swinging levers 74 which are pivoted at their lower ends between the arms of U-shaped standards 75 fixed to and rising from the wings of the quadrant. The said levers extend obliquely rearwardly from the standards 75 and are locked to the upper or closed ends of the standards by means of pivoted L-shaped detents 76 hinged to the lever 74. One arm of each L-shaped detent is provided with a lug or tooth 78 that enters a socket in the upper end of the associated standard 76 and to the other arm thereof is attached one end of a looped cable or bridle 79. Said bridle 79 extends from one side to the other of the quadrant and is trained through guide pulleys 80, one at each side of the quadrant, and extends at its ends through openings in the upper ends of the levers 74, and said ends are attached to the swinging detents 76 as stated. The detents 76 are yieldingly held in their locking positions by means of springs 76^a attached at their upper ends to the arms of the detent and at their lower ends to the standards 75. It is desirable that the tiller chains be released or cast off from the quadrant simultaneously with the connection of the auxiliary gear with the rudder post in the manner stated. To this end the clutch releasing cable 65 is connected with the bridle. This is effected in the present instance by providing the rear end of said cable with an eye 81 through which the bridle 79 passes. This construction permits the bridle to swing freely with the rudder as the rudder is moved from one side to the other without interfering with the connection between said bridle 79 and cable 65. From this construction it will be obvious that when the cable 65 is drawn forwardly as by means of a windlass 82 mounted in the stand of the bridge wheel 35, or by other suitable means, it acts not only to release the auxiliary gear clutch lever latch and to bring said clutch into operation to make the gear 47 fast to the auxiliary post 48, but acts also, through said bridle and its connection with the detents 76, to release the releasing hooks 68 and thereby cast off the tiller chains from the main quadrant.

The operation of the steering mechanism, as a whole, will be obvious from the foregoing but may be briefly stated as follows: The

boat is normally steered through the action of the main steering mechanism, embracing the steering engine 14, connected with the main quadrant by the tiller chains 15, and the valve mechanism of said engine is operated from the wheel through the medium of any suitable transmitting connections, as the connecting rod 27, and its connected rack and pinion mechanism in the construction herein shown. In case the steering gear should become deranged, a predetermined signal will be given to the man on the bridge, who will at once, through the operation of the cable 65 and the windlass in the upper wheel stand, release the tiller chains from the main quadrant and at the same time trip the clutch sleeve suspending the lever to bring the auxiliary steering mechanism into operation. Thereafter the steering will be controlled from the bridge wheel 35 and its associated connecting rod 40 in the manner before described.

I claim as my invention:—

1. A steering gear for boats comprising, in combination with the rudder and a rudder actuating mechanism located abaft midships and provided with a controlling device, a steering wheel located at the forward part of the boat and a rigid inextensible connection between said wheel and the controlling device of the rudder actuating mechanism, arranged to operate the latter in both directions of movement of said connection, said connection serving to promptly transmit to the rudder the steering movements of the wheel and operating to maintain the relation of the steering wheel to the rudder for the purpose set forth.

2. A steering gear for boats comprising, in combination with the rudder and a rudder actuating mechanism, located abaft midships and provided with a controlling device, a steering wheel located at the forward part of the boat and a rigid inextensible rod extending fore and aft, the boat, connected at its forward end with said steering wheel and at its rear end with the controlling device for the rudder actuating mechanism, the parts being so arranged as to prevent lost motion between the same whereby the steering movements of the wheel are promptly transmitted to the rudder and the relation of the steering wheel and the rudder is accurately maintained.

3. A steering gear for boats comprising, in combination with the rudder and a steering engine located abaft midships for operating the rudder, of a valve controlling device located at the forward part of the boat, and operative connections between said controlling device and the engine valve mechanism, including a rigid connecting rod operatively connected at its ends, respectively, with the said controlling device and valve mechanism and operating positively to transmit

motion in both directions of its longitudinal movement to control said valve mechanism.

4. A steering gear for boats comprising, in combination with the rudder and a steering engine located abaft midships for operating the rudder, of a valve controlling device located at the forward part of the boat, and operative connections between said controlling device and the engine valve mechanism including a rigid connecting rod operating positively to transmit motion in both directions of its longitudinal movement to control the valve mechanism and rack and pinion mechanism connecting the ends of said rod, respectively, with the said controlling device and valve mechanism.

5. A steering device for boats comprising, in combination with the rudder and a steering engine for operating the rudder, of a valve controlling device located in the forward part of the boat, operative connections between said valve controlling device and the engine valve mechanism, including a rigid connecting rod operatively connected at its ends, respectively, with said controlling device and valve mechanism, guide sheaves on which said rods are supported and other sheaves located above and bearing downwardly on said rods.

6. A steering gear for boats, comprising, in combination with the rudder and a steering engine located abaft midships for operating the rudder, of a valve controlling device located at the forward part of the boat, operative connection between said controlling device and the engine valve mechanism, including a rigid connecting rod, operatively connected at its ends, respectively, with said controlling device and valve mechanism, and means engaging the rod at different points throughout its length for sustaining the rod and preventing lateral flexure thereof.

7. A steering gear for boats comprising, in combination with the rudder, a steering engine located abaft midships for operating the rudder, and means for controlling the valve mechanism of the engine from the bridge of the boat, comprising a rigid connecting rod connected at its rear end with the valve mechanism and adapted by movement of the rod fore and aft of the boat to positively operate the valve mechanism to swing the rudder in both positions from its neutral position, and manually operable means located at the bridge of the boat for reciprocating said connecting rod for the purpose set forth.

8. A steering gear for boats comprising, in combination with the rudder and a steering engine for operating the rudder, provided with a valve actuating rod, a valve controlling device located at the forward part of the boat, and operative connections between said controlling device and valve actuating rod, comprising a rigid connecting rod provided at its ends with racks, a pinion engaging one

of said racks and operatively connected with said valve actuating rod, and a second pinion engaging the other rack and operatively connected with said controlling device.

- 5 9. A steering gear for boats comprising, in combination with the rudder and a steering engine for operating the rudder, a valve controlling device located at the bridge of the boat, and operative connections between
10 the controlling device and the valve mechanism of said engine, comprising a rigid fore and aft reciprocating connecting rod extending from front to rear of the boat and provided at its ends with racks, a horizontal
15 rotative shaft at the forward end of said rod provided with a pinion engaging the forward rack on said connecting rod and extending transversely inwardly, and operatively connected at its inner ends with said valve controlling device, and a second horizontal rota-
20 tive shaft at the rear end of the connecting rod and provided also with a pinion engaging the rear rack and operatively connected with the valve mechanism of the steering engine.
- 25 10. In a boat, the combination with the rudder and a steering engine for operating the same, of a valve controlling device located at the forward part of the boat and operative connections between the control-
30 ling device and the valve mechanism of said engine comprising a longitudinally, reciprocating rigid connecting rod located in the wing of the boat and extending from front to rear thereof and provided at each end
35 with a rack, two horizontal rotative shafts extending transversely of the boat, one at the front and the other at the rear end of the connecting rod, each provided with a pinion meshing with the adjacent rack, the rear
40 transverse shaft being operatively connected with the valve mechanism of said engine, the controlling device being provided with a vertical rotative shaft, and intermeshing gears connecting said latter shaft with the forward-
45 transverse shaft.
- 50 11. In a boat, the combination with the rudder and a steering engine for operating the same, of a valve controlling device located at the bridge, and operative connections be-
55 tween the controlling device and the valve mechanism of the engine comprising a longitudinally reciprocating, rigid connecting rod located in the wing of the boat and extending from front to rear thereof and provided at
60 its ends with racks, two horizontal rotative shafts extending transversely of the boat, one at the front and the other at the rear end of the connecting rod, each provided with a pinion meshing with the adjacent rack, the
65 controlling device being operatively connected with said forward transverse shaft, a shaft associated with the engine valve mechanism, and provided with a beveled gear, and a beveled gear intermeshing therewith
and fixed to the rear transverse shaft.

12. A steering gear for boats comprising, in combination with the rudder, its post, the main quadrant attached thereto, and the tiller chains attached to said quadrant, of an auxiliary steering gear normally disconnected
70 from the rudder, and a single controlling device operating to disconnect the tiller chains from the main quadrant, and to also operatively connect the auxiliary gear with the rudder.

75 13. A steering gear for boats comprising, in combination with the rudder, its post, the main quadrant attached thereto, and the tiller chains attached to said quadrant, of an auxiliary steering gear normally disconnected
80 from the rudder, a single controlling device operating to disconnect the tiller chains from the main quadrant and to also operatively connect the auxiliary gear with the rudder, and means for controlling the
85 operation of the auxiliary gear.

90 14. A steering gear for boats comprising, in combination with the rudder, its post, the main quadrant attached thereto and the tiller chains attached to the quadrant, of an auxiliary steering gear normally disconnected
95 from the rudder, an auxiliary steering engine for operating the rudder through the auxiliary gear, means controlled by a single manually operable device located at the
100 bridge for disconnecting the tiller chains from the quadrant and also operatively connecting the auxiliary gear with the rudder, and a hand device located also at the bridge for controlling the operation of the auxiliary
steering engine.

105 15. A steering gear for boats comprising, in combination with the rudder, its post, the main quadrant attached thereto, and the tiller chains attached to said quadrant by
110 means of releasing hooks, of an auxiliary steering gear normally disconnected from the rudder, a clutch for operatively connecting the auxiliary steering gear with the rudder, a latch for normally locking the clutch mechanism out of operative position, a cable extending forwardly from and operatively connected with said releasing hooks and latch
115 and operating to release the chains from said hooks and at the same time to release said latch to permit the clutch to fall into its operative position, and a hand device located at the bridge for controlling the operation of the auxiliary gear.

120 16. A steering gear for boats comprising, in combination with the rudder and the main steering gear, of an auxiliary steering gear located abaft midships normally disconnected from the rudder, an auxiliary steering engine
125 located adjacent to the auxiliary gear for operating the latter, and means located at the bridge for disconnecting the main steering gear from the rudder and operating also to connect the auxiliary steering gear with
130 the rudder.

17. A steering gear for boats comprising, in combination with the rudder and the steering gear, an auxiliary steering gear normally disconnected from the rudder, an auxiliary steering engine for operating the auxiliary gear, means located at the bridge for disconnecting the main steering gear from the rudder and for also operatively connecting the auxiliary steering gear with the rudder, a hand device located at the forward part of the boat and operative connections between the hand device and the valve mechanism of the auxiliary steering engine including a rigid fore and aft reciprocating connecting rod operatively connected at its ends respectively, with the hand device and auxiliary steering engine valve mechanism in a manner to operate said valve mechanism in both directions from a neutral position.

18. A steering gear for boats comprising, in combination with the rudder, its post, the main quadrant attached thereto tiller chains and releasing hooks by which said chains are detachably connected with said quadrant of an auxiliary steering gear normally disconnected from the rudder and adapted to be connected thereto when the main steering gear is out of service, and a connection extending from said releasing hooks forwardly to the bridge for releasing the chains from said quadrant.

19. A steering gear for boats, comprising, in combination with the rudder and the main steering gear connected therewith, of the auxiliary steering gear normally disconnected from the rudder, a clutch for bringing said auxiliary gear into operative connection with said rudder, a lever for holding said clutch out of operative position, a latch for locking the lever in the latter position, and a connection extending forwardly from said auxiliary steering gear to the bridge of the boat for releasing said latch to permit the clutch to drop into its operative position.

20. A steering gear for boats comprising, in combination with the rudder, its post, the main quadrant attached thereto, and tiller chains detachably connected with the quadrant by releasing hooks, of an auxiliary steer-

ing gear normally disconnected from the rudder, a clutch for bringing the auxiliary gear into operative connection with the rudder, a latch for normally holding the clutch in its inoperative position, a cable extending forwardly from the steering gear to the bridge of the boat, and a loop or bridle connected at its end with said tiller chain releasing hooks and between its ends with said cable, and the cable being operatively connected between said bridle and the bridge with said clutch latch, whereby said latch and releasing hooks are released when tension is exerted on the cable to draw it forwardly.

21. A steering gear for boats comprising, in combination with the rudder, its post, the main quadrant attached thereto, and tiller chains detachably connected with the quadrant by releasing hooks, of an auxiliary steering gear normally disconnected from the rudder, a clutch for bringing the auxiliary gear into operative connection with the rudder, a latch for normally holding the clutch in its inoperative position, and a releasing connection extending forwardly from said hooks and latch to the bridge for simultaneously releasing said hooks and latch.

22. A steering gear for boats comprising, in combination with the rudder and a steering engine for operating the rudder, of a valve controlling device located at the bow of the boat and operative connections between said controlling device and the engine valve mechanism including a rigid connecting rod comprising relatively short detachably connected sections, said rod extending fore and aft of the boat and being operatively connected at its ends, respectively, with said controlling device and said valve mechanism.

In testimony, that I claim the foregoing as my invention I affix my signature in presence of two witnesses, this 9th day of September A. D. 1905.

EARL C. AKERS.

Witnesses:

E. M. PEPINEAU,
C. C. PETIT.