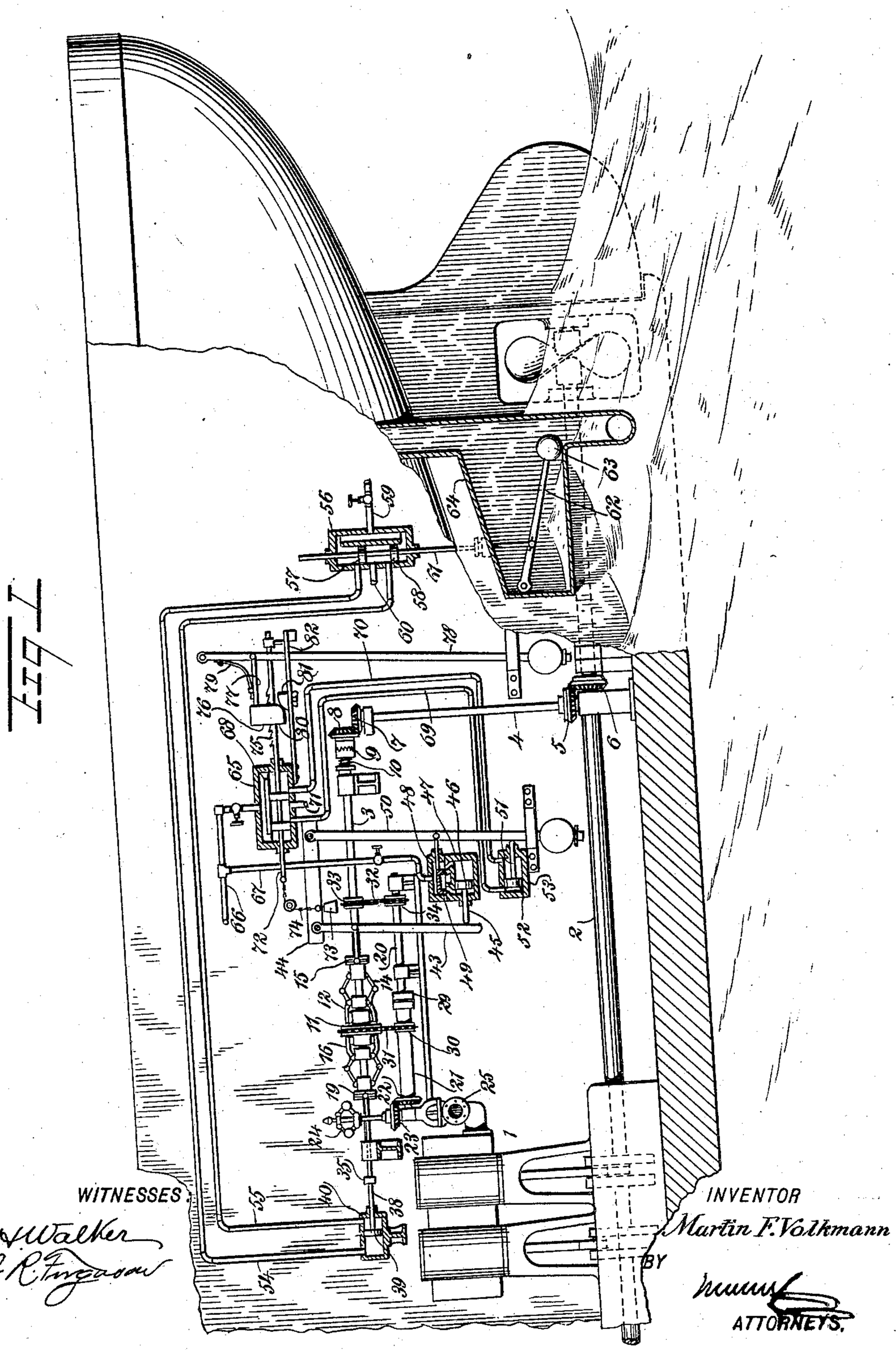
No. 707,038 Patented Aug. 12, 1902.

M. F. VOLKMANN.

MARINE ENGINE GOVERNOR.

(Application filed Dec. 19, 1901.)

(No Model.) 4 Sheets—Sheet 1.



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(No Model.) 4 Sheets—Sheet 2.

FIG 2

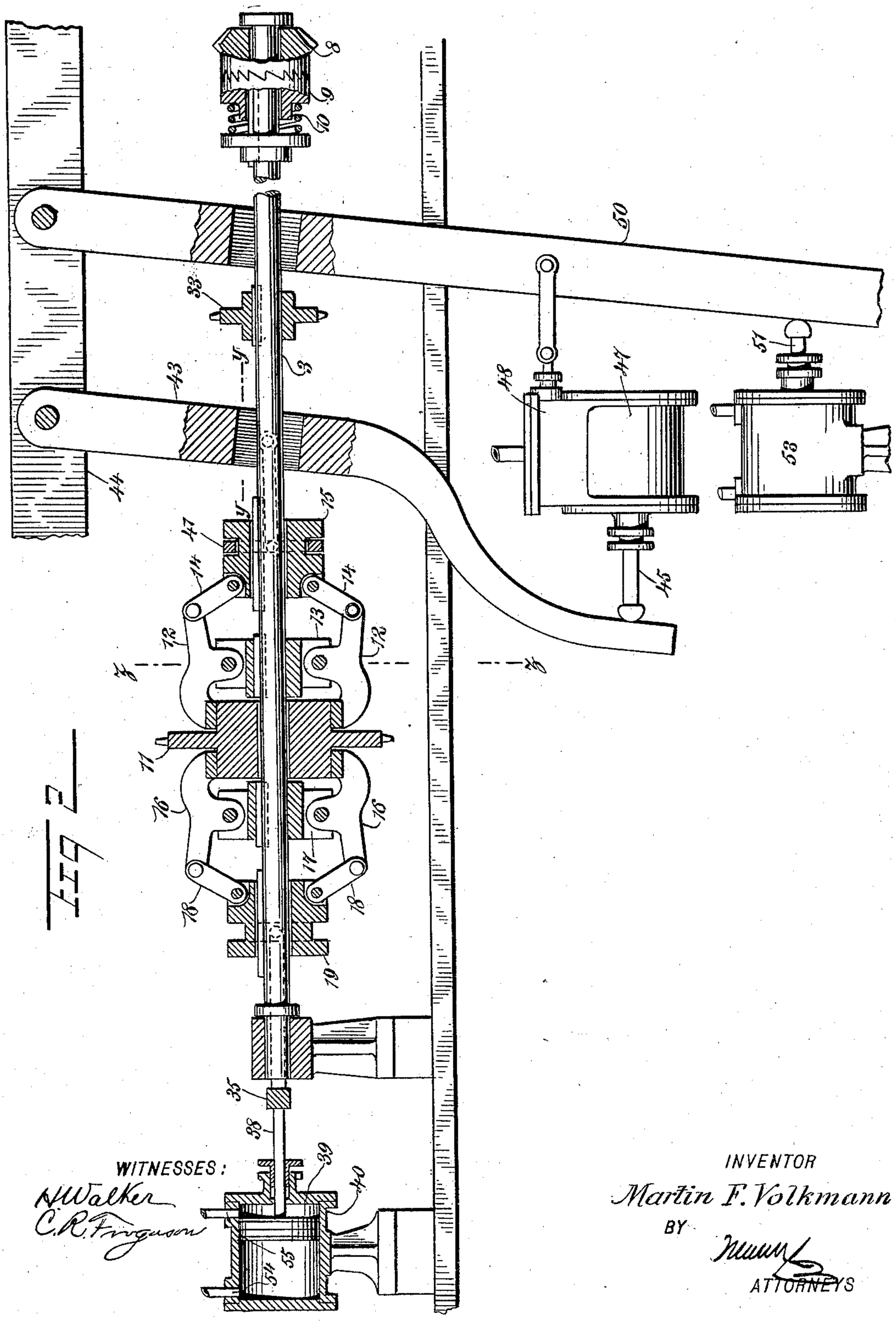

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Fig 3

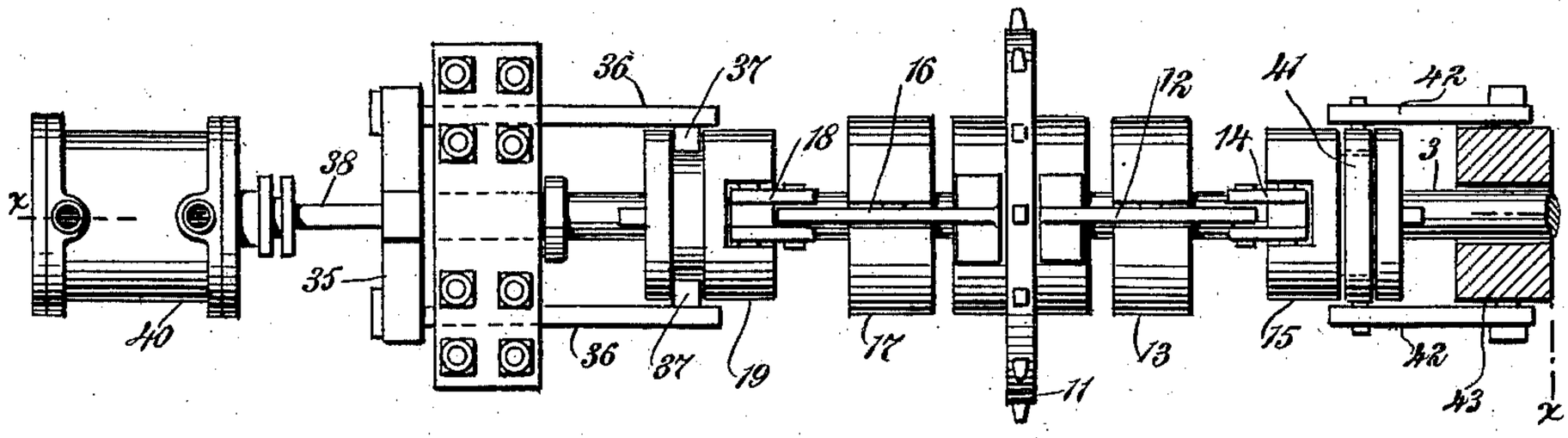

Fig 4

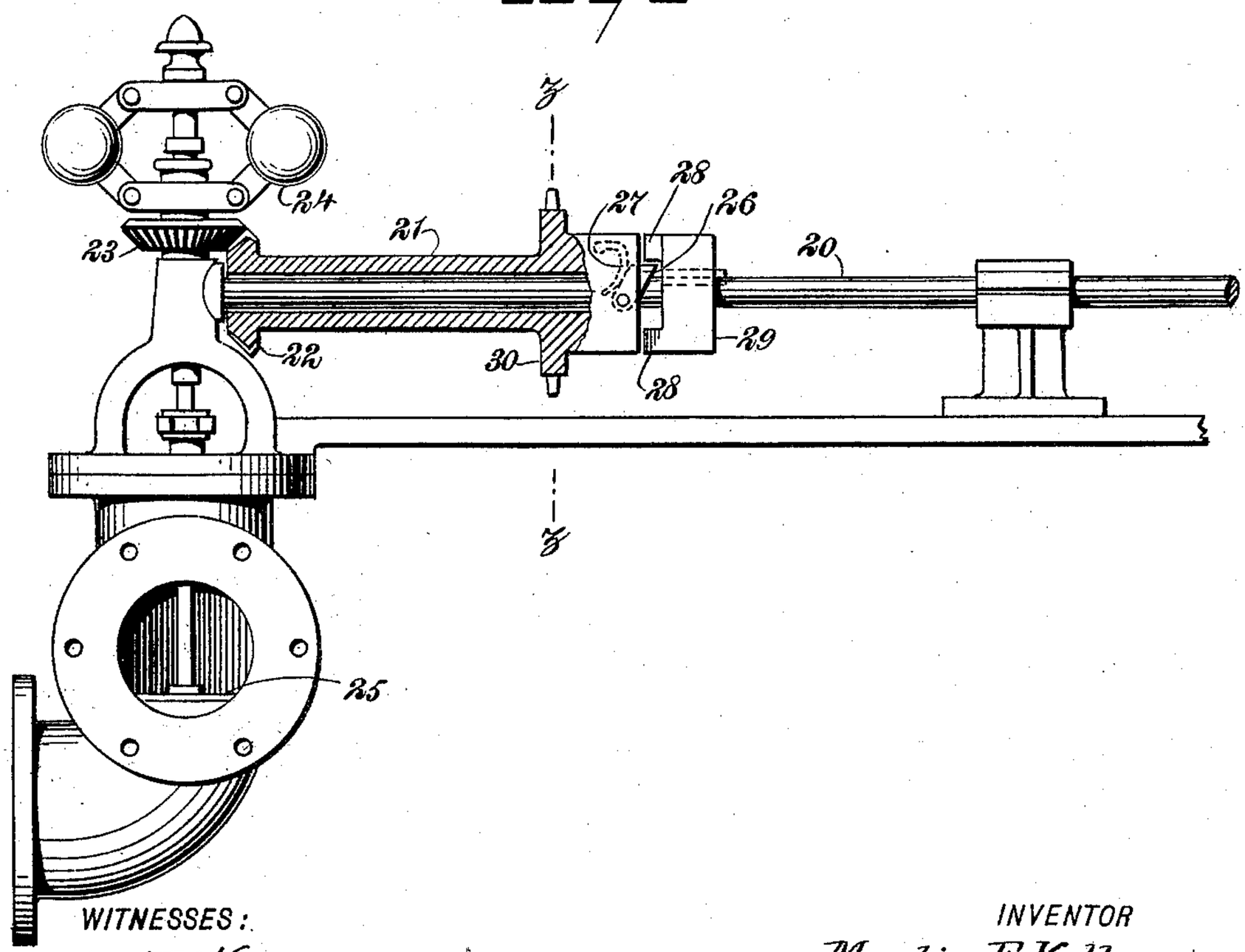

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Fig 5

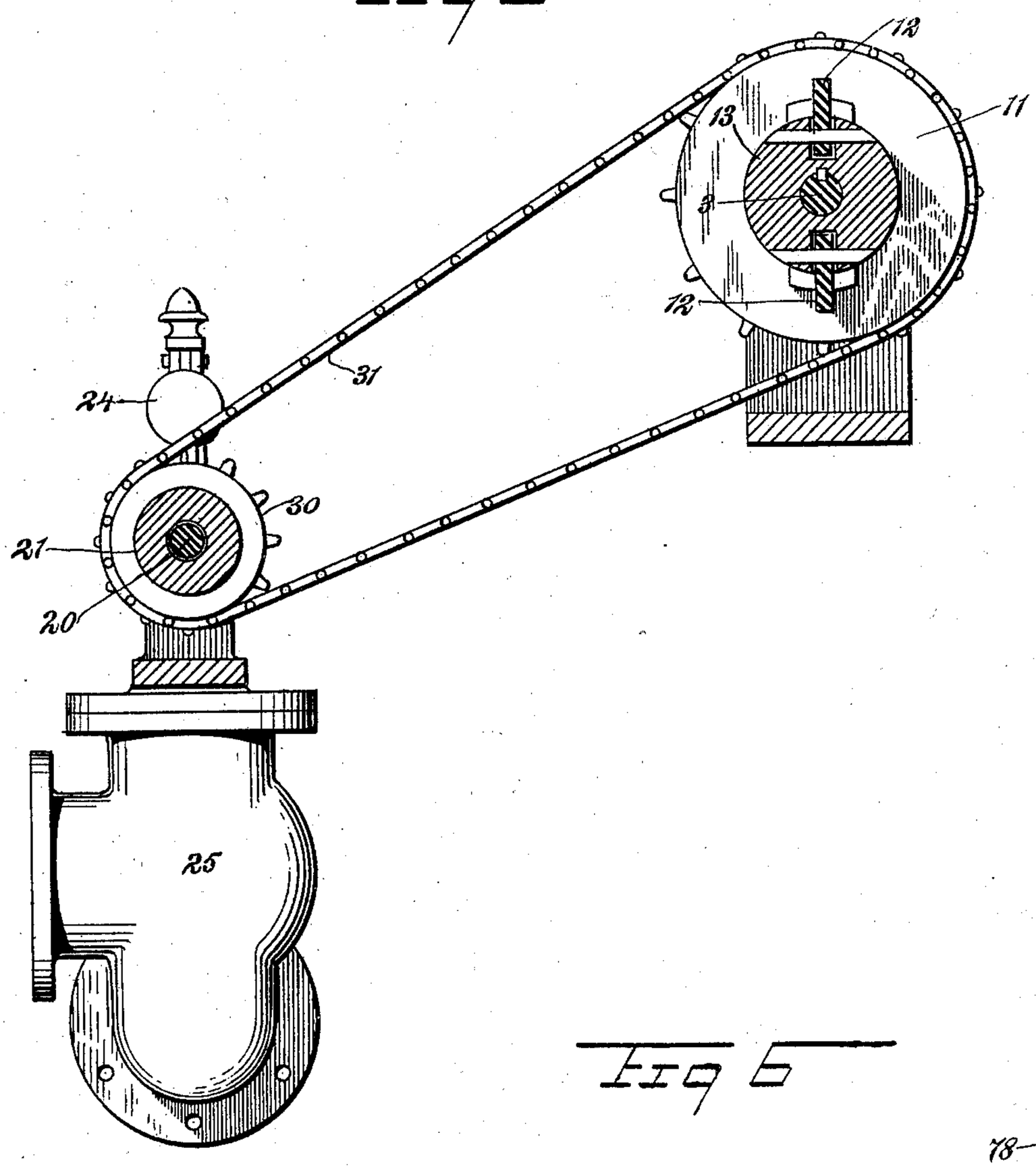
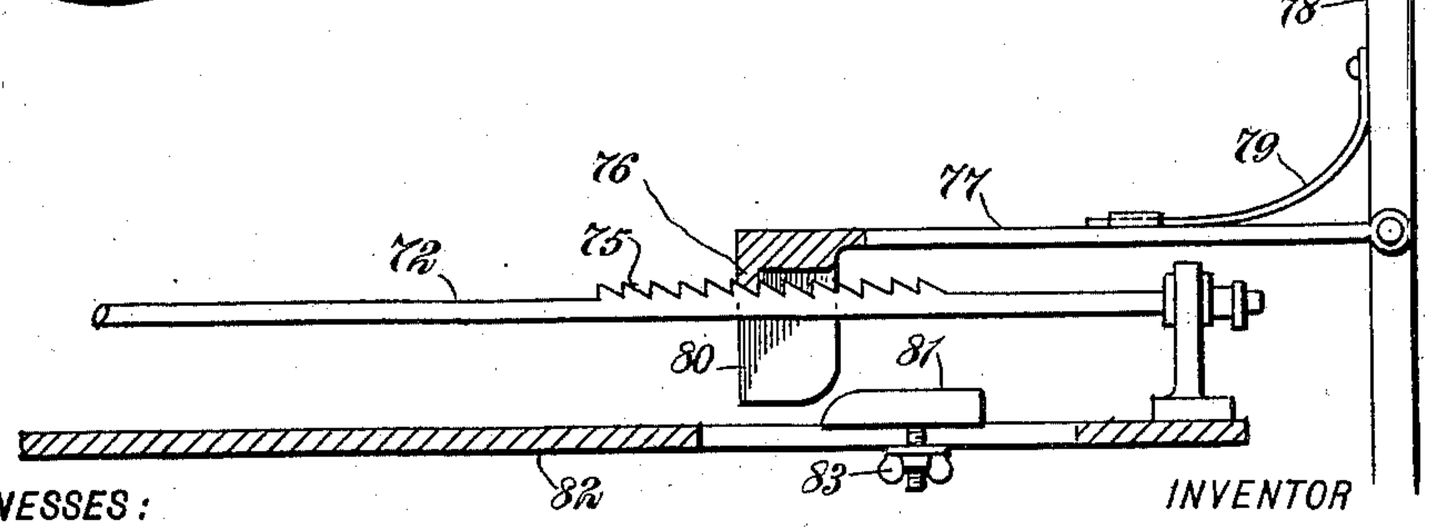


Fig 6



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UNITED STATES PATENT OFFICE.

MARTIN FREDERICK VOLKMANN, OF SANTA MONICA, CALIFORNIA.

MARINE-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 707,038, dated August 12, 1902.

Application filed December 19, 1901. Serial No. 86,525. (No model.)

To all whom it may concern:

Be it known that I, MARTIN FREDERICK VOLKMANN, a citizen of the United States, and a resident of Santa Monica, in the county of Los Angeles and State of California, have invented a new and Improved Marine-Engine Governor, of which the following is a full, clear, and exact description.

This invention relates to improvements in governing devices for marine engines; and the object is to provide a simple mechanism by means of which dangerous racing of the propeller-shaft will be prevented should the shaft break, the wheel become loose, or in case of the wheel rising out of the water by the pitching of the vessel.

I will describe a marine-engine governor embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a marine-engine governor embodying my invention and showing the same in a vessel. Fig. 2 is a sectional view on the line x x of Fig. 3, showing a driving-shaft and certain clutch mechanism employed. Fig. 3 is a plan view thereof, part being in section on the line y y in Fig. 2. Fig. 4 is a detail view, partly broken away and in section, showing the driven shaft. Fig. 5 is a section on the line z z of Figs. 2 and 4, and Fig. 6 is a detail view showing the valve mechanism employed.

Referring to the drawings, 1 designates a marine engine operating the propeller-shaft 2. Arranged in the vessel is a driving-shaft 3, which is operated from the propeller-shaft by means of a vertical shaft 4, having gear connections 5 6 with the propeller-shaft, and on the upper end of said shaft 4 is a bevel-gear 7, meshing with a bevel-gear 8, loosely mounted on the driving-shaft 3. The hub of this gear 8 is provided with clutch-teeth designed to be engaged by the teeth of a movable clutch member 9, mounted to slide on the shaft 3, but to rotate therewith. This clutch-section 9 is yieldingly held against the clutch-section of the gear-wheel 8 by means of a spring 10. It will be noted that the teeth of the clutch-sections are in the form of ratchet-teeth, and therefore at certain times when there is a slight difference in speed between the propeller-shaft and the driven shaft the clutch members may slide one upon the other. Ordinarily, however, the clutch-sections will be in engagement, so that the shaft 3 will be driven positively from the propeller-shaft.

Mounted loosely on the driving-shaft 3 is a sprocket-wheel 11 designed to be engaged at its opposite sides, as will be hereinafter described, by clutch devices carried by the driving-shaft. The clutch devices at one side consist of arms 12, provided with shoes for engaging frictionally on the hub of the sprocket-wheel, and these arms are pivoted in a collar 13, attached to the shaft, and links 14 extend from the arms to connection with a collar 15, mounted to slide on the shaft, but to rotate therewith. At the opposite side are the clutch-arms 16, having shoes for engaging with the hub of the wheel 11, and these arms are pivoted in a collar 17, mounted to rotate with the shaft 3, and the arms have link connections 18 with a collar 19, mounted to slide on the shaft, but designed to rotate therewith.

Arranged below the driving-shaft is a driven shaft consisting of two sections 20 and 21, the section 21 being in the form of a sleeve surrounding the section 20, and this sleeve-section carries a bevel-gear 22, meshing with a bevel-gear 23, mounted on the spindle of the governor 24, which controls the valve 25 for the engine. Under normal conditions the two shaft-sections are to be driven together, but under other conditions—that is, when the propeller rises out of the water by the pitch of the vessel—it is designed to speed the governor, and therefore the sleeve-section 21 will have a faster motion than the constantly-driven section 20. To provide for this, I attach to the sleeve-section 21 a lug 26, pivoted in a recess in the end of the shaft and held outward yieldingly by means of a spring 27. This lug is designed to engage with a lug or lugs 28, extended laterally from a collar 29 mounted on the shaft-section 20. Obviously when the shaft-section 20 is rotated under normal conditions the lug 28, by engaging with the lug 26, will cause a corresponding movement of the tubular shaft-section 21,

thus operating the governor to hold the steam-controlling valve in open position; but when the tubular shaft-section 21 rotates faster than the section 20 the lug 26 will yield and pass over the lug or lugs 28 on the collar 29.

On the shaft-section 21 is a sprocket-wheel 30, from which a sprocket-chain 31 extends to the sprocket-wheel 11 on the driving-shaft. The driving-shaft 3 is connected to the shaft-section 21, so as to give constant motion to the driven shaft by means of a sprocket-chain 32, engaging with a sprocket-wheel 33 on the driving-shaft and a sprocket-wheel 34 on the driven shaft. The sprocket wheels 30, 33, and 34 are substantially of the same size. The sprocket-wheel 11, however, is considerably larger than the other sprocket-wheels, so as to speed the motion of the shaft and governor, as before mentioned.

From a cross-head 35 rods 36 extend through suitable bearings and have at their ends lugs 37, which engage with an annular channel formed in the collar 19, and from this cross-head 35 a stem 38 projects and connects with a piston 39, operating in a cylinder 40.

A ring 41 is seated in an annular channel formed in the collar 15, and from this ring arms 42 extend to connection with a pendulum 43, mounted to swing on a support 44. This pendulum is provided with an opening, through which the shaft 3 passes. The lower end of this pendulum 43 engages loosely against the end of a stem 45, projected from a piston 46, operating in a cylinder 47. On the cylinder 47 is a steam-chest 48, in which a slide-valve 49 operates to control the passage of steam to the opposite sides of the piston 46 and also to control the exhaust from the opposite sides thereof. This slide-valve 49 has connection with a pendulum 50, which is mounted to swing on the support 44 and is designed to control the movements of the slide-valve. At the lower end this pendulum 50 is designed to engage with the stem 51 of a piston 52, operating in a cylinder 53.

From the cylinder 40 pipes 54 55 lead to opposite ends of a cylinder 56, arranged at the stern of the vessel and in which are slide-valves 57 and 58, and this cylinder 56 receives steam from the boiler through a pipe 59 and exhausts through a pipe 60. The valves 57 and 58 are mounted on a rod 61, arranged to slide in the cylinder, and the lower end of this rod is connected to the pivoted arm 62 of a float 63, arranged in a trunk 64, which has openings at its lower side for the entrance of water.

Leading into a main or controlling cylinder 65 is a steam-pipe 66, and from this steam-pipe 66 a pipe 67 leads to the steam-chest 48. Operating in the cylinder 65 is a slide-valve 68 for controlling the passage of steam through the pipes 69 and 70, leading to the opposite sides of the piston 52 in the cylinder 53, and between the connections of the pipes 69 and 70 with the cylinder 65 is the exhaust 71. The slide-valve 68 is mounted on a rod 72, which extends through the heads of the cylinder 65 and is connected at one end to a weight 73, from which a chain 74 passes over a roller to a connection with said rod. The opposite end of the rod 72 is provided with a series of teeth 75, designed to be engaged by a pawl 76, mounted on the end of an arm 77, having swinging connection with a pendulum 78, and the pawl is held yieldingly in engagement with the rack by means of a spring 79, connected at one end, as here shown, to the pendulum and having a sliding connection at the other end with the arm. Extended down at opposite sides of the rod 72 and from the pawl 76 are tappets 80, which are designed at a certain time, as will be hereinafter described, to engage with a block 81, adjustable along a supporting-bar 82. As here shown, this supporting-bar 82 is provided with a longitudinal slot, through which a bolt from the block 81 passes, and this bolt is engaged by a thumb-nut 83.

In operation when the vessel is running on even keel the governor for controlling the valve of the engine will be rotated normally from the propeller-shaft, as before mentioned. At this time, if the propeller is sufficiently immersed, the float 63 will raise the valves 57 and 58, so that the steam or air pressure (it is to be understood that either steam or air pressure may be used) may enter the pipe 55, and the exhaust from cylinder 40 will pass through pipe 54 and through cylinder 56 at the exhaust-port 60, thus releasing the clutch controlled by the cylinder 40; also, the valve 68 will be in its normal position, so that air or steam pressure will enter the pipe 70 and force the piston 52 to the position shown in Fig. 1, and the exhaust from cylinder 53 passes through the pipe 69 and the cylinder 65 at the exhaust 71, and of course the several pendulums will be hanging straight and the clutch members out of engagement with the wheel 11. Should the vessel pitch forward, raising the propeller out of the water, the several pendulums will swing forward. This movement of the pendulum will move the slide-valve 49, so as to permit steam from the pipe 67 to press against the piston 46, forcing the pendulum 43 forward, causing the clutch-arms 12 to engage the sprocket-wheel 11, locking it to the driving-shaft, consequently through the medium of the shaft-section 21 speeding the governor and closing or partly closing the engine-governing valve. Also when the stern rises the pendulum 78 will swing forward and the pawl 76 will pass over one or more of the teeth 75. When the stern begins to fall, the pendulum 78 will return to its normal position, and as the pawl now engages with a tooth on the rod 72 the valve 68 will be drawn rearward, thus reversing the pressure, causing the steam to pass through the pipe 69 to the opposite of piston 52, returning the pendulum 50 to normal position and also returning the slide-valve 49 to normal position, permitting the pendulum

43 to swing and loosen its clutch engagement with the sprocket-wheel. When the tappets 80 engage with the block 81, the pawl 76 will be raised out of engagement with the tooth on the rod 72, permitting the weight 73 to draw the valve 68 to normal position.

Should the water fall away from the propeller-wheel, the water passing out of the trunk 64 will permit the float 63 to drop, opening steamway through the pipe 54, causing the piston 39 to operate the clutch-arms 16 in the manner before described to speed the governor. As the water rises in the trunk of course the valve will be moved to normal position, and the pressure will enter pipe 55, forcing piston 39 backward, thus releasing the clutch, and the exhaust from cylinder 40 will pass through the pipe 54 and through the cylinder 56 at the exhaust-port 60.

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

1. In connection with a marine engine and a propeller-shaft driven thereby, a driving-shaft operated from the engine, a governor for the steam-valve of the engine and normally operated from said driving-shaft, and means for speeding the governor upon the rise of the propeller in the water, substantially as specified.

2. A marine-engine governor, comprising a governor having connection with the steam-controlling valve of the engine, a driving-shaft operated from the engine, a driven shaft operated from the driving-shaft, the said driven shaft consisting of two sections, one mounted to rotate on the other, a gear connection between the governor and said section mounted to rotate on the other section, a sprocket-wheel loosely mounted on the driving-shaft, a driving connection between said sprocket-wheel and the last-named member of the driven shaft, clutch devices carried by the driving-shaft and adapted for engagement with the sprocket-wheel, and means for engaging the clutch devices with said sprocket-wheel, substantially as specified.

3. In a marine-engine governor, a ball-governor having connection with the inlet-valve, a propeller-shaft driven by the engine, a driving-shaft, a gear connection between the propeller-shaft and driving-shaft, a driven shaft consisting of a main section and a tubular section, means for locking the two sections together, a gear connection between the tubular section and the governor, a sprocket-wheel loosely mounted on the driving-shaft and having driving connection with the sleeve-section, a driving connection between the driving-shaft and the main section of the driven shaft, a clutch device mounted to rotate with the driving-shaft and adapted for engagement with the loose sprocket-wheel thereon, a pendulum for moving said clutch, and a steam-controlled device for moving the pendulum, substantially as specified.

4. In a marine-engine governor, a governor for the engine, a propeller-shaft driven by the engine, a driving-shaft, a gear connection between the driving-shaft and propeller-shaft, a sprocket-wheel loosely mounted on the driving-shaft, a driven shaft consisting of a main section and a tubular section, a gear connection between the tubular section and the governor, a sprocket-chain connection between the driving-shaft and the main section of the driven shaft, a sprocket-wheel loosely mounted on the driving-shaft and having chain connection with the tubular section of the driven shaft, a clutch device mounted on the driving-shaft and adapted for engagement with said loose sprocket-wheel, a steam-cylinder, a piston in said cylinder having connection with the clutch device, a steam-cylinder arranged at the stern of the vessel and having pipe connections with the first-named cylinder, a rod movable in the last-named cylinder, valves on said rod for controlling the passage of steam through the pipes, a water-trunk supported at the stern of the vessel, and a float in said water-trunk having connection with said rod, substantially as specified.

5. In a marine-engine governor, a ball-governor having connection with the controlling-valve for the engine, a propeller-shaft operated by the engine, a driving-shaft, a gear connection between the propeller-shaft and the driving-shaft, a driven shaft consisting of a main section and a tubular section, the said tubular section being geared to the governor, a chain connection between the driving-shaft and the main section of the driven shaft, a sprocket-wheel loosely mounted on the driving-shaft and having driving connection with the tubular section of the driven shaft, a clutch member mounted on the driving-shaft and adapted for engagement with said loose sprocket-wheel, a pendulum having connection with said clutch, a main steam-cylinder, a supply-pipe leading therein, a slide-valve in said cylinder, a steam-chest having pipe connection with the supply-pipe, a slide-valve operating in said chest, a pendulum with which said slide-valve connects, a cylinder receiving steam from the steam-chest, a piston operating in said cylinder and adapted for engagement with the first-named pendulum, a steam-cylinder having connection with the main cylinder, and a piston in said cylinder having connection with the last-named pendulum, substantially as specified.

6. In a marine-engine governor, a ball-governor, a driving-shaft operated from the engine, a driven shaft consisting of a main section and a tubular section, the said tubular section having gear connection with the governor, a driving connection between the driving-shaft and the main section of the driven shaft, a sprocket-wheel loosely mounted on the driving-shaft and having driving connection with the tubular section of the driven shaft, a clutch on the driving-shaft adapted for engagement with said last-named sprocket-

wheel, a pendulum having connection with the clutch, a main steam-cylinder, a valve mounted to slide in said steam-cylinder, a rod extended through the heads of the cylinder and to which the valve is connected, a weight at one end of said rod, teeth on the other end of said rod, a pendulum rearward of the first-named pendulum, a pawl mounted to swing on said pendulum and adapted for engagement with the teeth on said rod, means for lifting the pawl out of engagement with a tooth as the pendulum moves to normal position, and means controlled by said slide-valve for operating the first-named pendulum in one direction, substantially as specified.

7. A controlling device for the governor of a marine engine, comprising a steam-cylinder for receiving steam from the boiler, a slide-valve arranged in the cylinder, a rod connected to the slide-valve and extended through the heads of the cylinder, a weight attached to one end of said rod, teeth on the other end of said rod, a pendulum, a spring-pressed arm mounted to swing on the pendulum, a pawl carried by the arm for engaging with the teeth, a tappet extended downward from the pawl, and a block adapted for engagement with said tappet for raising the pawl out of engagement with a tooth, substantially as specified.

8. In connection with a governor for a marine engine, a driving-shaft driven from the engine, a driven shaft geared to the governor, and means operated from the driving-shaft for imparting different rates of motion to the driven shaft, substantially as specified.

9. In connection with a governor for a marine engine, a driving-shaft, a sprocket-wheel loosely mounted on the driving-shaft, a driven shaft geared to the governor and having connection with said sprocket-wheel, clutch devices on the driving-shaft at opposite sides of the sprocket-wheel, and means operated by the pitching of the vessel, for moving either one of said clutch devices into engagement with the sprocket-wheel, substantially as specified.

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

MARTIN FREDERICK VOLKMANN.

Witnesses:
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JOSEPHINE RELYEA.