

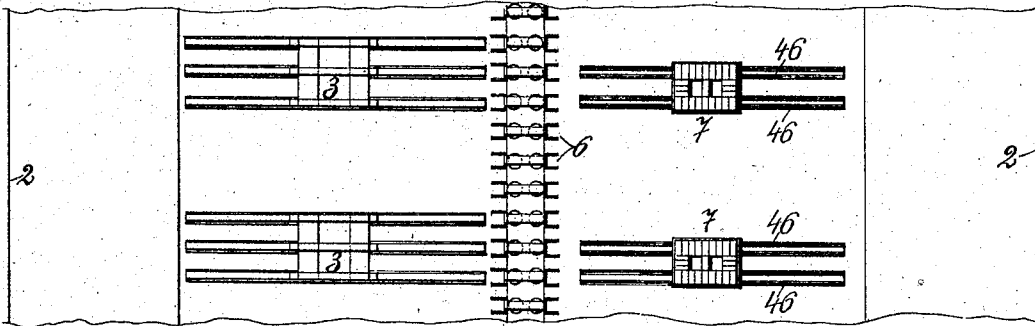
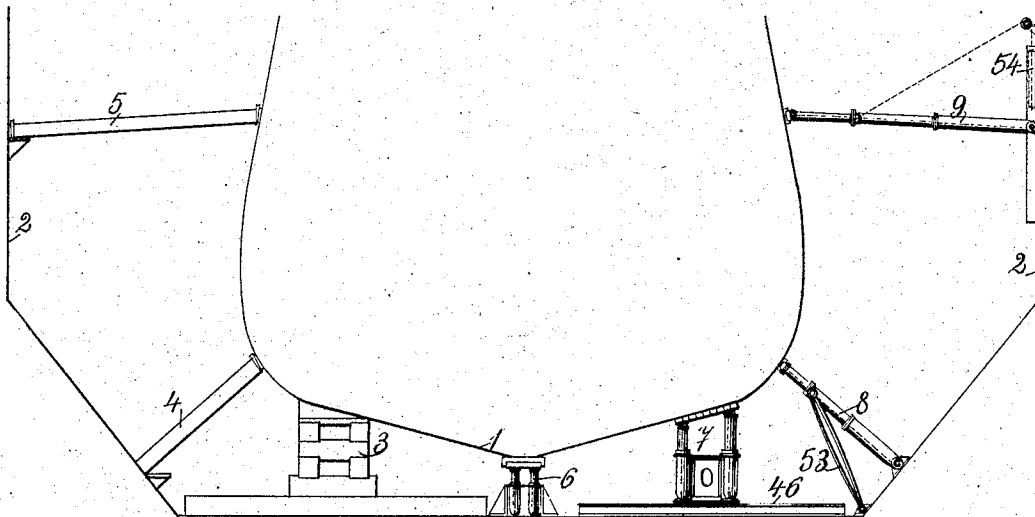
No. 786,840.

PATENTED APR. 11, 1905.

G. & K. PROCHAZKA.  
HYDRAULIC SUPPORT FOR SHIPS.  
APPLICATION FILED MAY 11, 1904.

6 SHEETS—SHEET 1.

*Fig. 1.*



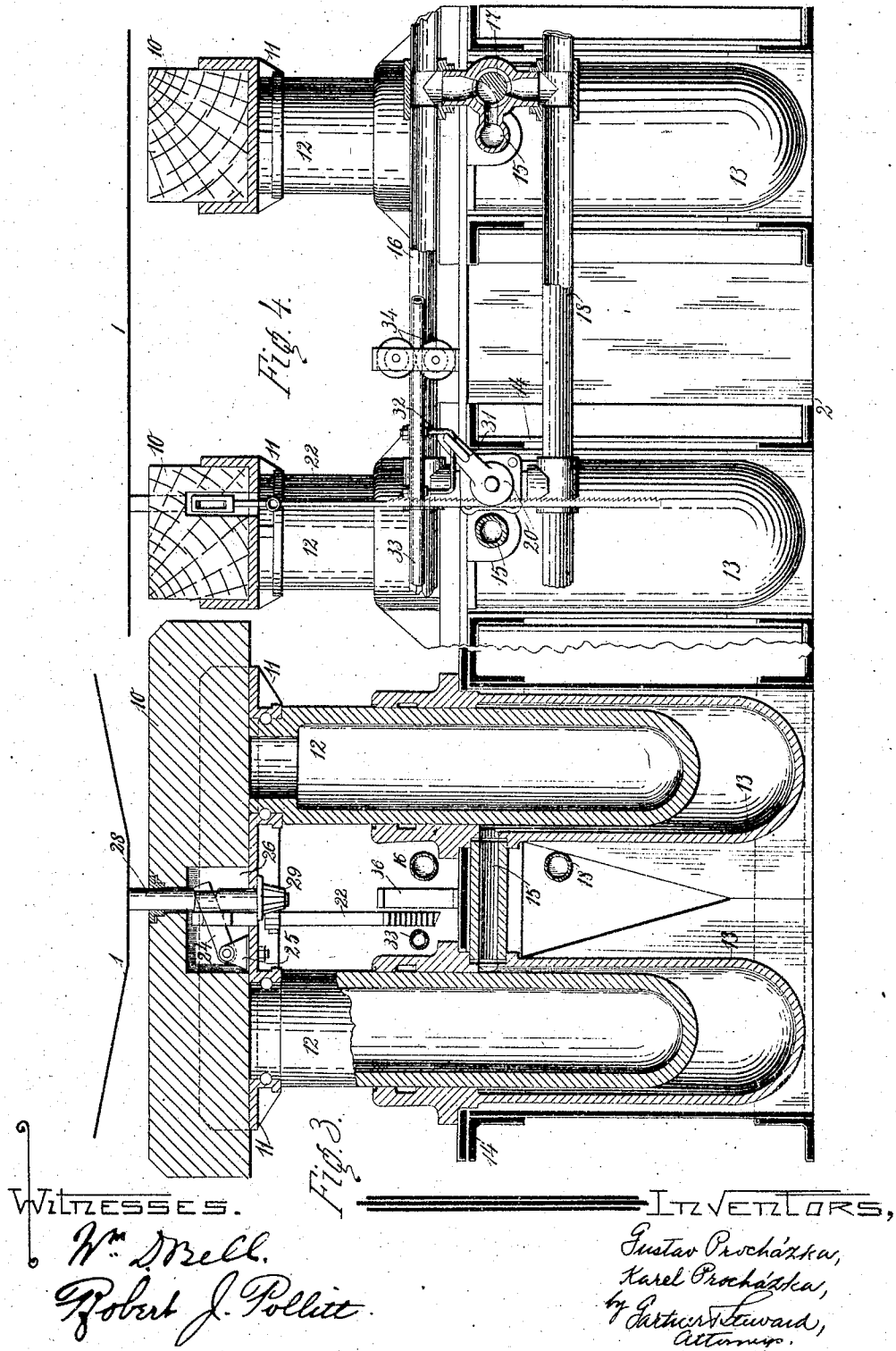
*Fig. 2.*

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6 SHEETS—SHEET 2.



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6 SHEETS—SHEET 3.

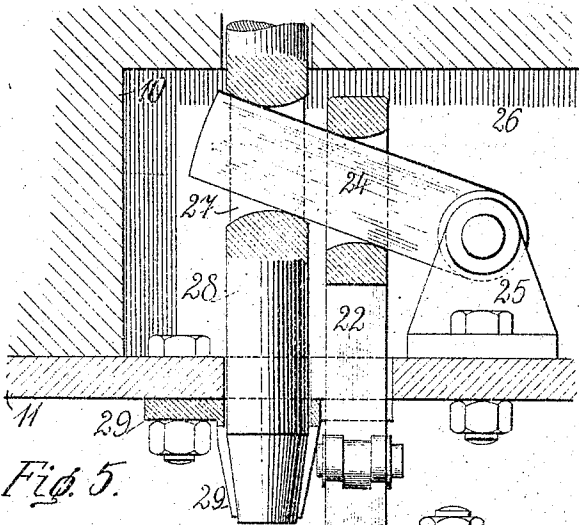


Fig. 5.

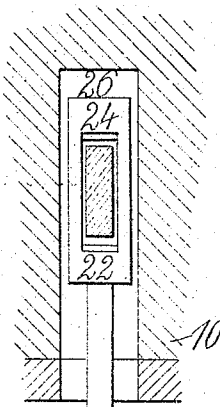


Fig. 6.

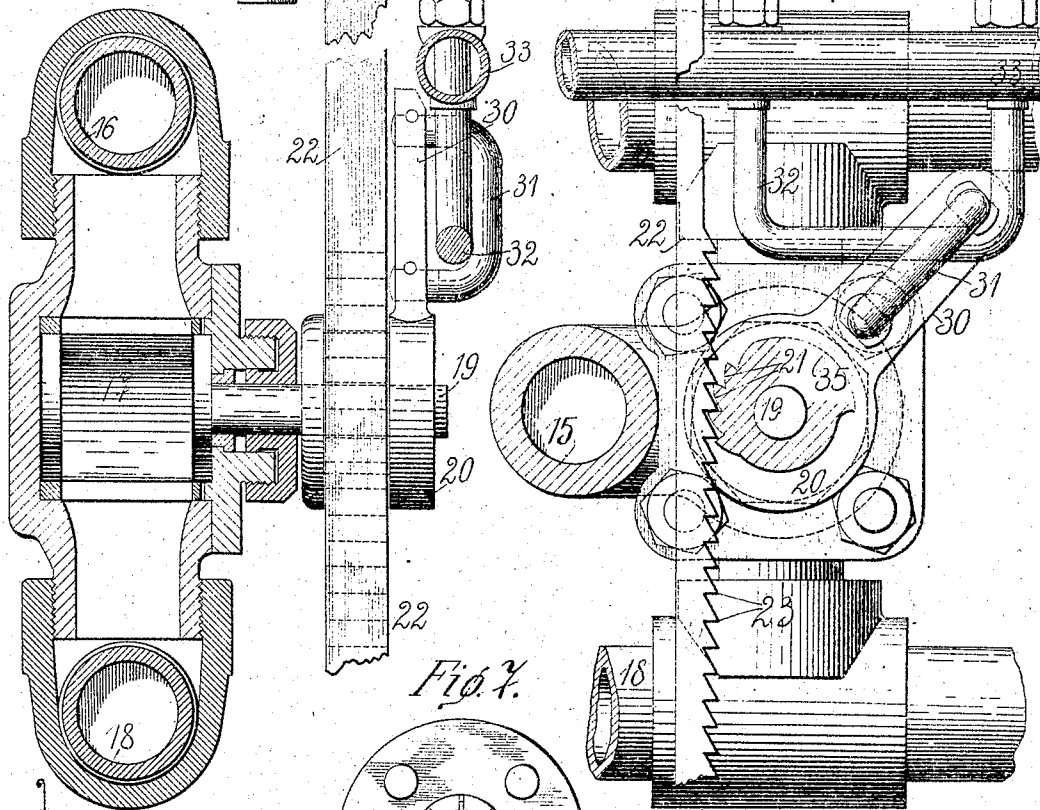


Fig. 7.

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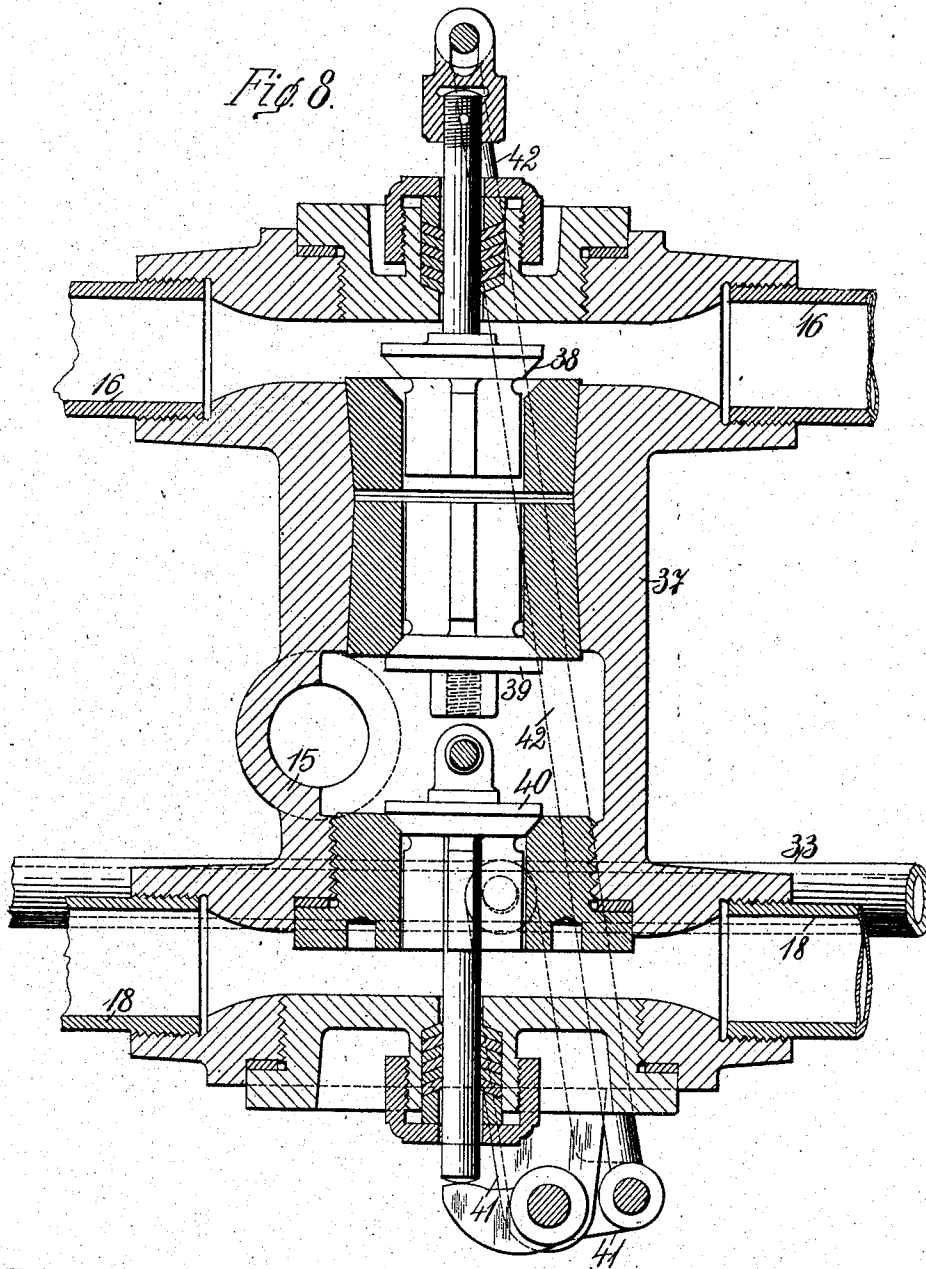
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6 SHEETS—SHEET 4.



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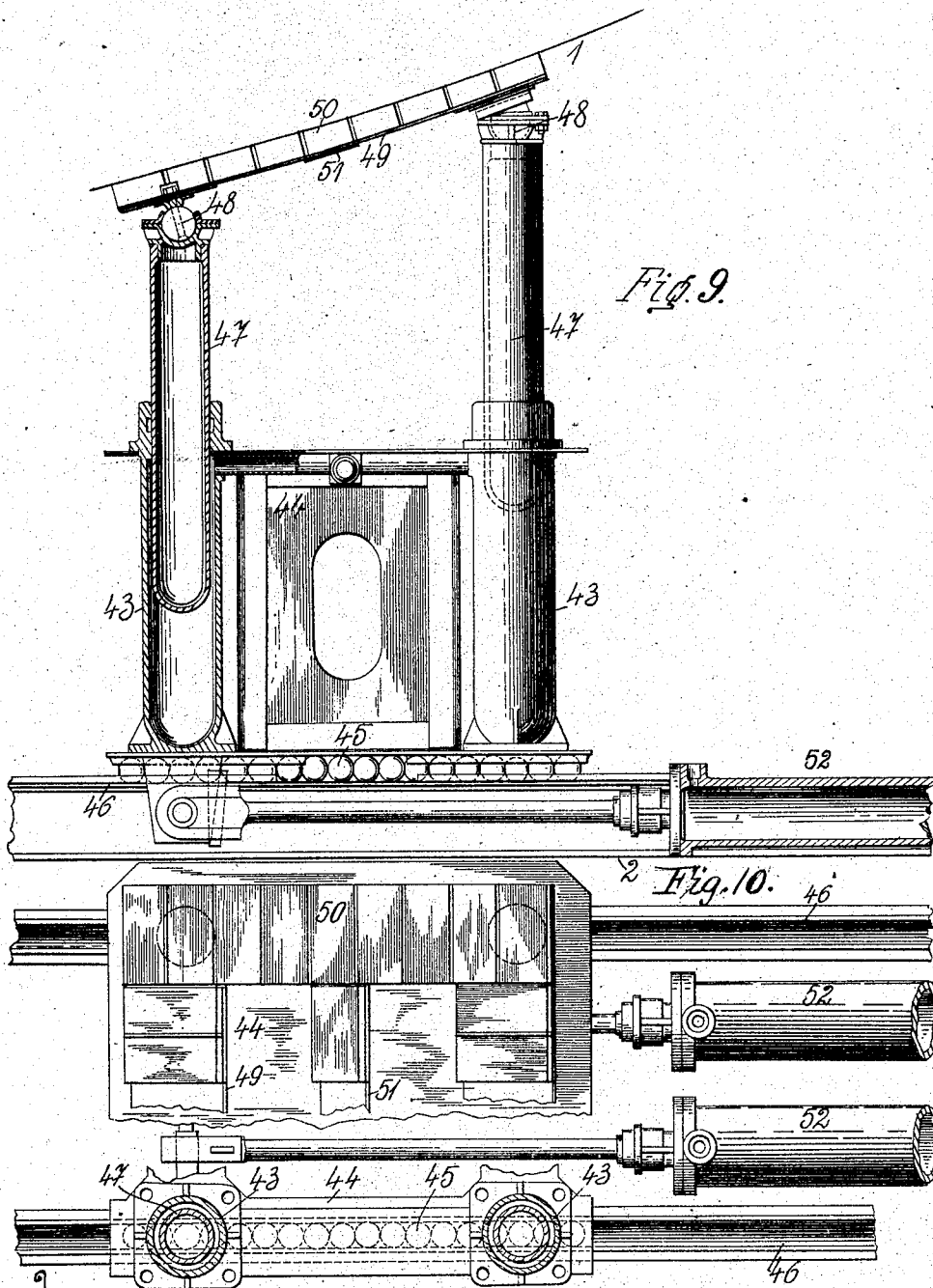
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6 SHEETS—SHEET 5.



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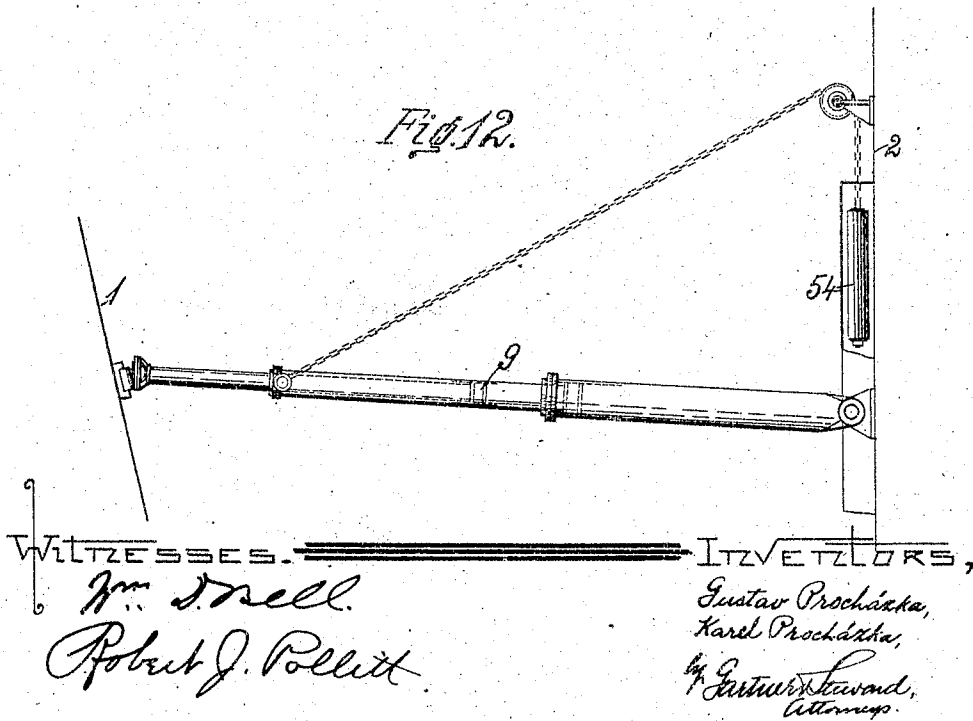
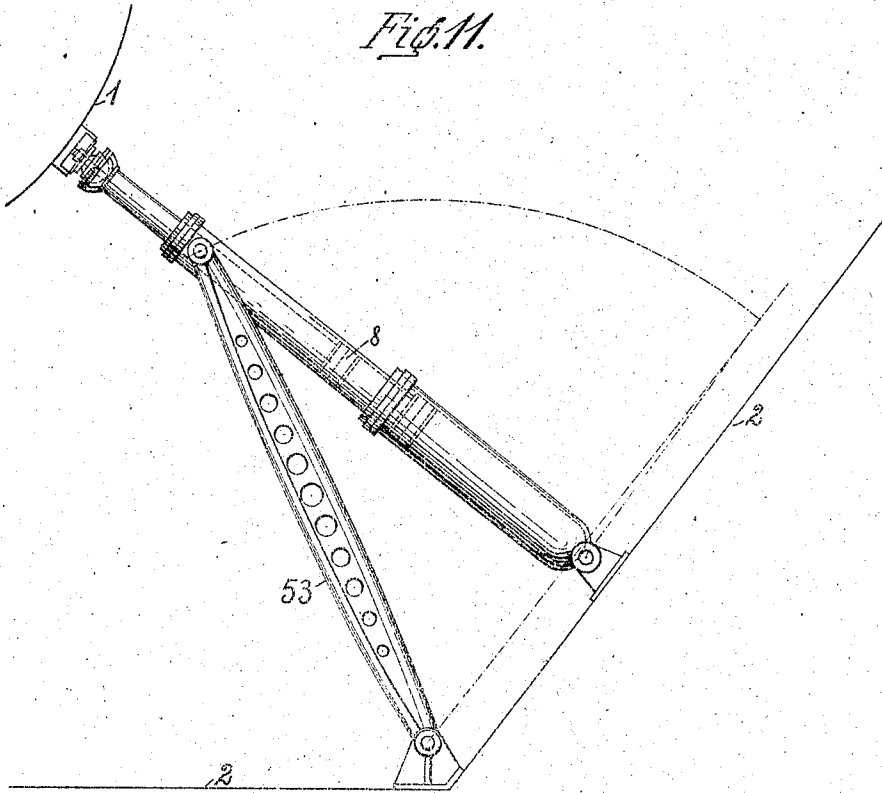
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6 SHEETS—SHEET 6.



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# UNITED STATES PATENT OFFICE.

GUSTAV PROCHÁZKA AND KAREL PROCHÁZKA, OF VELÍM, AUSTRIA-HUNGARY.

## HYDRAULIC SUPPORT FOR SHIPS.

SPECIFICATION forming part of Letters Patent No. 786,840, dated April 11, 1905.

Application filed May 11, 1904. Serial No. 207,505.

*To all whom it may concern:*

Be it known that we, GUSTAV PROCHÁZKA and KAREL PROCHÁZKA, of Velím, in the Kingdom of Bohemia, Austria-Hungary, have invented certain new and useful Improvements in Hydraulic Supports for Ships; and we hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to supporting devices for ships, first, for use in docks for the purpose of more rapidly docking the ships without previously fitting and preparing supporting blocks or props, according to the plan of construction of the ship, and, secondly, for use in connection with carriages of devices for lifting and transporting ships on dry land.

In the accompanying drawings, which illustrate the invention by way of example, Figure 1 shows a diagrammatic representation in cross-section of the supporting devices holding up the ship in a dock, the left hand showing supporting means heretofore employed, while at the right side of the same figure is shown the new means for supporting the ship by means of hydraulic-pressure cylinders. Fig. 2 is a plan of Fig. 1. Fig. 3 is a cross-section of the hydraulic props. Fig. 4 is a longitudinal section showing a set of two hydraulic props. Fig. 5 is a sectional view showing details of the automatic devices for turning off the water-cock. Fig. 6 is an elevation of the same. Fig. 7 shows the spring-sleeve of the driving-bolt. Fig. 8 is a section through the valve-chamber of the automatically-acting valve, which may be used as a modification in place of the arrangement shown in Figs. 5 to 7. Fig. 9 is a vertical section and elevation of the hydraulic bilge-block. Fig. 10 is a plan of the same. Fig. 11 is an elevation of the lower side supports, and Fig. 12 an elevation of the upper side supports.

It is known that the supports heretofore used for a ship 1 in a dock 2 had rigid blocks 3 and side supports 4 and 5. Said parts are replaced in our invention by hydraulically-setting devices 6, 7, 8, and 9, which automatically come to rest against the skin of the ship and then are held fast in position while the inflow of water under pressure, which has

taken place through inlet-cocks with automatically-operating devices or through automatic valves, has been cut off. In this case the ship rests on blocks carried by hydraulic pistons and exerts a pressure corresponding to its weight on the pressure-cylinders cut off from the pressure water-pipe. Accordingly the adjustment of the ship and the preparation of each support according to the plan of the ship are no longer necessary, so that the ship may now be brought directly into the dock, and the ship is supported on pumping out the water without any regard to the form of the vessel.

As shown in Figs. 3 and 4, the blocks 10 are arranged on a common head 11 of pistons 12, arranged in pairs. The corresponding cylinders are set in a bed 14, running the entire length of the dock. Both cylinders 13 with one block 10 are connected by the pipe 15, so as to have equal pressure on both cylinders, and therefore a horizontal disposition of the block 10. Into the connecting-tube 15 water under pressure is admitted from the pipe 16 through a tap 17. The outlet-water is carried through the same tap 17 to the outlet-pipe 18, for which purpose the tap 17 is so devised that it first establishes connection between the pipe 16 and the pipe 15; secondly, cuts off such connection, and, thirdly, establishes connection of the cylinders with the outlet-pipe 18. This tap is shown in Fig. 4 as permitting communication between tube 15 and pipe 16 and closing off communication between tube 15 and pipe 18. Each tap has securely mounted upon its spindle 19 a toothed wheel 20, having teeth 21 engaged by a rack 22, having teeth 23. This rack 22 is by means of a spring (not shown) pressed against the wheel 20 and may in its upward motion slip over the teeth 21, while on its downward motion the rack gears with the said toothed wheel 20, so as to turn the same until the pipe 15 is cut off. The rack 22 is suspended from a one-armed lever 24, the supporting-bracket 25 of which is screwed to the head 11 of the piston 12 in a slot 26 in the block 10. One end of the lever 24 engages the slot 27 in the bolt 28, whose lower conical end enters the

spring-sleeve 29 and projects some centimeters beyond the block 10. The bolt 28 serves for cutting off the admission of water, as follows: When the ship 1 is brought into the dock, the cut-off valve of the pipe 16 is open and water issues under pressure into the hydraulic cylinders 13, whereby the pistons 12 are pressed against the ship, the bolts 28 coming first against the sides of the vessel. On further displacement of the blocks the bolts 28 enter the sleeves 29 and press the racks 22 downward, acting through the levers 24, so as to automatically shut off the cocks 17 from the pipe containing water and pressure, whereby the block 10 is pressed firmly against the ship. This operation takes place with each hydraulic block offering support to the vessel. When the ship is to be removed from the dock, after water has been admitted into the latter, or, (if the dock be a floating one, after submersion of the same,) the cocks 17 are turned so that the water can flow from the cylinder 13 into the outlet-pipe 18. For this purpose on each wheel 20 is attached a lever 30 with a clip 31. Such clip 31 is engaged by a second clip 32, which is secured to a rod 33, of gas-pipe, guided in rollers 34. By drawing or pushing forward each rod 33 all the cocks 17 simultaneously open, and then water can issue from the cylinders. The pistons 12 sink and the blocks move therewith. So that the racks 22 can move independently of wheels 20, the latter are provided above the teeth 21 with smooth cylindrical faces 35, covering more than half the circumference. When the blocks 10 sink, the bolts 28 strike the tappets 36, attached to the beds 14, so as to return to their former position. The cocks are then brought back to their first position by reversement of the rod 33, so that the blocks are ready for docking the next ship. The second method for cutting off the water at the moment the blocks press against the sides of the ship may be carried out by arrangement of an automatic valve such as shown in Fig. 8. In the casing 37 three valves are arranged over one another. Beneath the uppermost valve 38 for the water under pressure is disposed a valve 39, opening in the contrary direction, which valve when the blocks press against the sides of the ship automatically cuts off the water-inflow if at this moment greater pressure of water is exerted in the cylinder by the weight of the ship resting on the blocks than is present in the pipe 16. The lowermost outlet-valve 40 may be opened by lever 41 and rod 33, as in the previous modification. In order that no water under pressure can flow from the pipe 16 on opening the outlet-valve 40, the inlet-valve 38 is at the same moment closed by a rod 42. On closing the valve 40 the inlet-valve 38 is again opened. The middle valve 39 works automatically. The bilge-supports 7 are arranged in the same manner. These comprise four hydraulic cylinders 43, built on a common framework 44, resting on

running-rails 46 through the intermediary of two rows of balls 45. The pistons 47 carry above, by means of ball-joints 48, a frame 49, of sheet metal, to which wooden cushions 50 are secured, which cushions are sufficiently flexible to adjust themselves to the shape of the ship. The inflow of water under pressure takes place either by the arrangement above described, the middle block being arranged on the cross-bar 51 of the frame 50, or is cut off by an automatic valve. The movement of the bilge-supports against the middle of the dock is effected by horizontal pressure-cylinders 52.

The slide-supports 8 and 9 are represented as telescopically-sliding tubes wherein the pressure-water is cut off either automatically or by hand. The lower supports, Fig. 11, are held by braces 53 and are on outflow of the water automatically brought against the wall of the dock in their position of rest, as shown in dotted lines in Fig. 11. The upper side supports, Fig. 12, are, on the other hand, balanced by counterweights 54.

The above-described arrangement of devices for supporting a ship in a dock is equally applicable for bedding a ship on the carriage of apparatus for raising and moving on land, as the ship can then be quickly placed above supports irrespective of the form of the ship without danger of injuring the latter.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a hydraulic supporting device for ships, the combination of a cylinder, a piston in said cylinder, a block carried by the piston and adapted to directly receive the impact of the ship, means for conducting a liquid into said cylinder, and means, operative upon an approximation of pressures of the ship and the liquid in the cylinder on the piston, for cutting off the supply of liquid to the cylinder, substantially as described.

2. In a hydraulic supporting apparatus for ships, the combination of a series of cylinders, a series of pistons in said cylinders, blocks carried by the pistons and adapted to directly receive the impact of the ship, means for conducting a liquid into said cylinders, means, operative upon an approximation of pressures of the ship and the liquid in the cylinders on the pistons, for cutting off the supply of liquid to the cylinders, and means for effecting the release of the liquid in said cylinders simultaneously from all of them, substantially as described.

3. In a hydraulic supporting device for ships, the combination of a cylinder, a piston in said cylinder, a block carried by the piston and adapted to directly receive the impact of the ship, a liquid-supply pipe, a liquid-discharge pipe, a three-way valve having one way connected with the supply-pipe, another way with the discharge-pipe, and the third



5 way with the cylinder, and means, operative from the ship upon the approach of the block into contact therewith, for shifting the movable part of said valve to cut off access between said valve and the cylinder, substantially as described.

10 4. In a hydraulic supporting device for ships, the combination of a cylinder, a piston in said cylinder, a block carried by the piston and adapted to directly receive the impact of the ship, a liquid-supply pipe, a liquid-discharge pipe, a three-way valve having one way connected with the supply-pipe, another way with the discharge-pipe, and the third way with the cylinder, means, operative from the ship upon the approach of the block into

contact therewith, for shifting the movable part of said valve to cut off access between said valve and the cylinder, and means for thereupon moving said movable member of the valve to establish connection between the interior of said cylinder and the discharge-pipe, substantially as described.

In witness whereof we have hereunto set our hands in presence of two witnesses. 25

GUSTAV PROCHÁZKA.  
KAREL PROCHÁZKA.

Witnesses:

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ADOLPH FISCHER.