No. 755,536. PATENTED MAR. 22, 1904.

F. POKORNÝ.

APPARATUS FOR RAISING OR SINKING VESSELS IN LOCK CHAMBERS.

APPLICATION FILED OCT. 19, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

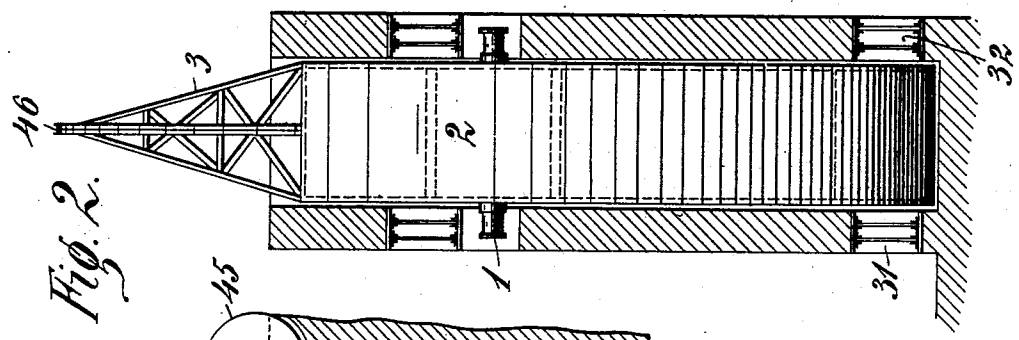

Fig. 2.

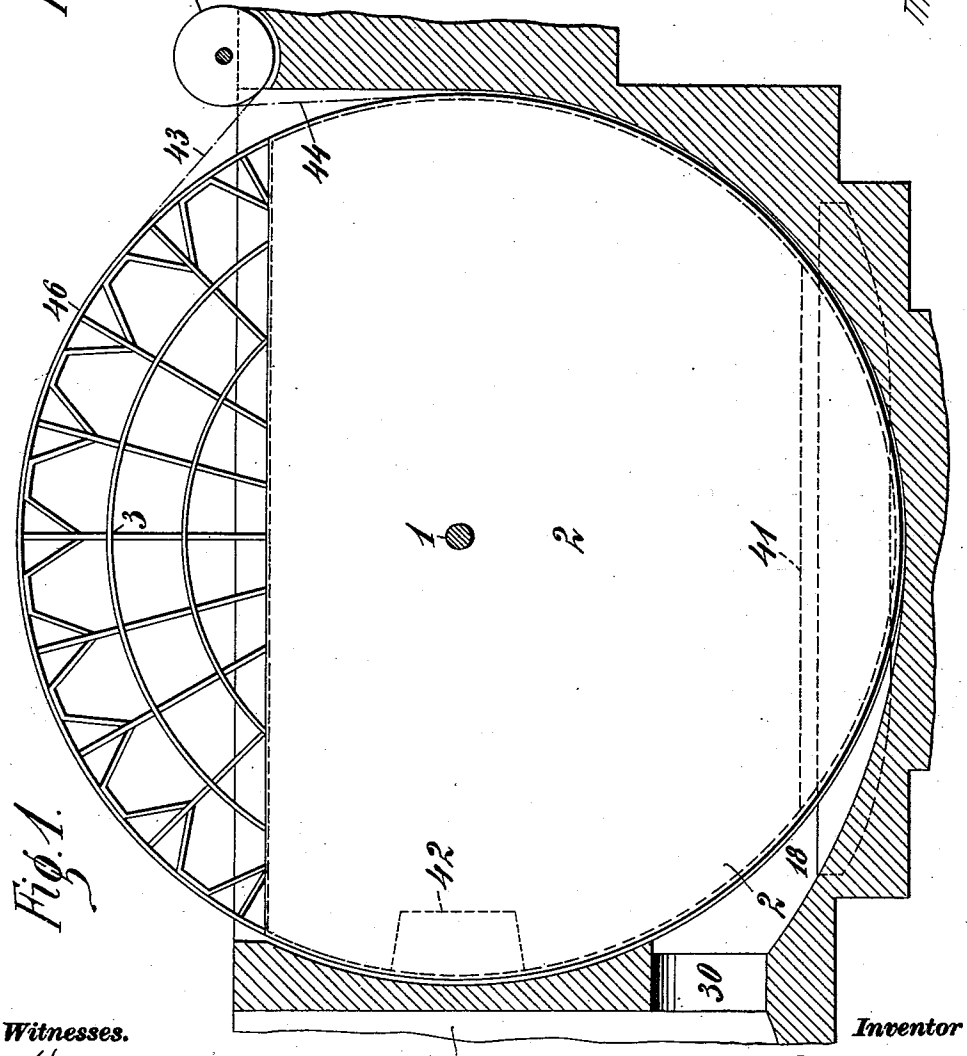

Fig. 1.

Witnesses.
C. Seymann.
L. Baldman

Inventor
Ferdinand Pokorný
by B. Singer
Att'y.

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NO MODEL. 4 SHEETS—SHEET 2.

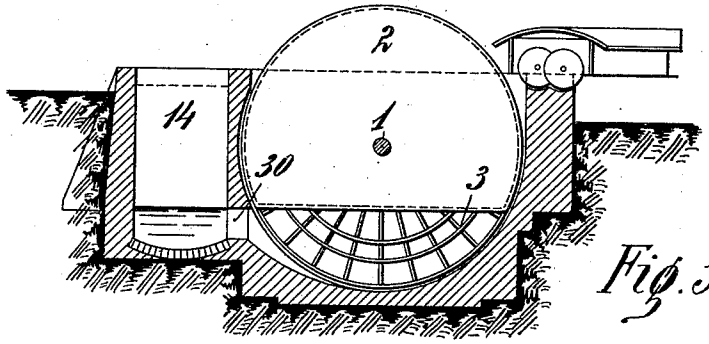

Fig. 3.

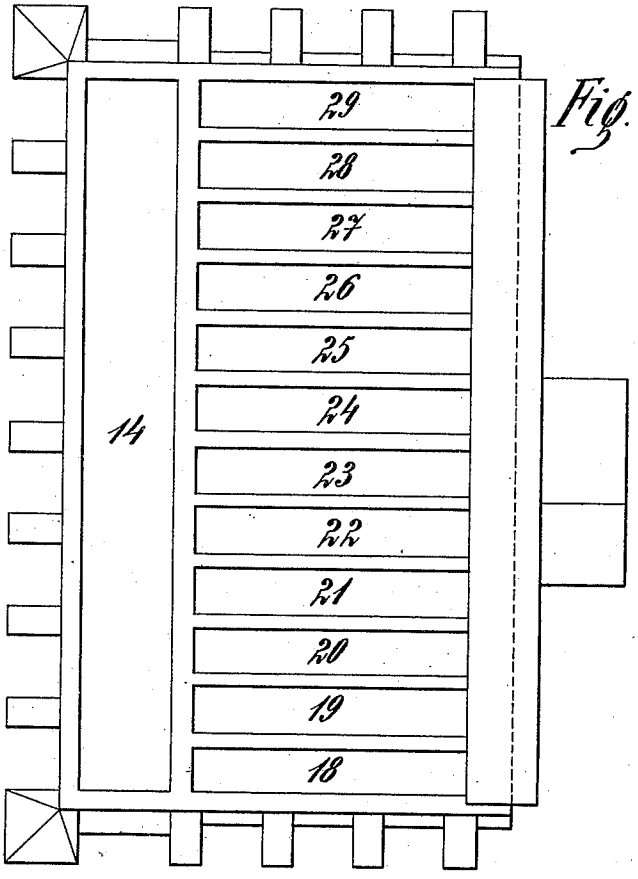

Fig. 4.

Witnesses.
C. Heymann
L. Haldman

Inventor.
Ferdinand Pokorný
by B. Singer
Att'y.

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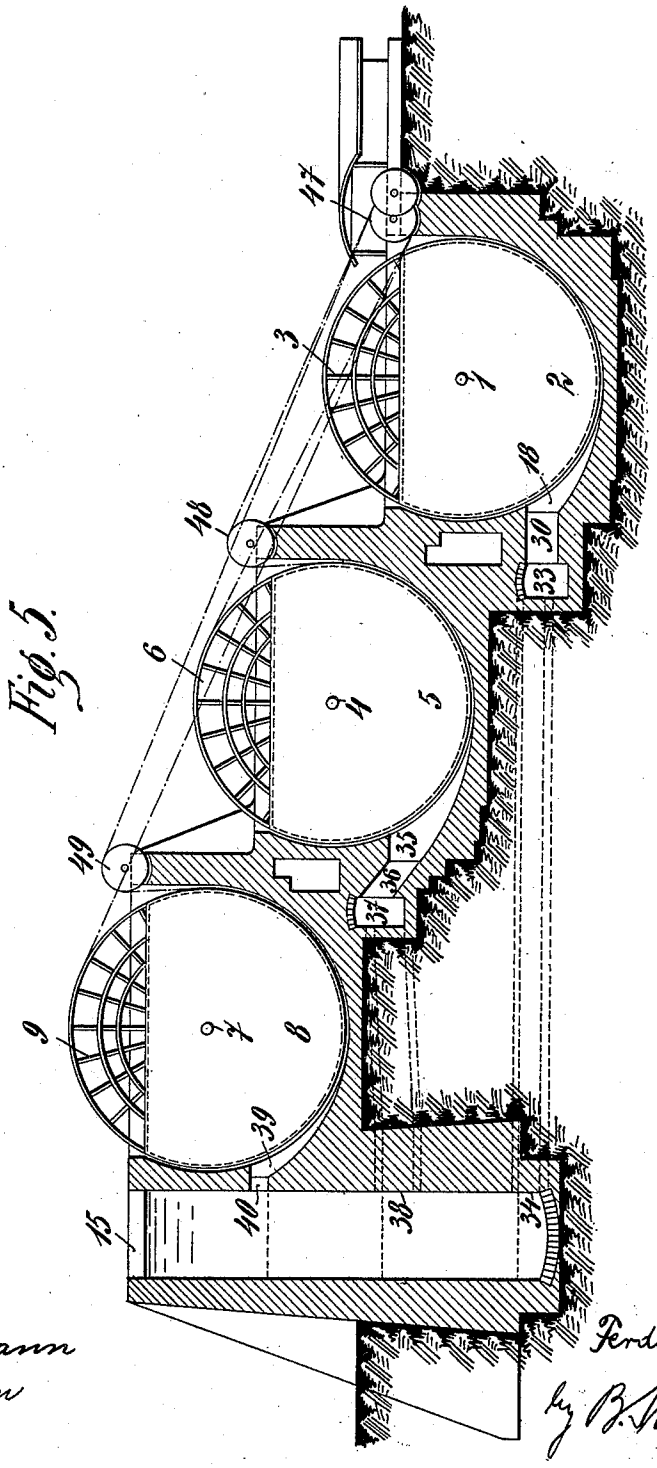
NO MODEL. 4 SHEETS—SHEET 3.

Fig. 5.



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Ferdinand Pokorný
by B. Singer
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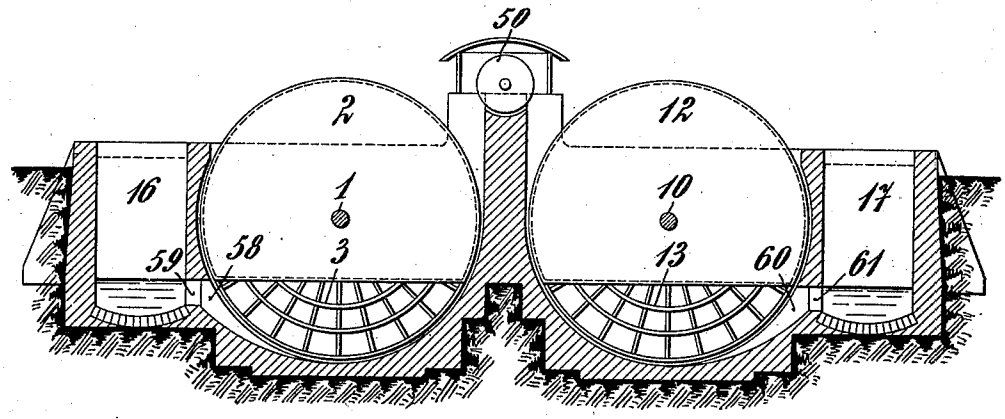
NO MODEL. 4 SHEETS—SHEET 4.

Fig. 6.



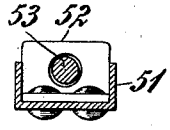


Fig. 8.

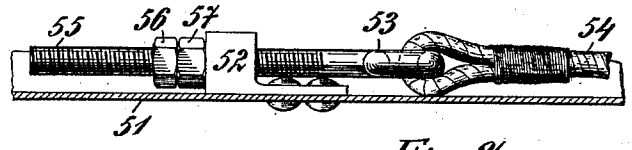


Fig. 7.

Witnesses.
C. Heymann.
L. Baldman

Inventor.
Ferdinand Pokorný
by P. Singer.

Att'y.

No. 755,536. Patented March 22, 1904.

UNITED STATES PATENT OFFICE.

FERDINAND POKORNÝ, OF MORAVSKÁ OSTRAVA, AUSTRIA-HUNGARY.

APPARATUS FOR RAISING OR SINKING VESSELS IN LOCK-CHAMBERS.

SPECIFICATION forming part of Letters Patent No. 755,536, dated March 22, 1904.

Application filed October 19, 1903. Serial No. 177,616. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND POKORNÝ, a subject of the Emperor of Austria-Hungary, residing at Moravská Ostrava, in the Province of Moravia, Austria-Hungary, have invented a new and useful Apparatus for Raising or Sinking Vessels in Lock-Chambers, of which the following is a specification.

My invention relates to improvements in apparatus for raising and lowering vessels in lock-chambers; and it consists more particularly in combining displacement drums or cylinders with auxiliary chambers whereby the water may be forced from said chambers into the lock-chamber or allowed to flow back into said chambers as the drums are rotated.

The object of this invention is to provide an economical and cheap apparatus for raising and lowering vessels with the least possible amount of water and of mechanical power. I obtain these objects by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a vertical sectional view through one of the auxiliary chambers, showing one of the drums in position. Fig. 2 is also a sectional view taken at right angles from Fig. 1. Fig. 3 is a vertical sectional view through the entire apparatus, showing one of the displacement-drums with its open segment at the bottom. Fig. 4 is a plan view of the lock-chamber and auxiliary chambers. Fig. 5 is a sectional view showing a number of auxiliary chambers with apparatus adapted to raise the water in the lock-chamber to a greater height than with a single drum. Fig. 6 is a sectional view showing double locks with double displacement apparatus. Figs. 7 and 8 are details of the rope tension for the peripheral ring.

As shown in Figs. 1 and 2, the displacement drum or cylinder 2 is mounted on a horizontal axis 1, having its bearings in side walls of a chamber 18. The drum is adapted to fit the chamber as closely as possible without engaging the sides or ends thereof. A segmental portion 3 of the cylinder 2 is constructed of open framework. The chamber 18 communicates with the lock-chamber 14 through an opening 30 near the bottom of the chamber 18. It will be understood that the lock-chamber requires a series of displacement-cylinders and auxiliary chambers of the kind shown in Figs. 1 and 2, and all of such chambers are in communication with the main lock-chamber. Such a series of auxiliary chambers is shown in Fig. 4 at 18 to 29.

The operation of this apparatus is as follows: The lock-chamber 14 and auxiliary chambers are all filled with water to about the level shown in Fig. 3, with the open segments of the cylinders at the lowest position. When it is desired to raise the water in the lock-chamber 14, the cylinders are all turned on their axles until the segmental portions are at the top, whereby the closed drum portions force the water from the lower part of the auxiliary chambers through the openings 30 into the chamber 14, and thereby raise the water-level in said chamber. When it is again desired to lower the water in the chamber 14, the cylinders are revolved to the first position, and the water flows back into the auxiliary chambers. The auxiliary chambers are preferably in communication with each other through openings 31 32 at the bottom, as shown in Fig. 2. The cylinders are preferably provided with counterweights, as at 41 42, Fig. 1, in order to reduce the necessary driving power and to overcome the resistance. When such counterweights are properly proportioned and placed, the power required for turning the cylinders, and thereby raising and lowering vessels in the lock-chamber, is reduced to a minimum and only needs to be sufficient for overcoming the friction and the water resistance. The small power necessary for operating this apparatus forms one advantage of my invention, while another is that it can be worked practically without any additional water except as such small quantities as are lost by evaporation or dripping. Any desired power may be used for operating the drums, and, if convenient, water-power may serve for the purpose.

When it is desired to raise the water in a lock-chamber to a considerable height, a plurality of series of displacement-drums at different levels may be used in connection with one lock-chamber, as shown in Fig. 5. The

lowest series communicates with chamber 15 through conduits 33 34. The next higher set of drums or cylinders 5, rotating on axles 4 and having open segments 6, are mounted in chambers 35, having communication with the lock-chamber 15 through conduits 36 37 38. The highest set of drums or cylinders 8, having open segments 9, are mounted on axles 7 in chambers 39, having communication through openings 40 with the lock-chamber 15. If a vessel is to be lifted up from the bottom level, all of the drums or cylinders will be turned with their segments 3 6 9 downward. Then the lowest set of cylinders 2 will be turned till their segments 3 are at the top. This raises the water-level in the chamber 15 up to the conduits 38. The conduits 30 are then closed, (by means not shown,) so that no water can flow back into the chambers 18. Then the middle set of cylinders 5 are turned, which raises the water up to the openings 40, and the conduits 36 are then closed to prevent the water from flowing back into the chambers 35. Finally the highest set of cylinders is turned, and the water-level is raised to the position shown in Fig. 5. If the single lock-chamber is not sufficient for the traffic, two chambers 16 and 17 may be placed adjacent to each other and operated by means of series of cylinders 2 and 12, as shown in Fig. 6. These cylinders are mounted in chambers 58 and 60, which communicate with the lock-chambers 16 and 17, respectively, through openings 59 and 61. The cylinders 12 are provided with open segments 13, as above described, and are mounted on axles 10, also as above described. By means of this arrangement vessels may be simultaneously raised in both locks, or one may be raised in one lock while another is being lowered in the other lock. While these cylinders may be turned in any desired manner, I prefer to revolve them by means of ropes and sheaves, as shown in the drawings. The cylinder 2, Figs. 1 and 2, is provided with a peripheral U-shaped band 46, in which a rope 43 44 is rove and from there around a driving-sheave 45. If desired, several of such ropes may be used for each cylinder. It is readily apparent that the apparatus shown in Fig. 5 may be driven from one main drive, as shown, each set of cylinders still having its own sheave 47 48 49. In order to provide for giving the drive-ropes sufficient tension, I use the device shown in Figs. 6, 7, and 8, in which 51 represents the U-shaped iron corresponding to the rim 46 of Fig. 1. The rope 54 is fastened at the end to a bolt 53, which is threaded at 55 to engage with a tapped lug 52 on the rim 51 and is provided with lock-nuts 56 57. By means of this take-up the rope may be given the desired tension.

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

1. In an apparatus for raising and lowering vessels in lock-chambers, the combination with the lock-chamber, of a series of auxiliary chambers communicating with said lock-chamber at the bottom thereof, rotating cylinders in said auxiliary chambers provided with open segmental portions, whereby the water may flow into said auxiliary chambers, when the segmental portions are at the bottom, and ejected therefrom when the closed portions of the cylinders are turned to the bottom.

2. In an apparatus of the character set forth, the combination with a lock-chamber, of auxiliary chambers communicating therewith, hollow displacement-cylinders in said chambers, axles on which said cylinders rotate, segmental portions of said cylinders being open, and means for rotating said cylinders on their axles.

3. In an apparatus of the character set forth, the combination with a lock-chamber, of a plurality of series of auxiliary chambers arranged to open at their bottoms into said lock-chamber at different heights, and segmental displacement-cylinders in said chambers, whereby the water may be raised to different levels in said lock-chamber.

4. In an apparatus of the character set forth, the combination with a lock-chamber, of lateral supply-chambers communicating with said lock-chamber through bottom conduits, segmental hollow displacement-cylinders in said auxiliary chambers, having open segmental parts, rims around said cylinders, ropes adapted to engage with said rims, and drive-sheaves for said ropes.

5. The combination with a segmental displacement-cylinder provided with counterweights, and having a peripheral rim, of a drive-rope, a threaded bolt with which said rope is connected, a tapped lug on said rim for said bolt, and lock-nuts for locking said bolt.

6. The combination with a lock-chamber, of auxiliary chambers, displacement-cylinders closely fitting in said chambers, axles on which said cylinders are mounted, an open segmental portion on said cylinders, and counterweights for said cylinders, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FERDINAND POKORNÝ.

Witnesses:

D. Tom Dezort,

Ladislav Vojaill.