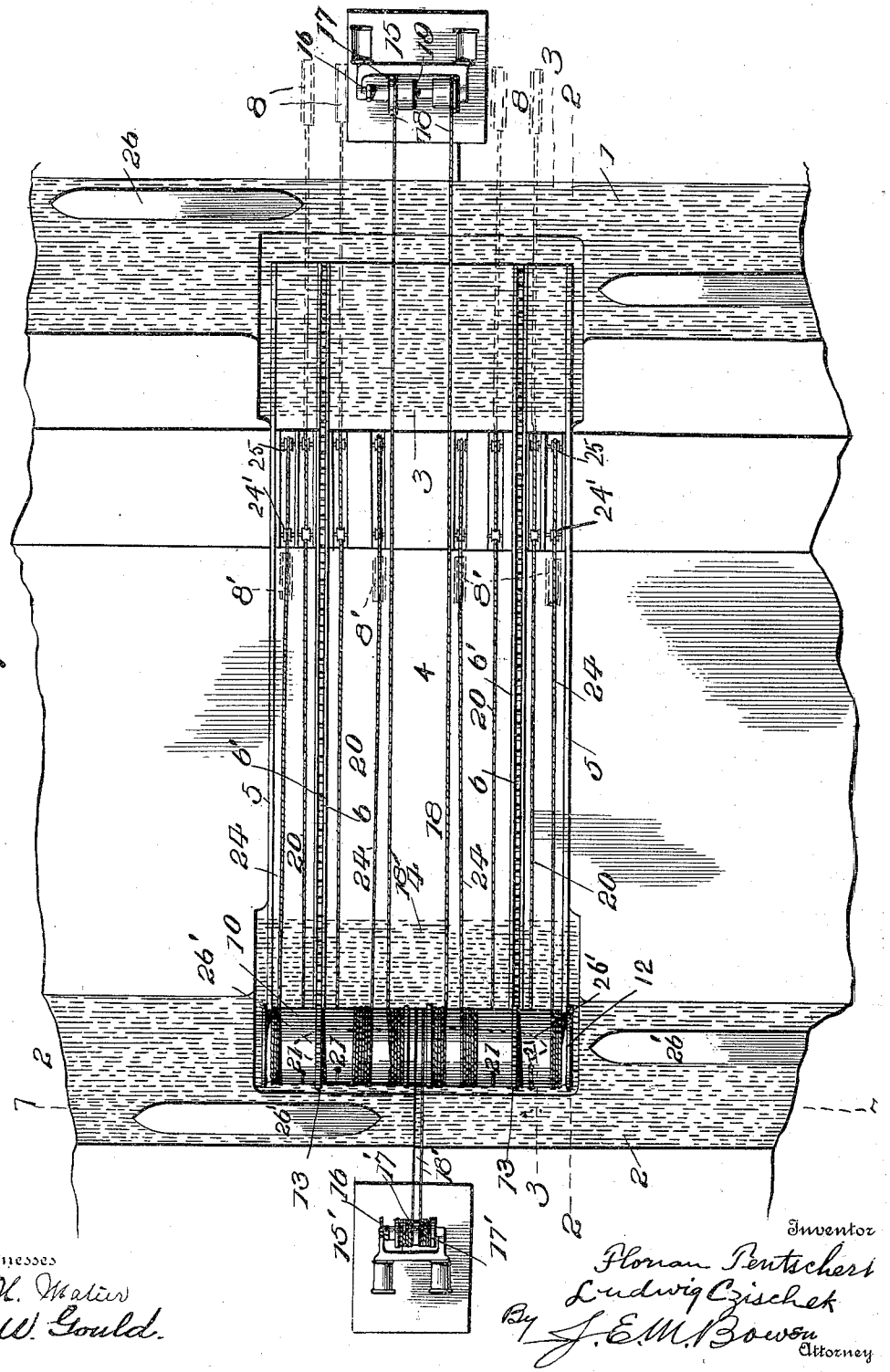
No. 643,171. Patented Feb. 13, 1900.

F. TENTSCHERT & L. CZISCHEK.

MEANS FOR ELEVATING OR LOWERING SHIPS.

(No Model.) (Application filed Mar. 18, 1899.) 6 Sheets—Sheet 1.

Fig. 1.



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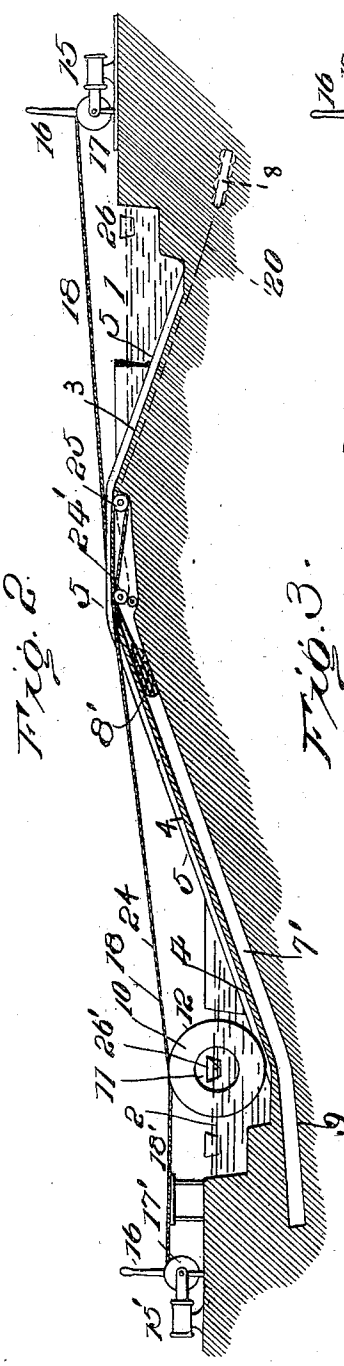

Fig. 2.

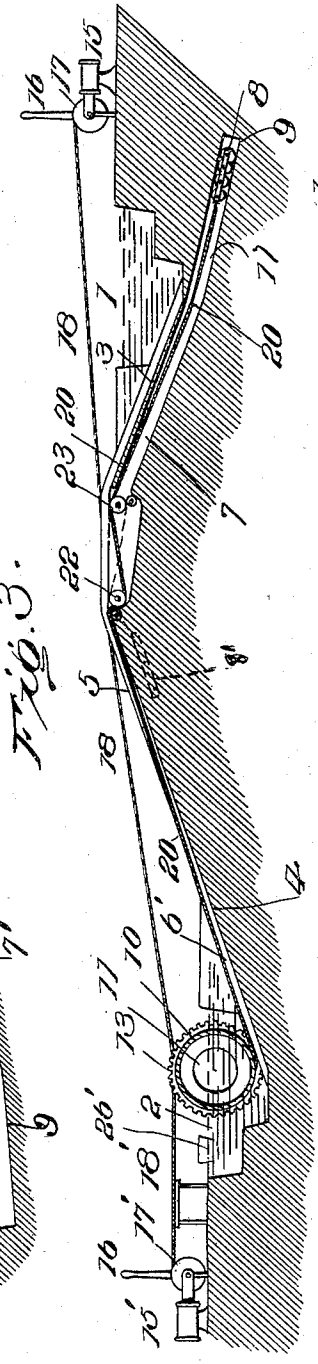

Fig. 3.

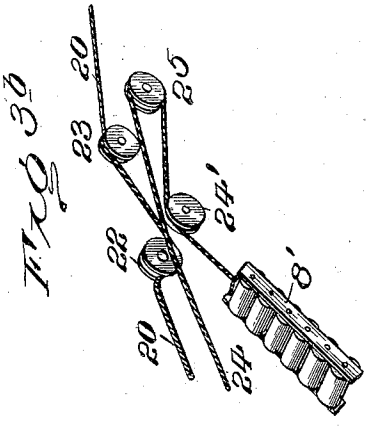

Fig. 3b

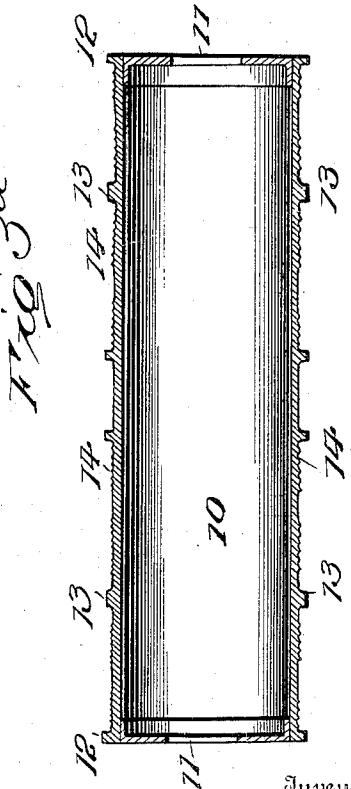

Fig. 3a

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6 Sheets—Sheet 3.

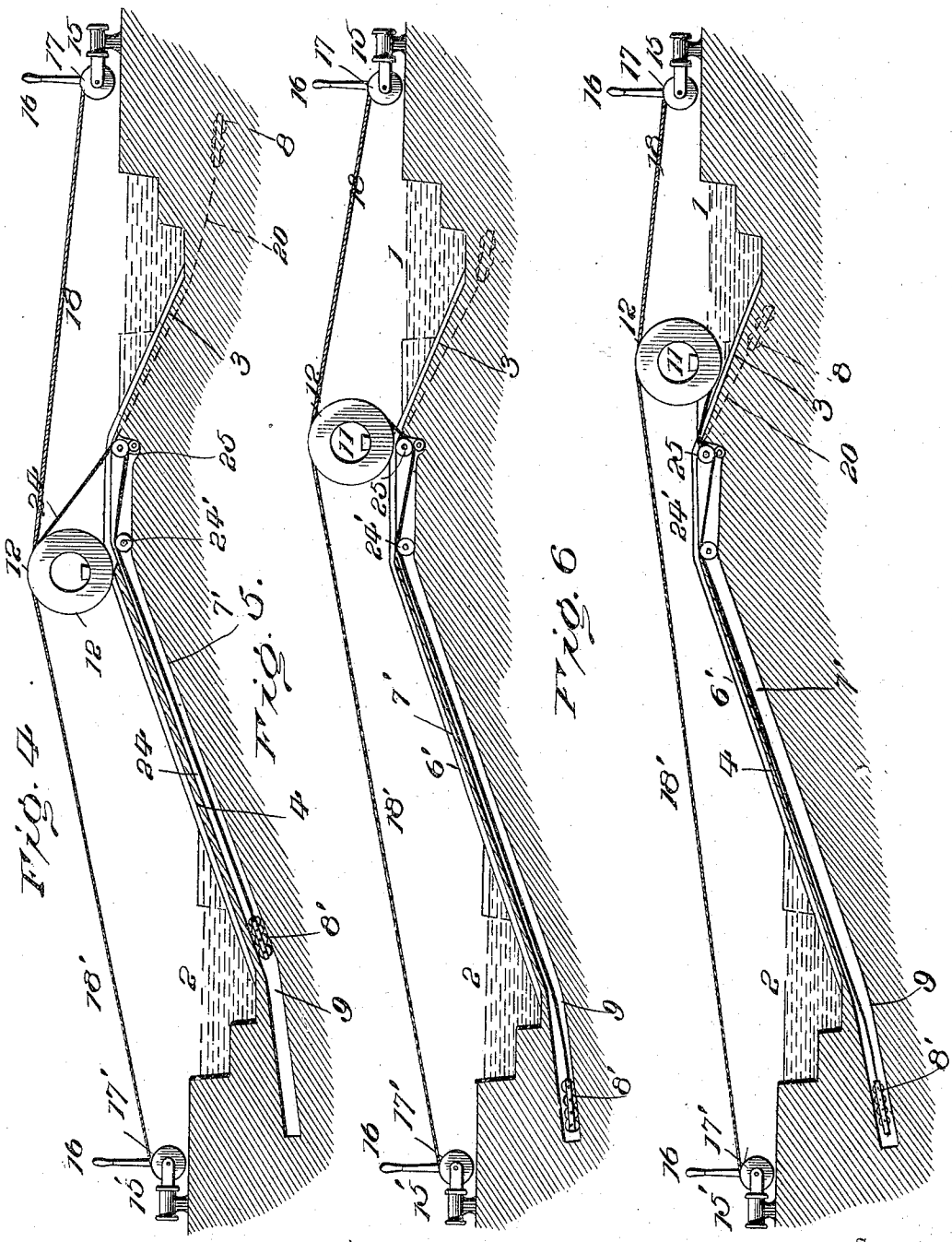

Fig. 4.

Fig. 5.

Fig. 6.

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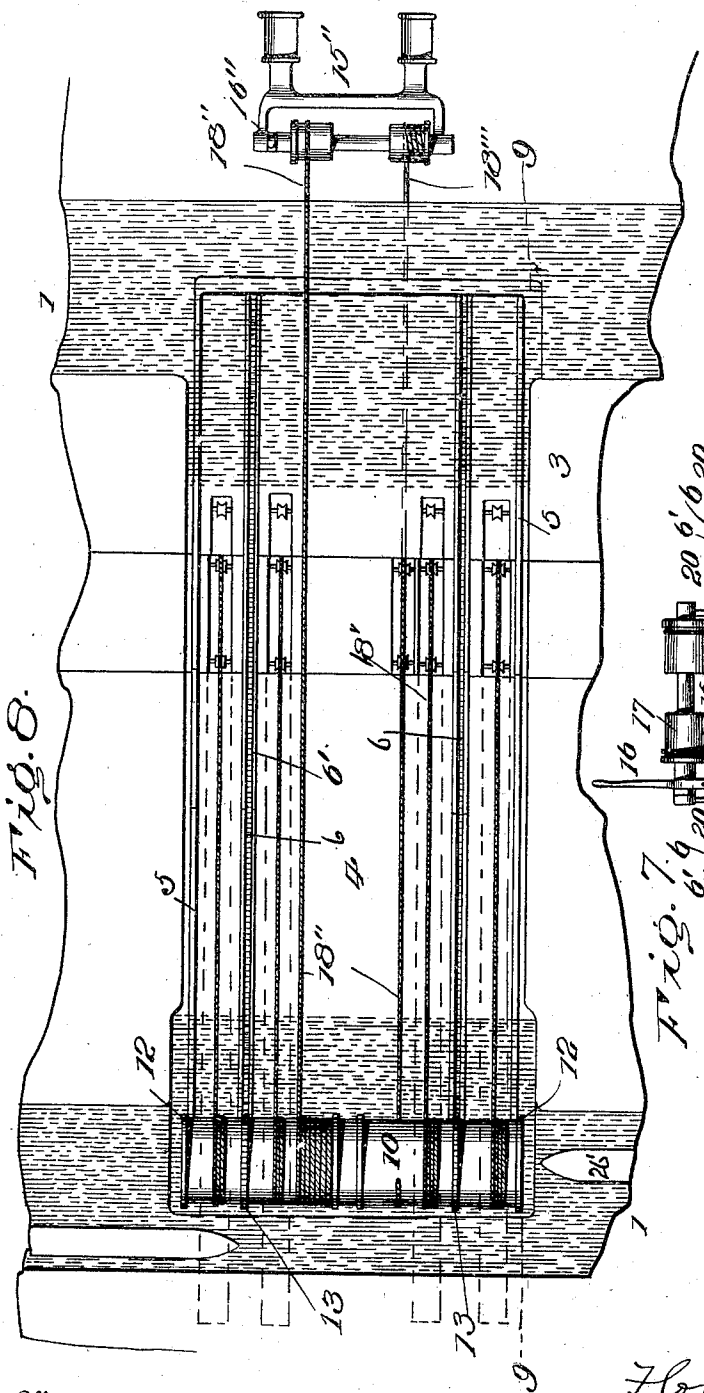

Fig. 8.

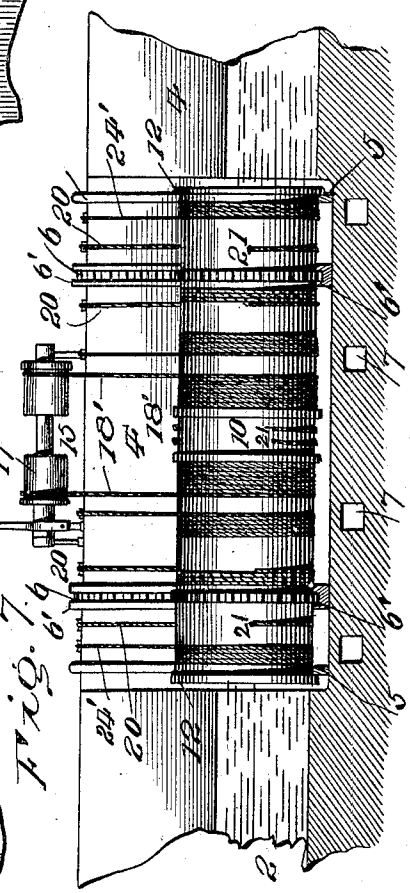

Fig. 7.

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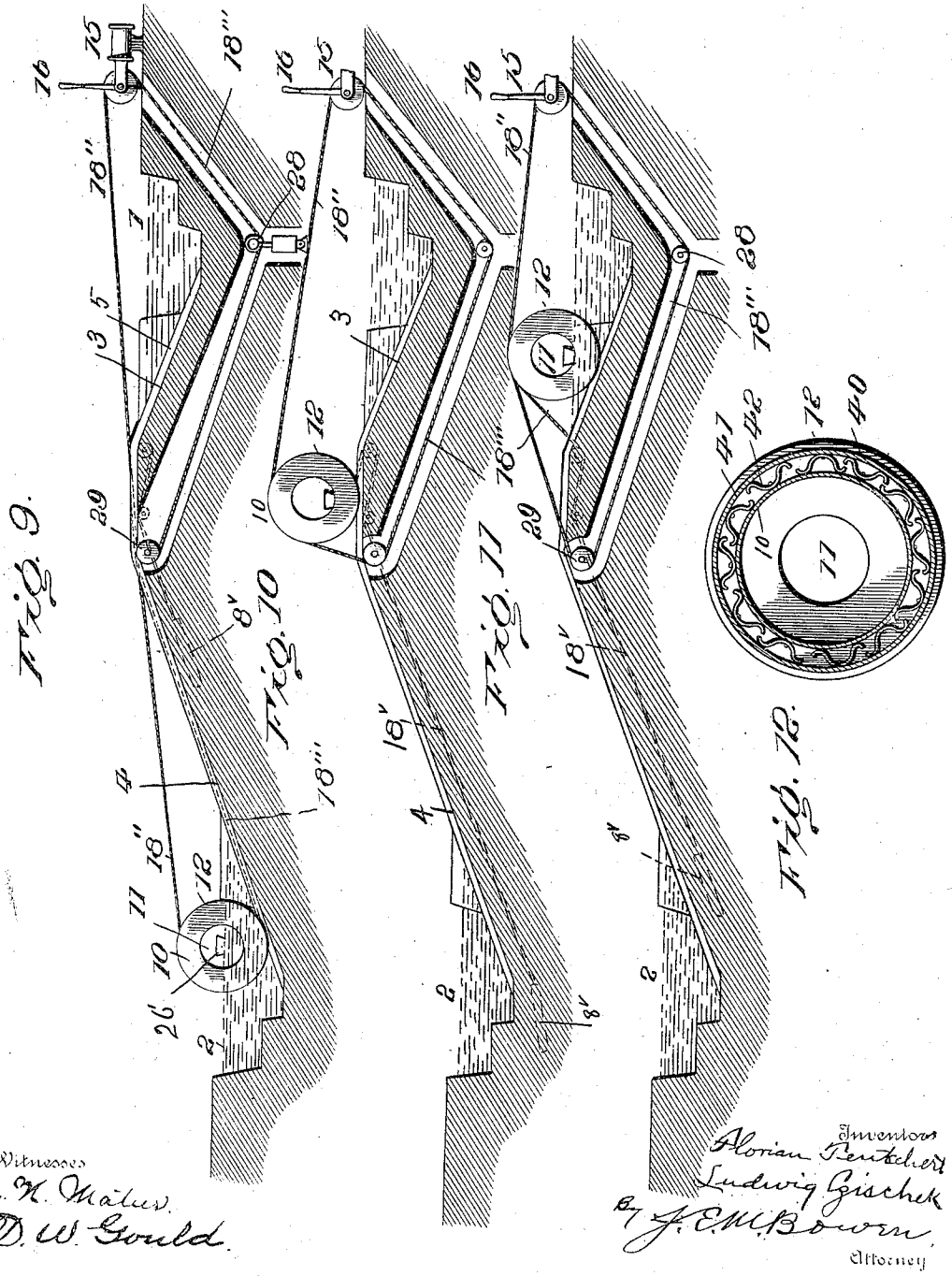
MEANS FOR ELEVATING OR LOWERING SHIPS.

(No Model.) (Application filed Mar. 18, 1899.)

6 Sheets—Sheet 5.



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MEANS FOR ELEVATING OR LOWERING SHIPS.

(No Model.) (Application filed Mar. 18, 1899.)

6 Sheets—Sheet 6.

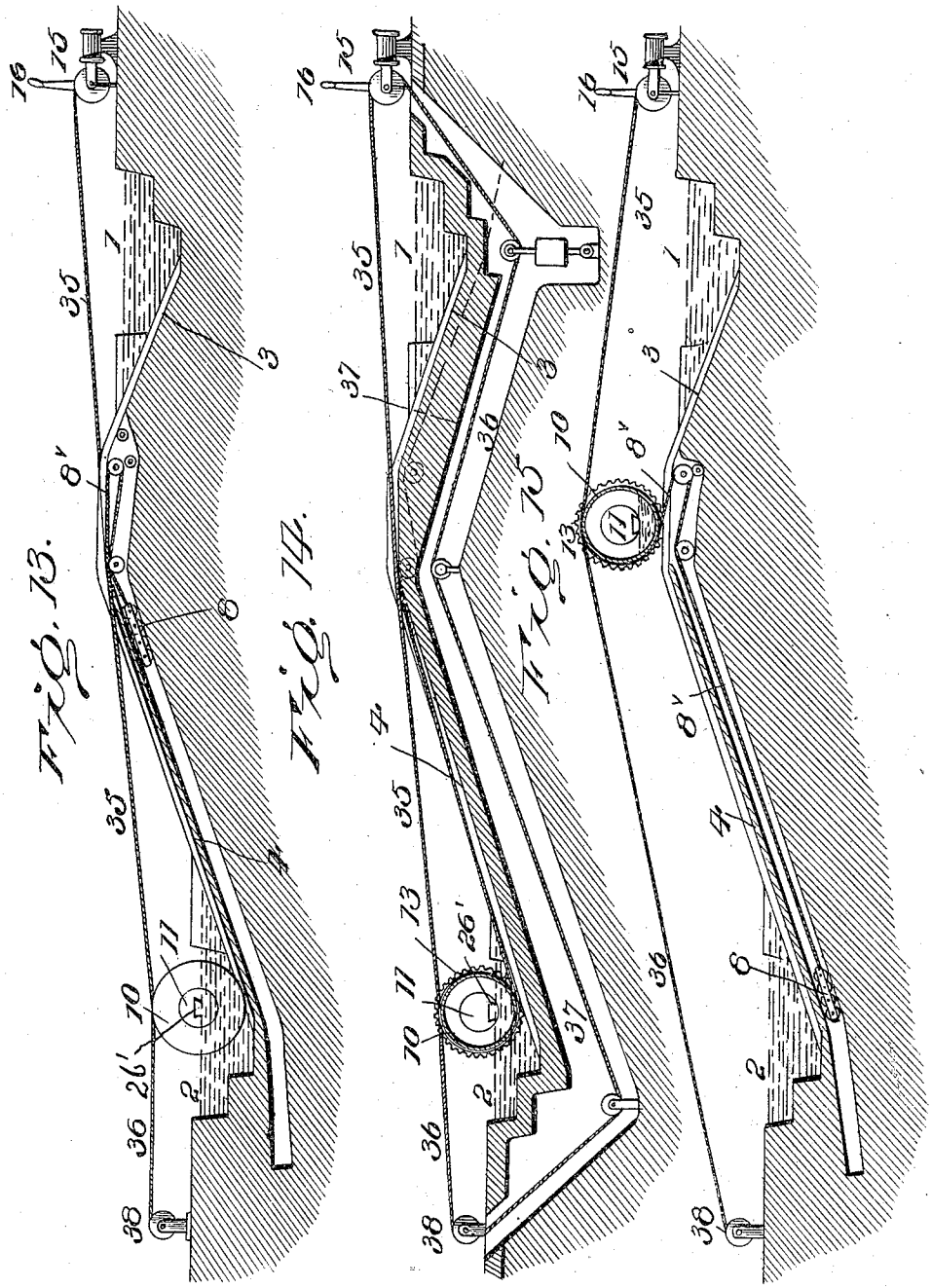

Fig. 13.

Fig. 14.

Fig. 15.

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UNITED STATES PATENT OFFICE.

FLORIAN TENTSCHERT AND LUDWIG CZISCHEK, OF VIENNA, AUSTRIA-HUNGARY.

MEANS FOR ELEVATING OR LOWERING SHIPS.

SPECIFICATION forming part of Letters Patent No. 643,171, dated February 13, 1900.

Application filed March 18, 1899. Serial No. 709,598. (No model.)

To all whom it may concern:

Be it known that we, FLORIAN TENTSCHERT and LUDWIG CZISCHEK, engineers, of Vienna, Austria-Hungary, have invented certain new and useful Improvements in Means for Elevating or Lowering Ships or Vessels Without Level or Pond Ports and Without Sluices, of which the following is a specification.

This invention relates to improved means for the transportation of vessels or ships from one level to another. Among other means there have been proposed for that purpose movable sluices in the form of a closed wagon with a water-basin in its interior for the reception of the ship to be transported in a floating state, this wagon being moved parallel to its center line upon rails on an inclined plane.

Now the object of the present invention is to replace the said wagon by a drum capable of being horizontally revolved up and down the rails of the inclined plane, whereby the vessel to be raised or lowered is likewise carried up and down in a floating condition. The said drum insures great safety in working and little friction, there being no pulleys or wheels employed. Moreover, according to our invention two oppositely-inclined planes are used instead of a single one, while level ports and tightening and locking devices—such as are used in similar constructions for the passage of vessels into the basin, and vice versa—are dispensed with by the employment of the drum in place of the basin.

In order that our invention and the manner of carrying the same into effect may be fully understood, we shall describe the same with reference to the accompanying drawings, in which—

Figure 1 is a plan of the preferred form of our apparatus. Fig. 2 is a section on line 2 2 of Fig. 1. Fig. 3 is a section on line 3 3 of Fig. 1. Fig. 3^a is a longitudinal section of the drum. Fig. 3^b is a view showing a weight, ropes, and pulleys. Figs. 4, 5, and 6 are sections on line 2 2 of Fig. 1 at different stages of the movement of the drum. Fig. 7 is a side view of the drum and inclined plane. Fig. 8 is a plan of a modification. Figs. 9, 10, and 11 are sections on line 9 9 of Fig. 8. Fig. 12 is a central transverse section of a modified drum. Figs. 13, 14, and 15 are longitudinal sections showing another modified apparatus.

In the drawings, 1 2 indicate parallel canals or channels containing water, 1 being the upper-level channel and 2 the lower-level channel.

3 4 are inclines extending, respectively, from the bottoms of the upper and lower channels to the level section between their upper ends. Extending the whole length of the inclined and the connecting planes are guide-tracks 5 and preferably racks 6 6, parallel therewith.

7 are underground passages or other ways, and 8 8′ are gravitating roller-weights adapted to travel therein, 8 being under the upper channel 1 and 8′ under the lower channel 2. Said passages have parts 9 at their lower ends of less inclination than the upper parts for the purpose hereinafter described.

10 is a large drum, the ends of which have central openings 11 of considerably smaller diameter than the drum. The ends of the drum have flanges 12, adapted to travel along the rails 5 to guide the drum, preventing all movement of the drum in the direction of its length.

13 are gears on the drum adapted to engage the racks 6 6. The racks may have smooth running-surfaces 6′ on one or both sides of the teeth, on which smooth surfaces the drum or rims thereon may roll.

14 indicates spiral grooves around the drum to receive and guide ropes wound and unwound from the drum, as hereinafter described. To avoid complication of lines, these grooves are omitted, except in the enlarged section, Fig. 3^a. It is not essential in all cases to provide these grooves. It is, however, preferable to use them.

15 is an engine or motor at the upper level, and 15′ is an engine or motor at the lower level. The particular form of these motors is not important; but they should have winding-drums 17 17′ and suitable means (indicated by handle 16) whereby the drums may be made to wind or to unwind the series of power-ropes 18 18′. Ropes 18, of which there may be any desired number, (two being

shown,) are secured to drums 17, adapted to be driven in either direction or driven and released by motor 15, wound one or more times in the same direction on said drums, thence to and around drum 10, passing over and spirally around the drum 10, the ends of the ropes being secured to the drum. Ropes 18′ from the left motor are secured to drum 10, wound thereon oppositely to ropes 18, but passing over drum 10, thence to drum or drums 17′ of motor 15′, being wound in the same direction and having their ends secured to the drum 17′. There are also two sets of ropes called the "weight-ropes." The set consisting of ropes 20 (four being shown) are connected to drum 10 at 21, pass around the drum oppositely to ropes 18, thence under pulley 22, Fig. 3, over pulley 23, and through the right underground passages to the rolling weights 8. The set of ropes 24 (four being shown) are secured to drum 10, wound therearound oppositely to ropes 20, and wound when ropes 20 are unwound, passing from the drum to and over pulleys 24′, around pulleys 25, back over pulleys 24′, and to rolling weights 8′ in the left underground passages or ways.

26 26′ are canal-boats or other boats to be transferred from one level to another and capable of passing through the openings in the ends of drum 10, 26′ being shown in Figs. 1 and 2 in its drum.

The operation of the apparatus thus far described is briefly as follows: The drum being at the lower level, as in Fig. 1, and the boat having been floated therein, motor 15′ is by handle 16 or otherwise caused to unwind or allowed to unwind ropes 18′ from drum 17′. At the same time motor 15 is started in the direction to wind up ropes 18, thus rolling drum 10 up incline 4. This movement winds ropes 18′ on drum 10. At the same time the weights 8′, which are at the top of inclined passage 7′, move down the incline, helping to raise drum 10. The parts are so proportioned that weight 8′ reaches the bottom of the steep incline as the drum 10 reaches the top thereof. (See Fig. 4.) During the upward movement of drum 10 just described the weights 8 remain at the lower parts of their passages, since drum 10 travels up the incline as rapidly as ropes 20 are wound thereon. When drum 10 passes pulleys 22, weights 8 begin to move up, owing to the direct pull on the ropes around said pulleys, and when the drum is passing across the flat portion between the inclines to the position shown in Fig. 5 weight 8 is moved over the lower little-inclined part of the passages 7, but little resistance to movement of the drum being needed, the weights at this time merely keeping the ropes straight. At the same time when but little power is needed weights 8′ roll over the lower little-inclined parts of their passages. During movement of the drum from the position of Fig. 4 to that of Fig. 5 the motor 15′ should be braking slightly, while motor 15 continues to roll the drum. While the drum is passing from the position of Fig. 5 into the water, Fig. 6, motor 15′ exerts sufficient resistance (in addition to the resistance of weights 8, now being drawn up inclines 3) to cause the drum to descend gradually into the water of the upper level, where the boat will rise in the drum, so that it can be floated out through end opening 11. It will be understood that there is always enough water held in the drum by the ends to float the boat. The weights are so arranged as to assist in raising the drum and also to resist its descent.

Referring to Figs. 8, 9, 10, and 11, an arrangement is shown in which the motor devices are located at one end only of the tracks. This is sometimes more convenient. 15″ is the motor and 16″ its controlling-lever. Rope 18″ is so connected to the drum of the motor as to be wound up when the motor is started. This unwinds the rope from drum 10, at the same time rolling the drum up the long incline. Simultaneously rope 18‴, which is wound on its drum oppositely to 18″, is unwound; but as drum 10 rolls up incline 4 said rope 18‴ is wound thereon. As the drum 10 moves up incline 4 weight 8ᵛ rolls down its passage or way, its rope being unwound from drum 10 by its rotation. The weight thus aids the motor in rolling up the drum. The weight-rope 18ᵛ is so secured to the drum that the rope and weight which assisted to raise the drum on plane 4 resists the downward movement on plane 3 and while the drum is passing across the horizontal connecting-plane. This is effected, as indicated in Fig. 10, by the point of connection of the weight-rope to drum 10 passing under the drum, whereby the weight-rope will be wound up during the descent of the drum, drawing up the weight, which thus assists the motor in holding back the drum, as shown in Figs. 10 and 11. Rope 18‴ passes from the motor along a subterranean passage, under a tension device 28 along incline 4, under pulley 29, to and under drum 10, as shown in Fig. 9. As drum 10 passes pulley 29 the rope 18‴ passes up and over the drum.

In the modification shown in Figs. 13, 14, and 15 a motor 15 is used at one side only; but one rope 35 from the motor drum or reel extends to and around drum 10, Fig. 14. Another rope 36, oppositely wound on its motor-drum, passes through a subterranean passage 37, around the pulley 38, and to drum 10, so as to be wound thereon as the drum rolls to the right. Drum 10 is rolled to the right by rope 35, but to the left by rope 36. Weights may or may not be used with this form of apparatus. A weight-rope and weight are indicated at 8ᵛ, Fig. 15, arranged as in Fig. 10. We do not limit ourselves to any particular number of weights and ropes nor to a particular number of ropes from the motor.

Instead of making drum 10 as a simple cylinder it is sometimes made as a cylinder with rings 40 around it and adapted to travel on the track, with elastic devices 42 between the

cylinder and rings to elastically support the drum 10 and its load. It is preferred to form openings in both ends of the drum; but this is not always essential.

For all the ropes 18, 18', 20, and 24 spiral grooves are preferably provided, and in order to avoid lateral displacement the ropes are put alternately in opposite directions around drum 10, their ends being attached to the drum.

We claim—

1. The combination with inclined planes, and canals on different levels between which the inclined planes extend, of a rolling water and boat holding drum, and means for rolling said drum over said inclined planes from one canal to the other.

2. The combination with an upper and a lower channel, of an inclined plane extending from the lower channel to a plane above the upper channel, a second inclined plane extending from the upper channel to about the same height as the first inclined plane, the inclined planes being connected at the top, a drum adapted to roll up and down said inclined planes, ropes wound on the drum, means for pulling such ropes to unwind the same thereby rolling the drum up one incline, and means for retarding the rolling of the drum down the second incline.

3. The combination with an upper and a lower channel, of an inclined plane extending from the lower channel to a plane above the upper channel, a second inclined plane extending from the upper channel to about the same height as the first inclined plane, the inclined planes being connected at the top by an approximately horizontal plane, a drum adapted to roll up and down said inclined planes and across said horizontal plane, ropes wound on the drum, means for pulling such ropes to unwind the same thereby rolling the drum up one incline, and means for retarding the rolling of the drum down the second incline.

4. The combination with an upper and a lower channel, of an inclined plane extending from the lower channel to a plane above the upper channel, a second inclined plane extending from the upper channel to about the same height as the first inclined plane, the inclined planes being connected at the top, a drum adapted to roll up and down said inclined planes, tracks on said planes on which the drum rolls, ropes wound on the drum, means for pulling such ropes to unwind the same thereby rolling the drum up one incline, and means for retarding the rolling of the drum down the second incline.

5. The combination with an upper and a lower channel, of an inclined plane extending from the lower channel to a plane above the upper channel, a second inclined plane extending from the upper channel to about the same height as the first inclined plane, the inclined planes being connected at the top, a drum adapted to roll up and down said inclined planes, racks lengthwise of said planes, circumferential gears on the drum to engage said racks, ropes wound on the drum, means for pulling such ropes to unwind the same thereby rolling the drum up one incline, and means for retarding the rolling of the drum down the second incline.

6. The combination with upper and lower channels, and the oppositely-inclined connected planes between the channels, and extending above the channels, of a rolling drum adapted to travel on said planes from one channel to the other and to carry a load, ropes wound on the drum, a motor or motors for operating said ropes to roll the drum up and down the inclines, other ropes on said drum, and weights connected thereto and coöperating with the motor or motors to raise and lower the drum on the inclined planes.

7. The combination with upper and lower channels, and the oppositely-inclined connected planes between the channels, and extending above the channels, of a rolling drum adapted to travel on said planes from one channel to the other and to carry a load, ropes wound on the drum, a motor or motors for operating said ropes to roll the drum up and down the inclines, a set of ropes wound on the drum, weights at the top of their course to which the last-mentioned ropes are connected, weights at the lower part of their course, a set of ropes connected with the drum but unwound connected to the last-mentioned weights, whereby the weights assist in rolling the drum up one plane and in retarding its descent down the other plane.

8. The combination with upper and lower channels, inclined tracks for a rolling drum between and extending above the channels, a rolling drum, and one or more motors therefor, of inclined passages or ways, weights in said passages, ropes connected to the drums and to said weights so that said weights cooperate with the motor or motors in raising and lowering the drum.

9. The combination with upper and lower channels, oppositely-inclined planes between and extending above said channels, said planes being adapted to support a rolling drum, of oppositely-inclined weight passages or ways.

10. The combination with upper and lower channels, oppositely-inclined planes between and extending above said channels, said planes being adapted to support a rolling drum, ropes wound on the drum, and motor devices for rolling the drum up and down said planes, of oppositely-inclined weight passages or ways, rolling weights therein, and ropes connecting the rolling weights to the drum and coöperating with the motor devices in raising and lowering the drum.

11. The combination with upper and lower water-channels 1, 2, inclined planes 3, 4, a drum having ends closed except at the cen-

ter for a space sufficient to admit a boat or other float 26′, means for rolling the drum up one incline, whereby boat 26′ sinks below the central openings 11, the boat, however, remaining afloat, and means for retarding the rolling of the drum down the opposite incline, whereby the drum moves gently into the water of the second channel, and boat 26′ floats so that it can pass out through an open end of drum 10.

12. The combination with upper and lower water-channels 1, 2, inclined planes 3, 4, guiding and supporting tracks on said inclined planes, a drum having ends closed except at the center for a space sufficient to admit a boat or other float 26′, surfaces on the drum adapted to roll on said tracks, means for rolling the drum up one incline, whereby boat 26′ sinks below the central openings 11, the boat, however, remaining afloat, and means for retarding the rolling of the drum down the opposite incline, whereby the drum moves gently into the water of the second channel, and boat 26′ floats so that it can pass out through an open end of drum 10.

13. The combination with upper and lower water-channels 1, 2, inclined planes 3, 4, guiding and supporting tracks and racks on said inclined planes, a drum having ends closed except at the center for a space sufficient to admit a boat or other float 26′, surfaces on the drum adapted to roll on said tracks, and gears on the drum engaging the racks, means for rolling the drum up one incline, whereby boat 26′ sinks below the central openings 11, the boat, however, remaining afloat, and means for retarding the rolling of the drum down the opposite incline, whereby the drum moves gently into the water of the second channel, and boat 26′ floats so that it can pass out through an open end of drum 10.

14. A drum for raising and lowering ships in combination with racks, toothed rims engaging with such racks and working ropes wound at one end around the drum and at the other on motor-drums.

15. In a device for raising and lowering ships, a ship-carrying drum, a motor-drum, a drawing or working rope, a pulley over which the rope passes, an underground passage for the rope.

16. In a device for raising and lowering ships a drum in combination with supporting-rings, and intermediate springs.

17. A drum for moving canal-boats and the like from one level to another, consisting of a cylindrical body, with partially-closed ends, the ends having central openings adapted to admit the boat to be moved.

18. A drum for moving canal-boats and the like from one level to another, consisting of a cylindrical body, with partially-closed ends, the ends having central openings adapted to admit the boat to be moved, said drum having circumferential gears.

19. A drum for moving canal-boats and the like from one level to another, consisting of a cylindrical body, with partially-closed ends, the ends having central openings adapted to admit the boat to be moved, said drum having circumferential gears and track-flanges.

20. A drum for moving canal-boats and the like from one level to another, consisting of a cylindrical body, with partially-closed ends, the ends having central openings adapted to admit the boat to be moved, said drum having spiral grooves adapted to guide ropes as they are wound thereon.

21. A drum for moving canal-boats and the like from one level to another, consisting of a cylindrical body, with partially-closed ends, the ends having central openings adapted to admit the boat to be moved, supporting-rings around the cylinder, and intermediate springs.

22. The combination with inclined planes, and a rolling boat-moving body, of motor devices and coöperating weights for raising the drum on one plane and for retarding its descent on the other plane.

In witness whereof we have hereunto signed our names, this 3d day of March, 1899, in the presence of two subscribing witnesses.

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