

Oct. 7, 1930.

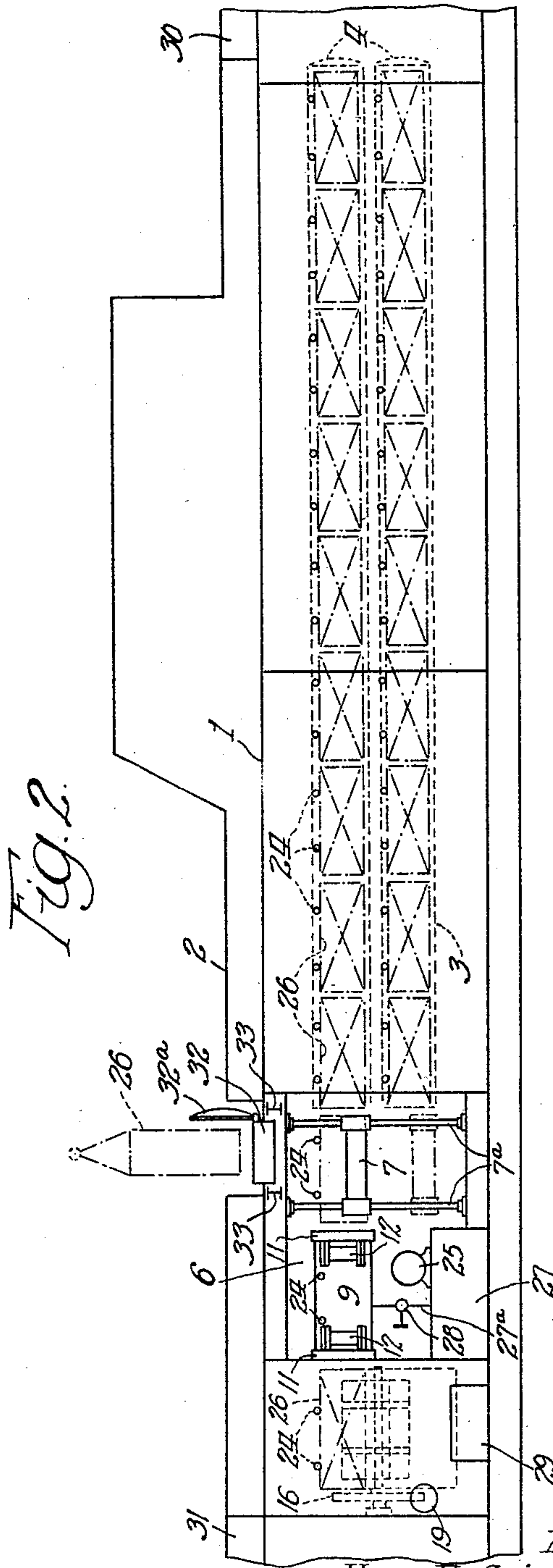
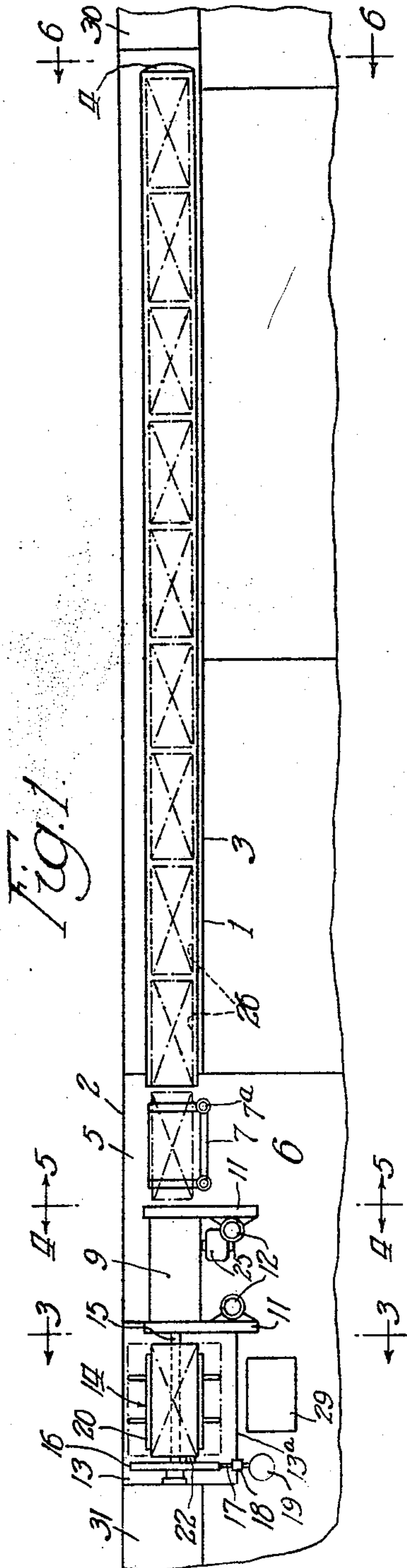
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1,777,304

DRY MINE LAYING SUBMARINE

Filed July 1, 1929

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

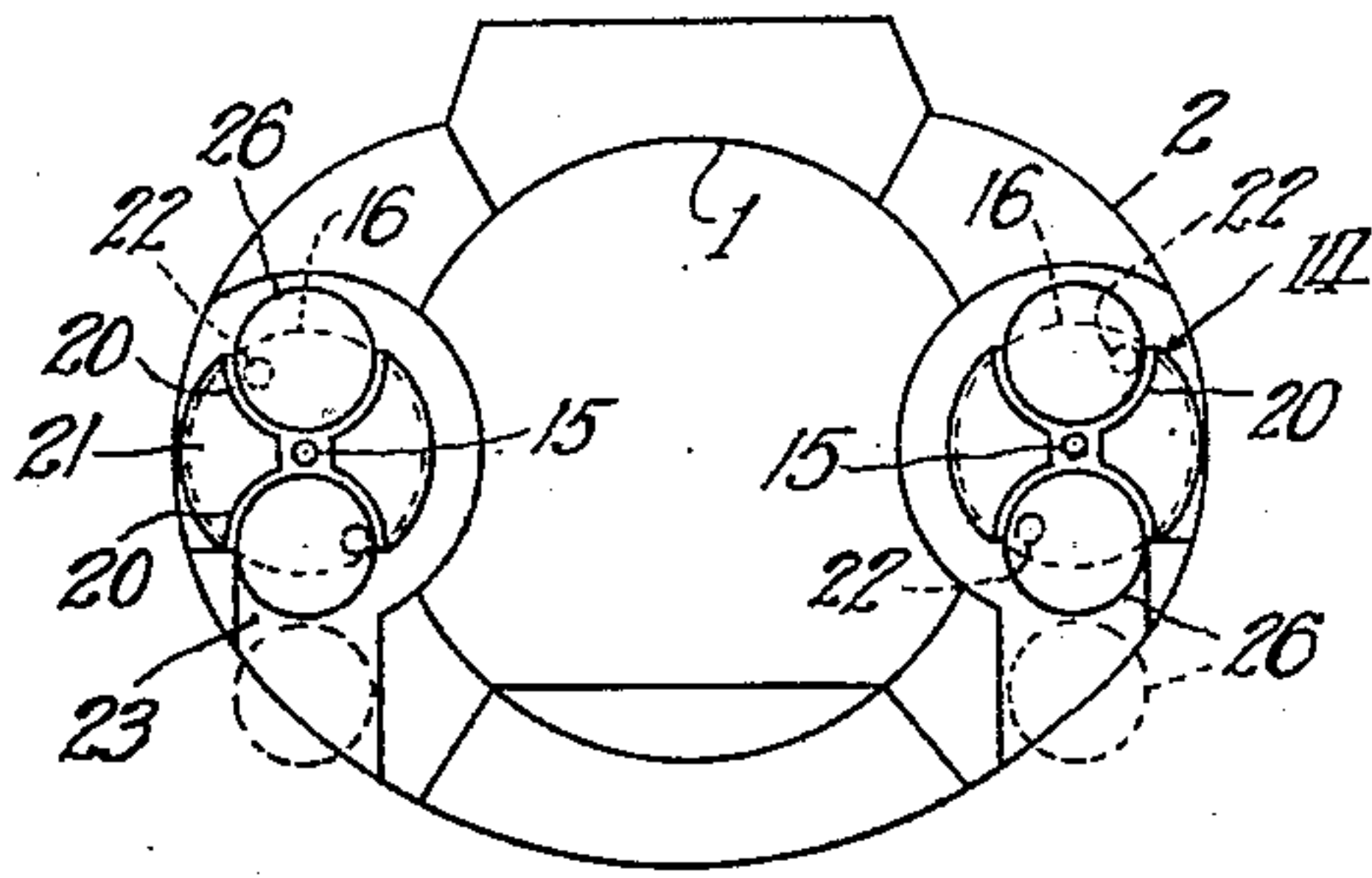


Fig. 4.

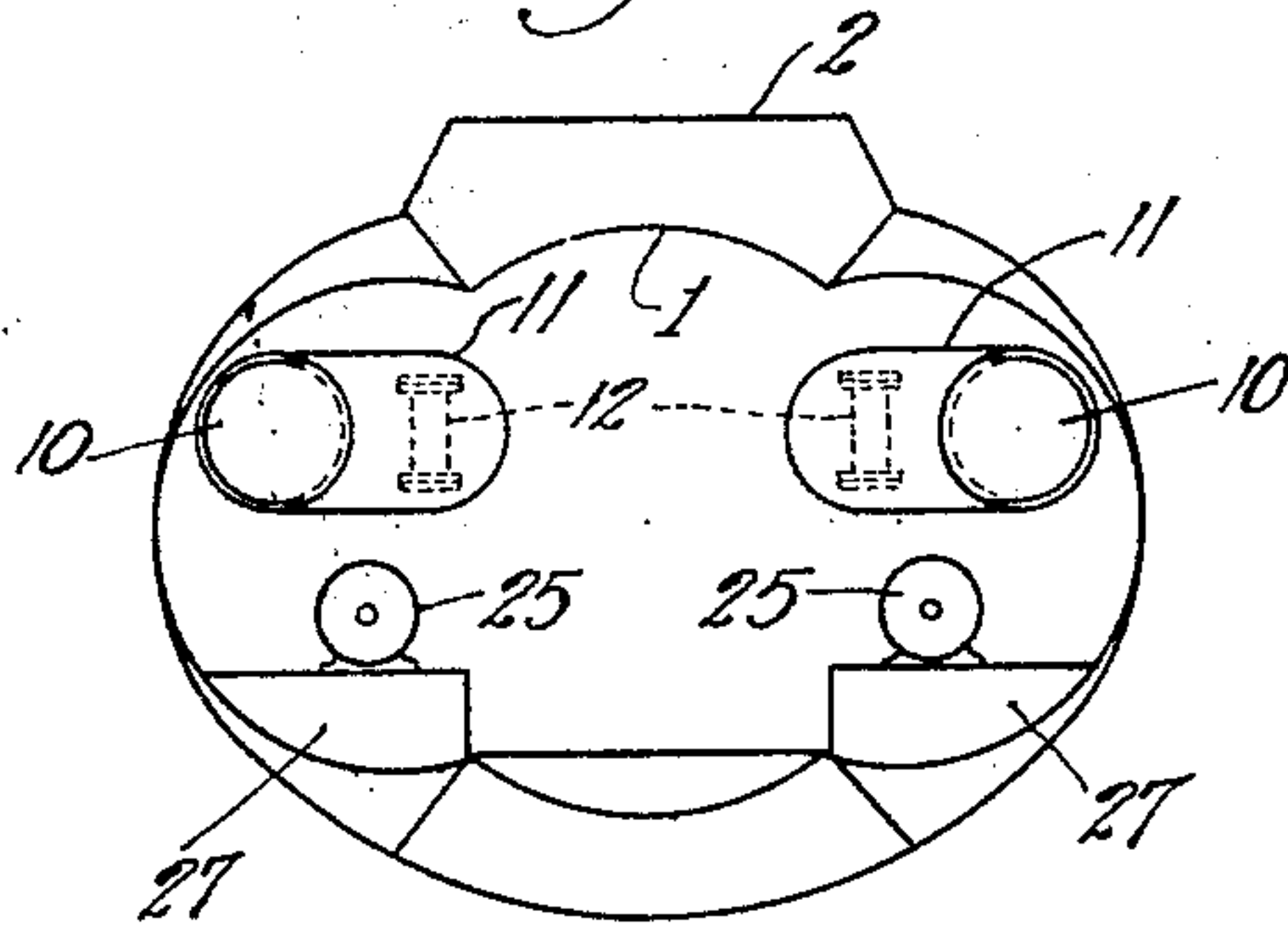


Fig. 5.

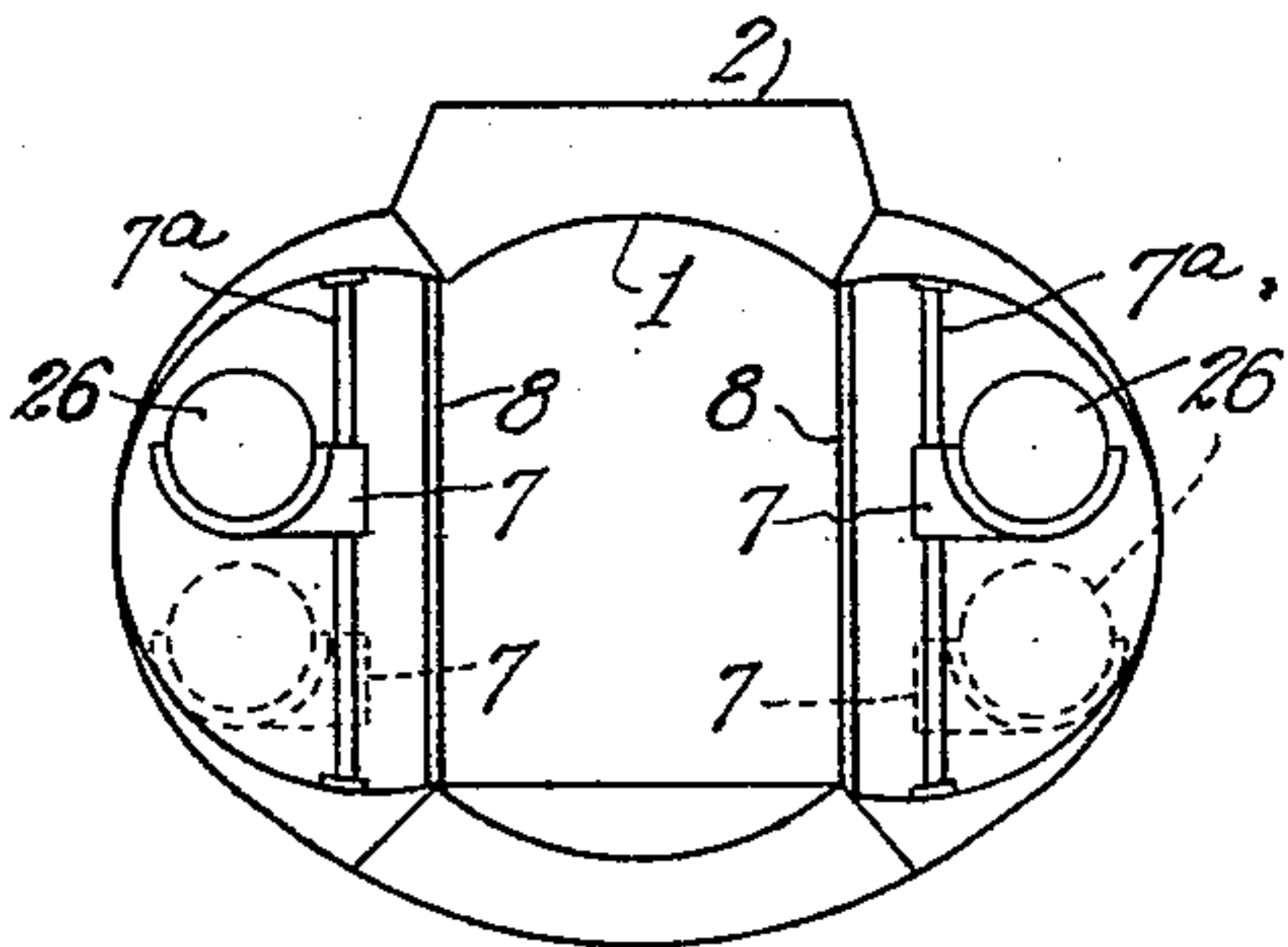
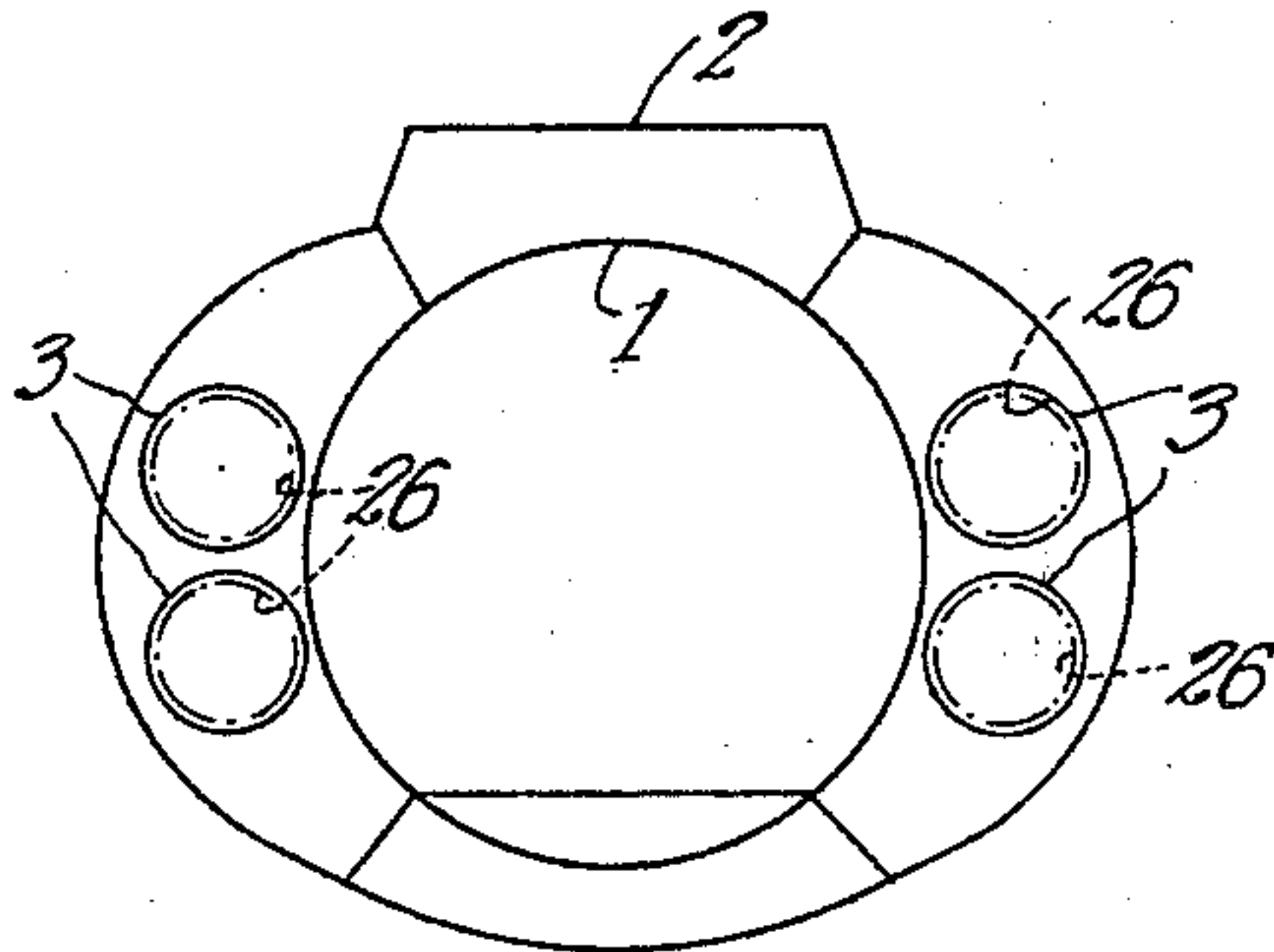


Fig. 6.



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UNITED STATES PATENT OFFICE

HUGO E. GRIESHABER AND ELMER R. DUNCKLEE, OF NEW LONDON, CONNECTICUT, AND
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DRY-MINE-LAYING SUBMARINE

Application filed July 1, 1929. Serial No. 375,103.

This invention relates to mine laying submarine boats, and more particularly to a submarine boat for laying mines by what is known as the dry system.

One of the main objects of our invention is to provide a submarine boat having mine stowage tubes so disposed as not to occupy valuable space in the hull, these tubes having associated therewith means for transferring the mines from the tubes and for discharging them exteriorly of the hull. Another object is so to dispose the mine stowage tubes in relation to the hull structure as to obviate any increase in the dimensions thereof, thus preventing interference with the speed or radius of action of the boat. A further object is to provide a boat in which the stowage tubes and associated parts are so disposed as to provide an extremely simple compensating system while also preventing any material change in trim of the boat during discharge of the mines.

It is also an object of our invention to provide simple and highly efficient means for laying or discharging the mines while permitting the same to be examined immediately before discharge to determine the condition of the gear thereof. Further objects and advantages of our invention will appear from the detailed description.

In the drawings:

Figure 1 is a fragmentary horizontal sectional view taken through the mid-ship portion of a submarine boat constructed in accordance with our invention;

Figure 2 is a fragmentary vertical sectional view through the mid-ship portion of the boat;

Figure 3 is a section taken substantially on line 3—3 of Figure 1;

Figure 4 is a section taken substantially on line 4—4 of Figure 1;

Figure 5 is a section taken substantially on line 5—5 of Figure 1;

Figure 6 is a section taken substantially on line 6—6 of Figure 1.

The boat is, in general, of known construction and comprises an inner pressure hull 1 and an outer hull 2, the space between these two hulls constituting ballast, compensating

and fuel tanks, in a known manner. At each side of the pressure hull 1, and in the space between the two hulls, we provide two tubes 3 which are disposed in superposed relation. These tubes extend fore and aft of the hull and are preferably, though not necessarily, disposed horizontally.

The tubes 3 are water-tight and are adapted to withstand full submergence pressure. The forward ends of the tubes are closed at 4. At their rearward ends the tubes open into spaces 5 which constitute extensions of a mine room 6 within hull 1 at the mid-ship portion thereof. Mine racks 7 are mounted in spaces 5 for vertical adjustment upon supporting pillars 7^a, and, when the mines have been loaded into the tubes and upon these racks, removable stanchions 8 are secured at the inner sides of the spaces 5, as in Figure 5.

The stowage tubes 3 open aft, that is, toward the stern of the boat. A mine discharge tube 9 is provided in alignment with each of the upper tubes 3 and closely adjacent rack 7. This discharge tube is provided, at each end, with a gate valve 10. These valves operate in casings 11 which extend through the pressure hull 1 and into the mine room 6. The valve 10 may be operated manually from within the mine room 6, though we prefer to provide a suitable mechanism for assuring quick operation of the valves, this mechanism comprising cylinders 12 to which compressed air may be supplied in a known manner, and suitable mechanism operating in the cylinders and having operating connection with the valves. Any other suitable or preferred means may be employed for operating the gate valve. The tube 9 and the associated valves constitute a lock for transferring a mine from the rack to the exterior of the hull 1.

The aft end of this tube 9 opens into a space 13 in which is mounted an ejector 14.

The ejector 14 is of cylindrical shape and is secured upon a shaft 15 rotatably mounted in space 13, the axis of this shaft being parallel to the lock tube 9. A gear 16 is secured on the aft end of shaft 15 and has driving connection, in a suitable manner, with a shaft

17 which extends through a stuffing box 18 through the inner wall 13^a of space or compartment 13. This shaft is driven by an electric motor 19 disposed within the mine room. The ejector 14 comprises two semi-cylindrical mine receiving members 20 which are disposed at diametrically opposite sides of the ejector, these members being connected by spaced brace elements or webs 21. The upper one of the members 20 is disposed in alignment with and adjacent the aft end of lock tube 9 to receive a mine moved aft therefrom into the ejector. Preferably, though not necessarily, we provide the gear 16 with two contact members 22 disposed in alignment with the mine receiving recesses of the members 20 for engagement by the end of a mine which has been moved into full position in such member. The contact members 22 are interposed in the circuit of motor 19 and serve to close the motor circuit when the mine has been moved into full position into member 20 of the ejector. The motor then turns the ejector inboard through an arc of 180 degrees, thus discharging the mine into a vertical discharge well 23 extending from compartment 13 to the bottom of the outer hull 2 at the side thereof, the mine being discharged through this well by gravity. The other member 20 of the ejector is then in the upper position and is disposed to receive a second mine from the lock tube 9.

Each of the tubes 3 and 9 is provided with suitable conveying mechanism for moving the mine through the tubes in either direction and for transferring the mine from the rack to the tube 9 of the lock. Similar conveying mechanism is also associated with the rack 7 and the ejector 14 for moving the mine onto and off of the rack and transferring them from tube 9 into member 20 of the ejector. Conveying mechanism of this character is known in the art and need not be illustrated nor described in detail. We have indicated such mechanism diagrammatically by pinions 24, in Figure 2, disposed above tube 3, rack 7, and ejector 14, and in the upper portion of the lock tube 9. These various sets of pinions may be driven, in a known manner, by an electric motor 25 disposed in the mine room, and are disposed to mesh with racks on the mines 26 for moving them in desired direction in accordance with the direction of drive of the pinions. This conveyor mechanism provides means whereby the mines can be loaded into the stowage tubes and can be transferred therefrom to the ejector 14 with facility.

When it is desired to lay or discharge the mines, the valve at the forward end of the tube or lock 9 is opened, the other valve remaining closed. A mine is then moved from the rack 7 into tube or lock 9, and the valve at the forward end of this lock is then closed. Sea water is then admitted to lock 9 from a

compensating tank 27 located in alignment with and below lock 9 and communicating therewith by a pipe 27^a provided with a valve 28 for controlling communication between the compensating tank and the lock.

The valve at the aft end of lock 9 is then opened and the mine is moved aft into the upper member 20 of ejector 14. When the mine is in full position in the ejector, it actuates contact member 22 thus closing the circuit of motor 19, which results in the ejector being turned inboard through an arc of 180 degrees thus causing the mine to be discharged through well 23 in the manner previously described. As soon as a mine has been moved out of lock 9 into the ejector, the valve at the aft end of the lock is closed and the water in the lock is blown into the compensating tank 26. We also provide a small quick flooding compensating tank 29 located inside the mine room and approximately in line with the ejector, with a sea water capacity equivalent to the negative buoyancy of one mine. This tank is flooded full from the sea while a mine is being discharged, so that the weight of water taken in offsets the net weight in sea water of the mine which is discharged, thus maintaining the original balance of weight and buoyancy of the vessel. As soon as this compensating tank 29 is full, the sea valve is closed and the water which has been admitted thereto is transferred to main compensating tanks 30 and 31 disposed forward of tube 3 and aft of compartment 13, respectively. This leaves the small compensating tank 29 empty and in condition for reception of a second compensating quantity of sea water when the succeeding mine is discharged from the ejector 14.

Instead of having but one small compensating tank 29, two or more of such tanks may be provided when it is desired to discharge the mines rapidly and the time element becomes of more than usual importance.

Suitable means is provided whereby water from the compensating tank 27 may be transferred to compensating tank 31. During the movement of the mine from lock 9 into the ejector 14, water is caused to flow from the main compensating tank 31 forwardly to main compensating tank 30, this forward movement of the water offsetting the moment due to the rearward or sternward movement of the mine. In practice, the first mine is discharged from rack 7 at one side of the hull, the second mine being discharged from rack 7 at the other side of the hull, the rack at the first side of the hull is then lowered to receive a mine from the lower tube 3 and is then raised into the position illustrated in Figure 2 and this mine is then discharged, after which the rack at the other side of the hull is lowered to receive a mine from the lower tube and this rack is then raised and such mine discharged. A mine from the upper tube at the

side of the hull from which the first mine was discharged is then transferred to the rack and discharged, after which the rack at the other side of the hull receives a mine from the upper tube which mine is then discharged, the racks being then lowered to receive mines from the lower tubes, which mines are then raised with the racks and discharged, the discharge of the mines from the tubes continuing in this order until all or as many of the mines as desired have been discharged.

It is not essential, however, that the mines be discharged in the order stated, and the order of discharging the mines may be varied as conditions may require, though, where conditions will permit, we prefer to discharge the mines in the order stated as this prevents disturbing the trim of the boat. After all of the mines have been discharged, the compensating tanks 30 and 31 are full of water, these tanks being of proper capacity to compensate for the mines. It is to be particularly noted that the stowage tubes, as well as the main and supplemental compensating tanks, and the locks and ejectors, are disposed at the mid-ship portion of the boat. This provides a simple arrangement which facilitates compensation and enhances trim and stability of the boat.

In order to facilitate shipping of the mines, we provide a hatch 32 which opens into the mine room 6. This hatch has a suitable door 32^a, and by raising this door the mines may readily be lowered into the mine room, through hatch 32, as indicated in Figure 2. After the mines have been lowered into the mine room, the stanchions 8 having been removed, they are transported by a suitable trolley, which travels upon rails 33 extending transversely of the mine room and at opposite sides of hatch 32, to the racks 7 which have been moved into their lower position indicated by the dotted lines in Figure 2, so as to be aligned with the lower stowage tubes 3.

The mines are then successively loaded onto the racks and, by proper operation of the conveying mechanism, are moved rearwardly into the lower tubes. After the lower tubes have been completely loaded, the racks are raised into their upper position and the upper tubes are loaded in like manner, after which one mine is placed upon each of the racks. In this manner the tubes and the racks can be loaded with facility.

Each of the tubes 3 is capable of containing nine mines which, with the two mines supported upon the racks in alignment with the upper tubes, makes a total of 38 mines which can be carried by the boat without taking up valuable space within the pressure hull. The length of the stowage tubes can be varied within limits and we do not, therefore, limit ourselves to the particular number of mines which these tubes carry.

By disposing the tubes between the hulls, valuable space in the pressure hull is not taken up and the necessity of increasing the dimensions of the board to accommodate the mine stowage tubes is eliminated. It is also to be noted that, by employing a small number of mine stowage tubes, the mines can be readily laid or discharged therefrom by comparatively simple mechanism and all necessity of employing a large number of discharging mechanisms for this purpose is avoided. A further advantage is that all of the mechanisms for transferring the mines from the tubes and for discharging them, are controlled from the mine room 6. The advantage of having the tubes 3 open into the spaces or extensions 5 of the mine room is that the mines can be inspected immediately before discharge thereof to determine the condition of the mine gear and, if necessary, proper alterations or repairs therein can be made.

What we claim is:

1. In a mine laying submarine boat, a mine stowage tube, a rotatably mounted mine ejector comprising a plurality of mine receiving and discharge members, means for transferring mines from the tube to said members, and means controlled by positioning of the mines in said members for intermittently rotating the ejector a distance equal to the distance between two succeeding receiving and discharge members, the continued rotation of the ejector successively disposing said members to discharge the mines therefrom.

2. In a mine laying submarine boat, a mine stowage tube, a mine ejector rotatably mounted on an axis parallel to the tube and having a mine receiving and discharge member disposed in endwise alignment with the tube, means for transferring mines endwise from the tube to said member, and means for intermittently rotating the ejector, the means for rotating the ejector being controlled by positioning of a mine in the mine receiving and discharge member.

3. In a mine laying submarine boat, a mine stowage tube mine ejector mounted for rotation in one direction and on an axis parallel to the tube and having a plurality of axially arranged mine receiving and discharge members spaced about the same, one of said members being disposed in endwise alignment with the tube when the ejector is in normal position, means for transferring mines endwise from the tube to said members, and means controlled by mines position in the receiving and discharge members for intermittently rotating the ejector a distance equal to the distance between two successive members.

4. In a mine laying submarine boat, a mine stowage tube, a mine ejector rotatably mounted on an axis parallel to the tube and

having two diametrically opposite and axially arranged mine receiving and discharge members, said members opening radially outward for discharge of a mine therefrom when in inverted position, the upper one of the members being at the top of the ejector in alignment with the tube and there being an unobstructed mine discharge opening beneath the lower member when the ejector is in normal position, means for transferring mines endwise from the tube to said receiving and discharge members, a confining member extending about the ejector from the upper position thereof to said opening, said confining member being concentric with the ejector and disposed to hold a mine in the upper receiving and discharge member during travel thereof from its upper position, to its lower position, and means for intermittently rotating the ejector through an arc of 180 degrees.

5. In a mine laying submarine boat, a mine stowage tube, a mine ejector rotatably mounted on an axis parallel to the tube and having two diametrically opposite and axially arranged mine receiving and discharge members, said members opening radially outward for discharge of a mine therefrom when in inverted position, the upper one of the members being at the top of the ejector in alignment with the tube and there being an unobstructed mine discharge opening beneath the lower member when the ejector is in normal position, means for transferring mines endwise from the tube to said receiving and discharge members, a confining member extending about the ejector from the upper position thereof to said opening, said confining member being concentric with the ejector and disposed to hold a mine in the upper receiving and discharge member during travel thereof from its upper position to its lower position, and means for intermittently rotating the ejector through an arc of 180 degrees, said means being controlled by the positioning of mines in the mine receiving and discharge members.

6. In a mine laying submarine boat comprising an inner hull and an outer hull, a mine stowage tube between the hulls and disposed fore and aft thereof, an ejector compartment between the hulls aft of the tube, an ejector in the compartment, said ejector being rotatable on an axis parallel to the tube and having two axially arranged and diametrically opposite mine receiving and discharge members opening outward radially of the ejector, said compartment having a bottom mine discharge opening and a wall concentric with the ejector and extending about the same from the upper portion thereof to the opening, said wall being disposed to confine a mine in the upper receiving and discharge member during travel thereof from its upper receiving position to its lower dis-

charging position, the upper member being in alignment with the tube and the lower member being vertically aligned with said opening when the ejector is in normal position, means for transferring mines from the tube to the receiving and discharge members, and operating means for intermittently turning the ejector through a half rotation.

7. In a mine laying submarine boat comprising an inner hull and an outer hull, a mine stowage tube between the hulls and disposed fore and aft thereof, an ejector compartment between the hulls aft of the tube, an ejector in the compartment, said ejector being rotatable on an axis parallel to the tube and having two axially arranged and diametrically opposite mine receiving and discharge members opening outward radially of the ejector, said compartment having a bottom mine discharge opening and a wall concentric with the ejector and extending about the same from the upper portion thereof to the opening, said wall being disposed to confine a mine in the upper receiving and discharge member during travel thereof from its upper receiving position to its lower discharging position, the upper member being in alignment with the tube and the lower member being vertically aligned with said opening when the ejector is in normal position, means for transferring mines from the tube to the receiving and discharge members, and operating means for intermittently turning the ejector through a half rotation, said operating means being controlled by positioning of mines in the mine receiving and discharge members.

8. In a mine laying submarine boat, mine discharging means comprising, a rotatably mounted ejector having a mine receiving and discharge member mounted thereon and opening outward radially thereof, and operating means for intermittently rotating said ejector, said operating means being controlled by positioning of a mine in said member.

9. In a mine laying submarine boat, mine discharging means comprising, a rotatably mounted ejector having a plurality of mine receiving and discharge members mounted thereon and opening outward radially thereof, and operating means for intermittently rotating said ejector through a distance equal to the distance between successive receiving and discharge members, said operating means being controlled by positioning of mines in said members.

10. In a mine laying submarine boat comprising an inner hull and an outer hull, a mine stowage tube between the hulls and disposed fore and aft thereof, an ejector rotatably mounted on an axis parallel to the tube and having axially arranged mine receiving and discharging members opening outward radially of the ejector, said mem-

bers being successively brought into alignment with the tube by rotation of the ejector, means for transferring mines endwise from the tube to the receiving and discharge members, and means for intermittently rotating the ejector.

11. In a mine laying submarine boat, a mine storage tube disposed fore and aft of the hull, an ejector rotatably mounted at the side of the hull for rotation on an axis parallel to the tube, said ejector having axially arranged mine receiving and discharging members opening outward radially of the ejector for discharging the mines at the side of the hull, said members being successively brought into alignment with the tube by rotation of the ejector, means for transferring mines endwise from the tube to the receiving and discharge members, and means for intermittently rotating the ejector.

In witness whereof we, the said HUGO E. GRIESHABER and ELMER R. DUNCKLEE, hereunto subscribe our names at Groton, Connecticut, this 21 day of June, 1929.

HUGO E. GRIESHABER.
ELMER R. DUNCKLEE.

In witness whereof I, the said JOHN F. TRUDEAU, hereunto subscribe my name at Bayonne, New Jersey, this 24th day of June 1929.

JOHN F. TRUDEAU.