

Oct. 7, 1930.

R. C. SIMPSON

1,777,332

MINE LAYING SUBMARINE

Filed July 1, 1929

3 Sheets-Sheet 1

Fig. 1.

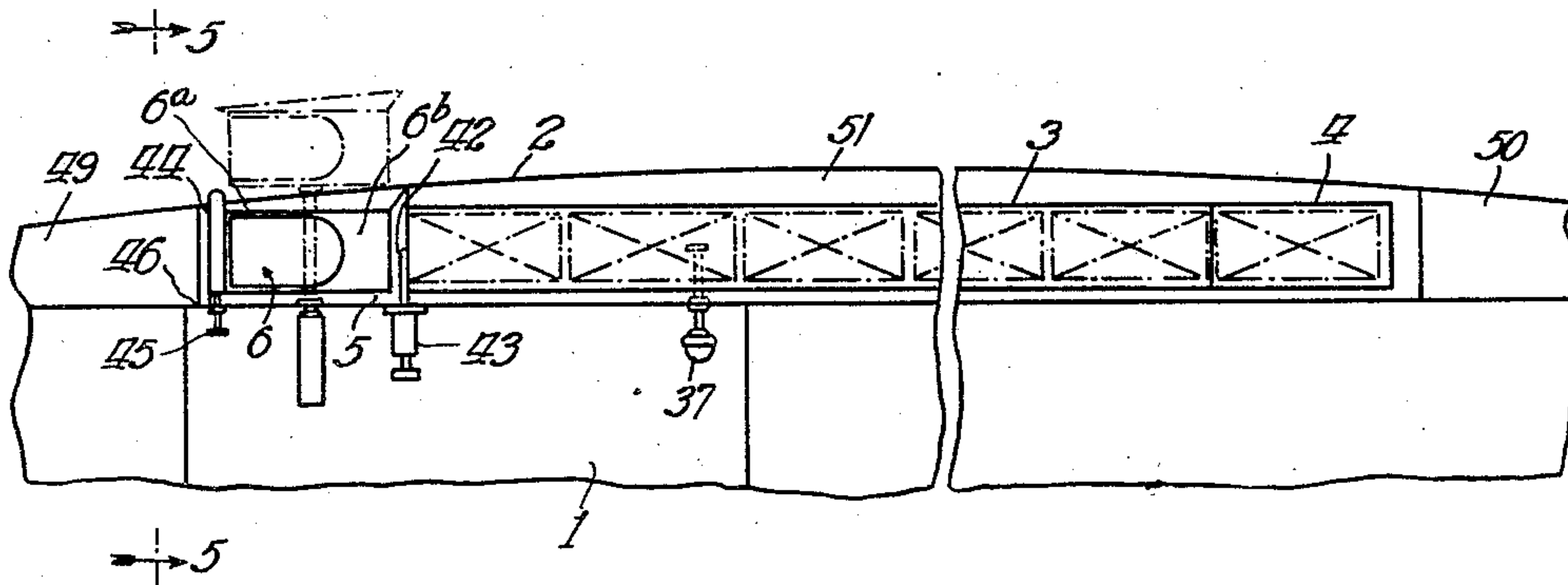
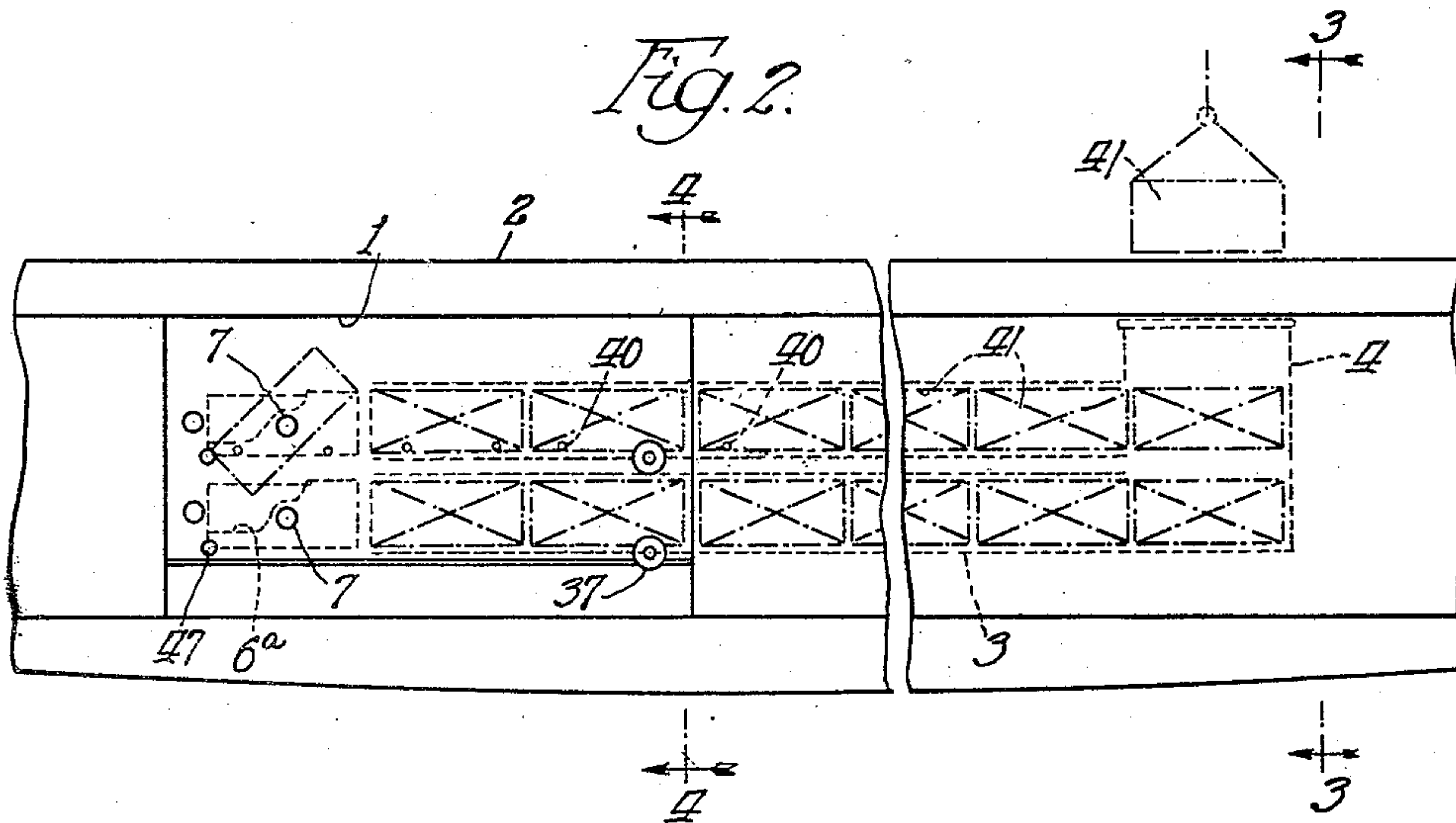


Fig. 2.



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Fig. 3.

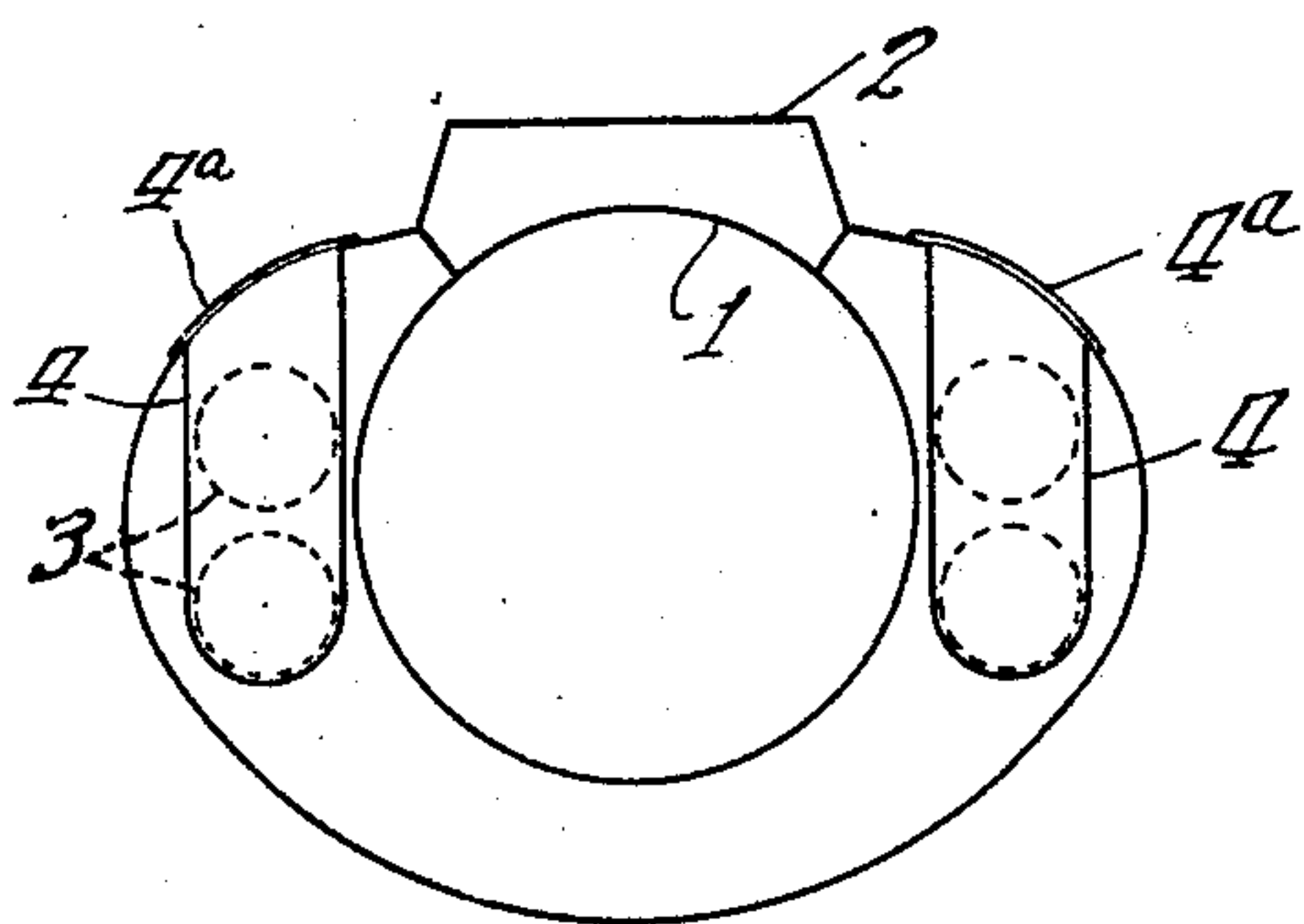


Fig. 4.

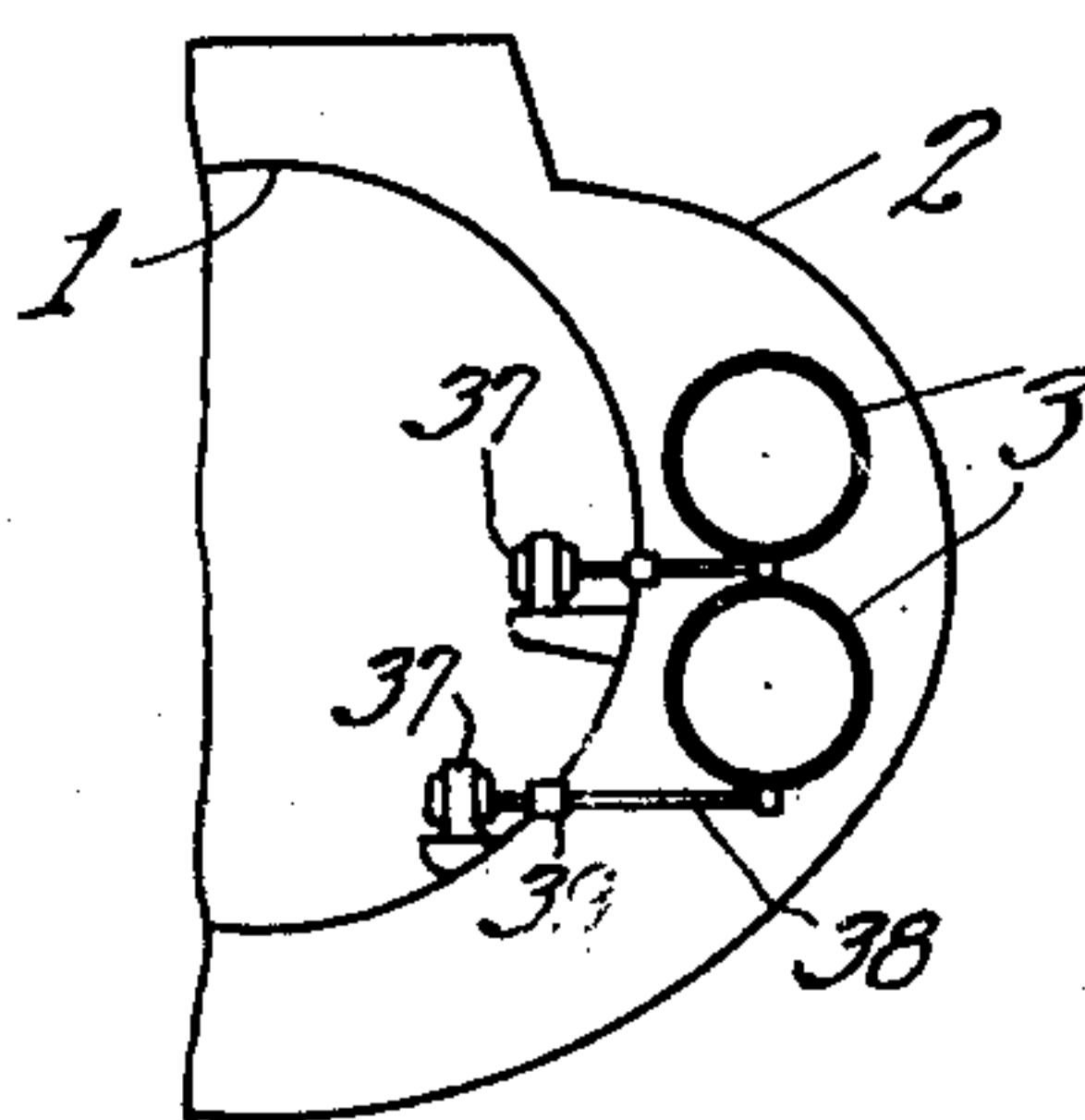


Fig. 7.

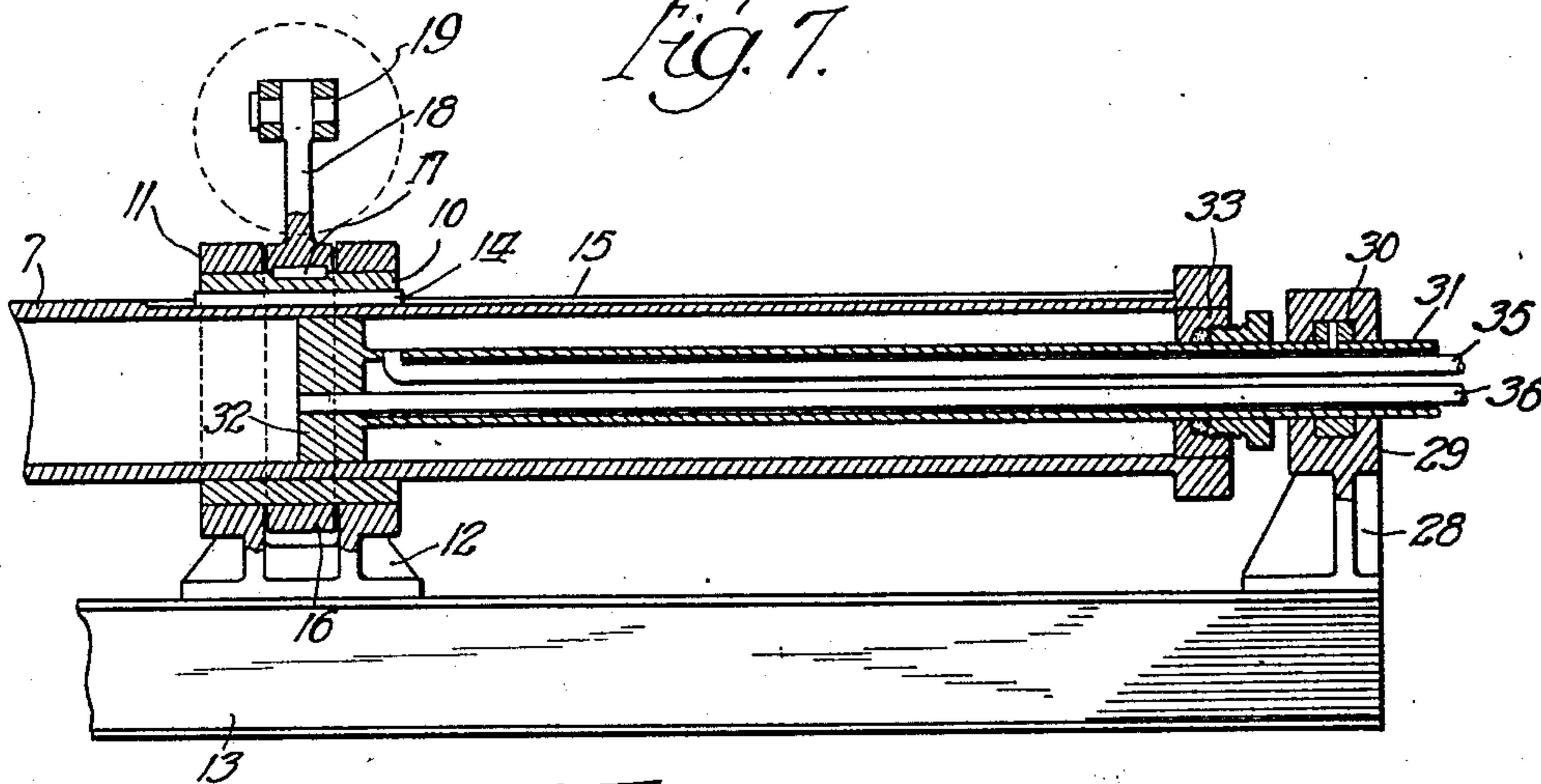
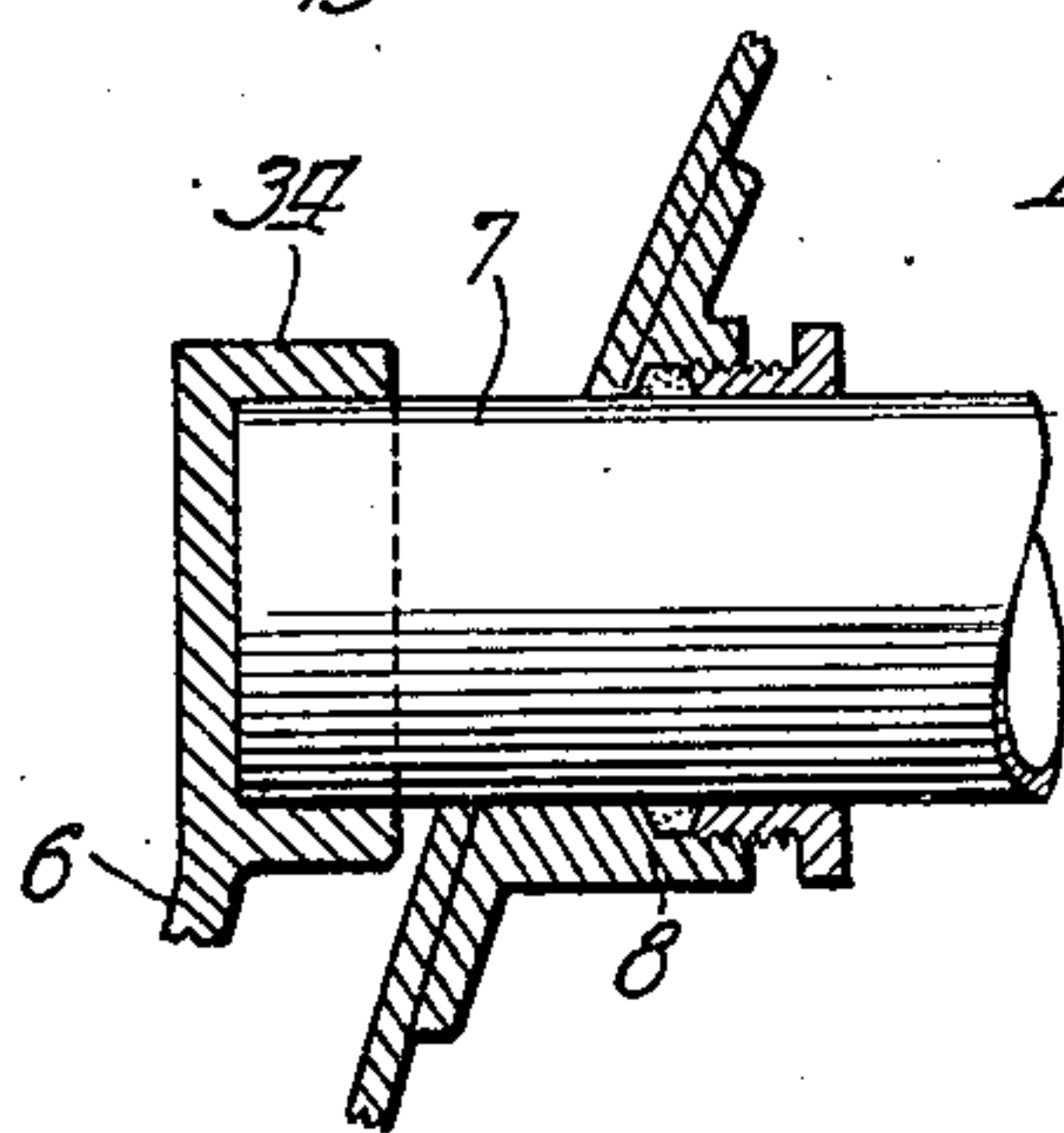


Fig. 8.



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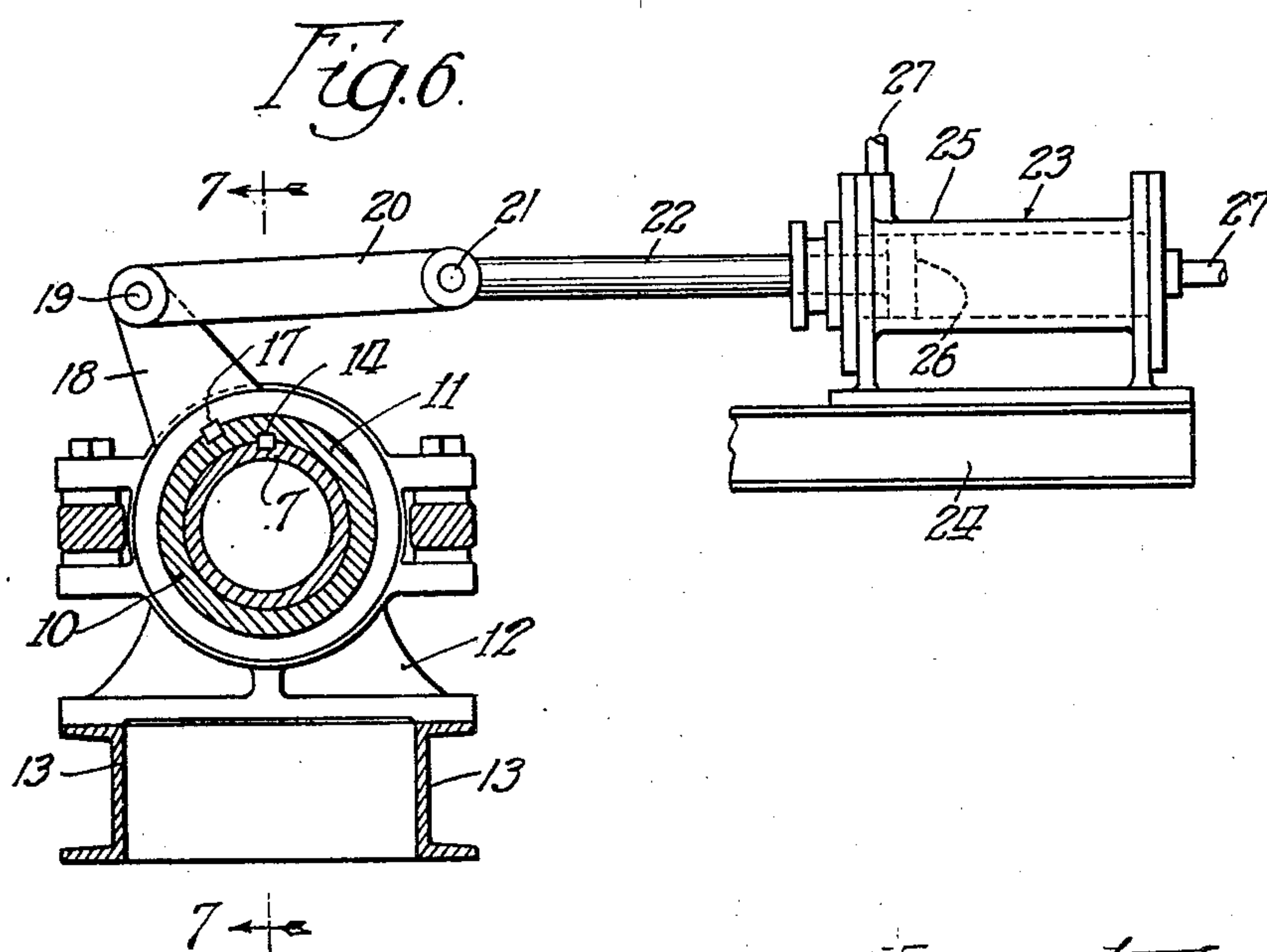
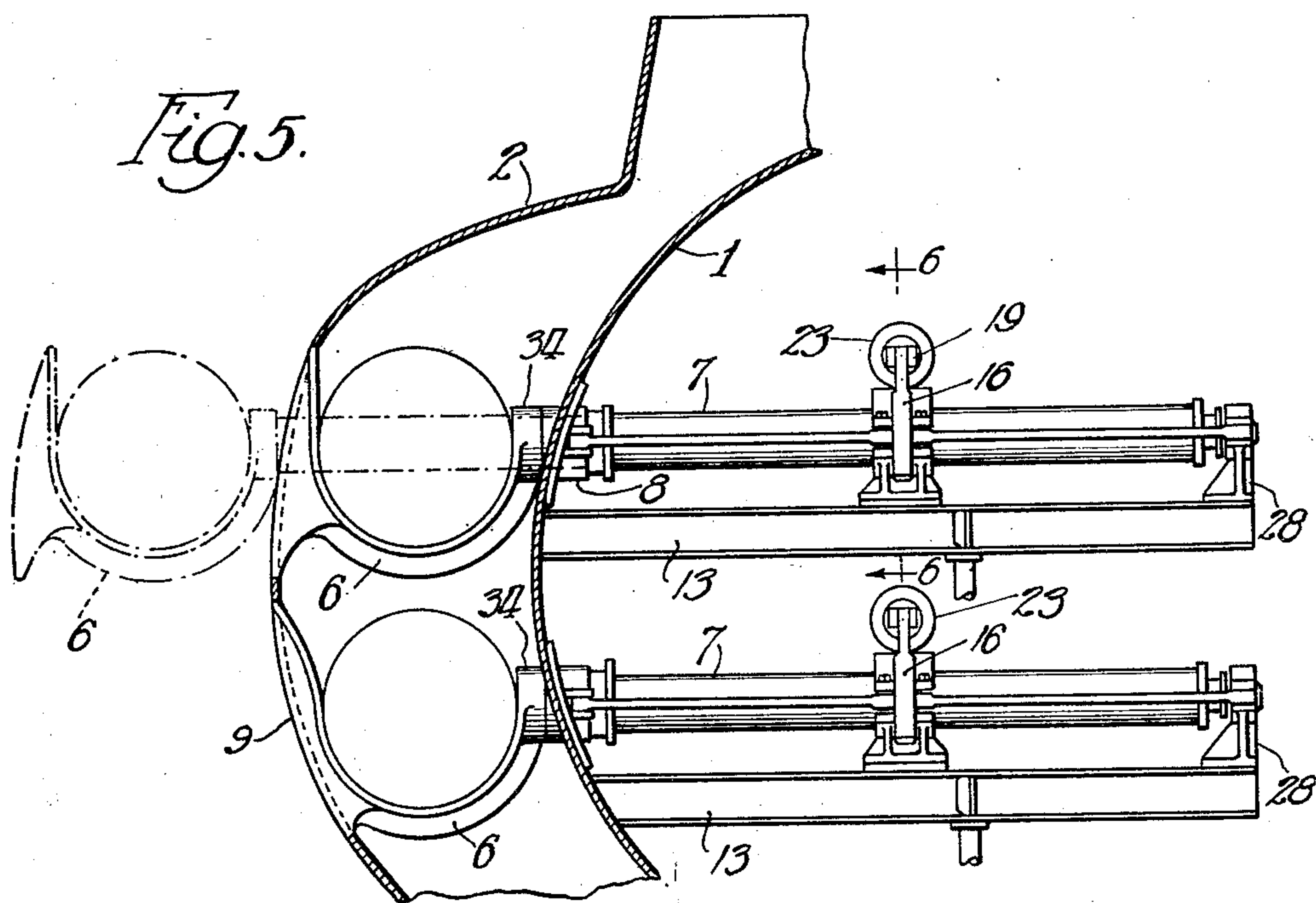
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MINE LAYING SUBMARINE

Filed July 1, 1929

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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MINE-LAYING SUBMARINE

Application filed July 1, 1929. Serial No. 375,220.

This invention relates to submarine boats for laying mines.

One of the main objects of my invention is to provide a submarine boat in which the mine stowage and discharge means are so constructed and arranged as to conserve the valuable space in the pressure hull while not necessitating any increase in the dimensions of the boat. Another object is to provide means whereby a multiplicity of closures and complicated mechanism for discharging the mine is avoided.

A further object is to provide means whereby the mines are discharged laterally of the hull so as to be clear thereof and of the propeller. A still further object is to provide means for discharging the mines, so constructed and arranged that eddies such as would have detrimental effect on the speed and radius of action of the boat are avoided. It is also an object of my invention to provide mine stowage and discharge means so related to the hull as to assure proper trim of the boat at all times and facilitate compensation for the mines discharged.

Further objects and advantages of my invention will appear from the detail description.

In the drawings:

Fig. 1 is a fragmentary horizontal sectional view through the midship portion of a mine laying submarine boat embodying my invention, the parts being shown semi-diagrammatically;

Fig. 2 is a longitudinal vertical sectional view through the midship portion of the boat, parts being shown semi-diagrammatically;

Fig. 3 is a section taken substantially on line 3—3 of Fig 2;

Fig. 4 is a section taken substantially on line 4—4 of Fig. 2;

Fig. 5 is a section, on an enlarged scale, taken substantially on line 5—5 of Figure 1;

Fig. 6 is a section taken substantially on line 6—6 of Fig. 5;

Fig. 7 is a section taken substantially on line 7—7 of Fig. 6;

Fig. 8 is a detail sectional view through the

packing or stuffing box for the spoon operating shaft.

My invention relates particularly to the means for discharging the mines from the stowage tubes, and the drawings are, in the main, diagrammatic and all parts which are not necessary to the illustration of my invention and the relation thereof to the mine stowage tube, have been omitted for clearness of illustration.

The boat comprises an inner pressure resisting hull 1 and an outer hull 2, the space between these two hulls constituting ballast and compensating tanks in a known manner. Between the hulls 1 and 2, and at each side thereof, I provide two mine stowage tubes 3, these tubes extending fore and aft of the hull at the midship portion thereof. At their forward ends the tubes open into a vertical stack 4 which opens through the outer hull 2 at the upper portion thereof. The upper end of this stack is normally closed by a hatch cover or door 4^a. The aft end of each of the tubes is open and is in direct communication with a space 5 in which is disposed a spoon 6 suitably secured on the outer end of a tubular shaft 7 which operates through a stuffing box 8 carried by inner hull 1. This spoon is provided, at the outer side thereof, with an element 9, such as a segment of plate. Element 9 is of proper size and shape to close the opening through the outer hull 2 through which the spoon operates, when the spoon is in its retracted position, element 9 being faired to the hull so as to provide a neat and smooth closure of the spoon opening. This is advantageous as avoiding objectionable eddies such as would be apt to interfere with the speed or radius of action of the boat. The tubes 3 are open to the sea through the spaces 5 at their after ends, but these tubes are water-tight and are out of communication with the ballast tank in which the tubes are located.

The spoons are operated by the tubular shafts 7 which extend through stuffing boxes 8 in the inner hull 1. Referring more particularly to Figure 7, shaft 7 is slidably mounted through a sleeve 10 the end portions of which are mounted for turning movement

in a pair of collars 11 carried by a bracket 12 suitably secured to a supporting structure or foundation such as an I-beam 13. The shaft 7 is secured to collar 10 by a key 14 secured in the sleeve and operating in a keyway or slot 15 of the shaft. A ring 16 extends about sleeve 10 and is secured thereto in a suitable manner, as by means of a key 17, this ring being disposed between the collars 11. The ring serves to hold sleeve 10 against endwise movement through collars 11 while also providing means for turning the sleeve. Shaft 7 is thus mounted for endwise movement for projecting and retracting the spoon and also has turning movement about its axis for tilting the spoon to discharge the mine therefrom.

Ring 16 is provided with a radially projecting arm 18 rigidly secured thereto, as by being formed integrally with the ring.

Arm 18 is pivotally secured at its outer end, as at 19, to one end of a link 20, the other end of which is pivotally secured at 21 to piston rod 22 of an engine 23 for turning ring 16 in desired direction. This engine is suitably supported by a structure 24 which may be secured in any suitable or known manner to the I-beam structure 13. The engine 23 comprises a cylinder 25 in which operates a piston 26 which is secured to piston rod 22, suitable pipes 27 communicating with the cylinder at the ends thereof for admitting thereto and exhausting therefrom a suitable operating fluid under pressure, the engine being either pneumatic or hydraulic in its operation. By admitting fluid under pressure between piston 26 and the right hand head of cylinder 25, as considered in Figure 6, the piston rod 22 is projected so as to turn shaft 7 in a counter-clockwise direction as considered in this figure. When operating fluid is admitted under pressure between the piston 26 and the left hand end of the cylinder, the previously admitted fluid is expelled from the cylinder and the piston rod 22 is retracted so as to return shaft 7 to its initial position relative to rotation of this shaft on its axis.

A bracket 28 is secured to the supporting structure or foundation 13 adjacent the inner ends thereof and comprises a split bearing 29 having an inner annular channel which receives a collar 30 pinned or otherwise suitably secured upon a tubular piston rod 31 extending through the bearing. This piston rod projects into shaft 7 and is provided with a piston 32 which fits the interior of the shaft sufficiently snugly to form a substantially fluid tight closure therewith. Shaft 7 is provided, at its inner end, with a stuffing box 33 which forms a fluid tight closure about rod 31, and the outer end of shaft 7 is closed in a suitable manner, as by means of a socket element 34 of spoon 6, which is secured tightly about the end of the shaft. Pipes 35 and

36 extend through piston rod 31, these pipes being connected to a suitable source of operating fluid under pressure, such fluid being either gaseous or liquid as desired. Pipe 35 opens through rod 31 into the interior of shaft 7 at the right hand side of piston 32, as considered in Figure 7, and pipe 36 extends through the piston 32 and opens into shaft 7 at the left hand side of the piston. With the shaft 7 in its retracted position of Figure 7, when operating fluid is admitted under pressure through pipe 36, such fluid is confined between the outer end of shaft 7 and piston 32. Since the rod 31 is held against endwise movement by bearing 29 and collar 30, the pressure exerted by the operating fluid on the outer end of shaft 7 serves to project this shaft so as to move the spoon into its outboard position. With shaft 7 projected, when operating fluid is admitted under pressure through pipe 35, such fluid is confined between piston 32 and the stuffing box structure 33 and acts to retract shaft 7 so as to return the spoon to its inboard position. During this inward movement of shaft 7 the fluid between piston 32 and the outer end of the shaft is expelled through pipe 36.

Each of the tubes 3 has associated therewith suitable conveyor means for moving the mines through the tubes. Conveyor means of this type is known in the art and need not be illustrated nor described in detail. Such means may comprise electric motors 37, there being a separate motor for the conveyor mechanism of each tube, these motors serving to drive shafts 38 operating through stuffing boxes 39 extending through the inner hull 1. The shaft 38 has suitable driving connection with pinions 40 mounted in a suitable manner in the lower portion of the respective tubes, these pinions meshing with racks carried by the mines. Conveying means of this general character for stowing mines in stowage tubes and delivering the mines from such tubes to mine discharging means, is known in the art and need not be illustrated nor described in detail, it being sufficient to note that suitable means is provided for conveying the mines into the tubes and for delivering the mines therefrom.

In shipping the mine, the hatch door or cover 4^a being opened, the mines 41 are lowered into the stack 4, as indicated in Figure 2, and are moved aft through the lower tube until this tube has been completely filled, one mine remaining in the bottom of stack 4. A suitable spacer is then placed above this mine and the mines are loaded into the upper tube 3, in the same manner, until this tube is filled, the last mine loaded or shipped remaining in stack 4. A suitable spacing member is then placed between this mine and the hatch cover 4^a, which is then suitably secured and closed so as to effect a proper closure of the stack. The mines are held against casual

discharge from the after ends of the tubes by stop pins 42 which operate through stuffing boxes 43 extending into the inner hull, these pins projecting outwardly across the ends of the tubes as in Figure 1.

When the spoons 6 are in their normal or inboard position, they are disposed in axial alignment with the tubes 3, as in Figures 1 and 2. When it is desired to discharge or lay the mines, the motors 37 are set into operation so as to drive the conveyor mechanism above referred to. The conveyor mechanism serves to move the mines aft in the tube 3, and as a mine leaves the tube it passes into the spoon 6. If desired, suitable indicating means may be provided to show when the mine is properly positioned in the spoon. Such indicating means may conveniently control, in a suitable manner, a valve which controls the admission of operating fluid under pressure to pipe 36 for projecting shaft 7. When the mine is properly positioned on the spoon, shaft 7 is projected so as to move the spoon into its outboard position shown in dotted lines in Fig. 5. In this position the mine is disposed clear of the outer hull 2, so that, when it is discharged from the spoon, there is no danger of the mine fouling the hull of the boat or the propeller thereof. After the mine has been moved into the position referred to, by moving the spoon into its outboard position, it is discharged from the spoon by turning shaft 7 in a counter-clockwise direction, as considered in Figure 6, thus tilting the spoon 6 downwardly towards the stern of the boat. The mine slides out of the spoon and sinks to the bottom where it remains for a predetermined time, after which it rises to a predetermined depth in the water at which depth it is maintained by suitable control means carried by the mine.

Generally, the vessel will be moving forward when discharging the mine so that as the spoon passes outwardly beyond the outer hull there will be more or less pressure exerted by the water against the forward end of the mine, tending to slide it out of the spoon towards the stern of the vessel. To prevent the mine sliding out of the spoon before it is clear of the hull, I provide a stop 44 at the aft end of the spoon, this stop being operated in a suitable manner, as by means of a screw 45 which extends into the mine room and operates through a stuffing box 46.

The stop 44, when projected, extends beyond the outer hull 2 so as to assure that the mine will not leave the spoon until it is clear of the outer hull. In its retracted position, the stop 44 is disposed between inner hull 1, and element 9 of the spoon. After the spoon has been moved into its outboard position, it is tilted in the manner previously described to discharge the mine. The mine, with its attached anchor and associated mechanism has considerable weight in the water and it

will readily pass off of the inclined spoon and sink clear of the vessel. This discharge of the mine is accelerated by the water forces acting on the forward end of the mine if the vessel is in motion, and the mine may in some cases leave the spoon before the latter is tilted. Provision is made for this by cutting away the upper rearward portion of the spoon, as indicated at 6^a, and by providing rollers 47 at the lower portion of the after end of the spoon. In this connection, it is to be noted that the mines when in the water, are buoyant at the ends containing the explosive charge and are heavy at the opposite or anchor end.

In view of this fact, I have not cut away the top portion of the spoon at the forward end thereof, but have left such portion closed as at 6^b in order to restrain the buoyant end of the mine so as to prevent it from rising and fouling the side of the vessel during movement of the mine to discharging position with the spoon. The mines are stowed in the stowage tubes 3 with the charge receiving or buoyant ends thereof forward so that the mines are delivered to the spoon heavy and first.

After a mine has been discharged from the spoon, the spoon is returned to its inboard or normal position for reception of a second mine which is discharged in the manner above described, this operation being repeated until the tubes have been emptied or the desired number of mines discharged. In practice, a mine is first discharged from one of the lower tubes, a second mine being then discharged from the lower tubes on the opposite side of the hull, a third mine being discharged from the top tube at the side of the hull at which the first mine was discharged, and the fourth mine being discharged from the top tube at the side of the hull from which the second mine was discharged, this order being repeated until all of the mines have been discharged from the tubes. It is not essential that the mines be discharged in this particular order, though it is the order which I prefer as maintaining proper trim of the boat at all times.

Compensating tanks 49 and 50 are provided adjacent spaces 5 and tubes 3, respectively, these tanks being at the end of the ballast tanks 51 in which the tubes 3 are disposed. Whenever a mine is discharged a suitable quantity of water is taken into the tank 49 to compensate for the mines, and as the succeeding mine is moved aft in the tube 3, water is caused to flow forward from tank 49 to tank 50, in a known manner, to off-set the after moment due to movement of the mine aft. When all of the mines have been discharged, both of the compensating tanks 49 and 50 are full of water these tanks being of proper capacity to compensate for the mines.

While I have shown one spoon for each tube, I contemplate, as an alternative, the use of but one spoon for each pair of tubes, in which case the spoon, when in its normal inboard position, would be aligned with one of the tubes and any suitable means would be employed for transferring mines from the other tube to the spoon. Also, while I have illustrated and described, by way of example, one form of mechanism for projecting the spoon shaft and turning it, I do not intend to in any way limit my invention to this particular form of mechanism since any suitable or preferred means may be employed for this purpose. In its broader aspects, my invention comprehends the use of a spoon or equivalent member for reception of the mines, this spoon being mounted upon a shaft or support which is projected beyond the outer hull and is then tilted for discharging the mine.

While I have illustrated my invention, by way of example, as used for laying mines by what is known as the "wet" system, it is also capable of being used for laying mines by the "dry" system, in which latter system the stowage tubes are not open to the sea.

What I claim is:

1. In a mine laying submarine boat, a mine stowage tube, and means for transferring mines from the tube and discharging them from the boat at the side thereof and outwardly beyond both the hull and the tube.

2. In a mine laying submarine boat, a mine stowage tube, a mine receiving and discharging member bodily movable into and out of position beyond the hull, and means for transferring mines from the tube to said member to be discharged thereby beyond the hull.

3. In a mine laying submarine boat, a mine stowage tube, a mine receiving and discharging member normally disposed in inboard position for reception of mines to be discharged, means for transferring mines from the tube to said member, and operating means for projecting said member outwardly beyond the hull and turning it to discharge a mine therefrom and for returning the receiving and discharging member to its normal inboard position.

4. In a mine laying submarine boat, a mine stowage tube, a mine receiving and discharging spoon disposed fore and aft of the hull and open at both ends, means for transferring mines from the tube to the spoon, said spoon being normally disposed in inboard position for reception of mines, and operating means for moving the spoon outwardly by rectilinear motion beyond the hull.

5. In a mine laying submarine boat, a mine stowage tube disposed fore and aft of the hull, a mine receiving and discharge spoon open at its end and disposed fore and aft of the hull, said spoon in its normal inboard po-

sition being aligned with the tube, means for transferring the mines from the tube to the spoon, and operating means for moving the spoon outboard beyond the hull and for returning it to its normal inboard position, said means imparting rectilinear movement to the spoon.

6. In a mine laying submarine boat, a mine stowage tube disposed fore and aft of the hull, a mine receiving and discharge spoon disposed fore and aft of the hull, said spoon in its normal inboard position being aligned with the tube, means for transferring the mines from the tube to the spoon, and operating means for moving the spoon outboard beyond the side of hull and turning it about a transverse axis into position to discharge a mine therefrom, said means acting to return the spoon to its fore and aft position and to then return the spoon to its normal inboard position.

7. In a mine laying submarine boat, a mine stowage tube disposed fore and aft of the hull, a mine receiving and discharge spoon aft of the tube and disposed fore and aft of the hull, means for transferring the mines from the tube to the spoon, the aft end of said spoon being open, the spoon normally being disposed inboard adjacent the hull, and operating means for projecting the spoon outwardly beyond the hull and tilting it downwardly toward the stem of the boat for discharging a mine therefrom, said means acting to return the spoon to its normal inboard position.

8. In a mine laying submarine boat, a mine stowage tube disposed fore and aft of the hull, a shaft slidable through the side of the hull and disposed aft of the tube, a mine receiving and discharge spoon at the outer end of the shaft and normally disposed inboard adjacent and fore and aft of the hull, means for transferring the mines from the tube to the spoon, and means for projecting the shaft outwardly for moving the spoon outwardly beyond the hull and for retracting the shaft to return the spoon to its normal inboard position.

9. In a mine laying submarine boat, a mine stowage tube disposed fore and aft of the hull, a shaft mounted through the side of the hull for sliding and turning movement, a mine receiving and discharging tube secured to the outer end of the shaft and disposed inboard adjacent and fore and aft of the hull in the retracted position of the shaft, means for transferring the mines from the tube to the spoon, and operating means for projecting and retracting the shaft and for imparting turning movement to the shaft.

10. In a mine laying submarine boat comprising an inner hull and an outer hull, a mine stowage tube disposed between the hulls and fore and aft thereof, a mine receiving and discharge spoon disposed between the

hulls fore and aft thereof and adjacent the
aft end of the tube and in alignment there-
with, the spoon being open at both ends,
means for transferring the mines from the
tube to the spoon, the outer hull having an
opening accommodating outward movement
of the spoon beyond said outer hull, and ele-
ment carried by the spoon and covering said
opening when the spoon is in its normal in-
board position, and operating means for pro-
jecting the spoon outboard through the open-
ing and beyond the outer hull and for return-
ing the spoon to its normal inboard position.

mine from the tube by tilting thereof on a
transverse axis.

In witness whereof, I hereunto subscribe
my name this 19th day of June, 1929.

ROBERT C. SIMPSON.

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11. In a mine laying submarine boat com-
prising an inner hull and an outer hull, a
mine stowage tube disposed between the hulls
and fore and aft thereof, a mine receiving
and discharge spoon disposed between the
hulls fore and aft thereof and adjacent the
aft end of the tube and in alignment there-
with, the spoon being open at its aft end,
means for transferring the mines from the
tube to the spoon, a shaft slidably and rotata-
bly mounted through the inner hull, the spoon
being secured on the outer end of the shaft,
operating means for projecting and retract-
ing the shaft and for turning it on its axis,
the outer hull having an opening accom-
modating the spoon, the shaft when projected
moving the spoon outboard beyond the outer
hull, and an element carried by the spoon,
and covering said opening when the spoon
is in its inboard position.

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12. In a mine laying submarine boat,
means for discharging mines beyond the hull,
comprising a shaft slidably and rotatably
mounted through the hull, a mine receiving
and discharge spoon secured upon the outer
end of the shaft, and means for projecting
and retracting the shaft and for turning it
on its axis.

13. In a mine laying submarine boat com-
prising an inner hull and an outer hull, a
mine receiving and discharge spoon normal-
ly disposed inboard between the hulls, the
outer hull having an opening to accommo-
date outboard movement of the spoon be-
yond said outer hull, means for projecting the
spoon outwardly beyond the outer hull by
rectilinear movement and for returning the
spoon to its normal inboard position, and a
closure element carried by the spoon and clos-
ing said opening when the spoon is in its in-
board position.

14. In mine discharge means for mine lay-
ing submarine boats, a cylindrical mine re-
ceiving and discharge spoon open at both
ends and having the upper part of its aft
portion cut away, the wall at the forward
portion of the spoon being continuous, said
tube being adapted for reception of a mine
inserted into the tube through the forward
end and axially thereof, the cut away aft por-
tion of the tube facilitating discharge of a