April 23, 1929. P. MATTHIESSEN ET AL 1,710,585

HINGED GATE FOR THE TESTING CYLINDERS OF SUBMARINES

Filed June 1, 1926

Fig. 1.

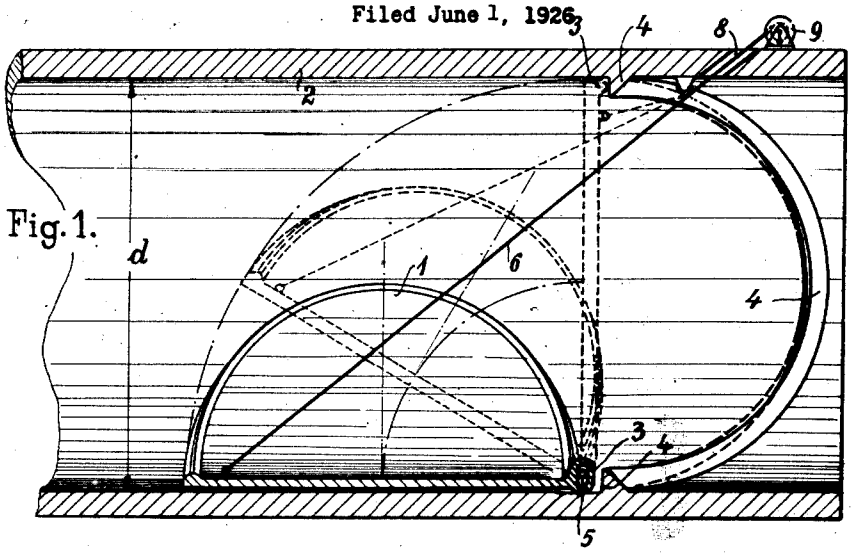


Fig. 2.

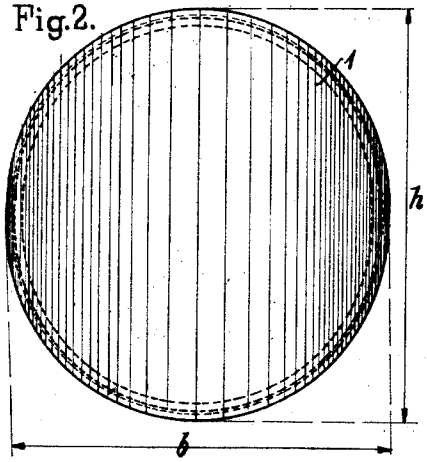


Fig. 4.

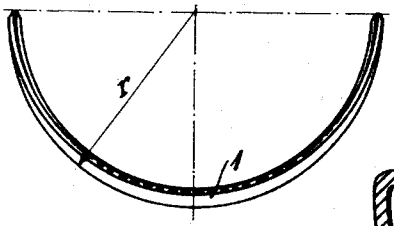


Fig. 6.

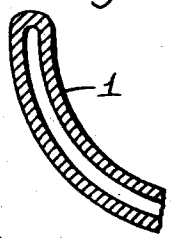
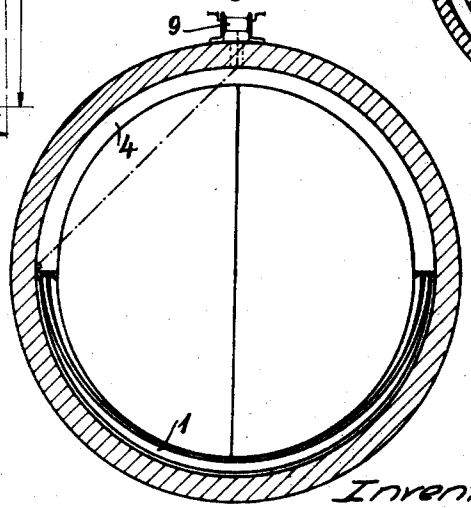


Fig. 5.



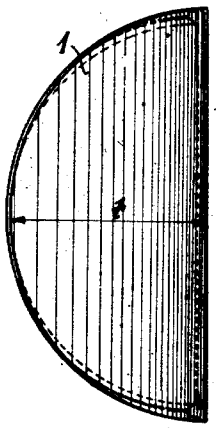


Fig. 3.

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UNITED STATES PATENT OFFICE.

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HINGED GATE FOR THE TESTING CYLINDERS OF SUBMARINES.

Application filed June 1, 1926, Serial No. 113,084, and in Germany November 27, 1925.

In constructing cylinders within which to test submarines the main difficulty in furnishing a practical lock gate is caused by the very large diameter of the cylinder. The lock gates used heretofore were floating gates which, however, suffer from the drawback that they can only be employed when the water is perfectly at rest. Otherwise they oscillate in the water and can be introduced into the cylinder only with the greatest difficulty. Another drawback connected with these floating gates is that the cylinder must be formed with an elliptical entrance to permit introduction of the gate.

Attempts to overcome these drawbacks by using hinged gates have hitherto failed because hinged gates hitherto known have required a special construction of the cylinder to provide the necessary room to permit unobstructed entry of the submarine. This necessitates enormous dimensions of such testing cylinders and therefore structural difficulties of such magnitude that the use of hinged gates heretofore was considered impossible.

The invention consists in a novel construction of a hinged gate which is free from these drawbacks and which can be used for lock sluices as well as for other purposes. The new gate has the shape and size of that part of a geometrical tubular shell having the same diameter as the inner diameter of the testing cylinder, defined by the perpendicular intersection with said shell of another geometrical tubular shell of the same diameter. In other words, the new gate is curved, having an elliptical development and a substantially circular projection upon a plane tangent to the curved surface of the gate at its median element.

In the accompanying drawing is shown, by way of example, a submarine testing cylinder constructed according to the invention. From this illustration the application of the invention to sluices or the like will be easily understood.

Fig. 1 is a longitudinal section of a submarine testing cylinder showing the hinged gate in lowered or open position, the upright or closed position as well as an intermediate position being shown in dotted lines.

Fig. 2 is a front view of the gate looking in the direction of the axis of the cylinder, the gate being represented in upright position.

Fig. 3 is a side view, and

Fig. 4 an end view of the gate in open position.

Fig. 5 is a cross-section of the testing cylinder, the gate being shown in lowered position.

Fig. 6 is a cross section taken in a horizontal plane when the gate is closed showing a modified construction in which the gate is hollow.

The gate 1 consists of a curved body, the developed view of which represents an ellipse, the body being so curved that when lowered it fits snugly the curvature of the inside of the cylinder 2. The shape of the body may be clearly gathered from Figs. 2, 3 and 4. As shown in Fig. 2, the geometrical projection of the gate in the direction of the axis of the cylinder when the gate is closed is theoretically a circle, that is to say, the height h is equal to the breadth b, and both are equal to the inside diameter d of the testing cylinder. In practice, the breath will be made slightly less than the height, so that the geometrical projection is not exactly a circle but an ellipse, which only deviates slightly from the form of a circle, the major axis h being vertical, and the minor axis b being horizontal. This characterization will also be true if the testing cylinder is not circular in cross-section, but, for instance, elliptical. Even then the gate will always comprise a curved body the periphery of whose projection upon a plane tangent to the curved surface of the gate at its median element conforms to the inner outline of the opening to be closed. The same is true of the adaptation of the invention to sluice gates or the like, in which by way of example there is to be closed a channel which is open on top. If this channel is semi-circular, the gate would comprise half of that shown in Figs. 2 and 3, by way of example the half above or below the horizontal centre line.

The gate, in the example shown, when in upright position, is disposed with its concave surface towards the entrance of the testing cylinder. The gate is provided with a bead 3 adapted to register with a shoulder 4 formed in the testing cylinder near the entrance thereof.

In a testing cylinder the greatest pressure acts from inside, that is to say against the convex surface of the gate, the bead 3 being thus pressed against the shoulder 4. In the

construction shown the gate is hinged at 5, the formation of the hinge being such as to permit slight bodily movement of the gate in the direction of the axis of the cylinder 2 whereby to secure a tight joint. Preferably the gate is hollow and its buoyancy will be approximately equal to its weight, so that the gate will nearly float. In such case only very little force is required to raise the gate into vertical position. Such force can be transmitted by the cable 6, which passes over the gate pulley 7 by way of an aperture 8 in the upper wall of the testing cylinder 2, and may be pulled by a winch 9, which, by way of example, is arranged on the end of the testing cylinder as shown.

As will be well understood, the gate 1 will not obstruct in any way the introduction of the submarine, owing to the snug fit of the gate within the inner wall of the testing cylinder. The work required to raise the gate is comparatively small and the joint will be absolutely tight, since, the greater the pressure of the water within the cylinder, the tighter will be the joint.

We claim:—

1. A hinged gate for submarine testing cylinders, sluices, or the like, characterized in that the gate constitutes a curved body formed as part of a geometrical tubular shell having the same diameter as the inner diameter of the testing cylinder, defined by the perpendicular intersection with said shell of another geometrical shell of the same diameter, the geometrical projection of the gate on a plane perpendicular to the axis of the testing cylinder when the gate is closed, conforming to the shape and size of the cross section of the testing cylinder.

2. A hinged gate according to claim 1, further characterized in that, when the gate is in closed position, the convex surface of the gate is presented to the region of greatest fluid pressure, the rim of the gate bearing against a shoulder bounding the opening to be closed.

3. A hinged gate according to claim 1 further characterized in that, when open, the gate fits snugly in the bottom of the testing cylinder or the like with the concave surface of the gate facing upwardly the gate being hinged at a point near the opening to be closed.

4. A hinged gate according to claim 1 further characterized in that, when open, the gate fits snugly in the bottom of the testing cylinder or the like with the concave surface of the gate facing upwardly, the gate being hinged at a point near the opening to be closed, and in that the hinge being constructed to permit a slight bodily movement of the gate in the direction of the axis of the cylinder.

5. A hinged gate according to claim 1, further characterized in that, in open position, the gate, with its concave surface facing upwardly, lies on the bottom of the testing cylinder or the like, the gate being hinged at a point near the opening to be closed, a cable for raising and lowering the gate being attached thereto opposite the hinge, and a perforation in the wall of the testing cylinder through which the cable passes.

6. A hinged gate according to claim 1, further characterized in that the gate is hollow and its buoyancy is approximately equal to its weight.

In testimony whereof we have signed our names to this specification.

PAUL MATTHIESSEN.

ADOLF DETLEF MÖLLER.