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SAFETY DEVICE FOR SUBMARINES

Filed May 16, 1928

3 Sheets-Sheet 1



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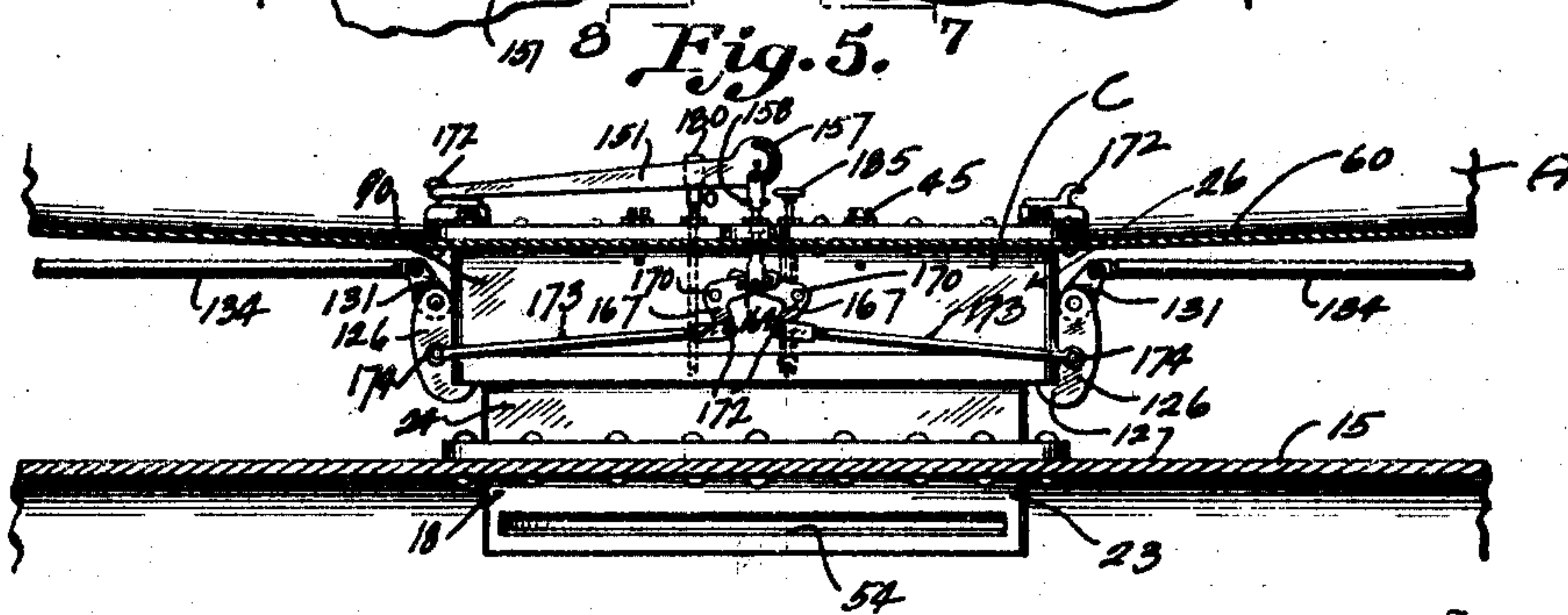
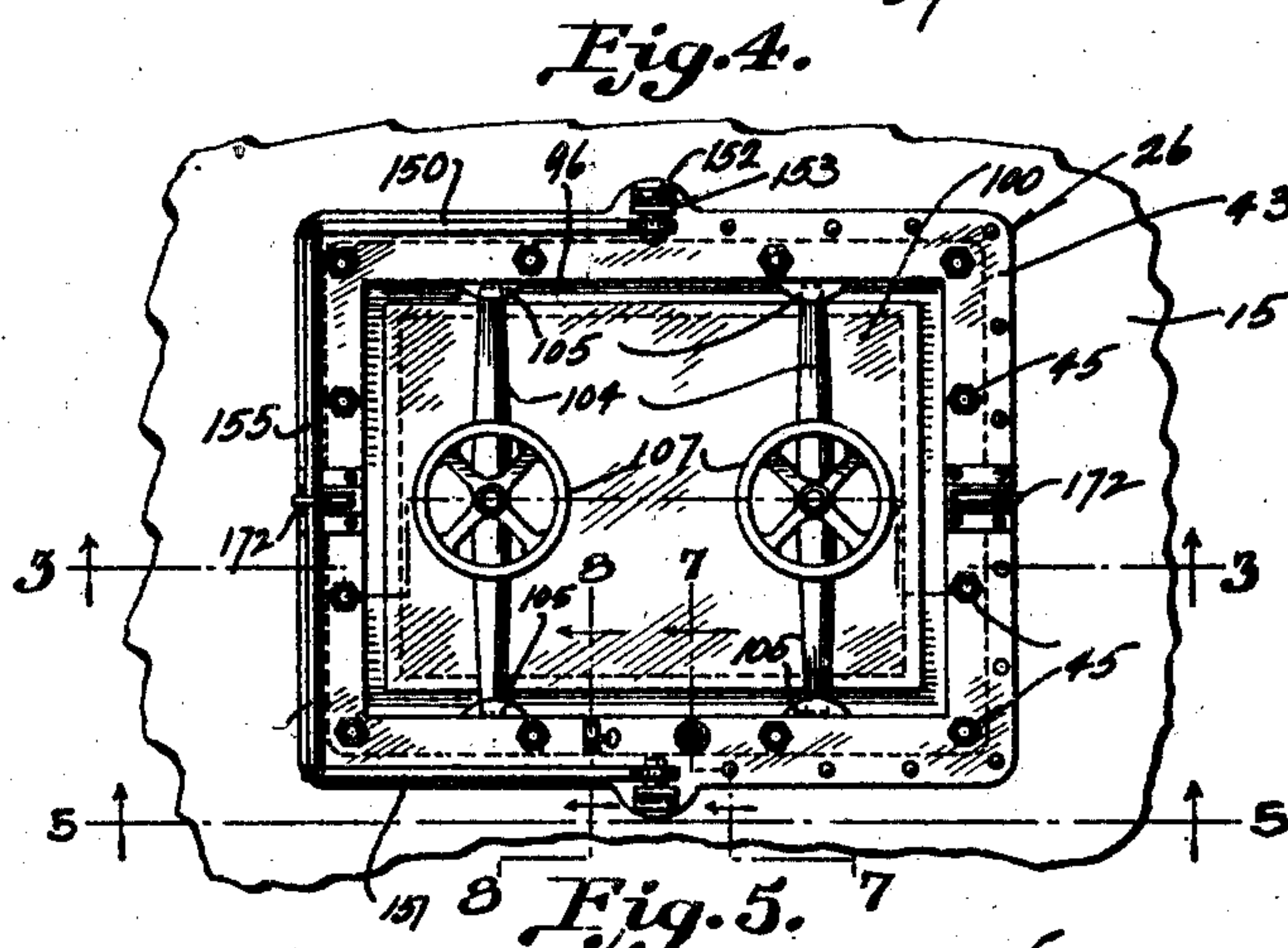
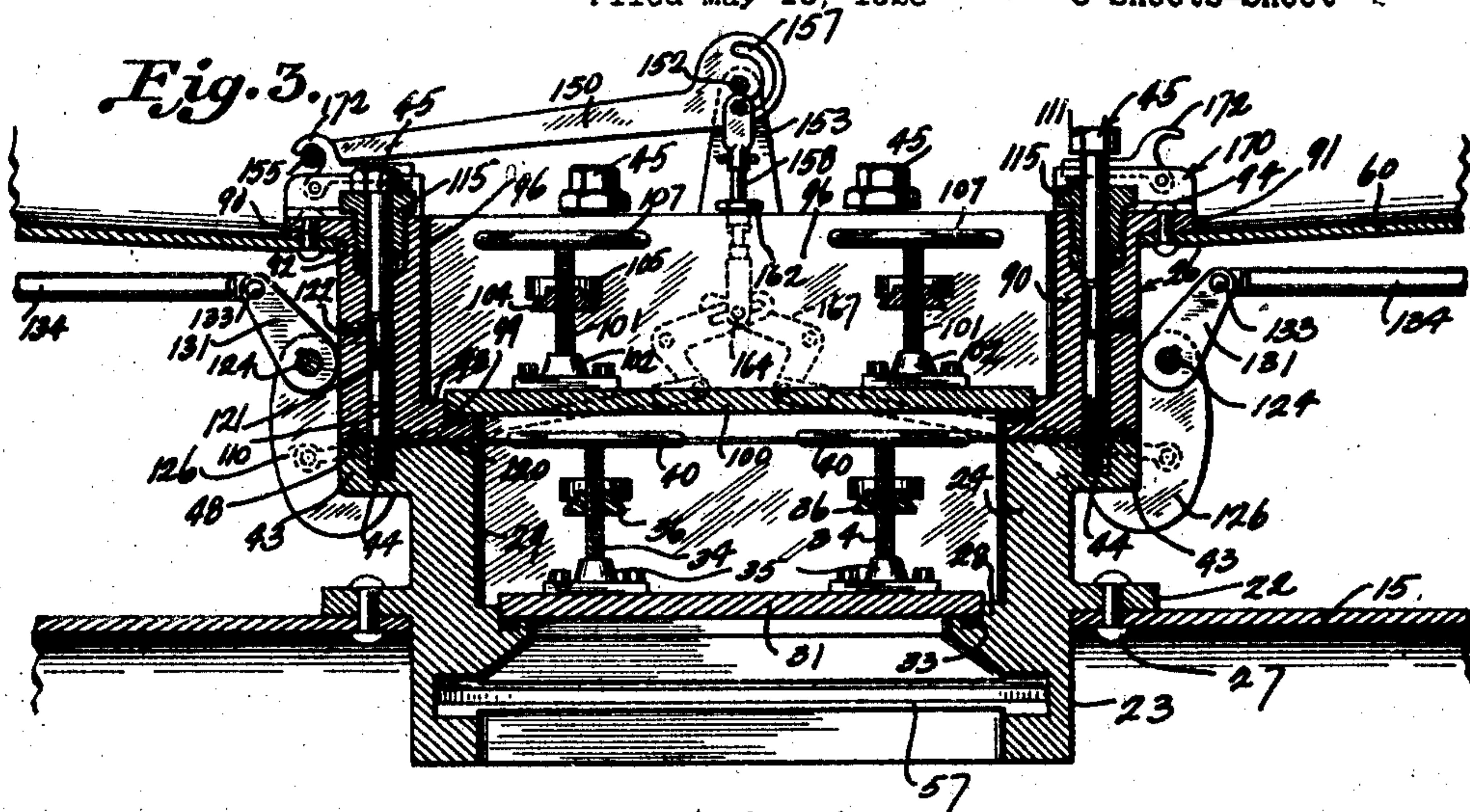
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SAFETY DEVICE FOR SUBMARINES

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3 Sheets-Sheet 3

Fig. 6.

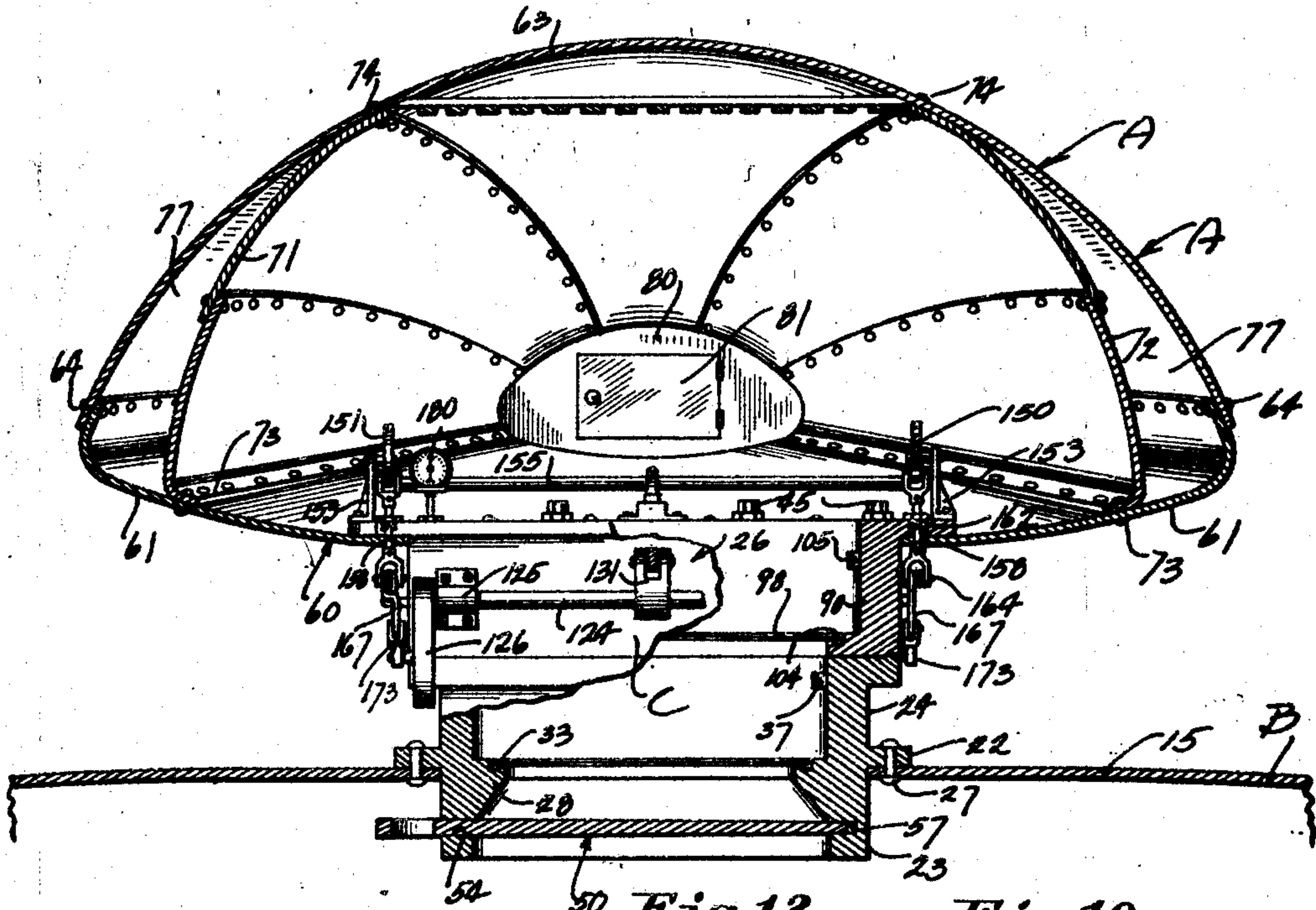


Fig. 7.

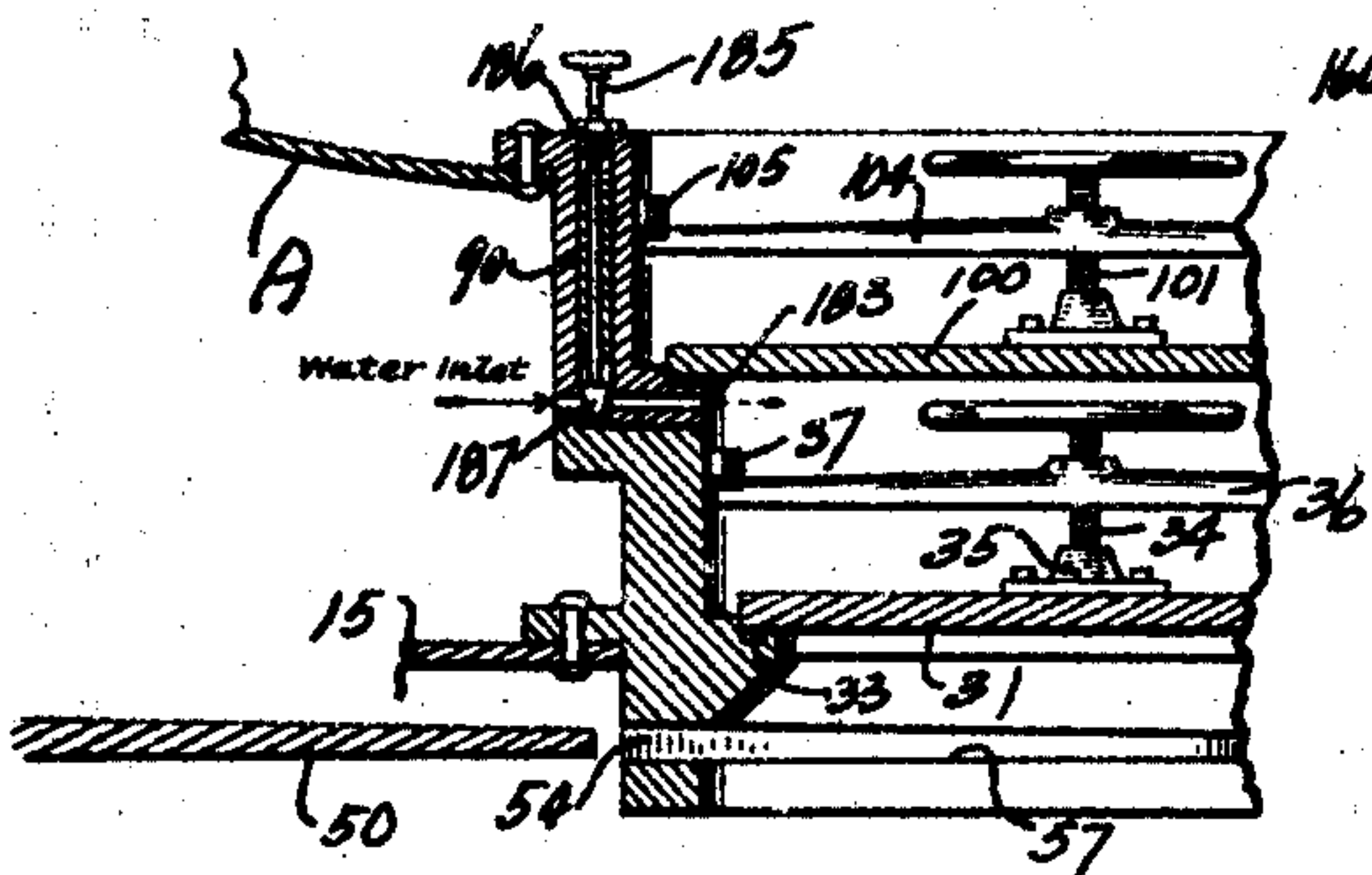


Fig. 12.

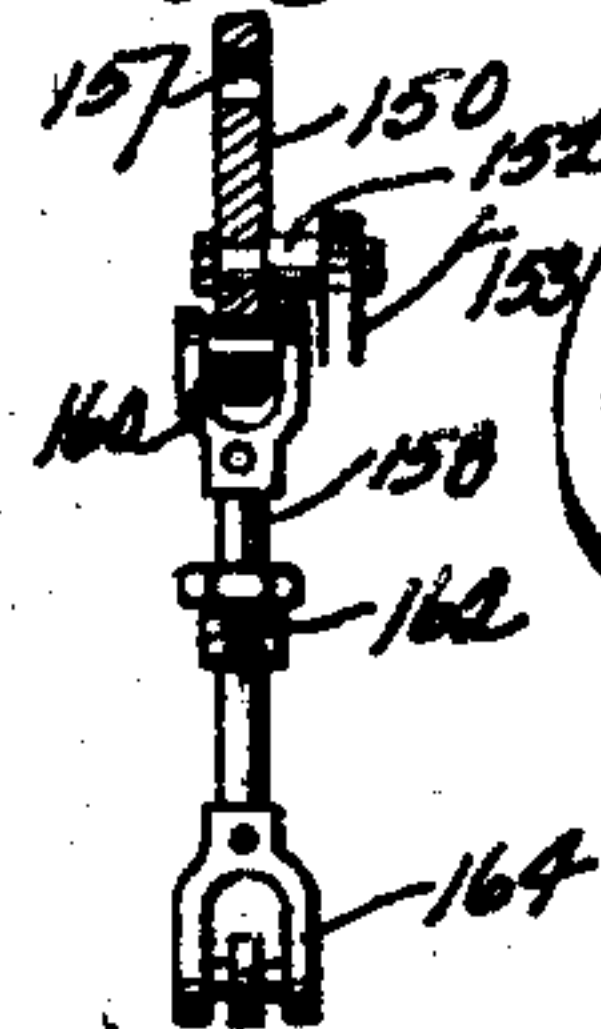


Fig. 10.



Fig. 11.

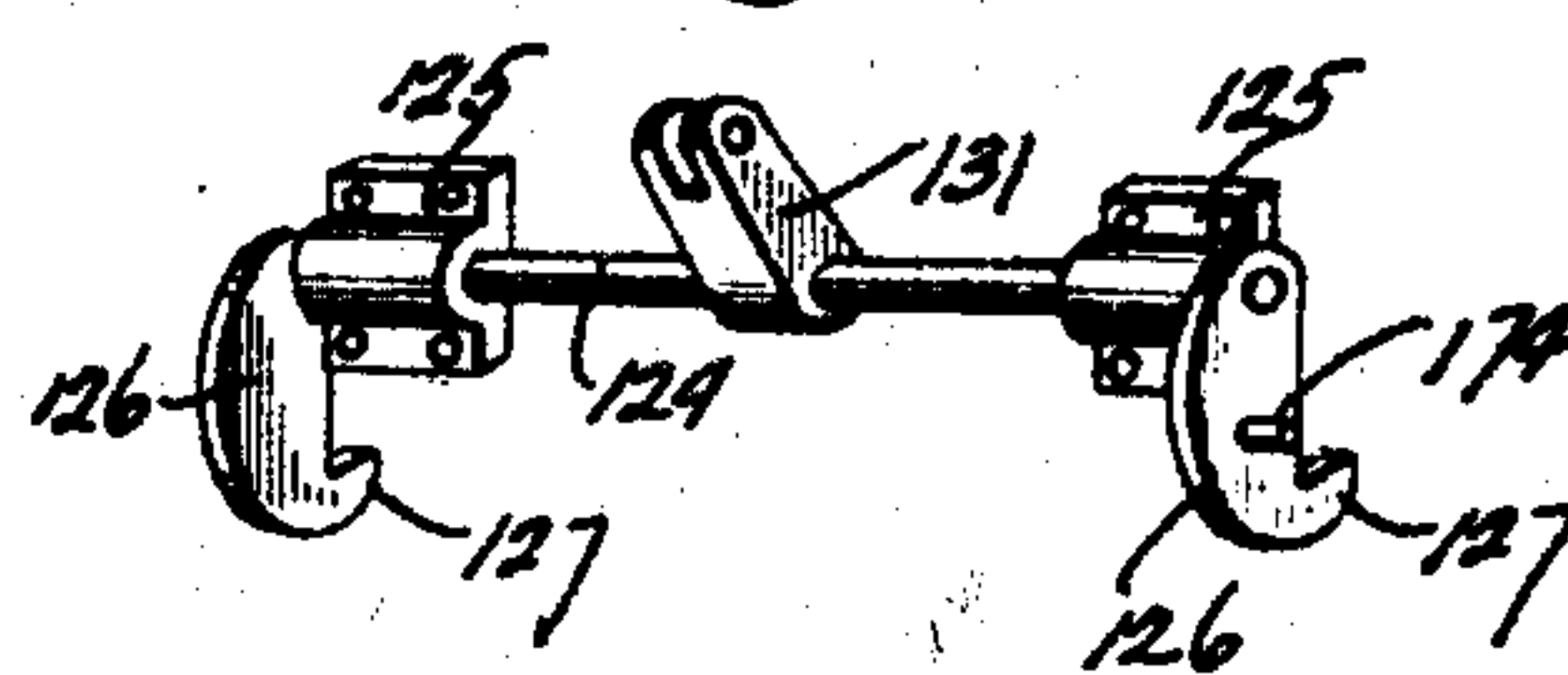


Fig. 9.

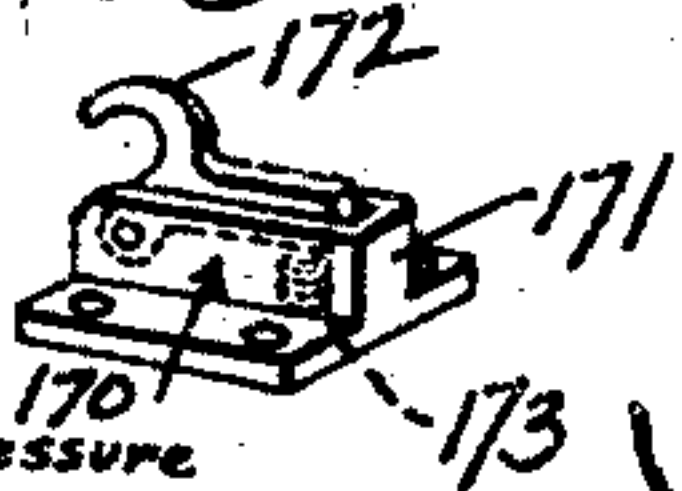
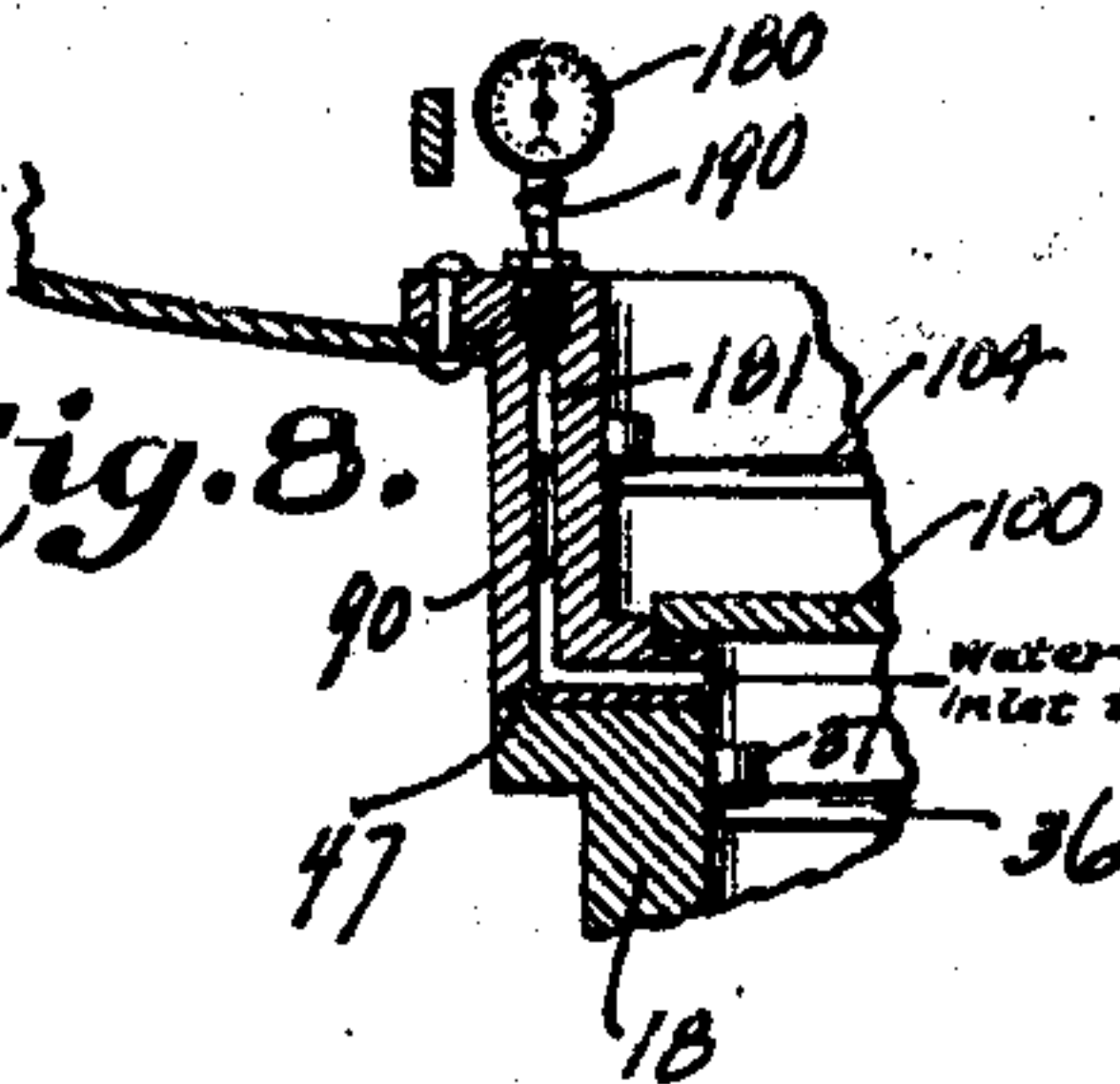


Fig. 8.



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SAFETY DEVICE FOR SUBMARINES

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This invention relates to improvements in safety apparatus for submarines.

The primary object of this invention is the provision of safety craft for submersibles, comprising a boat of stream-like design, novelly positioned in an inverted relation upon the deck of a submarine with novel hatch connection therewith by means of which the crew of the submarine may pass therefrom into the safety craft and with facility close both the submarine and the safety craft against admission of water, and expeditiously release the safety craft from the submarine; the same being of such nature that it will right itself as it is released and buoyed upwardly.

A further object of this invention is the provision of a novel hatch connection between submarines and their safety craft.

A further object of this invention is the provision of a novel safety craft construction for submarines.

A further object of this invention is the provision of improved quick release apparatus for the safety connection of life saving craft to submarines.

A further object of this invention is the provision of improved testing equipment adapted to be used in connection with safety craft for submarines, by means of which the crew within the safety craft may test the efficiency of the connection between the safety craft and submarine prior to release of the safety craft, and by means of which the crew within the safety craft after its release from the submarine may ascertain the depth of the safety craft or its position upon the surface of the water.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views.

Figure 1 is a fragmentary view, partly in section, showing the improved safety craft mounted upon the upper deck of a submarine, just prior to release therefrom.

Figure 2 is a view similar to Figure 1, but

showing the safety craft just after the same has been released from the submarine deck.

Figure 3 is an enlarged sectional view taken through the hatch connection of the safety craft with the submarine, this view being taken substantially on the line 3—3 of Figure 4.

Figure 4 is an inside plan view of the hatch construction of the safety craft.

Figure 5 is a sectional view taken substantially of the line 5—5 of Figure 4.

Figure 6 is a transverse sectional view taken through the improved safety craft at its hatch connection with the submarine, and showing an emergency closure to be used for closing off the compartment of the safety craft from the submarine in event of damage to the safety craft.

Figure 7 is a fragmentary sectional view showing related details of the hatch of the improved construction.

Figure 8 is a sectional view showing a pressure gauge connection as used with the hatch way of the safety craft.

Figure 9 is a view of a catch detail used to hold the locking lever of the release mechanism in place.

Figure 10 is a perspective view of the emergency closure.

Figure 11 is a perspective view of certain detent mechanism used in connection with the safety craft for holding the hatch thereof clamped to the hatch of the submarine.

Figure 12 is a sectional view, showing the link connection between the lever of the release mechanism within the craft and the detent mechanism externally of the craft.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may generally designate the improved safety boat or craft, which is of a novel construction, and connected to a submarine B by means of a novel hatch construction C which includes complementary hatches upon the submarine and the life boat. Releasable locking means E is used to retain the craft A in place upon the submarine B.

The submarine B includes the deck 15, having an opening 17 therein into which the sub-

marine hatch 18 of the construction C fits. While it is preferred to place the craft A upon the deck of the submarine, it is obvious that such craft may be located any place upon the submarine found to be most practical.

Referring at this time to the hatch 18, the same preferably comprises a substantially rectangular shaped body 20, having an attaching flange 22 thereon externally thereabout between the marginal edges of the body 20, subdividing the hatch 18 into a portion 23 which fits through the opening 17 and depends into the submarine compartment, and an upper portion 24 which extends externally of the submarine and cooperates with the hatch 26 forming part of the construction C, and attached to the craft A, as shown in Figures 1 and 2. The flange 22 is attached permanently by means of rivets 27, to the deck 15 of the submarine, in an anti-leak relation. A peripheral shelf 28 is provided within the hatch-way 29 in about the plane of the submarine deck, forming a support for the hatch closure 31. This shelf 28 is grooved on the upper surface thereof for receiving packing 33 upon which the closure 31 rests. This closure may be efficiently clamped in a sealed relation in the hatch-way by means of screws 34 swivel connected at 35 upon the outer surface of the closure 31, and each screw thereon having a threaded engagement with an elongated clamping nut 36, between the ends of the nut; the nuts 36 at the ends thereof being adapted to detachably fit into the recessed lower surfaces of lugs 37 welded or cast integral at opposite sides within the hatch way 29, as shown in the various views of the drawings. It is quite apparent that rotating the screw wheels 40 will cause the nuts 36 to feed therealong for engaging at their ends beneath the opposite lugs 37, to move toward or retract the closure 31 with respect to the shelf 28, to operate as a hatch closure in a manner which is perfectly apparent from the drawings. It is to be noted that the wheel 40 and all of the clamping details for the hatch closure 31 are located below the plane of the outer edge of the hatch frame 20.

The outer portion 24 of the hatch frame 20 is provided with an outwardly extending peripheral flange 43, which has screw threaded sockets 44 therein, best shown in Figure 3 of the drawings, adapted to receive clamping bolts 45, to be subsequently described, as a means of connecting the hatch portion 26 of the craft A against the hatch 18 of the submarine B. On the outer edge of the flange 43 is provided a V-shaped continuous tongue 47, adapted to fit into a V-shaped recess 48 provided in the lower edge of the hatch 36 in a relation to be subsequently described, to prevent relative movement of the submarine and safety craft hatches along their plane of connection.

It is to be understood that the hatch clo-

tures of the hatch construction C are adapted to be closed by the individuals after they are in the safety craft A, at the time of shutting them off from the submarine compartment. Under some circumstances, such as when the superstructure safety boat might be damaged by a collision, it may be necessary to shut off the communication of the safety craft from the submarine, I prefer to provide an auxiliary hatch closure 50, shown in Figure 10 of the drawings, the same being preferably rectangular in form and having a handle 51 at one end and tapering with a diminishing thickness from that end to the opposite end edge 52. The depending portion 23 of the hatch frame 20 is provided with a slot 54 in one end thereof, thru which the auxiliary hatch closure 50 may be slipped; the internal walls and opposite wall of the depending portion 23 of the hatch frame 20 being provided with grooves 57 to receive the margins of the closure 50 in a leak-proof connection; the grooves being such that the closure 50 may be driven into a tight wedging leak-proof connection as it finds the end of its seat in the hatch frame, and as shown in Figures 6 of the drawings.

Referring to the safety boat or craft A, the same is preferably of steel plate construction, shaped to lessen head-on resistance to the travel of the submarine through the water, and formed so that the deck thereof is normally lowermost, that is, the craft A is inverted when it is hatch-connected with the submarine.

The boat A therefore consists of a plate deck 60, which is flat at its transverse center midway between the ends of the boat, and therefrom slopes towards the opposite sides as shown at 61, at a very slight and acute angle from the plane of the deck 60, as shown in Figure 6. The normal bottom of the safety boat A is preferably formed of a metal plate 63, convexly arcuated throughout the width thereof and overlapped and riveted at its longitudinal edges 64 with the deck plate 60, as shown in the various views in the drawings. The plates 60 and 63 forming the craft decrease in width towards the opposite ends 68 and 69 of said boat or craft, to offer a stream-line shape, and the bottom 63 slopes at a sharp angle at 70 from midway of the ends of the craft towards the ends 68 and 69, where the deck and bottom plates meet in a blunt, but substantially chisel edge; the space within the craft A thus tapering from midway of the ends of the craft with a decreasing depth to the ends of the boat or craft.

The shell of the boat A is provided with air compartments at the opposite longitudinal sides thereof, formed by placing partition plates 71 and 72 in the shell of the craft at opposite sides thereof, the plates 71 and 72 having flanged connections at 73 with

the deck 60, in spaced relation with the juncture of the deck with the bottom and side plates 63; the partitions 71 and 72 at their respective sides of the craft sloping in a converging relation with the plates 63 and being connected at 74 with the plate 63 short of the longitudinal center of the craft. This provides air compartments 77 at each side of the boat, which are widest at the deck 61 and slope in width downwardly along the bottom 63; it of course being understood that the joint formed by partition plates 71 and 72, at the connections thereof with the plates of the shell of the craft are welded or otherwise rendered leak-proof. At the ends 68 and 69 the craft is provided with cross partitions 80, shown in Figures 6 of the drawings, to provide compartments in said ends of the boat adapted to store supplies, water, and the like; each of the partitions 80 having a leak-proof connection with the shell of the craft and having a leak-proof closure 81 therein.

Referring to the support of the craft A upon the submarine deck 15, at opposite sides of the hatch construction C, it is preferred to provide supports 82 and 83, the legs 85 of which are suitably braced together and provided with feet flanges connected at 87^a by rivets upon the deck 15, as shown in Figures 1 and 2. At their outer ends the supports 82 provide saddles 87, suitably pocketed to receive the ends of the craft A in a resting relation therein.

Referring at this time to the hatch structure 26 of the safety boat A, as is more particularly shown in Figure 3 of the drawings, and elsewhere, the said hatch includes a rectangular shaped body 90, provided with an external flange 91 thereabout at an end thereof; the body 90 being adapted to extend through an opening 92 in the normal deck 60 of the boat A, at the central portion thereof, the flange 91 exteriorly overlapping with the deck 60 and being riveted as at 94 thereto. Thus the body or frame 90 of the hatch structure 26 projects beyond the outer surface of the deck of the safety boat A, and therein a hatch-way 96 is provided, adapted to be aligned with the hatch-way 29 of the submarine hatch 18, and thru which individuals may crawl from the submarine to the safety boat and vice versa. An internal flange 98 is provided in the hatch frame 90 at the outer end thereof, suitably recessed and provided with packing 99, forming a seat for the hatch closure 100 which is adapted to be forced thereagainst to seal the hatch-way 98.

It is to be noted that the hatch closure 100 is in a plane at the outer end of the hatch frame 90, and within the compartment 96 is disposed the means which clamps the closure in place. This means of course faces the compartment of the safety boat, and comprises screws 101 swivelly connected at 102 onto the inner surface of the closure 100; the

same having threaded thereon the elongated nuts 104, more particularly shown in Figure 4 of the drawings, which extend the entire width of the compartment 96, and at the ends thereof are adapted to seat in the under recesses of lugs 105, which are formed integral or in a bracketed relation on the walls of the frame 90 and project into the way 96. The screws 101 have wheels 107 thereon by means of which to rotate them and adjust the clamping of the closure 100 against the packing 99 to shut off the way 96, and exclude water from the safety craft, in a manner which is perfectly apparent from the description.

The bolts 45, used to clamp the hatch construction 26 to the hatch construction 18, are mounted in spaced relation about the frame 90, being vertically movable in sockets 110 provided through the thick walls of the hatch frame 90, as shown in Figure 3 of the drawings. The bolts 45 have their head ends 111 disposed in facing relation within the compartment of the safety craft A, and their screw threaded ends are relatively short and adapted to thread into the sockets 44 of the submarine hatch frame 20. For each bolt 45 it is preferred to provide a stuffing connection 115 facing in the compartment of the safety boat, to provide a seal against admission of water. As before mentioned the frame of the submarine hatch is provided with a V-shaped tongue 47 thereabout, and this is adapted to fit into the V-shaped groove 48 of the frame 96. A gasket 120 is provided between the facing surfaces of the frames of the hatches 18 and 26, to provide a leak-proof connection therebetween, as effected by the bolts 45.

In order to limit the movement of the bolts 45 and prevent their falling into the compartment of the safety boat when it has righted itself after being detached from the submarine, it is preferred to annularly recess each of the bolts 45, as shown at 121 in Figure 3 of the drawings, and provide detent pins 122 with a screw threaded connection in the frame 90, with their ends projecting into the recesses 121 to limit the movement of the bolts, as is obvious.

The quick release means E, which locks the submarine and safety boat together until the bolts 45 have been retracted completely, preferably includes shafts 124 at each end of the hatch frame 96, pivoted thereto by suitable bearing brackets 125, best shown in Figure 11 of the drawings; the ends of the shaft 124 extending outwardly beyond these brackets 125, and thereat being provided with detents 126, which radially extend therefrom and at their lower ends are offset at 127 for engagement beneath the flange 43 of the hatch frame 29 of the submarine hatch structure 18. These shafts 124 are each provided intermediate their ends with radial

extensions 131, the outer ends of which are bifurcated, as shown in Figure 11 of the drawings, for pivotally receiving at 133 the adjacent ends of lock rods or members 134 which extend longitudinally along the outside of the deck of the safety boat A, and at the ends thereof are adapted to seat within suitable sockets 136 provided in the safety boat supports 82 and 83, acting as keepers. The ends of these rods 134 are supported by means of brackets 138, provided with openings thru which said rods slidably extend; the brackets 138 being secured on the deck of the safety boat in approved manner, preferably by means of reinforcing bands 140, shown in Figures 1 and 2 of the drawings. These brackets 138 are of course located adjacent to and between the end supports and the hatch structure C.

It is to be noted that the detents 126 lock the hatches of the submarine and safety boat together at the same time that the retaining rods 134 are locked in the keeper openings 138. Upon slight angular rotation of the rods or shafts 124 the detents 126 and the keeper rods 134 may be released from their engagement with the submarine parts to release the safety boat. The means for causing this release is operable from within the compartment of the safety craft and preferably includes lever arms 150 and 151, pivoted at 152 on suitable brackets 153 at opposite sides of the hatch way 96. The levers 150 and 151 at their free ends are connected by a cross rod 155. At their opposite pivoted ends the levers 150 and 151 are enlarged and provided with grooves or slots 157, eccentrically arcuated with respect to the pivot pins 152; the said slots 157 having connected therein the inner ends of connecting links 158. The links 158 have a roller connection at 160 within the slots 157 and between their ends the links 158 slidably extend through suitable stuffing boxes 162, more particularly shown in Figures 6 and 12 of the drawings; the outer ends of the links 158 extending exteriorly alongside of the hatch construction C and being provided with pins 164 for disposal within the elongated slots of bell crank levers 167. The bell crank levers 167 are pivoted at 170 at opposite sides of the common connection thereof with the link 158; the said bell crank levers 167 at their opposite ends being swivelly connected at 172 with connecting rods 173 which extend exteriorly along the hatch construction C and have pivot connection at their opposite ends with pins 174 disposed on the detents 126 eccentric to the axis of the shaft 124, as shown in Figures 5 and 11 of the drawings.

It is to be noted that the levers 150 and 151 and their cross connection 155 form a U-shaped operating leverage and eccentric for operating the detent mechanism, which straddles the hatch 26 within the safety boat com-

partment. To hold the same against accidental movement, it is preferred to provide releasable catches 170, at each end of the hatch-way 96, the same each including a body 171 bolted to the hatch frame within the boat compartment and having a pocket therein with a pivoted detent 172, which is normally urged by a spring 173 in said pocket in one direction so as to catch and hold the cross rod 155, depending upon which side of the hatch way the cross rod 155 is positioned, whether for holding the releasable lock means operative or inoperative with respect to connection of the safety boat and submarine.

It is to be particularly noted that the parts have been designed with the idea of providing a stream-line shape to the life craft which will obviate head-on resistance to a great extent. To prevent damage to the lock rods 134 the same may be suitably housed within guard casings (not shown), which may be attached to the shell of the life craft.

A pressure gauge 180 is detachably mounted upon the hatch frame 90, within the compartment of the craft A, the same having operating connection with a duct 181 which extends through the frame 90 and opens into the space in the hatch connection C between the hatch closures 31 and 100; these details being shown in Figure 8.

It is preferred to provide a duct 183 extending transversely through the frame 90 of the safety boat hatch, adapted to admit water from externally of the hatch construction into the space between the hatch closures 31 and 100 when the safety boat is clamped to the submarine. A suitable lift valve 185 operably supported by the frame 90 in a suitable bushing 186, is provided with a tapered valve 187 adapted to be used to close off the duct 183 as desired.

When it is desired to abandon the submarine, the individuals crawl through the open hatchways into the safety boat A, and the submarine hatch closure is then clamped in a leak-proof connection, in place, and thereafter the safety hatch lid 100 is clamped in place, it being noted that the said hatch closures are of different sizes and adapted to be placed while the operatives are within the safety craft. When the hatch closures have been clamped in place, the lift valve 185 is opened to admit water in the space between the latch closures 31 and 100, and when a sufficient time has elapsed to permit the filling of this space, the valve 185 is closed and the pressure of the water in this space is noted on the pressure gauge 180. If the submarine hatch is leaking past the closure 31 the pressure gauge will record this fact, and the operatives must then open the hatch closure 100 and attempt to seal the hatch closure 31 so that no water will leak into the submarine and damage the parts therein. It

is of course understood that there may be some parts of the submarine in which the water has not leaked, and it is of great assistance in salvaging a submarine that as much air as possible be maintained therein to displace the water which otherwise would offer considerable obstruction to the raising of the craft. A small stop cock 190 may be provided on the pressure valve, and this may be closed before releasing the safety boat from the submarine.

The retaining bolts 45 are now unscrewed from the submarine hatch frame 20, and the heads of these bolts may be engaged by any suitable means to cause rotation of the bolts, such as by means of a wrench wheel or the like. When the bolts 45 have all been released, it is then merely necessary for the operator to release the catch 172 and grasping the rod 155 to throw the levers 150 and 151 by a single operation to the opposite side of the hatch-way. This simultaneously releases all of the detents 26 and the retaining rods 134 from their connection with the submarine hatch end supports 82 and 83. The safety boat A, due to its buoyancy will then rise away from the submarine, as shown in Figure 2, and immediately thereafter will invert and right itself and float to the surface. When it reaches the surface this fact will be recorded upon the pressure gauge 80, and designate when it is safe to open the hatch cover 100 and permit the occupants to be freed.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In combination with a submarine having a hatch construction, a safety boat having a hatch construction, supports on the submarine for supporting the ends of the safety boat, pivotally mounted detents for holding the safety boat in communicating leak-proof connection with the submarine hatch, means operating in synchronism with the detent means to connect the boat at the ends thereof in releasable manner with the end supports, and means operable from within the safety boat for releasing the last mentioned means and said detents.

2. In combination with a submarine having a hatch construction, a safety boat having a hatch construction, supports on the submarine for supporting the ends of the safety boat, pivotally mounted detents for holding the safety boat in communicating leak-proof connection with the submarine hatch, means operating in synchronism with the detent means to connect the boat at the ends thereof in releasable manner with the end supports, means operable from within the safety boat for releasing the last mentioned means and

said detents, said means to cause said release comprising a lever pivoted within the safety boat, bell crank levers exteriorly pivoted upon the safety boat, means connected with the bell crank levers having an eccentric sliding connection with said operating lever within the safety boat, and means connected with said bell crank levers and with the detents to cause their operation.

3. In combination with a submarine having a hatch construction, a safety boat having a hatch construction, clamping means for releasably holding the hatch constructions in leak-proof connection directly at said hatch constructions, means operatively connected with the last mentioned means for releasably connecting the life boat at its ends upon the submarine, whereby when the hatch clamping means is operated for releasing the hatches, the ends of the boat will also be released, and operating means accessibly operable from within the life boat having an operative connection with said clamping means for operating the same.

WILLIAM C. GORDON.

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