

1,170,577.

5 SHEETS—SHEET 1.



W. H. Furness Jr.
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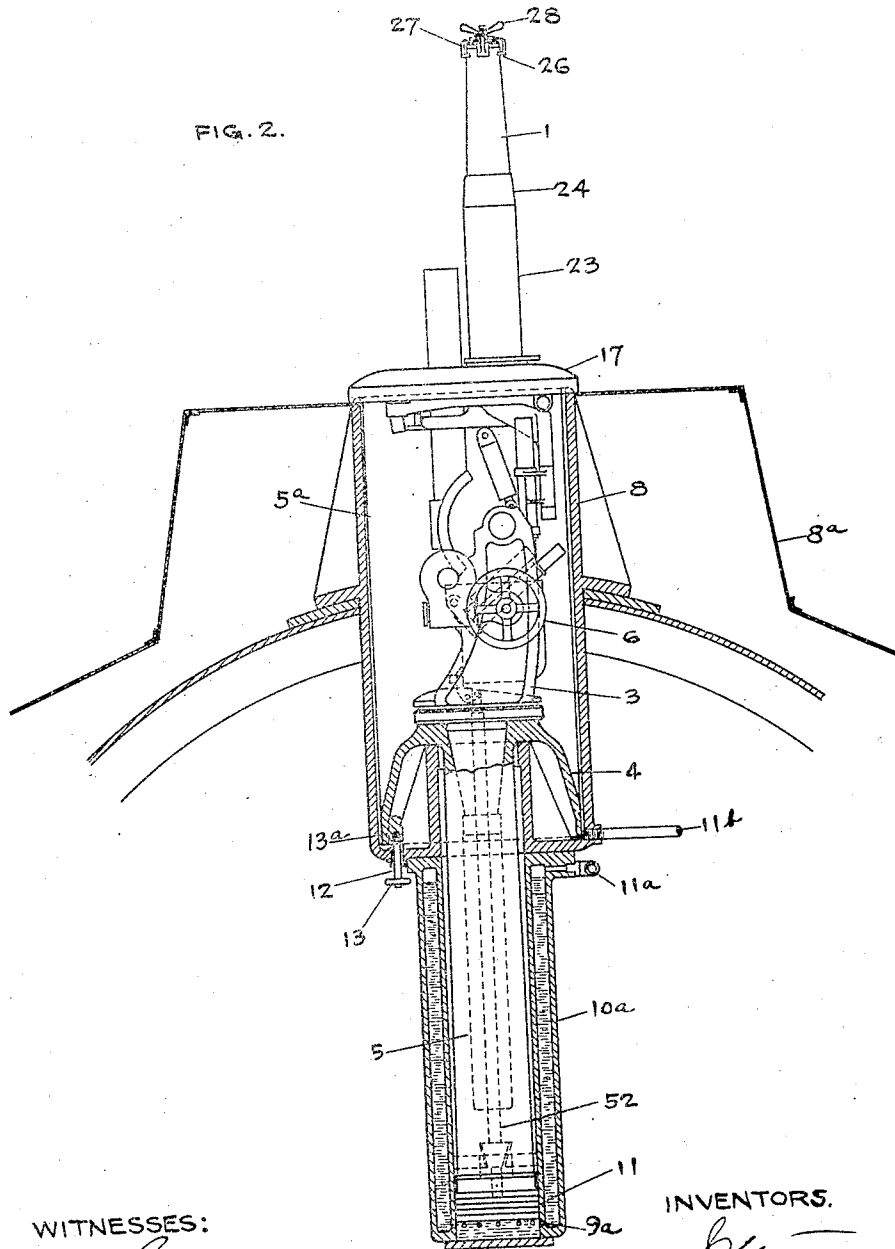
John
Halsey

J. STRAUSS & A. S. HALSEY.
HOUSING FOR GUNS.
APPLICATION FILED SEPT. 4, 1914.

Patented Feb. 8, 1916.
5 SHEETS—SHEET 2.

1,170,577.

FIG. 2.



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5 SHEETS—SHEET 3.

FIG. 3.

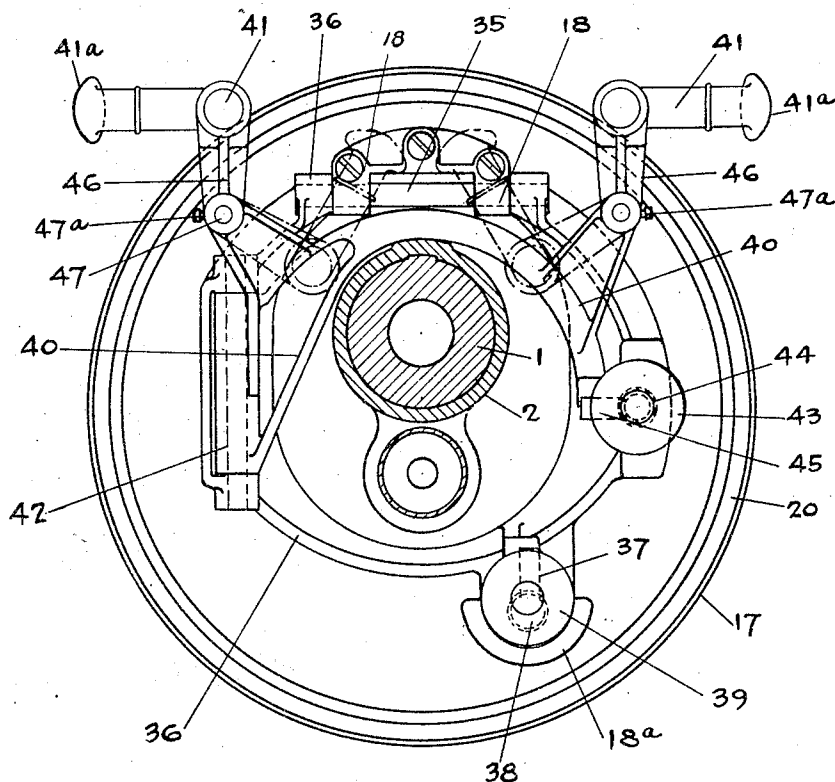
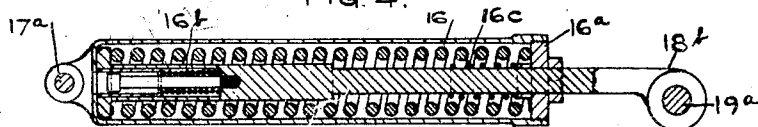


FIG. 4.



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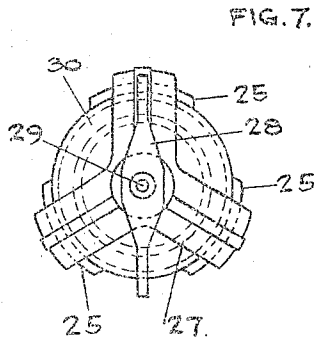
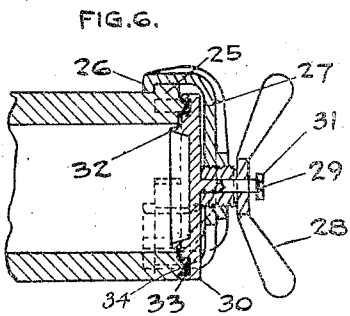
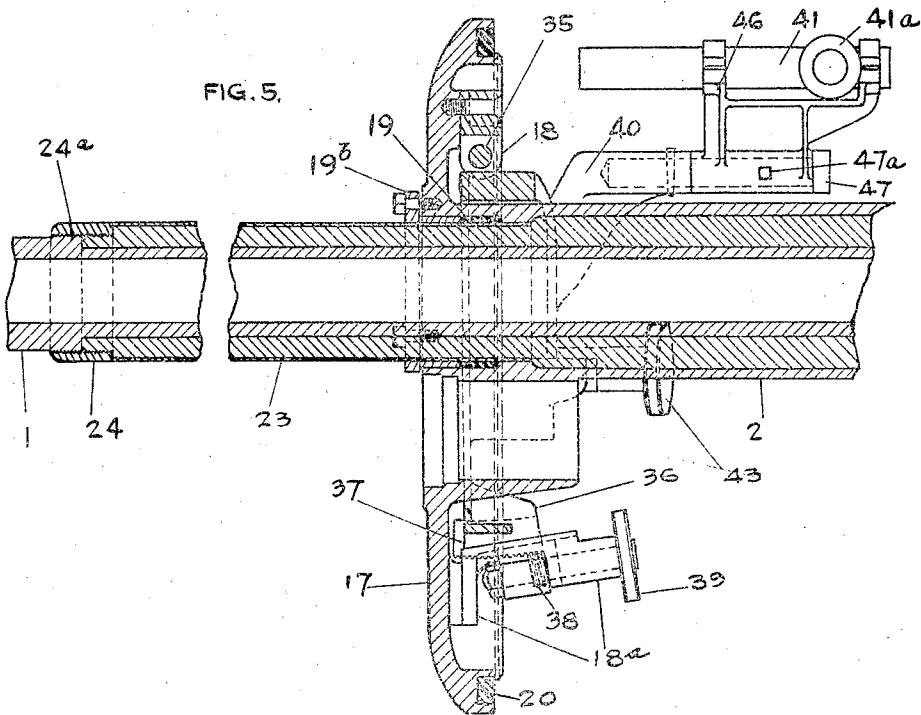
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5 SHEETS—SHEET 4.



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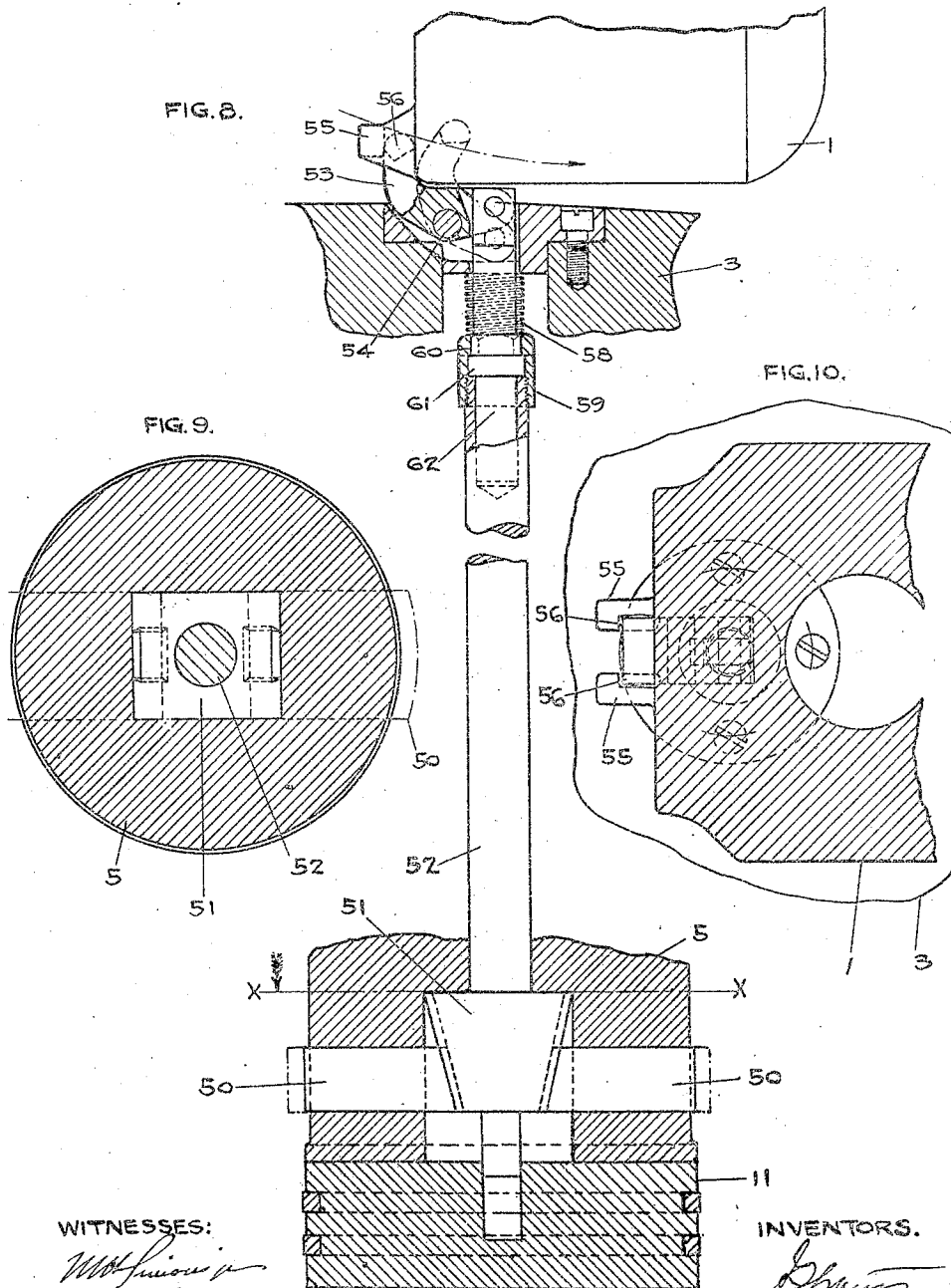
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UNITED STATES PATENT OFFICE.

JOSEPH STRAUSS AND ARTHUR S. HALSEY, OF WASHINGTON, DISTRICT OF COLUMBIA,
ASSIGNORS TO THE GOVERNMENT OF THE UNITED STATES.

HOUSING FOR GUNS.

1,170,577.

Specification of Letters Patent.

Patented Feb. 8, 1916.

Application filed September 4, 1914. Serial No. 860,299.

To all whom it may concern:

Be it known that we, JOSEPH STRAUSS and ARTHUR SHERMAN HALSEY, citizens of the United States, residing in Washington, District of Columbia, have invented certain new and useful Improvements in Housings for Guns, the invention being clearly described in the following specification.

This invention has for its object a compact water-tight housing located below decks, for guns for use on submarines, adapted to house the gun in a vertical position with the muzzle projecting above the housing, in order to reduce the length of housing below decks, and means for hoisting the gun to the battery position.

This invention relates to that class of guns suitable for use on submarines although it may be used on any class of vessel or in a shore fortification where it is desired to house the gun in a compartment located below the battery or firing position of the gun.

The features of this invention are: First, a water-tight hatch cover rigidly mounted on the gun slide, serving as a shield and provided with a water-tight joint around the gun through which the gun recoils, and adapted to close the hatch when the gun is housed in a vertical position. Second, means to lock the gun in the vertical position in the mount in order that the gun will enter a small hatch in the deck, means to keep the gun raised in the battery position and interlocking means whereby the gun cannot be housed until it is locked in the vertical position. Third, a sight mounting adapted to house the sight behind the hatch cover. Fourth, a hydro-pneumatic cylinder provided with a plunger the upper end of which carries the gun and mount and means for automatically controlling the speed of hoisting or lowering the gun through the hatch. Fifth, counter-balancing springs by means of which the gun and shield are counter-balanced about the trunnions in a novel manner. Sixth, a gun provided with an outer cylindrical sleeve, the function of which is to prevent rust and corrosion and to form a water-tight joint in the hatch cover. Seventh, a water-tight muzzle cover, designed to be clamped on the gun muzzle and to keep water out of the bore when the gun is submerged.

In the accompanying drawings, showing clearly this invention: Figure 1 is a vertical

section taken through the hatch, showing the gun in the battery position. Fig. 2, is a vertical section taken through the hatch showing the gun in the housed position. Fig. 3 is a rear view showing the sight mounting. Fig. 4 is a section taken through the counter-balancing spring. Fig. 5 is a longitudinal section through the hatch cover and muzzle of the gun. Fig. 6 is a section through the gun showing the water-tight muzzle cover. Fig. 7 is an end view of the gun, also showing the muzzle cover. Fig. 8 is a detail section showing the locking device for securing the gun in the firing position and the means for interlocking the gun with the locking device whereby the gun cannot be housed until it is elevated to the vertical position. Fig. 9 is a horizontal section on line X X in Fig. 8 looking from the top and Fig. 10 is a plan view of Fig. 8 showing the interlocking lever and lugs on the gun.

Referring to the drawings: the gun (1) is supported in the slide (2), which is horizontally pivoted, by means of the trunnions, in the carriage (3), in the usual well known manner. The carriage (3), is mounted in and revolves on ball or roller bearings formed in the head (4) of the lifting plunger (5), said plunger being guided by key (5^a). The gun is elevated by the handwheel (6) and trained by a handwheel (not shown), the elevating and training gear being mounted in the usual manner and of well known construction, but designed for compactness in order to reduce the diameter of the housing hatch (8), extending down into the submarine (8^a). The gun is hoisted and lowered in the hatch by means of the hydro-pneumatic cylinder (9) and plunger (5). The head (4) forms, in connection with the piston (11), the support for the gun and is designed to resist the shock due to firing. Mounted in the lower end of the hatch (8) is a screw (12), operated by the handwheel (13) and adapted to engage a lug (13^a) in the head (4), when the latter is in the housed position; the function of the screw is to lock the gun in the hatch. The piston (11) on the lower end of the plunger is acted upon by means of liquid, which is forced by air pressure through the orifices (9^a) extending around the lower end of the cylinder. The cylinder (9) is surrounded by an annular space (10^a). The piston (11) on the lower end of the plunger (5) is acted upon by

liquid pressure and when the gun is housed the liquid recedes into the annular space through the communicating holes (9^a). The annular space is of somewhat larger capacity than the cylinder and therefore is of sufficient capacity to receive all the displaced liquid. At (11^a) air pressure is admitted through suitable controlling valves which, acting upon the surface of the liquid, causes the latter to flow to the cylinder, thus raising the gun to the battery position. By allowing the air in the annular space to escape through a suitable exhaust valve, the gun may be lowered to the housed position. The communicating holes (9^a) by a suitable limitation of their size, serve to automatically regulate the speed of lowering and hoisting in accordance with the well known laws of hydraulics. Pipe (11^b) is a drain pipe for removing the water washed in from the sea. Although the method of hoisting a gun to the battery position by hydraulic pressure is well known it is believed that the combination of liquid and air pressure for use in a gun mount in the manner hereinbefore described, is new and novel.

The gun is mounted in the slide (2) with considerable muzzle preponderance due to the fact that the center of gravity of the oscillating parts, including the shield (17) is located some distance forward of the trunnions. This is the usual manner of mounting guns of high angle fire and necessitates the employment of the counterbalancing spring (16) the operation of which is described hereinafter. The spring (16) is seated in the end of the casing (16^a) which is pivotally connected to the slide by means of the pin (17^a) and is compressed by the rod (18^b) which also pivots at (19^a) to the carriage. As the pivot (17^a) with the slide oscillates about the trunnions, the distance between the pivots (17^a) and (19^a) increases or diminishes, thus automatically varying the spring pressure roughly to suit the varying muzzle preponderance. In gun mounts of this type now well known, the counterbalancing spring does not entirely balance the overhung weight at all angles of elevation. This is due to the fact that the moment of the oscillating weights varies as the cosine of the angle of elevation while the counterbalancing spring varies in direct proportion to its deflection. In other words the moments due to the weights would be represented by one curved line for certain angles of elevation, while the moments due to the spring for the same angles would be represented by either a straight line or a somewhat different curved line. In this present invention, the spring is so arranged that the moments of the spring and weights are approximately equal for any angle of elevation. This result is accomplished by locating the pivots (17^a) and (19^a) ap-

proximately as shown) so as to vary the length of the lever arm from the trunnions, at which the spring acts, as the gun is elevated or depressed. Thus at all angles of elevation the product of the spring load times its lever arm may be made approximately equal to the product of the oscillating weight times its lever arm and an approximate counter-balance secured. In order to effect a closer approximate counter-balance, two auxiliary springs (16^b) and (16^c) are employed. Spring (16^b) is compressed when the gun is vertical and acts against the spring (16) to reduce its pressure, while spring (16^c) is compressed when the gun is horizontal and acts in conjunction with spring (16) to increase its pressure. By this arrangement of springs it is possible to obtain a very close approximation between the moments of the oscillating weights and the moments of the counterbalancing springs and thus a very satisfactory balance is secured. It is believed that the means for counter-balancing a gun and shield as hereinbefore described, is new and novel.

It should be understood that we do not limit ourselves as to the number of counterbalancing springs to be used, as, when the unbalanced moment of the gun is considerable, several springs may be required.

Referring to Fig. 5, the hatch cover (17) is formed as part of the slide (2) and is provided with lugs (18 and 18^a) for carrying the sight mounting, a packing ring (19) and a gland (19^b) fitted around the gun and a soft packing ring (20) said ring (20) being designed to form a water-tight joint in conjunction with the upper edge (21) of the hatch (8). This hatch cover (17) is preferably of armor plate adapted as a shield to deflect the enemy's bullets, etc. The cylindrical bronze sleeve (23) is pressed or shrunk on the outside of the gun and is additionally held by a locking ring (24) which is screwed on the gun by means of thread (24^a).

Referring to Figs. 6 and 7, the gun muzzle is provided with lugs (25) designed to engage the lugs (26) formed on the arms of the carrier (27). The carrier (27) is internally threaded to receive the clamping handle (28), through the center of which passes the stud (29), rigidly secured to the cover (30) and provided with a collar (31). The cover (30) is provided with an internal flange (32) and a soft packing ring (33), engaging the annular sharpened surface (34) of the gun when clamped in position, thus making a water-tight joint. The object of this muzzle cover is to protect the bore of the gun when the gun is submerged; it is not an essential part of the combination which renders the compartment water-tight when the mount is housed, as the cartridge case in the breech end of the gun pre-

vents the entrance of water, into the compartment, through the bore.

Referring to Figs. 1, 2, 3 and 5, showing the sight mounting, the lug (18) secured to the hatch cover (17) is machined to receive the horizontal hinge pin (35) of the sight mounting. The sight saddle (36) is hinged at the pivot (35) and is provided with a toothed arc (37) which meshes with the elevating worm (38). The worm (38), by means of the handwheel (39) mounted in the lug (18^a) elevates and depresses the sight. The yoke (40) carries the pointer's and trainer's telescopes (41) with eye pieces (41^a) and is pivoted to the saddle (36) by means of the hinge pin (42). The handwheel (43) mounted in the saddle (36) operates the azimuth worm (44) which meshes with the toothed arc (45), and provides the azimuth adjustment for the yoke (40). The telescopes (41) are carried by the holders (46) which are pivotally mounted on the bars (47) secured to the yoke (40) on each side of the mount. When the sight is in use the telescopes and holders are locked in the full line position shown in Fig. 3 and in this position the field of the telescope is unobstructed by the shield. Before the gun can be housed in the hatch of the vessel the telescopes must be housed so as not to project beyond the limits of the hatch opening and this is done by unlocking and swinging the holders into the housed or dot and dash position shown in Fig. 3. The telescope holders are locked on the bars (47) by any suitable means such as the set screws (47^a). This sight mounting is designed especially to suit the requirements of this gun for use on submarines and the new and novel features comprise the method of housing the telescopes and the means of setting the sight.

Referring to Figs. 8, 9 and 10, showing the interlocking device, the plunger (5) is machined to receive the locking pawls (50) which are moved in and out by means of the dove-tailed wedge (51), formed on the lower end of the rod (52). The rod (52) is raised and lowered by means of the interlocking lever (53) pivotally connected to the carriage by the pin (54) the lever (53) being engaged by the breech end of the gun, when the gun is elevated to vertical position. The breech of the gun has formed thereon two lugs (55) which engage the projections (56) formed on the lever (53) and serve to push the rod (52) down when the gun is depressed from the vertical position.

By reference to Figs. 1 and 2 it will be seen that the locking pawls (50) cannot be thrown out until the gun is fully raised to the battery position and that when thrown out the pawls rest on the top edge of the bearing (57) formed in the housing hatch and lock the gun securely in battery. Hence, before the gun can be housed in the hatch

it must first be raised to the full vertical position which movement automatically withdraws the locking pawls and permits the gun to be lowered, nor can the gun be moved from the vertical position to any other angle as for firing until it has been fully raised from the housing hatch. The spring (58) serves to keep the pawls out and in engagement with the hatch when the gun is in the battery position, Fig. 1. In order that the carriage can be trained with the gun while the locking pawls remain fixed in the non-training plunger, a swiveled joint is provided in rod (52). The nut (59) is screwed on the end of rod (52) said nut being provided with a shoulder (60) to engage collar (61) formed in the rod extension (62) which is pivotally connected to the lever (53). The rod (52) and nut (59) are keyed in the plunger by means of the flat sides of the wedge (51) while the rod extension (62) revolves with the carriage. The gun is elevated to the vertical position by means of the handwheel (6), Figs. 1 and 2 and is locked in this position in the mount by the elevating worm (7) and connecting gearing.

Having thus described our invention, what we claim is:—

1. In a watertight compartment for sheltering and housing a gun and mount, a combination of an up and down adjustable gun and mount, a shield rigidly secured to the mount and made a part thereof, said shield being provided with a permanently watertight joint through which the gun recoils and through which it projects when housed, the whole combination serving to close the compartment and make it watertight when the gun and mount are housed.

2. In connection with a housing compartment, a combination of a gun, a housable mount, a shield rigidly secured to the mount and made a part thereof, said shield provided with a permanently watertight joint through which the gun recoils and through which it projects when the mount is housed, the whole combination being adapted to close the compartment and make it watertight when the mount is housed, and means for securing the combination in the housed position.

3. In connection with a housing compartment, a combination of a gun, a housable mount, a shield rigidly secured to the mount and made a part thereof, said shield provided with a permanently watertight joint through which the gun recoils and through which it projects when the mount is housed, the whole combination being adapted to close the compartment and make it watertight when the mount is housed, and means for securing the combination in the battery position.

4. A combination of a housable sight mounted on a shield, said shield being rig-

idly attached to a gun mount and made a part thereof and fitted with a permanently watertight joint through which the gun recoils; said sight in its normal or sighting position projecting beyond the limits of the shield but so adapted as to permit it being closed to a housed position within the limits of the shield.

5. In a watertight compartment for sheltering a gun and mount, a combination of an up and down adjustable gun and mount, a shield rigidly attached to the mount and made a part thereof, said shield being provided with a permanently watertight joint through which the gun recoils and through which it projects when sheltered, the whole combination serving to close the compartment and make it watertight when the gun and mount are sheltered, and a detachable watertight cover for protecting the bore of the gun.

6. In combination with an adjustable gun mounting a watertight hatch for housing the same a watertight hatch cover rigidly secured to the gun mount and through which the gun recoils and through which it projects, in a permanently watertight fitting, when housed, a hydraulic cylinder for hoisting the gun to or lowering it from the battery position, a jacket around the cylinder and orifices in the walls of the cylinder for the passage of liquid between the jacket to the cylinder for the purpose of controlling the speed of hoisting or lowering the gun and improved means for operating the hydraulic cylinder.

7. In combination with an adjustable gun mounting, a watertight hatch for housing the same, a hydraulic cylinder for hoisting or lowering the gun to or from its battery position, a jacket around the cylinder, and

orifices in the wall of the cylinder for the passage of liquid between the jacket and the cylinder, and means for introducing air under pressure into the jacket to act on the surface of the liquid for the purpose of hoisting the gun to its battery position.

8. A combination of an adjustable gun mounting, a watertight compartment for housing the same, a hatch cover secured to the gun mount and made a part thereof, and through which the gun muzzle projects, in a permanently watertight fitting, both when the gun is in battery and when it is housed and at all intermediate positions, and means for raising or lowering the gun mount from or to the housed position.

9. In combination with a housable mount for guns, a shield rigidly attached to the mount and made a part thereof, a sight normally projecting beyond the limits of the shield when the mount is in the battery position, and means for housing the sight behind and within the limits of the shield when the mount is to be placed in its housed position.

10. The combination of a gun mounting for ships, a watertight housing for the same, a shield secured rigidly to the gun mount and provided with a permanently watertight fitting through which the gun projects when the mount is housed, acting as a watertight cover for the housing, and a sight normally projecting beyond the limits of the shield and adjustably mounted for housing behind the shield when the gun mount is to be housed in the watertight compartment.

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Witnesses:

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