

Part IV.  
Section 4.Communi-  
cations  
and Control  
of Fire.

Below the armoured deck is the main transmitting station, which is divided into two compartments, the lower and smaller of which is the main armament transmitting station and the upper the secondary armament transmitting station.

The fore control tower is said to be the primary control position for both the main and secondary armament. The after control tower is thought to be the secondary control position.

The officers stationed in these positions vary according to the organisation of the ship. It has been reported that in the "*König*" class both the first and second gunnery officers are stationed in the fore control tower, the former controlling the main armament and the latter the secondary armament.

In the "*Kronprinz*" the firing is said to be controlled from aloft. This arrangement is believed to be experimental.

From a photograph of the "*Bayern*" it appears that a substantial control top is fitted aloft and in addition two other large tops of a less substantial construction.

Method of Control in the "*Braunschweig*" in 1909.

The following is derived from a reliable report, received in 1909, as to the manner in which fire control was exercised in the "*Braunschweig*" in that year. The report is only given as an aid in filling up the gaps in the information available as to how control is carried out at the present time. This should be read in conjunction with the description of the arrangement of instruments in this ship which appears on page 26.

No rate-of-change instruments or range clocks were then in use, but these have since been introduced.

The 1st artillery officer in the fore conning tower has a flexible voice-pipe, which he carries about with him, leading to the transmitter operator on the engaged side. The ear-piece for the operator is fixed either to the side of the transmitter or to the wall of the conning tower.

The ranges are called out by the range-readers, and are passed to the operator by the 1st artillery officer. They are then transmitted to the guns both by transmitter and telephone. Spotting corrections are applied directly to the range scale of the range-finder, the range-reader at once calling out the new range, which is passed to the guns (*vide* page 17).

The deflection is given by the 1st artillery officer, and is the total lateral correction due to speed, wind, &c.; officers of quarters do not give orders relative to deflection, except in the case of local control.

The bearing of the object is obtained in degrees from the bearing indicators, and is passed to the guns by telephone. In the floor of the turret there is a small sighting hole, through which the graduated training arc can be read.

The control of the heavy and of the medium calibre guns is separated, the 1st artillery officer controlling whichever he considers the more important calibre and the 2nd artillery officer controlling the other. In the "*Braunschweig*" the 1st artillery officer controlled the 6.7-inch (17-cm.) guns, and the 2nd artillery officer the 11-inch (28-cm.) guns.

The orders passed by the 1st artillery officer for opening fire are as follows:—"Bearing  $x^\circ$ "; "Description of target, *e. g.*, on 1st, 2nd ship, &c. of enemy's line"; "Range in hundreds of metres"; "Deflection—left or right." Ranging is carried out with *Teilsalven* (partial broad-side salvos) from three or four 6.7-inch guns.

Fire is opened with the 11-inch guns as soon as the shots of a (17-cm.) *Teilsalve* fall both over and short.

Rapid independent fire is employed whenever (a) the range is nearly constant, (b) the range is short.

The general order to "Cease Fire" (*Halt!*) is passed by telephone, a captain's "Cease Fire" gong not being fitted.

No special dispositions are made for engaging two targets simultaneously on one side, but all guns fire at one target, except when the after (28-cm.) turret will not bear. In this case a special target is assigned to the turret, on which the turret officer assumes local control, finding his own range, &c.

The ranges from the range-finder in the fore lower top can only be passed down by a voice-pipe to the monkey island, thence by a megaphone mouthpiece in the roof of the conning tower.

Part IV.  
Section 4.Communi-  
cations  
and Control  
of Fire.

When practising the disablement of the fore conning tower, no order to this effect is passed to the guns, but the transmission of ranges, orders, &c. is simply discontinued. On failure to obtain any reply from the conning tower by telephone the officers of quarters at once assume the local control of their groups, and transmit ranges by electrical instruments to the transmitting station, whence they are retransmitted to the gun positions.

## Control of Anti-T. B. Armament.

It was reported in 1909 that in the "*Braunschweig*" one gun from each 11-inch (28-cm.) turret and all the 6.7-inch (17-cm.) guns, in addition to the 3.5-inch (8.8-cm.) guns, were used for repelling torpedo boat attack.

It was reported in June 1910 that the 16 3.5-inch (8.8-cm.) guns of the battleship "*Nassau*" were divided into four groups of four guns each for purposes of control at night. Two forward groups are controlled from the fore conning tower, and the two after groups from the after conning tower. Each gun has an indicator near it which shows range and deflection, and each gun has a call-bell.

It should be noted that the above arrangement of the grouping of anti-T. B. guns can be no longer in use, as the number of 8.8-cm. guns carried in capital ships has recently been considerably reduced. These remarks have, however, been allowed to stand as they may give some indication of the method of grouping the guns of light and medium calibre now used as anti-T. B. armament.

No electrical range instruments are provided at the 3.5-inch (8.8-cm.) guns on board the "*Von der Tann*." Orders and ranges are believed to be passed by voice-pipe, and bells are provided to each pair of guns which are used as "permissive to fire."

The guns are divided into four groups of four guns each, with two searchlights allotted to each group. These are electrically controlled, each light having its own electrical controller, two being placed each side of the forebridge and the same aft.

The 3.5-inch (8.8-cm.) guns of the "*Goeben*" have no electrical range instruments. Voice-pipes leading to the upper bridge are fitted as permanent fixtures with flexible ends.

## Control of Practice Firing in Peace Time.

The following information was derived from various sources prior to the war:—  
In ships of the Dreadnought type the secondary armament is manned during day and night action.

Salvoes appear to be generally used when firing at long ranges. In a demonstration firing before the Turks in 1911 salvoes from 5.9-inch guns were fired alternately with those from the 11-inch.

In salvo fire (*Salvenfeuer*), on the command "*Salve*" all guns are trained on the target; on the order "*Feuern*" all guns are fired within the firing limit as soon as the sights come on.

The point of aim ordinarily used is the centre of the enemy's ship on the water-line. At close ranges, *i. e.*, about 3,000 metres and under, the control officer passes the order "*Teilscheibe suchen*," on which each gunlayer selects his own point of aim.

It has been reported from several independent sources that the Germans endeavour to obtain 25 per cent. of short shots.

Simultaneous firing of both guns of a turret is frequently practised, the gun-slides being locked together so that the guns move in elevation as one.

In controlled fire (*Feuern nach Kommando*) the gunlayer fires as soon as his sights are on after receiving the order to fire, provided a certain definite interval of time is not exceeded.

In independent fire (*Geschützweises Feuern*) the gunlayer fires independently, but still uses the range and deflection as ordered. If, however, the order "*Kasematte*" (casemate) or "*Türme Geschütze selbständig*" (turret independent) is given, the gunlayer judges his own range and deflection, and in some cases the target also. If it is desired to develop the maximum rate of fire the order "*Schnellfeuer*" (rapid fire) is given.

## Peace Practice in Repelling Torpedo Boat Attack.

The following is a translation of the "Firing Regulations for repelling Torpedo Boat Attack" which were in use in 1909.



Part IV.  
Section 4.  
—  
Communi-  
cations  
and Control  
of Fire.

Two descriptions of firing are employed, viz., "Controlled" and "Non-controlled."

The non-controlled firing falls into two categories—deliberate firing (*Einzelschiessen*) and effective firing (*Wirkungsschiessen*).

**Deliberate Firing (*Einzelschiessen*).**

The manner of firing is by single shots, i. e., each individual shot is observed, and, after the necessary correction has been placed upon the sight, No. 4 reports "*Eingestellt*" (adjusted). The fall of the next shot is then observed; No. 1 keeps his sights continually on the target.

**RULES.**—*Strichschiessen* or shortened (abbreviated) *Strichschiessen*. In this method a "short" shot is sought after, and the same elevation kept on the sight until an "over" is obtained. In the abbreviated *Strichschiessen*, after obtaining a "short," the sight is raised 100 metres after each shot until an "over" is obtained.

As soon as the "over" is obtained, the gun is on the target and No. 4 reports "*Eingeschossen*" (Range obtained!) *Wirkungsschiessen* is then resorted to. If the first shot is not, as expected, a "short" but an "over," the sight is put down from 400 to 200 metres between each round according to the rate of approach of the target until a "short" is obtained. If the rate of approach exceeds 25 knots, *Strichschiessen* is employed; if less than 25 knots, abbreviated *Strichschiessen*. After doubtful rounds No. 4 uses his own judgment in deciding how much to lower the sight.

**Effective Firing (*Wirkungsschiessen*).**

The method of firing is rapid fire, i. e., No. 1 fires as rapidly as possible without taking any notice of the fall of the shot. No. 4 attempts to keep the shots on the target by altering the sight.

Rules can only be indicated generally, and cannot be definitely laid down to meet every case. Success in keeping on the target will be obtained by careful attention and by practice. As a general rule the *Wirkungsschiessen* will consist of a constant series of *Strichschiessen* based on an approximate estimate of the rate of approach. Thus, after an "over" the sight is lowered more than the distance the target has approached so as to obtain a "short," and then firing is continued till an "over" is again obtained. The point to be aimed at is only to obtain one "short." The ideal, therefore, is to obtain alternately "short" and "over" or "hit." If the rate of approach is very small a second "over" may be expected if the sight is only lowered sufficiently to correspond with the estimated rate of approach; likewise, in such a case, after a "short" one can shoot up to the target by raising the sight 50 to 100 metres per round.

In every case the rules to be observed are as follows:—

Unless the target is obviously getting further away, the sight must be lowered after every "over," even if no alteration in range is observed. If after lowering the sight a "short" was to be expected but was not obtained, the amount the sight is lowered between the shots must be energetically increased until the desired "short" is obtained.

**Director Firing.**

Very little information concerning director firing has been obtained during the war. It is however believed that the following notes on director firing apply to the most recent

German battleships, battle cruisers, and cruisers:—

Ships are fitted with a form of "director" firing, the guns being laid in elevation and training from a master sight. The elevation and training are communicated electrically in each turret to a dial on which a black hand shows the elevation and a red hand the bearing. The captain of the turret lays and trains until two other hands, likewise one black and one red, cover the first two.

The guns of a turret are fitted with "local" firing gear for individual laying, but this is only used if the "director" system has failed.

It is not yet clear whether the guns are actually fired by a key at the master sight or by some system indicating a definite position in the roll and closing the circuits at such a position either by hand or automatically.



## 26 GERMAN NAVY—PART IV.—TARGET PRACTICE, ETC., JULY, 1917.

### Part IV. Section 4. Communi- cations and Control of Fire.

movable strips, one being for right and the other for left deflection. The strips are adjusted by means of two small wheels on the front face of the instrument, and move past fixed pointers.

The order transmitter is placed by the side of the deflection transmitter, and consists of a movable pointer which is pulled outwards and then slid up or down to transmit the orders. The orders are engraved on the face of the instrument. Some of these are—

<i>Schnellfeuer</i> .....	Rapid fire.
<i>Stahlvollg</i> .....	A. P. shot.
<i>Granaten</i> .....	Shell.
<i>Schiff dr. n. B. B</i> .....	Ship turning to port.
<i>Schiff dr. n. St. B.</i> .....	Ship turning to starboard.
<i>Schiff g. ger. aus</i> .....	Ship steering straight ahead.

The range-transmitter in the lower portion of the instrument consists of a revolving strip graduated in range for each 100 metres (109 yards). The strip is moved by means of a small wheel placed below the slot, past two fixed pointers. For showing distances of 50 metres there is a special arrangement (not shown on the sketch) at the side of the range strip, by which 50 can be indicated.

Buzzers are fitted in the circuits and operate during any alteration in range, deflection, or order.

On the top of the instrument there is a switch for switching on the current.

#### Instruments in T. B. D's.

Twelve T. B. D's. were ordered to be fitted with the "Schepeler" system of fire control before the summer of 1914, and, should the instruments successfully withstand wear and tear, a provisional promise to order 150 sets was given. This system is described on page 20 of Danish Navy, Part IV, Section 4, in which Figs. 1, 2, and 3 of Plate V show the types of instrument ordered by the German Navy.

According to information obtained from prisoners and other sources during the war, fire is controlled in T. B. D's by means of electric transmitters, telephones, or flexible voice pipes. The electrical receiving apparatus is fixed above each gun just in front of the breech. It shows the range to the nearest 100 metres, and the deflection and orders for firing. The orders shown are as follows:—

- Rapid fire (*Schnellfeuer*).
- Independent (*Selbständig*).
- Local control (*Geschützweise*).
- Cease firing (*Batterie halt*).

Fire gongs are fitted.

#### Arrangement of Instruments on board the Battleship "Braunschweig." (From a Report received in 1909.)

(See Plates 44 and 45.)

#### Fore Conning Tower.

The following fire-control instruments are fitted:—

Transmitters and Telephones.—Two range, order and deflection transmitters and two telephones for the 6.7-inch (17-cm.) guns, one for each broadside. These instruments, which are connected to receivers in the transmitting station, are placed low down on the wall of the conning tower on either side of the entrance, and the operators sit to manipulate them.

One range, order and deflection transmitter, and one telephone for the 11-inch (28-cm.) turrets, connected to similar instruments in the transmitting station. The transmitter can be used for either or both 11-inch and 6.7-inch turrets. The transmitters and telephones for the 11-inch and 6.7-inch guns can be switched on direct to the gun positions (see under "Transmitting Station"). One telephone to the after conning tower.

Fire-gongs.—Alongside each of the 6.7-inch transmitters there are seven switches, one for each gun, operating single stroke fire-gongs in the gun positions. There is also a separate push switch which rings all the fire-gongs on the broadside simultaneously.



The bearing indicator in the turrets consists of two dials; the lower one, with a red pointer, is an electrical receiver, to which bearings are transmitted from the control position. The upper one, with a black pointer, indicates the bearing of the turret.

In the "*Friedrich der Grosse*" a similar arrangement is fitted, but with a single dial with two hands, one red and the other black.

The range receiver in the "*König*" consists of an electrical receiver showing ranges to 25 or 30 metres. These are fitted above each gun. It is believed that these instruments were fitted in a few ships before the Jutland action, and it has been stated that they are now fitted in all the more modern ships.

The combined range, deflection, order and bearing receivers of the 5.9-inch guns are mounted above the guns and clear to view.

Fire gongs are fitted to all guns.

Ranges are received in control tower from turrets by telephone only.

Combined range deflection and order transmitters and receivers, and voice pipe communication from the control tower and turrets and 5.9-inch batteries, are fitted in the transmitting stations of the "*Friedrich der Grosse*." In addition, there are telephones to all turrets.

#### Method of Use of Instruments.

It has been reported on reliable authority that the turret guns in the "*König*" are always fired by gong, one short ring indicating "Salvo," followed by one short and one long ring indicating "Fire."

It has been stated that one of the officers in the control tower plots range-finder ranges. Other information in this connection is not available.

#### Control Staff.

The following personnel are reported to be employed in connection with fire control in the "*König*":—

Gun control tower.....	Three officers, including the second and third gunnery officers, and one able seaman range-taker.
Upper transmitting station.....	Three able seamen.
Main armament transmitting station.....	Four men (no officers).
Secondary armament transmitting station.....	Eight men (no officers).
After conning tower.....	Four men and one petty officer for rangefinder and torpedo control.
Aloft.....	One officer and one midshipman for spotting.



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Part IV.  
Section 5.

July 1917.

Attention is called to the penalties attaching to any infraction of the Official Secrets Act.

C. B. 1182.

## GERMAN NAVY.

### PART IV.

#### SECTION 5.

#### INDEX TO PART IV.

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Part IV.  
Section 5.  
Index.

## SECTION 5.

## INDEX TO PART IV.

Subject.	Section and Page.	Subject.	Section and Page.
Adjusting Ranges for Torpedoes.....	3-16	Electric Transmitters and Receivers.....	4-25
Air Compressors.....	3-15	Experimental Shell.....	2-8
Allowance of Ammunition per Gun.....	2-13	Explosive Boat.....	3-17
Annual.....	4-4	Explosives (High).....	2-5
Ammunition, Table of.....	2-14	Explosive Sweeps.....	3-30
Ammunition (Types of, &c.).....	2-3		
Ammunition Supply to Secondary Armament.....	2-17	Field Guns. See Guns.	
Annual Allowance of Ammunition.....	4-4	Field Guns, Mountings for.....	1-26
Anti-Aircraft Guns. See Guns.		Firings, Weather Conditions during.....	4-3
Anti-Aircraft Targets.....	4-15	Firing Practices:	
Anti-T. B. Armament, Control of.....	4-23	1910-1912.....	4-5
Anti-Submarine Devices.....	3-31	1912-1913.....	4-6
A. P. Shell.....	2-7	1913-1914.....	4-9
Arrangements for striking down Searchlights.....	3-33	During War.....	4-14
Automatic Guns.....	1-11	Fleet Sweepers.....	3-30
Automatic Pistol.....	2-17	Fuzes.....	2-10
Awards for Good Shooting.....	4-3	Base Fuzes.....	2-10
		Delay Action Base Fuze.....	2-11
Bands, Driving.....	2-9	H. E. Base Fuze.....	2-11
Battery Mountings.....	1-24	H. E. Nose Fuze.....	2-11
Bayonet.....	2-18	Internal Delay Action Fuze.....	2-10
B. L. Guns. See Guns.		Internal Fuzes.....	2-11
Boat Guns. See Guns.		Nose Fuzes.....	2-10
"Braunschweig," Method of Control in 1909.....	4-22	Steel Percussion Nose Fuze.....	2-10
"Braunschweig," Arrangement of Instruments on board.....	4-26	Time and Percussion Fuze.....	2-12
Breech Mechanism.....	1-7	Gaines.....	2-13
For Automatic Guns.....	1-11	Gun Circuits.....	1-12
For Semi-Automatic Guns.....	1-11	Gun Mountings. See Mountings.	
For Q. F. Guns.....	1-7	Gun Sighting Telescopes.....	1-29
Calibration (Target Practice).....	4-3	Guns.....	1-29
Caps.....	2-9	Anti-Aircraft.....	1-3
Carbonit Mine.....	3-26	Anti-T. B.....	1-7
Carbonit Mine Finder.....	3-29	B. L.....	1-6
Carbonit Mine, New (Fish type).....	3-27	Boat.....	1-4
Cartridges.....	2-5	Breech Mechanism for.....	1-6
For B. L. Guns.....	2-6	Classification of.....	1-7
For Q. F. Guns.....	2-6	Field.....	1-3
Marking of.....	2-6	Light Q. F.....	1-6
Cases (Powder).....	1-24	Machine.....	1-6
Casemate Mountings.....	2-5	Q. F.....	1-6
Charges.....	3-13	Reserve of.....	1-4
Charge for Warheads.....	1-3	Relining of.....	1-4
Classification of Guns.....	2-9	Rifling.....	1-4
Coloured Star Shells.....	2-8	Sub-Calibre Guns.....	1-3
Common Shell.....	4-20	Submarine Guns and Mountings.....	1-7
Communications.....	4-26	T. B. and T. B. D.....	1-7
Compasses, Gyroscopic.....	4-23	Types in Use.....	1-7
Control of Anti-T. B. Armament.....	4-20	Gyroscope.....	1-3
Control of Fire.....	4-20	Gyroscopes, Schwartzkopf.....	3-14
General System.....	4-21	Gyroscopic Compasses.....	3-11
Spotting.....	4-21	"Helmholtz" Class of Battleship, Types of Instruments on board.....	4-25
Towers and Transmitting Stations.....	2-18	H. E. Shell.....	4-28
Outlass.....	3-31	High Explosives.....	2-7
Depth Charges.....	2-18	Hydrophones.....	2-5
Details of Small Arms.....	1-29	Instructional Appliances (Target Practice).....	3-32
Director Firing.....	4-24	Kite, Submarine.....	4-3
Control of Fire.....	3-11	"König" Class of Battleship, Control Arrangements and Instruments fitted.....	3-31
Discharge of Torpedoes.....	3-17	Krupp War Material.....	4-28
Distance Controlled Explosive Boat.....	2-9		1-29
Driving Bands.....			

## INDEX.

Part IV.  
Section 5  
Index.

Subject.	Section and Page.	Subject.	Section and Page.
Leon's Automatically-steered Torpedoes.....	3-11	Range-Finders.....	4-15
Leon's Torpedo Mine.....	3-23	Anti-Aircraft.....	4-17
Life of Rifling.....	1-3	Divided Image.....	4-16
Light Q. F. Guns.....	1-6	Method of Showing Gun-Range.....	4-17
		Numbers carried.....	4-17
"M" Class Minesweepers.....	3-30	Sextant Principle.....	4-16
Machine Guns. See Guns.	2-5	Stereoscopic.....	4-15
Magazine Flooding Arrangements.....	2-13	Types of Instruments.....	4-18
Magazine Ring.....	2-6	Range-Finder Positions.....	4-19
Marking of Cartridges.....	2-9	Range-Takers and Range-Finding.....	1-4
Marking of Projectiles.....	4-22	Reserve of Guns.....	2-17
Method of Control in "Braunschweig" in 1909.....	4-14	Rifles.....	1-3
Method of firing during Action.....	4-14	Rifling.....	1-3
Methods of Firing.....	3-11	Rifling, Life of.....	1-27
Methods of Discharge of Torpedoes.....	3-18	Rocking Motion Sights.....	3-13
Mines.....	3-26	Seaplanes fitted with Dropping Gear.....	3-32
Carbonit.....	3-22	Searchlights.....	3-32
General.....	3-22	Searchlights, Arrangement for striking down.....	3-32
Inertia Firing Gear.....	3-28	Searchlights, Arrangement of Projectors.....	3-32
Leon Torpedo.....	3-19	Searchlights, Control of.....	3-32
Naval Types I. to VI.....	3-27	Searchlights, Types in Use.....	2-17
New Carbonit (Fish Type).....	3-25	Secondary Armament, Supply of Ammunition.....	1-11
Notes on the Handling of Recovered Naval Mines.....	3-22	Semi-Automatic Guns.....	2-7
Possible (Experimental) Government.....	3-23	Shot, Steel.....	2-8
Safety Gear.....	3-18	Shrapnel Shell.....	1-27
Sinkers.....	3-20	Sights.....	1-27
Supply of, to Ships.....	3-29	General.....	1-29
Table of Dimensions.....	3-30	Night.....	1-28
Mine Sweeping and Seeking.....	3-29	Non-Automatic Pattern.....	1-27
Mine-Sweepers, "M" Class.....	1-14	Rocking Motion.....	1-27
Mining Vessels.....	1-26	Tangent.....	2-17
Mountings.....	1-26	Small Arms.....	2-3
Boat and Field Gun.....	1-14	Small Arm Powder.....	2-3
For T. B.'s and T. B. D.'s.....	1-14	Smokeless Powder.....	4-21
General Notes.....	1-14	Spotting.....	3-16
Turret.....	1-24	Squadron Firing with Torpedoes.....	2-9
Types employed.....	1-24	Star Shell, Coloured.....	2-8
Upper Deck, Battery and Casemate.....	3-19	Star Shells.....	3-31
Naval Mines.....	3-18	Steel Wire Nets.....	3-31
Naval Mining Policy.....	1-13	Submarine Kite.....	3-18
Naval Ordnance, Table of.....	3-14	Submarine Mines.....	3-13
Net Cutters.....	3-27	Submarine Tubes.....	3-11
New Carbonit Mine (Fish Type).....	3-19	Submerged Torpedo Tubes.....	2-7
Notes on Handling of Recovered Mines.....	4-15	Substitute A. P. Shell.....	2-17
Night Action.....	1-29	Supply of Ammunition to Secondary Armament.....	3-18
Night Sights.....	2-3	Supply of Mines to Ships.....	2-18
Nitro-Glycerine Powders.....	1-29	Supply of Small Arms to Ships.....	3-9
Obry Gun-Firing Apparatus (Petravic Gear).....	2-12	Schwartzkopf Torpedoes.....	3-30
Percussion Fuze.....	2-3	Sweeps:	
Powder.....	2-6	Explosive.....	3-30
Powder Cases, Boxes, &c.....	2-3	Double Wire.....	3-30
Powder, Smokeless.....	2-3	Kite.....	3-30
Powder, Small Arm.....	2-3	Torpedo Boat and T. B. D.....	2-14
Powders, Nitro-Glycerine.....	2-5	Table of Ammunition.....	1-13
Powders, Storage and Supply to ships.....	4-23	Table of Naval Ordnance.....	1-27
Practice Firing, Control of, in Peace Time.....	2-9	Tangent Sights.....	4-15
Primers.....	2-7	Targets.....	4-3
Projectiles.....	2-7	Target Practice.....	1-29
Projectiles, A. P.....	2-7	Telescopes, Gun Sighting.....	2-12
Projectiles, General Notes on.....	2-9	Telescopes, Gun Sighting.....	3-16
Projectiles, Marking of.....	3-15	Time and Percussion Fuze.....	4-23
Proportion of Supply of Torpedoes to Ships.....		Torpedo Adjusting Ranges.....	3-16
		Torpedo Boat Attack, Repelling of.....	3-17
		Torpedo Directors.....	
		Torpedo Net Defence.....	
Q. F. Breech Mechanisms. See Breech Mechanisms.			
Q. F. Guns. See Guns.			



Part IV.  
Section 5.

## Index.

Subject.	Section and Page.	Subject.	Section and Page.
Torpedo Practice.....	3-15	Tracer Shell.....	2-8
Torpedo Protection Bulkheads.....	3-17	Training of Gunlayers.....	4-4
Torpedo Tubes in Submarines.....	3-13	Triple Turrets.....	1-14
Torpedo Tubes in T. B. D.'s and T. B.'s.....	3-12	Turret Mountings.....	1-14
Torpedo Tubes, Submerged.....	3-11	Types of Guns in Use.....	1-3
Torpedoes:		Types of Mountings employed.....	1-14
General.....	3-13	Universal Speed Gear.....	1-14
Government.....	3-2	Upper Deck Battery and Casemate Mountings.....	1-24
Leon's Automatically-steered.....	3-11		
Outrigger.....	3-17	"Von der Taun," Arrangement of Instruments on board.....	4-27
Schwartzkopff.....	3-9		
"Emden's" 17.7-in. No. 3,552.....	3-4	War Material, Krupp.....	1-29
17.7-in. "Improved" Emden Type.....	3-5	Williams-Jannet Universal Speed Gear.....	1-14
19.7-in. Nos. "G" 5,955 and "K" 7,400.....	3-5	Zeiss Stereoscopic Range-Finder.....	4-20
17.7-in. Fiume, No. 11,582.....	3-8		
17.7-in. Fiume, No. 13,555, fired from Seaplane	3-9		
Old Bronze German 17.7-in., No. 1,731.....	3-3		

The bearing indicator in the turrets consists of two dials; the lower one, with a red pointer, is an electrical receiver, to which bearings are transmitted from the control position. The upper one, with a black pointer, indicates the bearing of the turret.

In the "*Friedrich der Grosse*" a similar arrangement is fitted, but with a single dial with two hands, one red and the other black.

The range receiver in the "*König*" consists of an electrical receiver showing ranges to 25 or 30 metres. These are fitted above each gun. It is believed that these instruments were fitted in a few ships before the Jutland action, and it has been stated that they are now fitted in all the more modern ships.

The combined range, deflection, order and bearing receivers of the 5.9-inch guns are mounted above the guns and clear to view.

Fire gongs are fitted to all guns.

Ranges are received in control tower from turrets by telephone only.

Combined range deflection and order transmitters and receivers, and voice pipe communication from the control tower and turrets and 5.9-inch batteries, are fitted in the transmitting stations of the "*Friedrich der Grosse*." In addition, there are telephones to all turrets.

#### Method of Use of Instruments.

It has been reported on reliable authority that the turret guns in the "*König*" are always fired by gong, one short ring indicating "Salvo," followed by one short and one long ring indicating "Fire."

It has been stated that one of the officers in the control tower plots range-finder ranges. Other information in this connection is not available.

#### Control Staff.

The following personnel are reported to be employed in connection with fire control in the "*König*":—

Gun control tower.....

Three officers, including the second and third gunnery officers, and one able seaman range-taker.

Upper transmitting station.....

Three able seamen.

Main armament transmitting station.....

Four men (no officers).

Secondary armament transmitting station.....

Eight men (no officers).

After conning tower.....

Four men and one petty officer for rangefinder and torpedo control.

Aloft.....

One officer and one midshipman for spotting.



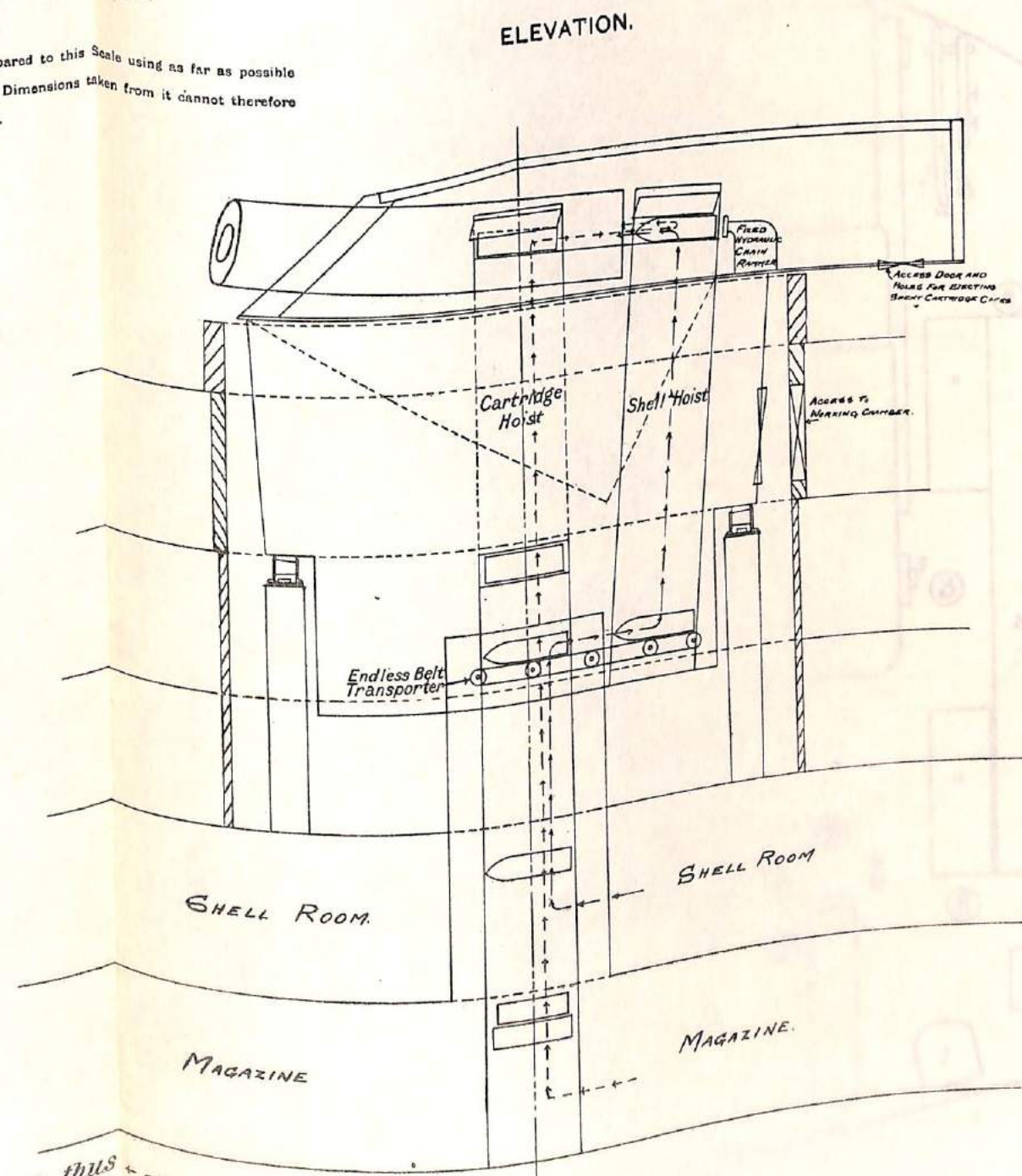
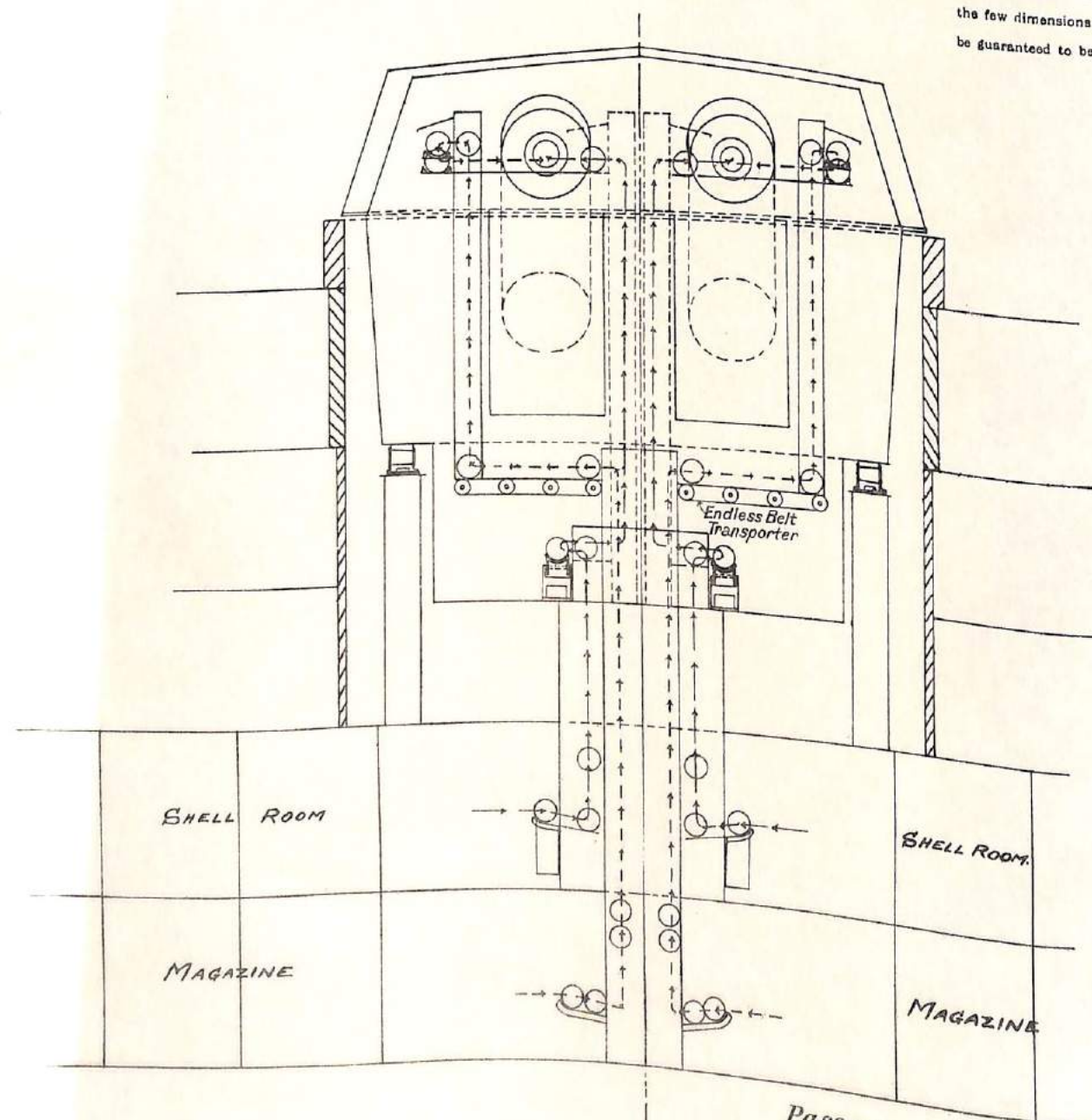
# 12 INCH (30.5 c.m.) BARBETTE MOUNTING, SHOWING AMMUNITION ARRANGEMENTS.

"KAISER" AND "KÖNIG" CLASSES.

SCALE  $\frac{1}{8}$  IN = ONE FOOT.

SECTIONAL ELEVATION.

NOTE:—This Drawing has been prepared to this Scale using as far as possible the few dimensions given. Dimensions taken from it cannot therefore be guaranteed to be correct.



Passage of Cartridges shown thus  
Projectiles

Ordnance Survey, July, 1917



# 12 INCH (30.5 c.m.) GUN HOUSE, "E" TURRET

Showing Positions of Machinery and Guns' Crews.

"KAISER" AND "KONIG" CLASSES.

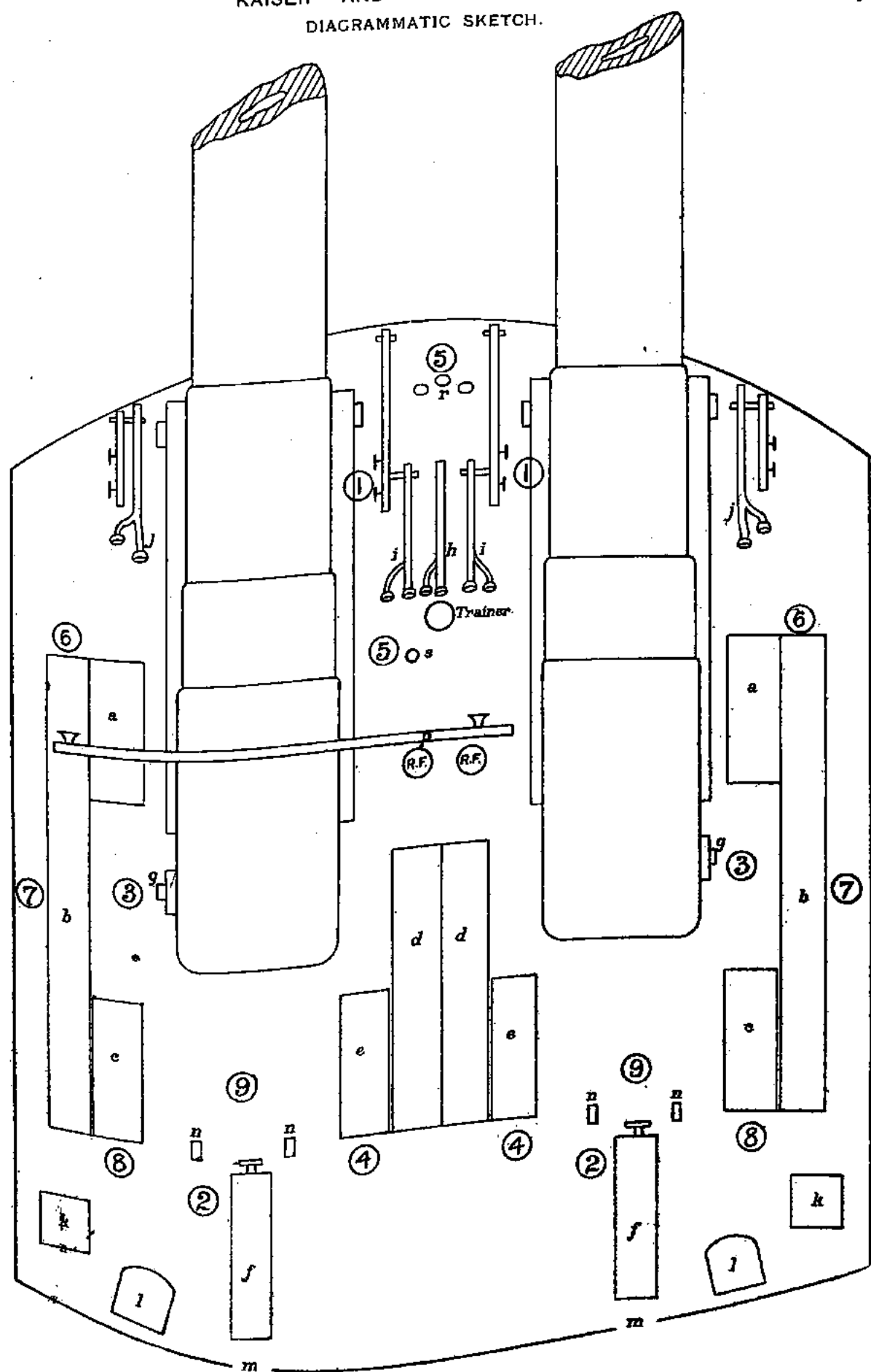
DIAGRAMMATIC SKETCH.

Plate 10<sup>a</sup>

C.B. 1182.

At end of Part IV.

July 1917.



- a Cartridge Hoist.
- b Cartridge Tray.
- c Cartridge Loading Tray.
- d Projectile Hoist.
- e Projectile Loading Tray.
- f Hydraulic Chain Rammer.
- g Breech Mechanism Motor.
- h Centre Sight (direct).
- i Gunlayers' Sights (Periscopic).

- j Outer Sights (Periscopic).
- k Manhole.
- l Cartridge Exit.
- m Rammer Hole now closed with flap.
- n Clips for holding safety flaps in place.
- p Range Finder.
- r Range, Deflection and Order Receivers.
- s Voices Pipes.

The figures, etc. in circles show the positions of the Turret's Crew.  
The Officer of the Turret is in the Sighting Hood.

Ordnance Survey, July, 1917.

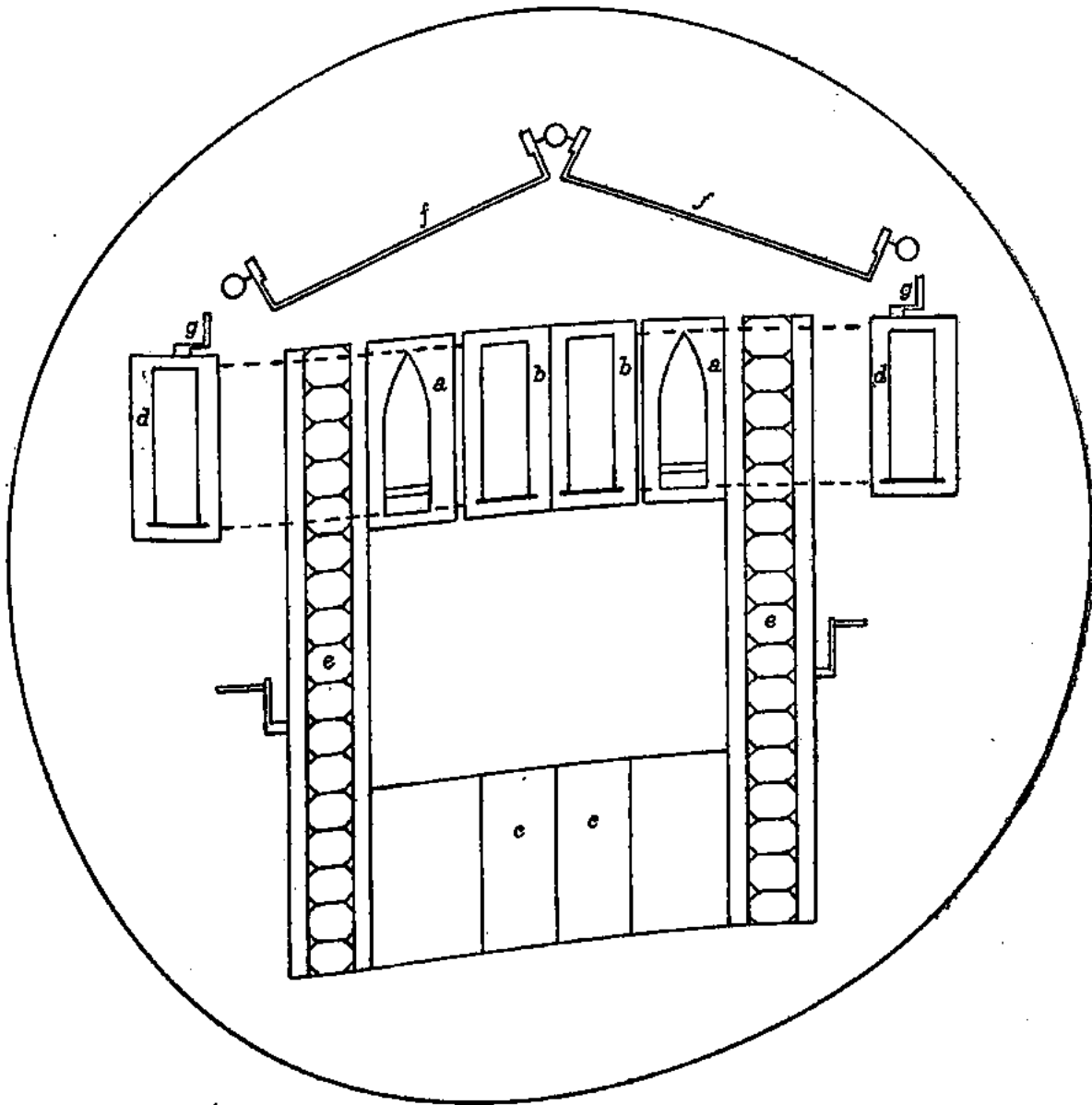


# 12 INCH (30.5 c.m.) TURRET

*Plan of Working Chamber.*

"KAISER" AND "KONIG" CLASSES.

DIAGRAMMATIC SKETCH.



- a - Projectile Hoist from Shell Room.
  - b - Cartridge Hoist from Magazine.
  - c - Projectile Hoist to Gun House.
  - d - Cartridge Hoist to Gun House.
  - e - Transporting Traveller for Projectiles, Endless Belt, hand worked.
  - f - Hand Training Winches.
  - g - Cartridge Transporting Winches working Endless Belt.
- The cartridges pass over the Projectile Hoist and Transporter.

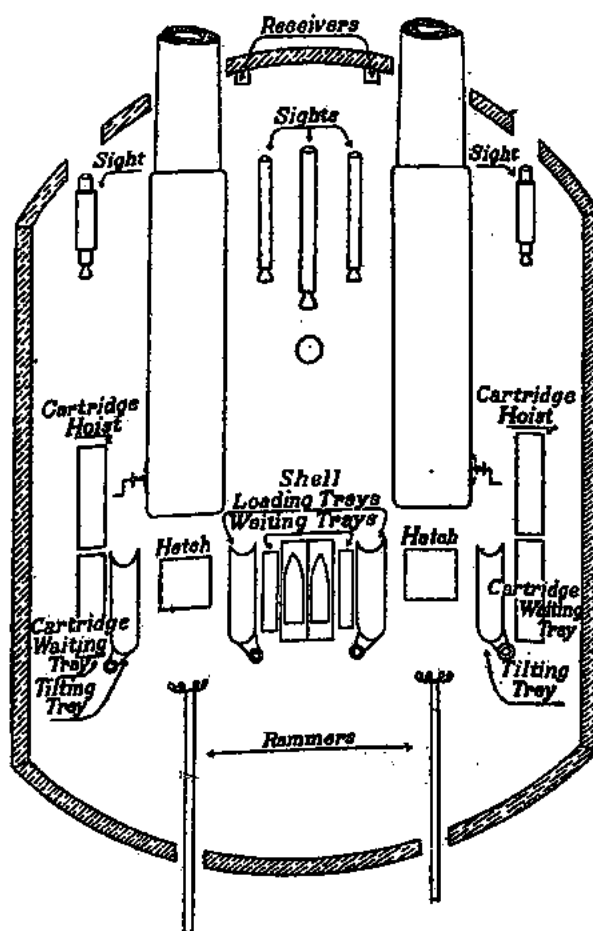
DECLASSIFIED  
Authority E.O. 105

Ordnance Survey, July, 1917.

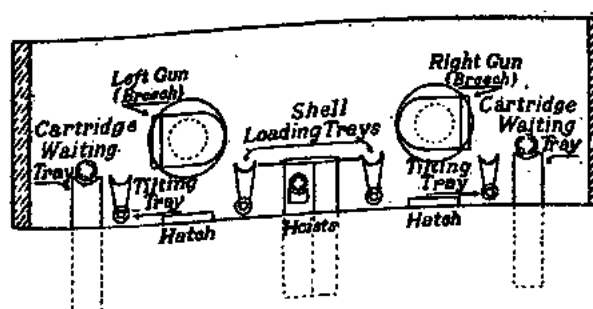


11" (28 c.m.) BARBETTE MOUNTING (DREHSCHIEBEN-LAFETTE).  
 (General arrangement of Turret).  
 "MOLTKE."

DIAGRAMMATIC SKETCH



PLAN OF TURRET



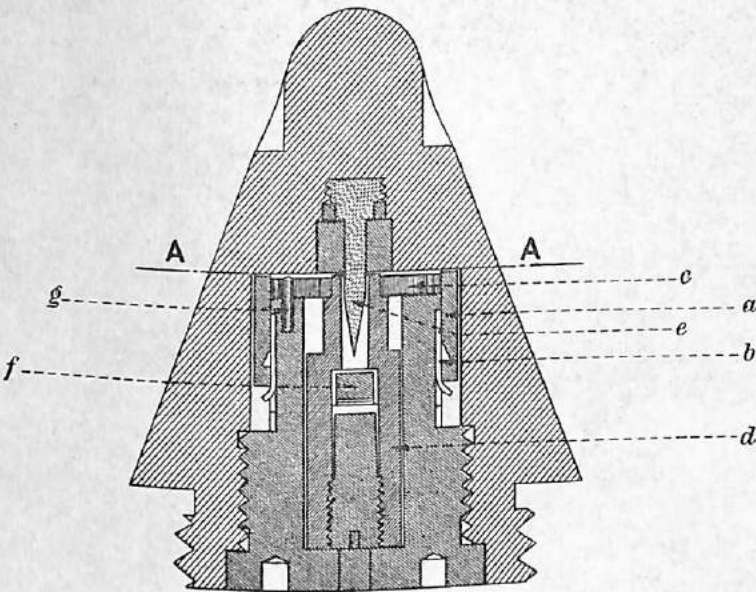
REAR ELEVATION



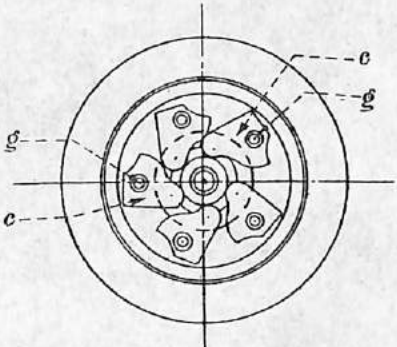
# STEEL PERCUSSION NOSE FUZE.

FULL SIZE.

Plate 23<sup>a</sup>  
C.B. 1182.  
At end of Part IV.  
July, 1917.

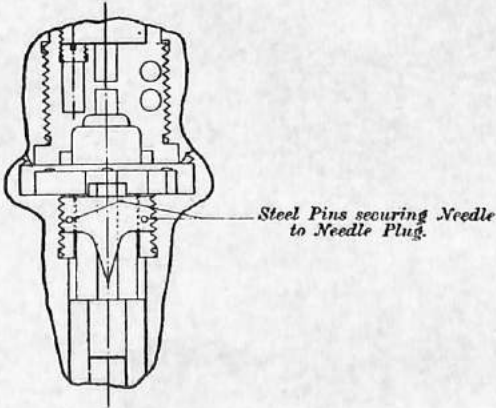
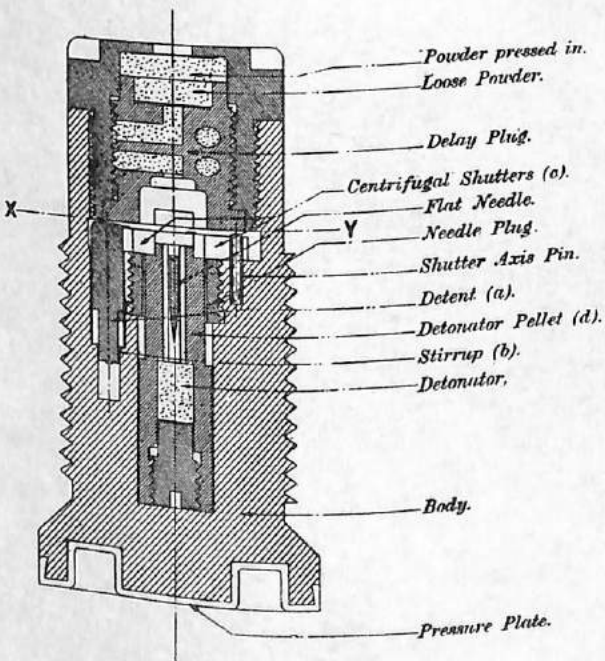


SECTION A.A.

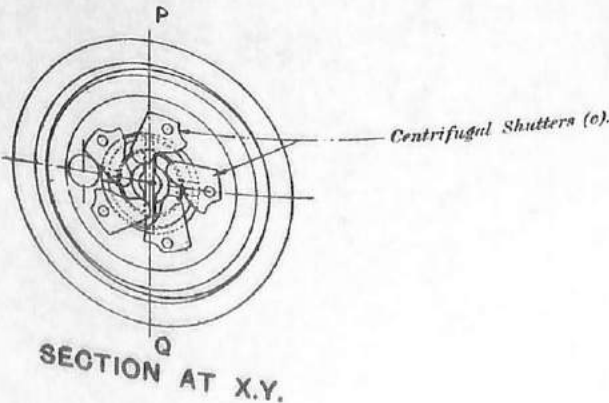


## DELAY ACTION BASE FUZE.

With safety shutters.  
FULL SIZE.



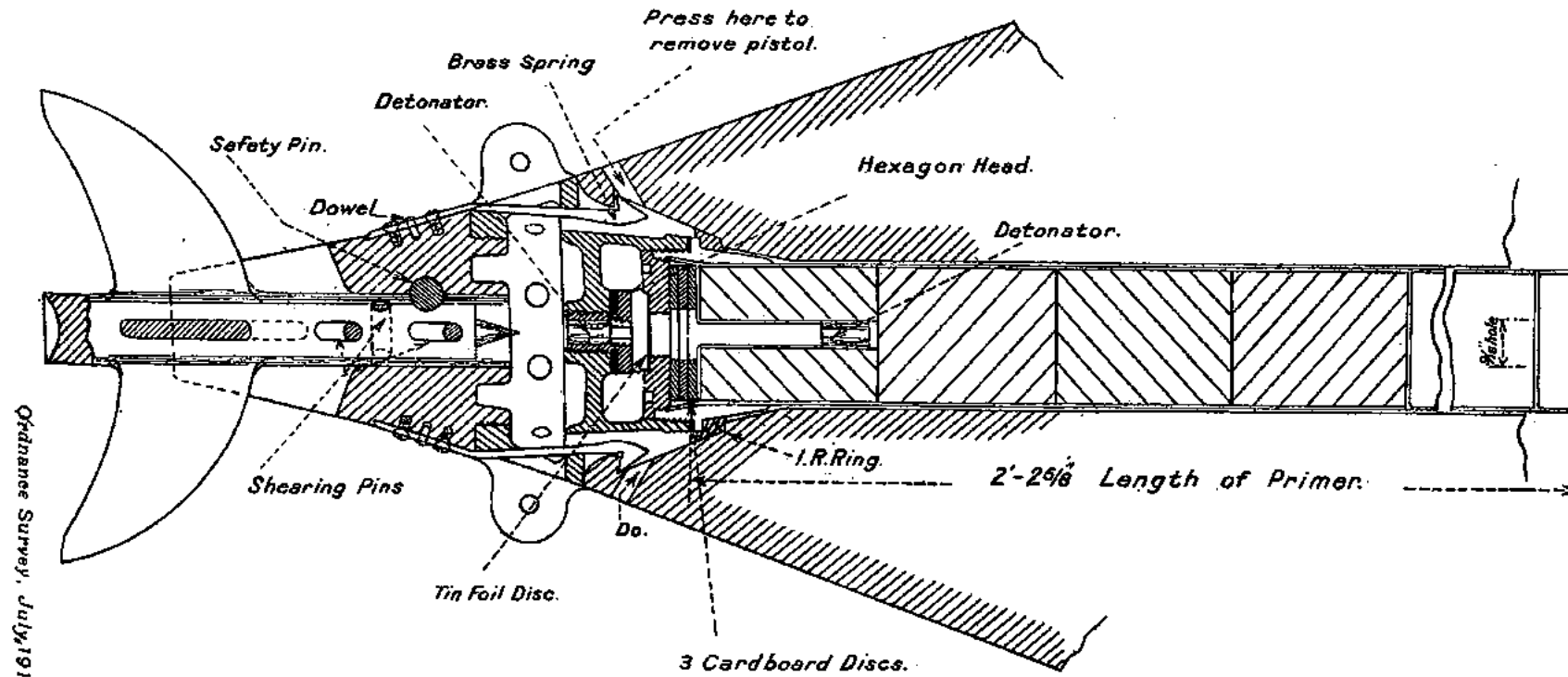
PART SECTION AT P.Q.





PISTOL & PRIMER FROM GERMAN 17.7 INCH (45 c.m.) TORPEDO No. 1731.  
1/2 SIZE.

20349 17



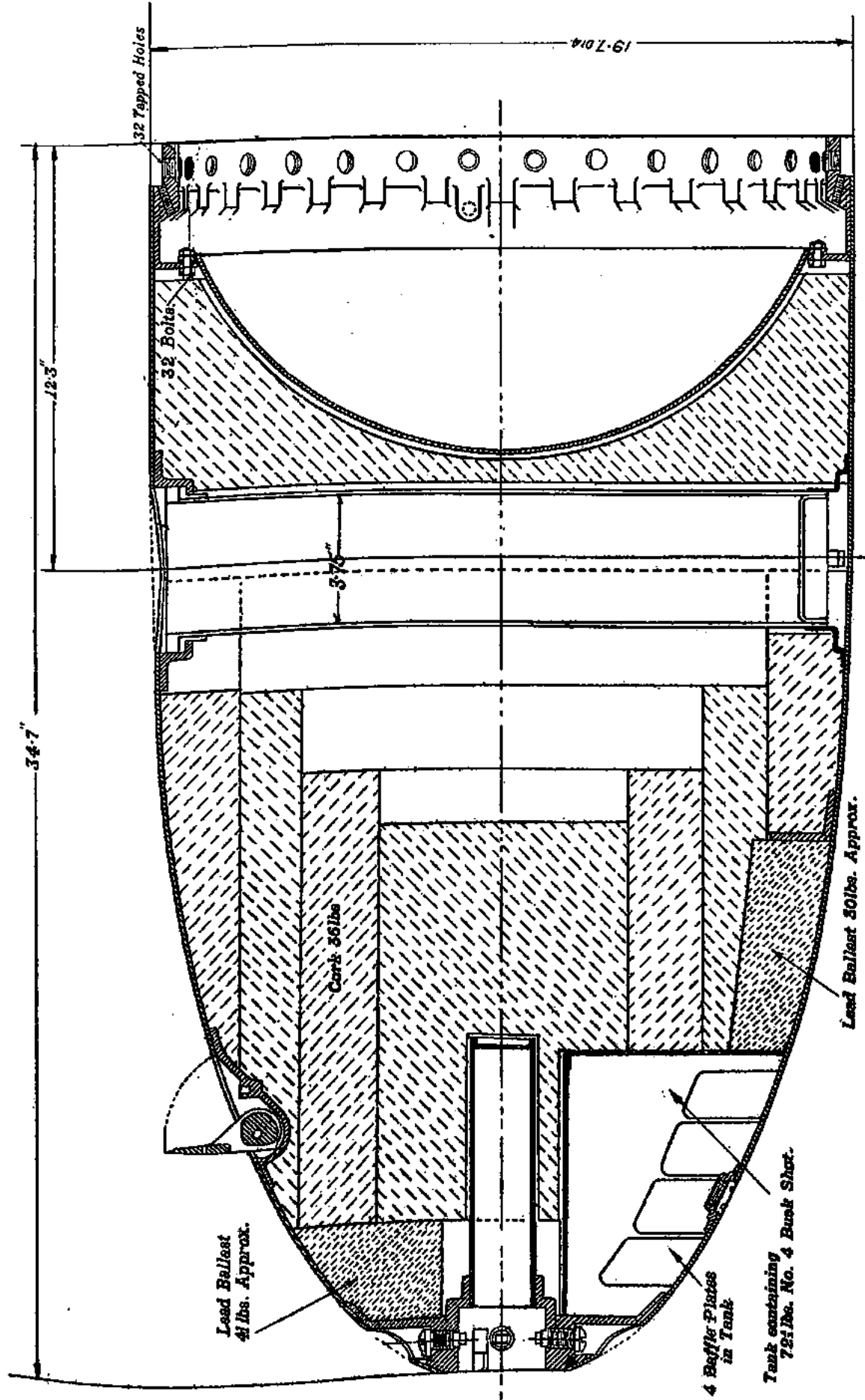
CLASSIFIED  
 Authority EO 10501

Plate 24 a  
 C.B. 182.  
 At end of Part IV.  
 July 1912



EXERCISING HEAD FROM GERMAN 19.7 Inch (50 c.m.)  
 TORPEDO NUMBER K 7460.

SCALE - 1/4 FULL SIZE.



Total Weight of Head - - - 2841bs.  
 " " " " in water - 57 lbs.  
 Ordnance Survey July, 1917.

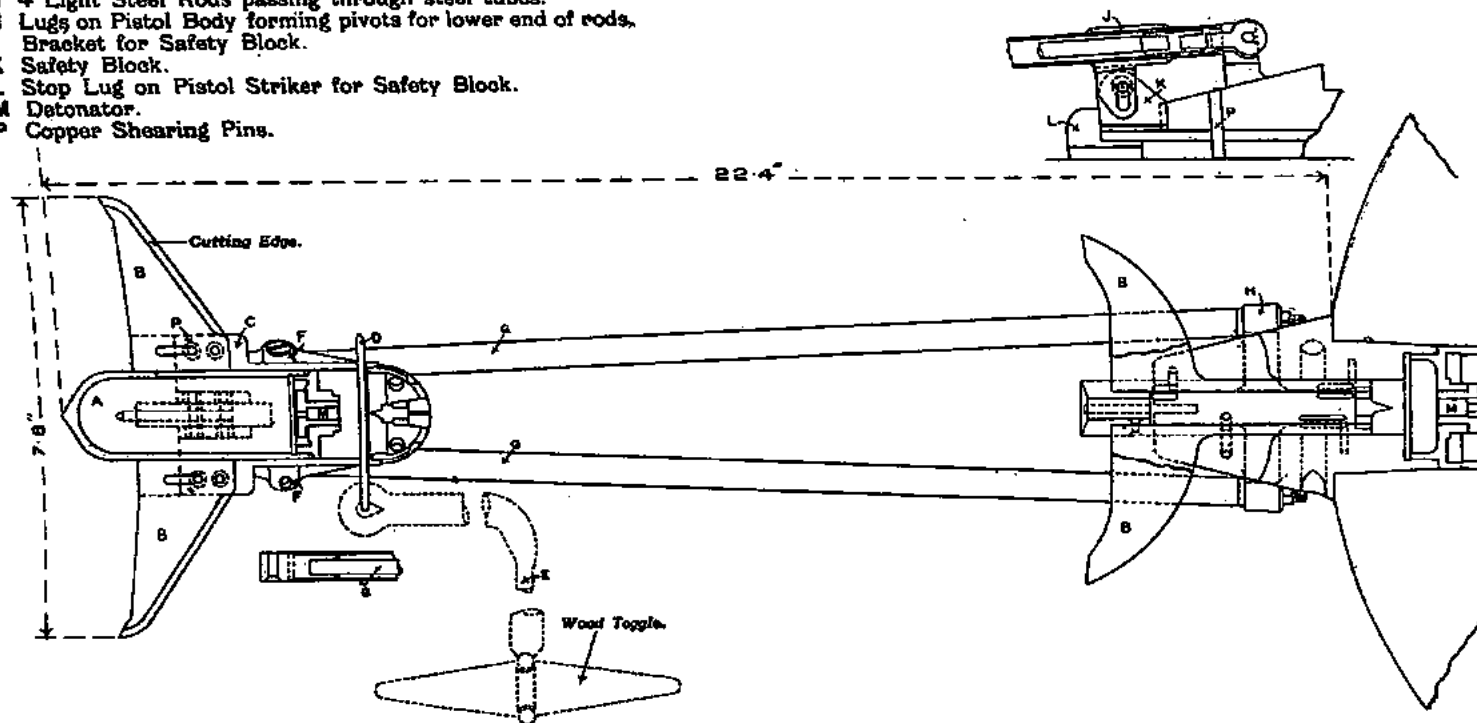


20340-17

# REFERENCE

## NET CUTTER AND PISTOL FOR GERMAN 19.7 INCH (50 c.m.) TORPEDO.

- A Metal Case holding Explosive Charge.
- B Whiskers.
- C Casting, with Lugs holding 8 Copper Shearing Pins.
- D Safety Pin secured to large Lanyard.
- E Rope Lanyard.
- F Lugs on Casting C, acting as pivots for top end of rods.
- G 4 Light Steel Rods passing through steel tubes.
- H Lugs on Pistol Body forming pivots for lower end of rods.
- J Bracket for Safety Block.
- K Safety Block.
- L Stop Lug on Pistol Striker for Safety Block.
- M Detonator.
- P Copper Shearing Pins.



Ordinance Survey, July 1917.

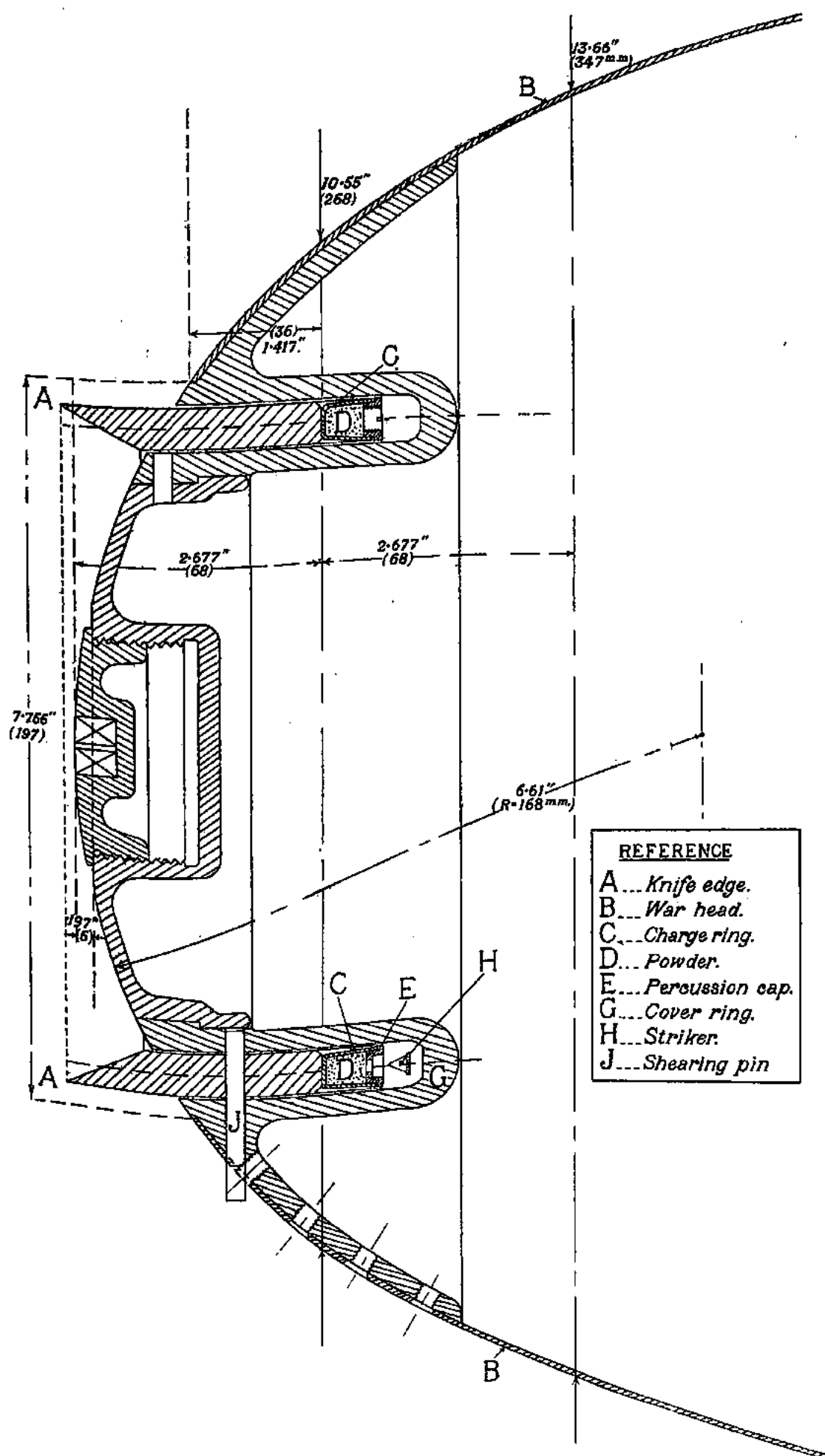
DECLASSIFIED  
Authority E.O. 10501

Plate 24c  
C.B. 1182.  
At end of Part IV.  
July, 1917.



# FIUME EXPLOSIVE NET CUTTER. Scale $\frac{2}{3}$ full size.

Plate 25<sup>a</sup>  
C.B. 1182,  
At end of Part IV.  
July, 1917.



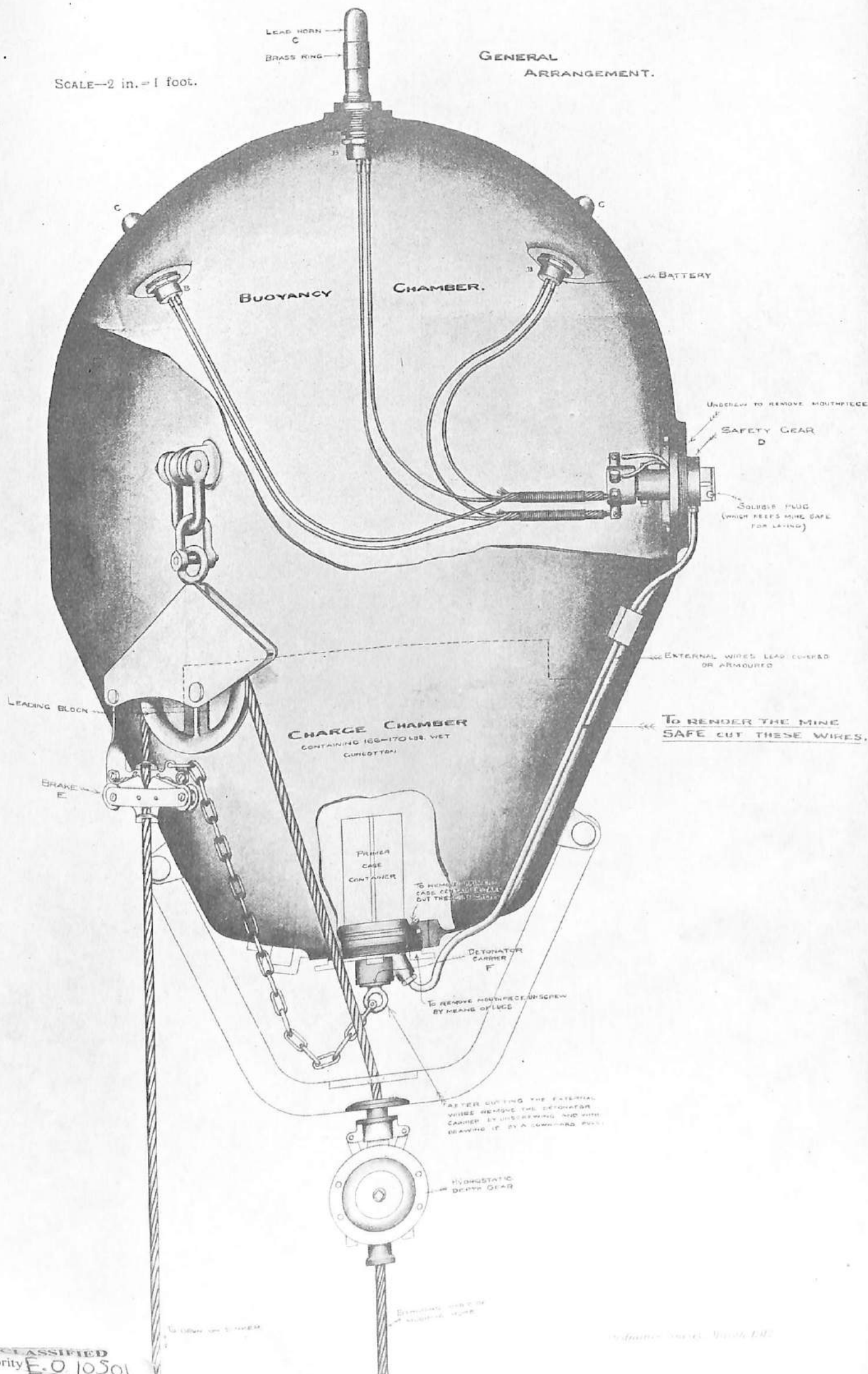
Ordnance Survey, July 1917.



# GERMAN NAVAL MINE. TYPE I.

SCALE—2 in.=1 foot.

GENERAL  
ARRANGEMENT.

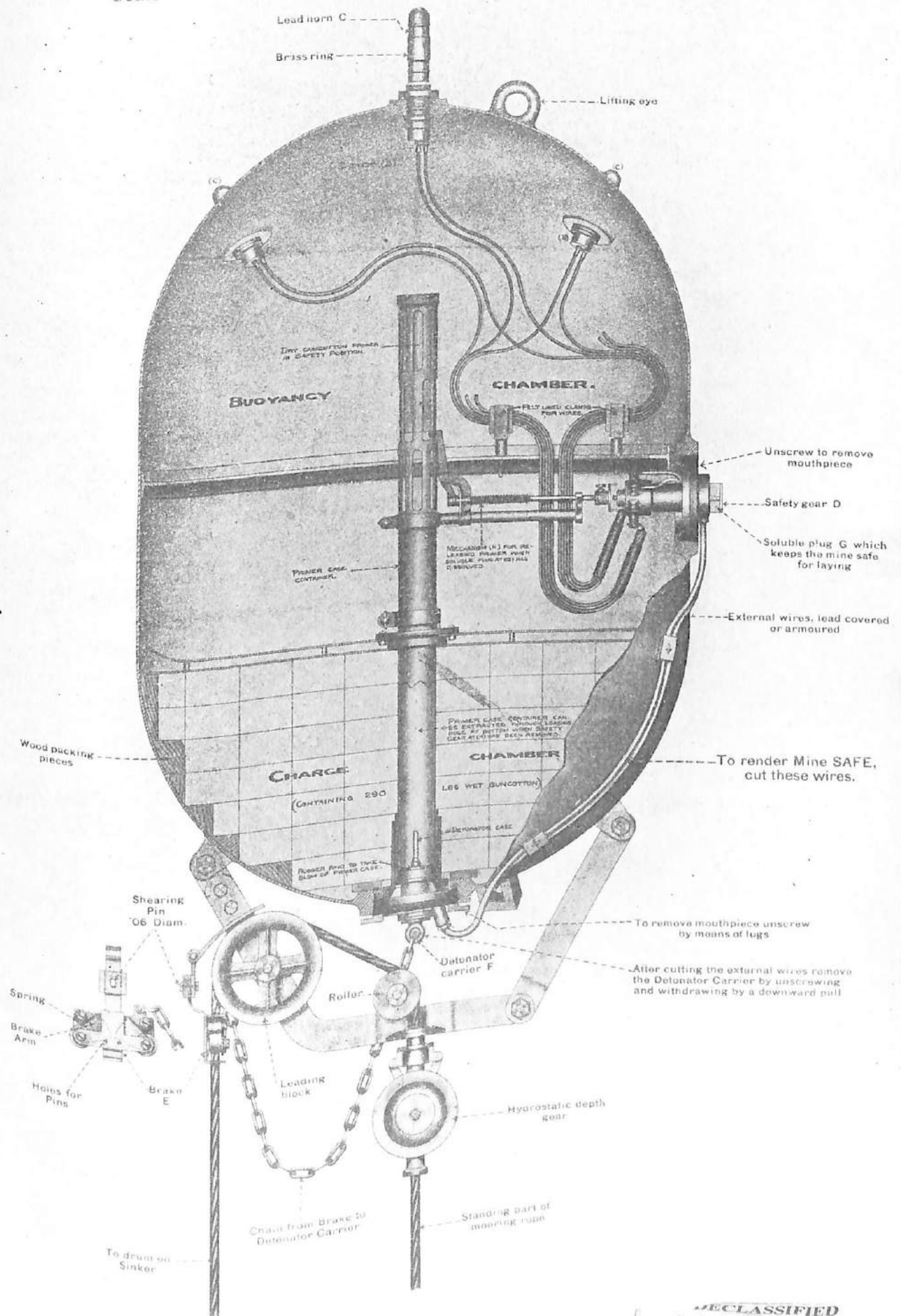




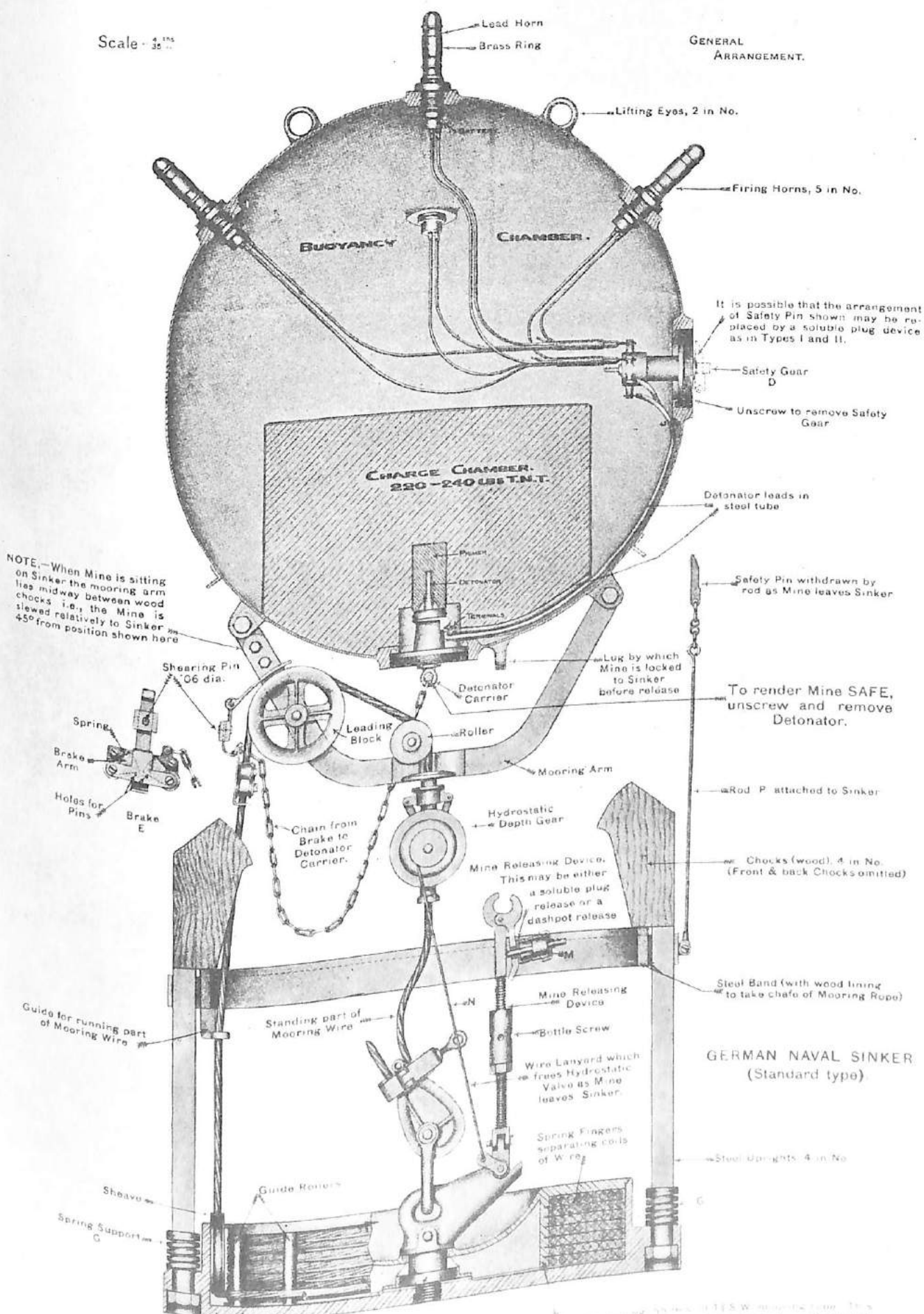
# GERMAN NAVAL MINE. TYPE II.

Scale— $\frac{2}{15}$  in.

GENERAL  
ARRANGEMENT.





Scale =  $\frac{4 \text{ ms}}{30 \text{ mm}}$ 

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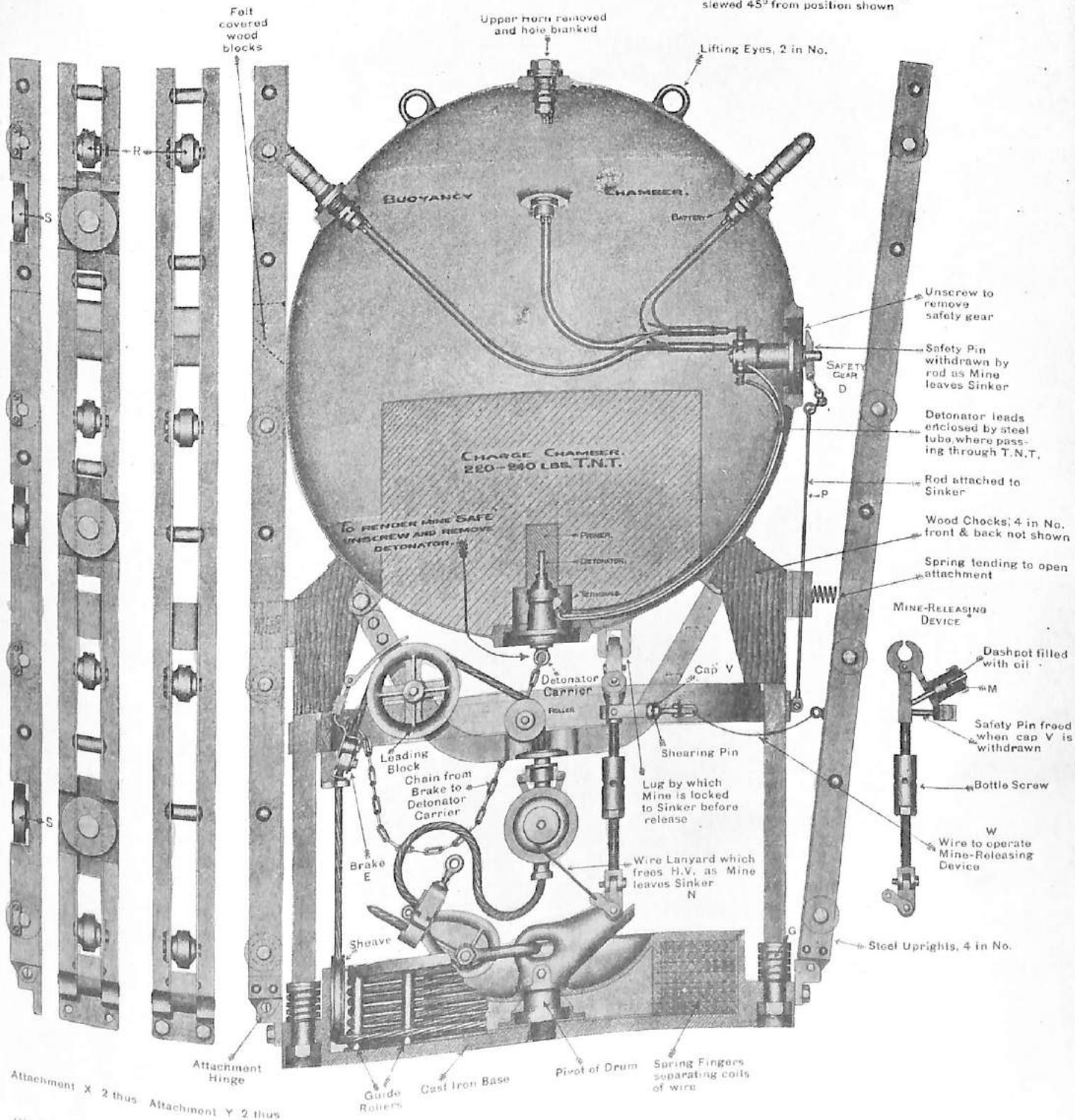


# GERMAN NAVAL MINE. TYPE IV.

Scale -  $\frac{1}{32}$  in.

GENERAL  
ARRANGEMENT.

NOTE.—When Mine is sitting on Sinker the mooring arm lies midway between wood checks, i.e., the Mine is slewed 45° from position shown



Attachment X 2 thus Attachment Y 2 thus

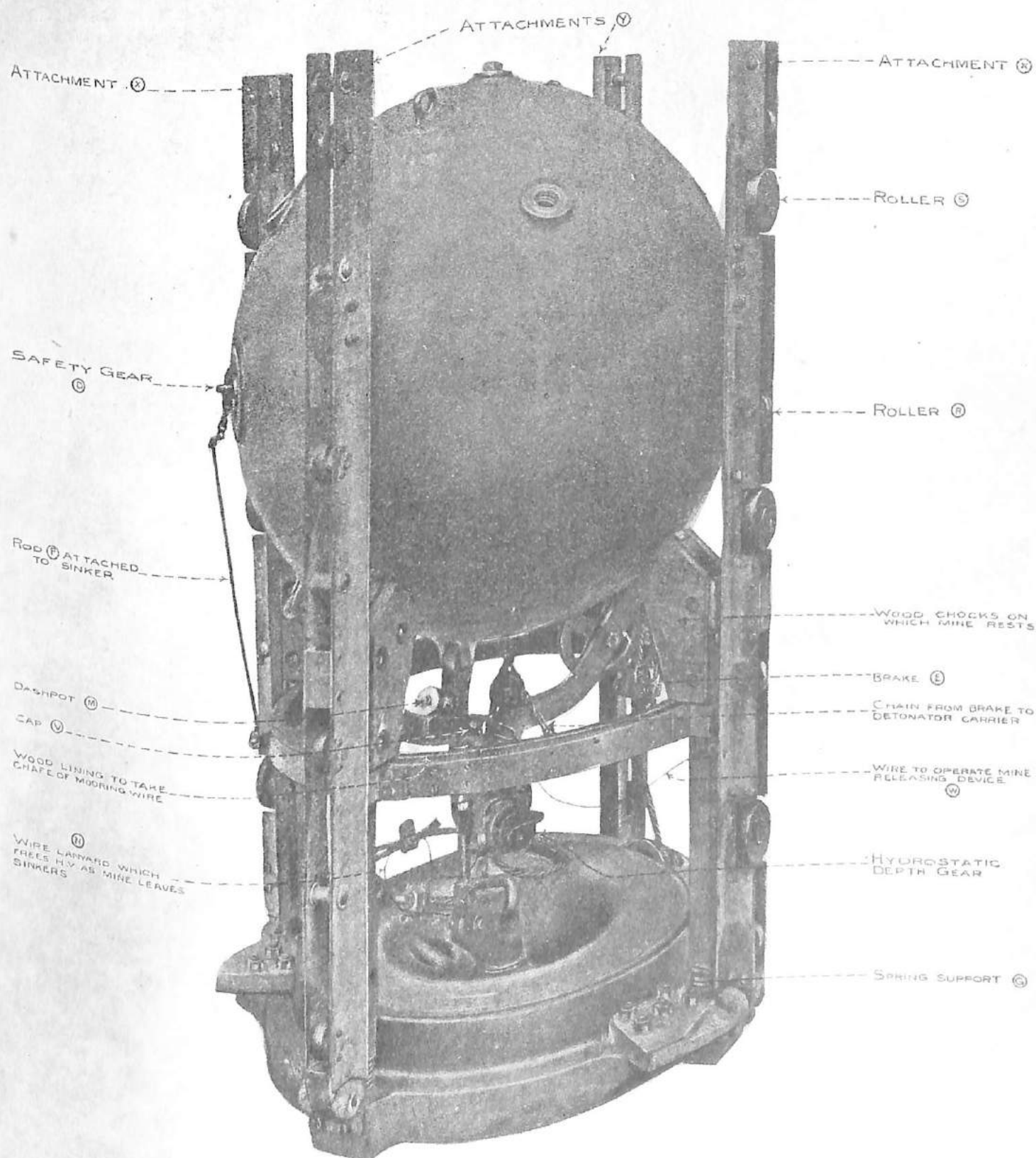
Hinged attachment to enable Mine to be laid from special vertical tubes in Submarine (Attachments X not shown in general arrangement, but would be at back and front of Sinker)

GERMAN NAVAL SINKER  
(Standard type with special attachments)

Drum carrying 55 fms. of  $1\frac{1}{2}$  S.W. mooring rope made up thus: 6 strands laid up left handed, each strand being composed of 12 wires (G38 dia.) laid up right handed: the inner 3 of the 12 are laid up together left handed forming a core.



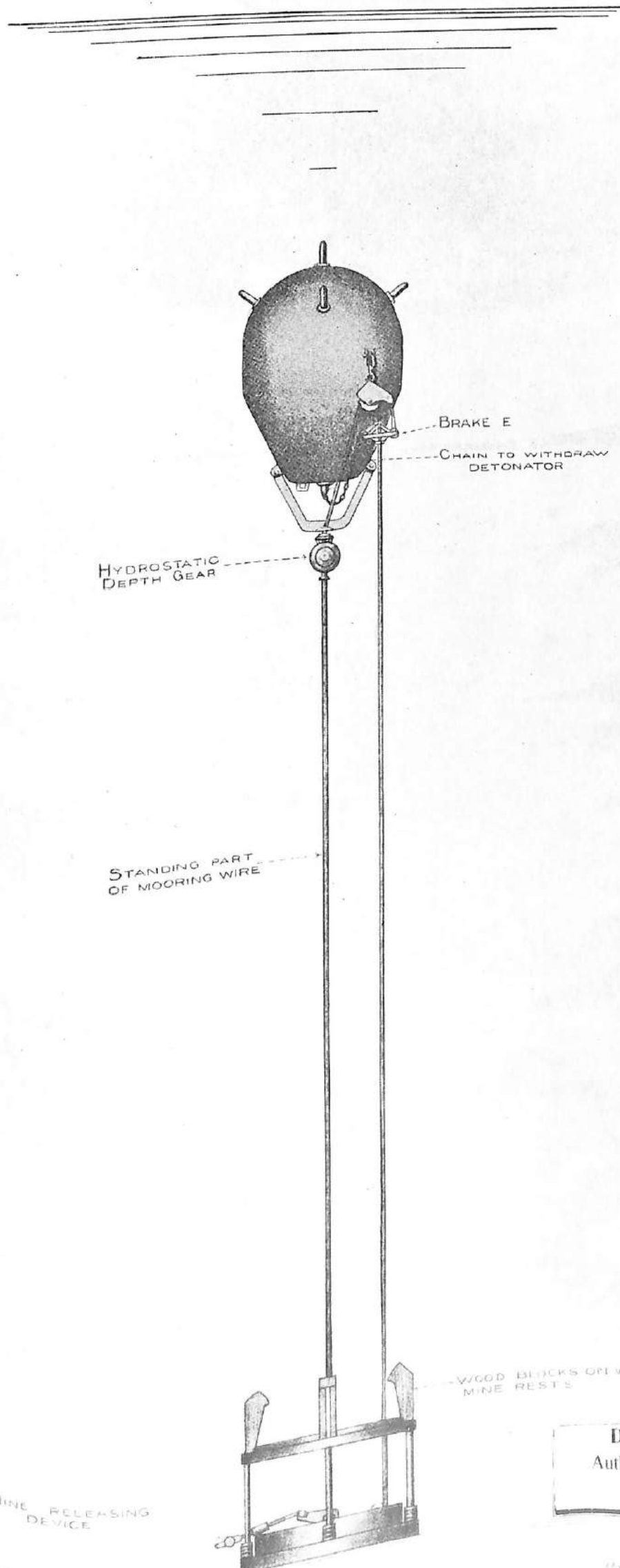
# GERMAN NAVAL MINE. TYPE IV.



DECLASSIFIED  
Authority E.O. 10501



GERMAN TYPE I, MINE, MOORED.

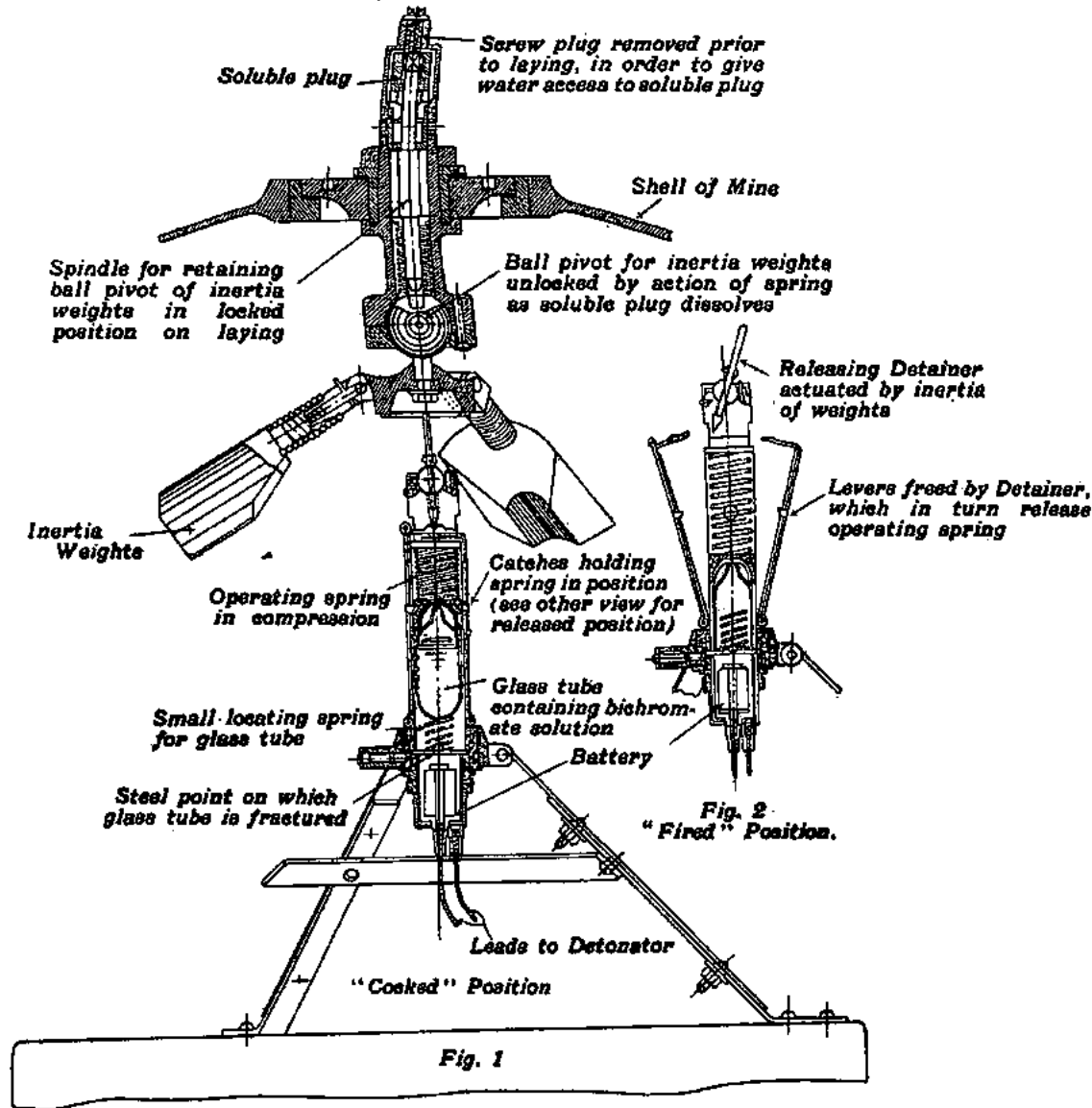


DECLASSIFIED  
Authority E.O. 10501



# GERMAN NAVAL MINES.

## INERTIA FIRING MECHANISM.



## HORN WITH METAL EXTENSION.

(Used in the Baltic when laying from above Water Minelayers).

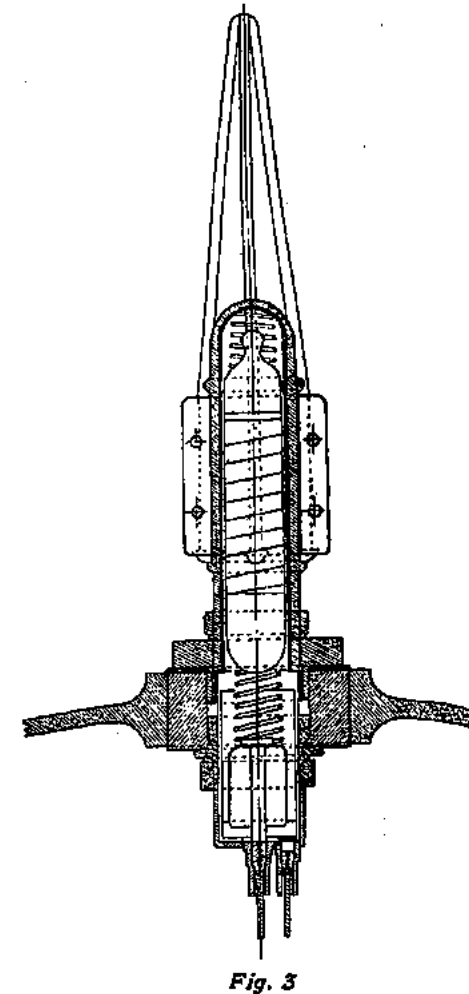
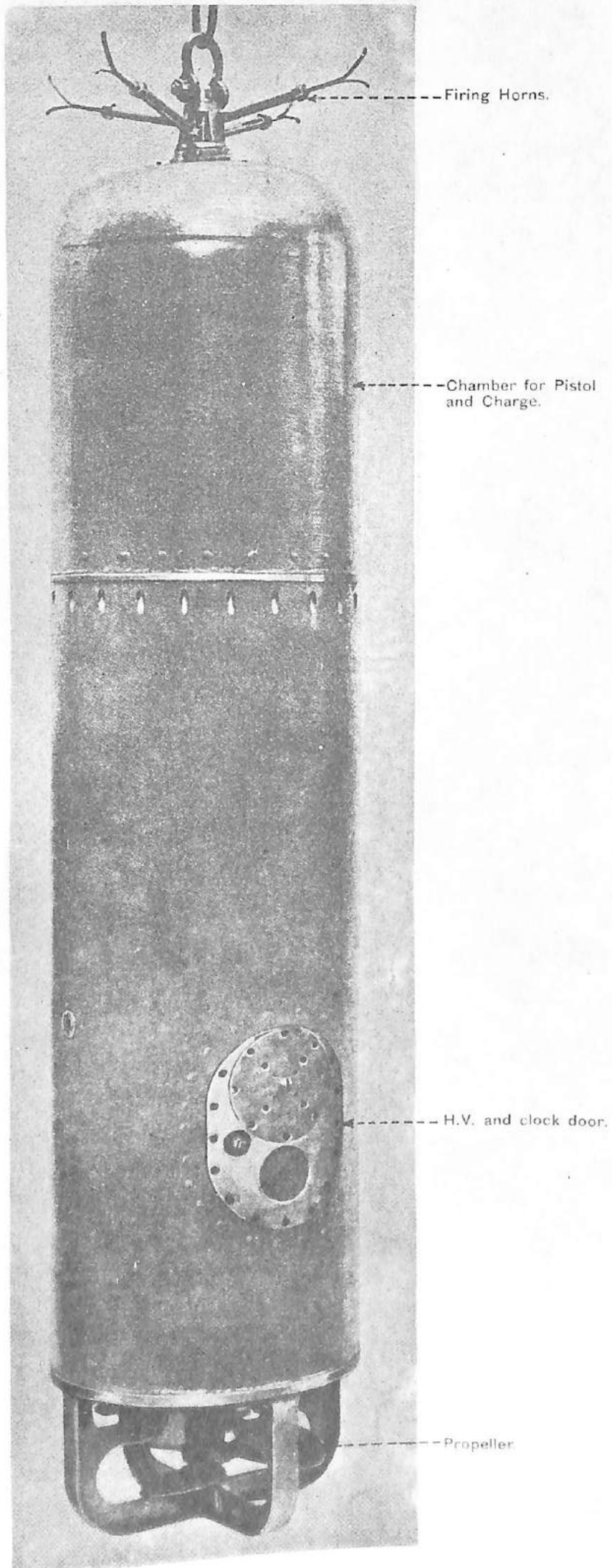


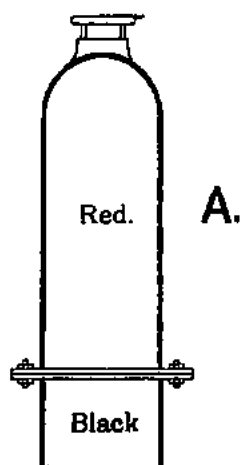
Fig. 3



# LEON TORPEDO MINE.



DEPTH CHARGE.



SUBMARINE KITE.  
*Diagrammatic only.*

