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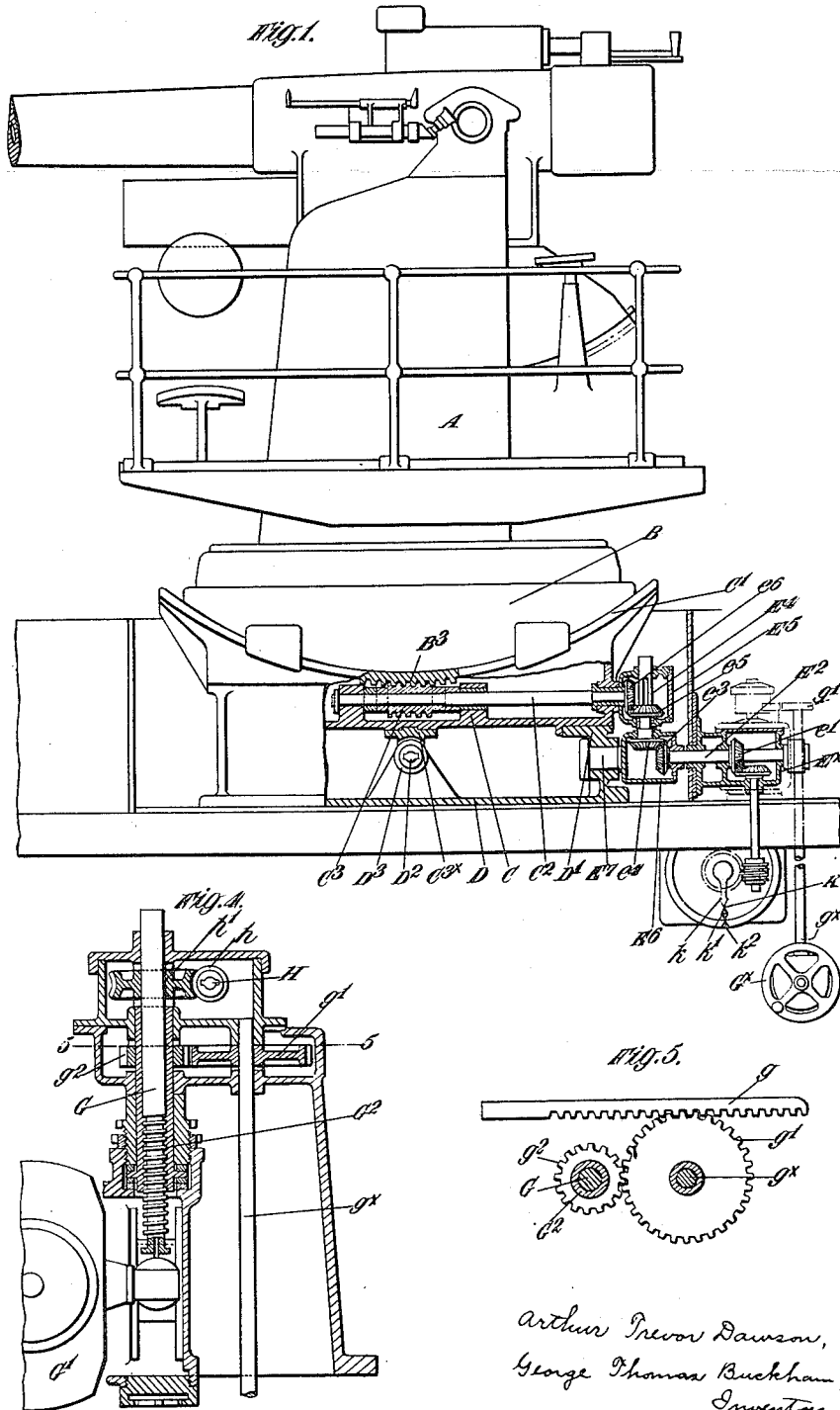
GUN MOUNTING.

APPLICATION FILED MAR. 25, 1920.

Patented June 21, 1921.

2 SHEETS—SHEET 1.

1,382,174.



Arthur Trevor Dawson,
George Thomas Buckham,
Inventors.
Perrin, Davis, Marvin & Edmunds,
Attorneys.

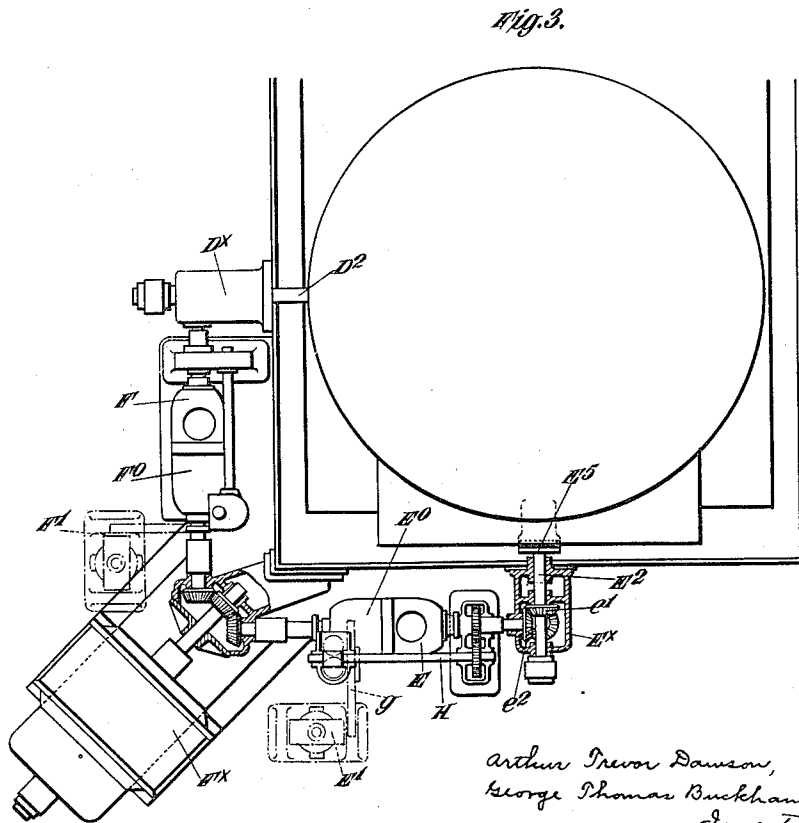
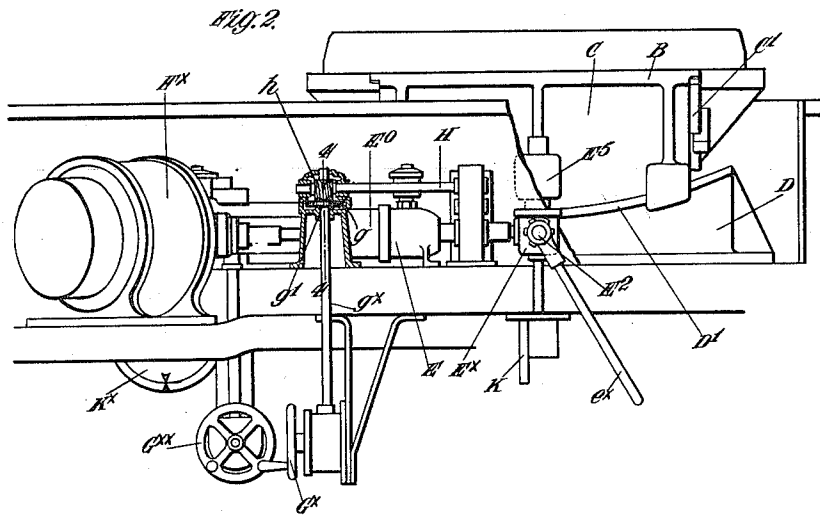
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UNITED STATES PATENT OFFICE.

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GUN-MOUNTING.

1,382,174.

Specification of Letters Patent. Patented June 21, 1921.

Application filed March 25, 1920. Serial No. 368,739.

To all whom it may concern:

Be it known that we, ARTHUR TREVOR DAWSON and GEORGE THOMAS BUCKHAM, both subjects of the King of Great Britain, residing at Vickers House, Broadway, Westminster, in the county of London, England, have invented certain new and useful Improvements in or Relating to Gun-Mountings, of which the following is a specification.

This invention relates to gun mountings for use on ships in which the mounting complete with its elevating and training mechanism is supported through the intermediary of a leveling device by the adjustment of which the mounting can be brought into and maintained in a position in which the training axis is truly vertical, thereby counteracting the effect of the rolling, pitching and tossing of the ship on the laying of the gun. The present invention is particularly applicable to a gun mounting provided with the leveling device described in the specification of the prior British Patent No. 129,390, in which the said device comprises two superposed members or castings, the upper one of which carries the gun mounting and is capable of sliding on a curved bearing surface on the other or lower member and the latter is capable of sliding on a curved bearing surface or a fixed part, the said curved surfaces being situated in planes at right angles to each other so that leveling adjustments of the gun mounting can be effected in any direction.

According to the present invention the leveling device of the gun mounting is operated by power under gyroscopic control so that the mounting is automatically maintained in a position in which the training axis is truly vertical notwithstanding the rolling, pitching and tossing of the ship. For this purpose when employed in conjunction with the leveling device forming the subject of the earlier patent referred to above there are two motors one appertaining to each of the superposed members of the leveling device and these motors are controlled by separate gyroscopes whose axes are arranged in vertical planes at right angles to each other so that they become operative to effect the control of the motors

under the influence of movements in planes at right angles to each other, that is to say under the influence of the rolling movements of the ship and the pitching and tossing movements of the ship.

In order that the said invention may be clearly understood and readily carried into effect we will now describe the same more fully with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation with the lower part in section showing a gun mounting provided with a constructional form of our improvements.

Fig. 2 is a rear elevation of the lower part of Fig. 1 with the gun mounting removed.

Fig. 3 is a plan of Fig. 2.

Fig. 4 is a section taken approximately on the line 4, 4, of Fig. 2 and drawn to an enlarged scale, and

Fig. 5 is a section taken approximately on the line 5, 5 of Fig. 4.

A is the gun mounting including training and elevating mechanism and B is the upper one of the aforesaid superposed members of the leveling device, this member carrying the base-plate or non-training part of the gun mounting. C is the lower one of the said members which is slidably mounted on a curved bearing surface D' on a part D attached to the deck; the member C is provided with a curved bearing surface C' which is arranged transversely to the bearing surface D' and upon which the upper member B is slidably mounted. The lower member C rotatably carries a shaft C² provided with a worm C³ gearing with a worm wheel segment B³ on the upper member B and the fixed part D rotatably carries a shaft D² provided with a worm D³ gearing with a worm wheel segment C^{3*} on the lower member C. This arrangement of parts is generally similar to that described and shown in the specification and drawings of the aforesaid earlier British Patent No. 129,390. E and F are the two motors controlled by gyroscopes E', F' whose axes are arranged in vertical planes at right angles to each other for the purpose hereinbefore stated, the motor E operating upon the worm shaft C² through the gearing shown

by Figs. 1 and 3 and the motor F operating upon the worm shaft D² through bevel gearing contained in a casing D^x (Fig. 3). The gearing between the motor E and the worm shaft C² comprises a shaft E² having at one end a bevel pinion e¹ gearing with a bevel pinion e² (Fig. 3) on the motor shaft and at the other end a bevel pinion e³ gearing with a bevel pinion e⁴ fixed to a shaft E⁴ which is rotatably supported in a casing E⁵ rotatably carried by the aforesaid member C co-axially with the worm shaft C². The shaft E⁴ has slidably connected to it (by a long key, for example, as shown) a bevel pinion e⁵ meshing with a bevel pinion e⁶ on the worm shaft C² and the shaft E⁴ is also carried by a casing E⁶ which is rotatably mounted in the aforesaid fixed part D by a trunnion E⁷ arranged in line with the shaft E². This arrangement of gearing provides for the bodily movement of the worm shaft C² relatively to the shaft E² during the sliding movement of the member C upon its curved bearing surface D'. The shafts D² and E² may extend outwardly beyond their casings D^x and E^x as shown by Fig. 3 to receive ratchet hand levers (one of which is shown at e^x in Fig. 2) by means of which the mounting can be brought to its zero or level position in the event of the motors E, F breaking down or becoming inoperative.

In the example shown the motors E, F are constituted by the motor units or so called B ends of variable speed hydraulic transmission gears of the Williams-Janney type the pump units or so called A ends E^o, F^o of which are driven by a single electric motor F^x or other prime mover common to the pump units. The gyroscopes E', F' are connected to the control rods or other control members of the pump units by suitable mechanism. Figs. 4 and 5 show one convenient form of this mechanism as applied to the pump unit E^o and similar mechanism would also preferably be employed in connection with the pump unit F^o. In these figures G is the screw-threaded control rod which operates upon the tilting box G' of the pump unit and which engages in a nut G². This nut has rigidly connected to it a pinion g² meshing with a toothed wheel g' which in turn meshes with a rack g connected to the gyroscope E'. Thus when the gyroscope operates the rack g angular motion is imparted to the nut G² and the rod G (which is prevented from moving angularly by worm gear h and h') is thus shifted axially to impart stroke to the pistons of the pump unit E^o and thereby cause the motor unit E to operate the shaft C². The said worm gear h, h' forms part of a hunting gear operating to return the tilting box G' to the neutral position and thereby bring the motor unit E to rest in a position cor-

responding to the amount of movement given to the nut G². The worm wheel h' of the said gear is connected to the control rod G in such a manner that the latter can move axially in relation to the worm wheel, and the worm h is carried by a shaft H connected by spur wheels to the shaft of the motor unit E. Thus when the motor unit operates, the control rod G is rotated within the nut G² to return the tilting box G' to its neutral position as aforesaid. The aforesaid toothed wheel g' may be connected to a shaft g^x as shown and this shaft may be operated through bevel gearing from a control hand wheel G^x, thus providing a hand control gear by which the tilting box G' can be operated by hand when required instead of being operated automatically by means of the gyroscope E'. An indicator or tell-tale K comprising a pointer k driven from the shaft E² and a zero mark k' on a gravity controlled member or pendulum, is provided, it being the duty of the member of the crew who operates the handwheel G^x to so move this handwheel as to maintain the pointer k opposite the mark k'. A second mark k² is provided for the purpose of giving the position of the mounting relatively to the plumb level of the ship, i. e., for showing the angle of tilt. A similar arrangement of hunting gear, hand control gear and indicator would be employed in connection with the control of the other pump unit F^o, G^x being the hand wheel of this hand control gear and K^x the indicator. This indicator may be provided with a mark corresponding to the mark k² of the indicator K. The hand wheels G^x, G^x, the indicators K, K^x, the electric motor F^x, the pump units E^o, F^o, the motor units E, F and the gyroscopes E', F', are arranged beneath the deck that supports the gun mounting, so that these parts are effectively protected from contact with sea-water.

It will be observed that the aforesaid hunting gear is common to the hand control gear and the gyroscopic control gear so that the tilting boxes will be automatically returned to their neutral positions as described above whether the initial displacements of the tilting boxes be effected from the hand wheels or from the gyroscopes.

What we claim and desire to secure by Letters Patent of the United States is:—

1. The combination with a gun mounting including training and elevating mechanism for use on ships, of a leveling device which supports the mounting as a whole, power operated means for operating said leveling device and gyroscopic means on the leveling device for controlling said power operated means whereby the training axis of the mounting is automatically maintained truly vertical notwithstanding the rolling, pitching and tossing of the ship.

2. The combination with a gun mounting including training and elevating mechanism for use on ships, of a leveling device which supports the mounting as a whole, motors for operating said leveling device and gyroscopic means on the leveling device for controlling said motors so that the training axis of the mounting is automatically maintained truly vertical notwithstanding the rolling, pitching and tossing of the ship.

3. The combination with a gun mounting including training and elevating mechanism for use on ships, of a leveling device which supports the mounting as a whole and which comprises two superposed members the upper one of which is slidably mounted on a curved bearing surface on the lower one and the latter is slidably mounted on a second curved bearing surface on a fixed part, these surfaces being arranged at right angles to each other, two motors one operating on said upper member and the other on said lower member and gyroscopic means on the leveling device for controlling said motors so that the training axis of the mounting is automatically maintained truly vertical notwithstanding the rolling, pitching and tossing of the ship.

4. The combination with a gun mounting including training and elevating mechanism for use on ships, of a leveling device which supports the mounting as a whole and which comprises two superposed members the upper one of which is slidably mounted on a curved bearing surface on the lower one and the latter is slidably mounted on a second curved bearing surface on a fixed part, these surfaces being arranged at right angles to each other, two motors one operating on said upper member and the other on said lower member, two gyroscopes whose axes are arranged in vertical planes at right angles to each other and means whereby said gyroscopes operate to control said motors so that the training axis of the mounting is automatically maintained truly vertical notwithstanding the rolling, pitching, and tossing of the ship.

5. The combination with a gun mounting including training and elevating mechanism for use on ships, of a leveling device which supports the mounting as a whole and which comprises two superposed members the upper one of which is slidably mounted on a curved bearing surface on the lower one and the latter is slidably mounted on a second curved bearing surface on a fixed part, these surfaces being arranged at right angles to each other, two motors one operating on said upper member and the other on said lower member, control devices for said motors, two gyroscopes whose axes are arranged in vertical planes at right angles to each other and means whereby said gyroscopes operate upon said control devices so

that the training axis of the mounting is automatically maintained truly vertical notwithstanding the rolling, pitching and tossing of the ship.

6. The combination with a gun mounting for use on ships, of a leveling device which supports the mounting as a whole and which comprises two superposed members the upper one of which is slidably mounted on a curved bearing surface on the lower one and the latter is slidably mounted on a second curved bearing surface on a fixed part, these surfaces being arranged at right angles to each other, two motors one operating on said upper member and the other on said lower member, control devices for said motors, two gyroscopes whose axes are arranged in vertical planes at right angles to each other, means whereby said gyroscopes operate upon said control devices so that the training axis of the mounting is automatically maintained truly vertical notwithstanding the rolling, pitching and tossing of the ship, and hand control gear for operating said control devices by hand when required instead of automatically.

7. The combination with a gun mounting for use on ships, of a leveling device which supports the mounting as a whole and which comprises two superposed members the upper one of which is slidably mounted on a curved bearing surface on the lower one and the latter is slidably mounted on a second curved bearing surface on a fixed part, these surfaces being arranged at right angles to each other, two motors one operating on said upper member and the other on said lower member, control devices for said motors, two gyroscopes whose axes are arranged in vertical planes at right angles to each other, means whereby said gyroscopes operate upon said control devices so that the training axis of the mounting is automatically maintained truly vertical notwithstanding the rolling, pitching and tossing of the ship, and hunting gear for returning said control devices to their neutral positions when the motors have made the movements determined by the positions to which said control devices were moved by the gyroscopes.

8. The combination with a gun mounting for use on ships, of a leveling device which supports the mounting as a whole and which comprises two superposed members the upper one of which is slidably mounted on a curved bearing surface on the lower one and the latter is slidably mounted on a second curved bearing surface on a fixed part, these surfaces being arranged at right angles to each other, control devices for said motors, two gyroscopes whose axes are arranged in vertical planes at right angles to each other, means whereby said gyroscopes operate upon said control devices so that the training axis of the mounting is automatically maintained

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In testimony whereof we affix our signa-
tures.

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