A. T. DAWSON & J. HORNE.

ELEVATING MECHANISM OF HEAVY GUNS.

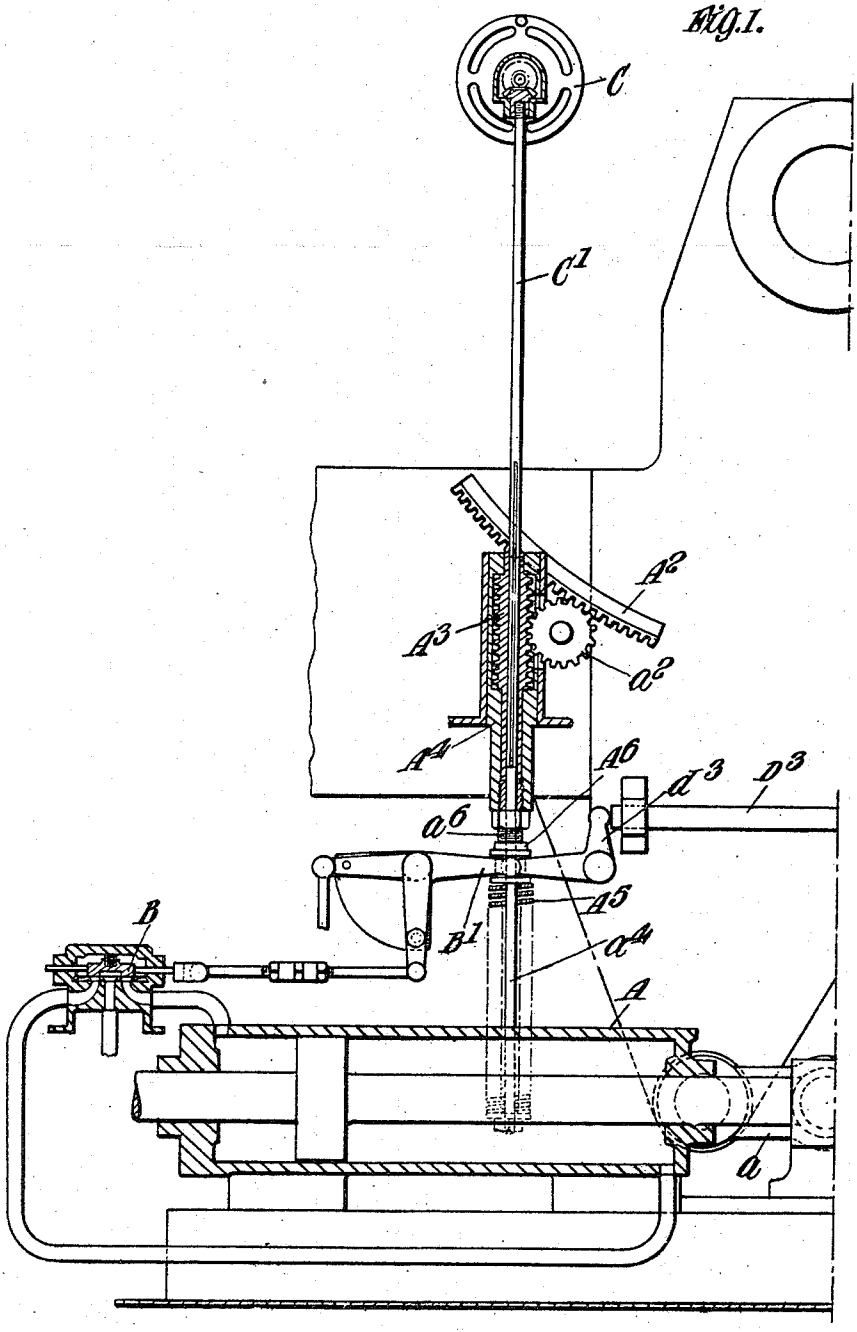
APPLICATION FILED MAY 15, 1915.

1,289,693.

Patented Dec. 31, 1918.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 1. (Continuation)

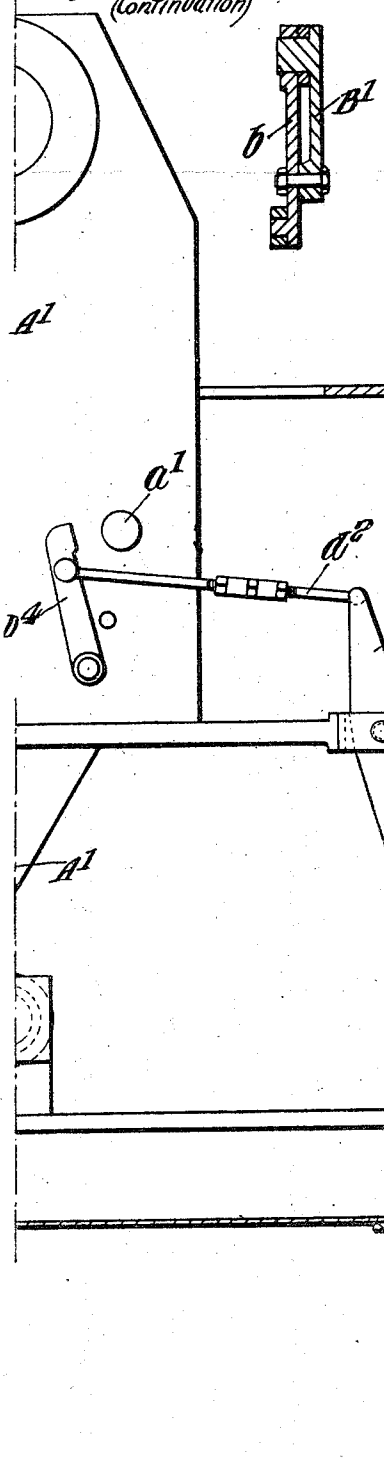


Fig. 4.

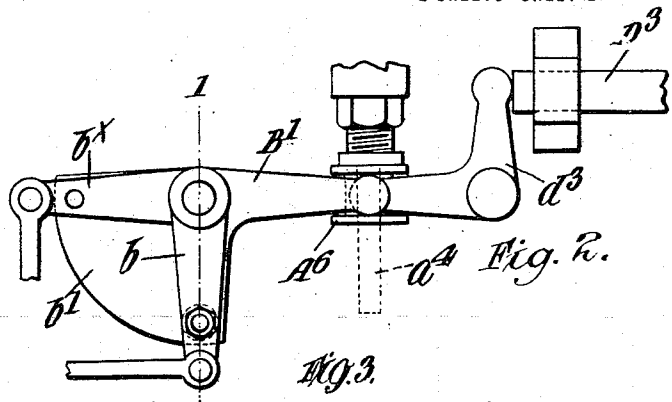
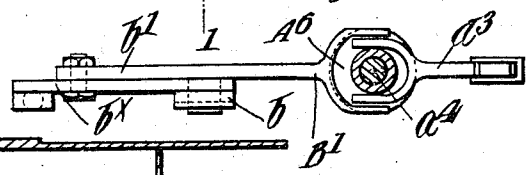


Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

ARTHUR TREVOR DAWSON, OF WESTMINSTER, LONDON, AND JAMES HORNE, OF BARROW-IN-FURNESS, ENGLAND, ASSIGNORS TO VICKERS LIMITED, OF WESTMINSTER, LONDON, ENGLAND.

ELEVATING MECHANISM OF HEAVY GUNS.

1,289,693. Specification of Letters Patent. **Patented Dec. 31, 1918.**

Application filed May 15, 1915. Serial No. 28,494.

To all whom it may concern:

Be it known that we, Sir ARTHUR TREVOR DAWSON, knight, and JAMES HORNE, both subjects of the King of Great Britain, residing, respectively, at Vickers House, Broadway, Westminster, in the county of London, England, and Naval Construction Works, Barrow-in-Furness, in the county of Lancaster, England, have invented certain new and useful Improvements in or Relating to the Elevating Mechanism of Heavy Guns, of which the following is a specification.

This invention relates to elevating mechanism of the kind in which means are employed for preventing the gun from being depressed into a position such that if fired it would cause damage to any part of the ship within the training arc of the turret, and, in certain circumstances, for automatically elevating the gun from the danger zone.

According to this invention the said means (which may be termed a safety depression gear) are combined with hunting control gear operating to bring the gun to rest in a position of elevation or depression which as is usual with hunting control gear is dependent upon the amount of movement imparted to the elevating hand wheel.

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

Figure 1 is a side elevation showing, in a more or less diagrammatic manner, a constructional form of our invention,

Fig. 2 is an enlarged view of a portion of Fig. 1,

Fig. 3 is a plan of Fig. 2, and

Fig. 4 is a section taken approximately on the line 1, 1 of Fig. 2.

A is the elevating motor which is shown as being in the form of a press whose ram or piston rod is connected through a link a to the trunnion arm A′ of the gun. B is the control valve of the press A and C is the elevating hand wheel for operating the said valve.

In the example shown the safety depression gear comprises the usual stationary vertical cam rail D which operates through a "roller bar" D′ upon a floating lever D^2 pivotally carried by a "plunger block" D^3 and connected by a link d^2 to a pivoted arm D^4 arranged in the path—when gun is being depressed—of a tappet a' on the trunnion arm A′ or on any other suitable part moving with the gun the said plunger block operating upon the control valve B of the elevating press A.

The hunting control gear comprises a rack A^2 connected to a part of the slide frame or to any other suitable part that moves in elevation and depression with the gun. With this rack a worm wheel a^2 engages, this worm wheel being mounted on a part that does not move with the gun in elevation and depression. The said worm wheel meshes with a worm A^3 slidably connected to a shaft C′ actuated by the elevating hand wheel C. The said worm is mounted in a casing A^4 which has an extension piece a^4 carrying a compression spring A^5 which normally holds a sliding collar A^6 against a shoulder a^6 on the extension piece. This collar engages with a lever B′ connected to the control valve B and also with a bell crank lever d^3 bearing against one end of the aforesaid plunger block D^3.

When the elevating hand wheel C is rotated to depress the gun, the aforesaid worm A^3 is rotated and travels (for example) upward relatively to the worm wheel a^2 which is held stationary by its engagement with the rack A^2. The extension piece a^4 is consequently moved upward and the sliding collar A^6 follows under the influence of its spring A^5. The control valve B is thereby moved to the "depress" position and the gun is depressed; the movement of the gun displaces the worm A^3, through the aforesaid rack A^2 and worm wheel a^2, in a downward direction, thereby returning the control valve to its cut off position and bringing the gun to rest; a similar action (but with the direction of the movements reversed) takes place when the gun is elevated.

If the gun has been depressed to say its limit of movement and the turret is trained into a dangerous position the aforesaid cam rail D raises the roller bar D′ and causes the floating lever D^2 to be rocked about the point of connection of its upper arm with the aforesaid link d^2, thereby displacing the plunger block D^3 and its bell crank lever d^3

to move the sliding collar A^6 and the control valve to place the latter in the "elevate" position, this movement of the collar taking place against the resistance of its spring A^5. As the gun is elevated the extension piece a^4 is caused to move upward by means of the aforesaid rack A^2, thereby shifting the control valve to the cut off position when the gun has been elevated sufficiently, the aforesaid spring A^5 being still further compressed. When the roller bar D′ comes opposite a depressed portion of the cam rail D during the training of the turret, the spring A^5 causes the control valve to move to the "depress" position to which it was originally placed by the elevating hand wheel. Similarly in the event of the elevating hand wheel being moved to depress the gun beyond its fixed limit or the safe limit determined by a raised portion of the cam rail, the control valve will be moved by the tappet a' to its cut off position and the gun brought to rest, the aforesaid floating lever D^2 in this case moving about the end of its lower arm which is in contact with one end of a sliding rod d the other end of which bears against a bell crank lever d' connected to the roller bar D′.

Although the invention has been described in connection with an elevating press, it will be obvious that any other suitable form of elevating motor might be used and in this event its control device would be operated in substantially the manner above described with regard to the control valve B.

Similarly the invention may be employed in conjunction with one or other of two or more different elevating motors which provide independent and optional elevating means for the gun. For example, in addition to the elevating press A a variable speed hydraulic transmission gear may be provided and means are then employed whereby the lever B′ can at will be connected either to the control valve B or to the tilting box (or other control device) of the pump unit forming part of the variable speed hydraulic transmission gear. For this purpose an arm b interposed between the valve B and the lever B′ is detachably connected to a quadrant b' forming part of the lever B′; an arm b^x interposed between the tilting box of the pump unit (not shown) and the said lever B′ is similarly connected to the quadrant b'. By these means either the control valve or the tilting box can be connected to the lever B′ according as the press A or the variable speed hydraulic transmission gear is to be used for elevating the gun.

Although we have described one particular form of safety depression gear as being used in combination with the hunting control gear, it is to be understood that other forms of the first mentioned gear may, if desired, be employed.

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

1. In the elevating mechanism of ordnance, the combination with the elevating motor, the control device of said motor and the actuating handle of said control device, of safety depression gear for stopping the depression of the gun and hunting gear operated by said handle and by the motor for automatically bringing said motor to rest with the gun at a position predetermined by the extent of movement given to said actuating handle.

2. In the elevating mechanism of ordnance, the combination with the elevating motor, the control device thereof and the actuating handle of said control device, of safety depression gear operating upon said control device to stop said motor and hunting gear operated by said handle and by the motor and also operating upon said control device for automatically bringing said motor to rest at a position predetermined by the extent of movement given to said actuating handle.

3. In the elevating mechanism of ordnance, the combination with the pressure fluid elevating motor, the control valve thereof and the actuating handle of said valve, of safety depression gear operating upon said control valve to stop said motor and hunting gear operated by said handle and by the motor and also operating upon said valve for automatically bringing said motor to rest at a position predetermined by the extent of movement given to said actuating handle.

4. In the elevating mechanism of ordnance, the combination with the pressure fluid elevating motor, the control valve thereof and the actuating handle of said valve, of a member connected to said valve, means for operating said member from the actuating handle, means for actuating said member by the normal movements of the gun in elevation and depression without displacing said actuating handle for bringing the motor to rest with the gun at a position predetermined by the extent of movement given to said handle, and safety depression gear for actuating said member to stop the motor without displacing said actuating handle.

5. In the elevating mechanism of ordnance, the combination with the pressure fluid elevating motor, the control valve thereof and the actuating handle of said valve, of a shaft driven by said actuating handle, a worm slidably connected to said shaft, a worm wheel gearing with said worm, means for imparting movement to said worm wheel during elevation and depression of the gun, a sliding member in which said worm is rotatably mounted, a spring for controlling said sliding member,

means for connecting said sliding member to the control valve and safety depression gear operating upon said sliding member to move the control valve to its cut off position.

6. In the elevating mechanism of ordnance, the combination with the pressure fluid elevating motor, the control valve thereof and the actuating handle of said valve, of a shaft driven by said handle, a worm slidably connected to said shaft, a worm wheel gearing with said worm, means for imparting movement to said worm wheel during elevation and depression of the gun, a sliding member in which said worm is rotatably mounted, a spring for controlling said sliding member, means for connecting said sliding member to the control valve, a cam member having a contour adapted to the deck fittings or other obstructions within the training arc of the gun and means interposed between said cam member and said sliding member for automatically moving the control valve to its cut off position when the gun is approaching a dangerous angle of depression.

7. In the elevating mechanism of ordnance, the combination with the pressure fluid elevating motor, the control valve thereof and the actuating handle of said valve, of a shaft driven by said handle, a worm slidably connected to said shaft, a worm wheel gearing with said worm, means for imparting movement to said worm wheel during elevation and depression of the gun, a sliding member in which said worm is rotatably mounted, a spring for controlling said sliding member, means for connecting said sliding member to the control valve, means for disconnecting said sliding member from the control valve, means for connecting the sliding member to the control device of another elevating motor, a cam member having a contour adapted to the deck fittings or other obstructions within the training arc of the gun and means interposed between said cam member and said sliding member for automatically moving the control valve to its cut off position when the gun is approaching a dangerous angle of depression.

In testimony whereof we affix our signatures.

ARTHUR TREVOR DAWSON.
JAMES HORNE.