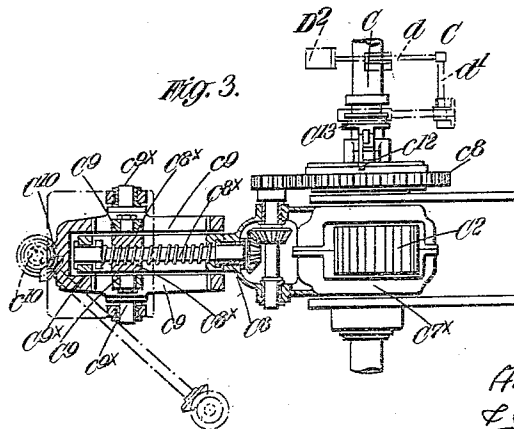
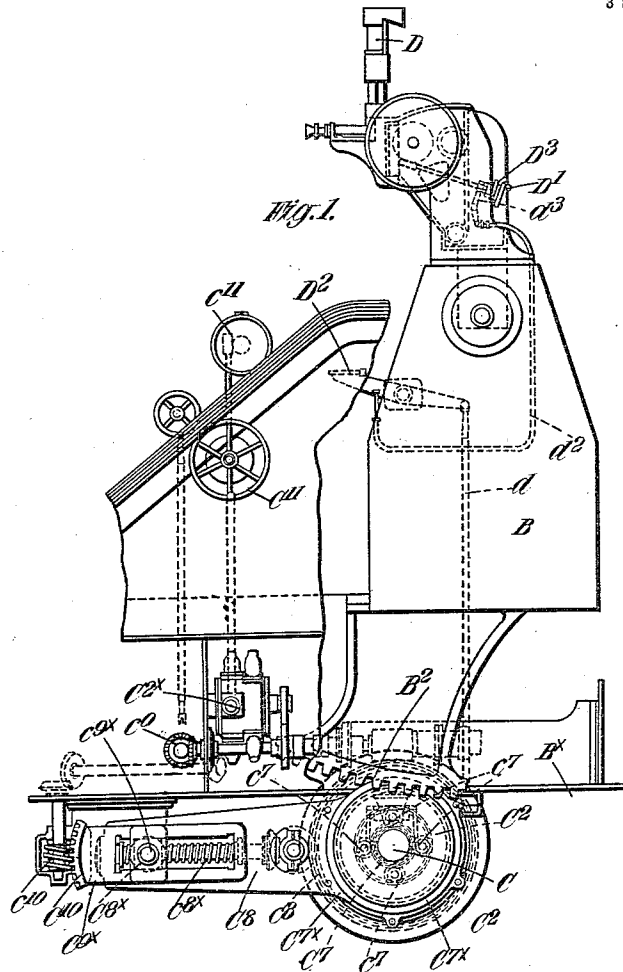


A. T. DAWSON & J. HORNE.
HEAVY ORDNANCE.
APPLICATION FILED JULY 20, 1912.

1,041,602.

Patented Oct. 15, 1912

3 SHEETS—SHEET 1.



Witnesses
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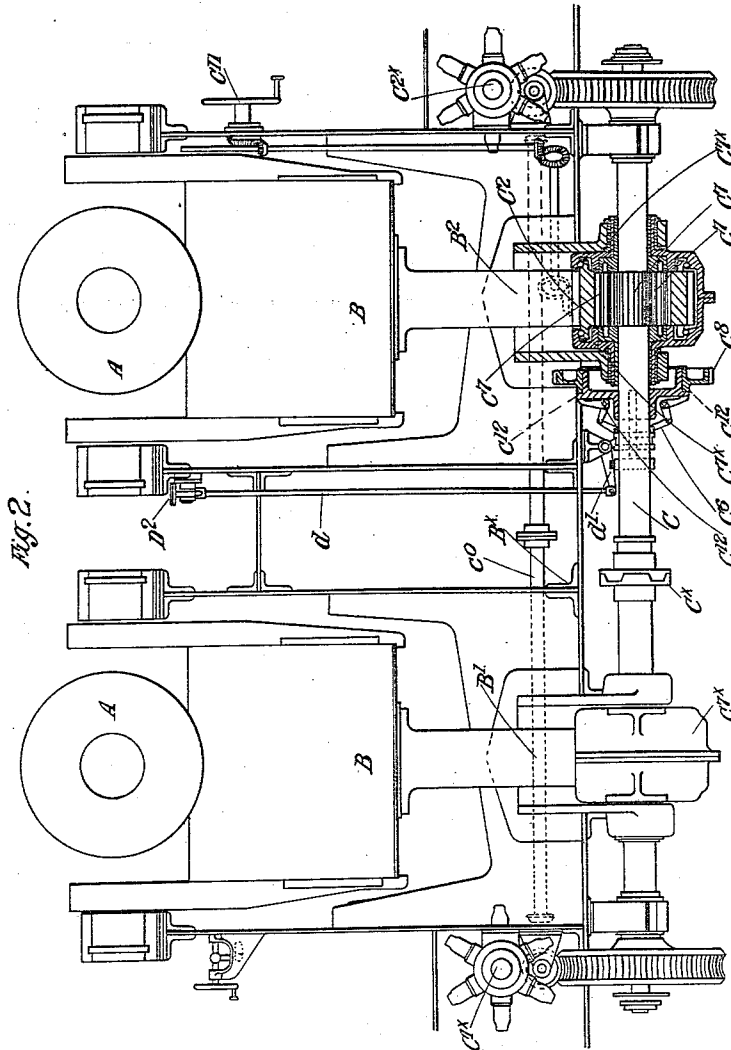
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3 SHEETS-SHEET 2.



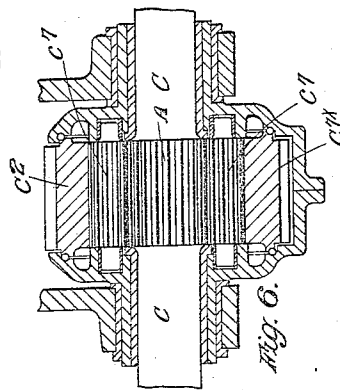
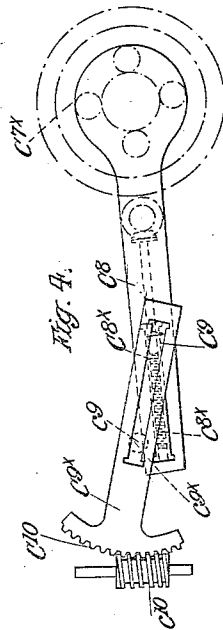
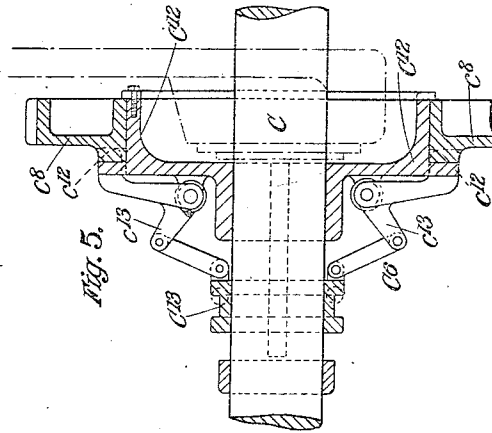
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A. T. DAWSON & J. HORNE.
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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

HEAVY ORDNANCE.

1,041,602.

Specification of Letters Patent.

Patented Oct. 15, 1912.

Original application filed March 29, 1912, Serial No. 687,114. Divided and this application filed July 20, 1912. Serial No. 710,684.

To all whom it may concern:

Be it known that we, 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 Heavy Ordnance, of which the following is a specification.

This invention relates to mountings for heavy ordnance of the kind in which two or more guns are moved simultaneously during elevation, and in which the correction for difference in muzzle velocity between the guns is effected by changing their relative angle of elevation.

According to this invention we provide a device which is so constructed and arranged in relation to the elevating gear that during the elevation of the guns the said device automatically actuates a differential gear to correct the elevation to compensate for the difference in muzzle velocity existing between them. The said device may comprise a member which can be initially adjusted to accord with the known difference in muzzle velocity between the guns and which is so arranged that it will, during the elevation of the guns, cause an additional movement to be transmitted through the differential gear to the gun which is to be corrected, the magnitude of this movement depending upon the amount of adjustment initially given to the member in accordance with the difference in muzzle velocity. The said differential gear may be interposed between the elevating pinions of the guns and is adapted to angularly move one or more of said pinions relatively to the shaft on which it is mounted, in order to give to one or more of the guns the additional movement that is required.

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:—

Figures 1 and 2 are respectively a sectional side elevation and a rear elevation of a twin gun mounting provided with a constructional form of our improvements. Figs. 3 and 4 are respectively a plan and a side elevation showing more clearly the said improvements. Fig. 5 is a section of a detail hereinafter referred to, and Fig. 6 is an enlarged view of the differential gear shown in Figs. 1 and 2.

In all these figures like letters of reference indicate similar parts.

A, A are the guns, and B, B the slide frames, B^x is the gun platform or turntable, C, C are the elevating shafts and C^x is the clutch connecting them.

C', C² are the elevating pinions gearing with the toothed elevating arcs B', B², and C'^x, C^{2x} are the elevating motors interconnected by the transverse shaft c^o.

D is the sight and D' the sight setting hand wheel.

In the constructional form of our invention shown the aforesaid device for automatically correcting for differences in muzzle velocity of the guns, comprises a system of differential gear by means of which the angular displacement of the elevating pinion or pinions is effected directly. The said differential gear (Figs. 1, 2 and 6) comprises in the example shown a small pinion C' rigidly mounted on the elevating shaft C, the said pinion driving the internally toothed elevating pinion C² through four planet wheels c' which engage with the internal teeth of the elevating pinion, the said planet wheels revolving in bearings provided in a divided gear box C'^x. This gear box is capable of receiving small angular displacements about the axis of the elevating shaft C and is supported by the main bearings of the said shaft. By angularly displacing the said gear box the elevating pinion is, by reason of the aforesaid differential gear, caused to rotate an amount in proportion to the movement of the gear box,

thus giving a corresponding increase or decrease of elevation to the gun. The ratio of the gearing is preferably such that the movement given to the pinion C^2 is twice
5 that of the movement of the gear box.

To provide for the automatic displacement of the gear box it is, in the example shown, provided with a rearward extension C^8 (Figs. 1 and 4) in which a slide block
10 C^{8x} is adapted to move. This slide block (which we term the main slide block) receives its motion from a screw c^{8x} driven through the bevel and spur gearing shown in Fig. 3 from a spur wheel c^8 on the elevat-
15 ing shaft C. On each side of the main slide block and pivoted thereto is an auxiliary slide block C^9 adapted to move in a guide c^9 formed in a guide member C^{9x} having trunnions c^{9x} supported in fixed bearings the
20 axes of which are in alinement with the center of the main slide block C^{8x} (as shown in Figs. 1 and 3) when the gun is in the horizontal position. The said guide member C^{9x} can be set in any angular position by means
25 of a worm c^{10} which gears with a worm wheel segment C^{10} formed on the rear part of the guide member C^{9x} . The said worm is in the example shown operated through bevel gearing by a hand wheel C^{11} the movement
30 of which also displaces a dial c^{11} (Fig. 1) graduated for differences of muzzle velocity. So long as the said guide member C^{9x} remains in a horizontal position, as shown in Fig. 1, the main and auxiliary blocks C^{8x} ,
35 C^9 move during the elevation of the gun without altering the position of the gear box C^7 . When, however, the guide member C^{9x} is set at an angle by means of the worm c^{10} gearing with the worm wheel segment C^{10}
40 on the guide member, the movement of the auxiliary blocks C^9 along the inclined guides c^9 imparts a gradually increasing angular movement to the said gear box. This condition is shown in Fig. 4, the parts being
45 depicted in the position they occupy when corrections are being made for the maximum difference in muzzle velocity and with the guns at the maximum elevation. The angular movement of the gear box increases
50 more rapidly as the elevation increases and therefore meets the requirements of the case.

It is necessary to provide means for disconnecting the operating mechanism of the correcting gear when the guns are sighted
55 during the rolling of the ship or when the ship has a permanent heel. This disconnecting device comprises a clutch C^6 appertaining to the spur wheel c^8 on the elevating shaft C, the clutch being operated by the
60 pedal D^2 on the gun platform. The spur wheel is in the example shown carried on a drum C^{12} (Fig. 5) which is keyed to the elevating shaft and is connected with the drum by clutch keys c^{12} . These clutch keys

are so arranged that they can only engage 65 in one position of the spur wheel relatively to the drum and are attached by links c^{13} to a sliding ring C^{13} which is loosely keyed to the shaft and which is moved axially by links d, d' connected to the pedal D^2 . When
70 the gun is elevated and the said clutch keys c^{12} are in the engaging position as shown, the spur wheel c^8 revolves with the drum C^{12} , thus imparting through the aforesaid screw c^{8x} and the gear box C^7 the required
75 compensation for muzzle velocity. Should it be necessary to alter the elevation of the guns on account of the heel of the ship, the pedal D^2 is depressed and the spur wheel is disconnected from the elevating shaft. 80
Movement of the said shaft does not now affect the said spur wheel and no further correction for difference in muzzle velocity takes place whatever change in elevation the guns may receive. When an alteration takes place
85 in the range the clutch must first be allowed to engage, and to effect this the pedal is released and the clutch keys c^{12} will then move into position as the gun reaches the elevation at which they were withdrawn. The
90 sight and the gun may then be re-set and the required correction for muzzle velocity will continue to be imparted to the elevating pinions.

In order to prevent any motion from 95 being imparted to the range adjusting gear when the clutch C^6 is disengaged, we provide an interlocking device between the pedal D^2 and the said range adjusting gear in a similar manner to that described with-
100 in the specification of our application Serial Number 687114. We also employ means similar to those described in the said specification for ascertaining from the sighting
105 apparatus the correct position in which the disconnecting of the clutch should take place.

It will be obvious that our improvements are applicable to two, three or more inter-
connected guns. 110

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

1. In mountings for heavy ordnance, the combination with the elevating pinions of a plurality of guns, of a rotary elevating
115 shaft, a differential gear for connecting one of said pinions with the shaft, and means for actuating said differential gear during the elevation of the guns.

2. In mountings for heavy ordnance, the 120 combination with the elevating pinions of a plurality of guns, of a rotary elevating shaft, a differential gear for connecting one of said pinions with the shaft, and an adjustable correcting device for actuating said
125 differential gear during the elevation of the guns.

3. In mountings for heavy ordnance, the

combination with the elevating pinions of
a plurality of guns, of a rotary elevating
shaft, a differential gear for connecting one
of said pinions with the shaft, a correcting
5 member connected to said differential gear,
a pivot for said member, mechanism for ac-
tuating said member during the elevation of
the guns, and means for adjusting the pivot
of said member.

10 4. In mountings for heavy ordnance the
combination with the elevating pinions of a
plurality of guns, of a rotary elevating
shaft, a differential gear for connecting one
of said pinions with the shaft, a correcting
15 member connected to said differential gear,
a pivot for said member, mechanism for
actuating said member during the elevation

of the guns, means for adjusting the pivot
of said member, and means for disconnect-
ing the mechanism that actuates the mem- 20
ber.

In testimony whereof we affix our signa-
tures in presence of two witnesses.

ARTHUR TREVOR DAWSON.
JAMES HORNE.

Witnesses to the signature of Arthur Tre-
vor Dawson:

HENRY KING,
JNO. R. CASWELL.

Witnesses to the signature of James
Horne:

H. S. McDOWALL,
H. L. GITTINS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."