A. T. DAWSON & J. HORNE.

HEAVY ORDNANCE.

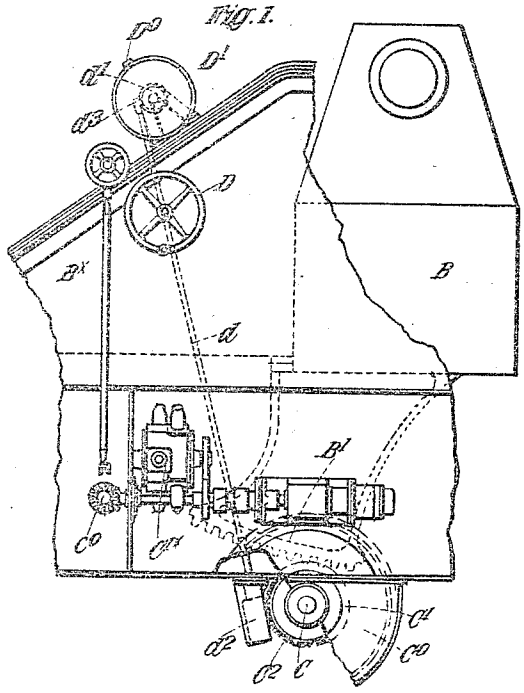
APPLICATION FILED MAR. 29, 1912.

1,041,248.

Patented Oct. 15, 1912

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

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5 SHEETS—SHEET 2.

Fig. 2.

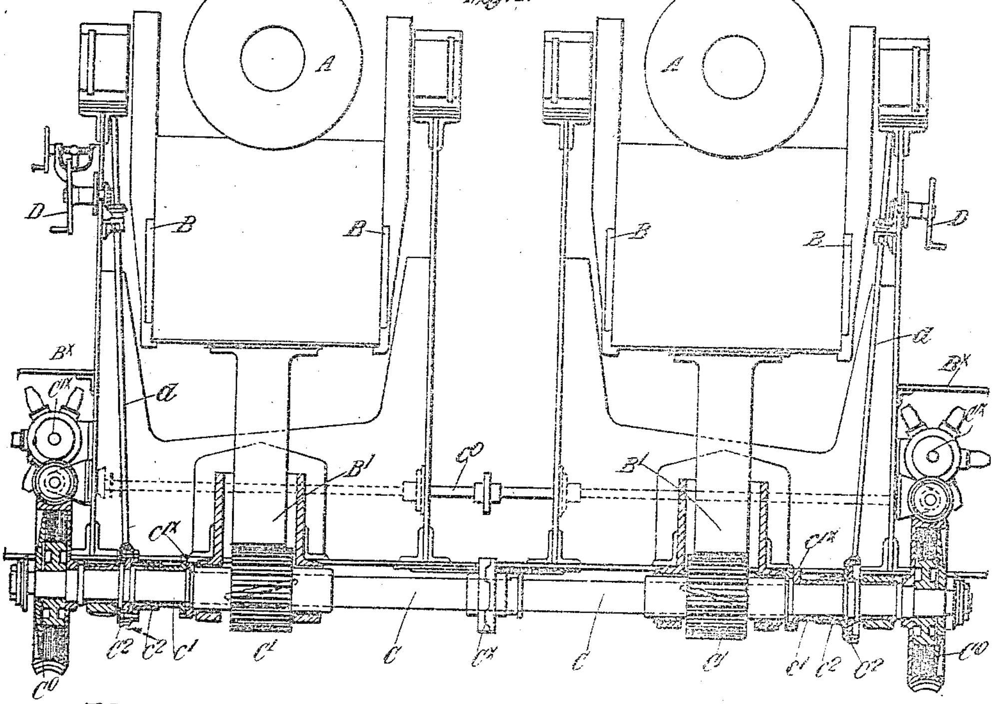
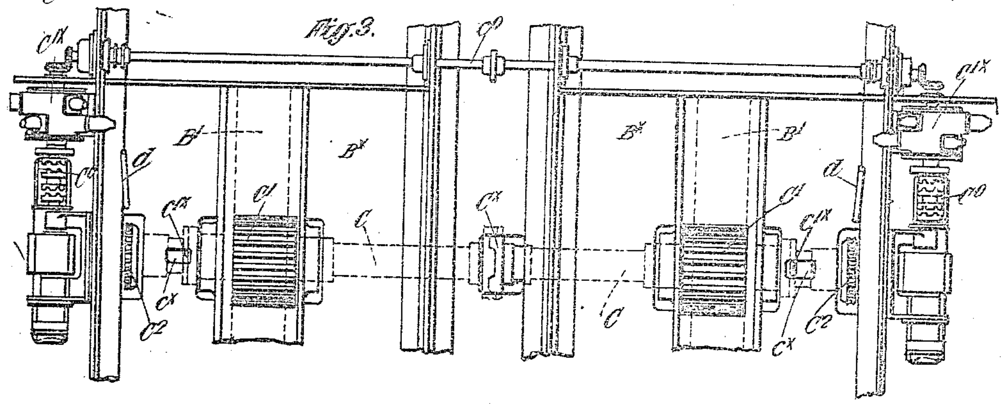


Fig. 3.



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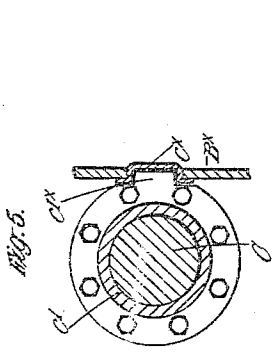

Fig. 5.

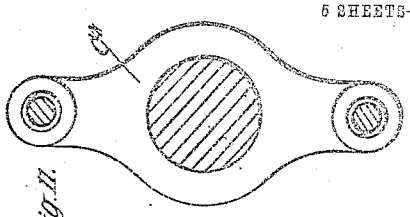

Fig. 11.

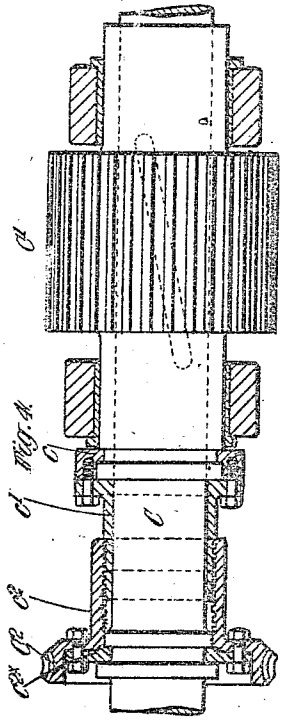

Fig. 4.

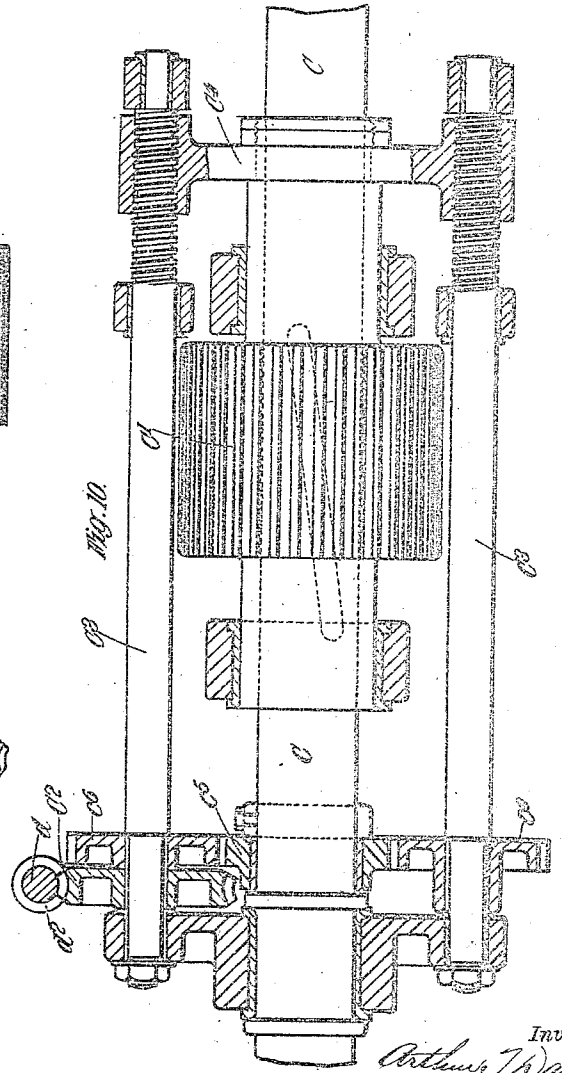

Fig. 10.

Witnesses.

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5 SHEETS—SHEET 4.

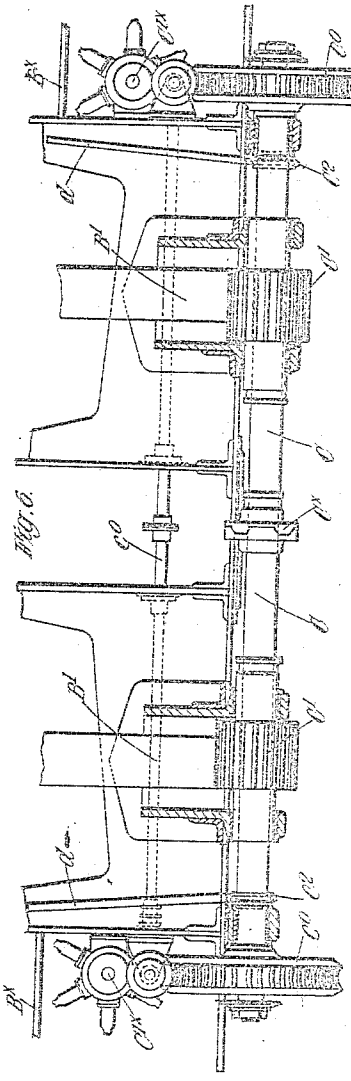

Fig. 6.

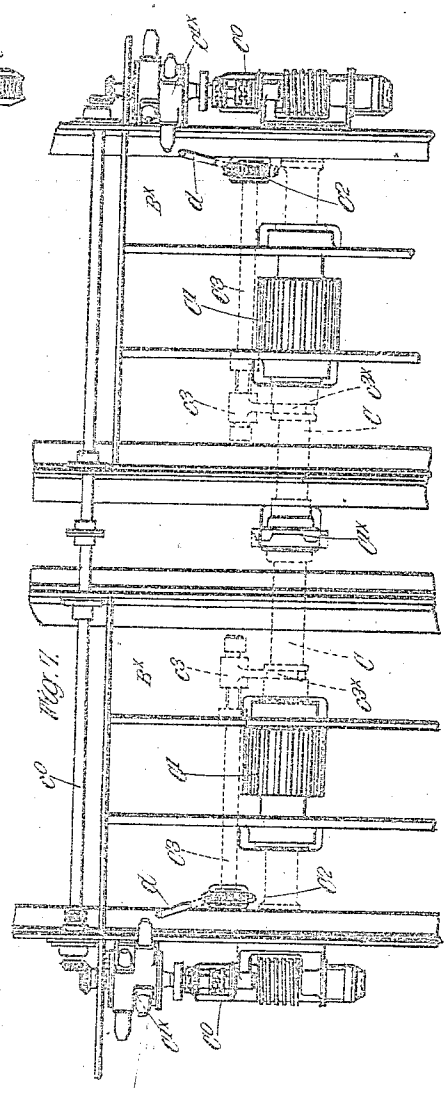

Fig. 7.

Witnesses.

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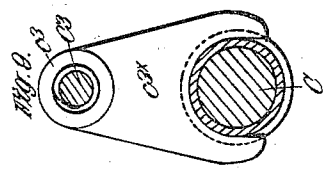
5 SHEETS—SHEET 5.



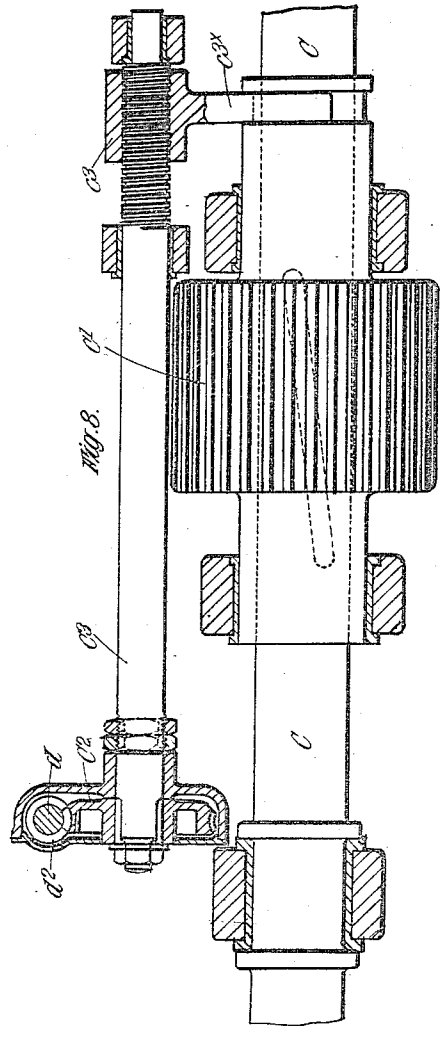


Fig. 8.

Witnesses.

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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, ENGLAND.

HEAVY ORDNANCE.

1,041,248. Specification of Letters Patent. Patented Oct. 15, 1912.

Application filed March 29, 1912. Serial No. 687,113.

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 the elevating pinions of two or more guns are carried by a transverse shaft in such a manner that the guns move simultaneously in elevation, one or more of the said pinions being adapted to be angularly displaced relatively to the said transverse shaft in order to effect changes in the angle of elevation existing between the guns to compensate for differences in muzzle velocity of the guns.

In the specification of our British Patent No. 4890 of 1907 we described a method of angularly displacing the elevating pinions but in the present invention we provide improved means, comprising hand actuated mechanism operating upon one or more of the said pinions through worm or other suitable gearing, and we also provide in conjunction with the aforesaid mechanism one or more appropriate indicators or the like graduated in ranges corresponding to the known difference in muzzle velocity of the guns, so that the amount of adjustment to be given to the pinion or pinions will correspond not only to the difference in muzzle velocity but also to the range. The said indicators may comprise a dial provided with the aforesaid graduations, and a pointer or the like that can be adjusted relatively to the graduated dial to accord with any variation in the difference in muzzle velocity between the guns; the said dial is adapted to be angularly displaced by gearing deriving its motion from the aforesaid hand actuated mechanism.

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. Fig. 2 an end elevation, and Fig. 3 a plan of a twin gun mounting provided with one constructional form of our improvements. Fig. 4 is an enlarged view of one method of displacing the elevating pinions. Fig. 5 is a side elevation of a detail hereinafter referred to. Figs. 6 and 7 are views similar to Figs. 2 and 3 showing another constructional form of our improvements. Fig. 8 is a plan on an enlarged scale showing more clearly the said improvements. Fig. 9 is a side elevation of a detail of Fig. 8 hereinafter referred to. Fig. 10 is a view similar to Figs. 4 and 8 of another constructional form of our improvements, and Fig. 11 is a side elevation of a detail of Fig. 10 hereinafter referred to.

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

A, A are the guns and B, B the slide frames.

$B^{\times}$ is the gun platform or turntable.

C, C are the elevating shafts and $C^{\times}$ is the clutch connecting them.

C′, C′ are the elevating pinions gearing with the toothed elevating arcs B′, B′; $C'^{\times}$, $C'^{\times}$ are the elevating motors and C°, C° the elevating worm wheels.

D, D represent hand-wheels for angularly displacing the elevating pinions.

D′ D′ represent the aforesaid graduated dials and D°, D° their adjustable pointers.

In the examples shown the elevating pinions C′, C′ are connected to their transverse elevating shafts C, C by means of a spiral or inclined key and keyway arrangement as previously proposed by us. The outer end of the sleeve of each of the pinions C′ C′ of the construction shown in Figs. 1 to 5 is formed with a circumferential groove which receives a collar c (Figs. 1 to 5) preferably made in halves for convenience in assembling. The said collar is, in the example shown in Figs. 1 to 5 attached by screws to a sleeve c' formed with external screw threads to engage with internal screw threads in the elongated boss or nave c^2 of a worm wheel C^2. This worm wheel as shown is held in position on the transverse shaft C by a ring $c^{2\times}$ (Fig. 4) engaging with collars formed on the said shaft. The externally screw threaded sleeve c' is prevented from rotating by means of a fin $c'^{\times}$ (Figs. 2, 3 and 5) extending therefrom and working in a guide $c^{\times}$ carried on the underside of the turntable $B^{\times}$. Rotary movement is transmitted to the worm wheel

C^2 by means of the aforesaid hand actuated mechanism operated from the gun platform by the hand wheel D. This mechanism comprises, in the example shown, a vertically disposed shaft d connected by bevel pinions with the shaft of the hand wheel D and furnished at its lower end with a worm d^2 engaging with the aforesaid worm wheel C^2. The upper end of the shaft d is provided with a worm d^3 which engages with a worm wheel d' appertaining to the dial D' that is graduated in ranges corresponding to the difference in muzzle velocity of the guns, as aforesaid. When the hand wheel D is rotated, the dial D' is angularly displaced until the graduation corresponding to the range at which the gun is firing is opposite the pointer D^6. At the same time the worm wheel C^2 is angularly displaced, and the said worm wheel through the screw threads of the boss c^2 and the sleeve c' displaces the latter axially, carrying with it the elevating pinion C'. Owing to the inclined key and keyway connection between the shaft C and the pinion C' the latter is angularly displaced and the gun appertaining thereto elevated or depressed to the required extent with respect to the other gun.

By the aforesaid arrangement with the worm wheel and the screw gearing situated co-axial with the transverse elevating shaft and retained in position on the same by collars, all axial forces due to the endwise movement of the elevating pinion are taken up by the bearings of the said shaft.

The axial movement of the elevating pinions may alternatively be effected by means of a screw threaded shaft C^3 arranged parallel of the transverse elevating shaft C, as shown in Figs. 6 to 9. The said screw-threaded shaft is as shown supported in suitable bearings carried by the turntable and coöperates with a screw-threaded nut or sleeve c^3 which is formed with a fork shaped arm c^{3x} (Figs. 8 and 9) adapted to engage in the aforesaid circumferential groove in the outer end of the sleeve of the elevating pinion C'. The hand actuated mechanism for transmitting movement to the said screw-threaded shaft comprising the shaft d, worm d^2 and worm wheel C^2, is shown as being similar to that described with reference to Figs. 1 to 5. The indicator working in conjunction with the said mechanism may also be similar to that shown by Figs. 1 to 5.

In Figs. 10 and 11 we have shown two screw-threaded shafts C^3 which are used in order to avoid the side strain incidental to the use of a single screw-threaded shaft. These shafts are connected together by the gear wheels c^4, c^5, c^6 to cause them to be rotated at equal speeds. Each of the said screw-threaded shafts has mounted thereon a nut forming part of a transverse bar or crosshead C^4 which engages in the aforesaid circumferential groove in the outer end of the sleeve of the elevating pinion.

The clutch C^5 through which the elevating shafts are connected together is adapted to be engaged or disengaged from the gun platform and is so arranged that it can be placed into a position to couple the shafts together only when the guns are at the same elevation. The shafts C are supported in bearings carried by the turntable, and are rotated by the motors C'^x as shown or by manual power. Friction plates may, as shown in Fig. 2, be provided and constitute the connection between the elevating worm wheels C^2 and their shafts C so that undue stress in the parts is avoided. To prevent locking of the worms and worm wheels of the elevating gears, the worm shafts are connected by bevel gearing to a transverse shaft c^7 as previously proposed by us.

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

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

1. In mechanism for elevating to a common range, a plurality of guns of different muzzle velocities, the combination with said guns of gun elevating mechanism common to all of them, range correcting mechanism associated with said guns for correcting the elevation of the guns individually for differences in muzzle velocity, and individual gun elevating connections operable by the common elevating mechanism and by the elevation correcting mechanism, the individual elevating connections being movable by the common elevating mechanism without moving the elevation correcting mechanism, substantially as described.

2. In mechanism for elevating to a common range a plurality of guns of different muzzle velocities, the combination with said guns of gun elevating mechanism common to all of them, range-correcting mechanism associated with said guns for correcting the elevation of the guns individually for differences in muzzle velocity, individual gun elevating connections operable by the common elevating mechanism and by the elevation correcting mechanism, the individual elevating connections being movable by the common elevating mechanism without moving the elevation correcting mechanism, and indicating devices associated with the elevation correcting machanism whereby the correction in the elevation of the individual guns may be observed, substantially as described.

3. In mechanism for elevating to a common range a plurality of guns of different muzzle velocities, the combination with said guns of gun elevating mechanism common to all of them, range correcting mechanism associated with said guns for correcting the

elevation of the guns individually for differences in muzzle velocity, individual gun elevating connections operable by the common elevating mechanism and by the elevation correcting mechanism, the individual elevating connections being movable by the common elevating mechanism without moving the elevation correcting mechanism, and indicating devices associated with the elevation correcting mechanism whereby the correction of the elevation of the individual guns may be observed, the indicator associated with the elevation correcting mechanism having a scale calibrated on the basis of the known muzzle velocity of the gun with which it is associated to indicate the corrections for different ranges, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

ARTHUR TREVOR DAWSON.
JAMES HORNE.

Witnesses as to the signature of Arthur Trevor Dawson:
HENRY KING,
JNO. R. CASWELL.

Witnesses as to signature of James Horne:
MARK G. ATKINSON,
HENRY T. MCDOWALL.