

A. T. DAWSON & G. T. BUCKHAM.

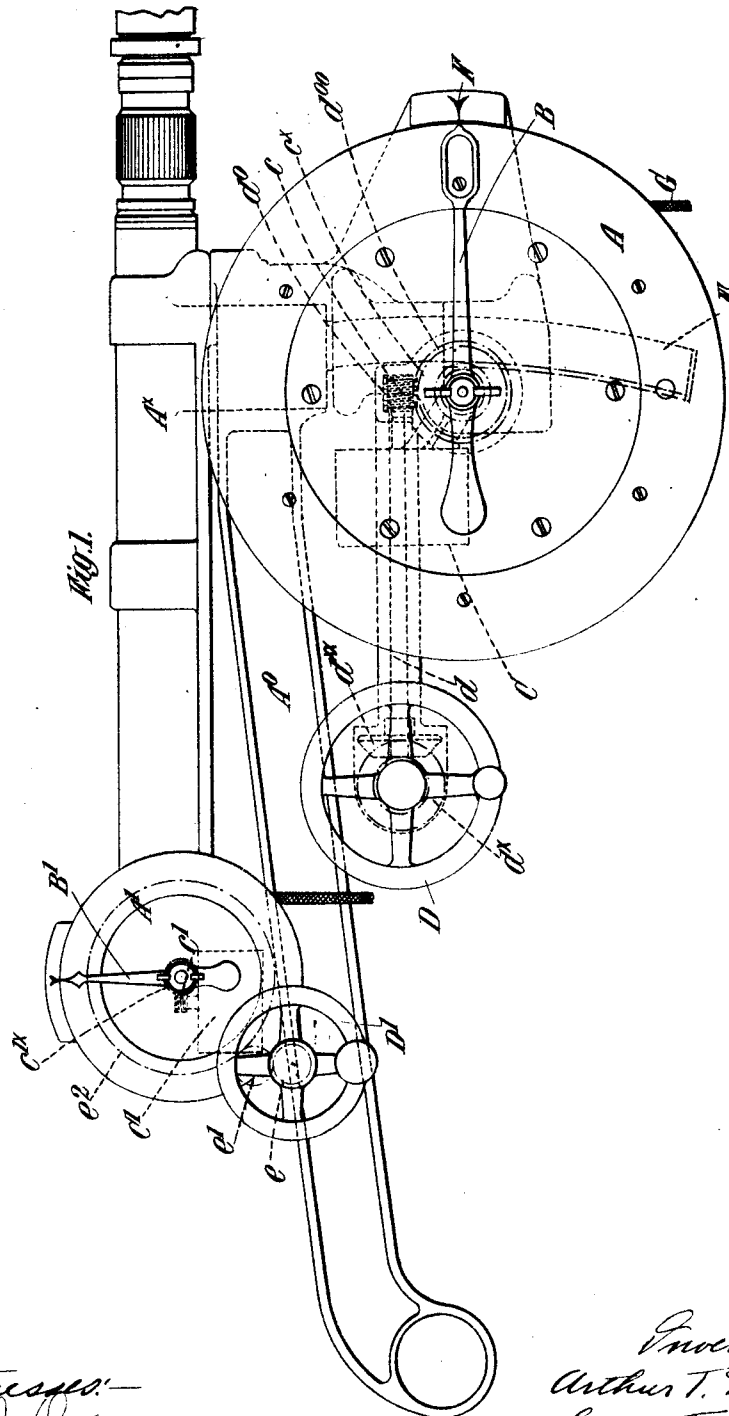
SIGHTING APPARATUS FOR ORDNANCE.

APPLICATION FILED APR. 5, 1910.

1,040,161.

Patented Oct. 1, 1912.

3 SHEETS-SHEET 1.



Witnesses:-
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their Attorneys

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3 SHEETS-SHEET 2

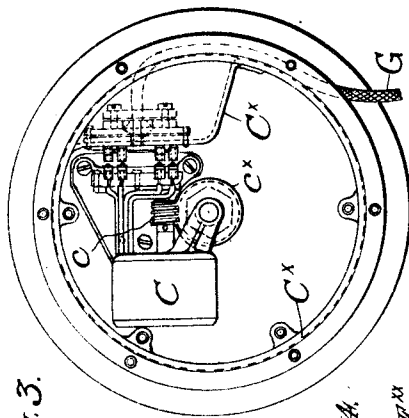


Fig. 3.

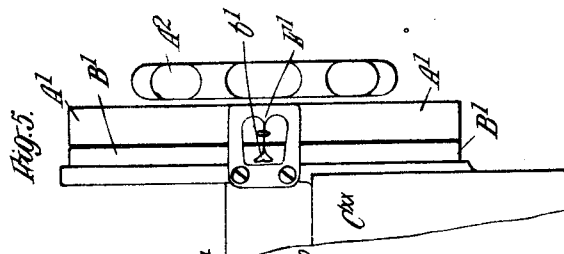
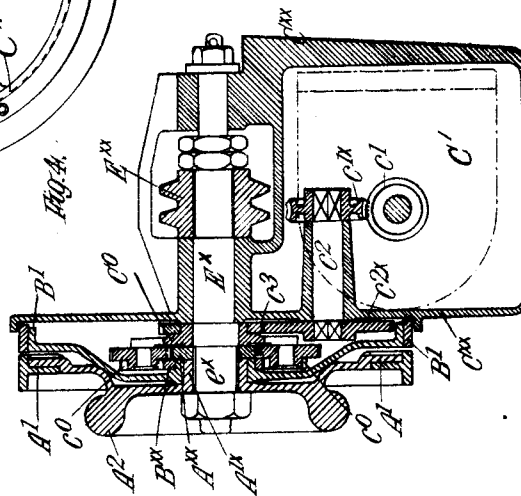
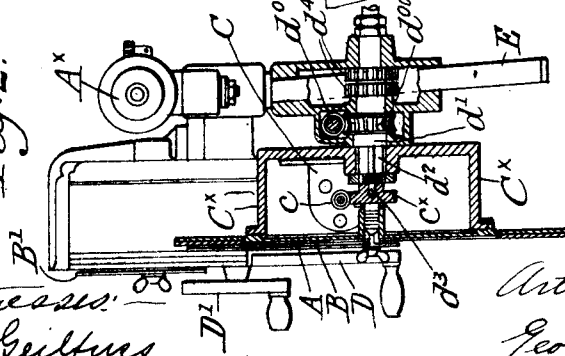


Fig. 2.



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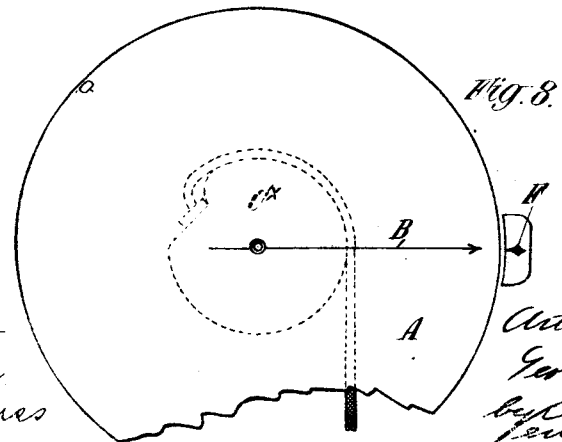
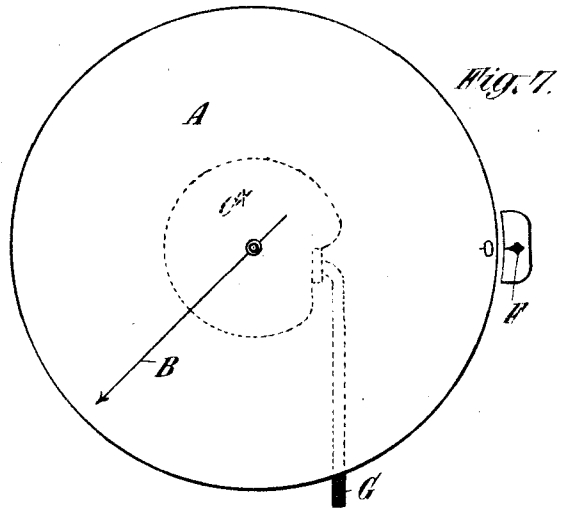
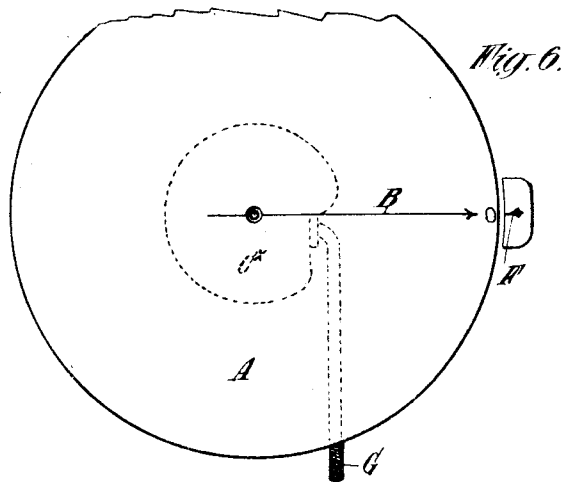
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UNITED STATES PATENT OFFICE.

ARTHUR TREVOR DAWSON AND GEORGE THOMAS BUCKHAM, OF WESTMINSTER, LONDON, ENGLAND, ASSIGNORS, BY MESNE ASSIGNMENTS, TO VICKERS, LIMITED.

SIGHTING APPARATUS FOR ORDNANCE.

1,040,161.

Specification of Letters Patent.

Patented Oct. 1, 1912.

Application filed April 5, 1910. Serial No. 553,554.

To all whom it may concern:

Be it known that we, ARTHUR TREVOR DAWSON, knight, and GEORGE THOMAS BUCKHAM, both subjects of the King of Great Britain, residing at 32 Victoria street, Westminster, in the county of London, England, have invented certain new and useful Improvements in Sighting Apparatus for Ordnance, of which the following is a specification.

This invention relates to sighting apparatus of the kind already proposed by us in which a traveling range pointer is actuated through worm gearing by an electric motor controlled from a distant station whence the information relating to the sighting is transmitted, the movements of the pointer being followed by angularly displacing a graduated range dial or drum, or an index, operated by the movement of the sighting apparatus during its elevation or adjustment by hand through the intervention of the usual rack and pinion arrangement. Apparatus of this kind has been disclosed in the specification of the prior U. S. Patent No. 863593 already granted to us. We have also disclosed an arrangement in connection with the aforesaid apparatus in which the electric motor is inclosed in a casing that is capable of angular displacement about the axis of the range dial for enabling corrections to be made in the indications to compensate for variations in muzzle velocity, temperature of charges, etc., such an arrangement being disclosed in the specification of our prior U. S. Patent No. 913705.

According to our present invention we still employ the motor actuated pointer, but do not provide for following the movements of the pointer by angularly displacing the range dial or drum. The pointer is angularly displaced by the motor to any desired extent, and is brought back to the zero or starting position of the sight by a corresponding angular displacement of the range dial or drum, thereby setting the sight. For this purpose we may attach the casing of the said motor to the said dial or drum so that when the dial or drum is moved by the hand-actuated gearing in setting the sight, movement will be imparted to the pointer in a direction opposite to that which it receives from the motor, in order to return said pointer to its zero or starting po-

sition. Thus the act of setting the sight to accord with the indications of the motor actuated pointer, instead of causing the dial to follow the movements of the pointer as in our previous arrangements, causes the pointer to return to the zero or starting position after each angular displacement it receives from the motor.

In order that our 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, and Fig. 2 is a vertical section taken approximately through the center of the range dial on an enlarged scale, of sighting apparatus provided with our improvements. Fig. 3 is an elevation on a still larger scale of the range receiver with the dial and cover removed. Fig. 4 is a vertical section, and Fig. 5 is an elevation of a modified construction in which the motor is stationary. Figs. 6, 7 and 8 are diagrammatic views showing respectively the pointer in the zero or starting position, in a position to which it has been angularly displaced by the motor and in the position to which it is moved with the dial to bring the pointer opposite the index mark.

A is the range dial, A' is the deflection dial, A^x is the telescopic sight mounted on the hinged sight bar A^o, B, B' are respectively the electrically controlled pointers of the range dial and the deflection dial, C, C' are the respective motors and D D' the operating hand wheels. The motor C (Figs. 2 and 3) is connected to a casing C^x which is attached to the range dial A in any suitable manner. The motion of the motor C is transmitted to the pointer B by means of the worm *c*, which gears with a worm wheel *c'*, the said gearing permitting the motor to move the pointer but preventing the pointer from being moved relatively to the motor when the dial and the casing C^x are actuated by the hand gearing. This gearing comprises a longitudinal shaft *d* actuated from the hand wheel D by means of bevel wheels *d'*, *d''*; the said shaft carries the worm *d'* which gears with a worm wheel *d''*. The said worm wheel is mounted on a shaft *d'* which is provided at its outer end with a squared portion *d''* fitting in a corre-

sponding hole in the rear wall of the casing C^x , and is also provided with a spigot d^3 on which the aforesaid worm wheel e^x is mounted. The shaft d^2 also carries the pinions d^4 which gear with the sight elevating sector E. It will be understood that the pointer B will travel with the dial A and casing C^x during the setting of the sight by hand but that the pointer B alone moves under the action of the motor C. The index mark F to which the pointer is moved when setting the sight by the hand gearing is in the example shown fixed; it may however in some cases be made capable of adjustment to compensate for variations in muzzle velocity, etc. The electric cable G by means of which the current is conducted to the motor is made flexible and is capable of winding on or unwinding from the periphery of the casing C^x during the setting of the sight so as to avoid an undue amount of loose cable existing in the apparatus.

Referring to the diagrammatic view illustrated by Figs. 6, 7 and 8, Fig. 7 shows the pointer after it has been operated from the transmitting instrument through the motor C to indicate a particular range and Fig. 8 shows the position the parts assume when the aforesaid hand wheel D is operated to bring the pointer back to the index mark F and the elevating pinions d^4 and motor casing C^x together with the range dial A have been thereby rotated as hereinbefore explained.

Although we have described our invention more particularly with regard to the range dial, it will be obvious that it can be applied equally well to the deflection dial, in which case the deflection dial A' and the deflection pointer B' would be actuated in a similar manner to that above described with reference to the range dial and pointer, the motor C' actuating the pointer B' through the intervention of the worm e' and the worm wheel e^x . The shaft of the hand wheel D' would be provided with a pinion e engaging with a pinion e' ; the latter also gearing with a pinion e^2 suitably connected with a casing containing the motor C' and its worm gearing, the said casing being similar to the casing C^x except that it revolves in a fixed bracket. The rotation of the hand wheel D' would cause the pointer B' and the dial A' to be rotated, and at the same time the necessary amount of deflection would be imparted to the sight A^x in the usual manner.

In the modification shown in Figs. 4 and 5, the motor does not move with the dial as in the arrangements above described. In this construction which is shown by way of example in connection with the deflection receiver the motor C' is secured to the casing C^{xx} which forms a stationary part of the sight. The worm e' of the motor gears

with a worm wheel e'^x which is mounted at one end of a shaft e^2 . The outer end of said shaft carries a pinion e^{2x} which gears with a pinion e^3 secured to a disk C^o carrying a number of planet pinions e^o each of which has two sets of teeth of different diameters. The pointer is in this construction in the form of a drum B' having an arrow mark b' on its periphery, and the index mark is in the form of a gate F' attached to the aforesaid casing C^{xx} . The graduated drum A' is integral with a hand wheel A^2 , and is provided with a boss A'^x which is mounted on the squared end e^x of the shaft E^x carrying the usual deflection worm E^{xx} . Mounted on the said squared end e^x is a pinion A'^x , which gears with the teeth of the larger diameter of the aforesaid planet pinions e^o . The periphery of the boss A'^x forms a bearing for the pointer drum B' to which is secured a pinion B'^x , the said pinion engaging with the teeth of the smaller diameter of the aforesaid planet pinions e^o .

The movements of the motor C' are transmitted by means of the worm gearing e' , and e'^x and the pinion e^{2x} to the pinion e^3 which is as aforesaid secured to the disk C^o carrying the planet pinions e^o . These planet pinions gear with the aforesaid pinions A'^x and B'^x and as the former, which is mounted on the shaft E^x , remains stationary during this operation, the pinions e^o are rotated and by reason of their different diameters movement is imparted to the pinion B'^x and the pointer drum B' . During the hand operation to bring the arrow b' of the drum B' to the index mark, the hand wheel A^2 is actuated and with it of course the graduated drum A' . Owing to the fact that the boss A'^x is mounted on the squared end e^x of the shaft E^x , the latter will be rotated; consequently the pinion A'^x will rotate and will revolve the planet pinions e^o gearing therewith, the disk C^o being held stationary by the worm gearing e' , e'^x . The pinions e^o which as aforesaid gear with the pinion B'^x , will actuate the latter, and cause the drum B' to be rotated. This operation therefore causes the graduated drum A' , and the pointer drum B' to be angularly displaced, and at the same time the worm E^{xx} imparts the necessary deflection to the sight. Obviously differential gear of the kind above described can be employed in connection with the range dial or drum and the range pointer.

The graduated dial or drum is not absolutely necessary for the purpose of our present invention but is provided so that it may be used for setting the sight in the event of the electrical function becoming for any reason inoperative. In the case of the construction shown in Figs. 4 and 5 the graduated drum when employed is preferred.

erably covered by suitable means during the normal operation, and is adapted to be uncovered only if the electrical function fails.

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

1. In sighting apparatus for ordnance, the combination with a sight, means for setting the sight, a pointer for indicating the extent to which the sight is to be set, and an actuating motor for said pointer, of means whereby the setting of the sight causes the said pointer to return to its zero or starting position.

2. In sighting apparatus for ordnance, the combination with a sight, means for setting the sight, a pointer for indicating the extent to which the sight is to be set, and an actuating motor for said pointer, of a displaceable member on which the said motor is mounted, and means whereby the setting of the sight causes the said member and the pointer to be displaced so that the latter returns to its zero or starting position.

3. In sighting apparatus for ordnance, the combination with a sight, means for setting the sight, a pointer for indicating the extent to which the sight is to be set, and an actuating motor for said pointer, of a casing on which the said motor is mounted, a dial attached to said casing, and means whereby the setting of the sight causes the casing, dial and pointer to be displaced so that the latter returns to its zero or starting position.

4. In sighting apparatus for ordnance, the combination with a sight, means for elevating the sight, a pointer for indicating the extent to which the sight is to be elevated, and an actuating motor for said pointer, of a casing on which the said motor is mounted, a range dial attached to said casing, and means whereby the setting of the sight to accord with the indication of the range pointer causes the latter to return to its zero or starting position.

5. In sighting apparatus for ordnance, the combination with a sight, means for deflecting the sight, a pointer for indicating the extent to which the sight is to be deflected, and an actuating motor for said pointer, of a casing on which the said motor is mounted, a deflection dial attached to said casing, and means whereby the setting of the sight to accord with the indication of the deflection

pointer causes the latter to return to its zero or starting position.

6. In sighting apparatus for ordnance, the combination with the pointer and its actuating motor, of a spindle on which the said pointer is mounted, a worm wheel attached to said spindle, a worm of said motor gearing with said worm wheel, hand operated means for setting the sight, and means whereby the actuation of said hand-operated means returns the pointer to its zero or starting position.

7. In sighting apparatus for ordnance, the combination with the pointer and its actuating motor, of a casing to which said motor is attached, a spindle on which said pointer is mounted, a worm wheel attached to said spindle, a worm of said motor gearing with said worm wheel, hand operated means for setting the sight, and means for connecting the said hand operated means with the said casing, so that during the actuation of said hand-operated means, the pointer is returned to its zero or starting position.

8. In sighting apparatus for ordnance, the combination with the pointer and its actuating motor, of a casing to which said motor is attached, a dial connected with said casing, a spindle on which said pointer is mounted, a worm wheel attached to said spindle, a worm of said motor gearing with said worm wheel, hand operated means for setting the sight, and means for connecting the said hand operated means with the said casing, so that during the actuation of said hand-operated means, the pointer is returned to its zero or starting position.

9. In sighting apparatus for ordnance, the combination with the pointer and its actuating motor, of a casing to which said motor is attached, a spindle on which said pointer is mounted, a worm wheel attached to said spindle, a worm of said motor gearing with said worm wheel, a shaft connected with said casing and hand actuated means for rotating said shaft to set the sight and to return the pointer to its zero or starting position.

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

ARTHUR TREVOR DAWSON.
GEORGE THOMAS BUCKHAM.

Witnesses:

HENRY KING,
ALFRED PEAKS.