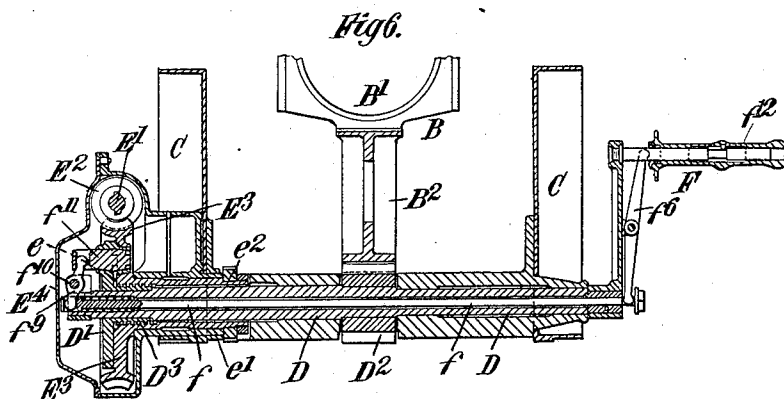
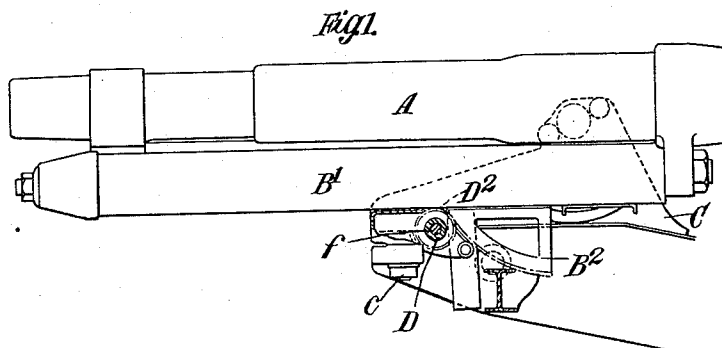


A. T. DAWSON & G. T. BUCKHAM.
ELEVATING AND LOADING GEAR OF HOWITZERS.
APPLICATION FILED SEPT. 7, 1909.

1,043,512.

Patented Nov. 5, 1912.

3 SHEETS—SHEET 1.



Witnesses:-
H. A. Broyer
A. C. Barlow

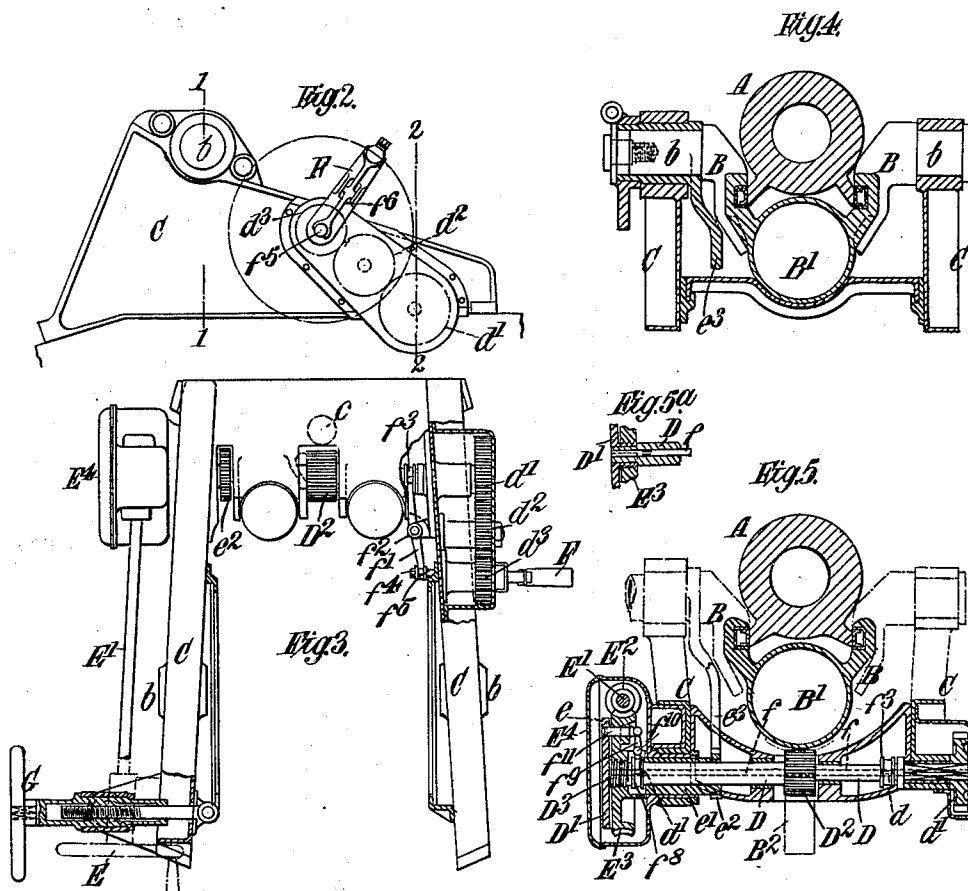
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3 SHEETS—SHEET 2.



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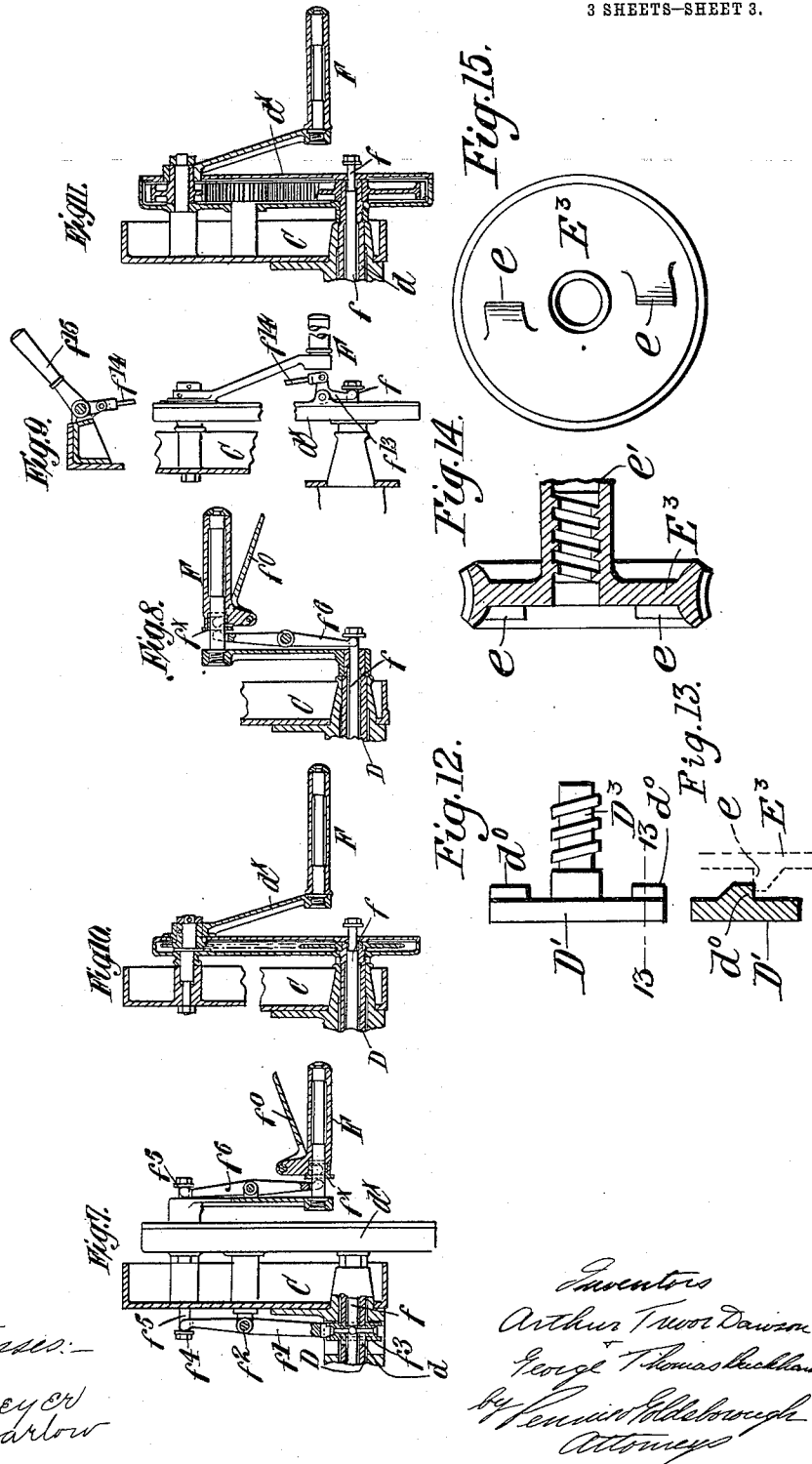
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3 SHEETS—SHEET 3.



Witnesses:
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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, OF WESTMINSTER, ENGLAND.

ELEVATING AND LOADING GEAR OF HOWITZERS.

1,043,512.

Specification of Letters Patent.

Patented Nov. 5, 1912.

Application filed September 7, 1909. Serial No. 516,354.

To all whom it may concern:

Be it known that we, ARTHUR TREVOR DAWSON and GEORGE THOMAS BUCKHAM, subjects of the King of Great Britain, both residing at 32 Victoria street, Westminster, in the county of London, England, have invented certain new and useful Improvements Relating to the Elevating and Loading Gear of Howitzers, of which the following is a specification.

This invention relates to the elevating and loading gear of howitzers and other guns firing at high angles of elevation and the said invention relates particularly to the kind of such gear in which the slow or elevating movement of the gun is effected from one side of the mounting and the quick or loading movement from the opposite side, suitable stops being provided for limiting the extent of the quick return movement of the gun in order to bring it to the correct firing position after loading, and in which a single segmental rack is provided which serves to move the gun both for elevation and for loading, permanently engaging with this segmental rack being a toothed pinion carried by a transverse shaft that also carries at one end the worm wheel appertaining to the elevating gear and at the other end the actuating mechanism appertaining to the loading gear. Suitable means have in this class of gear been proposed whereby when the loading gear is actuated the elevating gear will be thrown out of action so that the movement of the gun will be effected through the segmental rack without affecting the elevating gear.

According to the present invention a longitudinally displaceable rod is provided extending through the transverse shaft and adapted to be operated by suitable mechanism which may be actuated from the handle appertaining to the loading gear. The longitudinal displacement of the said rod effects the disengagement of a locking device that normally retains the worm wheel connected with a clutch disk or plate movably mounted on the said transverse shaft in such manner that during the initial movement of the transverse shaft when the latter is actuated by the loading gear, the disk will move out of contact with the worm wheel and lie out of the path of suitable stops that are provided on the said worm wheel for limiting

the extent of movement the gun performs in returning to the firing position after loading.

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

Figure 1 is a general sectional elevation of the gun and mounting showing the segmental rack and the actuating pinion engaging therewith. Fig. 2 is a side elevation showing the loading gear which is situated at the right hand side of the mounting. Fig. 3 is a plan of the upper carriage of the mounting, showing the relative positions of the elevating, traversing and loading gear. Fig. 4 is a transverse section taken approximately in the line 1. 1. of Fig. 2 through the trunnions. Fig. 5 is a transverse section taken approximately on the line 2. 2. of Fig. 2 through the axis of the elevating pinion. Fig. 5^a is a local section through the bosses of the worm wheel and the clutch disk of Fig. 5. Fig. 6 is a transverse section similar to Fig. 5 but shows a modification of the elevating and loading gear on a larger scale. Fig. 7 is a sectional plan of the actuating crank handle of the loading gear illustrated in Figs. 1 to 5 showing a slight modification of the mechanism therein shown for operating the longitudinally displaceable rod. Fig. 8 is a similar view of the actuating crank handle of the loading gear illustrated in Fig. 6 showing a modification of the mechanism therein shown for operating the longitudinally displaceable rod. Fig. 9 is a sectional plan of the said actuating crank handle of the loading gear illustrated in Figs. 1 to 5 showing a further modification in which the operation of the longitudinally displaceable rod is effected by means that are independent of the said crank handle. Figs. 10 and 11 are sectional plans showing the gearing used in the arrangement illustrated by Fig. 9, the former of these figures indicating chain gearing and the latter spur gearing. Fig. 12 is a side elevation on an enlarged scale of a detail hereinafter referred to. Fig. 13 is a section on the line 13. 13. of Fig. 12. Figs. 14 and 15 are respectively a sectional side elevation and an end elevation of another detail hereinafter referred to.

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

A is the gun adapted to recoil in the gun-cradle, B B¹, which is trunnioned at *b* to the upper carriage C secured to the trail of the gun carriage or mounting in the usual manner.

B² is the segmental rack which is attached to the underside of the gun cradle at a point about midway between the side cheeks of the upper carriage C.

D is the transverse shaft which is mounted near its ends in bearings in the said side cheeks of the upper carriage and carries the toothed pinion D² that engages with the segmental rack B².

E is the elevating hand wheel which is situated at the left hand side of the mounting and is carried by a spindle E¹ having at its inner end the worm E². The said worm gears with the worm wheel E³ which is rotatably mounted on the adjacent end of the transverse shaft D, to which it is normally clutched by means of the clutch disk D¹ and pin *f*¹¹. The end of shaft D, with the worm and clutch disk and associated parts is included in the usual protecting box or casing E⁴.

F is the actuating crank handle which is situated at the right hand side of the mounting adjacent to the other end of the transverse shaft D for bringing into action and operating the loading gear.

G is the traversing hand wheel which operates in the usual manner to swing the upper carriage C laterally about a vertical pivot at *c*.

The said transverse shaft D is as aforesaid made hollow to receive the longitudinally displaceable rod *f*, which in the example illustrated by Figs. 1 to 5^a and Fig. 7 receives its longitudinal movement from a lever *f*¹ pivoted at *f*² to one of the side cheeks of the upper carriage C. One end of this lever is forked to engage with a sliding collar *f*³ on the shaft D, the said collar having a pin which extends through a slot *d* (Figs. 5 and 7) in the said shaft and engages with the longitudinally displaceable rod *f*. The other end of the said lever *f*¹ engages with a collar *f*⁴ (Figs. 3 and 7) at the inner end of a sliding rod *f*⁵ which passes axially through the shaft of the actuating crank handle F appertaining to the loading gear. This crank handle is provided with a lever *f*⁶ one end of which engages with the said sliding rod *f*⁵ and the other end with a sliding collar *f*⁷ of the handle, which collar is adapted to be moved by a grip-lever *f*⁸ pivoted at its inner end to the said handle. Near the opposite end of the longitudinally sliding rod *f* is a sliding collar *f*⁸ (Fig. 5) with which the said rod engages by means of a pin extending through a slot *d*¹ in the shaft D. Engaging

with this collar is a lever *f*⁹ which is pivoted at *f*¹⁰ to the boss of the worm wheel E³ and which serves to actuate the locking device that operates to connect and disconnect the worm wheel E³ and the disk D¹ which rotates with, but is slidable on the shaft D. In the example shown in Figs. 1 to 5^a this locking device comprises a sliding pin *f*¹¹ which is carried by the worm wheel and is pivoted to the aforesaid lever *f*⁹, the movement of the said lever causing the sliding pin to engage with an aperture in the disk D¹ or to become disengaged therefrom. The said disk D¹ has a sleeve which is connected with the worm wheel E³ by screw threads D³ so that during the initial rotary movement of the said shaft D when the latter is operated by the loading gear from the crank handle F, the said disk will move away from the adjacent surface of the worm wheel E³ and lateral stops *d*² thereon lie out of the path of stops *e* that are provided on the said worm wheel for coöperating with the stops *d*² to limit the extent of movement that the gun performs in returning to the firing position after loading. This arrangement is shown in Fig. 5^a and Figs. 12 to 15. During the actuation of the loading gear the elevating worm wheel E³ remains in engagement with the worm E² and cannot be rotated except by turning the worm by means of the elevating hand-wheel E. When the loading gear is moved in the reverse direction to return the gun to the loading position, the said disk D¹ will move toward the adjacent face of the worm wheel E³ and the stop *d*² of the disk will again come into position for engaging with the stops *e* on said worm wheel so as to bring the gun to rest in the correct firing position. On releasing the handle F of the loading gear the aforesaid longitudinally displaceable shaft *d* will return to its normal position and cause the sliding pin *f*¹¹ to resume its locking position relatively to the said disk and the worm wheel, so that when the elevating gear is actuated the said transverse shaft D will be operated through the worm gearing E² E³. The motion of the crank handle F is imparted to the shaft D in the arrangement illustrated by Figs. 1 to 5^a through a train of toothed wheels *d*¹ *d*² *d*³ (Fig. 2) inclosed in a box or casing *d*⁴. The said worm wheel E³ may be furnished with a sleeve *e*¹ carrying a toothed pinion *e*² for imparting movement to a toothed rack *e*³ to actuate the sighting apparatus when the worm wheel is revolved (see Fig. 5).

The modified arrangement illustrated by Fig. 6 is very similar to the arrangement illustrated by Figs. 1 to 5^a with the exception that the sliding pin *f*¹¹ of the locking device is carried by the disk D¹ instead of by the worm wheel E³ and the pivot *f*¹⁰ of the lever *f*⁹ for actuating the said sliding

pin is carried by the shaft D instead of by the worm wheel. Furthermore the lever f^6 carried by the crank handle F of the loading gear is adapted to be actuated by a longitudinal movement of the sliding member f^{12} of the said handle and the said lever f^6 acts directly upon the longitudinally displaceable rod f instead of indirectly through the rod f^5 , the lever f^1 and the collar f^3 as in the previously described arrangement. The toothed gearing through which the crank handle F actuates the shaft D is also dispensed with. In some cases we adapt the aforesaid grip-lever f^6 and the lever f^6 shown in Fig. 7 to act directly upon the longitudinally displaceable rod f as shown in Fig. 8.

Instead of arranging the crank handle F to operate the aforesaid longitudinally displaceable rod f as hereinbefore described, we may provide independent means therefor. For example we may arrange a bell crank lever f^{13} with one of its members in engagement with the said longitudinally displaceable rod f and connect its other member by means of a rod f^{14} to a hand lever f^{15} as shown in Fig. 9. And in this case we may either employ toothed gearing for transmitting the motion of the crank handle F to the shaft D as shown in Fig. 11, or chain gearing as shown in Fig. 10. Obviously the chain gearing may be employed in connection with any of the arrangements illustrated for indirectly actuating the said shaft D from the crank handle F.

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

1. In elevating and loading gear of ordnance the combination with the elevating worm wheel, of a non-sliding transverse shaft, a toothed pinion mounted thereon, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading, a locking device which normally retains said worm wheel in operative connection with the said transverse shaft and a longitudinally displaceable rod, for actuating said locking device.

2. In elevating and loading gear of ordnance the combination with the elevating worm wheel, of a non-sliding transverse shaft, a toothed pinion mounted thereon, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading, a locking device which normally retains said worm wheel in operative connection with the said transverse shaft and a longitudinally displaceable rod coaxial with said transverse shaft for actuating said locking device.

3. In elevating and loading gear of ordnance the combination with the elevating worm wheel, of a transverse shaft with respect to which the worm wheel is concentrically supported, a toothed pinion mounted

ed on said shaft, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading, a clutch disk mounted to slide on, but to rotate with said transverse shaft, a longitudinally sliding pin for engaging and disengaging said clutch disk with and from said worm wheel, and a longitudinally displaceable rod for actuating said sliding pin.

4. In elevating and loading gear of ordnance the combination with the elevating worm wheel, of a transverse shaft with respect to which the worm wheel is concentrically supported, a toothed pinion mounted on said shaft, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading, a clutch disk mounted to slide on, but to rotate with said transverse shaft, a longitudinally sliding pin for engaging and disengaging said clutch disk with and from said worm wheel, a longitudinally displaceable rod for actuating said sliding pin and means for imparting motion to said longitudinally displaceable rod.

5. In elevating and loading gear of ordnance the combination with the elevating worm wheel, of a transverse shaft with respect to which the worm wheel is concentrically supported, a toothed pinion mounted on said shaft, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading, a clutch disk mounted to slide on, but to rotate with said transverse shaft, a longitudinally sliding pin for engaging and disengaging said clutch disk with and from said worm wheel, a longitudinally displaceable rod for actuating said sliding pin and lever mechanism for imparting motion to said longitudinally displaceable rod.

6. In elevating and loading gear of ordnance the combination with the elevating worm wheel, of a transverse shaft with respect to which the worm wheel is concentrically supported, a toothed pinion mounted on said shaft, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading, a clutch disk mounted to slide on, but to rotate with said transverse shaft, a longitudinally sliding pin for engaging and disengaging said clutch disk with and from said worm wheel, positioning stops on the elevating worm wheel adapted to engage said disk, a sliding pin for engaging and disengaging said clutch disk with and from the said worm wheel, and a longitudinally displaceable rod operating said sliding pin.

7. In the elevating and loading gear of ordnance the combination with the elevating worm wheel, of a transverse shaft, a toothed pinion mounted thereon, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading,

a clutch disk mounted to slide on, but to rotate with said transverse shaft, a screw threaded sleeve of said clutch disk upon which the aforesaid worm wheel is rotatably mounted, positioning stops on the said worm wheel adapted to engage the disk, a sliding pin for engaging and disengaging said clutch disk with and from the said worm wheel and a longitudinally displaceable rod operating said sliding pin.

8. In the elevating and loading gear of ordnance the combination with the elevating worm wheel, of a hollow transverse shaft a toothed pinion mounted thereon, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading, a clutch disk mounted to slide on, but to rotate with said transverse shaft, a screw threaded sleeve of said clutch disk upon which the aforesaid worm wheel is rotatably mounted, positioning stops on the said worm wheel adapted to engage the disk, a sliding pin for engaging and disengaging said clutch disk with and from the said worm wheel, and a longitudinally displaceable rod mounted within said hollow shaft and operating said sliding pin.

9. In the elevating and loading gear of ordnance the combination with the elevating worm wheel, of a hollow transverse shaft a toothed pinion mounted thereon, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading, a clutch disk mounted to slide on, but to rotate with said transverse shaft, a screw threaded sleeve of said clutch disk upon which the aforesaid worm wheel is rotatably mounted, stops on the said worm wheel adapted to engage said disk, a sliding pin carried by said clutch disk for engaging and disengaging said clutch disk with and from the said worm wheel, a rod mounted within said hollow shaft, a pivoted lever engaging directly with said rod and means for connecting the said lever with the aforesaid sliding pin.

10. In elevating and loading gear of ordnance the combination with the elevating worm wheel of a hollow transverse shaft, with respect to which the worm wheel is concentrically mounted, a toothed pinion mounted on said shaft, a segmental rack gearing with said pinion and serving to

move the gun for elevation and for loading, a clutch disk mounted to slide on, but to rotate with said transverse shaft, a sliding pin for engaging and disengaging said clutch disk with and from the said worm wheel, a rod operating said sliding pin and mounted in said hollow shaft, and means for longitudinally displacing said rod from the handle of the loading gear.

11. In elevating and loading gear of ordnance the combination with the elevating worm wheel of a hollow transverse shaft with respect to which the worm wheel is concentrically mounted, a toothed pinion mounted on said shaft, a segmental rack gearing with said pinion and serving to move the gun for elevation and for loading, a clutch disk mounted to slide on, but to rotate with said transverse shaft, a sliding pin for engaging and disengaging said clutch disk with and from the said worm wheel, a rod operating said sliding pin and mounted in said hollow shaft, a pivoted lever engaging with one end of said rod, and a handle for operating said pivoted lever to displace the said rod.

12. In elevating and loading gear of ordnance the combination with the elevating worm wheel of a hollow transverse shaft, with respect to which the worm wheel is concentrically mounted, a toothed pinion mounted on said shaft, a segmental rack gearing with the said pinion and serving to move the gun for elevation and for loading, a clutch disk mounted to slide on, but to rotate with said transverse shaft, a sliding pin for engaging and disengaging said clutch disk with and from the said worm wheel, a rod operating said sliding pin and mounted in said hollow shaft, a pivoted lever engaging with one end of said rod, and a sliding handle mounted on the handle of the loading gear, said sliding handle engaging with the pivoted lever to rock the same and longitudinally displace the said rod.

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

ARTHUR TREVOR DAWSON.
GEORGE THOMAS BUCKHAM.

Witnesses:

HENRY KING,
ALFRED PEAKS.