



E. SCHNEIDER.

APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.

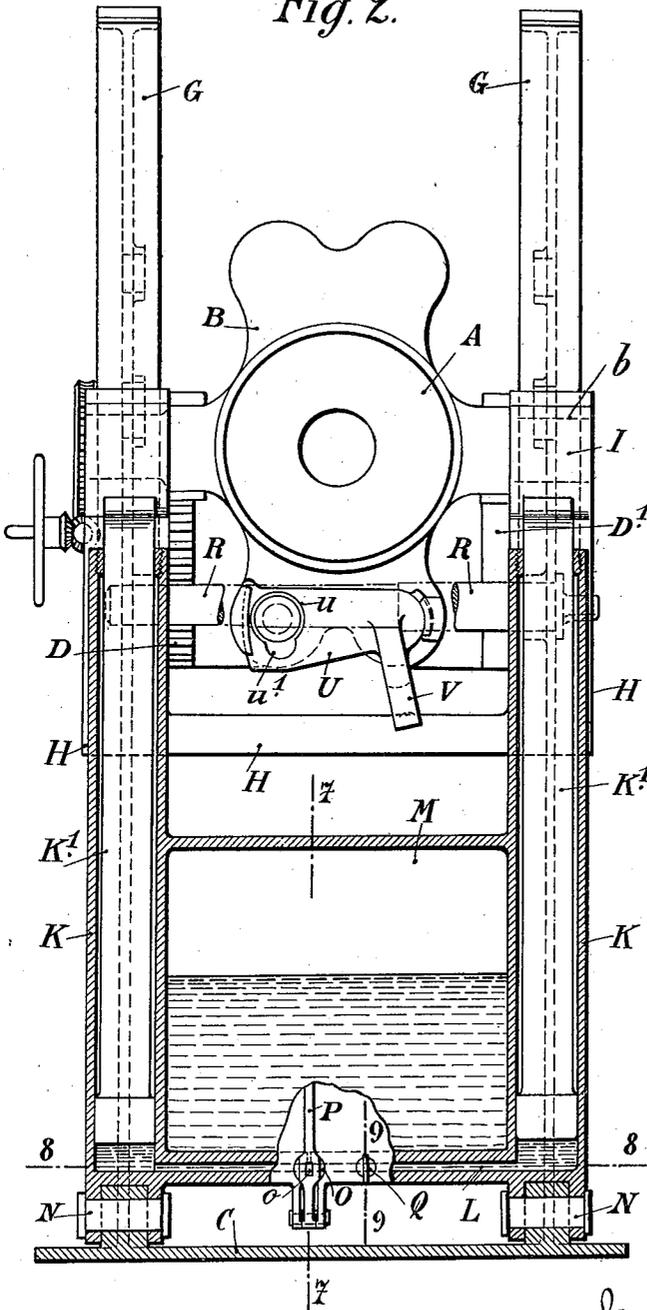
APPLICATION FILED JULY 21, 1920.

1,396,064.

Patented Nov. 8, 1921.

11 SHEETS—SHEET 2.

Fig. 2.



Inventor  
Eugene Schneider  
By Cameron Lewis Kerkam  
Attorneys

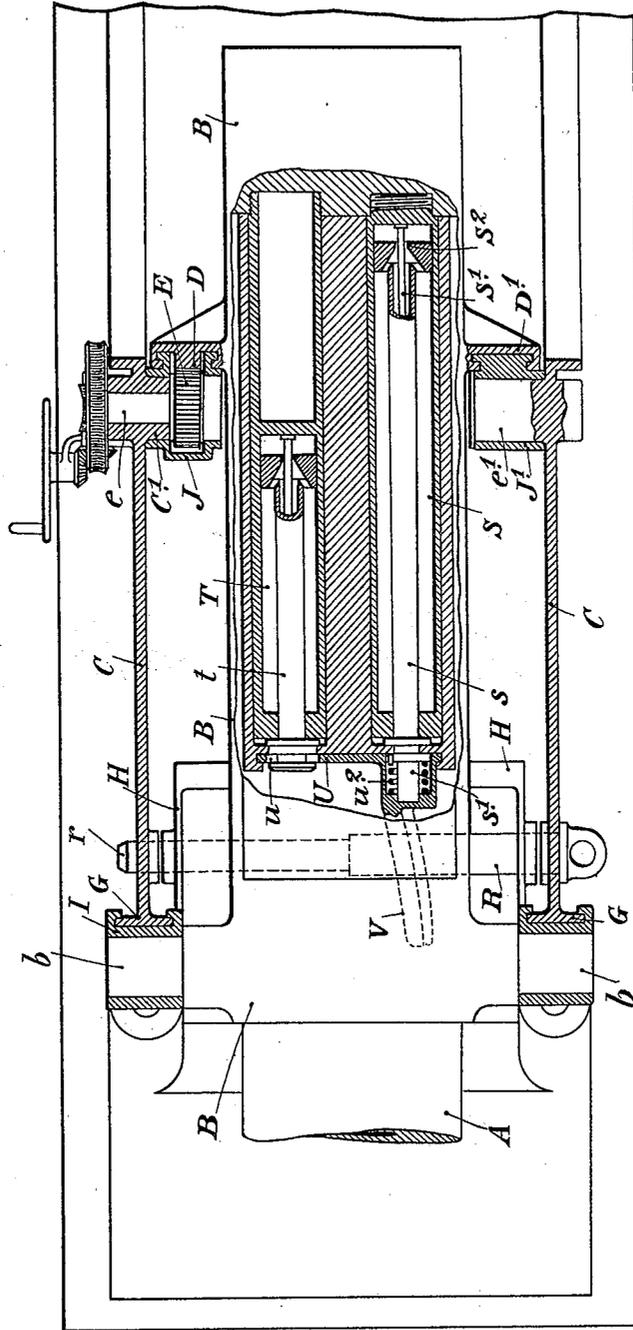
E. SCHNEIDER.  
 APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.  
 APPLICATION FILED JULY 21, 1920.

1,396,064.

Patented Nov. 8, 1921.

11 SHEETS—SHEET 3.

Fig. 3.



Invented  
 By Eugene Schneider  
 Mann, Johnson, Davis & Kerkam  
 Attorneys

E. SCHNEIDER,  
 APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.  
 APPLICATION FILED JULY 21, 1920.

1,396,064.

Patented Nov. 8, 1921.

11 SHEETS—SHEET 4.

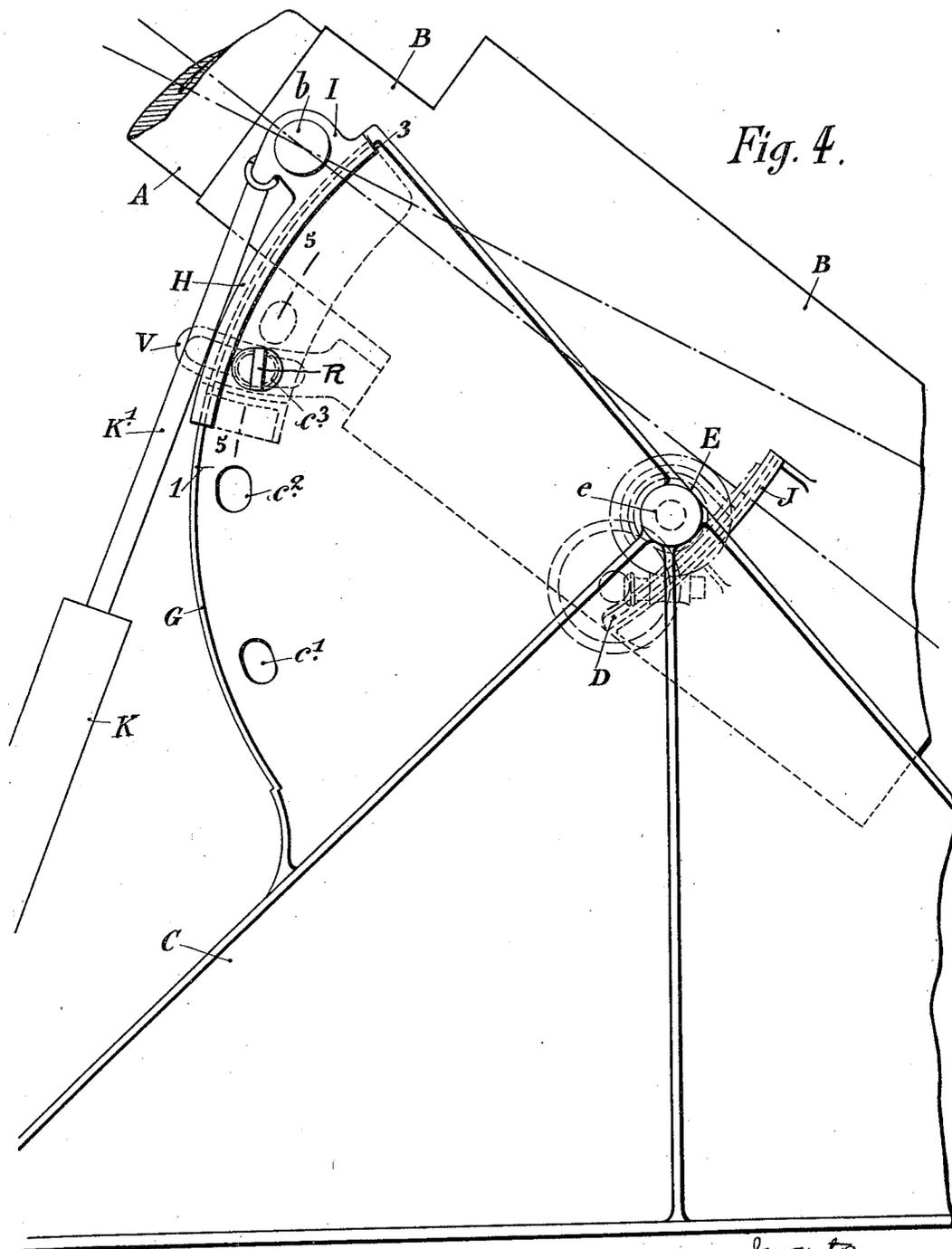


Fig. 4.

Inventor,  
 Eugene Schneider  
 By *Mans, Cameron, Davis & Keenan*  
 Attorneys

E. SCHNEIDER.  
 APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.  
 APPLICATION FILED JULY 21, 1920.

1,396,064.

Patented Nov. 8, 1921.

11 SHEETS—SHEET 5.

Fig. 5.

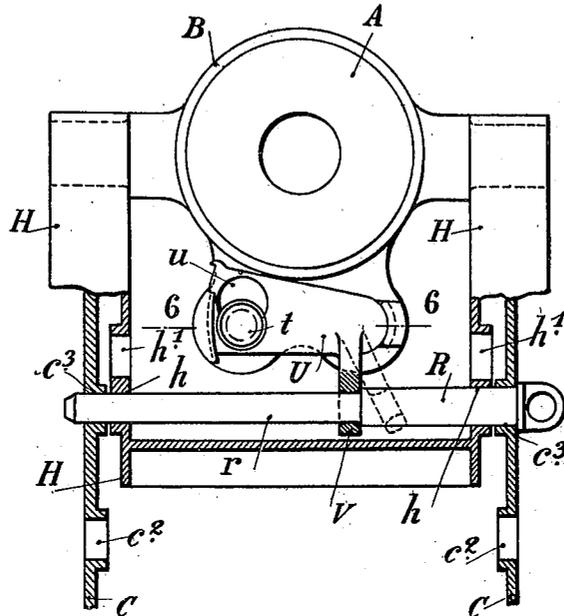
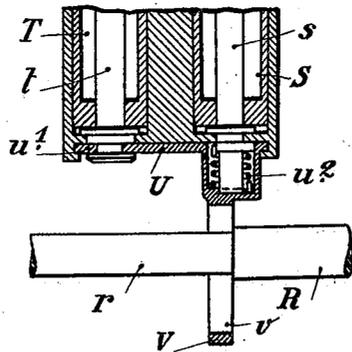


Fig. 6.



Inventor,  
 Eugene Schneider  
 By  
 Mans, Cameron, Lewis & Keenan  
 attorneys

E. SCHNEIDER.

APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.

APPLICATION FILED JULY 21, 1920.

1,396,064.

Patented Nov. 8, 1921.

11 SHEETS—SHEET 6.

Fig. 7.

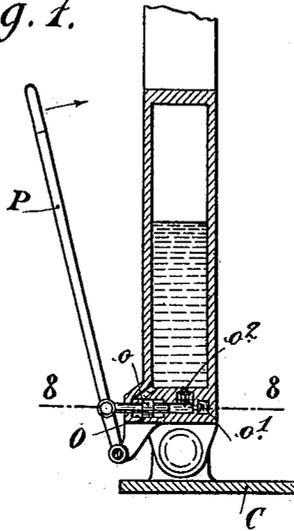


Fig. 9.

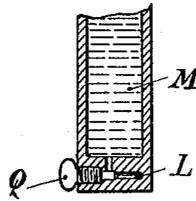
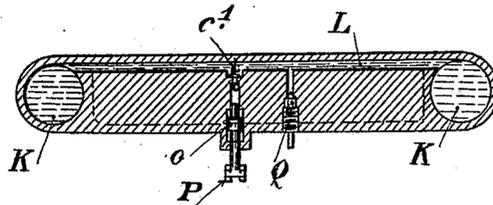


Fig. 8.



Inventor,  
Eugene Schneider  
By  
Maurice Cameron Lewis & Kerckhoff  
Attorneys

E. SCHNEIDER.

APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.

APPLICATION FILED JULY 21, 1920.

1,396,064.

Patented Nov. 8, 1921.

11 SHEETS—SHEET 7.

Fig. 10.

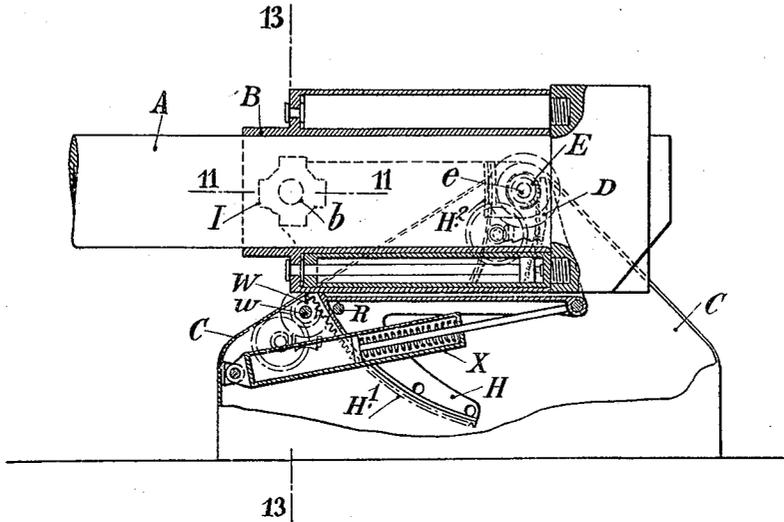
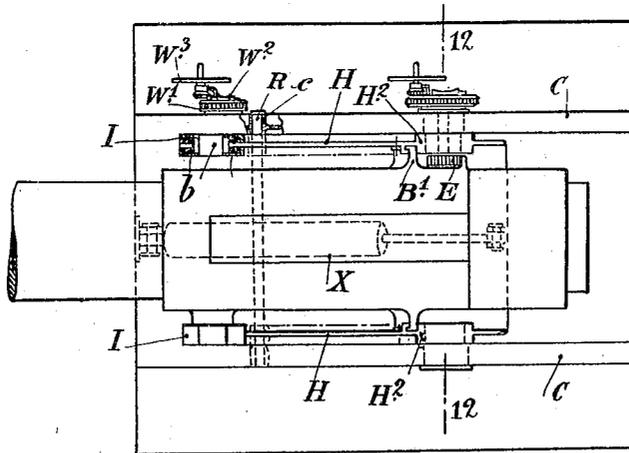


Fig. 11.



Inventor,  
Eugene Schneider  
By  
Maurice Camille Louis Herkany,  
Attorneys

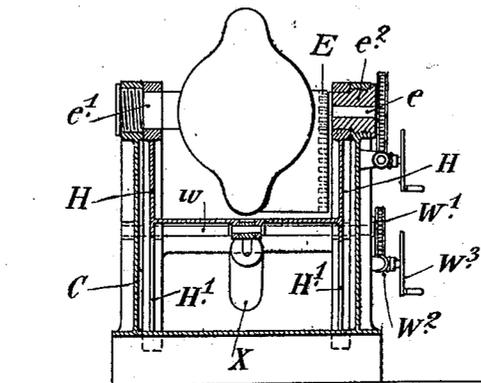
E. SCHNEIDER.  
APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.  
APPLICATION FILED JULY 21, 1920.

1,396,064.

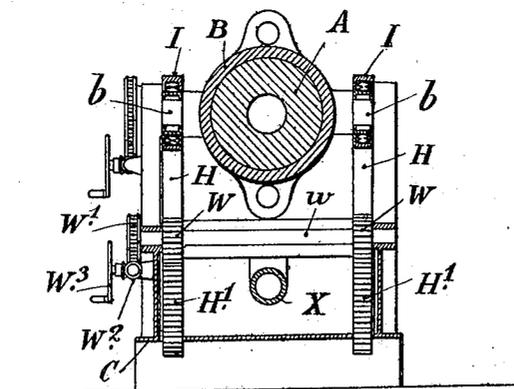
Patented Nov. 8, 1921.

11 SHEETS—SHEET 8.

*Fig. 12.*



*Fig. 13.*



Inventor,  
Eugene Schneider  
By  
Mans, Amun, Lewis & Kerkam  
attorneys

E. SCHNEIDER.  
 APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.  
 APPLICATION FILED JULY 21, 1920.

1,396,064.

Patented Nov. 8, 1921.

11 SHEETS—SHEET 9.

Fig. 14.

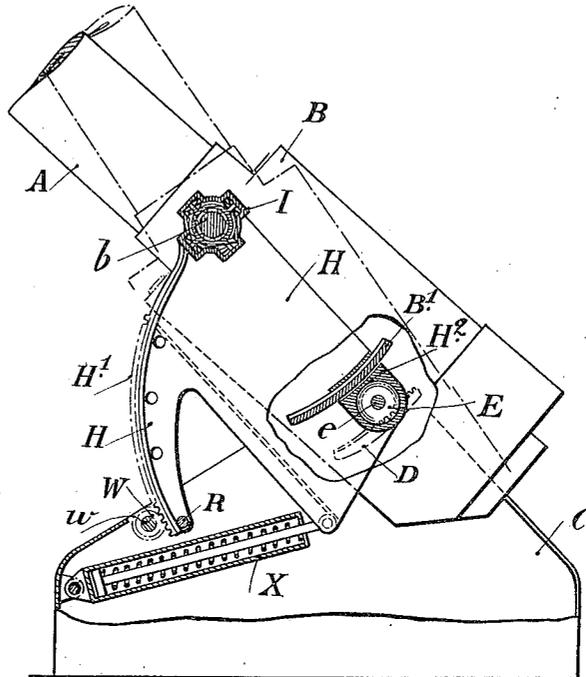


Fig. 16.

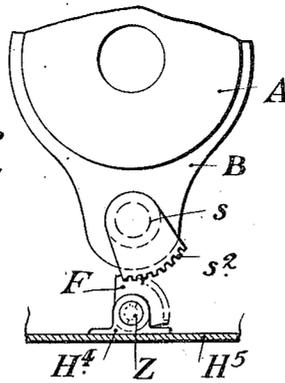
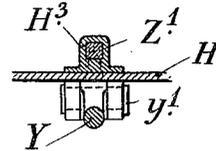


Fig. 17.



Inventor,  
 Eugene Schneider  
 By  
 Morris, Cameron, Lewis & Kerkam  
 Attorneys

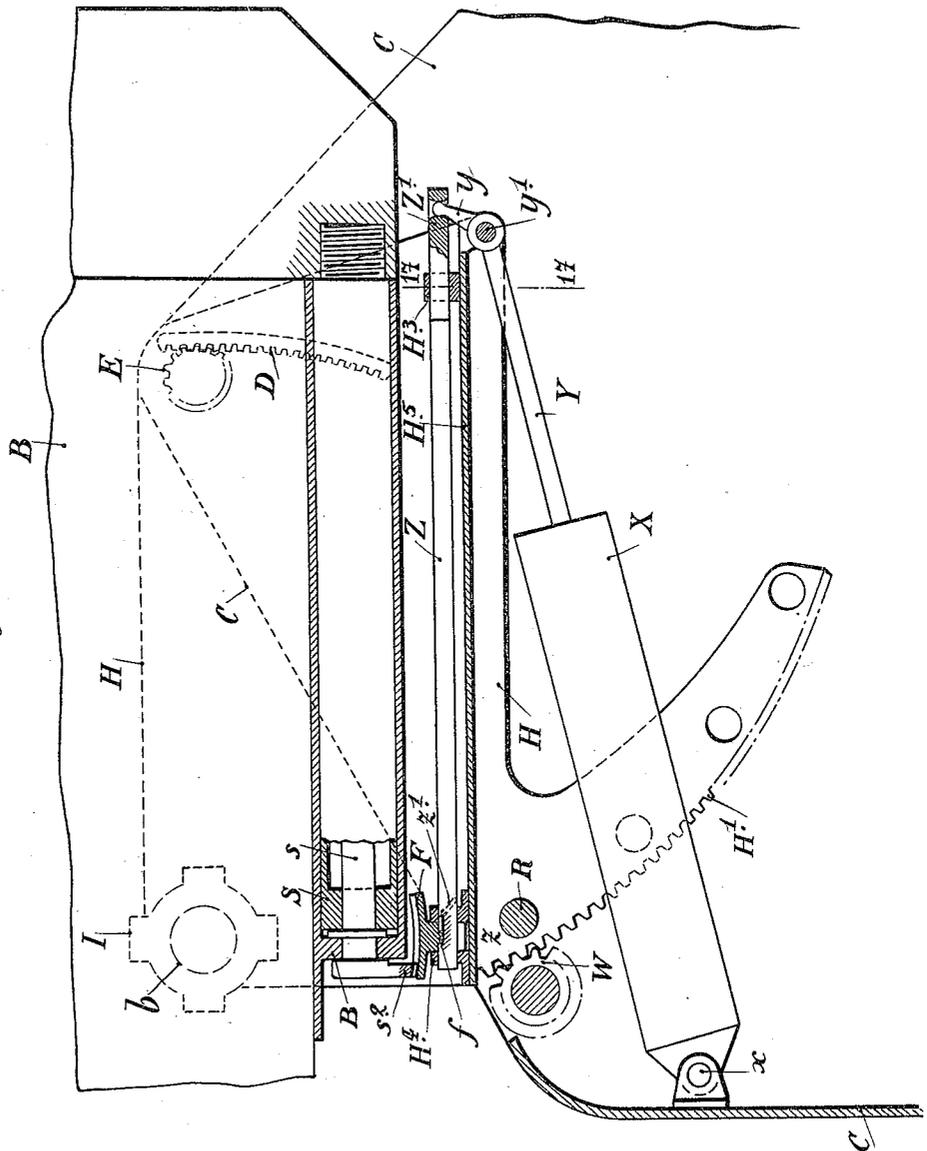
E. SCHNEIDER.  
 APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.  
 APPLICATION FILED JULY 21, 1920.

1,396,064.

Patented Nov. 8, 1921.

11 SHEETS—SHEET 10.

Fig. 15.



Inventor,  
 Eugene Schneider  
 By  
 Mauro, Cameron, Davis & Keckam  
 Attorneys

E. SCHNEIDER,  
 APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE TRAIL GUNS.  
 APPLICATION FILED JULY 21, 1920.

1,396,064.

Patented Nov. 8, 1921.

11 SHEETS—SHEET 11.

Fig. 18.

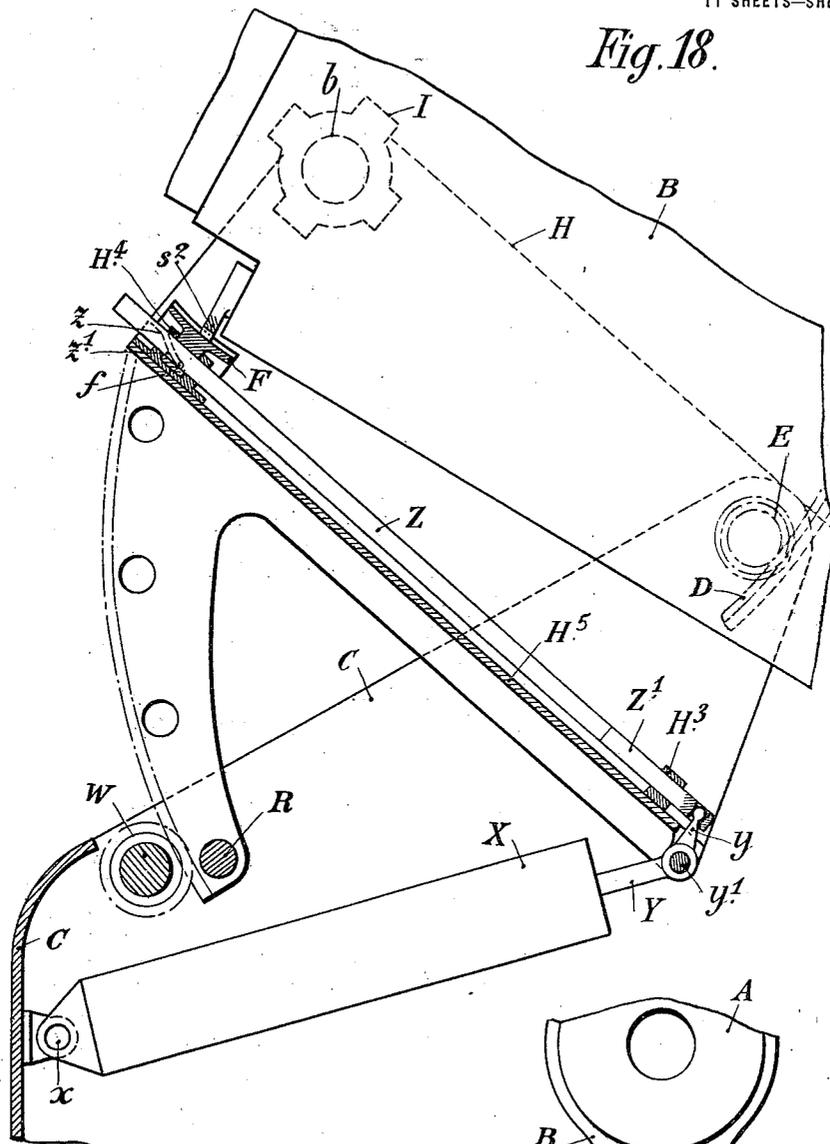
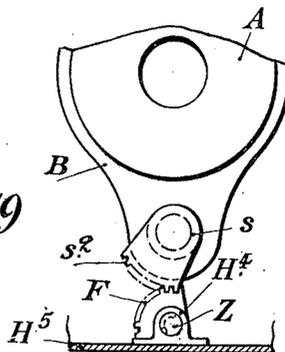


Fig. 19



Inventor  
 Eugene Schneider  
 By *Manis, Cameron, Lewis & Keckum*  
 Attorneys

# UNITED STATES PATENT OFFICE.

EUGÈNE SCHNEIDER, OF PARIS, FRANCE, ASSIGNOR TO SCHNEIDER & CIE., OF PARIS, FRANCE, A LIMITED JOINT-STOCK COMPANY OF FRANCE.

APPARATUS FOR INCREASING THE RANGE OF ELEVATION IN SINGLE-TRAIL GUNS.

1,396,064.

Specification of Letters Patent.

Patented Nov. 8, 1921.

Application filed July 21, 1920. Serial No. 397,946.

*To all whom it may concern:*

Be it known that I, EUGÈNE SCHNEIDER, a citizen of the Republic of France, residing at Paris, France, have invented new and useful Improvements in Apparatus for Increasing the Range of Elevation in Single-Trail Guns, which invention is fully set forth in the following specification.

In an earlier United States Patent No. 1,310,147 we have described an apparatus for increasing the range of elevation of gun carriages, characterized by a mechanism allowing of bringing the gun cradle trunnions to variable levels on the upper carriage by an angular displacement of the said trunnions and their bearings around the horizontal axis of the pinion or pinions controlling the elevating mechanism.

In this angular displacement of the gun cradle trunnions and their bearings, the elevating pinions remain stationary, whereas the elevating sectors carried by the cradle and meshing with the said pinions are guided on concentric circular arcs movable on the fixed carriage, around the geometric axis of the said pinions.

The present invention has for its object to provide improved forms of construction and application of the apparatus above referred to, and a combination of the mechanism for raising the cradle trunnions with an automatic apparatus for changing the length of recoil of the gun barrel.

Figures 1 to 9 illustrate one of these constructional forms.

Fig. 1 is an elevation illustrating the cradle trunnions and their bearings in their lowest position on the gun carriage.

Fig. 2 is an end elevation corresponding to Fig. 1 partly in section on the line 2—2 of that figure.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1, partly broken away to show the brake cylinders in section.

Fig. 4 is a side elevation similar to Fig. 1, but showing the cradle trunnions and their bearings brought into their highest position on the gun carriage by angular displacement around the geometric axis of the elevating pinion.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig. 6 is a section on the line 6—6 of Fig. 5.

Fig. 7 is a section on the line 7—7 of Fig. 2.

Fig. 8 is a horizontal section on the line 8—8 of Figs. 2 and 7.

Fig. 9 is a section on the line 9—9 of Fig. 2.

Figs. 10 to 14 inclusive illustrate a second constructional example of the invention.

Fig. 10 is a vertical longitudinal axial section of the gun barrel and its cradle.

Fig. 11 is a corresponding plan in partial section on the line 11—11 of Fig. 10.

Fig. 12 is a vertical cross-section on the line 12—12 of Fig. 11.

Fig. 13 is a vertical cross-section on the line 13—13 of Fig. 10.

In the foregoing, Figs. 10 to 13, the cradle trunnions are shown in their lowest position.

Fig. 14 is a side elevation corresponding to Fig. 10, the cradle trunnions and their bearings being brought into their highest position by angular displacement around the axis of the elevating pinion.

Figs. 15 to 19, inclusive, show a third constructional example of the invention.

Fig. 15 is a partial vertical longitudinal section taken along the axis of the recoil brake, the cylinder S of which is carried by the gun barrel, while the piston rod s is fixed to the cradle and capable of receiving rotational motion to produce in known manner a change in the length of recoil.

Fig. 16 is a partial end elevation of Fig. 15.

Fig. 17 is a partial section on the line 17—17 of Fig. 15.

Fig. 18 is a vertical longitudinal section corresponding to Fig. 15, the cradle trunnions and their bearings being assumed to have been brought into their highest position.

Fig. 19 is a corresponding partial end elevation similar to Fig. 16.

In the constructional form of the invention shown in Figs. 1 to 9, A is the gun barrel of any known type adapted to recoil in a cradle B. C are the cheeks or side frame plates of a gun carriage, which latter may be of any desired type. The cheeks may form part of a trail or of a frame mounted on a platform upon which the said frame can pivot for training the gun; or these cheeks may constitute the parts of a gun carriage designed to be carried by a girder-like

structure, which latter is in turn supported on trucks, etc.

In the example shown, the elevation of the combined gun barrel and cradle respectively to the gun carriage C—C, is effected in the known manner by rolling the elevating sector D, carried by the gun cradle and having its center on the axis of the trunnions  $b$  of the latter, over a pinion E carried by an axle  $e$  journaled in the gun carriage C.

In the same manner as in the apparatus described in our aforesaid patent, the gun carriage is so constructed as to allow of the trunnions  $b$  of the cradle, together with their bearings I, to be brought to different levels by angular displacement around the geometric axis of the pinion E. For this purpose the bearings I are in the present construction carried each by a sliding member H curved to an arc of a circle having its center on the geometric axis of the pinion E, and guided on a rib G of corresponding curvature formed on the respective carriage cheek C. The two sliding members H are preferably stayed together as shown in Fig. 5.

It is to be understood that the position of the cradle trunnions  $b$  and their bearings I can be varied as regards their elevation, by bringing the sliding member H—H at a variable point of the guiding arc G by means of a suitable raising device. If, besides, there be provided a device for locking the sliding member in its various positions, then it will be possible to give to the combined cradle and gun barrel the desired inclination for firing around the more or less elevated line of fire, by the usual operation of the elevating mechanism D—E.

In the example shown, the displacement of the sliding member H—H is produced by means of two conjoined hydro-pneumatic jacks K. The cylinders K of these jacks communicate by way of a passage L with the reservoir M in which air is compressed above the free level of a suitable liquid. The pressure in this reservoir is such that the pistons  $K^1$  upon which the bearings I bear, exert under the latter a force which is slightly less than the weight of the rocking mass A—B. The combination K—M—K is jointed by means of pins N to the carriage C. A pump O carried by the reservoir M, and whose balanced piston  $o$  can be operated by means of a lever P, allows of drawing liquid from the reservoir M and delivering it under the pistons  $K^1$  so as to cause these pistons to rise and thereby raise the mass B—A. The lowering of the mass is effected by causing the liquid to return into the reservoir by operating a plug valve Q (Figs. 8 and 9) in the desired direction.

A number of positions, variable at will, may be provided for the sliding member H—H with means for locking same in its different positions. In practice, it will be

sufficient in most cases to provide for three positions. The locking device which may be of variable form, may comprise, as shown in the drawings, a skewer R for which holes are formed in the cheeks of the gun carriage and also in the cheeks of the sliding members H.

For reasons hereinafter set forth, the skewer R is made of oval shape in cross section, and holes  $c^1$ ,  $c^2$ ,  $c^3$ , formed in the cheeks C, are made of corresponding cross section. In the case of the holes  $c^1$  and  $c^2$ , the major axis of these holes is arranged in the direction of the height, whereas in the case of the upper holes  $c^3$ , it is arranged in the direction of the width. Two series of holes are provided in the sides of the sliding members H, the holes  $h$  having their major axis arranged in the direction of the width, whereas the upper holes  $h^1$  have their major axis arranged in the direction of the height.

In the same manner as in the apparatus described in our aforesaid patent, the elevating sector D carried by the cradle and engaging with the pinion E, is guided on a concentric arc guide J forming part of a box movable on the fixed carriage C, which latter is provided for this purpose with a cylindrical bearing surface  $C^1$  serving at the same time as a bearing for the axle-pin  $e$  of the said pinion E. The cradle B may, besides, be guided by an arc guide  $D^1$  arranged symmetrically to the elevating sector D on a guiding member  $J^1$  adapted to pivot on the axle-pin  $e^1$  that is fixed to the respective carriage cheek and has the same geometric axis as the pinion E.

The locking by means of the skewer R is according to this invention, combined with an apparatus that allows of varying the length of the recoil of the gun barrel. As a matter of fact, the combination as shown, allows the gun barrel to have its normal recoil when the cradle trunnions occupy either the departure position shown in Fig. 1 or a higher position corresponding to the engagement of the skewer in the holes  $c^2$  of the carriage cheeks. A reduced recoil will on the contrary be assured to the gun barrel, by the fact of locking the said sliding members H in their highest position shown in Fig. 4, by means of the skewer R which is then engaged in the holes  $c^3$ .

For locking the cradle in its highest position, the locking skewer R is engaged in the holes  $c^3$  of the carriage cheeks and the lower holes  $h$  of the sliding members H.

For combining the variation of the length of the recoil with this locking mechanism, use is made of two recoil brakes S and T, of which one T remains inoperative for the long recoil, but is on the contrary automatically rendered operative by the fact of the locking of the cradle in its higher position. For this purpose the piston rod  $t$  of the

brake T which is normally free, is then rendered stationary by a shutter U pivoting around an extension  $s^1$  of the piston rod  $s$ .

For this purpose this shutter is formed with a buttonhole slot having two diameters. When the portion  $u$  of larger diameter is situated opposite a groove in the rod  $t$ , the latter remains free. When, on the contrary, it is the portion  $u^1$  of reduced diameter that is in engagement with the said groove, then the rod  $t$  is rendered stationary. Normally the shutter U is kept depressed in the position shown in Fig. 2, by its weight and the action of a twisting spring  $w^2$  (Fig. 3). The shutter carries a projecting arm V which is formed at its free end with a slot  $v$  equal in width to the minor axis of a portion  $r$  of slightly reduced section of the skewer R. The slot has the shape of an arc of a circle having its center on the axis of the cradle trunnions.

When the cradle trunnions  $b$  and their bearings I occupy the lowest position (Figs. 1 to 3), the locking skewer is engaged by means of its portion R of largest section, in the holes  $c^1$  of the right hand cheek, whereas the portion  $r$  of reduced section engages in the corresponding holes of the left hand cheek.

In this position the shutter U is depressed by its weight and by the action of the twisting spring  $w^2$ , so that the piston rod  $t$  of the brake T is free. In these conditions, the brake S is alone operative and the braking is effected in the usual manner by the wire-drawing of the liquid between the counter-rod  $S^1$  and the die  $S^2$  formed on the piston rod.

If, on starting from this lowest position, it is desired to raise the line of fire and to bring it to an intermediate height, the plug valve Q of the raising mechanism being closed, the lever P is operated. The movement of the piston  $o$  toward the right (Fig. 7) produces a forcing out of the liquid through the valve  $o^1$  into the passage L and into the chambers of the jacks K. The result is to raise the pistons  $K^1$  and consequently to raise the trunnions  $b$  and their bearings I. The combined gun barrel and cradle A—B is thereby caused to rock around the axis of the pinion E. When the sliding members H which, at starting, were situated opposite a mark 1 provided on the carriage cheek C, come with their upper edges opposite the mark 2, the working of the pump is stopped.

To lock the bearings I in this position the skewer R is inserted in the holes  $c^2$  of the carriage cheeks and into the holes  $h^1$  of the sides of the sliding members H.

To bring the trunnions  $b$  and their bearings into the highest position, the lever P of the pump is operated as before, until the

upper edge of the sliding members H has come opposite the mark 3 (Fig. 4).

In this position the locking is effected by inserting the skewer R into the holes  $c^3$  of the carriage cheeks, which holes are then situated opposite the slot  $v$  of the arm V. The engagement of the portion  $r$  of the skewer in this slot acts to push and to upright the arm V as soon as the latter is met by the inner end of the portion R of larger section of the skewer. The arm thus passes from the position indicated in dot and dash lines in Fig. 5 into the position shown in full lines, at the same time as the end  $r$  of the skewer is engaged in the holes  $h$  of the sides of the sliding members H and in the corresponding holes of the left cheek of the carriage. The raising of the shutter U has the effect of engaging the portion  $w^1$  of the buttonhole slot in the groove of the rod  $t$  of the brake piston T and thus rendering stationary this piston, and thereby causing the said brake T to become operative.

To return the combined cradle and the gun barrel into an intermediate position or into the lowest position which is suitable for transport, it is sufficient to unlock the sliding members H by withdrawing the skewer R and causing the liquid to flow from the jacks into the reservoir by opening the plug valve Q. The preponderance of the weight of the mass A—B will assure this flow.

It is to be noted that both in the position shown in Fig. 1 and in the intermediate position, it is impossible to effect a rising of the shutter U, and consequently a reduction in the length of the recoil.

If the skewer R were to be inserted in the holes  $c^1$  or  $c^2$ , when the slot  $v$  should happen to be situated in front of these holes, it would be impossible for the skewer to pass through the said slot.

In the example shown in Figs. 10 to 14, A designates as in the preceding example, the gun barrel of any known system mounted in a cradle B in which it can recoil. C is a carriage, likewise of any known type. The elevating mechanism comprises exactly the same parts as in the preceding example:  $e$  is the axle journaled in the gun carriage and carrying the elevating pinion E with which there meshes a toothed sector D formed on the cradle.

The bearings I for the trunnions  $b$  of the cradle are carried by two movable members H journaled on the axles  $e^1$ ,  $e^2$  having the same geometric axis as  $e$ , and formed on the cheeks of the gun carriage C.

The rotary motion of the trunnions  $b$  and their bearings I around the geometric axis of the pinion E is produced by means of toothed sectors  $H^1$  fixed to the movable members H and having their centers on the axis of the pinion E; the said sectors meshing with pinions W mounted on an axle  $w$

journalled in the carriage C. The simultaneous driving of the two pinions W may be effected by any suitable means, for instance by a gear comprising a worm wheel  $W^1$  meshing with a worm  $W^2$  that is actuated by a hand wheel  $W^3$  through the medium of suitable gearing.

These angular movements may be facilitated by the use of a balancer X of the spring or other type.

The locking of the movable members H that carry the bearings I of the cradle trunnions, may be effected by means of a skewer R which is adapted to be inserted into one or other of the various holes formed in the movable members H when the latter are situated opposite the holes  $c$  formed in the gun carriage cheeks C.

It is an advantage to relieve the supporting movable members H of the bearings of a considerable portion of the strains occurring in the recoil. For this purpose, the trunnions  $b$  are mounted elastically in the bearings I, and the movable members H are provided, near their jointing on the carriage C, with stops  $H^2$  for ribs  $B^1$  formed on the cradle B. These ribs  $B^1$  have the form of circular arcs having their centers in the axis of the trunnions  $b$ , and the bearing surface of the stops  $H^2$  is made of corresponding curvature.

In practice, the ribs  $B^1$  may, as shown in Figs. 11 and 14, be guided with play in slideways formed in the stops  $H^2$ .

The constructional form just before described may be combined with an apparatus that allows of automatically varying the length of the recoil according to the position given to the trunnions  $b$  of the cradle and to their bearings. This combination is illustrated in Figs. 15 to 19.

In order to produce automatically the rotation of the rod  $s$  in the angular displacements of the combined gun barrel and cradle around the axis of the elevating pinion, as shown in Figs. 15-19, there is employed a gear between the said rod and a finger  $\gamma$  carried by the rod Y of the piston of the spring balancer whose cylinder X is jointed at  $x$  to the carriage C; the rod Y being in its turn jointed at  $y^1$  to a stay  $H^5$  connecting the movable members H together.

In the angular displacements of the sectors  $H^1$ , the finger  $\gamma$  moves a bar Z sliding with a portion  $Z^1$  of rectangular cross section in a guide  $H^3$  carried by the stay  $H^5$ . In the forward end of the bar Z there is formed a guide slot  $z-z^1$  for a stud  $f$  carried by a toothed sector F held in a block  $H^4$  carried by the stay  $H^5$ . This sector F meshes with a sector  $s^2$  that is carried externally by the rod  $s$  of the brake piston.

It will be readily perceived that on making the guide slot  $z-z^1$  of suitable shape, it is possible, owing to the longitudinal dis-

placement of the bar Z due to the effect of the angular movements imparted to the cradle when the pinions W are actuated, to produce a suitable rotational motion of the toothed sector  $s^2$ , and thereby produce in the known manner a corresponding variation of the length of the recoil.

The toothed sector F has, as shown in Figs. 15 and 18, teeth of sufficient length to remain constantly in mesh with the teeth of the sector  $s^2$ . These teeth of the sector F have further the shape of arcs of a circle having their centers on the axis of the cradle trunnions.

If the guide slot  $z-z^1$  be made with a section  $z$  parallel to the axis of the bar, it is clear that so long as the stud  $f$  of the sector F is moving in this section of the guide slot, the pinion F will not turn around the axis of the bar and will not produce any rotation of the piston rod  $s$ .

The length of this section  $z$  will be determined according to the elevation which it is desired to give to the trunnions  $b$  of the cradle above the lowest position (Fig. 15) without causing a change in the length of the recoil.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates, a single member having bearings for both cradle trunnions mounted to move between the cheek plates and in sliding engagement therewith in an arc of a circle concentric with the axis of the actuating pinion of the elevating sector, and means for raising and lowering the single member to move simultaneously both trunnions to vary the elevation of the gun independently of the pinion and sector mechanism.

2. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates, a single member having bearings for both cradle trunnions mounted to move between the cheek plates and in sliding engagement therewith in an arc of a circle concentric with the axis of the actuating pinion of the elevating sector, means for raising and lowering the single member to move simultaneously both trunnions to vary the elevation of the gun independently of the pinion and sector mechanism, and means for locking the single member to the cheek plates in the different positions of elevation of the gun.

3. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including cheek plates having opposite circumferentially arranged openings, a slide having bearings for the cradle

trunnions mounted to move between the cheek plates in an arc of a circle concentric with the axis of the actuating pinion of the elevating sector, said slide having aligned openings to register with opposite openings of the cheek plates as the slide is moved, means for raising and lowering the slide carrying the trunnions to vary the elevation of the gun independently of the pinion and sector mechanism, and a displaceable skewer introduced into registering openings of the cheek plates and slide to lock the slide to the cheek plates in a determined position of elevation of the gun.

4. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle having a circumferential guide concentric with the axis of the actuating pinion of the elevating sector, a single member slidable on the circumferential guide having bearings for both cradle trunnions, and means for raising and lowering the single member on the circumferential guide to move simultaneously both trunnions to vary the elevation of the gun independently of the pinion and sector mechanism.

5. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including a carriage having opposite circumferential guides concentric with the axis of the actuating pinion of the elevating sector, a single member slidable on the circumferential guides having bearings for both cradle trunnions, means for raising and lowering the single member on the circumferential guides to move simultaneously both trunnions to vary the elevation of the gun independently of the pinion and sector mechanism, and means for locking the single member on the circumferential guides in the different positions of elevation of the gun.

6. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates having circumferential guides concentric with the axis of the actuating pinion of the elevating sector, slide members slidable on the circumferential guides having bearings for the cradle trunnions, and common mechanism for simultaneously raising and lowering the slide members on the circumferential guides to move simultaneously both trunnions to the same extent to vary the elevation of the gun independently of the pinion and sector mechanism.

7. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates having circumferential guides concentric with the axis of the actuating pinion of the elevating sector, slide members slidable on the circumferential guides having bearings for the cradle trunnions, common mechanism for simultaneously raising and lowering the

slide members on the circumferential guides to move simultaneously both trunnions to the same extent to vary the elevation of the gun independently of the pinion and sector mechanism, and means for locking the slide members to the cheek plates in the different positions of elevation of the gun.

8. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates having circumferential guides concentric with the axis of the pinion of the elevating sector, interstayed members slidable on the circumferential guides having bearings for the cradle trunnions, and means for raising and lowering the interstayed members on the circumferential guides to vary the elevation of the gun independently of the pinion and sector mechanism.

9. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates having circumferential guides concentric with the axis of the pinion of the elevating sector, interstayed members slidable on the circumferential guides having bearings for the cradle trunnions, means for raising and lowering the interstayed members on the circumferential guides to vary the elevation of the gun independently of the pinion and sector mechanism, and means for locking the interstayed members to the cheek plates in the different positions of elevation of the gun.

10. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates having circumferential guides concentric with the axis of the actuating pinion of the elevating sector and said cheek plates having opposite circumferentially arranged openings, slide members slidable on the circumferential guides having bearings for the cradle trunnions and said slide members each having an opening to register with the openings of its corresponding cheek plate, means for raising and lowering the slide members on the circumferential guides to vary the elevation of the gun independently of the pinion and sector mechanism, and a displaceable skewer introduced into registering openings of the slide members and cheek plates to lock the slide members to the cheek plates in a determined position of elevation of the gun.

11. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates having circumferential guides concentric with the axis of the actuating pinion of the elevating sector and said cheek plates having opposite circumferentially arranged openings, interstayed slide members slidable on the circumferential guides having bearings for the cradle trunnions and said slide

members each having an opening to register with the openings of its corresponding cheek plate, means for raising and lowering the interstayed slide members on the circumferential guides to vary the elevation of the gun independently of the pinion and sector mechanism, and a displaceable skewer introduced into registering openings of the slide members and cheek plates to lock the interstayed slide members to the cheek plates in a determined position of elevation of the gun.

12. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle having a circumferential guide concentric with the axis of the actuating pinion of the elevating sector, a slide movable on the circumferential guide having bearings for the cradle trunnions, and a fluid-pressure jack pivoted at one end to the fixed frame of the gun mounting and pivoted at its other end to the slide for raising and lowering the slide on the circumferential guide to vary the elevation of the gun independently of the pinion and sector mechanism.

13. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates having circumferential guides concentric with the axis of the actuating pinion of the elevating sector, slide members slidable on the circumferential guides having bearings for the cradle trunnions, fluid-pressure jacks connected with the slide members and mounted in a frame pivoted to a fixed part of the gun mounting, and means for simultaneously controlling the flow of fluid-pressure to and from the jacks for simultaneously raising and lowering the slide members on their circumferential guides to vary the elevation of the gun independently of the pinion and sector mechanism.

14. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including opposite cheek plates having circumferential guides concentric with the axis of the actuating pinion of the elevating sector, slide members slidable on the circumferential guides having bearings for the cradle trunnions, a frame pivoted to a fixed part of the gun mounting, fluid-pressure jacks carried by the frame and pivotally connected to the slide members, a fluid-pressure tank carried by the frame and communicating with the lower ends of the jacks, and means controlling the flow of fluid-pressure between the tank and the jacks to operate said jacks for simultaneously raising and lowering the slide members on their circumferential guides to vary the elevation of the gun independently of the pinion and sector mechanism.

15. In apparatus for extending the limits of elevation of guns, a gun provided with a

cradle having a short recoil brake normally disconnected from the gun, a mounting for the gun and cradle having a circumferential guide concentric with the axis of the actuating pinion of the elevating sector, a slide movable on the circumferential guide having bearings for the cradle trunnions, means for raising and lowering the slide on the circumferential guide to vary the elevation of the gun independently of the pinion and sector mechanism, a skewer inserted in registering openings of the guide and slide to hold the gun in a position of extreme elevation, and mechanism actuated by the insertion of the skewer in the registering openings for connecting the short recoil brake with the gun so that said brake will operate while the gun is in a position of extreme elevation.

16. In apparatus for extending the limits of elevation of guns, a gun provided with a cradle having a short recoil brake normally disconnected from the gun, a mounting for the gun and cradle having a circumferential guide concentric with the axis of the actuating pinion of the elevating sector, a slide movable on the circumferential guide having bearings for the cradle trunnions, means for raising and lowering the slide on the circumferential guide to vary the elevation of the gun independently of the pinion and sector mechanism, a skewer inserted in registering openings of the guide and slide to hold the gun in a position of extreme elevation, a shutter pivoted to the gun having an actuating arm to be engaged by the skewer thrust through the registering openings, the engagement of the skewer with said arm operating to move the shutter into engagement with piston-rod of the short recoil brake to connect operatively said brake with the gun while the latter is in a position of extreme elevation.

17. In apparatus for extending the limits of elevation of guns, a gun provided with a cradle having a short recoil brake normally disconnected from the gun, a mounting for the gun and cradle having a circumferential guide concentric with the axis of the actuating pinion of the elevating sector, a slide movable on the circumferential guide having bearings for the cradle trunnions, means for raising and lowering the slide on the circumferential guide to vary the elevation of the gun independently of the pinion and sector mechanism, a skewer inserted in registering openings of the guide and slide to hold the gun in a position of extreme elevation, a shutter pivoted to the gun having an actuating arm provided with a slot concentric with the cradle trunnions, the skewer passing through said slot when thrust through the registering openings and having an enlargement to engage the actuating arm to move the shutter into engagement

ment with the piston-rod of the short recoil brake to connect operatively said brake with the gun while the latter is in a position of extreme elevation.

- 5 18. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including a single member having bearings for both cradle trunnions and movable in an arc of a circle concentric  
10 with the axis of the actuating pinion of the elevating sector, and means for raising and lowering said single member to move simultaneously both trunnions to vary the elevation of the gun independently of the  
15 pinion and sector mechanism.

19. In apparatus for extending the limits of elevation of guns, a mounting for the gun and cradle including a single member

having bearings for both cradle trunnions and movable in an arc of a circle concentric 20 with the axis of the actuating pinion of the elevating sector, means for raising and lowering said single member to move simultaneously both trunnions to vary the elevation of the gun independently of the pinion and 25 sector mechanism, and means for locking said single member carrying the cradle trunnions in the different positions of elevation of the gun.

In testimony whereof I have signed this 30 specification.

EUGÈNE SCHNEIDER.

Witnesses:

ANDRÉ MOSTICKER,  
CLEMENT S. EDWARD.