

No. 647,232.

Patented Apr. 10, 1900.

J. KRONE.

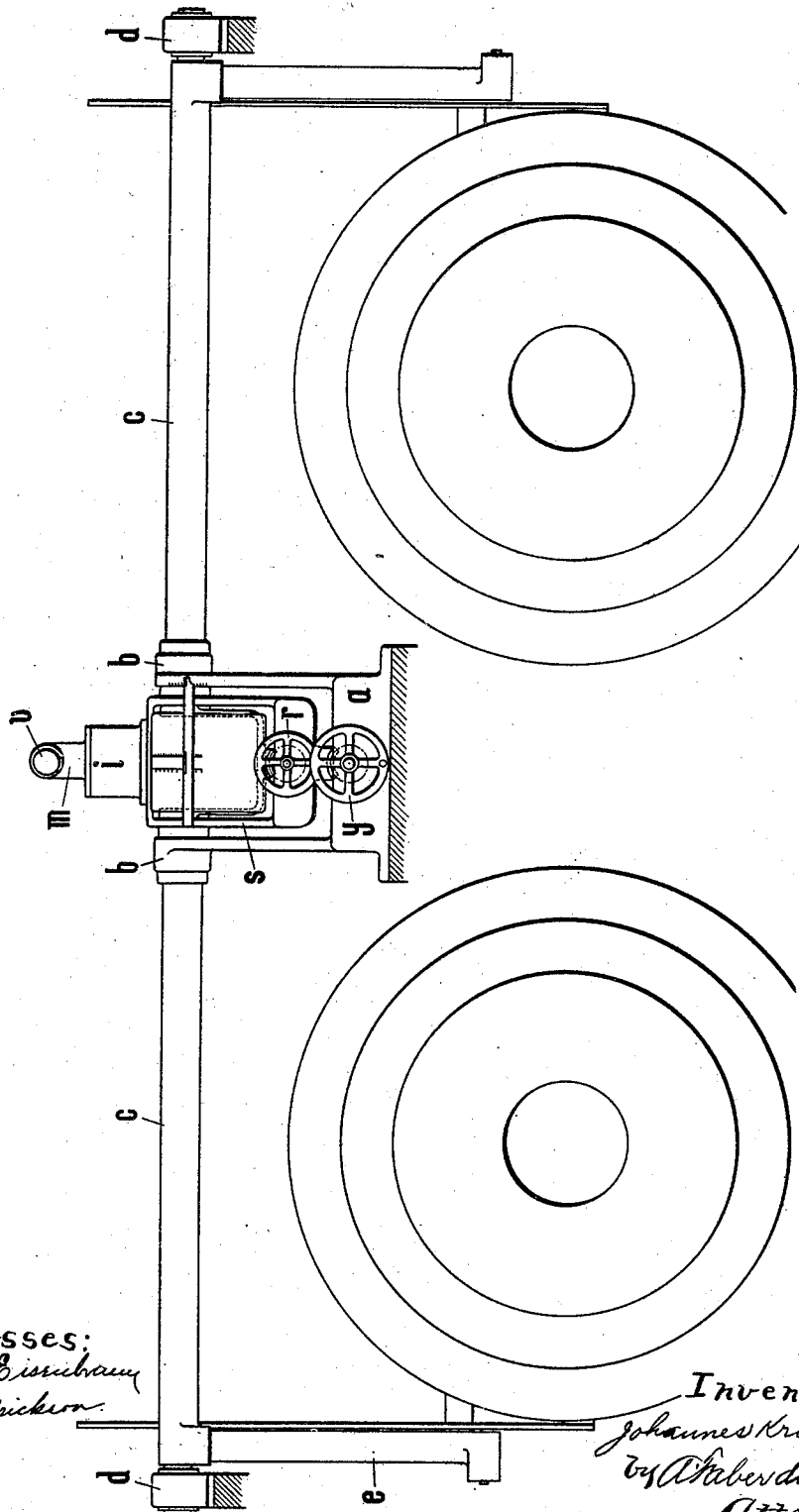
APPARATUS FOR ADJUSTING ELEVATION OF GUNS.

(Application filed Jan. 23, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



Witnesses:
Geo. W. Eisenbaum
C. P. Hendrickson

Inventor:
Johannes Krone,
by Alexander duRoi,
Attorney.

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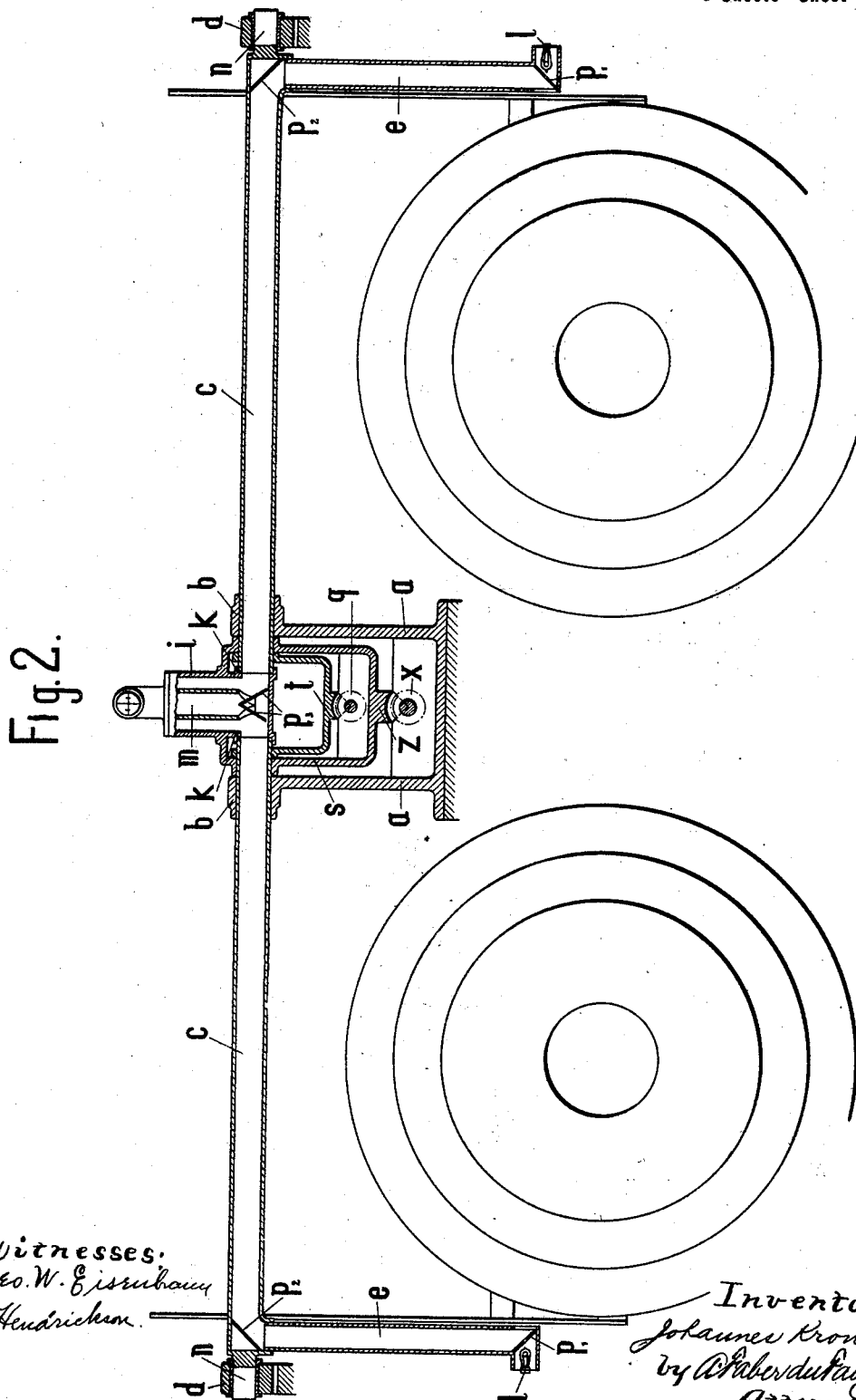
J. KRONE.

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Witnesses.
Geo. W. Eisselbaum
E. P. Hendrickson.

Inventor:
Johannes Krone
by Chas. E. Duff
Attorney.

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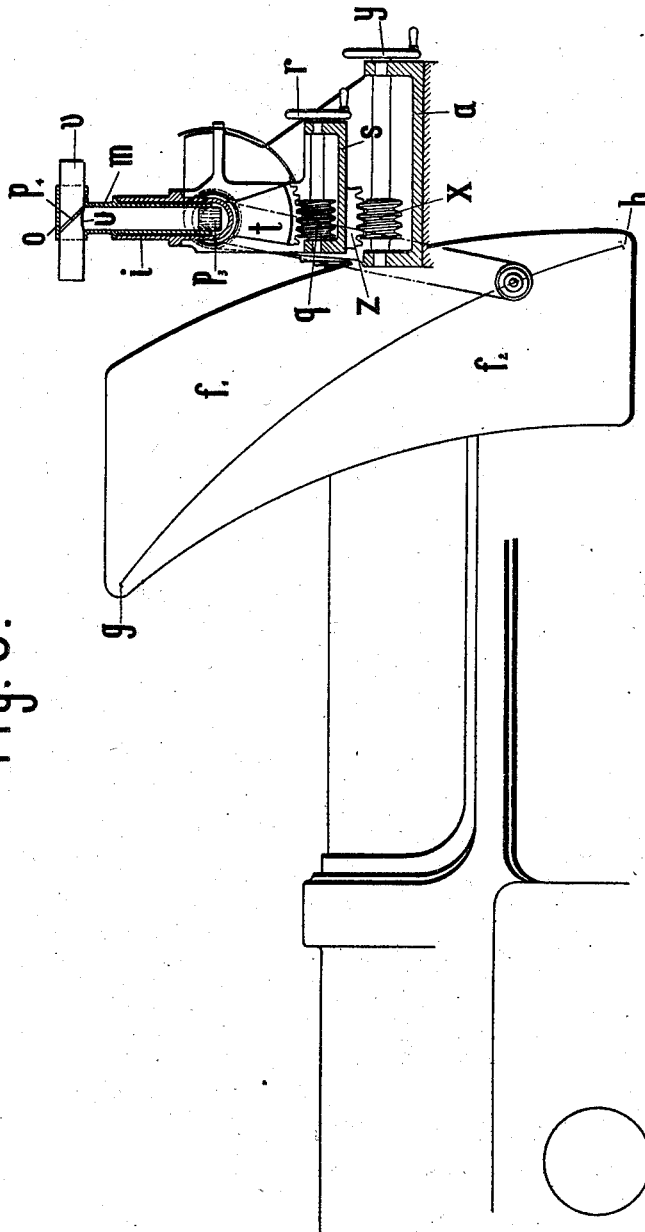
APPARATUS FOR ADJUSTING ELEVATION OF GUNS.

(Application filed Jan. 23, 1900.)

(No Model.)

3 Sheets—Sheet 3.

Fig. 3.



Witnesses:
Geo W. Eisselmann
E. P. Hendrickson

Inventor:
Johannes Krone
by Arthur du Pont, Jr.
Attorney.

UNITED STATES PATENT OFFICE.

JOHANNES KRONE, OF ESSEN, GERMANY, ASSIGNOR TO FRIED. KRUPP, OF SAME PLACE.

APPARATUS FOR ADJUSTING ELEVATION OF GUNS.

SPECIFICATION forming part of Letters Patent No. 647,232, dated April 10, 1900.

Application filed January 23, 1900. Serial No. 2,440. (No model.)

To all whom it may concern:

Be it known that I, JOHANNES KRONE, engineer, a citizen of the German Empire, residing at 56 Bismarckstrasse, Essen-on-the-Ruhr, Germany, have invented certain new and useful Improvements in Apparatus for Adjusting the Elevation of Guns, of which the following is a specification.

My invention has reference to improvements in apparatus for adjusting the elevation of guns, such as described in United States Letters Patent No. 639,407, granted to me December 19, 1899, which latter apparatus consists, essentially, in an index-hand adjustable to the proper angle for distance and difference of level and an index-curve marked upon an index-plate secured to the gun or cradle at right angles to the axis of the trunnions, the index-hand being first adjusted to the proper angle and the gun then turned on the trunnions until a fixed point of the index-hand intersects the index-curve, whereupon the gun is in proper position for firing.

My present invention has for its object to so arrange the apparatus as to permit the gunner without leaving his position at sighting to observe the relative positions of the index-hand and of the index-plate, and thus to watch the elevation of the gun. For this purpose, according to my present invention, the index-hand and the index-shaft are made hollow and are on the inside provided with a system of mirrors by which an image of the part of the index-plate facing the end of the index-hand is transferred to the telescope.

My invention is shown in the annexed drawings as applied to twin guns.

In the drawings, Figure 1 is a rear end view of the apparatus; Fig. 2, a vertical cross-section, and Fig. 3 a longitudinal section.

The arrangement of the index-plate and the index-hand in relation to each other and to the gun, as well as the means by which the adjustment of the index-hand and of the device for sighting is effected, is the same as described in the above-mentioned Letters Patent, small changes only being made which are necessary by making the axis hollow.

The index-curve g h is by preference made of a narrow strip of polished metal, while the surfaces f' f'' of the index-plate are made in

different colors above and below the curve.

The index-hand e , which moves over the plate, is hollow and carries at its lower end an incandescent lamp l and an inclined mirror p' . At its center the latter is provided with a small opening, opposite which the wall of the tube has likewise an opening, so that through the two openings the incandescent lamp illuminates a part of the index-plate. The likewise hollow index-shaft c is cut off at the center, and where the two index-hands join the same there is a mirror p'' , one on each side. The shaft c turns within bearings b b' of the fixed standard a , as well as on journals n n' in fixed bearings d d' . The shaft is turned by means of the worm-sector t , the hand-wheel r and the worm-wheel q resting in bearings of the frame s . The box-shaped frame s is arranged to turn on the shaft c by turning the hand-wheel y , the worm-wheel x , and the worm-sector z in the same manner as in the above-mentioned Letters Patent. The frame is made in one piece with a hollow projection i , the two lateral openings k of which receive the inner ends of the shaft c . The projection i serves for the reception of the telescope-carrier m , which consists of a T-shaped pipe. This latter is cut off semicylindrically (corresponding to its intersection with the shaft c) at its lower end which projects down into the hollow shaft and is provided with two inclined mirrors p^3 . Into the upper cross-piece o the sighting-telescope v is placed. Just above the vertical part of the carrier m the telescope has an opening u corresponding to its clear diameter and above the opening on the inside an inclined reflecting-diaphragm p^4 .

The operation of the arrangement is as follows: In adjusting the elevation of the gun the index-plate moves past the lower end of the index-hand and the part of the plate illuminated at the time is reflected by the mirrors p' , p'' , and p^3 to the diaphragm p^4 . Consequently within the field of view of the telescope the images of the surfaces illuminated on both sides appear side by side. The gunner will recognize by the color of the image whether the gun is elevated too much or too little and can change the elevation accordingly until the image of the curve itself ap-

appears in the field of view of the telescope cutting the parts of the horizontal wire to the right and left of the intersection of the cross-wires in the middle. As soon as this happens the correct adjustment of the elevation of the gun is reached. By preference the color of the index-plate is made to increase in darkness from the curve outward, so that by the shade of the color of the image the approaching to the proper adjustment is recognized. Instead of making the curve of a polished strip it might also be formed as a dark line upon a light ground. It would also be possible to get the image of the curve as a point by the interposition of a lens.

It is evident that the illumination of the index-plate might be effected by other means than the lamp within the index-hand—for instance, the index-plate might be made diaphanous and illuminated from the rear.

What I claim as new is—

1. In an apparatus for adjusting the elevation of guns of the character specified having an index-plate and an index-hand, a hollow index-hand and hollow index-axle provided with a system of mirrors reflecting the image of the part of the index-plate before the end of the index-hand into the telescope, substantially as specified.

2. In an apparatus for adjusting the elevation of guns of the character specified having an index-plate and an index-hand, a hollow index-hand and hollow index-axle provided with a system of mirrors reflecting the image

of the part of the index-plate before the end of the index-hand into the telescope, the index-curve being formed by a narrow strip differing in color from that of the index-plate, substantially as specified.

3. In an apparatus for adjusting the elevation of guns of the character specified having an index-plate and an index-hand, a hollow index-hand and hollow index-axle provided with a system of mirrors reflecting the image of the part of the index-plate before the end of the index-hand into the telescope, the divisions of the index-plate made by the index-curve being differently colored, substantially as specified.

4. In an apparatus for adjusting the elevation of guns of the character specified having an index-plate and an index-hand, a hollow index-hand and hollow index-axle provided with a system of mirrors reflecting the image of the part of the index-plate before the end of the index-hand into the telescope, and an incandescent lamp arranged at the lower end of the hollow index-hand for illuminating a limited field of the index-plate through an opening in the index-hand, substantially as specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHANNES KRONE.

Witnesses:

WILLIAM ESSENWEIN,
P. LIEBER.