

No. 644,370.

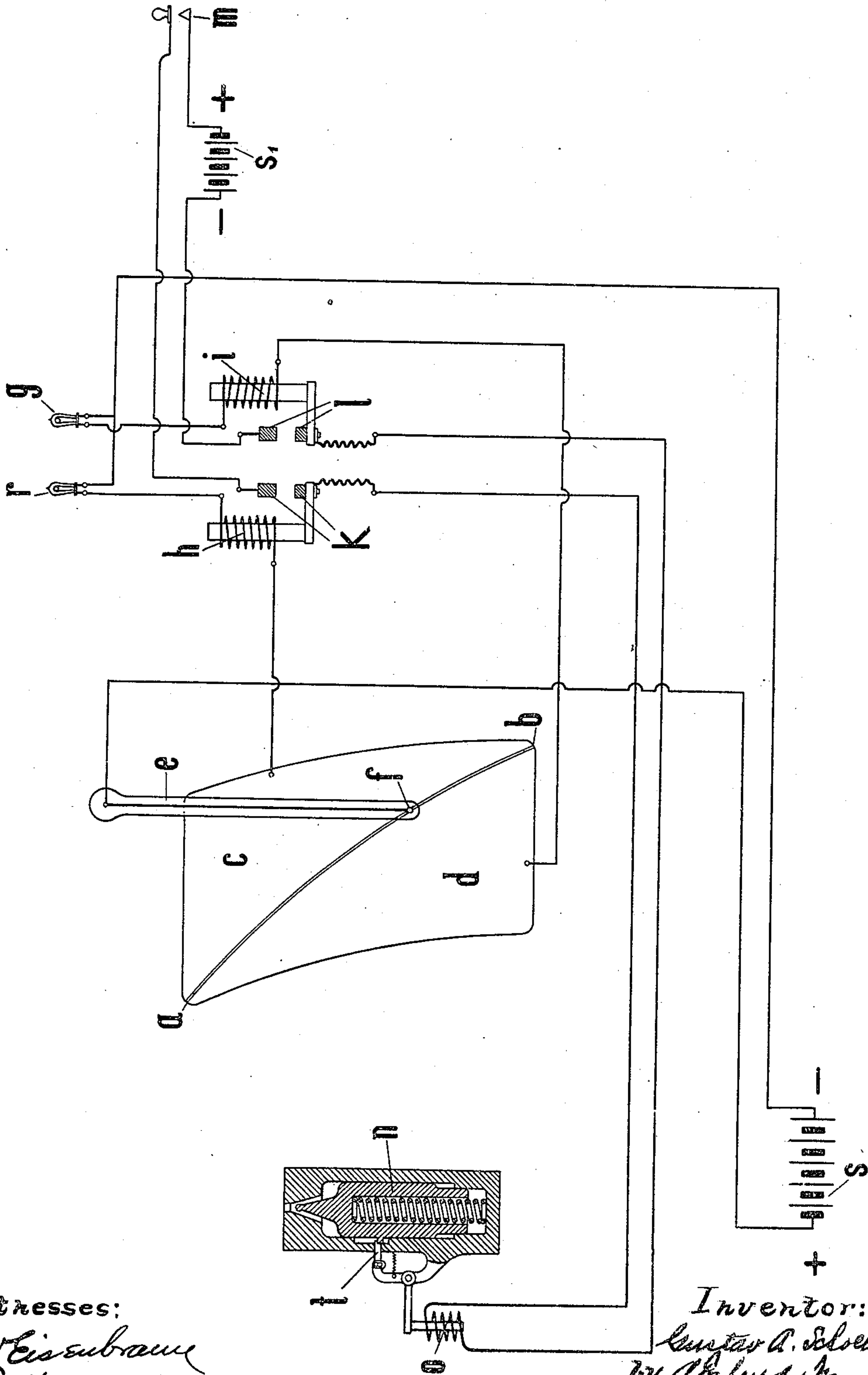
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G. A. SCHOELLER.

APPARATUS FOR ADJUSTING ELEVATION OF GUNS.

(Application filed Nov. 29, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ADJUSTING ELEVATION OF GUNS.

SPECIFICATION forming part of Letters Patent No. 644,370, dated February 27, 1900.

Application filed November 29, 1899. Serial No. 738,634. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV A. SCHOELLER, engineer, residing at Mülheim-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 application for United States Letters Patent, Serial No. 713,878, filed April 21, 1899, which latter apparatus consists, essentially, in an index-hand adjusted 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 consists in electrical connections between the index-hand, the plate, and the index-curve which permit the gunner without leaving his position to see whether the gun is turned to the proper elevation or whether it has to be raised or lowered, and, furthermore, prevent firing until the gun is turned to the proper elevation, whereupon it can be automatically fired.

My invention will be best understood by reference to the annexed diagrammatic drawing, in which—

a b is the index-curve, formed of non-conducting material, interposed between the two sections *c* and *d* of the index-plate, which said sections are made of conducting material and insulated from each other and also from the gun or cradle. The upper surfaces of the index-curve *a b* and of the sections *c* and *d* of the index-plate are in one plane and at right angles to the axis of the trunnions.

e is the index-hand, which is adjusted according to the required elevation of the gun and which has at its outer end a spring-contact *f*, bearing against the index-plate. The path described by the contact of the index-hand on the index-plate in changing the ele-

vation of the gun is that of an arc of a circle having the axis of the trunnions for a center. The diameter of the contact-button is somewhat larger than the width of the index-curve, so that when its center is over the center of the index-curve it laps over and is in contact with both sections *c* and *d* of the index-plate. The contact-button is connected to the positive pole of the source of electricity *s*, while the negative pole is in parallel connection with the sections *c* and *d* of said index-plate. Incandescent lamps *r* and *g* of different colors are inserted into the two parallel circuits, which circuits I shall hereinafter designate as "index-plate" circuits. The lamp *r*, with circuit leading to the section *c*, for instance, may be red, and the lamp *g* in the circuit leading to the section *d* may be green.

When the contact *f* on the index-hand bears against the section *c* of the index-plate, the circuit through the red lamp *r* is closed and this lamp will be lighted, but when the contact bears on the part *d* the circuit through the green lamp *g* is closed. When, however, the contact is substantially central to the index-curve *a b*, (the position corresponding to the proper elevation of the gun,) both lamps are lighted.

To point the gun, the index-hand *e* is first adjusted to the proper elevation, preferably by means such as described in the application above referred to. Then the gun is raised or lowered by suitable gear until both lamps are lighted, when the gun has the elevation corresponding to the position of the index-hand and is in the position for firing. Should the red lamp only be lighted, the breech of the gun must be raised. When, however, the green lamp only is lighted, the breech must be lowered.

In view of the above-described arrangement the gunner is enabled to watch the elevation of the gun without leaving his place by simply observing the two lamps, and if the elevating mechanism is close by to individually adjust the gun to the proper elevation.

It is evident that the two lamps might be replaced by other signaling devices—for in-

stance, by semaphores. Without changing the nature of the invention the index-curve *a b* may be formed of conducting material and the index-plate *c d* of non-conducting material, in which case the index-plate would be electrically connected by a single circuit from the strip *a b* to the negative pole, and but a single lamp would be lighted. The lamp would then glow when the contact *f* bears on the curve *a b*—that is, when the gun has the proper elevation. It is readily seen, however, that this latter arrangement is not as convenient as the first described, since it only shows when the gun is at the proper elevation, but not the direction in which the gun must be turned on the trunnions to bring it to the elevation corresponding to the position of the index-hand.

To make firing of the gun impossible until the gun has reached the elevation corresponding to the position of the index-hand, the following arrangement is made: The circuit of a separate source of electricity *s'* is provided with a key *m*. This circuit may cause the discharge of the gun either by an electric spark or by an incandescent wire or, as shown in the drawing, by an electromagnet, respectively solenoid *o*. In the latter case the electromagnet *o* effects the release of a pin *t*, holding the hammer, which pin *t* either serves as a sear, as shown in the drawing, or when a special firing device is provided as a safety-pin. Within the firing-circuit normally-open contacts are inserted, corresponding to the number of index-table circuits, generally as *k* and *l*. The contact *k* is closed by an electromagnet (respectively solenoid) *h*, which is shunted in the wire connected to the part *c* of the index-table, the contact *l* by an electromagnet (respectively solenoid) *i*, shunted in the wire leading to the part *d* of the table. As long as the contact *f* of the index-hand *e* is upon the part *c* or upon the part *d* of the index-table the current passes through but one of the two electromagnets *h* or *i*. Consequently but one of the contacts *k* or *l* is closed. Consequently the firing-circuit remains open as long as the gun has not reached the elevation corresponding to the adjustment of the index-hand *e*. When, however, the gun is in the proper position—i. e., when the contact-button *f* is upon the curve *a b*—both magnets *h* and *i* simultaneously are vitalized, both contacts *k* and *l* are closed, and by pressing the key *m* firing, respectively releasing of the safety-pin of the hammer, is effected. When the key *m* is kept pressed down, firing of the gun or the release of the safety-pin of the hammer will be caused automatically at the moment the gun reaches the elevation corresponding to the adjustment of the index-hand.

In the case referred to, where the curve *a b* is made of conducting material and the parts *c* and *d* of non-conducting material, of course

but one electromagnet is required in place of the two, *k* and *l*. In this case also firing is only made possible, respectively effected, at the instant the gun reaches the elevation corresponding to the adjustment of the index-hand.

What I claim is—

1. In an apparatus for adjusting the elevation of guns of the character specified, an index-plate partly constructed of insulated conducting material and partly of non-conducting material, a conducting index-hand with a contact moved in changing the elevation of the gun to slide upon the index-plate, a source of electricity and electric connection to the metallic part or parts of the index-plate and to the index-hand, whereby the circuit is closed when the contact of the index-hand is over the metallic part or parts of the index-plate, substantially as and for the purpose specified.

2. In an apparatus for adjusting the elevation of guns of the character specified, an index-plate made of three parts, two metallic insulated parts and a non-conducting index-curve; an index-hand with a contact moved in changing the elevation of the gun to slide upon the index-plate, a source of electricity, an electric connection from one pole to the index-hand, respectively its contact, and parallel connections to the metallic parts of the index-plate, whereby the current is closed whenever the contact of the index-hand is upon the metallic parts of the index-plate, substantially as and for the purpose specified.

3. In an apparatus for adjusting the elevation of guns of the character specified, an index-plate made of three parts, two metallic insulated parts and a non-conducting index-curve; an index-hand with a contact caused in changing the elevation of the gun to slide upon the index-plate; a source of electricity; an electric connection from one pole to the index-hand, respectively its contact; parallel connections to the metallic parts of the index-plate, and electric signals inserted within the circuit or circuits, whereby the current is closed whenever the contact of the index-hand is upon the metallic parts of the index-plate and the closing indicated by the signals, substantially as and for the purpose specified.

4. In an apparatus for adjusting the elevation of guns of the character specified, an index-plate partly constructed of insulated conducting material and partly of non-conducting material, an index-hand with a contact caused in changing the elevation of the gun to slide upon the index-plate; a source of electricity and electric connections to the metallic part or parts of the index-plate and to the index-hand, respectively its contact, whereby the circuit is closed when the contact of the index-hand is over the metallic part or parts of the index-plate; in combination with a separate electric circuit with a key and an open

contact or open contacts, electromagnets (or solenoids) inserted into the index-plate circuit or circuits, said magnets closing the contacts of the separate electric circuit, so that
5 the current is directed to the firing device, when the key is pressed down, substantially as and for the purpose specified.

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

GUSTAV A. SCHOELLER.

Witnesses:

WM. ESSENWEIN,
EMIL HOETTE.