

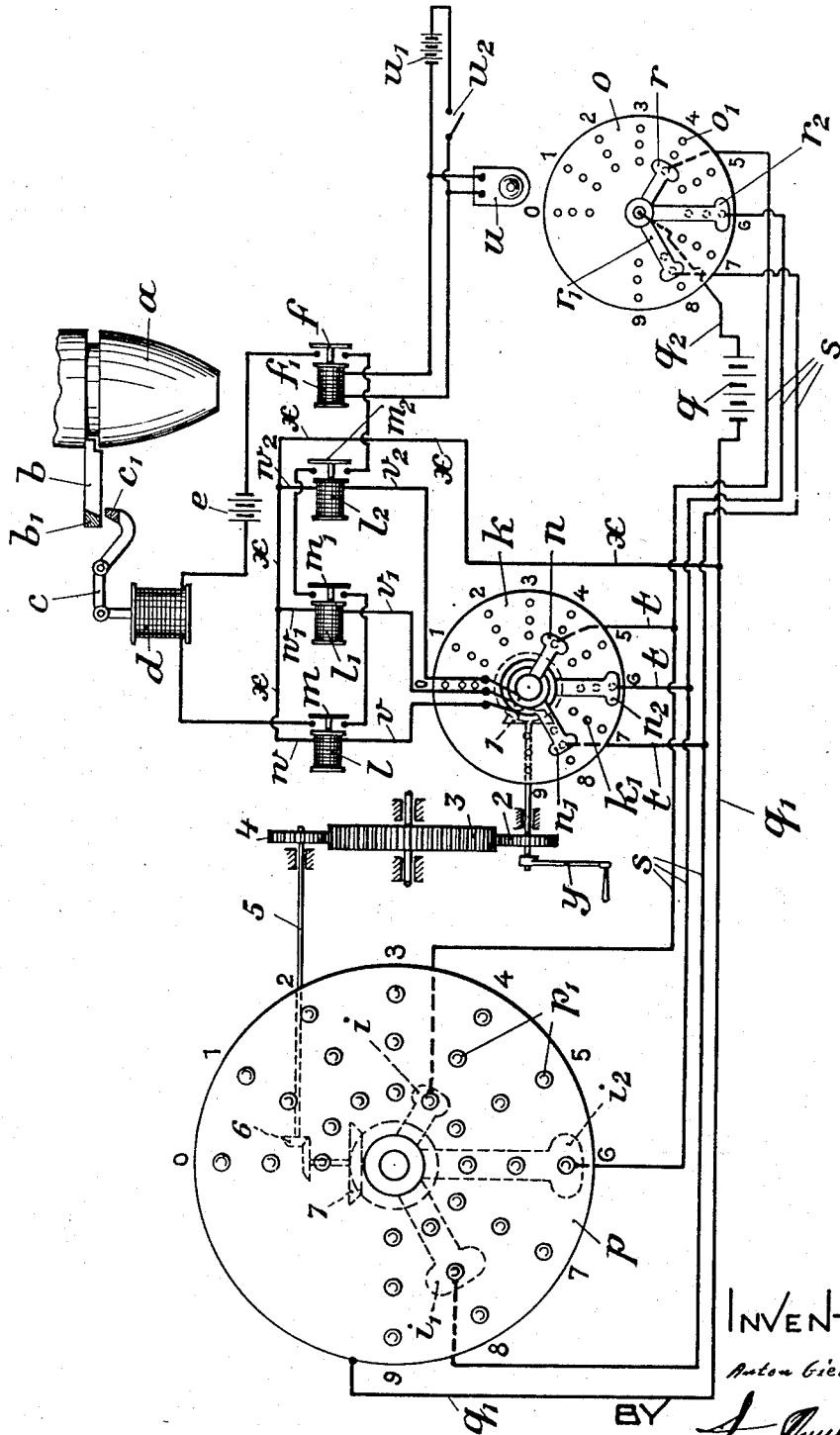
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AUTOMATIC FUZE SETTING APPARATUS

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AUTOMATIC FUZE SETTING APPARATUS

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The invention relates to automatic fuze setting apparatus, in which the fuze timing settings are transmitted by a sequence indicating device, and to which by means of a further signal device 5 which is connected with the signal device of the gun giving the fire orders, the order for removing the projectile from the automatic fuze setting apparatus and for inserting it into the gun is given.

10 In the automatic fuze setting apparatus already known the bolting device which prevents the removal of the projectile from the setting socket is influenced only by parts of the automatic fuze setting apparatus itself, that is the 15 bolting device is disengaged as soon as—after a projectile has been inserted in the fuze setting socket—the fuze setting member which is turned when the fuze is being set, has carried out two revolutions. Thus the order transmitting devices 20 do not control the bolting device.

In automatic fuze setting apparatus of this type mistakes are liable to occur, particularly when fire is directed at rapidly moving and turning targets which frequently change their course 25 (as for instance air craft).

If the target changes its course during the time fire orders are being given, it may be useless to fire in accordance with an order received. In such a case before a shot is fired in accordance 30 with orders just given, new firing orders may be transmitted and when the course of the target changes repeatedly, it may be necessary to change the fire orders several times in succession before a shot is actually fired.

35 Now, if a projectile is removed from the automatic fuze setting apparatus as soon as the fuze has been correctly set in accordance with the first setting order and before orders have been given for later altered fuze settings and before 40 the order to fire is given, the changed fuze settings can not be given, to the projectile prematurely removed from the automatic fuze setting apparatus, and the projectile is fired with the previously ordered, but now incorrect, time 45 setting.

Another source of error may occur when the projectile is not removed from the automatic fuze setting apparatus until the firing order has been given, for instance if the gunner adjusting the 50 sequence indicator of the transmitter and the receiver does not immediately obey a newly transmitted command, and the firing order is given before the sequence indicator has been adjusted to agree with the receiver, then, at the moment 55 when the projectile is removed from the auto-

matic fuze setting apparatus, the fuze setting member is not correctly adjusted.

In the automatic fuze setting apparatus according to the invention there are provided means, controlled by the fire order signal device, 5 which actuate the locking device which bolts the projectile in the apparatus when the signal for firing the gun is given.

Further, in the fuze setting apparatus according to the invention means are provided for making 10 the actuation of the said locking device dependent on the correct adjustment of the sequence indicator to the fuze setting ordered by the transmitter so that unless this adjustment is correctly made the projectile remains bolted in 15 the apparatus. Even if the adjustment has been correctly made the projectile remains bolted in the receiver until the fire order is given.

The accompanying drawing illustrates diagrammatically a typical embodiment of the in- 20 vention.

The transmission of orders to the automatic fuze setting apparatus is effected by a sequence indicating device having a lamp receiver. In 25 the lamp receiver *p* there are arranged, for example, on three concentric circles, thirty electric incandescent lamps *p*₁, there being on each concentric circle ten lamps corresponding to the reference figures 0-9. The illuminating 30 lamps of the inner circle may, for instance, denote the number of units, the illuminating lamps of the middle circle the number of tens, and the illuminating lamps of the outer circuit the number of the hundreds of a three-place number which represents the particular fuze-setting ordered. 35

The transmitter *o* consists of a disc in which thirty insulated contacts *o*₁ are inserted and arranged in the same manner as the lamps of 40 the receiver. Each lamp *p*₁ of the receiver *p* is connected with the similarly arranged contact *o*₁ of the transmitter *o* by an electric conductor *s*. Corresponding to the thirty lamps 45 *p*₁ and the thirty contacts *o*₁ there are thirty wires *s* available, only three of which, however, are shown in the diagram.

The source of electric current *q* which feeds the sequence indicating device with current is connected by a wire *q*₁, to the lamp holder of 50 the receiver *p* and by a wire *q*₂ to the three sliding contacts *r*, *r*₁, *r*₂ of the transmitter *o*. Of the sliding contacts of the transmitter, the first slides on the contacts of the inner contact circuit, the second on the contacts of the middle 55 contact circuit and the third on the contacts

of the outer contact circuit. If the sliding contacts of the transmitter are brought into contact with any three contacts, the correspondingly arranged lamps of the receiver are illuminated.

In the example shown in the drawing the fuze setting order is denoted by the number 684.

Over the lamps of the receiver there swing three sequence indicators i, i_1, i_2 which are pivotally mounted at the common central point of the concentric circles on which the lamps are arranged. These sequence indicators are connected with the fuze setting members, not shown in the drawing, in such a manner that when the indicators cover the lamps illuminated at the time the fuze setting members are correctly adjusted according to the command.

The order for firing the gun is given by means of the electric bell u on the gun, which bell is energized from the source of current u_1 , its circuit being closed by means of the switch u_2 .

The projectile a is bolted by means of the bolt b in the setting socket of the automatic fuze setting apparatus. The bolt, which is provided with an inclined surface b_1 can be moved from its locking position to release the projectile, for example by a double-lever c provided with a correspondingly inclined surface c_1 , and is moved by the armature of the bolting magnets d . The bolting magnet is disposed in the circuit of a source of current e . In this circuit there are disposed in series four interrupter switches f, m, m_1, m_2 which switches are acted on by springs, not shown in the drawing, in such a manner that each of them opens the circuit and are actuated to close the circuit when electromagnets f_1, l, l_1, l_2 are excited.

The magnet f_1 of the interrupter f is connected to the circuit of the fire order bell u and is excited as soon as the latter is energized.

The other electromagnets l, l_1 and l_2 are controlled by a control switch k_1 which, similarly to the transmitter o , consists of a disc with thirty insulated contacts k_1 arranged in the same way as the lamps p_1 of the receiver p and the fixed contacts o_1 of the transmitter o . Over the contacts k_1 of the control switch k there slide three counter-contacts n, n_1, n_2 which are arranged in the same way as the movable contacts of the transmitter o .

These counter-contacts n, n_1, n_2 are positively connected with the sequence indicators i, i_1, i_2 by gear wheels 1, 2, 3, 4, 5, 6, 7 and are moved synchronously therewith by the crank y . The indicator i is connected with the indicator i_1 by means of a transmission 1:10 and with the indicator i_2 by means of a transmission 1:100. In the same manner the counter-contacts n, n_1, n_2 are interconnected.

From each of the electric wires s there branches off a wire t to the particular contact k_1 of the control switch k which is arranged in similar disposition as the corresponding lamp on the receiver p and the corresponding contact o_1 on the transmitter o .

The counter contacts n, n_1, n_2 which are moved synchronously with the sequence indicators i, i_1, i_2 are connected by way of brush ring contacts and wires v, v_1, v_2 to the electromagnets l, l_1, l_2 , the other terminals of which are connected by the wires w, w_1, w_2 and the wires x to the wire q_1 and the source of current q .

In the above-described arrangement only those contacts k_1 in the control switch k are connected by way of the transmitter o to a pole of the

source of current q which are associated with the lamps of the receiver switched in, in each particular case by the transmitter o , and the counter contacts n, n_1, n_2 of the control switch k come into contact with these contacts connected with one pole of the source of current only when the sequence indicators i, i_1, i_2 with which the counter contacts n, n_1, n_2 are moved synchronously to register with the lamp switched on at the time. The electromagnets l, l_1, l_2 are thus excited and the interrupters m, m_1, m_2 closed only when the sequence indicators i, i_1, i_2 register with the lamps switched on at the time. As, moreover, as explained above, the electromagnet f_1 is excited only when the fire order bell u is energized, it will be seen that all the interrupter switches f, m, m_1 and m_2 located in the circuit of the unbolting magnet d are closed only when, at the same time, the sequence indicators register with the particular lamps of the receiver illuminated at the time and the fire order bell is energized.

I claim:—

1. An automatic fuze setting apparatus for projectiles comprising a lock adapted to engage and retain the projectile in the apparatus while the fuze is being set, a device for operating the lock, a fire order transmitting system, and means rendered effective on transmission of a fire order in said system for causing said device to operate the lock to release the projectile.

2. An automatic fuze setting apparatus for projectiles comprising a lock adapted to engage and retain the projectile in the apparatus while the fuze is being set, a device for operating the lock, a system for signalling fuze setting sequences comprising a receiver and a transmitter, and means rendered effective only when the received signals agree with the transmitted signals to operate the lock to release the projectile.

3. An automatic fuze setting apparatus for projectiles comprising a lock adapted to engage and retain the projectile in the apparatus while the fuze is being set, a device for operating the lock, a fire order transmitting system, a system for signalling fuze setting sequences comprising a receiver and a transmitter, and means rendered effective to operate the lock to release the projectile only on transmission of a fire order when the received signals agree with the transmitted signals.

4. Apparatus according to claim 2, in which the receiver comprises sequence indicating means in accordance with the position of which the fuze setting is determined and in which the lock is operated to release the projectile only when the sequence indicating means are in agreement with the transmitted signals.

5. An automatic fuze setting apparatus for projectiles comprising a lock adapted to engage and retain the projectile in the apparatus while the fuze is being set, an electromagnet, a device operated by the electromagnet for operating the lock to release the projectile, an electrical control circuit for the electromagnet, a plurality of switches disposed in series in said circuit, a system for signalling fuze setting sequences, and means for operating the switches under the control of the signalling system.

6. Apparatus according to claim 5 including a fire order signal device and in which the switches in the lock control circuit include a switch under the control of the fire order signal device.

7. An automatic fuze setting apparatus for projectiles comprising a lock adapted to engage

and retain the projectile in the apparatus while the fuze is being set, an electromagnet for operating the lock to release the projectile, an electrical control circuit for the electromagnet, a signalling system comprising a transmitter of fuze setting sequences and a receiver in which the received sequences determine the fuze settings, said transmitter and receiver being electrically connected with each other, a plurality of switches in series in said electrical control circuit and each switch having an electromagnet for operating the same, a common source of current for the switch electromagnet and the signalling system, and means effective upon agreement between the transmitted and the received sequences for enabling said source to energize the electromagnets of the series switches with resulting release of a projectile with its fuze correspondingly set.

8. An automatic fuze setting apparatus for projectiles comprising a lock adapted to engage and retain the projectile in the apparatus while the fuze is being set; an electromagnet for operating the lock to release the projectile; an electrical control circuit for the electromagnet; a system for electrically signalling fuze setting sequences comprising a transmitter switch having a plurality of arms movable over contact banks

to select settings to be transmitted, a receiver with means for visually registering the received sequences which determine the fuze settings, and a plurality of indicators corresponding to the arms of the transmitter switch movable to positions in accordance with the visually registered sequences; a control switch with movable arms and contact banks corresponding to those of the transmitter switch, said arms being positively coupled to the indicators of the receiver; circuit connections between said visual registering means and both said banks of contacts; a plurality of switches in series in the said electrical control circuit and each switch having an electromagnet for operating the same; a common source of current for the series switch electromagnets and the circuit connections of the signalling system; and connections branching from said circuit connections to the arms of the control switch and thence to the electromagnets of the series switches and the source of current.

9. Apparatus according to claim 8 including a fire order control circuit and an additional series switch in the electrical control circuit with its operating electromagnet arranged in the circuit of the fire order control switch.

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