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TARGET APPARATUS FOR USE WITH KINEMATOGRAPHS.
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3 SHEETS—SHEET 2.

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ATTORNEY
To all whom it may concern:

Be it known that we, BENJAMIN WILLIAM BATES, HENRY WELDON KELLY, and DOUGLAS HAYNES CORBIN, residents of Birmingham, in the county of Warwick; and Handsworth, Birmingham, respectively, have invented a new and useful Improvement in Target Apparatus for Use with Kinematographs; and we do hereby declare the following to be a full, clear, and exact description of the same.

Our invention comprises improvements in target apparatus for use with kinematographs and the like, and refers to that class in which a picture is projected upon a perforable screen, the screen having a light at the rear which is visible through the bullet hole when a shot is fired through the screen, the said hole thus indicating the position of the hit. Such a screen forms the subject of a prior U. S. A. Patent No. 1027371 granted to Benjamin William Bates and Alfred Thomas Corbin Hale, and our present improvements are particularly useful in connection with such a target screen though they may also be employed with any other suitable target. In kinematograph targets of this type which are necessarily used at short ranges it is obvious that some of the pictures or parts of the pictures will represent objects at different distances from the marksman than others, as for instance a picture representing a person at a distance say of half a mile as distinguished from point blank range. It is therefore desirable that the time taken in stopping the kinematograph picture may be in some cases proportioned or approximately proportioned to the time which would be taken by the bullet in passing from the rifle to the distant object so that users of the target may make proper allowance for the movement of the object during the passage of the bullet. We accomplish this by employing a retarding or lagging device in conjunction with the stopping gear. One way of accomplishing the object is by the employment of electrical contact devices secured to the film at points at which it is desired to retard or lag the stopping gear or holes may be provided in the film through which the contact can be made, said contacts being designed to operate a retarding or interrupting device whereby the stop gear will act more slowly than usual and obviously the amount of retardation may be regulated by the effective length or duration of the contact device.

Referring to the drawings:—Figure 1 is a partial diagram of our apparatus. Fig. 2 is a continuation of Fig. 1, the two views comprising a complete diagrammatical showing. Fig. 2 is a side elevation of the apparatus carried on the kinematograph. Fig. 2 is a side elevation of one of the relays. Fig. 3 is a side elevation with driving shaft broken at A-B, Fig. 4 showing the spring contacts. Fig. 4 is a plan of same. Fig. 5 is an end view of the screen controlling device. Fig. 6 shows the studs for operating the screen controlling device.

In carrying our invention into effect as shown in the diagram at Fig. 1 the apparatus is set in the position it would be just as the gun is fired. On firing a shot from the rifle or the like the picture projecting device is stopped in manner described in our U. S. A. application Serial No. 730970, a vibratory current is set up by the diaphragm of the microphone 1 vibrating owing to the sound waves, said microphone being connected by the wires 2 to the primary of the transformer 3, a battery or other source of energy 4 supplying the current for this circuit. The microphone is preferably located in a conical sound receiver. Connected to the secondary of the transformer 3 is a relay 5. On the vibration of the diaphragm of the microphone 1 a vibrating current is set up in the primary of the transformer 3 thereby inducing a vibrating current in the relay 5. The flanking contact springs 6 of the relay 3 are provided with contact pieces 7 so arranged that when the armature 8 of the relay vibrates a circuit which will be hereinafter described is broken by the contacts 7 being separated. Connected to the contact springs 6 are wires 9 and battery 10 which is also connected to the relay magnet 11. Normally the coils of the relay mag.
net 11 are energized thereby holding the armature 12 in position and completing a circuit which keeps the magnetic clutch energized in manner hereinafter described. On an induced current being set up in the transformer 3 the relay 5 is energized thereby breaking the contacts 7 and momentarily deenergizing the relay 11, the armature 12 then dropping under the influence of the spring 13 completing a circuit to energize solenoid 14.

In a lagging device according to our invention metal contacts 15 are secured in the film 16, said contacts being arranged in line with and to pass one of the brush contacts b, c, d, e, or f; these contacts are insulated from each other and in connection with relays which are operated when a contact on the film passes same.

As shown in the drawings the contact 15 on the film 16 will pass in contact with the brush contact b thereby energizing the relay A in the following manner: Current is taken from batteries 17 along wires 18, 19, 20 to electromagnets 21 energizing same and drawing the pivoted armature 22 which is common to relays A, B, C, D, and E, into engagement with them. At the same time as electromagnets 21 are energized electromagnets 23 of relay A are also energized in the following manner: The current passes from the coils of electromagnets 21 along wire 24 to electromagnets 23, wire 25, brush contact b, stop 15, film roll 26, which is connected to return wire 27, to battery 17 thereby drawing down the pivoted armature 28. The end of the armature 22 is provided with a triangular or other shaped stop 29, so arranged as to release the armature 28 when the armature 22 is drawn away from same.

Electromagnets 21 are so wound as to release the armature 22 quicker than the armature 28 is released by electromagnets 23.

The armature 22 is brought back to its normal position when the contact 15 has passed contact b by the spring 26, the end of the armature 28 is cut to a triangular or other suitable shape thereby allowing the armature 28 to be locked in its attracted position after the contact 15 has passed the brush contact b for reasons hereinafter explained.

On the end of the pivoted armature 28 is provided a spring contact 29 which engages another spring contact 30 to complete the circuit for energizing the relay 31 which is hereinafter explained.

On the firing of the gun the relay 11 is deenergized and the armature 12 drawn down onto the contact 33 thereby completing the circuit which energizes the holding magnet 34 which holds the armature on the contact 33. The circuit for completing the holding magnet 34 is as follows:—battery 17, wire 35, relay frame 36, armature 12, wire 37, around the coil of magnet 34, wire 38, contacts 39, 40, wires 41, 27, back to battery 17. At the same time as the armature 12 engages contact 33 a further circuit is completed energizing solenoid 14 as follows:— battery 17, wire 35, relay frame 36, armature 12, wire 42, solenoid 14, wires 43, 27, back to battery 17. On the completion of this circuit and when the contact 29 engages the contact 30 of relay A the relay 31 is energized as follows:—battery 17, wire 35, relay frame 36, armature 12, wires 42, 45, relay 31, wire 46, contact 47, movable contact 48, contact 49, wire 50, contacts 39, 29, armature 28, relay frame 51, wires 52, 27, battery 17.

In driving the kinematograph we preferably use a magnetic clutch such as described in our U. S. A. application Serial No. 730970; said clutch is normally energized in the following manner:—battery 17, wire 35, relay frame 36, armature 12, contact 53, wire 54, contact 55, movable contact 56, contact 57, wire 58, wipe contact 59, contact 60, to the coils of the clutch, said coils being earthed to the machine, wire 61 to battery 17. The kinematograph machine does not stop until the movable contact 48 engages one of the energized contacts 49, 49', 49", 49"', corresponding to the position of the contact stop 15 on the film and so when the aforementioned circuit is broken by the armature 12 disengaging the contact 53 the clutch will still be energized as follows:—The armature 62 of the relay 31 normally engages the contacts 63, 64, thereby completing the following circuit for energizing the magnetic clutch—battery 17, wires 18, 19, 65, contact 63, armature 62, contact 64, wires 65, 54, contact 55, movable contact 56, contact 57, wire 58, wipe contact 59 to the contact 60 to the coils of the magnetic clutch, the other end of the coils being earthed to the machine wire 61, to battery 17.

When the relay 31 is energized in manner heretofore explained the armature 62 engages the contacts 67, 68, to energize the solenoid 69, for the purpose hereinafter explained, the circuit for doing this is as follows:—battery 17, wire 35, relay frame 36, armature 12, contact 33, wire 70, contact 68, armature 62, contact 67, wire 71, solenoid 69, wires 72, 27, to battery 17.

The braking of the kinematograph is effected when the relay armature 62 engages contacts 67, 68, in the following manner:—Current passes from the battery 17, wire 35, relay frame 36, armature 12, contact 33, wire 70, contact 68, armature 62, contact 67, wires 71, 74, to the electromagnets 72 and other parts of the stop gear as described in our U. S. A. application Serial No. 730970, wire 61, battery 17.

Means are also provided so that after a shot has been fired and the kinematograph 130
stopped for a predetermined period according to our U. S. A. application Serial No. 730,970 the shot holes in the screen are obliterated; the said screen being according to the prior U. S. A. Patent No. 1027574 granted to Benjamin William Bates and Alfred Thomas Corbin Hale. The circuit for operating the means for obliterating the shot holes in the screen is as follows:—battery 17, wires 61, 76, 77, 78, contact 79, movable contact 85, contact 80, wire 81, through solenoids 82, wire 83, contacts 84, 85, of relay P, armature 86, wires 87, 20, 19, 18, to battery 17. Above the solenoid 82 is provided a rocking armature 88, Fig. 5, which is in contact with the magnets of solenoid 82 when the aforementioned circuit is completed, but when the movable contact 56 disengages the contacts 79 and 80, when the movable core 89 of the solenoid 69 is energized, the aforementioned circuit is broken.

The movable contact 56 is so arranged that as soon as it disengages contacts 79 and 80 and deenergizes solenoids 82 it engages another pair of contacts 90, 91, and completes the following circuit to energize another pair of solenoids 92 and thereby draws down the rocking armature 88. The circuit for performing this is as follows:—battery 17, wires 61, 76, 77, 126, contact 90, movable contact 56, contact 91, wire 93, to solenoid 92, wire 83, contacts 84, 85, armature 86, wires 87, 20, 19, 18, to battery 17 thereby moving the rocking armature 88 into contact with the magnets of the solenoids 92. On the return of the movable core 89 when the solenoid 69 is deenergized, the movable contact 56 breaks the circuit and deenergizes the solenoids 92, but as soon as this circuit is broken movable contact 56 engages contacts 79 and 80 and completes the circuit energizing solenoid 82, thereby giving the armature 88 a rocking motion.

The rocking armature 88 is fixed on a movable shaft 95 keyed onto same is a lever escapement 96 engaging with toothed wheel 97 thereby forming a "clockwork escapement." The wheel 97 is keyed to a shaft 98 and to this shaft is secured a pinion 99 operating the spur wheel 100, said spur wheel is secured to the store roll 101 so that when the solenoids 82 and 92 are alternately energized and deenergized, the ratchet 96 operates the wheel 97 thereby allowing the store roll 101 through the gears 99 and 100 to rotate by the action of a weighted rope or the like operating the store roll 101 by means of the escapement escapement as hereinbefore explained, and obliterating the shot holes in the screen in manner described in the prior U. S. A. Patent No. 1027574 granted to Benjamin William Bates and Alfred Thomas Corbin Hale.

We have described the circuit operating different parts of our apparatus and will now describe same from the time when a rifle or the like is fired and the effect that same has on the apparatus.

The contacts 15 in the film 16 are provided in each picture according to the distance of the object, i.e., say the object was 500 yards away the step 15 would be placed in the film so as to make contact with the brush contact 6, if the object was 2000 yards away the stop 15 would be placed in the film so as to make contact with the brush contact 3, any suitable number of stops can be placed in the film and each stop is arranged to represent any desired distance; of course there has to be a corresponding number of relays to the number of contacts and also a corresponding number of contacts to engage the movable contact 48 as there are contacts in the film.

When a shot is fired a vibrating current is set up in the transformer 3 which energizes the relay 5 breaking the contact 7 and momentarily deenergizing the relay 11 in manner heretofore explained thereby allowing the armature 12 to fall under the influence of the spring 13, and thereby engage contacts 33 and complete the circuit for energizing solenoid 14 in manner heretofore explained. When the solenoid is energized the movable core 102 rises under the retarding control of a dash pot or the like 103 until the movable contact 48 moves into contact with one of contacts 49, 49′, 49″, 49‴, or 49⁴, whichever one is in circuit with the contact 15, as shown in the diagram at Fig. 1; the movable contact 48 thus completes the circuit for energizing the relay 31 in manner heretofore explained.

It is obvious from the description and drawings that if the contact on the film is arranged to engage brush contact 3 relay B would be energized and the movable core 102 would have to rise to bring movable contact 48 into engagement with contact 49′, before the circuit to energize the relay 31 would be completed. Similarly if contact 15 is arranged to engage brush contact 4 relay C would be energized and movable contact 48 would have to rise to engage contact 49″ before relay 31 would be energized. If contact 15 is arranged to engage brush contact 2 thereby energizing relay D movable contact 48 has to rise and engage contact 49‴, before relay 31 is energized.

If contact 15 is arranged to engage brush contact 3, to energize relay E movable contact 48 will have to rise until it engages contact 49⁴ before relay 31 is energized.

It is obvious that after a shot has been fired, and say the step 15 has engaged brush contact 2 before the relay can be energized and operate the stopping gear, the movable core 102 will have to move contact 48 up to engage contact 49‴ under the influence of the dash pot 103, so the marksman will have
to judge the distance of the object he is aiming at and fire some distance in front of same, so that the distance traveled by the object from the time he fired until the contact 48 reached contact 49 and stopped the kinematograph would bring the object aimed at onto the shot hole to obtain a perfect shot; the relay 31 is then energized, raising the armature 62 and breaking the contacts 63, 64 and de-energizing the magnetic clutch in manner heretofore explained. The armature 62 then rises and engages contacts 67, 68, and energizes solenoid 69 in manner heretofore explained and also energizes the solenoids 73 of the stop gear thus stopping the kinematograph in manner described in our U. S. A. application Serial No. 730970.

When the movable core 89 of the solenoid 69 rises it is retarded by the dash pot 105 which is provided with a one way quick return valve, the circuit in which the solenoids 82 are in is broken by the movable contact 56 disengaging contacts 79, 80, thereby de-energizing the solenoids 92. But in the contact 56 reaching the contacts 90 the circuit is completed in which the solenoids 92 are in thereby energizing same and drawing down the pivoted armature 88 and allowing the store roll 101 to move in manner heretofore explained. The movable core 89, when nearly at the end of its upward travel, engages a plunger 110 and moves same into contact with spring contact 90, thereby breaking the circuit and de-energizing electromagnet 84 and solenoids 69, 14, and relay 31 and restoring same to their normal position in manner heretofore explained.

Means are provided whereby the result of the shots may be accurately determined after the kinematograph has been stopped as in squad firing such as by moving the paper at a known speed or rate proportionately or relatively to that of the kinematograph film. This may be done by driving the two at definite relative speeds either intermittently or continuously with the starting points accurately registered. Or the paper may be marked so as to indicate its first position, while a contact device of the type previously described is provided on the film for closing a circuit when it reaches a pre-determined point thus causing the apparatus to commence work. When it is desired, to ascertain and carefully check the results of the shooting the paper and film are restored to their original positions and slowly advanced at their original relative rates when the operation of the contact on the film will again cause the paper to commence to move at a moment corresponding with its original starting point, the shot hole then being opened to disclose the result of the shot as in the original shooting.

When it is desired to operate the paper automatically with the kinematograph, without the use of the stop gear or lagging device, for the purpose of repeating the paper on the screen to see the result of the shot holes for use such as in squad firing, this can be done with a slight addition to the kinematograph apparatus, and the employment of switches, in some of the hereinafter described circuits, which will be hereinafter explained.

The switch 111 is shown open on the drawing, but when it is desired to work automatically this is closed, switch 112 is moved onto contact 113, switch 113 is put onto contact 113, switch 114 is opened also switch 115 thereby cutting out the stopping gear and lagging device.

On the driving or other shaft 115 of the kinematograph is secured a pinion 116 meshing with another gear wheel 117, on the side of this wheel is arranged eight studs 118, 118', set in staggered relation, this wheel and studs being so arranged that for each picture which passes through the machine one of the studs 118 will engage either one of the spring contacts 119 or 120, and thereby alternately energize the solenoids 82, 92, in manner hereinafter explained.

At the beginning of the film the contact 15 is arranged to make contact with the brush contact a to momentarily energize the magnets 122 of relay F and also magnets 123 in the following manner: Current passes from the battery 17 along wires 18, 19, 20, 87, energizing magnetic coils 121, 122, and attracting the armature 123, and 86 respectively. The armature 123 and 86 are similar to those described with reference to relays A, B, C, D and E. On the contact 15 passing the brush contact a the magnets 121 and 122 are de-energized but the magnets 121 being wound to release the armature 123 quicker than the magnets 122, release the armature 86. By this means the following circuits for energizing solenoids 82 and 92 are completed in the following manner: On one of the studs 118 engaging the spring contact 119 current from the battery 17 passes along wires 18, 19, 20, 87, armature 86 of relay F, spring contacts 85, 84, wire 83, solenoid 82, wire 81, contacts 80, 56, 73, switch 111, wire 124, contact 119, stud 118, which is earthed to the machine, wire 81 to battery 17 thereby actuating movable armature 88 and allowing the store roll 101 to move in manner heretofore explained. When the wheel 117 rotates farther and stud 118 engages spring contact 120 solenoids 99 are energized as follows:—Current passes from battery 17 wires 18, 19, 20, 87, relay armature 86, contacts 85, 84, wire 83, solenoids 92, wires 93, 125, switch 78, wire 126, switch 113, contact 113, wire 127, spring contact 120, stud 118 which is earthed to 120.
the machine, wire 61, to battery 17 thereby actuating solenoid 92 in manner heretofore explained. In Fig. 1 the solenoid, or electromagnet 92 is illustrated on a smaller scale than the solenoid 82, but it is intended that it shall be of the same size as fully illustrated at Fig. 5.

It is obvious that as contacts 118, 119 pass contacts 119, and 120, solenoids 82 and 92 will be alternately energized and deenergized thereby allowing the store roll 101 to move through the clockwork escapement as heretofore explained.

Before the kinematograph is started for the automatic working of the screen the screen is marked so that when the firing has finished the screen can be returned to this predetermined point and the kinematograph started slowly from the beginning so that the result of each shot can be easily seen. The rotation of the drum 101 to bring the screen back to the predetermined point is done in the following manner:—The switch 127 is closed thereby closing a circuit for energizing the magnetic clutch 128. The clutch 128 is provided with a circular contact 129 which is connected to one end of the coils in the clutch and also connected to the wire 156 through the wire contact 129.

On the closing of the switch 127 the coils of the clutch are energized and the part 130 is drawn against the influence of the spring 131, against the frame 132. The clutch part 130 is slidable keyed to the shaft 98 and is thereby drawn along disengaging the teeth 133 from teeth 134, allows the rotation of the shaft 98, gear wheels 99, 100, and store roll 101 for moving the paper backward. A handle or the like 135 can be attached to the shaft 98 for rotating same. When the switch 127 is opened the coils of the magnetic clutch are deenergized and the part 130 returns to its normal position as shown in the drawing under the influence of the spring 131. The circuit for operating the clutch is as follows:—battery 17, wires 18, switch 127, wire 180, wires 156, wire contacts 129, circular contact 129 to the coils which are earthed to the frame, wires 137, 27, battery 17.

When the screen is being worked automatically with the kinematograph it is necessary at the end of each film to return the armature 86 to its normal position thereby breaking the contacts 85, 84, so that when a fresh film is started the paper of the screen will not be operated until the contact 15 has engaged the brush contact a and completed the herebefore described circuit for energizing the magnets 121, and 122. On these magnets being energized the contacts 84 and 83 are closed and the circuit completed for operating the solenoids 82, 92. To release the armature 86 and break the contacts 85, 84 the switch 150 is closed which energizes the magnets 121, and draws in the armature 123, releasing the armature 86. The switch 150 is then opened and the apparatus is restored to its normal position.

The circuit for operating the magnets 121 is as follows:—battery 17, wires 18, 19, 20, 87, magnets 121, wire 151, switch 150, wire 152, film roll 26, wire 27, to the other side of the battery 17.

In order to effect spectacular effects in connection with suitable pictures the film at suitable positions may be provided with metal contact pieces which are arranged to complete electrical circuits and operate suitable mechanism for controlling devices for simulating the bursting of a shell, firing of musketry or the like.

We do not wish to limit our invention to the arrangement shown and described, as we are aware various alterations may be made without departing from the spirit of our invention.

What we claim then is:

1. In a target apparatus for use with kinematographs, the combination of a picture projecting device; means for arresting the motion of the picture projecting device; means for regulating the moment of stoppage of the picture projecting device after the shot has been fired to correspond with the supposed distance of the object which is being fired at.

2. In a target apparatus for use with kinematographs, the combination of a picture projecting device; a target screen onto which the picture is projected; means responsive to sound waves whereby the movement of the picture projecting device is arrested when a shot is fired; means for regulating the moment of stoppage of the picture projecting device after the shot has been fired to correspond with the supposed distance of the object which is being fired at.

3. In a target apparatus for use with kinematographs, the combination of a picture projecting device; a target screen onto which the picture is projected; means responsive to sound waves whereby the movement of the picture projecting device is arrested when a shot is fired; means arranged at particular points on the film of the picture projecting device arranged to regulate the moment of stoppage of the picture projecting device.

4. In a target apparatus for use with kinematographs, the combination of a picture projecting device; a target screen onto which the picture is projected; means for arresting the movement of the picture projecting device when a shot is fired; a series of contact makers at suitable positions on the film according to the supposed distance at which the particular picture is away from the marksman; a series of relay devices adapted to be energized when said contact
makers operate, so arranged that the moment of stoppage of the picture projecting device is delayed for an amount of time corresponding with the particular contact maker and relay which is operated.

5. In a target apparatus for use with kinemotgraphs, the combination of a picture projecting device; a target screen onto which the picture is projected; means responsive to sound waves whereby the movement of the picture projecting device is arrested when a shot is fired; a series of relay devices adapted to be energized when said contact makers operate, so arranged that the moment of stoppage of the picture projecting device is delayed for an amount of time corresponding with the particular contact maker and relay which is operated.

6. In a target apparatus for use with kinemotgraphs, the combination of a kinemotograph picture projecting device; a screen embodying two relatively movable component members enabling perforations therein to be obliterated; a film carried by the kinemotograph picture projecting device; means for advancing the film and screen in synchronism with each other; means for restoring the screen and film to their initial starting position; and means for slowly reprojecting the picture and advancing the screen in synchronism therewith to enable the result of a series of shots to be ascertained.

In testimony whereof, we have signed our names to this specification in the presence of two subscribing witnesses.

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DOUGLAS HAYNES CORBIN.

Witnesses:
HAROLD J. C. FORRESTER,
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