E. KEEN.

SHOOTING GALLERY.

APPLICATION FILED APR. 16, 1912.

1,207,411.

Patented Dec. 5, 1916.

3 SHEETS—SHEET 1.

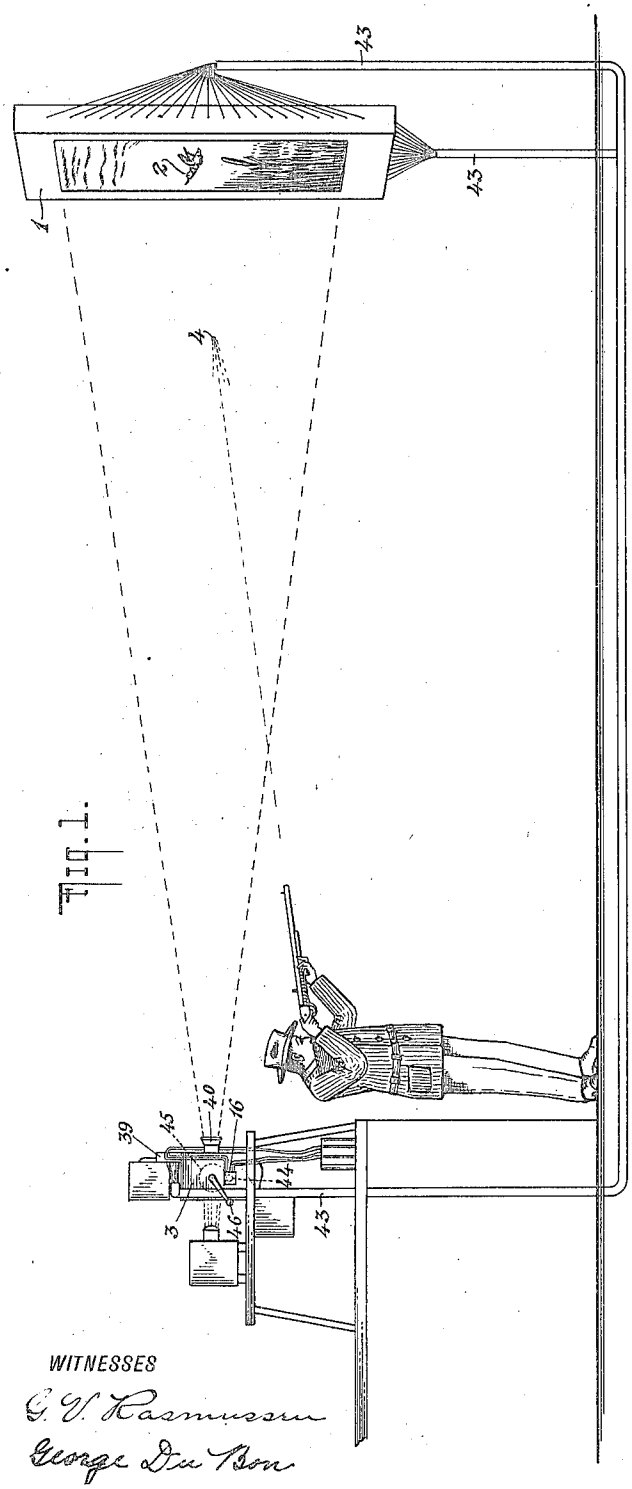


Fig. 1.

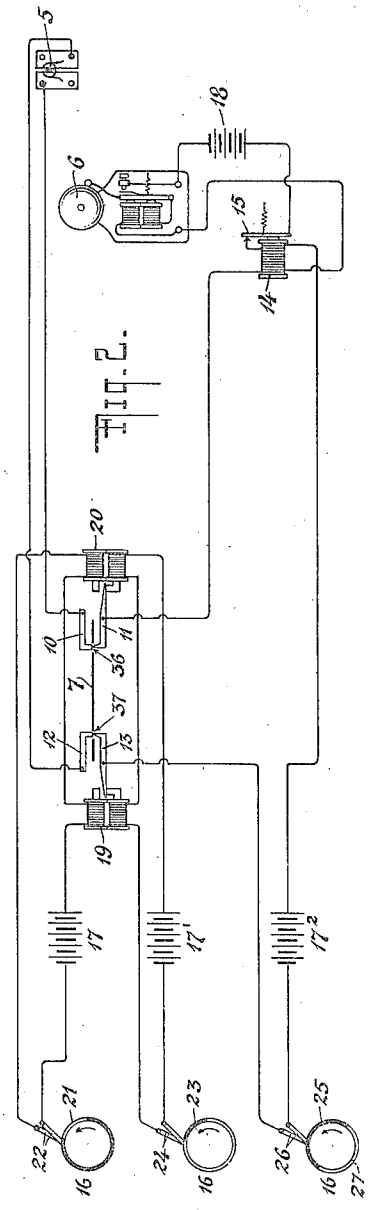


Fig. 2.

WITNESSES

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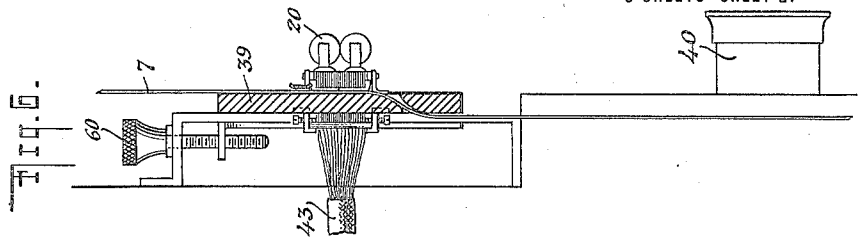


Fig. 6.

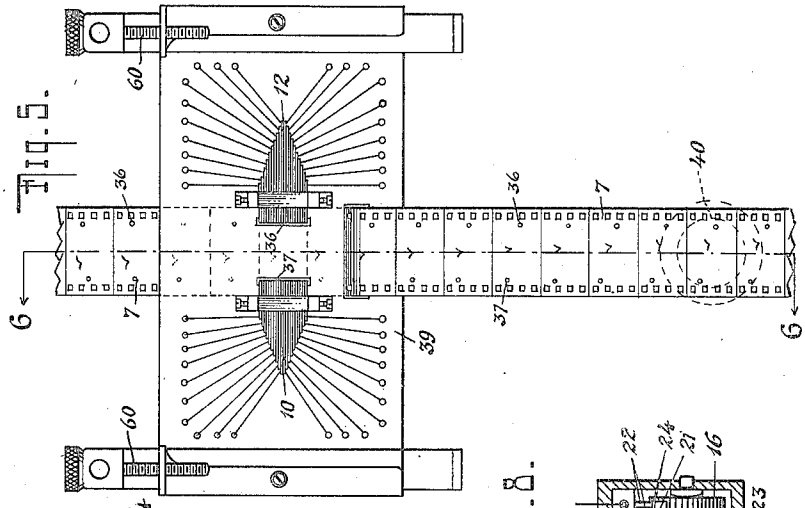


Fig. 5.

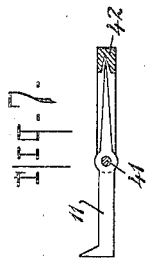


Fig. 7.

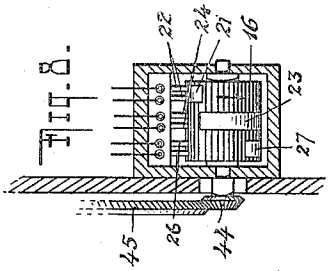


Fig. 8.

Fig. 4.

Fig. 3.

WITNESSES

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3 SHEETS—SHEET 3.

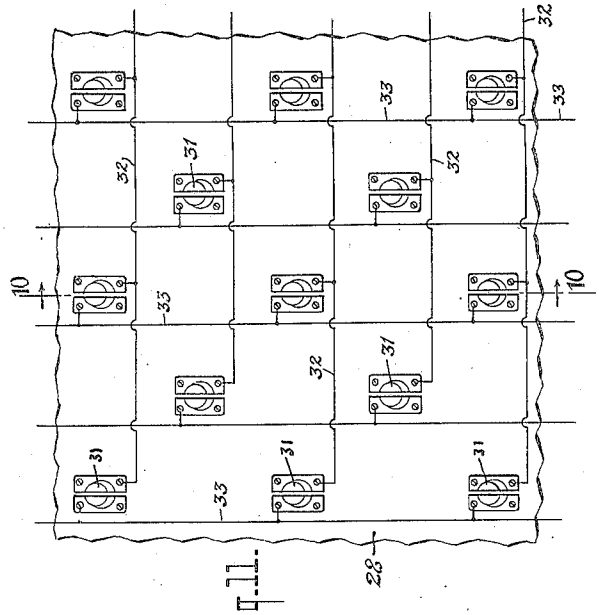


Fig. 11.

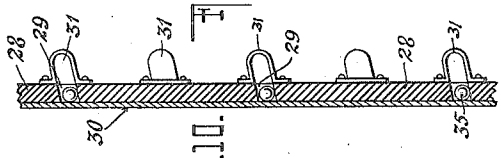


Fig. 10.

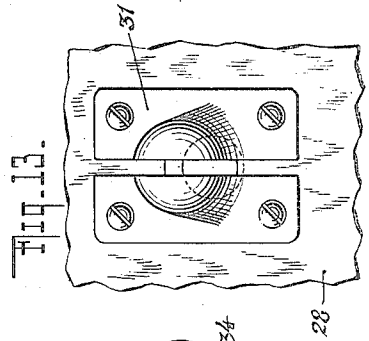


Fig. 13.

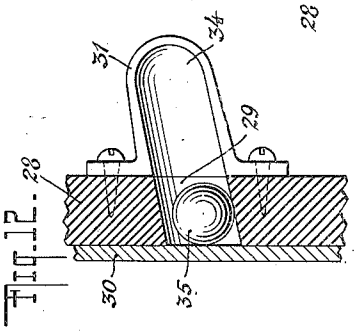


Fig. 12.

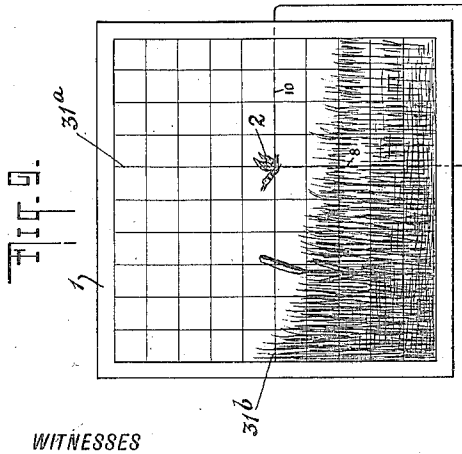
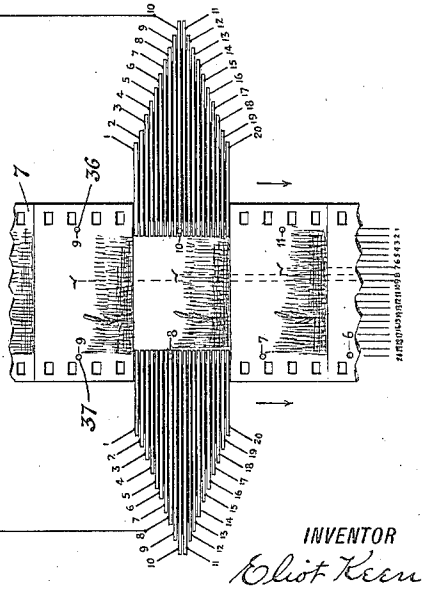


Fig. 9.



WITNESSES

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ELIOT KEEN, OF NEW YORK, N. Y.

SHOOTING-GALLERY.

1,207,411. Specification of Letters Patent. Patented Dec. 5, 1916.

Application filed April 16, 1912. Serial No. 691,096.

To all whom it may concern:

Be it known that I, ELIOT KEEN, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Shooting-Galleries, of which the following is a specification.

The object of this invention is to utilize as a target a moving picture, preferably one in which some animate object apparently moves through the scene.

My invention thus contemplates a projecting machine which, so far as its capacity as a moving picture producing machine is concerned is a machine of the usual and well known character not requiring special description. A film of the usual kind passes back of the lens of this machine and causes the appearance upon the target of a series of successive images creating generally the effect of an actually moving body. The problem to which I have devoted myself in connection with such a device relates more particularly to a suitable method of informing the person who is shooting at this target whether or not he has hit the moving object at which he was shooting, that is whether the bullet struck the target at approximately the place occupied by the image of the moving object at the time when the target was struck.

The mechanism illustrated in the accompanying drawings has been devised as typical of one of the effective forms of carrying out my invention.

In these drawings, Figure 1 is a general view of the entire device; Fig. 2 illustrates the electric circuits; Fig. 3 is a front view of the film, showing half of the contact devices in position. Fig. 4 is a section thereof through lines 4—4 of Fig. 3; Fig. 5 is a rear view of the film showing the rear contact devices in position; Fig. 6 is a vertical section on lines 6—6 of Fig. 5; Fig. 7 is a detail showing one of the fingers 11 and a section of the armature; Fig. 8 illustrates the commutator; Fig. 9 is a diagrammatic view showing the relation between the position of the moving object on the target and the perforations on the film; Fig. 10 is a sectional view through a portion of the target taken on line 10—10 of Fig. 11 and Fig. 11 is a rear view of a portion of the target; Fig. 12 is an enlarged section of one of the ball contacts and Fig. 13 is a rear view thereof.

The general scheme of the invention is shown in Figs. 1 and 2, in which the target 1 acts as the screen for the moving picture in which 2 represents the moving object. The projecting machine is shown at 3. If the bullet 4 strikes the target 1 at some point other than the space represented by the object 2, it is a miss and nothing will happen; if the bullet 4 strikes the image 2 wherever it may be on the target, an electrical connection will be brought into operation, preferably by the mechanical dislodgment of a small ball traveling in a socket to be hereinafter described in detail, but shown diagrammatically at 5 on Fig. 2, and this will result in a completion of an electric circuit and cause the ringing of a bell 6, or the operation of any other suitable indicating device. Obviously the bell, which is merely an audible signal, may be replaced or supplemented by a visible or even a recording signal, so that it may be readily determined how many of a certain number of shots were hits and how many were misses. It is, of course, also apparent that the device 5, instead of closing a circuit, may, with suitable arrangements, be made to break a continuous circuit, such modifications being within the scope of this invention.

The strip of film, a substantial portion of which is illustrated as 7 in Fig. 3, and which is also shown in Fig. 2, is shown as provided with two perforations 36 and 37 for each picture. These perforations, as will be explained later, serve to identify the position of the object 2 upon the screen 1. When the appropriate fingers, as they may be called, 10, 11 and 12, 13 are in contact with each other (this being clearly shown in Fig. 2) a current connection will be established through them with the magnet 14 on the one hand and the ball and slot device 5 on the other. If at this moment, the ball and slot device 5 completes the circuit by the bullet 4 striking the target at the image 2 the magnet 14 will close the switch 15 and complete the bell circuit, causing it to ring. The commutator 16 and the batteries 17 are shown to enter into the circuit system as illustrated in Fig. 2. The bell circuit is shown as an independent circuit having its own battery 18, because the ball and socket device 5 will close the cir-

cuit only for a minute fraction of time, whereas the indicator, if a bell, should have a more powerful and longer impetus than would be supplied through a directly operative circuit. The magnets 19 and 20, according as which one of each pair is energized through the commutator 16 either make or break the contact between the fingers 10, 11 and 12, 13 respectively, the object of this arrangement being to permit contact between the fingers 10 and 11 and 12 and 13 to be made only during that interval when each individual picture on the film is at rest behind the lens of the projecting machine. In this way, the formation of sparks and the possible ignition or explosion of the film is prevented or avoided. As each unit of the film is moved into place behind the lens of the projecting machine and until the beginning of movement to bring the next picture of the film into position, the commutator 16 revolves once. During the first part of this motion, the unshaded portion 21 of the commutator 16 with the brushes 22 in contact therewith energizes the first battery circuit and with it, the upper magnets 19 and 20 shown in Fig. 2, thereby disconnecting the fingers 10, 11 and 12, 13. During this part of the operation, the shaded or insulated part 23 of the commutator 16 prevents the lower magnets of the sets 19 and 20 from becoming active, but as soon as the film has become stationary, the brushes 22 will cause the circuit controlled by the battery 17 to become inoperative, while the brushes 24 now energize the circuit controlled by batteries 17′. This will energize the lower of the sets of magnets 19 and 20 to compel a contact between the fingers 10, 11 and 12, 13. Up to this point the battery 17^2 has been out of circuit because of the insulation 25 of the commutator 16 which prevents the brushes 26 from bringing said battery into the circuit. It is only after the fingers 10, 11 and 12, 13 have been in contact for a short period of time that the non-insulated part 27 of the commutator permits the battery 17^2 to become active, and the insulated part 25 again throws the battery 17^2 out of operation before the fingers 10, 11 and 12, 13 are disassociated. Consequently, no current passes through these fingers either during the time that they are making or breaking contact. Current only goes through them after they have made contact and ceases to flow through them shortly before they break contact. In this way, all possibility of sparks is avoided. This, generally speaking, is an outline of the operation of my novel device. There are, however, numerous details which must be considered in connection with a structure of this nature and I will briefly describe such as seem to require special mention.

The target.—The construction of the target 1 is shown in detail in Figs. 10 to 13. It is shown as composed of a board of wood 28 perforated at numerous places with the slightly inclined apertures 29. The entire front of the target is a continuous thin sheet of metal 30. This metal front plate is coated from time to time with a white pigment to act as the screen upon which appear the moving pictures and also to act as a stop for the bullets. Naturally after a certain number of bullets have struck the target it will become spotted and a new coat of paint or whitewash may readily be applied. Back of each of the apertures 29 is the split casing 31, each half of which is electrically connected with the main circuit by means of the wires 32, 33. These wires as shown connect a series of the split metal casings. The two halves of the casing are thus normally out of electrical contact. Taken together they form a pocket 34 adapted to receive the ball 35. The ball 35 is of such size that it normally rests within the aperture of the wooden board 28 and against the rear of the metal plate 30. As a bullet strikes the metal plate in front of one of these balls or within a short distance therefrom, the impact will send the ball up the inclined surface of the cup-like projection 34 of the split metal casings. As soon as the metal ball rides up this incline it will produce electric contact between the two halves of the casing thus completing a part of the electric circuit and enabling the bell to ring providing the proper one of the balls has been set in operation. For practical purposes it has been found advantageous to multiply the number of these metal casings so that an impact of the bullet against the metal plate of the target will actuate a plurality of the small balls 35 in the immediate neighborhood of the place where the bullet strikes.

By arrangements to be subsequently described, the current circuit is so arranged that as each picture appears on the screen, only one of the entire sets of split casings is in the circuit at any one time so that if the bullet hits the target at any other spot than the one actuating the electrically selected split casing no circuit will be entirely completed and the bell or signaling device will not ring. Thus if the bullet 4 in the Fig. 1 strikes the target at any spot except the moving object 2, the small balls 35 which do roll up their inclined split casings will have no effect electrically because only one of the balls located immediately behind the object 2 is capable of completing an electric circuit.

The electric selection of a particular split casing for every variation in every picture composing the film is naturally a very important part of this invention, and is produced as follows: For the purpose of giving

a clear understanding of the principles underlying this phase of the invention reference is made to Fig. 9 of the drawing. In this figure 7 represents the film composed of a consecutive series of pictures, the moving object thereon being represented as a bird. The film according to the location thereon of the bird is perforated on the two sides thereof as shown at 36 and 37. It is obvious that instead of perforations any other equivalent irregularity of film may be employed, the object of these perforations or irregularities being to produce an electrically selective identification point upon the screen; or a tape or film running synchronously with the projecting film may have the perforations instead of the projecting film itself. As illustrated, the apertures or perforations 36 are intended to show how far the picture of the bird will appear from the edge of the screen while the apertures 37 at the left of the film show the height of the bird from the bottom of the screen. A series of fingers 11 and 13 lie over the edge of the film in the path of the apertures 36 and 37. When the proper picture comes to rest behind the lens, the appropriate finger 11—13 passes through the appropriate aperture 36—37 and the electrical contacts are made in accordance with the scheme described with respect to Fig. 2. In the particular instance shown in Fig. 9, the tenth finger of the right hand set 11 has penetrated the film 7 and being electrically connected with the sockets 31 on the imaginary line 31^a diagrammatically represented in the upper part of Fig. 9, locates the position of the bird on the screen with respect to its distance from one edge thereof. This, however, only half completes the circuit. The eighth finger of the set 13 at the left of the film is passed through the aperture 37 and that eighth finger being connected with the split casings along the line 31^b locates the distance of the bird from the bottom of the screen. Consequently the circuit can only be completed by actuating that one of the balls 35 and the casings 31 which is located immediately behind the bird 2. As the film shifts so that the bird appears in a different position, the apertures shift so that no matter where the bird appears on the film there will be a correspondingly electrical identification of its position upon the screen. In other words, there is provided an electrically selective system for identifying the position of an image which in itself cannot be used as a part of the electric identification. The position of the apertures 36 and 37 on the film itself must of course be accurately determined in the preparation of the film. As a matter of general practice the apertures 36 and 37 adjacent to that portion of the film shown in Fig. 9 immediately below the fingers 11 and 13 are not applicable to that portion of the film but to the picture in the rear of the lens which is some distance away as shown in Fig. 3. This is due to the fact that the finger mechanism is preferably not located in the immediate vicinity of the lens but some distance away, and as it is the position of the bird on the portion of the film that is being illuminated which is to be identified the identification perforations applicable to the illuminated picture are placed adjacent one of the unilluminated pictures.

As thus described if we imagine the bird to appear upon the screen as shown in the upper part of Fig. 9, a bullet striking anywhere on the target although actuating the little balls 35 will not complete the circuit even though it strikes the lines 31^a or 31^b unless it strikes the target at a point where these two lines cross, and that point is the one occupied by the image of the bird on the screen.

The arrangement and operation of the finger mechanism.—This is shown in Figs. 3 to 6. During a part of is travel through the moving picture projecting machine the film is guided over a plate 39, which carries the sets of fingers 11 and 13. For each individual one of these fingers 11 and 13 there is a stationary finger 10 and 12 adapted to make electric contact therewith. The stationary fingers are preferably insulated from each other by a sheet of mica or the like. The movable fingers need not be. The movable fingers are pivoted at 41 and each set is supported by the bracket 42. The end of each movable finger is inserted in the V-shaped notch of the bracket 42 as shown in Fig. 7. The bracket as a whole is the part immediately actuated by the operation of the magnets 19 and 20. As soon as the film has become stationary behind the lens 40, as already described, the proper magnet will attract the pivoted bracket 42 and force the points of the fingers down upon the film. That finger which lies over the perforations 36—37 will pass through it, the remaining fingers simply resting upon the film. The slight spring action necessary for this purpose is furnished by adopting the construction shown in Fig. 7. In Fig. 3 we look down upon the top of the moving fingers and in Fig. 6 we look toward the stationary fingers. In Fig. 6 the stationary fingers are shown to be arranged in a staggered condition, the object of which is to permit the proper connection with each finger and the electric wires necessary to carry the current from them to the target. These wires run from the rear of the plate 39 through the cable 43 and thence to the target where they are appropriately connected with their respective split casings 31.

The commutator.—The commutator is shown in Fig. 8. Its operation has already been described. Its pinion 44 meshes with

pinion 45 which may either be the direct or some intermediate pinion between the commutator pinion and the pinion operated by the crank 46 of the moving picture machine.

Throughout this specification reference has been made to the picture as that of a bird, but it is manifest that any other moving object can be employed. The devices necessary for the commercial use of this invention do not occupy any unusual amount of room and are readily adapted to be incorporated in any existing shooting gallery. This invention represents, I believe, the first commercially successful effort to construct a shooting gallery employing as a mark a projected moving shadow or moving picture, and accordingly I desire to have the claims for my invention construed broadly with respect to equivalents.

The position of the plate 39 is shown as controlled by the adjusting screw 60. This makes possible an adjustment of the distance between the individual pictures which are being projected through the lens and the place where the fingers are actuated through the apertures 36, 37, thus allowing for compensation due to stretching of the film or extension or contraction thereof for any cause. The plate 39 can also be readily made the subject of repairs by reason of the manner in which it is mounted in the machine.

Having described my invention, what I claim is:

1. In combination a moving picture apparatus comprising a projecting machine, a film and a target screen, and means operatively connected with said film to identify the position of the image of the moving object of the projected picture upon said target screen.

2. In combination a moving picture apparatus comprising a projecting machine, a film and a screen, means operatively connected with said film to identify the position of the image of the moving object of the projected picture upon the screen, and signaling means to indicate when said position of the image upon the screen is struck from an outside source.

3. In combination a moving picture device comprising a projecting machine, a film and a target screen, and means to identify the position of a moving object of the film upon the target screen, said means comprising irregularly disposed elements operatively associated with the film so as to move therewith, and fixed elements disposed to coact with said irregularly disposed elements.

4. In combination a moving picture device comprising a projecting machine, a film and a target screen, and means comprising irregularly spaced perforations through the film to identify the position of the image of the moving object of the projected picture upon the target screen.

5. In combination a moving picture device comprising a projecting machine, a film and a target screen, and means to identify the position of the moving object of the film upon the screen, said means comprising irregularities in the film, and electrical devices adapted to coact with said irregularities so as to be operatively controlled thereby.

6. In combination a moving picture device comprising a projecting machine, a film and a screen, and means to identify the position of a moving object of the film upon the screen, said means comprising irregularities in the film, and electrical devices consisting of fingers so arranged that only such as correspond to the irregularities will be brought into electric contact.

7. In combination, a moving picture device comprising a projecting machine, a film, a target screen and means to identify the position of the image of the moving object of the projected picture upon the target screen, said means comprising irregularities positioned in the film in correspondence with the object and electrical devices having a plurality of fingers arranged to coact with said irregularities so as to close electrical circuits the exact position of the irregularities determining the fingers which coact and the circuits affecting the part of the target screen upon which the image falls.

8. In combination, a moving picture device comprising a projecting machine, a film, a target screen, and means to identify the position of the image of the moving object of the projected picture upon the target screen, said means comprising predetermined irregularities on the film positioned in correspondence with the object, and electrical devices having sets of opposite fingers arranged to be brought into contact so as to close electrical circuits by the irregularities the exact position of the irregularities determining the fingers which are brought into contact and the circuits affecting the part of the target screen upon which the image falls.

9. In combination a moving picture apparatus comprising a projecting machine, a film and a screen, and means operatively connected with said film to identify the position of the image of the moving object of the projected picture upon the screen, the said screen comprising an impervious face and a backing of wood having a multiplicity of apertures therein, and means in said apertures for producing a multiplicity of electric contacts.

10. In combination a moving picture apparatus comprising a projecting machine, a film and a screen, means operatively connected with said film to identify the position of the image of the moving object of the projected picture upon the screen, the said screen comprising an impervious face

and a backing of wood having a multiplicity of apertures therein, and means in said apertures normally out of all electrical contact, but capable of being displaced and thereby making electric contact.

11. In combination a moving picture apparatus comprising a projecting machine, a film and a screen, means operatively connected with said film to identify the position of the image of the moving object of the projected picture upon the screen, the said screen comprising an impervious face and a backing of wood having a multiplicity of apertures therein, and means in said apertures normally out of all electrical contact, but capable of being displaced and thereby making electric contact, said means consisting of a ball and an eletrically split casing therefor.

12. In combination means for projecting a moving picture comprising a moving picture machine, a film and a screen, and electrically operated means operatively connected with said film for signaling when a predetermined moving image on the screen is struck from an outside source.

13. In combination means for projecting a moving picture comprising a moving picture machine, a film and a screen, and electrically operated means for signaling when a predetermined moving image on the screen is struck from an outside source, said means comprising a series of irregularly disposed apertures operatively associated with the film so as to move therewith, means coacting with said irregularly disposed apertures to complete part of an electric circuit, means operated by an impact against the screen to complete another part of the electric circuit, and means for synchronizing the said two parts of the circuit, and a signaling device brought into operation when said two parts of the circuit are simultaneously in operation.

14. In combination means for projecting a moving picture comprising a moving picture machine, a film and a screen, and electrically operated means for signaling when a predetermined moving image on the screen is struck from an outside source, the said means comprising irregularly disposed apertures operatively associated with the film so as to move therewith, means for making selective electrical contact according to said irregularities, and means for causing current to flow through said contact after the physical contact is completed, and means for preventing current from passing through said contacts just prior to the breaking of the physical contact.

15. In combination a projecting apparatus for moving pictures and a movable film, apertures irregularly located on the edges of said film, stationary electrically insulated fingers located at one side of said film at points corresponding to said apertures, movable fingers similarly placed on the other side of said film and electromagnets for holding the movable fingers out of contact with said film and electromagnets for pressing said movable fingers down upon said film.

16. In combination a projecting apparatus for moving pictures, and a movable film, apertures irregularly located on the edges of said film, stationary electrically insulated fingers located at one side of said film at points corresponding to said apertures, movable fingers similarly placed on the other side of said film, electromagnets for holding the movable fingers out of contact with said film and electromagnets for pressing said movable fingers down upon said film, and means for causing the finger corresponding to a given aperture to pass through said aperture and make contact with one of the stationary fingers, while all the other movable fingers are pressed down upon the film.

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

ELIOT KEEN.

Witnesses:
FRITZ ZIEGLER, Jr.,
JOHN A. KEHLENBECK.