

[54] **BOMBING APPARATUS WHEREIN
VIRTUAL IMAGES OF THE
TRAJECTORY AND LAND APPEAR
AND ARE SHOT AT WHEN ALIGNED**

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[58] Field of Search.....273/101.1, 101.2, 102.2 R,
273/1 E; 35/25

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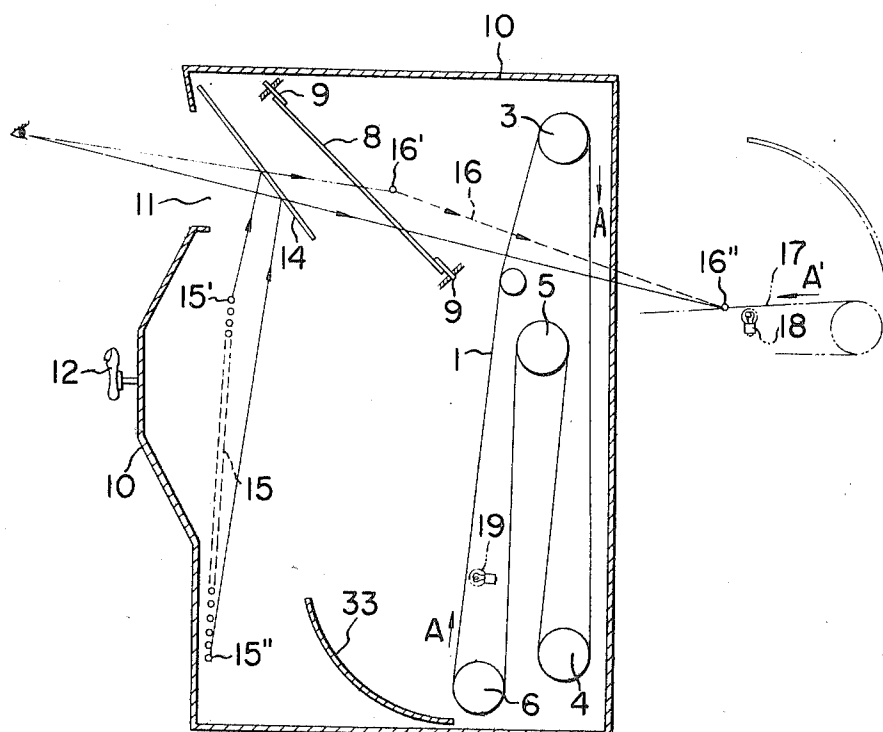
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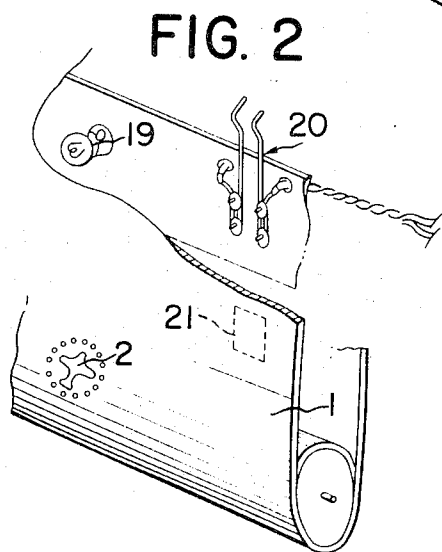
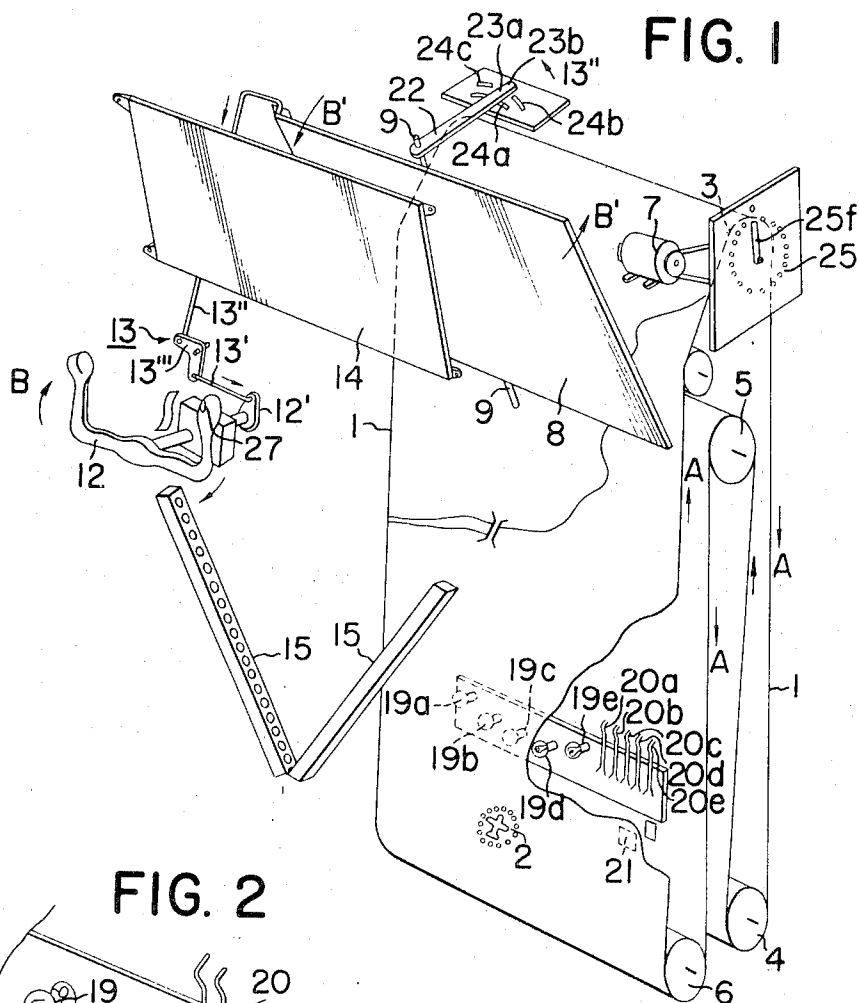
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ABSTRACT

A simulated bombing playing machine including a semitransparent map belt on which is depicted a target and the lay of the land. A first reflector is positioned for displaying a virtual image of the map belt to a player, and this reflector is rotatably adjusted by a player-operated control handle. The map belt is driven in a direction toward the first reflector. A trajectory reflector is disposed on the player's side of the first reflector. A trajectory displaying light source is so located that when a player depresses a trigger button switch, the light source is illuminated and its image is viewed through the trajectory reflector as moving from the player's side to far away. On the back side of the map belt are positioned a plurality of firing light sources so that one of them will flash at the point where the virtual image of the trajectory crosses with the virtual image of the lay of the land. In use, a player attempts to adjust the control handle and rotate the first reflector so that the virtual image, trajectory, as indicated by the trajectory light source, will cross the virtual image of the target. If he is successful, the firing light source will flash more brightly to indicate a bombing hit.

4 Claims, 6 Drawing Figures

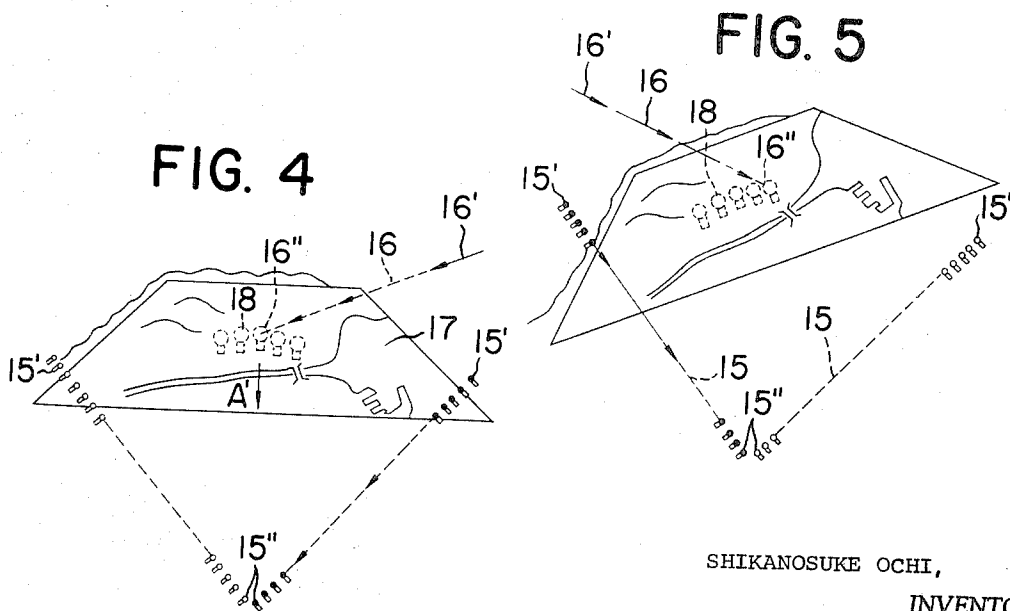
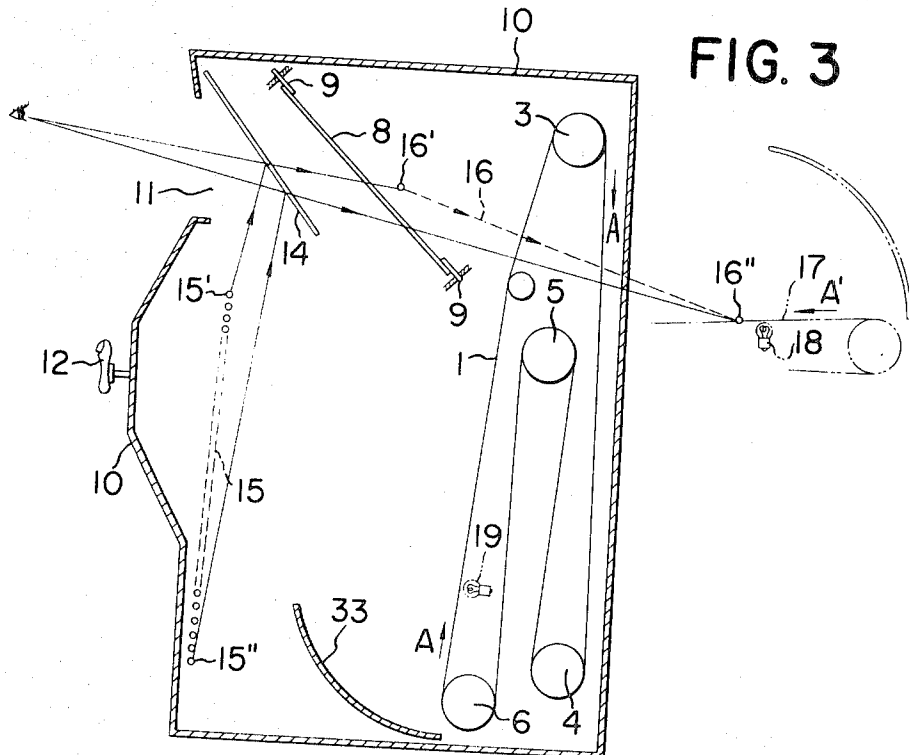




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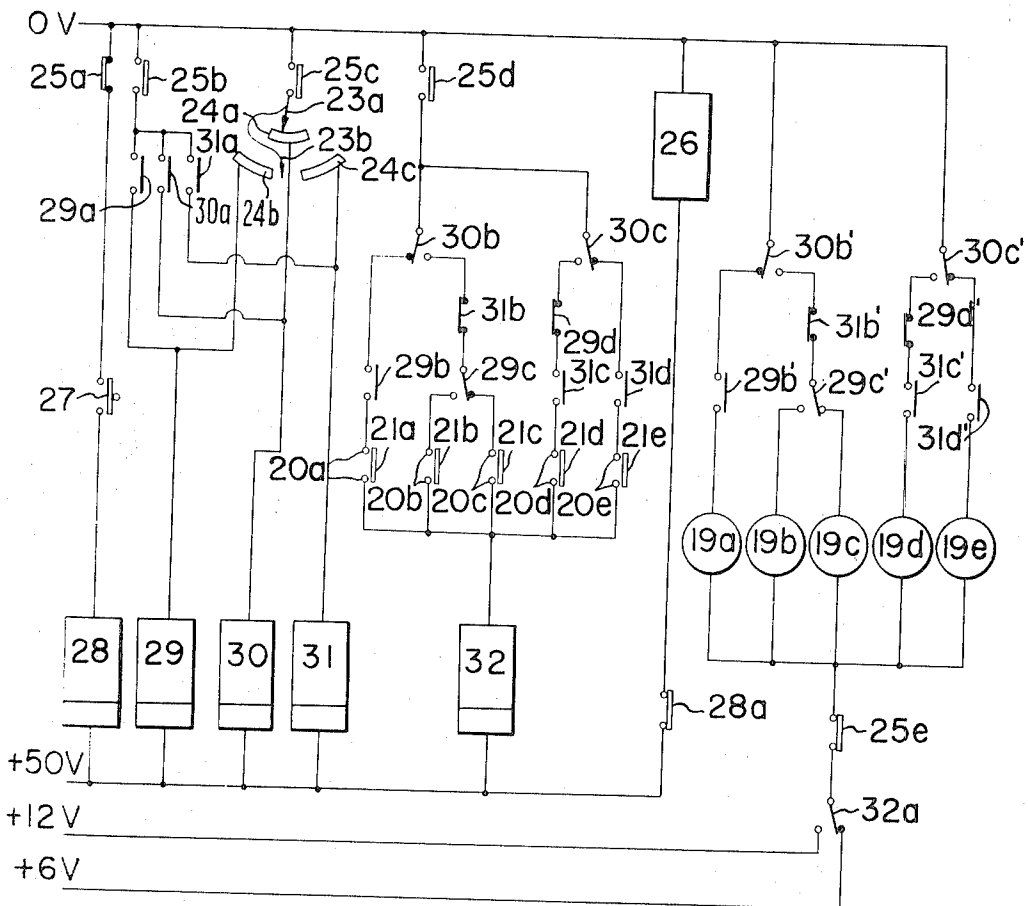


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FIG. 6



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BOMBING APPARATUS WHEREIN VIRTUAL IMAGES OF THE TRAJECTORY AND LAND APPEAR AND ARE SHOT AT WHEN ALIGNED

The present invention relates in general to a playing machine, and more particularly to a simulated bombing playing machine.

One object of the present invention is to provide an improved playing machine which is realistic and affords a player a feeling of attendance.

Another object of the present invention is to provide an improved playing machine which is rich in variety of play and gives much interest in the play.

In order to achieve the above-mentioned objects, the present invention provides a simulated bombing playing machine comprising a semitransparent map belt having the lay of the land depicted thereon, a reflector for displaying a virtual image of said map belt so as to be seen from a player, a driving mechanism for moving said map belt in the direction of approaching to said reflector, a control handle or a control stick, and control means responsive to a motion of said control handle or stick for rotating said reflector; characterized in that said machine further comprises a trigger button switch, a trajectory reflector disposed on the player's side of said first reflector, a trajectory displaying light source located at such position that upon closing said trigger button switch the player may look at its virtual image via said trajectory reflector as moving from the player's side to far away, a plurality of firing light sources positioned on the back side of said map belt so that one of them may fire to flash at a point where said virtual image of the trajectory crosses with said virtual image of the lay of the land, a target depicted on said map belt, and hit detector means for detecting whether or not said virtual image of the trajectory has crossed with the virtual image of said target.

Since the playing machine according to the present invention comprises, as described above, a semitransparent map belt having the lay of the land depicted thereon, a reflector for displaying a virtual image of said map belt so as to be seen from a player, a driving mechanism for moving said map belt in the direction of approaching to said reflector, a control handle or a control stick, and control means responsive to a motion of said control handle or stick for rotating said reflector; when said driving mechanism is started to move said map belt with said control handle or control stick maintained at a neutral position to keep the declination of said reflector at zero so that the cross line between said reflector and said map belt may be aligned in the direction of width of said map belt, the virtual image of the lay of the land on the map belt displayed by said reflector, approaches from the front to the player just as in the case of actually flying while sitting on the pilot seat, and thus the player feels as if he is flying. If the player operates said control handle or stick, the declination of said virtual image of the lay of the land changes in response to the movement of the control handle or stick, and thus the player feels as if the airplane has changed its direction either rightwardly or leftwardly.

In addition, since said simulated bombing playing machine according to the present invention comprises a trigger button switch, a trajectory reflector disposed in front of said first reflector, a trajectory displaying light source located at such position that upon closing said trigger button switch the player may look at its virtual image via said trajectory as moving from his side to far away, a plurality of firing light sources positioned on the back side of said map belt so that one of them may fire to flash at a point where said virtual image of the trajectory crossed with said virtual image of the lay of the land, a target depicted on said map belt, and hit detector means for detecting whether or not said virtual image of the trajectory has crossed with the virtual image of said target; when the player closes said trigger button switch, said trajectory displaying light source is put on so that its virtual image may move from his side to far away, and thereby the player is given a feeling as if a bomb or a rocket bullet has been projected towards the target. Furthermore, if the airplane is ex-

actly directed towards the target depicted on said map belt and if the timing for closing said trigger button switch is appropriate, after said virtual image of the trajectory has moved towards the virtual image of the target, it crosses with said virtual image of the target, resulting in flashing of said firing light source, and simultaneously said hit detector means is operated and thereby the hit to the target can be detected.

As described, according to the present invention, by means of a very simple structure, it is enabled to give the player a feeling exactly similar to that obtained upon actual bombing.

Other objects and advantages of the present invention will become apparent from the following description with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of an essential part of one preferred embodiment of the simulated bombing playing machine according to the present invention,

FIG. 2 is an enlarged view of a part of FIG. 1,

FIG. 3 is a side view of the embodiment in FIG. 1,

FIGS. 4 and 5 are diagrammatic views respectively showing different states of bombing in said playing machine, FIG. 4 showing the state wherein the airplane is flying straight forwards, while FIG. 5 showing the state wherein the airplane has changed its direction of flight, and

FIG. 6 is an electric circuit diagram for said playing machine.

Now explaining the present invention in connection to the illustrated embodiment, reference numeral 1 designates a map belt made of semitransparent plastic material such as, for example, foamed polystyrene and formed in an endless shape, and on said map belt 1 are depicted a target 2 as well as houses, sea, mountains, etc., as illustrated in FIG. 1.

Said endless map belt 1 is passed successively around an upper driving roll 3, a lower supporting roll 4, a tensioning roll 5 and lower supporting roll 6, and it is adapted to be driven in the direction A by means of a driving motor 7 coupled to said driving roll 3.

In addition, substantially at the same level as said driving roll 3, is disposed a flat reflector 8 with an inclination angle of about 45° with respect to a vertical axis having its upper edge located on the near side and its lower edge on the far side, and said reflector 8 is pivotably supported by means of a shaft 9 provided at the center in the direction of width along the upper and lower edges, so as to be readily rocked as will be described later.

Said map belt 1, rolls 3, 4, 5, 6, motor 7, reflector 8, and other components are disposed within a housing 10 as illustrated in FIG. 3, said housing 10 being provided with a window 11 opposite to said reflector 8 substantially at the same level as the latter, and also a control handle 12 is rotatably supported on the housing beneath said window 11.

As will be apparent from FIG. 1, the left upper corner of said reflector 8 and an arm 12' at the extremity of said control handle 12 are interconnected by connecting means 13 consisting of connecting rods 13', 13'' and a bellcrank 13''', in such manner that if said control handle 12 positioned at its neutral state is turned, for example, in the direction B, then said reflector 8 may be rocked in the direction B'.

Furthermore, on the player's side of said reflector 8 is disposed a trajectory reflector 14 consisting of a conventional glass plate taking a somewhat upstanding attitude relative to said reflector 8 as shown in FIG. 3, and immediately beneath said trajectory reflector 14 are arranged trajectory light source lamps 15 in a V-shape. Among said lamps 15, the top lamp 15' is at first turned on and off, then the next succeeding lower lamp is turned on and off, and so on successively downwards, and finally the bottom lamp 15'' is turned on and off, so that a virtual image 16 of said group of lamp 15 reflected by said trajectory reflector 14 is seen as shown in FIG. 3, and consequently the virtual image 16 of the lamp displaying a rocket bullet seems as if it is traveling towards a virtual image 17 of said map belt 1 displayed by said reflector 8 and reaches said virtual image 17 of the map belt 1 at the position of a virtual image 16'' of said bottom lamp 15''.

Firing display lamps 19, as many as five in this example, are arranged on the back side of said map belt 1 in the direction of the width so that the virtual image 18 of said lamp may be located in the proximity of said virtual 16' of the bottom lamp 15'', and on one side of said lamps 19 are arranged five sets of position detecting switches 20 each consisting of two contactors, along the direction of the width.

In addition, on the back side surface of said map belt 1 is stuck a thin metallic plate 21 such as an aluminum foil at a position in the transverse direction corresponding to the target 2 depicted on said map belt 1, and when said thin metallic plate 21 has passed over said five sets of position detecting switches 20, one pair of said contactors are adapted to be electrically connected by said thin metallic plate 21.

A swing lever 22 is mounted integrally on the shaft 9 of said reflector 8, and on said swing lever 22 are provided contactors 23a, 23b electrically insulated therefrom respectively and at different distances from said shaft 9. Opposite to said contactors 23a, 23b respectively, there are provided arcuated contactors 24a, 24b, 24c respectively having their center of curvature at said shaft 9, and said contactors 23a and 23b are adapted to be selectively connected to the contactor 24a and the contactor 24b or 24c, respectively, in response to the swing angle of the reflector 8 which can be made to swing in either direction by the operation of said control handle 12.

In addition, a rocket cam switch 25 is disposed adjacent to one end of said driving roll 3, and a clutch (not shown) to be freely connected or disconnected by means of a clutch solenoid 26 (shown in the circuit diagram in FIG. 6) is interposed between said driving roll 3 and said rocket cam switch 25. When said clutch becomes connected, a movable contact 25f of said rocket cam switch 25 rotates integrally with said driving roll 3, resulting in successive connection and disconnection of a power source for said trajectory light source lamps 15 beginning from the top lamp 15', and simultaneously, normally opened timing cam switches 25a, 25b, 25c, 25d, 25e contained in a hit detector circuit as will be described hereinafter, become to be closed in a predetermined timing relationship.

Still further, said control handle 12 is provided with a trigger button switch 27.

Explaining now the electric circuit according to the present invention with reference to FIG. 6, reference numeral 28 designates a trigger relay, and in a power supply circuit for said trigger relay 28 are interposed said first rocket timing switch 25a and said trigger button switch 27.

One terminal of each selector relays 29, 30, 31 is connected to said arcuated contactor 24b, 24a or 24c, respectively, while the other terminals of said selector relays 29, 30, 31 are connected to a 50 v. power supply terminal. The contactors 23a, 23b to make selective contact with said arcuated contactors 24a, and 24b or 24c, respectively, are connected to a 0 v. power supply terminal through the third rocket timing cam switch 25c.

In addition, one terminal of the self-holding contacts 29a, 30a or 31a of said selector relay 29, 30 or 31, respectively, is connected to the 0 v. terminal of the power source through the second rocket timing cam switch 25b, while the other terminal of said respective self-holding contacts 29a, 30a, 31a are connected to one terminal of said selector relay 29, 30, 31, respectively.

Still further, reference numeral 32 designates a hit detector relay, and in the power supply circuit for said relay 32 are connected the fourth rocket timing cam switch 25d, relay contacts 29b, 29c, 29d; 30b, 30c; 31b, 31c, 31d of said selector relays 29, 30, 31, respectively, and the position detecting switches 20a, 20b, 20c, 20d, 20e, as illustrated in the figure.

Also in the power supply circuit for said clutch solenoid 26 is interposed a trigger relay constant 28a.

On the other hand, respective relay contacts 29b', 29c', 29d'; 30b', 30c'; 31b', 31c', 31d' of the selector relays 29, 30, 31, respectively, are connected exactly in the same manner as the respective relay contacts 29b, 29c, 29d; 30b, 30c; 31b,

31c, 31d of the selector relays 29, 30, 31, respectively, provided in the power supply circuit for said hit detector relay 32, and in place of said position detecting switches 20a, 20b, 20c, 20d, 20e, are disposed firing display lamps 19a, 19b, 19c, 19d, 19e, while the fifth rocket timing cam switch 25e, one terminal of which is connected to the common junction of the parallel circuits containing said firing display lamps, is connected at the other terminal to one of the terminals of the relay contacts 32a of a hit detector relay 32, and the other terminals to be transferred of said relay contacts 32a are connected to 6 v. and 12 v. power supply terminals, respectively.

Also in FIG. 3, there is provided a sky background screen 33 at the lower position on the player's side of said map belt 1.

Since the illustrated embodiment is constructed in the above-described manner, when a coin is thrown into a slot of a coin sensing device (not shown), a light projector (not shown) is turned on, and said map belt 1 is driven in the direction A as it is illuminated on its player's side, so that the virtual image 17 of said map belt 17 appears to move from a distant place towards the player and he can have a feeling as if the airplane is flying forwardly.

When the target 2 on said map belt 1 has appeared from the distant horizon, if said control handle 12 is turned either leftwards or rightwards corresponding to the transverse location of said target 2, the scene as viewed from the player changes from the state of straightforward flying as illustrated in FIG. 4 to the state shown in FIG. 5 as if the airplane has turned in either direction (FIG. 5 shows the case where the control handle 12 was turned in the direction B).

After the target 2 was aimed, if the trigger button switch 27 is pushed, the scene looks as if a rocket has been projected towards the target from the reasons as will be described later.

In more particular, when said trigger button switch 27 is closed, said trigger relay 28 is operated to close its relay contacts 28a, resulting in excitation of said clutch solenoid 26 to start the operation of the clutch not shown, and consequently said driving roll 3 and said movable contact 25f of the rocket cam switch 25 are coupled together to start the rotation of said movable contact 25f as well as other cams not shown in the drawings. Thereafter even if the excitation of said solenoid 26 is released, said clutch maintains the connected state, and when said movable contact 25f and said cams have made one complete revolution, said said clutch is automatically disconnected, and consequently said movable contact 25f and said cams are stopped.

When said clutch starts its operation, the first rocket timing cam switch 25a is immediately opened to stop the operation of said trigger relay 28, so that even if said trigger button switch 27 is closed again before the bombing is completed, said trigger relay 28 is prevented from starting the operation.

As said movable contact 25f rotates, a power source is selectively connected, by means of a circuit not shown, to one of the lamp arrays of said V-shaped trajectory light source lamps 15, in such manner that the power source may be successively connected and disconnected to the lamps from the top one, so that the top lamp 15' in said trajectory light source lamps 15 turns on and off at first, then the lower lamps turn on and off in succession, and finally the bottom lamp 15'' turns on and off. Accordingly, the virtual image 16 of the lamps moves from the player's side to far away, and thereby causes the player to feel as if actually a rocket bullet is flying.

Furthermore, after said first rocket timing cam switch 25a has opened, the second and third rocket timing cam switches 25b and 25c are closed in a predetermined timing relationship, respectively. In case that said control handle 12 is appropriately operated and directed in a substantially neutral position as illustrated in FIG. 6, then only the second selector relay 30 is operated to close its self-holding relay contacts 30a and thereby held operated, and simultaneously its relay contacts 30b and 30b' are transferred. Said trajectory light source lamps 15 turns on and off successively from up to down, and just before the bottom lamp 15'' turns on and off, said fourth rocket timing cam switch 25d is closed, and simultaneously

therewith, the thin metallic plate 21 provided corresponding to the position of said target 2 makes contact with the switches 20. Accordingly, if said target 2 is located, for instance, at the center, then the third thin metallic plate 21c makes contact with the third position detecting relays 20c to operate the hit detector relay 32, and thus its relay contacts 32a is transferred so that the third firing display lamp 19c may be connected to the 12 v. power source to be lightened at a lighter brightness, which can afford the player a feeling as if the target has been hit. And in accordance therewith, a score adding device (not shown) is operated to add the marks.

On the other hand, if the operation of the control handle 12 with respect to the location of the target 2 is not proper, or if the timing for closing the trigger button switch 27 relative to the target 2 is not proper, then the hit detector relay 32 cannot be operated, so that only the firing display lamp 19 corresponding to the location where the rocket has fired, is connected to the 6 v. power source, and thus said lamp is lightened at a darker brightness than in the case of hitting.

In case that the target 2 is located at the right end as illustrated in FIG. 5, when said control handle 12 is turned in the direction B, said swing lever 22 swings in the direction B' to bring only the contactor 23b in contact with the arcuated contactor 24c, resulting in operation of only the third selector relay 31. If the timing is also proper, the hit detector relay 32 is operated in the same manner as described above, and thus the fifth firing display lamp 19e is lightened brightly.

As described, by means of various combinations of two contactors 23a, 23b and three contactors 24a, 24b, 24c, it is possible to detect and display five sets of locations.

What is claimed is:

1. A simulated bombing playing machine comprising semitransparent map belt having the lay of the land depicted thereon, a reflector for displaying a virtual image of said map belt so as to be seen from a player, a driving mechanism for moving said map belt in the direction of approaching to said reflector, a control handle or a control stick, and control

means responsive to a motion of said control handle or stick for rotating said reflector; characterized in that said machine further comprises a trigger button switch, a trajectory reflector disposed on the player's side of said first reflector, a trajectory displaying light source located at such portion that upon closing said trigger button switch the player may look at its virtual image via said trajectory reflector as moving from the player's side to far away, a plurality of firing light sources positioned on the back side of said map belt so that one of them may fire to flash at a point where said virtual image of the trajectory crosses with said virtual image of the lay of the land, a target depicted on said map belt, and hit detector means for detecting whether or not said virtual image of the trajectory has crossed with the virtual image of said target.

2. A simulated bombing playing machine as claimed in claim 1 further characterized in that said trajectory displaying light sources are arranged in a V-shaped configuration.

3. A simulated bombing playing machine as claimed in claim 1, further characterized in that said machine comprises hit detector means for detecting whether or not said virtual image of the trajectory crosses with the virtual image of said target, firing timing detector means for detecting the timing when said virtual image of the trajectory crosses with the virtual image of said lay of the land, firing point detecting means responsive to the motion of said control handle or control stick for detecting the location where said virtual image of the trajectory crosses with said virtual image of the lay of the land, and target detector means for detecting the location of the target on said map belt.

4. A simulated bombing playing machine as claimed in claim 3, further characterized in that when said hit detector means has detected a hit of bombing by the fact that said virtual image of the trajectory has crossed with said virtual image of said target, the firing flash is lightened more brightly than in the case of not hitting.

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