

June 6, 1939.

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2,161,012

SHOOTING-GALLERY GAME

Filed Jan. 5, 1937

6 Sheets-Sheet 1

Fig. 1.

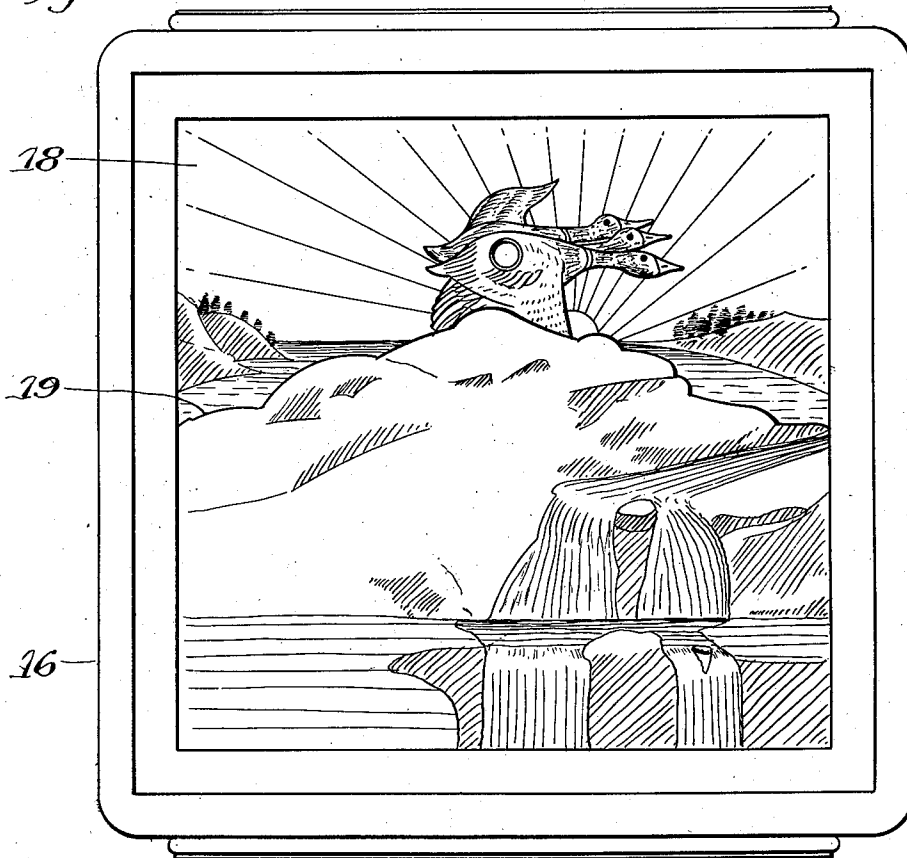


Fig. 10.

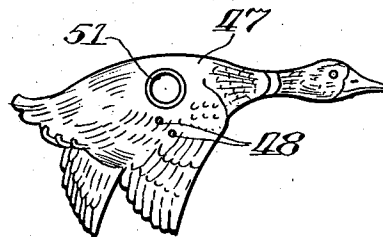


Fig. 9.

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6 Sheets-Sheet 2

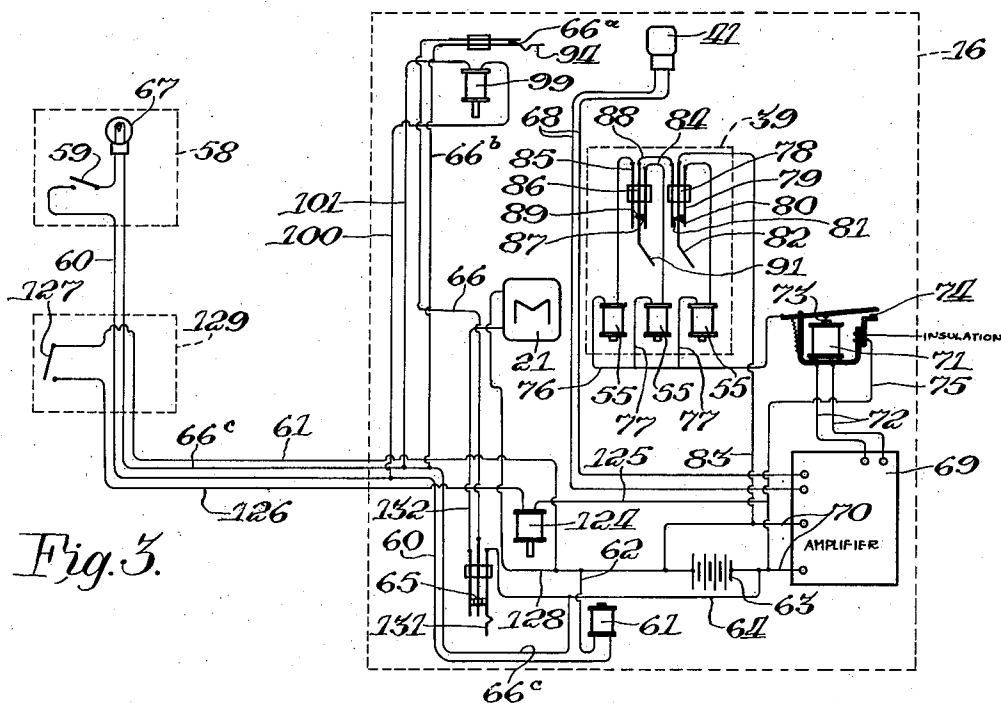


Fig. 3.

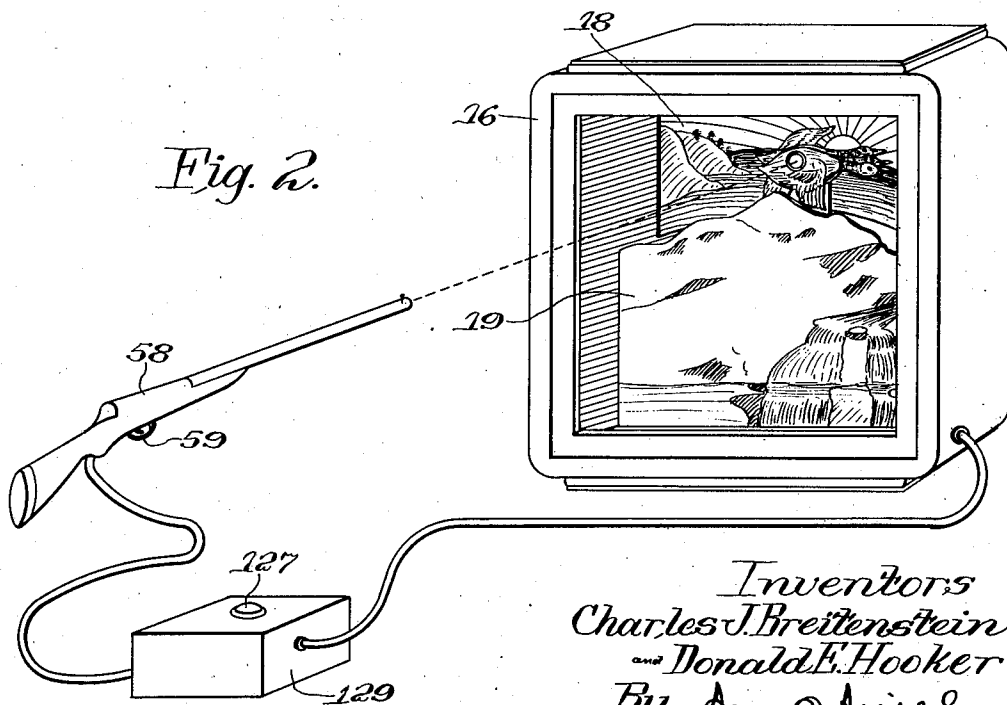


Fig. 2.

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6 Sheets-Sheet 3

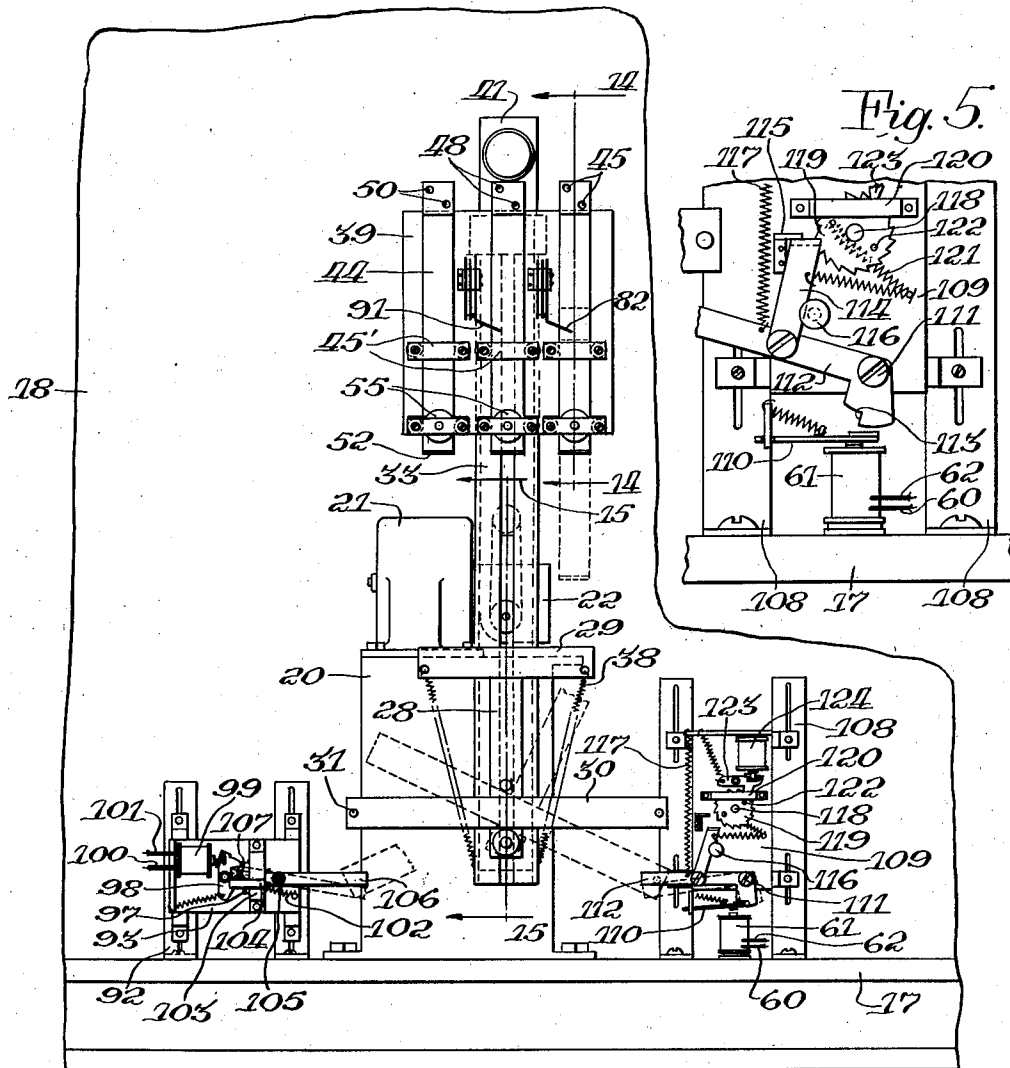
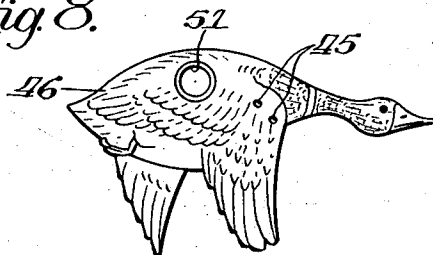


Fig. 5.

Fig. 8.



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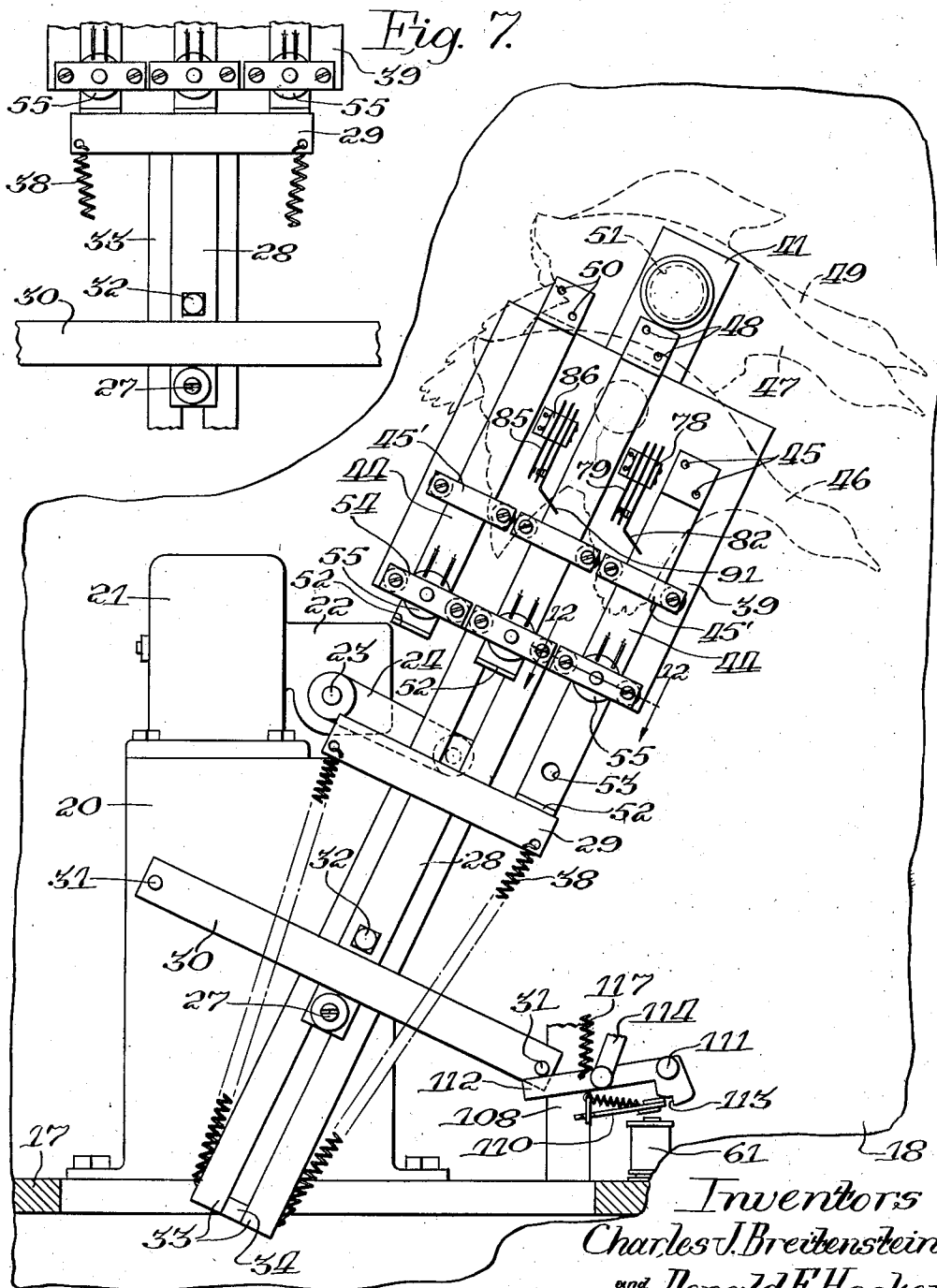
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6 Sheets-Sheet 4



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6 Sheets-Sheet 5

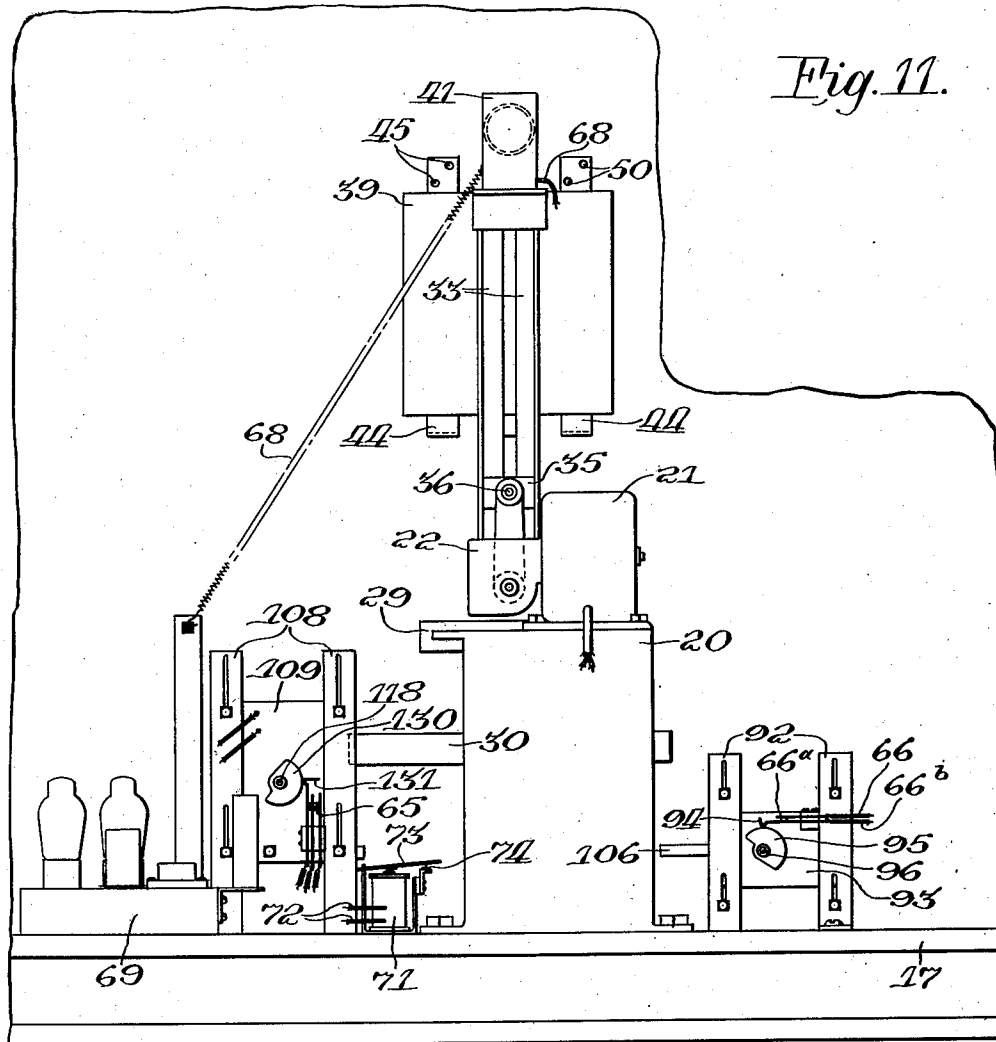
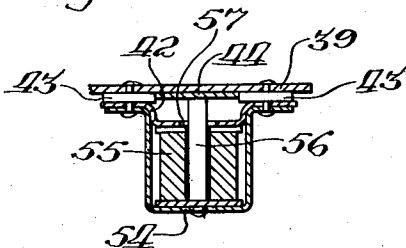


Fig. 12.



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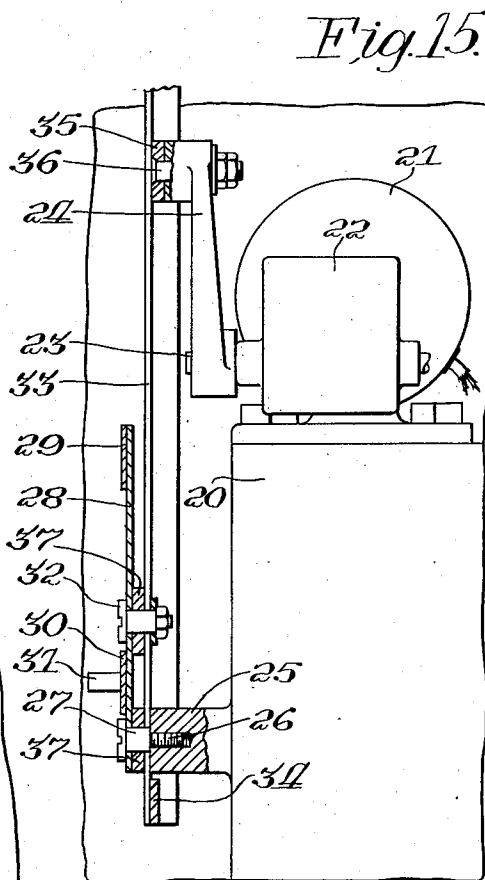
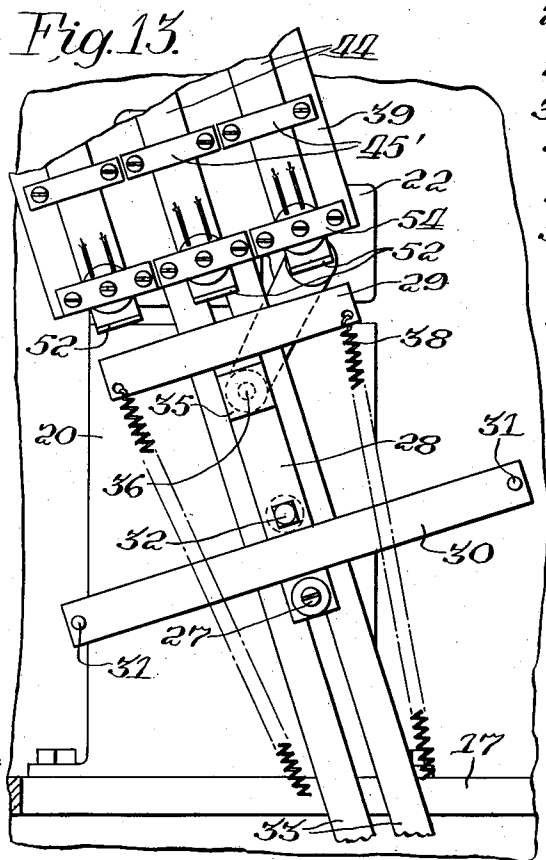
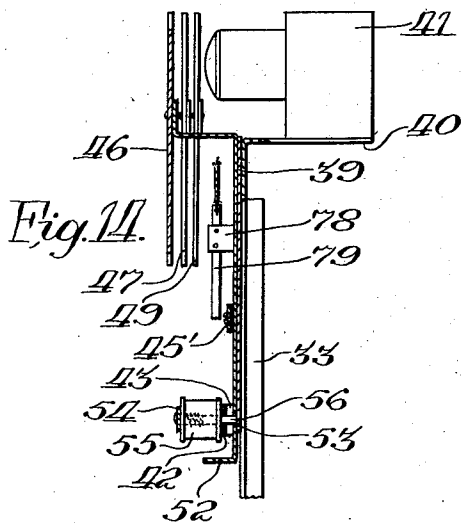
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SHOOTING-GALLERY GAME

Filed Jan. 5, 1937

6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,161,012

SHOOTING-GALLERY GAME

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Application January 5, 1937, Serial No. 119,118

31 Claims. (Cl. 273—101.1)

The invention relates to a shooting gallery type of amusement game in which a moving target structure is provided, along with a photo-electric cell, sensitive to a ray of light shot from a light producing gun or aiming element to cause operation of the target structure.

More particularly the invention has to do with the provision of an improved target structure, providing a plurality of targets adapted to be successively "hit" by the light ray and dropped in a manner imparting great realism to the playing of the game.

The primary object of the invention is to provide an improved mounting for one or more targets, plus an operating means therefor, causing the target or targets to be moved together, continuously in an orbital path lying in a vertical plane, from a position out of aiming range into an aiming range position and back again out of range.

Another object of the invention is to provide a target moving in said vertical orbital path which when hit in aiming range will abruptly and bodily drop out of view to simulate in a realistic manner a fallen bird.

Still another object is to provide, in such arrangement, a cluster or plurality of targets relatively superimposed in front of each other so that when one is hit and dropped the one immediately behind it will be exposed to view to be hit and so on, successively, until all targets have been dropped.

Another object is to make it possible on one cycle of movement of the carrier to drop a plurality of targets.

Another important object of the invention is to provide means whereby a dropped target is automatically reset so that it will be in proper position to be hit again on the next cycle, or movement thereof into aiming range.

Another object is to provide automatic means to limit the number of strokes or cycles the target carrier can make, when the game is released for operation.

Still another object is to provide means controlled by the movement of the target carrier to regulate or limit the number of cycles or flights that the targets can make.

Another object is to provide means controlled by the aiming element to limit the number of shots the player may make at the targets, and especially during each flight or passage thereof.

Also it is an object generally to improve devices of this character; to simplify same, and make them foolproof and certain of operation.

Other important objects will become apparent to those skilled in this art as the disclosure is more fully made.

Briefly, these desirable objects are achieved, in one form, by the illustrative structure herein disclosed, wherein a cabinet is provided with a partition behind which is a motor driven target carrier movable with a cluster of three superimposed targets simulating wild ducks in flight, in a vertical, orbital path. On the down stroke the targets disappear behind the partition to be momentarily out of aiming range, and on the up stroke the targets pass above the partition to appear in aiming range, simulating movement of a small flock of birds in flight. Associated with each target is an electromagnetic releaser for enabling the targets to drop successively when "hit" by a ray of light from an aiming element light source. The light source passes through openings in the targets to a photo electric cell movable therewith and located therebehind, the light being converted into electrical impulses to cause operation, in succession, as the targets are hit, of said electromagnetic releasers, to drop the targets bodily a limited amount. Means is also provided on the down stroke of the target carrier to reset the fallen targets to their normal flight position so that on the return or up stroke of the carrier for the next cycle or flight, said targets will all properly move across the aiming range position. Further, means is provided automatically to stop the motor drive to the carrier when said carrier and cluster of targets have made a predetermined number of cycles or flights, or when the aiming element has been operated the predetermined number of times. The structure is so constructed that when the target carrier comes to a position of rest when so stopped, the targets will be located behind the partition out of aiming range. So much will suffice in presenting a general understanding of the mechanism, which, in the accompanying sheets of drawings is shown in detail, and in which drawings:

Figure 1 is a general front elevational view of the shooting gallery comprising the cabinet which houses the target unit;

Figure 2 is a similar view, but showing the target unit in perspective; the aiming or gun unit; and also the starting or reset unit;

Figure 3 is an illustrative wiring diagram for the improved shooting gallery game;

Figure 4 is a front elevational view of the target structure, along with certain control units associated therewith, said target carrier being shown

in the topmost position of its orbital path of movement;

Figure 5 is an enlarged, fragmentary, front elevational view of the reset control unit shown in Figure 4;

Figure 6 is a view similar to Figure 4 but showing the target carrier, plus targets on an enlarged scale, and in position approximately at the termination of a flight, or cycle;

Figure 7 is also a front elevational view showing a fragmentary detail of the target carrier as it appears in its lowermost position;

Figures 8, 9 and 10 are respectively front elevational views of three targets representing wild ducks in flight, the duck of Figure 8 being the front one; the duck of Figure 9 being therebehind as the middle target; and the duck of Figure 10 being the rearmost target;

Figure 11 is a view similar to Figure 4 but showing the structure in rear elevation;

Figure 12 is a detail cross sectional view, the target carrier structure taken along the line 12—12 of Figure 6, looking in the direction of the arrows;

Figure 13 is a front elevational, fragmentary view similar to the showing in Figure 6, but showing the target carrier tilted to its opposite position;

Figure 14 is a vertical, detail, sectional view through the target carrier structure, taken along the line 14—14 of Figure 4, looking in the direction indicated by the arrows; and,

Figure 15 is an enlarged, side elevational view, partly in section, through the target carrier taken along the line 15—15 of Figure 4, looking in the indicated direction.

The target unit which is the main feature of the invention is generally shown at 16 as a cabinet which contains a horizontal support 17 near its lower portion and an appropriate scenic back wall 18, and forwardly thereof, and in spaced relation thereto is an appropriate scenic front wall or partition 19 which extends only part way up to expose the upper half of the rear wall 18. The target structure to be described is located behind the front wall 19.

Secured to the base support 17 is an upright bracket 20 on which is mounted an electric motor 21 having a horizontal shaft to drive an appropriate gear reducer 22 from which is driven and extends a longitudinal drive shaft 23 carrying and driving a crank 24 as shown in Figures 6 and 15. Near the lower front face of the bracket 20 is a forwardly extending boss 25 in which is secured a set screw 26, including a pivot portion 27. Pivotally mounted at its lower end on this pivot 27 is an upright bar 28 which at its upper end has rigidly connected thereto, as by welding, and intermediate its ends, a cross bar 29. The lower end of the bar 28, just above the pivot 27, has similarly connected to it a longer cross bar 30, the respective ends of which carry a forwardly extending trip pin 31. This bar structure comprising the bars 28, 29 and 30 is shaped like an aeroplane and comprises an integral part which moves or swings back and forth pivotally about the pivot 27, as will subsequently appear.

Above the bar 30 the bar 28 carries a bolt 32. Embracing the bolts 27, 32 are a pair of upright spaced angle bar arms 33, the lower ends of which, below the pivot 27 being cross connected by a plate 34 and the upper ends thereof being connected by a cross plate 35 and being pivotally connected by a pin 36 to the crank 24, as shown. Between the arms 33 and bar 28 the bolts 27, 32

carry appropriate spacers 37, as shown in Figure 15. The arms 33 in effect constitute an upright, slotted bracket, as can now be seen, which is reciprocated up and down and sidewise oscillatably by the crank 24, said bracket 33 having reciprocating motion in relation to the pivotal swinging motion of the aeroplane shaped part formed by the bars 28, 29 and 30. The lower end of each arm 33 has connected to it a tension spring 38 extending upwardly and respectively connected at their upper ends to the opposite ends of the bar 29, as shown in Figure 6, said springs serving to counterbalance the weight of the bracket 33 and parts carried thereby.

The slotted bracket 33 extends upwardly above the cross piece 35 as shown in Figures 6 and 14 and at its upper end has welded to it a fairly large rectangular plate 39, the upper end of which includes a horizontal bracket portion 40 on which is secured a photo-electric cell 41. Along its lower edge and on the front face of the plate 39, as shown in Figures 6 and 12 are three spaced guide brackets 42, each bracket mounting pairs of spaced guide rollers 43 to guide for up and down reciprocating movement three respective carrier bars 44 arranged in parallelism above the guides 42 each bar 44 is provided with an additional similar guide bracket 45' also carried on the plate 39, as shown in Figure 6. These upper guide brackets also include rollers like those numbered 43 and heretofore described.

The upper ends of the three carrier bars 44 respectively have riveted thereto three targets, each target preferably being in the form best simulating a wild duck in flight. For instance, looking at Figure 6 and viewing the arms 44 from right to left, the first arm 44 has riveted to it at the points 45 a duck target 46. As shown in Figure 14 the upper ends of the arms 44 are bent forwardly and upwardly to provide an attaching surface for the targets to be secured to. The target 46 is shown in Figure 8. The next, or middle arm 44 carries in a similar manner, the duck target 47 (Figure 9) at the attaching points 48, said target being disposed immediately behind the front target 46 as shown in Figure 14. The last or remaining arm 44 carries in a similar manner, the duck target 49 (see Figures 10 and 14) at the attaching points 50. These three targets are all disposed in a cluster with the same superimposed and each having an opening 51 therein, the openings 51 in the three targets always being in horizontal alinement and always registering with the photo-electric cell 41. In the present disclosure only three targets have been shown for the sake of illustration. Obviously this number can be varied as desired without departing from this invention.

The lower end of each target carrier bar 44 is formed with a forwardly bent end 52 and further each said bar just above its lower end is provided with a hole 53 (see Figures 6 and 14). Over each lower guide 42 (see Figure 12) is a bracket 54 fastened to the plate 39. Each bracket 54 serves to secure in place a solenoid 55 having a spring pressed core 56 adapted respectively to enter as a detent in the openings 53 in the bars 44 to lock said carrier bars in a position releasably holding the several targets in their raised positions. The inner brackets 42 as seen in Figure 12 are respectively provided with openings 57 for passage therethrough of the cores 56.

It can now be seen that when the motor 21 is turning over, the crank 24 will drive the carrier

33 from its initial starting position shown in Figure 4 to the right, to the position shown in Figure 6. In the position shown in Figure 4 all target carriers would be held raised by the electromagnetic detents 56 so that the ducks would show up in aiming range over the partition 19 as shown in Figure 1. The cluster or flock of ducks thus moves in aiming position from left to right. The carrier 33 as it swings to the position of Figure 6 lowers slidably along the guide bolts 27, 32, stretching the springs 38. Next the carrier swings to the left as shown in Figure 13 and then back to the position of Figure 4 and so on causing the flock of ducks to describe an orbital path with the same coming up over the partition 19 into view and then moving in aiming or viewing range to the right and disappearing behind the partition to complete the orbital path out of view while the targets traverse the bottom of their orbit.

When a magnetic releaser 55 is energized its core 56 is retracted from the opening in the associated carrier slide 44 to cause said slide with its target to drop abruptly by gravity behind the partition 19 to a position out of view. Such fallen target and its carrier is limited in its dropping movement when the upper bent end of the carrier abuts the aligned guide 45', as shown in dotted lines in Figure 4. As the carrier with a dropped arm 44 swings to the right, the lower bent end 52 thereof as shown in Figure 6 abuts the bar 29, whereupon as the carrier completes its orbit to the left the dropped bar 44 is pushed upwardly again until the spring pressed core 56 of the now deenergized solenoid 55 reenters the hole 53 to lock said bar 44 and its target in raised position. In other words, by the time a fallen target reaches aiming or view position in back of the partition 19 it will be in the normal flight or shooting position. The means for releasing the targets and their carriers 44 with them will now be described.

An aiming or shooting element, simulating a rifle 58, is provided as a unit apart from the cabinet 16 and located any desired distance therefrom. This gun embodies a trigger actuated switch 59 disposed in an electric circuit 60, through a solenoid 61, a wire 62 and thence to a suitable source of energy such as a battery 63 located in any convenient place. A circuit wire 64 leads from the battery to a triple blade double switch 65. A wire 66 continues the circuit to a switch 66^a, thence through a wire 66^b and a wire 66^c to an electric lamp 67 located in the gun 58 to complete a circuit for the lamp with the source of electrical energy. The lamp 67 is so disposed in the gun that when the trigger switch 59 is momentarily closed a flash or ray of light passes through the barrel, with the aid of a lens system therein, not shown, as a projectile of light which the player aims at the openings 51 in the cluster of targets as they move in flight behind the partition 19 in the manner already described.

Obviously a properly aimed ray of light will pass through the openings 51 and "hit" the photo-electric cell 41 therebehind.

This cell is, as shown in Figure 3, connected by two wires 68 in the usual way with an amplifier 69 one of said conductors being in the form of a spring. The amplifier 69 in turn is in circuit with the source of energy 63 by means of wires 70. An electromagnet 71, by means of wires 72, is always in circuit with the amplifier 69 but is not effective to attract a spring pulled armature 73 therefor unless the cell 41 has re-

ceived a light impulse. When the magnet 71 is thus energized the armature 73 serves to close a switch 74 in circuit with a wire 75 (see Figure 3) that leads to the battery 63. Another wire 76 leads from the armature 73, which is a conductor, to one of the solenoids 55, while taps 77 respectively lead from the line 76 to each of the other two solenoids 55.

The plate 39 as shown in Figures 6 and 3 carries two double spring switch units disposed between the carrier arms 44. The first switch comprises a suitably insulated bracket 78 carrying three spring switch blades 79, providing two sets of contacts 80 and 81. The middle blade has a depending bent tail portion 82 for a purpose soon to appear. A wire 83 connects the said middle blade 79 with the source of energy.

It can now be seen when the first target 47 is "hit" by sending a ray of light to the cell 41 that a circuit to the first solenoid 55 for said duck 47 is energized, thereby releasing the detent 56 and permitting the said duck target and its carrier 44 to drop bodily by gravity in the manner already made known.

As said carrier 44 drops, its upper forwardly bent end shown best in Figure 14 engages the tail 82 on the middle switch blade 77 and separates the contacts 80 to deenergize the associated solenoid 55, at the same time holding closed the contacts 81 to prepare a circuit for the middle solenoid 55 which becomes energized when the photoelectric cell is again "hit" by a ray of light passing through the middle target (and rear one). This middle solenoid 55, as shown in Figure 3, has a wire 84 leading to the other triple blade switch 85 carried on the plate 39 by an insulated bracket 86, said switch providing normally closed contacts 87 to which the wire 84 leads. One blade of the switch structure 79 is connected by a wire 88 between the contacts 81 and the normally closed contacts 87. The blade structure 85 also provides a normally open set of contacts 89 connected by a wire 90 to the final or third solenoid 55.

It can now be seen that the instant the cell 41 is struck by the light ray the switch 74 closes to establish a circuit with the source of energy for the middle solenoid 55 through closed contacts 81, wire 88, contact 87, wire 84, to the middle solenoid 55 and wires 77 and 76. Thus, the middle target 47 will drop and as a consequence the middle blade of the switch structure 85, which has a bent tail 91 will be pushed over in the manner described to open contacts 87 and close contacts 89, thus setting the circuit for the third and last target 49 and its solenoid releaser 55. Now when the cell 41 is "hit" a third time the final circuit just described is completed in the same manner and the last target 49 is enabled to drop.

On each flight, in the present embodiment, three duck targets pass together across the aiming field in back of the partition 19 to represent one flight. In each such flight or passage of the targets a skillful marksman can drop all three ducks successively, or one at a time, in the order already indicated. It is desirable to limit the number of shots automatically to three for each flight or passage of the targets and means for accomplishing such result will next be described.

The base 17 in any appropriate place adjacent one end of the swinging bar 30 carries a pair of spaced standards 92, which in turn carry for up and down adjustable setting, a plate 93. (See Figures 5 and 11.) The blade switch 66^a

heretofore described is carried horizontally on this plate 93 and is suitably insulated therefrom, one end of a blade of the switch as indicated at 94 having a wiper extension which engages the periphery of a fiber, non-conductor, cam 95 which turns with a horizontal shaft 96 journaled in the plate 93.

On the opposite face of the plate 93, the shaft 96 carries a ratchet wheel 97 for turning movement therewith. The plate 93 also carries a spring pulled pivoted pawl 98 which is an escapement pawl associated with the ratchet wheel 97. Said pawl 98 is positioned to be attracted by an electromagnet 99 carried on the plate 93, as shown, said magnet including a lead 100 in circuit with the wire 60. (See Figure 3.) The magnet 99 also has a lead 101 with the wire 66^c. This wire 66^c leads to wire 64 heretofore described and thence to the battery 63; whereas wire 100 leads through wire 60 to electromagnet 61 which by wire 62 is also in circuit with the battery 63. It can now be seen that the two electromagnets 99 and 61 are wired in parallel with the source of energy. The electromagnet 99 may be referred to as the escapement electromagnet, and the magnet 61, the location of which will be presently described, may be referred to as the trip electromagnet.

Looking now to Figure 4 it will be seen that a spring 102 is provided to pull on the ratchet wheel 97. Also the plate 93 carries a bracket 103 over the wheel 97, which bracket includes a horizontal stop bar 104. The plate 93 pivotally carries on a pin 105, intermediately of its ends, a lever 106 one end of which lies in the path of movement of the adjacent end of the arm 30 in such manner that the pin 31 thereon may strike or engage the lever 106, just described. The opposite end of the lever 106 is disposed behind the bracket 103 and is slotted to fit over a pin 107 carried rigidly on the face of the ratchet wheel 97.

The magnet 99 is normally deenergized and when the arm 30 is in position as appears in Figure 13 to start a first flight of the targets, said arm 30 through the adjacent pin 31 presses down on the lever 106 as indicated in dotted lines in Figure 4 to cause the opposite or slotted end of said lever 106, through pin 107 to turn the ratchet wheel 97, three teeth or steps in a clockwise direction as viewed in Figure 4. The pawl 98 permits the teeth on the ratchet wheel 97 to overrun in this direction and when the wheel has been so stepped up, serves to prevent the wheel from retrograde movement under the pull of the spring 102. Thus the shaft 96 and fiber cam 95 were turned a like amount, the cam now serving to press the spring wiper 94 to hold the switch 65^a for the lamp 67 circuit partly closed. Now, each time the trigger switch 59 in the shooting element 58 is closed the lamp 67 will be lighted and also the escapement magnet 99 will be momentarily energized to release the pawl 98 and permit the spring 102 to pull the ratchet wheel 97 reversely and with it move the cam 95 also reversely. In this fashion due to the design of the parts and the timing, the trigger switch 59 may be closed to light the lamp 67 only three times per flight of the targets across aiming range, because by the time the switch 59 has been closed three times, the ratchet wheel 97 will have moved three steps reversely to its initial starting position, and by this time the wiper 94 will have dropped off the high portion of the cam 95 to cause the spring blade switch 66^a to open and

break the light circuit. In this fashion the number of "shots" that could possibly be effective on the cell 41 is limited to three per flight. On the next succeeding flight the bar 30 is again operative in the same manner to set up the escapement control mechanism just described and so on until the termination of the play or shooting.

The play is terminated automatically by another control mechanism when the targets have made ten flights and this additional control means will next be described, reference being again had to Figures 4, 11 and 3, and in addition to Figure 5.

On the opposite side of the arm 30 the base 17 carries an upright bracket structure 108 for adjustably mounting a vertical plate 109. Mounted on the base 17 between the sides of the structure 108 and under the plate 109 is the trip electromagnet heretofore described. The bracket 108 carries a pivoted, spring pulled armature piece 110 operatively associated with the magnet 61. Pivotally mounted on a pin 111 above the magnet 61 on the plate 109, is a trip bell crank lever 112 having an enlarged, notched end 113 disposed just above the magnet 61, as shown. The opposite end of this lever 112 is disposed in the path of movement of the adjacent pin 31 on the arm 30. Intermediately of its ends, said lever 112 pivotally carries an upstanding spring pulled pawl 114 movable upwardly to a limit established by a stop 115 carried on the plate 109 and laterally in one direction by a guide pin 116, also carried on said plate 109. A spring 117 is connected between the lever 112 and the upper end of the bracket structure 108, as shown, to pull the lever 112 upwardly when the latter is unlatched.

Turnably carried in the plate 109 is a horizontal shaft 118 which on the pawl 114 side of the plate carries fast a ratchet wheel 119 behind a cross bar 120 mounted rigidly on the plate 109. The ratchet wheel 119 is always pulled by a spring 121 tending to move it until a pin 122 thereon hits the bar 120. A spring urged dog 123 is pivotally carried by the plate 109 above the wheel 119 and in normal back lash preventing engagement therewith, a normally deenergized electromagnet 124 is positioned along the top edge of the plate 109 to raise the dog 123 and release the ratchet wheel 119. Said magnet 124 may be termed the reset electromagnet, the same having a wire 125 leading to wire 75 (see Figure 3) for connection to the source of energy 63. Another wire 126 leads from the magnet 124 to a switch 127, in turn leading through a tap to the wire 61, and thence through a wire 128 back to the power source. As shown in Figure 2 the switch 127, which is the starting and reset switch, may be located in a suitable box, or separate unit 129, and, if desired, the switch 127 may be closed by a coin released device, in any well known manner.

The shaft 118 also carries and turns on the side of the plate 109 opposite from the ratchet wheel 119, a fiber, insulated cam wheel 130 as shown best in Figure 11. One blade of the double switch 65 heretofore described, has an extended wiper portion 131 in engagement with the cam 130. The double switch 65 as shown, is carried on the bracket structure 108 in proximity to the cam wheel 130.

The motor 21, is of course, also in circuit with the battery 63, such circuit constituting the wire

64, switch 65, a wire 132 and back to the battery again by means of the wire 128.

The trip lever 112 is, in the starting position of the play, locked by engagement of the end of member 110 in the notch 113. The first time the gun switch 59 is closed the magnet 61 is energized to release this lock and free the lever 112 and by the time the target carrier completes its first flight from left to right to the position shown in Figure 7 the spring 117 pulls the lever 112 upwardly to operate the pawl 114, ratchet 119 and cam 130. This step up continues once per flight of the targets, until ten flights have been made, whereupon the switch wiper 131 runs off the high portion of the cam 130 to cause the motor switch 65 to open and stop the motor 21 and consequently the drive for the target carrier. The bar 30 at the end of each flight contacts the lever 12 to reset it in latched position. This completes the detail description of the structural parts, and a summary of the mode of operation and manner of use of the improved shooting gallery game will next be given.

In the starting position of the mechanism the target carrier is in the position shown in Figure 4. The player shoulders the gun 58 and closes the switch 127, which sets up the circuit previously described to cause energization of the reset electromagnet 124. This magnet 124 attracts the dog 123 to raise same free of the ratchet wheel 119, whereupon the spring 121 is operative to turn the wheel 119 counterclockwise as seen in Figure 5 until the pin 122 hits the bar 120 as seen in Figure 4. This has rotated the fiber cam 130 to a position where the switch leg 131 is off the low side and placed onto the high side of said cam. As a result the switch 65 is pressed to close its contacts and complete the circuit heretofore described to energize the motor 21. With the motor in operation the crank 24 turns to swing the target carrier to the right as shown in Figure 6.

Thus the cluster of three targets swings to the right exposed above the partition 19 in aiming range. The marksman aims his gun 58 at the opening 51 in the front target 46 and pulls the trigger, but first it will be remembered that when the bar 30 moved from its left position it had set up the shot limit switch cam 95 to limit the number of shots per flight as has already been described. Continuing, the marksman pulls the trigger light switch 59 to complete the circuit for the lamp 67 to light it and also to energize the two electromagnets 99 and 61. As the magnet 61 is energized it operates the member 110 to free the bell crank lever 112. The energized magnet 99 operates the dog 98 to allow the ratchet wheel 97 to escape for retrograde movement, one step. This escapement unit, as has been described after three operations opens the light switch 66^a so that per flight the gun can operate effectively to shoot a ray of light only three times. On the beginning of each flight, no matter how many shots may have been fired, the bar 30 sets up the escapement again in a manner now readily understood.

The lever 112 in its starting or down position holds the spring 117 tensioned and the instant the magnet 61 is energized the lock member 110 is drawn down to the magnet, from notch 113 to free the lever 112, whereupon the spring 117 raises the lever 112 to cause the pawl 114 to engage and step up the ratchet wheel 119 and cam 130 one step. If additional shots, or closing of the gun light switch 59 occur during a flight and before

termination of said flight, the magnet 61 may, of course, be energized again a number of times but under such additional energizations the magnet 61 does not affect the lock 110, 113, since it is definitely freed and the member 110 merely flutters idly between the magnet and the lower edge of the enlarged end of the lever. Of course, when the flight to the right is ended the bar 30 again engages the lever 112 to rock it down to stretch the spring 117 again, but in the meanwhile, since magnet 61 is only momentarily energized the spring pulling member 110 is effective to reengage the lock 110, 113 to reestablish these parts in initial position. When the flight is over the step up operation is repeated and the pawl 114 turns the wheel 119 a second step, the stop 115 serving to hold the pawl stroke to one step for the wheel. The arrangement is such that by the time the wheel 119 and cam 130 have been stepped up ten times, the wiper 131 moves off the high portion of the cam 130 to the low, or cut off portion thereof, causing the switch 65 to open and shut off the motor 21. At the same time, since the switch 65 has two sets of contacts, the light circuit is also opened to prevent shooting a ray of light at the photo electric cell when the motor is not running.

Let us now assume the marksman passes a ray of light through the aligned openings 51 in the cluster of targets 46, 47 and 49 to the photo cell 41. It will be remembered that all target carriers 44 are held releasably latched in an up position relative to the carrier plate 39 by the solenoid controlled detents 56. With a ray of light hitting the cell 41, a circuit, previously described, through amplifier 69, relay 71, closes a circuit to the first solenoid 55 to release its detent and permit the first target 46 and its carrier 44 to drop abruptly and bodily by gravity behind the partition 19 to simulate a fallen bird. The associated guide 45' limits the drop of the carrier. In like manner, since three effective shots per flight are possible, the middle target 47 and rear target 49 may be dropped. It will be recalled that as the first target 46 dropped it established a circuit through the switch 81 to make possible energization, from the photo cell and source of energy, of the middle solenoid 55 to cause release of its detent; also as the middle target dropped it closed switch 89 to make it possible from the light ray to energize the final solenoid 55.

When one or more targets are dropped they, of course, swing in their orbital path with the carrier 33, and as they move downwardly as shown in Figure 6, the lower bent ends 52 of the carriers 44 abut the upper bar 29 to raise the targets and once more reset same in their raised positions preparatory to shooting at them again in unfallen positions as the succeeding flight takes place.

Thus, it will be seen three rays of light may be shot at the targets per flight, when the motor is running, and ten flights of the targets are made. This arrangement, of course, may be varied, so that more or less shots per flight may be fired, or more flights may be made before stopping the motor; all dependent upon the number of targets that may be used in a cluster.

It can now be seen that an improved shooting gallery amusement device has been provided, the structure of which achieves all of the desirable objects heretofore recited.

It is the intention to cover all changes and modifications of the example herein chosen for purposes of illustration which do not in material

respects constitute departures from the spirit and scope of the invention as subsequently defined in the claims.

What is claimed is:

5 1. A target apparatus comprising a support, a member pivotally carried on the support, an upright arm slidably associated with the member, means on the support including a crank for carrying and swinging the arm with the member and slidably in relation thereto, and a target carrier mounted on the arm for sliding movement in relation thereto.

10 2. A target apparatus comprising a support, an upright member pivoted at its lower end to the support, an upright arm slidably related to the member, a motor on the support including a crank connected to the arm for carrying and swinging the latter with the member and slidably in relation thereto, and a target carrier mounted on the arm at its upper end for bodily dropping movement in relation thereto.

20 3. A target apparatus comprising a support, a member pivotally carried on the support, an upright arm slidably related to the member, means on the support for carrying and swinging said arm with the member and slidably in relation thereto, a plurality of target carriers slidably mounted on said arm for independent dropping movement in relation to said arm, and means for successively dropping the carriers.

25 4. A target apparatus comprising a support, a member pivotally carried on the support, an upright arm slidably related to the member, means on the support including a crank for carrying and swinging the arm with the member and slidably in relation thereto, a target carrier mounted on the arm for sliding movement in relation thereto, and means to limit such sliding movement.

30 5. A target apparatus comprising a support, a member pivotally carried on the support, an upright arm, means for supporting and swinging said arm with the member and slidably with respect thereto, a target carrier mounted on the arm for sliding dropping motion in relation thereto, means releasably locking the carrier on the arm, and means to release the lock to free the carrier for dropping movement.

35 6. A target apparatus comprising a support, a member pivotally carried on the support, an upright arm, means for supporting and swinging said arm with the member and slidably with respect thereto, a plurality of target carriers mounted on the arm for sliding dropping motion in relation thereto, individual releasable lock means for respectively holding each carrier against such motion, and means for individually releasing the lock means for successively dropping the carriers.

40 7. A target apparatus comprising a support, a member pivotally carried on the support, an upright arm, means for supporting and swinging the arm with the member and slidably with respect thereto, a target carrier mounted on the arm for sliding dropping motion in relation thereto, a releasable lock to hold the carrier against such motion, and an electromagnetic releaser for said lock.

45 8. A target apparatus comprising a support, a member pivotally carried on the support, an upright arm, means for supporting and swinging the arm with the member and slidably with respect thereto, a target carrier mounted on the arm for sliding dropping motion in relation thereto, a photo electric cell carried on the arm, means

for releasably locking the carrier on the arm, and means operable from said cell to release the locking means to cause the carrier to drop.

9. A target apparatus comprising a support, a member pivotally carried on the support, an upright arm, means for supporting and swinging the arm with the member and slidably with respect thereto, a photo electric cell carried on the arm, a plurality of target carriers mounted on the arm for independent sliding dropping movement in relation to the arm, releasable means for individually latching said carriers against sliding movement, and means operable from said cell for independently unlatching said carriers to cause dropping movement thereof.

10 10. In a target apparatus, a swingably mounted arm, means to swing the arm, a plurality of carriers mounted on the arm for sliding movement in relation thereto, a target on each carrier, said targets being arranged in parallel vertical planes and normally disposed one in front of the other with each target having an opening therethrough, which openings when the targets are in normal position are in substantial registration, and means to releasably latch the carriers in a normal position against sliding movement.

15 11. In a target apparatus, a support, a plurality of targets mounted individually thereon for bodily limited dropping movement, means releasably holding said targets in a normal raised position, said targets in normal position being disposed side by side in spaced apart relation and provided respectively with an opening, said openings being in alignment in the normal position of the targets, a photoelectric cell carried on the support behind said openings, and means operable by the cell for releasing the targets to cause them to drop.

20 12. In a target apparatus, a support, a member pivotally carried on the support, an upright arm, means to carry and swing the arm in an orbital path by sliding same relative to but swinging same with the member, a target carrier mounted on the arm for relative sliding dropping movement, means to releasably latch the carrier against such relative movement, means to release the carrier for such relative movement, and means acting automatically to restore the dropped carrier to its raised latched position as the arm swings.

25 13. In a target apparatus, a swingable support, means to carry and swing the support in an orbital path, a plate rigid on the support, a plurality of target carriers mounted in parallel spacing on the plate for sliding movement relative thereto, each carrier carrying a target, said targets disposed in parallel vertical planes and side by side in spaced apart relation with said targets each formed with an opening, said openings normally being in registration, means to latch the carriers releasably against such relative movement, a photo-electric cell carried on the plate behind and in line with the normal positions of the target openings, and means operable by the cell when rays of light are passed through the target openings to cause successive release and dropping movement of the carriers.

30 14. In a target apparatus, a swingable support, means to carry and swing the support in an orbital path, a plate rigid on the support, a plurality of target carriers mounted in parallel spacing on the plate for sliding movement relative thereto, each carrier carrying a target, said targets disposed in parallel vertical planes and side by side

in spaced apart relation with said targets each formed with an opening, said openings normally being in registration, means to latch the carriers releasably against such relative movement, a photo-electric cell carried on the plate behind and in line with the normal positions of the target openings, electrical means operable by the cell when rays of light are passed through the target openings to cause the carriers to be released for dropping movement, and switch means on the plate controllable by the dropping carriers to regulate dropping of the carriers successively.

15. A target apparatus comprising a motor, a crank driven thereby, an upright slotted bracket carried and driven by the crank in an orbital path, a pivoted member with respect to which the bracket slides, a target carrier mounted on the bracket for relative sliding dropping movement, means to latch the carrier against such movement, means to release the latch to cause such dropping movement of the carrier, and a cross bar mounted on the pivoted member and rockable therewith, said bar serving to raise the dropped carrier to its latched position.

16. In a target apparatus, a motor, an upright support pivotally carried and oscillated to and fro on a fixed axis by means driven from the motor, a target operably related to and movable with the support, and means operable by the support after it has performed a predetermined number of oscillations to stop the motor.

17. In a shooting gallery, an operable aiming element and a swinging target carrier including a motor to drive the same, the combination with said carrier of means controlled thereby to limit the number of swings the carrier may make by stopping the motor, and other means controlled by the carrier to limit the number of operations the aiming element is capable of making per swing of the carrier.

18. In combination, a target apparatus comprising a support, an arm hingedly connected to said support, a bracket carried on the arm for hinging movement with the arm as well as for slidable relative movement with respect thereto, a target mounted on the bracket, and means for swinging the arm for hinging movement, and sliding the bracket to move the target in an orbital path.

19. In combination, a target apparatus comprising a support, an arm hingedly connected to said support on a fixed axis, a slotted bracket mounted on the arm for hinging movement with the arm as well as for sliding movement with respect thereto, a target mounted on the bracket, and rotary means connected to the slotted bracket for swinging same with the arm and sliding same relative to the arm to move the target in an orbital path.

20. In combination, a target apparatus comprising a support, an upright arm pivotally connected on a fixed axis adjacent its lower end to the support, an upright bracket extending above and below the bar, means to carry the bracket on the bar for relative sliding movement with respect thereto, a target mounted on the bracket, means to swing the arm about its pivot with the bracket, and means to slide the bracket relative to the arm while the arm swings to move the target.

21. In combination, a target apparatus comprising a support, an upright arm pivotally connected adjacent its lower end on a fixed axis to the support, an upright slotted bracket extending

above and below the bar and in parallelism therewith, means cooperable with the slot to mount the bracket on the arm for relative sliding movement, a target carried on the bracket for movement therewith, and means to swing the arm about its pivot and to move the bracket with and relative to the arm to produce an orbital movement of the target.

22. In combination, a target apparatus comprising a support, an upright arm hingedly carried by the support for swinging movement about a fixed axis, a target carrying bracket mounted on the arm for relative sliding movement with respect thereto, a motor carried on the support, and means driven by the motor and connected operatively to the bracket to swing the arm and bracket and slide the latter to move the target.

23. In combination, a target apparatus comprising a support, means carried on the support for swinging movement about a fixed pivot, target carrying means mounted for movement about said pivot with the first mentioned means and additionally for sliding movement relative thereto, and motor driven means for causing said first means and target carrying means to move as stated.

24. In combination, a target apparatus comprising a support, means carried on the support for swinging movement about a fixed pivot, target carrying means mounted for movement about said pivot with the first mentioned means and additionally for sliding movement relative thereto, yieldable means connected between the first means and target carrying means, and power actuated means for causing said first means and target carrying means to move as stated.

25. In combination, a target apparatus comprising a support, an upright arm mounted on the support for hinging movement about a fixed axis, an upright target carrying bracket mounted to hinge with the arm about the same axis and slide relative thereto, power actuated means to move the arm and bracket, and resilient means connected between the arm and bracket.

26. In combination, a target apparatus comprising a support, an upright bar pivotally connected to said support on a fixed axis, a target carrier operatively associated with the bar and mounted to swing with the bar and slide up and down relatively thereto, power actuated means to swing the bar, a plurality of targets mounted on the carrier respectively in different but parallel vertical planes, means independently carrying the targets for individual dropping movement with respect to the carrier, and means for successively dropping the targets.

27. In a target apparatus comprising a single movably mounted target carrier, a plurality of independently movable targets mounted on the carrier respectively in spaced apart relation one behind the other, said targets being formed respectively with an opening and so positioned normally that said openings are in registration and means responsive to the passage of a light beam through said openings for dropping the targets in succession.

28. In a target apparatus comprising a single movably mounted target carrier, a plurality of independently movable targets mounted on the carrier for dropping movement and disposed respectively in normal spaced apart relation in proximate but different vertical planes, and means responsive to a light beam passed through openings formed in the targets whereby said targets may be dropped successively.

29. In combination, a target apparatus comprising an upright bar pivoted on a fulcrum near its lower end, a target carrier movable with the bar and also having sliding movement relative to the bar, a target mounted on the carrier for bodily limited dropping movement, a cross member on the bar to cause resetting of a dropped target to raised position, and power actuated means to swing the bar.
- 10 30. In a target apparatus comprising an upright bar pivoted on a fixed fulcrum near its lower end, a target carrier movable with the bar and also having sliding movement relative to the bar, a target mounted on the carrier for dropping movement in relation thereto, power actuated means to swing the bar, and a cross bar carried intermediate its ends on the upright bar adjacent the fulcrum of the latter, said target when
- dropped having a portion to engage the cross bar for raising the target to normal position as the carrier moves.
31. In a target apparatus comprising an upright bar pivoted on a fixed fulcrum near its lower end, a target carrier movable with the bar and also having sliding movement relative to the bar, a target mounted on the carrier for dropping movement in relation thereto, power actuated means to swing the bar with the carrier, a pair of cross bars carried intermediate their ends on the upright bar in spaced parallel relation, said target having a portion to engage one cross bar to raise the target to normal position, and means controlled by the other cross bar to limit the operation of the power actuated means.
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