

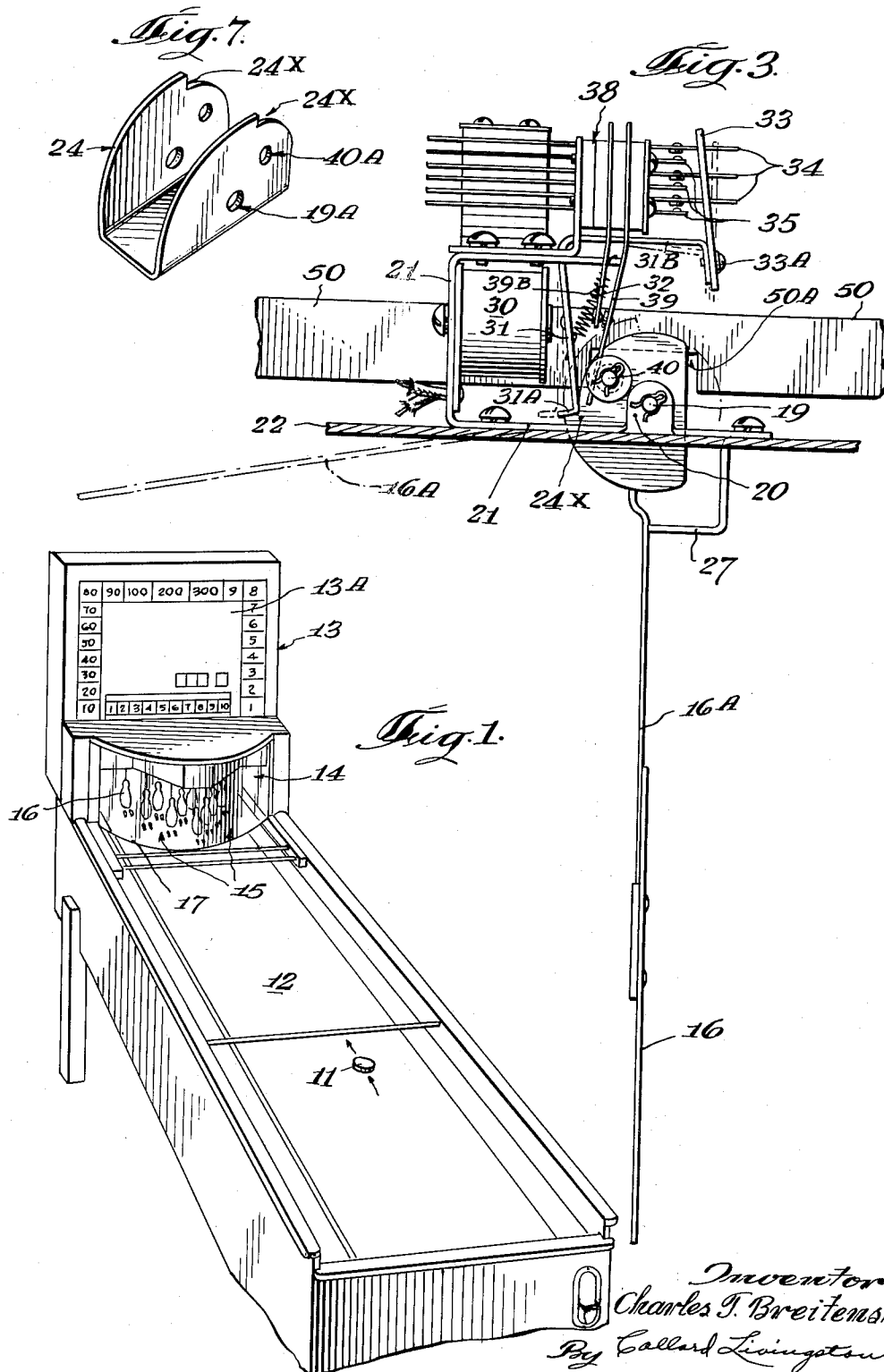
Nov. 1, 1955

C. T. BREITENSTEIN
PIN-SETTING AND TRIPPING MECHANISM
FOR SIMULATED BOWLING GAME

2,722,422

Filed March 22, 1950

3 Sheets-Sheet 1



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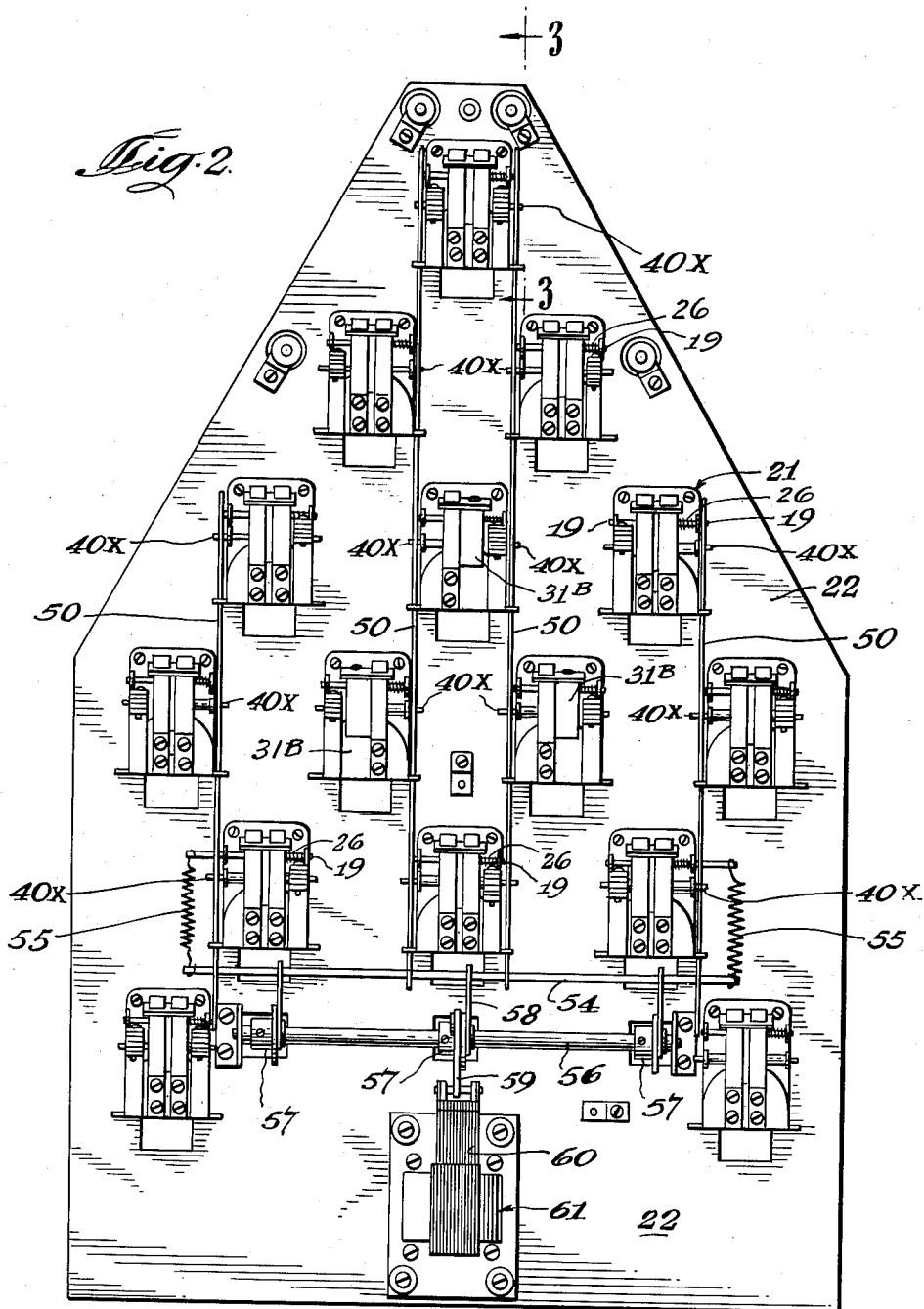
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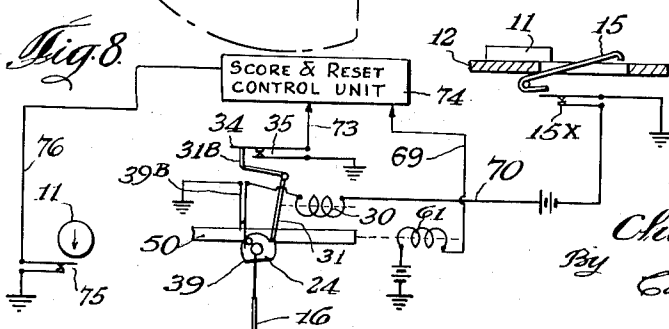
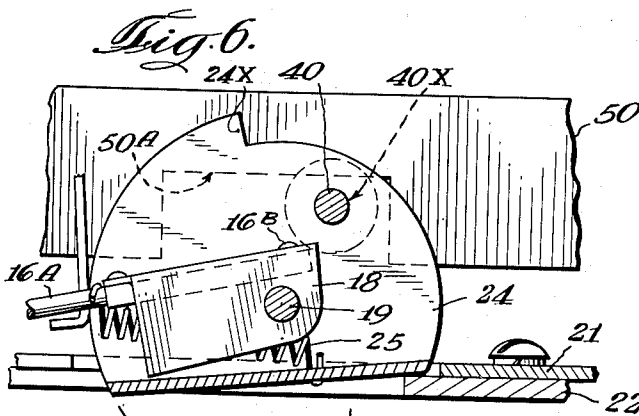
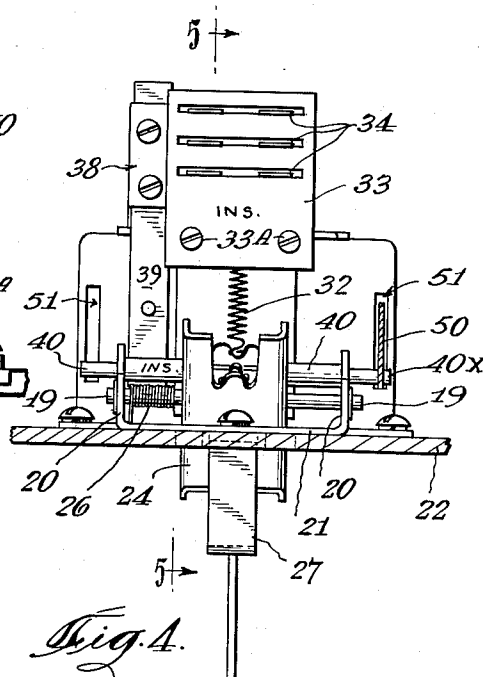
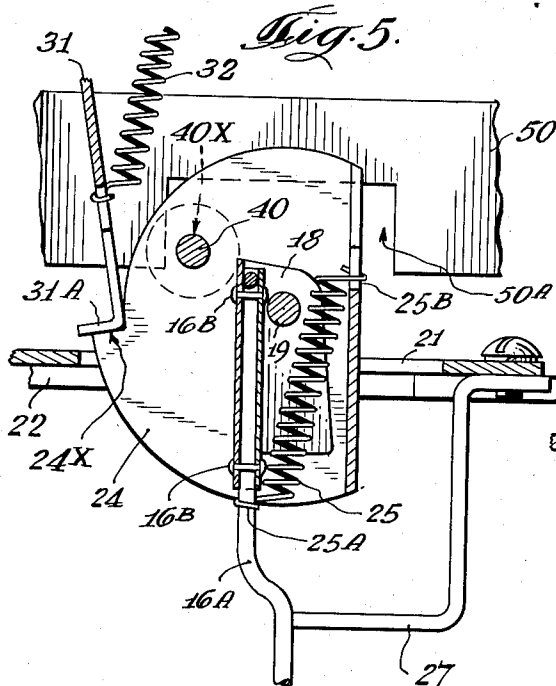
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3 Sheets-Sheet 3



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PIN-SETTING AND TRIPPING MECHANISM FOR
SIMULATED BOWLING GAMECharles T. Breitenstein, Chicago, Ill., assignor to Ray-
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Application March 22, 1950, Serial No. 151,292

19 Claims. (Cl. 273—126)

This invention has as its principal object the provision of a pin setting and tripping mechanism for use in bowling games and the like.

Another and more detailed object is the provision of a ten-pins unit for use in a simulated bowling game, this unit consisting essentially of a plurality of relays, a set of ten pins each of which is mounted on a normally pendent arm suspended from a setting pivot cooperable with the armature of an associated relay to be locked in pendent or set condition, and released by energization of the associated relay to elevate the pin in response to a scoring action in the appurtenant game.

Another object is the provision of a setting and releasing mechanism for use with game targets, or score-indicating objects in the type of game which includes game-operated switches and electrical scoring mechanism actuated or controlled thereby, said setting and releasing mechanism comprising a relay adapted to be operated by an associated one of said switches, score and control switch means operated by the relay armature movements, a pivoted target carrier spring-driven to turn the target, for instance a bowling pin, into raised position to indicate a "hit"; and a latch to hold the target carrier down in a set condition by a normal condition of the relay armature.

Another object is the provision of an electromagnetic gang reset mechanism for all target or pin carriers.

Yet another object is the provision of a set of simulated bowling pins and electromagnetic setting and tripping mechanism therefor, actuated by switches operated by a playing piece.

Additional objects and aspects of novelty and utility relate to details of the construction and operation of the embodiment described hereinafter in view of the annexed drawings in which:

Fig. 1 is a fragmentary perspective of a bowling game incorporating the invention;

Fig. 2 is a top plan view of the ten-pin setting and tripping unit;

Fig. 3 is a vertical sectional detail along lines 3—3 of Fig. 2 showing one of the pin-setting and tripping relays to enlarged scale;

Fig. 4 is a transverse section through the unit of Fig. 2 and showing the pin-setting and tripping device of Fig. 3 in front elevation;

Fig. 5 is a vertical sectional detail, to enlarged scale, of the pin latching means in set condition, and is taken along lines 5—5 of Fig. 4;

Fig. 6 is a detail like that of Fig. 5 but showing the pin and latching means in tripped or released condition;

Fig. 7 is a perspective detail of the pin latch;

Fig. 8 is a circuit diagram.

Referring to Fig. 1, a game utilizing the invention is shown to include a playing surface 12, a backbox or score panel 13, and a pin hood 14.

A playing piece or puck 11 is glided along the surface 12 to score hits on score switches, the operating arms 15 of which are situated in surface 12 beneath corresponding simulated ten pins 16.

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Preferably, a curved, transparent plastic window 17 on said hood shields, said pins, and interior lighting means (not shown) is provided within the hood 14. The lower margin of said shield 17 is raised above the playing surface 12 to permit the puck to pass therebeneath.

The player seeks to hit as many score switch arms 15 as possible by skillful gliding of the puck 11; and, as a result of hits on the score switches, corresponding pins 16 are tripped or released by electromagnetic relay means to cause said pins to be pivoted from the normally lowered or set condition of Fig. 1 to the hit or elevated condition indicated by the dotted-line representation of pin arm 16A in Fig. 3, such scoring being indicated by illumination of lamps (not shown) behind appropriate score indicia on score panel 13A.

As seen in Figs. 3 and 4, each pin 16 is attached to a rod 16A, which, as in Fig. 5, is secured as at 16B to a channel-shaped pivot bracket 18 (Fig. 6 also) pivoted on pin 19, seated in lugs 20 (Figs. 3 and 4) of relay bracket 21. There are a plurality of said relay brackets 21 mounted on the unit plate 22, as in Fig. 2.

A channel-shaped setting bracket 24, such as shown in Fig. 7, is also mounted on each pivot pin 19 (Figs. 4 and 5) and contains within its channel the pivot bracket 18.

Spring means 25 (Figs. 4, 5, and 6) is attached as at 25A to the pin rod 16A, and anchored as at 25B to the corresponding setting bracket 24 in each pin assembly, and tends to yieldingly couple each pivot bracket and associated pin rod to the setting bracket 24.

As seen particularly in Fig. 4, a torsion spring 26 on pivot pin 19, urges the corresponding setting bracket in a clockwise direction, as viewed in Figs. 3 and 6, and urges the corresponding pivot bracket and its pin rod into elevated or tripped condition as represented by the dotted line position at 16A.

In the normally set or pendent condition of the pin rods 16A, as depicted in Figs. 3, 4, and 5, each pin rod is aligned or spotted by a stop arm 27 depending from the unit base plate 22; and the yieldable spring coupling means 25 absorbs the shock of the resetting movement of each pin rod upon being forced (by means to be described) into pendent or set condition.

Associated with each tenpin is an electromagnetic tripping or releasing means in the preferred form of a relay such as shown in Fig. 3, and which includes a coil 30 on bracket 21; a pivoted armature 31 to be attracted by the coil against the effort of its spring 32, which spring in the condition of Figs. 3 and 5 tends to lodge the latching end or formation 31A in a latching notch 24X in the setting bracket 24 of the associated pin when the latter is in pendent or set condition, as shown to particular advantage in Fig. 5.

When any of the relay coils 30 is energized, the corresponding armature 31 is attracted toward the left as shown in dotted lines in Fig. 3, to withdraw latch end 31A from notch 24X, thereby freeing the setting bracket 24 for movement by its torsion spring 26 to elevate the associated rod 16A and its bowling pin 16.

In Fig. 3, it will be observed that armature 31 has an offset 31B, to which is attached an insulating wafer 33, as at 33A, (see also Fig. 4), which wafer is slotted to receive switch blades 34 to flex the latter downwardly for circuit-closing engagement with companion switch blades 35 when the coil 30 is energized to attract armature 31.

Contacts 34—35 are adapted to be connected in the score-control circuits (not shown) for the game.

Also associated with certain of said relays (Figs. 3 and 4) are switches 38 including downwardly projecting flexible contact blades 39, the lower ends of each, of which are positioned in the path of eccentrically sit-

uated switch pins 40 (see detail of Fig. 5) seated in pin holes 40A of the corresponding setting bracket (Fig. 7), said holes 40A being eccentric of the holes 19A for pivot pin 19.

Whenever any relay coil 30 is energized to release a set pin, the resulting clockwise turning of the corresponding setting bracket 24, as in Fig. 3, angularly displaces the switch pin 40 from the normally set position of Figs. 3 and 5, to the tripped position of Fig. 6, and away from a normal engagement with the lower end of said switch blade 39, to free the latter, for movement out of normal circuit-closing engagement with its companion contact 39B.

Switches 38 are normally closed when the associated ten pins are pendent or set, and are adapted to be connected in supervisory circuits (not shown) for the associated pins and scoring circuits, and accordingly, these switches 38 are referred to as supervisory switches.

The relay contacts 34—35 are normally open when the corresponding bowling pins are set or down, whereas at this time the corresponding supervisory switches 38 are closed; and this condition of the switches is reversed when said pins are tripped up.

Means for gang resetting all tripped pins simultaneously, includes an elongated reset bar 50 (Fig. 3) slidably sealed in slots 51 (Fig. 4) in relay brackets 21.

Each reset bar 50 has an elongated slot 50A (Figs. 5 and 6) into which projects one of the end portions 40X (Fig. 4) of the eccentric resetting pin 40, which is also the operator for the supervisory switch.

In Fig. 2 it will appear that each of the four reset bars 50 there shown is common to several relay and pin setting units.

Means for actuating all resetting rods 50 simultaneously in a gang, includes (Fig. 2) a common link rod 54 engaged in the inner end portions of the several reset bars, and spring means 55 urging said link rod, and hence all reset bars 50, forward to a normal position, which corresponds for bars 50 to that illustrated in Fig. 6.

The resetting means further includes a rocker shaft 56 seated in journals 57 and provided with bell crank levers 58 and 59, the former of which engages the link rod 54, and the latter of which levers is linked to the plunger 60 of a resetting solenoid 61.

In the operation of the resetting means, it may be assumed that one or more bowling pins 16 have been hit and elevated, in which condition the associated resetting brackets 24 would be displaced by clockwise rotation from the set position of Fig. 5 to the tripped position of Fig. 6; and it will be observed that in this transition the resetting pin means 40—40X will move from one (left) side of the reset slot 50A toward the opposite (right) side of this slot.

When, as a result of certain control-circuit operations (not illustrated) the resetting solenoid 61 is energized, plunger 60 is attracted from its normal position of Fig. 2 to rock the shaft 56 through crank lever 59, and hence to retract the link bar 54 and shift all reset bars 50 (toward the left as viewed in Fig. 6) thereby causing the righthand margins of the several reset slots 50A to engage any tripped resetting pin means 40—40X and shift the same back toward set condition, that is to say, from the condition of Fig. 6 back to the condition of Fig. 5.

Such shifting of the reset bars 50 causes any tripped-out reset brackets 24 to be rotated anti-clockwise a sufficient distance to permit the latching means 31A on the relay armatures to engage in their respective latching notches 24X; and one of the purposes of the resilient coupling means 25 for interconnecting the several ten-pin rods 16A to their reset brackets, is to allow an over-travel for said brackets 24 when the pin rods 16A are registered against their stop brackets 27, to ensure positive latching engagement of part 31A in notch 24X.

Moreover, the yieldable connection between pin rods and reset brackets permits a latitude of operating dis-

placement and over-travel for the several reset bars 50 to ensure positive resetting of all tripped pins through the gang operation of all bars by a single driving agency such as solenoid 61.

In the circuit shown in Fig. 8, a score switch 15X is associated with each switch-operating arm 15 on the game field 12, and hence with each bowling pin relay unit 16—24—30.

Assuming the pins to be spotted or set, and that a player lodges the puck 11 on arm 15, score switch 15X would thereby be closed to energize the associated relay and tripping coil 30 via conductor 70, in consequence of which the latching and relay armature means 31—31B would be attracted in the manner heretofore described, tripping the latch means and permitting the pin 16 to be elevated to the hit position.

It will be recalled that normally the supervisory switch 38 has its contacts 39—39B closed by the pin 40 on the pin setting bracket 24.

In the circuit of Fig. 8, the operating circuit for relay winding 30 is shown completed through the normally closed supervisory contacts. Thus, when the operating circuit for any relay coil 30 is closed by a score switch 15X, the said circuit will be automatically broken by opening of switch 38 to prevent further or continued energization of coil 30 by another puck or a puck which remains lodged on switch operating arm 15.

As a further incident to each tripping operation of the pin unit relays, relay contacts 34—35 are closed to establish via conductor 73 a control circuit to a master unit 74, which is operative to control and cycle the operation of the entire game, with respect to scoring, resetting, and conditioning for replay.

After the player has made a permitted number of throws of the puck 11, the control unit 74 is operative to shut off power to the game until the latter is conditioned for further play, as by operation of the usual coin control means (not shown).

In a bowling game, the player will be allowed ten frames of play, that is the pins will generally be set up ten times in each round of operation of the game, and the player will preferably be given two chances in each frame to make a strike, spare, or other score.

The resetting of the pins for each frame and round of play is under control of the master unit 74, which in turn is controlled via conductor 76 in cyclic operation by a puck switch 75 actuated by the puck in a gravitational return to the player after each permitted throw.

In the unit of Fig. 2, there are ten pin-setting relay units corresponding to the ten pins required for a bowling game; and, to avoid confusion, it is noted that there are five additional relays on the base 22 (these being the five situated around the reset shaft and adjoining solenoid 61), which are for circuit control purposes and have no pins 16.

Each resetting operation of the master unit 74 energizes the resetting solenoid 61 via conductor 69, which results in restoring any and all tripped pins to normal set condition.

The foregoing specification, in illustrating the invention as applied to a bowling game and the use of ten-pins 16 as target elements, is not limitative of the intended scope of the invention, since a great variety of target devices may be substituted for pins 16 in apparatus other than a bowling game, and the scope of the invention is not intended to be limited by the illustrative embodiment, excepting as may be specifically set forth in the following claims.

I claim:

1. In a bowling game, a playing surface over which a playing piece is moved, a base member supported above said surface, ten-pins each normally pendently suspended from a setting and tripping unit on said base, electrically

controlled means for setting said units with said pins in

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normal and pendently spotted position above said surface, spring means urging each pin into a tripped, raised position, score-switch means for each pin and including a switch-actuating member on said surface beneath the corresponding set pin, and electromagnetic latch and release means for each said unit normally latching the corresponding pin in set position and connected for operation by one of said score switches to trip the latch means thereby for release of the associated pin for movement to raised position.

2. Apparatus as set forth in claim 1 and further provided with a supervisory switch on each said unit normally closed by means positioned by the associated ten-pin mechanism when the pin is in set condition, said supervisory switch being connected in circuit with the corresponding electromagnetic release means and the corresponding score-switch means and operating responsive to tripping of the associated pin to open the operating circuit from said associated score-switch means following energization of the electromagnetic means thereby.

3. Apparatus as set forth in claim 2 and further characterized by the provision of relay switch means adapted for connection in a master game control unit and actuated by a part of the latch means of said unit.

4. Apparatus according to claim 1 and further characterized by the provision of a hood enclosing said base member and setting and tripping units thereon, said hood including a transparent curvilinear front wall shielding said pins but spaced at its lower margin for passage therebeneath of said playing piece.

5. For a bowling game, a pin setting and tripping mechanism including a pin rod, a simulated bowling pin carried by said rod, means pivotally mounting said rod at an upper end thereof, a latch bracket pivoted coaxially with said rod, means yieldingly coupling said rod and bracket for joint pivotal movement, an electromagnet including an armature latch normally cooperable with said latch bracket to latch the latter and said pin in set, pendent condition, spring means urging said bracket to a tripped condition for movement of the rod and pin to a raised position, and electromagnetic resetting means for moving said bracket from tripped to latched set condition to position the associated pin correspondingly.

6. A pin-setting and tripping mechanism for bowling games and comprising, a relay structure including a relay coil, a spring-normalized relay armature to be attracted from normalized position by said coil, a relay switch actuated by said armature, a bowling pin structure pivotally mounted adjacent said armature and spring-urged to a tripped condition, latch means cooperable with said armature in normalized condition to latch said pin structure in a set condition, and a supervisory switch on said relay and actuated by means moved by said pin structure and connected in operating circuit with said coil, said relay switch being adapted for connection in a game circuit.

7. A pin-setting and tripping unit for bowling games and the like, and comprising a support, a pivot on the support, a pin-carrying rod pivotally carried on said pivot, a latch member pivoted on said pivot, spring means urging the latch member to a tripped position, a spring coupling between the pin rod and the latch member whereby said rod and member tend to move together, a relay coil on said support, a relay armature to be attracted by said coil from normal position, spring means urging the armature into normal position, and latching means on said armature and cooperable in normal position of the latter, with said latch member pivoted into set position, to latch said member and pin-carrying rod in set condition, and a relay switch actuated by said armature.

8. A bowling pin mechanism including a simulated bowling pin attached to the lower portion of a carrier rod, means pivotally supporting an upper end portion of said rod, an electromagnet mounted near said upper end portion of the rod, a pivoted, electromagnetically attractable latch member mounted to be attracted from a normal

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latching position by said electromagnet, spring means urging said latch member into normal latching position, spring means cooperable with said upper end portion of the rod and tending to turn the latter into a raised, tripped position to elevate said pin from a set, pendent condition in lowered playing position, and a latch member moved with said upper end portion of the carrier rod into latching relation with said latch member when the rod is in set condition as aforesaid to automatically latch the rod and pin member in said condition, and from which set condition the rod and pin are released responsive to energization of said electromagnet and attraction of the latch member thereby from normal position.

9. In a simulated bowling game apparatus of the type including simulated bowling pins pendently pivoted over an alley with electrical mechanism for actuating the pins to indicate a hit, and switch means actuated by a projectile moving on said alley to control the electrical mechanism, improvements comprising, to wit: a plurality of said pins pendently pivoted over said alley; spring means individually urging each pin to pivot into a raised, hit-indicating position; electromagnetically-released latch means for each pin automatically latching the associated pin into lowered pendent position responsive to a pivoting of the pin from raised to lowered position; means common to all pins for pivoting raised pins jointly from raised to lowered position to effect latching thereof as aforesaid; alley switch means in said alley beneath each pin in association therewith; and circuit connections between each said alley switch means and the corresponding electromagnetically released latch means for the associated pin operable to release the latch means of any lowered pin when the corresponding alley switch means is operatively engaged by a projectile moved over said alley.

10. A simulated bowling amusement game apparatus comprising a supporting structure including a playing field and a horizontally arranged panel disposed in confronting spaced relation with respect to the field, a plurality of simulated bowling pins, means providing pivotal connection between the panel and said pins, means carried by the panel and connected to said pin connecting means for pivoting the said pins from a position horizontally with respect to said panel to a position vertically with respect thereto, electromagnetic means including latch structures for latching said pins in said vertical position, spring means connected to said panel and to said pin connecting means for pivoting said pins to said horizontal position when said pins are unlatched from said latched structures, and a power circuit for said electromagnetic means including switches each having a playing piece engaging element arranged on the playing field.

11. In a simulated bowling game apparatus, the combination with a supporting structure including a playing field: of a panel overlying said field and spaced in approximate parallelism thereto, a plurality of simulated bowling pins, means suspending said pins for individual pivotal motion from a pendent, vertical position over said field, to a raised and approximately horizontal position with respect thereto, spring means cooperable with each said pin-suspending means and normally urging the latter to pivot said pins individually to said raised position, releasable latch means cooperable with each said pin-suspending means for latching the latter in a condition with the corresponding pins in said pendent position, electromagnetic latch-releasing means severally cooperable with each said latching means and energizable to release the latter to effect movement of the corresponding pin to said raised position by said spring means; and reset means for moving any of said pins, which is in raised position, to lowered position, said reset means including a plurality of bars mounted on said panel, and interconnected, for joint reciprocation, each of said bars having a driving connection with a predetermined number of said pin suspending means for movement of the latter to effect movement to lowered position, as aforesaid, electro-mechanical

driving means cooperable with said reset means and operable to effect joint reciprocation of said bars, together with an operating circuit for each of said electromagnetic latch-releasing means, switch means connected in said circuit for selective energization of said electromagnetic latch-releasing means, and switch-operating means including actuating elements for said switch means and arranged in said field for engagement and operation by a playing piece.

12. In a simulated bowling amusement game apparatus of the type including a playing field and a horizontally arranged pin-mounting panel disposed thereabove, pin-tripping and resetting means comprising: a plurality of simulated bowling pins each having a rigid suspension rod attached thereto, pin-mounting means on said panel individually mounting each rod and associated pin for pivotal movement from a lowered position wherein each rod and pin is pendently disposed over said field, to a raised position wherein said rods and pins are disposed in an approximately horizontal position over said field; means connected with each pin-mounting means normally urging each rod and its associated pin to pivot to said raised position; reset means including a plurality of pushers carried on said panel and interconnected for joint reciprocation each to engage a part of a certain number of said pin-mounting means to pivotally move said rods and dispose the associated pins in said lowered position, latch means coacting with each pin-mounting means for automatically latching the corresponding rod and pin in lowered position, an electromagnetic release device for each said latch means and energizable to release the same and effect pivotal movement of the associated rod and pin to raised position, means including an electromagnetic driver and spring means on said panel and operable to reciprocate said pushers to reset said rods and pins from raised to latched, lowered position as aforesaid, an energizing circuit for said electromagnetic release devices and including operating switches for the latter connected in said circuit; switch-actuating elements for said switches and arranged in a predetermined spaced relation in said playing field for engagement and operation by a playing piece; and circuit means for energizing said electromagnetic driver.

13. A pin-setting and tripping mechanism for bowling games and comprising a simulated bowling pin, a suspension rod attached to said pin, bracket means pivotally mounting said rod for movement between a pendent, approximately vertical, position and a raised and approximately horizontal position to dispose said pin in corresponding pendent and set, or raised and tripped, positions; spring means having driving connection with said rod to pivotally urge the same into raised position, and latch means for releasably maintaining said rod and pin in said vertical, set position, said latch means including a magnetically attractable latching member spring-urged into blocking relation with a part movable with said rod to prevent movement of the latter from said vertical set position to said horizontal tripped position, and releasing means including an electromagnet mounted opposite said attractable latch member for energization to attract the latter out of said blocking relation, and permit movement of the rod and pin to raised position.

14. A simulated bowling amusement game apparatus comprising a supporting structure including a playing field and a horizontally arranged panel disposed in confronting spaced relation with respect to the field, a plurality of simulated bowling pins, means pivotally mounting said pins on said panel, means carried by the panel and cooperable with said pin mounting means for pivoting said pins from horizontal to vertical position, spring means normally urging said pins to pivot from vertical to horizontal position, electromagnetic means including latch structures for latching said pins in said vertical position, and a power circuit for said electromagnetic means including release-switch means associated with each pin and each

having a playing-piece engaging element arranged on the playing field.

15. Apparatus according to claim 14 and further characterized by the provision of additional switch means for each pin and respectively actuated dependently upon operation of the associated release switch means and said electromagnetic means and adapted for operative connection with score control means.

16. A simulated bowling amusement game apparatus comprising a supporting structure including a playing field and a horizontally arranged panel disposed in confronting spaced relation with respect to the field, a plurality of simulated bowling pins, means providing pivotal connection between the panel and said pins, means carried by the panel and operatively associated with said pin-connecting means for pivoting the said pins from a position horizontally with respect to said panel to a position vertically with respect thereto, electromagnetic means including latch structures for latching said pins in said vertical position, spring means for pivoting said pins to said horizontal position when said pins are unlatched from said latch structures, and a power circuit for said electromagnetic means including switches each having a playing-piece engaging element arranged on the playing field.

17. A simulated bowling amusement game apparatus comprising a supporting structure including a playing field and a horizontally arranged panel disposed in confronting spaced relation with respect to the field, a plurality of simulated bowling pins, means providing pivotal connection between the panel and said pins, said pins being adapted to pivot between a position horizontally with respect to said panel and a position vertically with respect thereto, electromagnetic means including latch structures for latching said pins in said vertical position, spring means operatively associated with said pin-connecting means for pivoting said pins to said horizontal position when said pins are unlatched from said latch structures, and a power circuit for said electromagnetic means including switches each having a playing-piece engaging element arranged on the playing field, and means cooperable with a part of said pin-connecting means for moving said pins from said horizontal position to said vertical position with respect to said panel, said last named means including a reset bar slidably carried on the panel and engageable with said part of said pin-connecting means.

18. Setting and tripping mechanism for game apparatus comprising a base, a plurality of pin-setting and tripping units mounted in a predetermined pattern of alignment on said base, each of said units in turn comprising a support, a pivot on the support, a pin-carrying rod pivotally carried on said pivot, a latch member pivoted on said pivot, spring means urging the latch member to a tripped position, a spring coupling between the pin rod and the latch member whereby said rod and member tend to move together, an electromagnetic coil on said support, an armature to be attracted by said coil from normal position, spring means urging the armature into normal position, and latching means on said armature and cooperable in normal position of the latter, with said latch member pivoted into set position, to latch said member and pin-carrying rod in set condition, a reset bar slidably mounted for reciprocation in the said supports of certain of said units, pin and slot means coupling said rod with each of the latching members in said certain units for movement of said latching members from tripped to set condition by reciprocation of said bar, and electromechanical means on said base for reciprocating said bar.

19. For use in a simulated bowling game, pin-setting and tripping mechanism comprising: a simulated bowling pin; support means for mounting said pin relative to a game playing field; an arm having attachment near an end thereof with the top region of said pin to support the latter pendently above said field; means pivotally

mounting an opposite end portion of said arm on said support means; a latch member and means operatively interconnecting the same with said opposite end portion of said arm to pivot with the latter; a movable latching element yieldingly urged into automatic latching engagement with said latch member in a predetermined set position of the latter and said arm to releasably hold the latter and the appertaining pin in a pendent set position; electromagnetic means for moving said latching element to unlatch the same from said latch member; spring means acting to turn said arm in a direction away from said set position to elevate said pin and arm to a raised tripped position above said field; and reset means operable to turn said arm, pin, and

latch member back to latched condition in said set position.

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