



Fig. 1

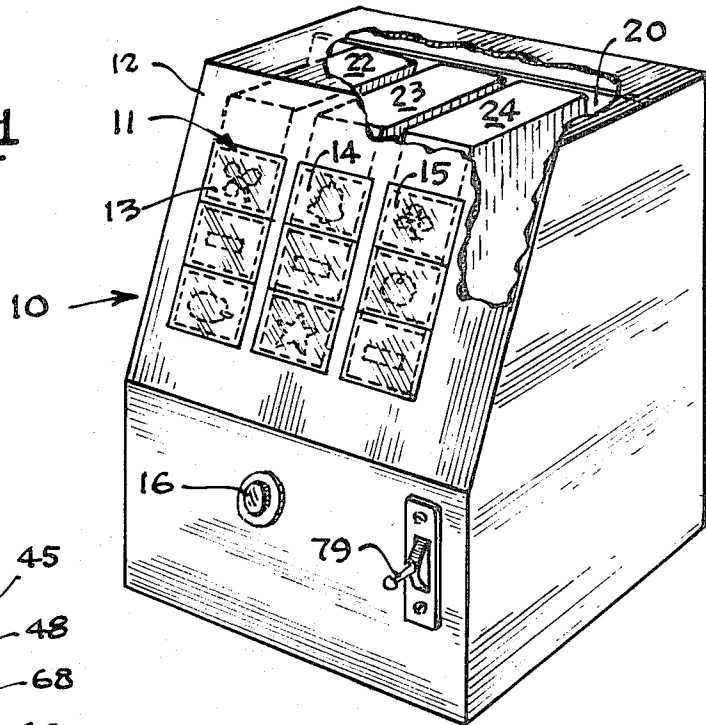


Fig. 3

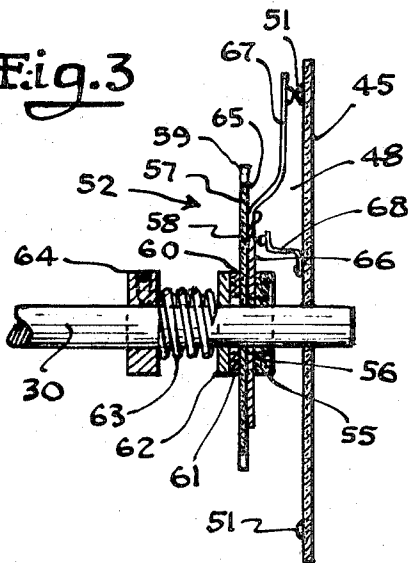
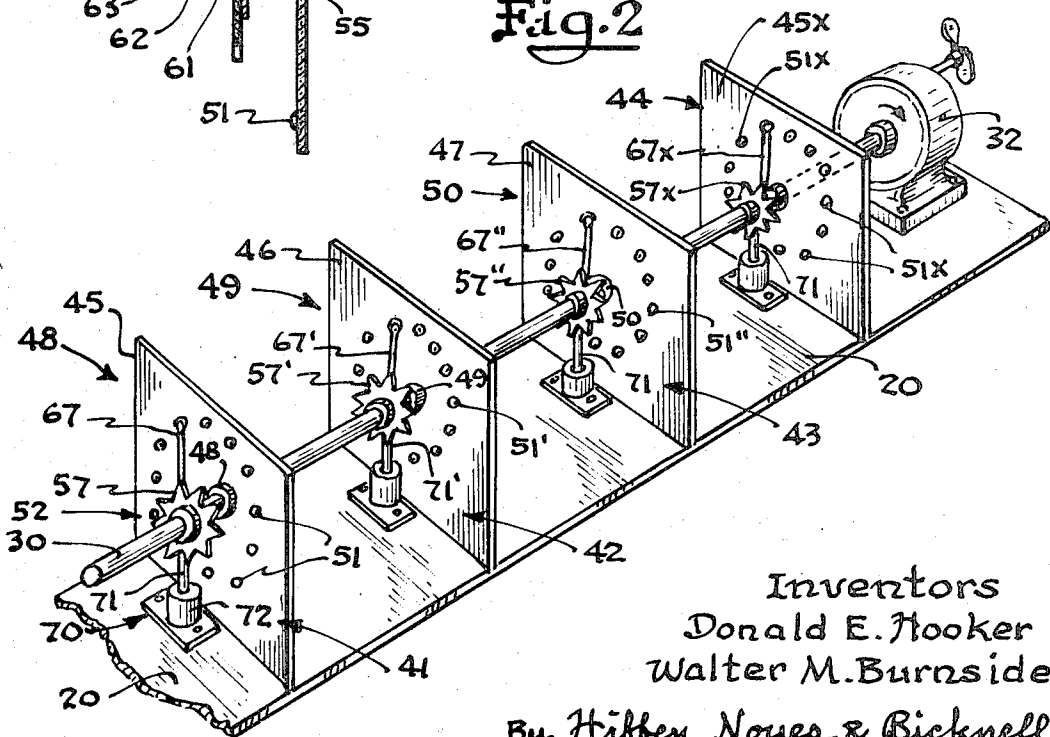


Fig. 2



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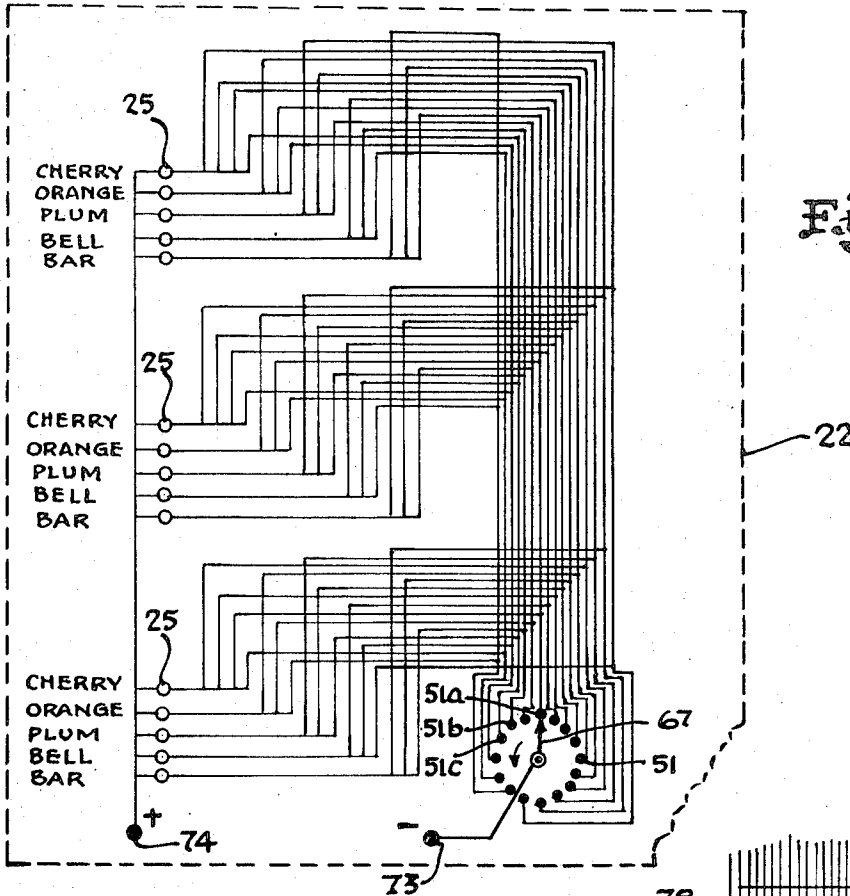


Fig. 4

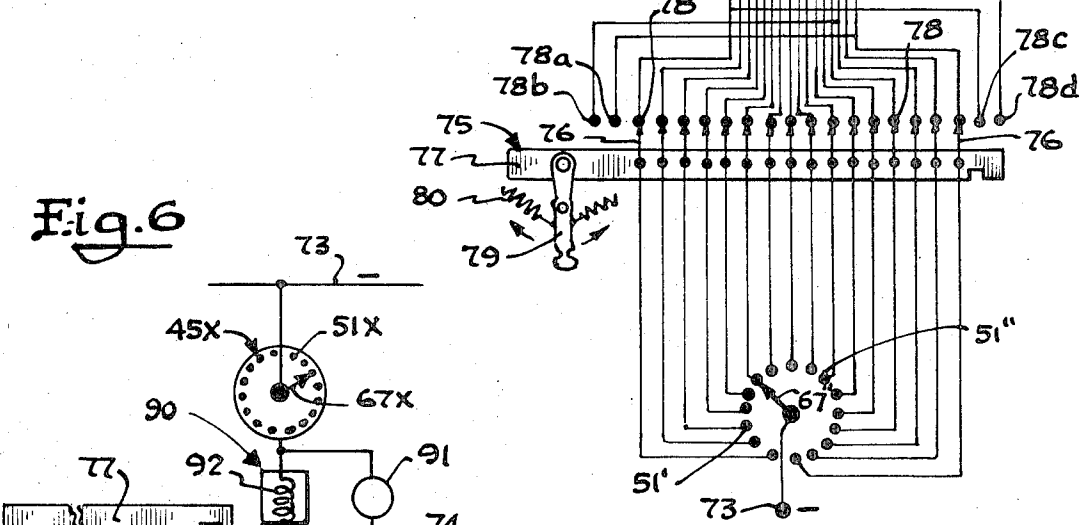


Fig. 5

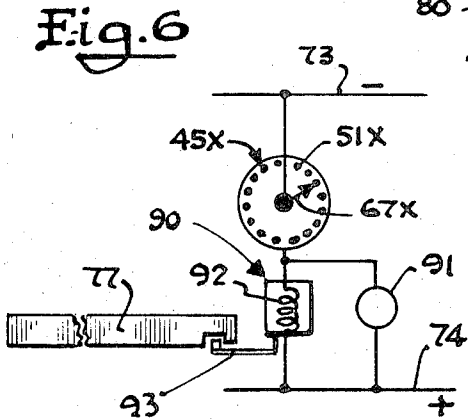


Fig. 6

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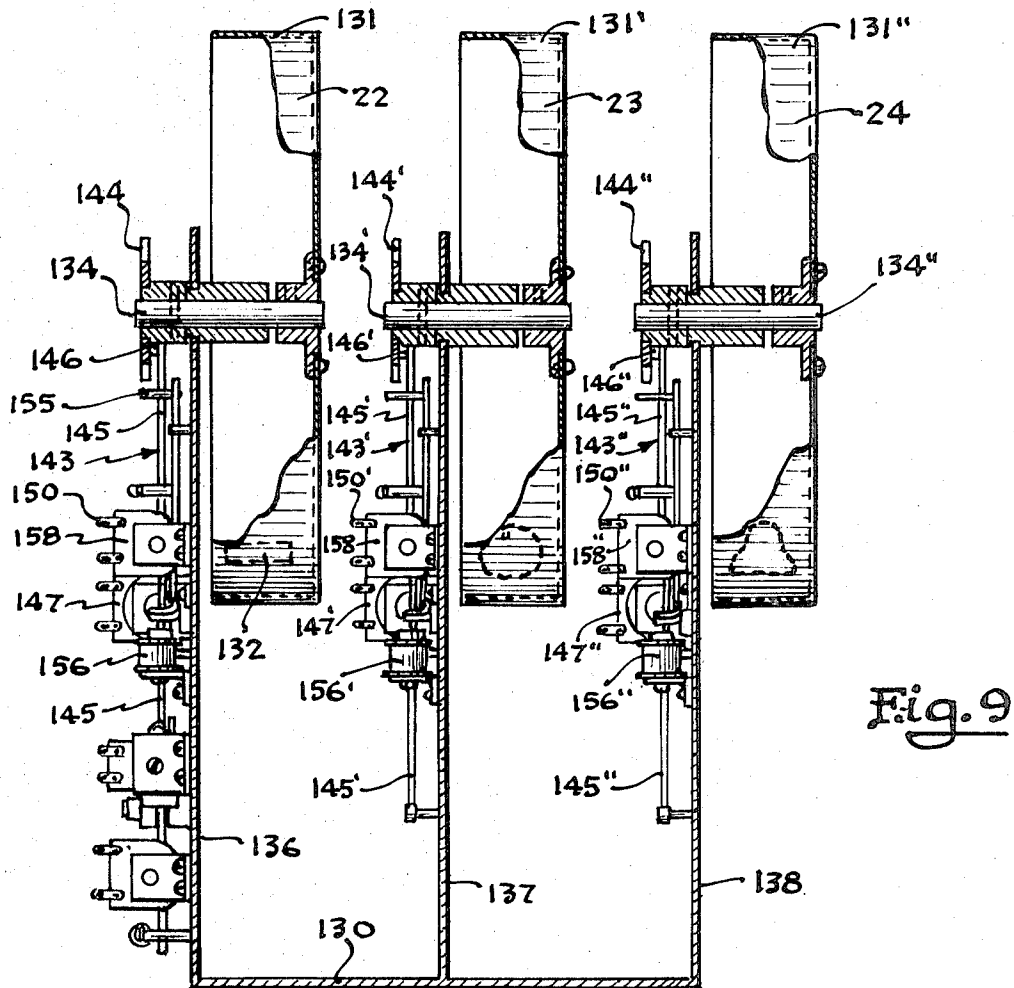


Fig. 9

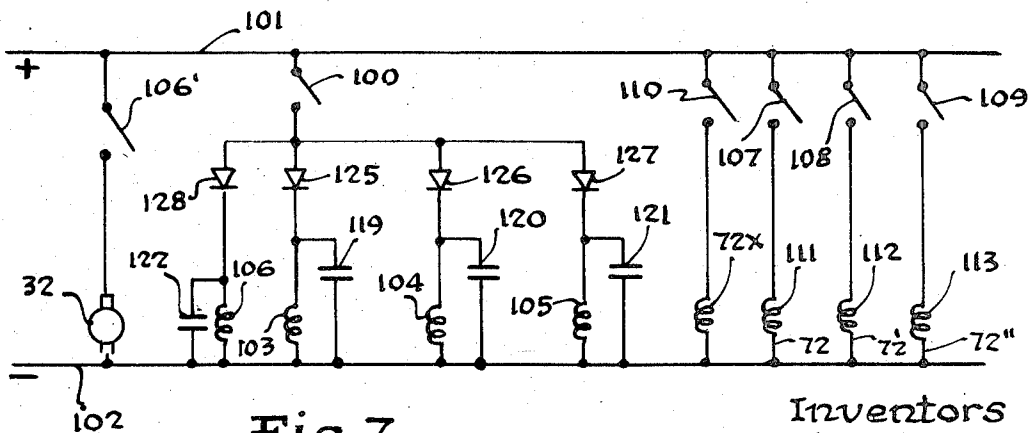


Fig. 7

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Fig. 8

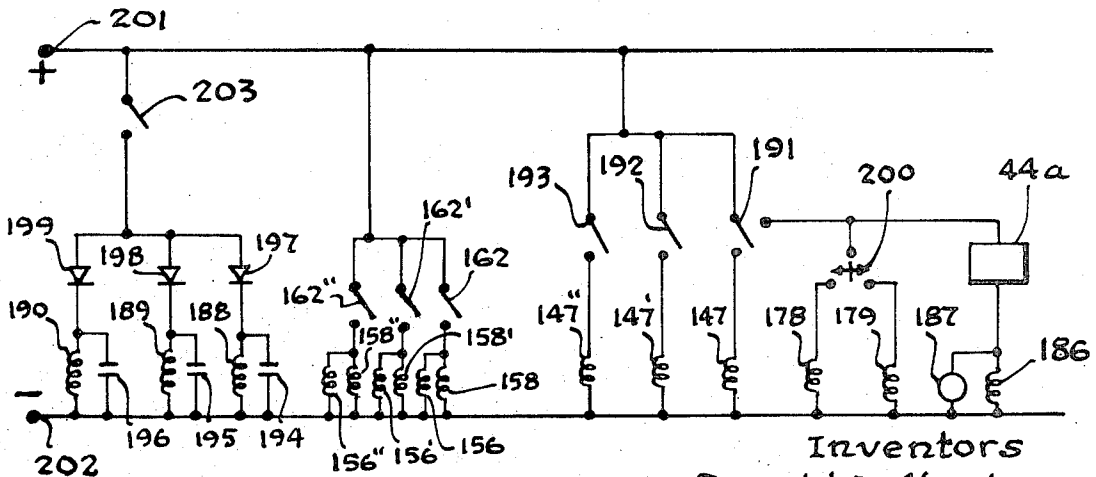
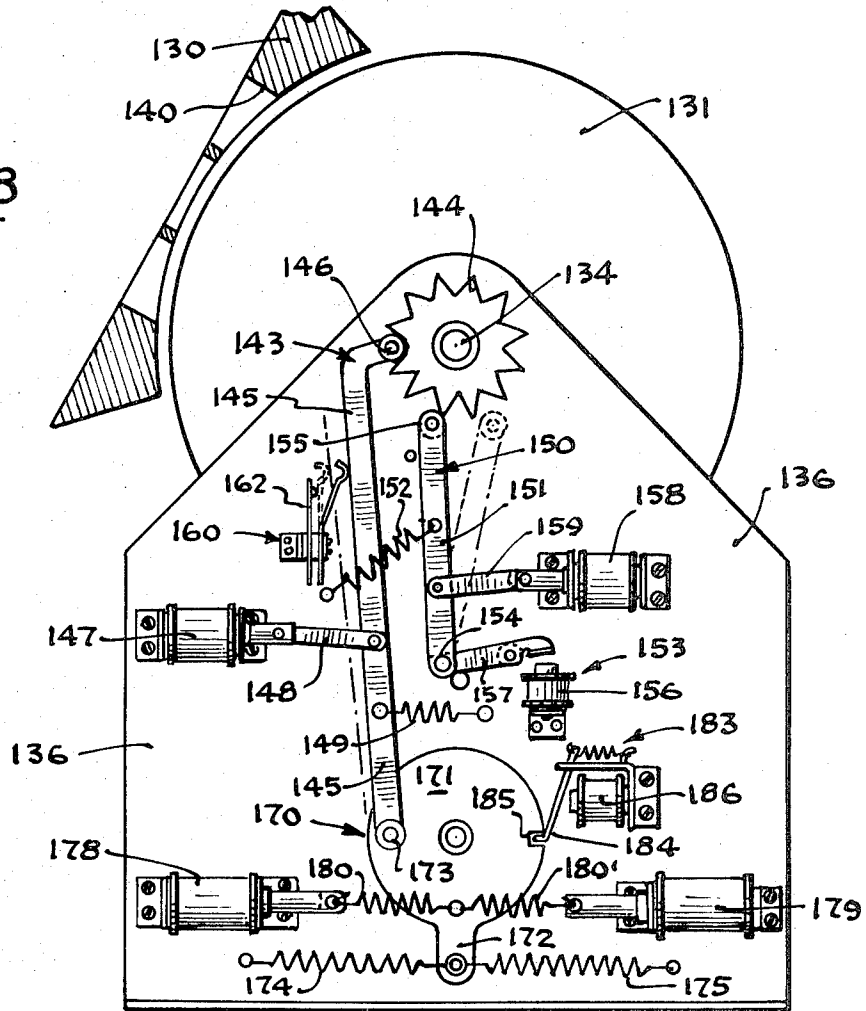


Fig. 10

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**DEVICE FOR DISPLAYING RANDOMLY  
SELECTED SYMBOL COMBINATIONS AND  
RANDOMLY OPERATIVE PLAYER OPERATED  
SYMBOL CHANGING MEANS THEREFOR.**

The present invention relates generally to amusement apparatus and more particularly to an amusement apparatus of the type commonly known as a slot machine.

Generally, the amusement apparatus of the present invention comprises symbol display means for presenting a plurality of changeable symbols within a viewing area with the symbols in side-by-side relationship to effect forming in a horizontal row or rows one or more combination of symbols which have a pre-determined play value. The means for providing the changeable symbols in the viewing area can comprise a plurality of rotatable drums or electro-optical reels mounted in side-by-side relationship. The term "electro-optical reel" is used to designate an electro-optical assembly which projects in sequence images of symbols on a self-contained translucent screen surface to simulate spinning reel action which gives the appearance of the rotation of a mechanical reel without requiring moving parts of any type. An "electro-optical reel" can be operated entirely by combinations of electronic elements as is well known in the electronic art. The foregoing electro-optical reels or the conventional rotatable drums having symbols on the periphery thereof are actuated by a player depressing a starting button or lever and at the end of a normal play cycle the sequential change of symbols is stopped by electronic, electrical or mechanical means with each reel or drum displaying a symbol in a viewing area and which together form one or more combinations of symbols in one or more horizontal rows with certain of the combinations being considered winning combinations entitling the player to a reward. Heretofore, in an amusement device of the foregoing type the only participation by the player has been the starting of the means which displays the symbols in the viewing area. It would substantially increase the amusement value of the device, if the player could take a more active part in selecting or determining the combination of symbols which appear in the viewing area and increase the frequency of winning combinations.

It is therefore an object of the present invention to provide an amusement apparatus of the foregoing type having means for increasing player participation in the selection of winning combinations.

Another object of the present invention is to provide an amusement apparatus of the instant type having means enabling a player to change one or more of the symbols at the end of a play cycle to form a winning combination or a combination having a higher play value.

Other objects of the present invention will be apparent to those skilled in the art from the following detailed descriptions and claims when read in conjunction with the accompanying drawing, wherein;

FIG. 1 is a perspective view of an amusement apparatus embodying the present invention with part of the exterior removed to show some of the interior mechanism;

FIG. 2 is a perspective schematic view of a portion of the control mechanism of the apparatus of FIG. 1;

FIG. 3 is a fragmentary vertical sectional view of part of the control mechanism of FIG. 2;

FIG. 4 is a schematic diagram of an electrical circuit associated with one part of the mechanism of FIG. 2;

FIG. 5 is a schematic diagram of an electrical circuit associated with another part of the mechanism of FIG. 2;

FIG. 6 is a schematic view of the shift bar locking mechanism and control circuit associated with the mechanism of FIG. 5;

FIG. 7 is a schematic diagram of the electrical circuit for the apparatus of FIG. 1;

FIG. 8 is a fragmentary side elevational view partially in section of a modified form of an amusement apparatus of the present invention; and

FIG. 9 is a fragmentary side elevational view partially in section of a part of the apparatus of FIG. 8; and

FIG. 10 is a schematic diagram of the electrical circuit for the apparatus of FIG. 8.

One preferred embodiment of an amusement apparatus embodying the present invention shown in FIGS. 1-7 comprises a machine having a console type cabinet 10 provided with a viewing area 11 on a front upper panel 12 of the cabinet 10. The viewing area 11 can, if desired, be subdivided into three elongated rectangular viewing areas 13, 14, 15. The cabinet section contains three electro-optical reels 22, 23, 24 mounted in side-by-side relationship with the display screen or symbol viewing surface of each reel disposed in the viewing area 11 with each of the electrooptical reels 22, 23, 24 displaying at least one and preferably three vertically aligned symbols which are changeable sequentially. The assembly of electro-optical reels 22, 23, 24 is adapted to form at least one and preferably three horizontal rows or combinations of symbols in the viewing area 11.

The electro-optical reels 22, 23, 24 each has associated therewith electro-mechanical or electronic means which enables each of the reels to display a sequence of symbols during a portion of the play cycle and which stops the sequential display of symbols to effect "indexing" each reel at the end of the play cycle so that each reel displays a symbol to form a combination in the viewing area. In addition, at least one of the electrical reels 22, 23, 24 has operatively associated therewith player activated means for shifting or changing one or more of the symbols of a combination appearing in the viewing area at the end of the play cycle.

In the embodiment of the present invention shown in FIGS. 1-7 of the drawing the symbol changing electro-optical reels 22, 23, 24 are mounted in a frame 20. A drive shaft 30 is mounted in suitable bearings with an electric motor 32 secured to the base plate 20 operatively connected to drive shaft 30 through suitable gears to effect rotation of the shaft 30 when the motor 32 is electrically driven. The drive shaft 30 has operatively associated therewith symbol selecting and index assemblies 41, 42, 43 which are electrically connected with the electro-optical reels 22, 23, 24, respectively. The drive shaft 30 preferably also has mounted thereon a random selector assembly 44 which is operatively connected with a locking means associated with the symbol shifting means provided for shifting the symbols appearing on at least one of the electro-optical reels at the end of the play cycle, as will be described in detail hereinafter.

Each of the symbol selecting and indexing assemblies 41, 42 and 43 comprises a contact plate 45, 46, 47, respectively, supported in a fixed position by the frame 20 with each of the contact plates 45, 46, 47 having a transverse passage 48, 49, 50, respectively, therein permitting the drive shaft 30 to pass freely therethrough substantially perpendicularly to the surface thereof. The contact plates 45, 46, 47 are made of electrical insulating material, such as Bakelite, and each has a set of spaced electrical conductive rivets or contact points 51, 51', 51'', respectively, affixed to the front surface thereof at equally spaced points along the circumference of a circle, the center of which coincides with the center of the passages 48, 49, 50, respectively. The number of contact points 51, 51', 51'' in each of the sets correspond to the number of electrical leads extending from the electro-optical reels 22, 23, 24, respectively, and in the embodiment illustrated there are sixteen contact points mounted on each of the plates 45, 46, 47.

Wiper assemblies 52, 52', 52'' are mounted on the drive shaft 30 opposite the set of contact points 51, 51', 51'', respectively. The wiper assembly 52, as best shown in FIG. 3, and which has a structure identical to assemblies 52' and 52'', comprises a collar 55 providing a suitable abutment surface 56 which engages an indexing ratchet wheel 57. The indexing ratchet wheel 57 comprises an outer washer shaped section 58 formed of electrical insulating material, such as Bakelite, having ratchet teeth 59 formed on the outer peripheral edge thereof and having the inner edge thereof secured to a hub section 60 which is mounted on the drive shaft 30. The number of ratchet teeth 59 formed on the ratchet wheel 57 correspond to the number of contact points 51 on the contact plate 45. The outer lateral surface of the hub section 60 is engaged by a friction washer 61 mounted on a support washer 62 with the friction washer 61 being urged into driving engagement with the ratchet wheel 59 by a spring means 63 supported by a set screw collar 64 secured to the drive shaft 30. The rear surface 65 of the washer shaped section 58 has mounted thereon a slip ring section 66 spaced electrically from the hub section 60 with an outwardly extending resilient wiper member or arm 67, the outer end section of which is adapted to form a sliding contact with the contact points 51 when the indexing ratchet wheel 57 is rotated by the drive shaft 30. The slip ring section 66 is continuously contacted by a slip ring wiper 68 mounted on plate 45 adjacent the axial passage therein. The slip ring wiper is continuously provided with electrical power for actuating the electro-optical reel 22 and is placed in electrical contact therewith by the circuitry disclosed in FIG. 4 of the accompanying drawing.

The wiper arm 67 of the wiper assembly 52 is maintained in a fixed position relative to the contact points 51 between play cycles by an index latch means 70 comprised of an indexing pawl 71 which normally engages one of the ratchet teeth 59 formed on the periphery of ratchet wheel 57 and an indexing pawl actuating solenoid 72 which is activated to effect withdrawal of the indexing pawl 71 out of contact with the ratchet wheel 57 when play of the apparatus is started, as will be described hereinafter.

The electrical circuits connecting the contact points 51 and 51' of the selecting and indexing assemblies 41 and 42 with the electro-optical reels 22 and 23, respec-

tively, are preferably identical and are illustrated in FIG. 4 of the drawing specifically showing the circuitry for the assembly 41. It will be evident from FIG. 4 that wiper arm 67 is connected in series with the electric reel 22 across lines 73, 74. When the wiper arm 67 is indexed in the position shown in FIG. 4 in contact with contact point 51a, electric current is supplied to the lights illuminating the symbols BAR-ORANGE-CHERRY of the electric reel 22. If the wiper arm 67 is advanced to contact point 51b, the symbols which will be illuminated on electric reel 22 will be PLUM-BAR-ORANGE. And, when the wiper arm 67 is advanced to contact point 51c, the illuminated symbols will be BELL-PLUM-BAR. Thus, when the wiper arm 67 is moved in a counterclockwise direction, the reel 22 is simulating the downwardly movement of a mechanical reel, as evident from the sequential movement of the "BAR" symbol from the top, to the middle and finally to the bottom row of horizontal symbols in FIG. 1.

Reel 24 which has assembly 43 associated therewith also includes means actuated by the player for changing the symbol displayed thereby at the end of the play cycle, and the circuitry therefor is shown in FIG. 5 of the drawing. Thus, a multi-pole selector switch means 75 is interposed between the contact points 51'' of assembly 43 and the 16 electric contacts 78 of the several projection lamps of the electro-optical reel 24. The multi-pole selector switch means 75 is adapted to simulate movement of the wiper arm 67'' one or more steps clockwise or counterclockwise without actually effecting rotation of the wiper assembly 52'', and in the form illustrated in FIG. 5 comprises a set of 16 movable contacts 76 mounted on a multi-pole selector switch bar 77 normally disposed directly opposite a corresponding set of fixed contact points 78 which connect with the leads from the projector lamp 25 of the electro-optical reel 24 associated therewith. The set of fixed contact points 78 also has associated therewith a number of additional fixed contacts in excess of those corresponding to the contact points 76. Thus, as shown in FIG. 5, two contact points 78a, 78b are disposed at the left end of the set of contact points 78 and two contact points 78c, 78d are disposed at the right end of the set of contact points 78. Movement of the multi-pole selector switch bar 77 one step to the left, as by pivotal movement of the lever arm 79, will effect movement of the set of flexible contacts 76 as a group to the left so that the extreme left contact point 76 will be electrically connected with the fixed contact 78a and all of the remaining contact points 76 will be moved one contact to the left of its normal position. Since fixed contact point 78a is electrically connected with the electrical lead from the lamps 25 disposed at the extreme opposite end of the set of fixed contacts 78, it will be evident that the movement of the multi-pole selector switch bar 77 has the effect of rotating the wiper arm 67'' one step in a clockwise direction, when the contact points 51'' were arranged in a circle. Similarly, the multi-pole selector switch bar 77 can be moved one step to the right to effect apparent movement of the wiper arm 67'' one step counterclockwise. It will also be evident from FIG. 5 that the multi-pole selector switch bar 77, if desired, can be moved two steps clockwise or two steps counterclockwise.

The multi-pole selector switch means 75 can be actuated manually by lever means 79, as schematically illus-

trated in FIG. 5, or if preferred can be electrically actuated by a suitable solenoid mounted within cabinet 10 and connected with the multi-pole selector switch bar 77. The switch bar 77 is preferably maintained in a neutral position by a suitable spring biasing means 80.

With the multi-pole selector switch bar 77 held in neutral position and the wiper arm 67'' disposed as shown in FIG. 5 of the drawing, the combination of symbols which will appear on the electro-optical reel 24 can be determined by substituting for the selector apparatus of FIG. 4 the wiper assembly and selector switch means shown in FIG. 5 of the drawing, since the electro-optical reel 24 has the same structure as electro-optical reel 22 shown in FIG. 4. It will thus be evident that the switch bar 77 in neutral position and with wiper arm 67'' in the position shown in FIG. 5 the symbols appearing on reel 24 will be PLUM-BAR-ORANGE. When the switch bar 77 is moved one step to the left in FIG. 5, the symbols appearing on reel 24 will be BELL-PLUM-BAR, and when switch bar 77 is moved one step to the right the symbols appearing on reel 24 will be BAR-ORANGE-CHERRY.

The means for changing a symbol at the end of a play cycle in the preferred embodiment has operatively associated therewith control means which normally act to prevent the player changing the symbol at the end of the play cycle and in the embodiment shown comprises means for locking the multi-pole selector switch bar 77 in a fixed position, such as the switch bar locking means 90 shown in FIG. 6. The control means also has associated therewith means which unlocks the switch bar 77 and permitting the player to activate the means for changing the symbol. Preferably a random selector means, such as selector assembly 44, is placed in the electric circuit of the switch bar locking means 90 to effect release of the locking means 90 but only on random selected occasions during successive plays of the apparatus. If desired, however, a manual or coin operated switch can be associated with the control means in place of a random selector means.

The random selector assembly 44 which controls the multi-pole selector switch bar locking means 90 preferably has the same construction as the selecting and indexing assembly 41 previously described and comprises a contact plate 45X supported in a fixed position on the frame 20 through which a drive shaft 30 extends perpendicular to the plate 45X. A plurality of electrical conductive rivets or contact points 51X are mounted along a circular path on the plate 45X at equally spaced intervals. The wiper assembly 52X is mounted on the drive shaft 30 opposite the contact points 51X and is constructed the same as the assembly 52. Only certain of the contact points 51X are electrically connected with the electrical current lines 73, 74 and the switch bar locking means 90. The remaining contact points 51X are dummy contacts and have no electrical connection with the lines 73, 74 and the switch bar locking means 90.

As shown in the schematic diagram of FIG. 6 an electric signal light 91 is placed in parallel with the solenoid 92 of the switch bar locking means 90 and both receive electric current from lines 73, 74 only when the random selector means 45X supplies current thereto. The electric signal lamp 91 will thus be lighted only when a selected contact 51X is in electrical contact with the supply lines 73, 74 (and the solenoid 92 has been activated), thereby indicating that the switch bar locking

pawl 93 is disengaged from the switch bar 77. The player can move the switch bar 77 to shift the symbols illuminated in electric reel 24, as above described, only when the lamp 91 is lighted.

FIG. 7 shows a schematic diagram of the electric circuitry employed with the selecting and indexing assemblies 41, 42 and 43 and the associated electro-mechanical elements which control the symbols displayed by the electro-optical relays 22, 23 and 24 at the end of each play cycle. The starting switch 100 which connects across electric current supply lines 101, 102 is activated by the starter button 16 mounted on the front panel of the cabinet 10. When switch 100 is closed by depressing starter button 16 electromagnet actuated relays 103, 104, 105 and 106 are activated and close relay switches 107, 108, 109 and 110 associated with relays 103, 104, 105 and 106, respectively. The relay switches 107, 108, 109 and 110 cause index solenoids 72, 72', 72'' and 72X, respectively, to be activated and draw the indexing pawls 71, 71', 71'' and 71X, respectively, out of engagement with the ratchet wheels 57, 57', 57'', 57X of assembly 41 and the corresponding ratchet wheels associated with assemblies 42, 43 and 44, respectively, and permitting the drive shaft 30 to rotate the assemblies 52, 52', 52'' and 52X. A switch 106' actuated by relay 106 starts electric motor 32. As the wiper assemblies 52, 52', 52'' are rotated, the electro-optical reels 22, 23, 24 are activated and form in sequence the selected symbols in the viewing areas 13, 14, 15, respectively. Diodes 125, 126, 127 and 128 are used between the switch 100 and the relays 103, 104, 105 and 106, respectively, to prevent interaction between the several relay circuits.

When the starting switch 100 is closed the condensers 119, 120, 121 and 122 in parallel with the relays 103, 104, 105 and 106, respectively, are charged to the voltage level of the lines 101, 102. The condenser 119 has a lower capacity than condenser 120, the condenser 120 has a lower capacity than condenser 121, and condenser 121 has a lower capacity than condenser 122.

When the starter button 16 is released and starter switch 100 is opened, all the condensers 119, 120, 121 and 122 begin to discharge through the relay coil associated therewith. As soon as condenser 119 discharges through the coil of the relay 103 to a voltage level lower than the hold-in voltage of the magnet of the relay 103, the armature of the relay 103 will drop out, opening the relay switch 107 and causing the indexing pawl 71 to be released and re-engage the ratchet wheel 57 to hold or "index" the wiper assembly 52 in a fixed position with the wiper arm 67 engaging one of the contact points 51, causing a set of three symbols to be "locked" in the viewing area occupied by electrooptical reel 22. As the voltage in the remaining condensers 120, 121, 122 drop below their hold-in voltage, the indexing pawls 71', 71'' and 71X, associated with the wiper assemblies 52', 52'' and 52X, respectively, re-engage the ratchet wheel thereof in pre-determined time-delayed sequential order after a limited period of free rotation with the indexing pawl 71X associated with assembly 52X being the last to re-engage with the ratchet wheel 57X associated therewith. With the indexing pawls engaging the assembly with which it is operatively associated, each of the electro-optical reels 22, 23, 24 will display a set of three vertically arranged symbols in side-by-side relationship with an adjacent



set of three vertically arranged symbols which together form three horizontal rows containing three symbols each, with one or more of the horizontal rows comprising a play combination for the purpose of determining whether a winning combination has been made. If the selector assembly 44 has been "indexed" so that wiper arm 67X thereof is in contact with a "live" electrical contact point 51X effecting release of the multi-pole selector switch bar 77, the multi-pole selector switch means 75 can be operated by the player to change the symbols or indicia displayed by the electro-optical reel 24 in the viewing area 15 of the cabinet 10, as described heretofore.

In the modified form of the invention shown in FIGS. 8-10 of the drawing, the amusement apparatus comprises a console-type cabinet 130 with preferably three mechanical reels 131, 131', 131'' disposed in spaced side-by-side relationship rotatably mounted on a horizontally disposed axles 134, 134', 134'' supported by three spaced vertically disposed support frames or panels 136, 137, 138 secured to the cabinet 130. Each of the reels 131, 131', 131'' has a plurality of symbols or indicia 132 which in the form illustrated consists of twelve equally spaced symbols formed on the peripheral surface of each reel and with at least one and preferably three of the symbols on each of the reels being visible through a viewing area or window 140 formed in the front panel of the cabinet 130. Each of the mechanical reels 131, 131', 131'' has associated therewith electro-mechanical reel indexing means 143, 143', 143'' and reel spinning means 150, 150', 150''. At least one of the said mechanical reels also has associated therewith a reel shift means 170 which in the embodiment illustrated is adapted to rotate reel 131 thirty degrees in a clockwise or a counterclockwise direction, as will be described in detail hereinafter.

Each of the reel indexing means 143, 143', 143'' associated with the reels 131, 131', 131'', respectively, preferably comprises ratchet wheel 144, 144', 144'', with twelve uniformly spaced ratchet teeth corresponding to the number of symbols on the periphery of the reels 131, 131', 131'', respectively. Each of the ratchet wheels 144, 144' and 144'' is secured to a supporting rotatable axle 134, 134' and 134'', respectively, and each is held in fixed relationship with the mechanical reel 131, 131', 131'', as each reel is also secured to the rotatable axle 134, 134', 134'', respectively. The ratchet wheel 144 is normally held in a fixed or "indexed" position by an indexing pawl 146 formed at the upper end of an index lever arm 145. The lever arm 145 has the lower end thereof pivotally supported on the peripheral of a rocking wheel 171 associated with a reel shift means 170 which will be described in detail hereinafter. The upper end of lever arm 145 has an indexing pawl 146 which is normally held in engagement with the ratchet wheel 144 by spring means 149 and is adapted to be drawn transversely away from the ratchet wheel 144 by an indexing release solenoid 147, the piston element of which is connected to the lever arm 145 between the ends thereof by means of suitable linkage means 148. When the index release solenoid 147 is activated, the index lever arm 145 is drawn away from the ratchet wheel 144 a sufficient distance to disengage index pawl 146 from the ratchet wheel 144, enabling reel 131 to be freely rotated. The reel indexing means 143' and 143'' associated with reels 131' and 131'', respectively, have a structure similar to that of the index-

ing means 143, except that the lever arms 145' and 145'' are pivotally mounted directly on the support panels 137, 138, respectively.

The electro-mechanical reel spinning means 150, 150', 151'' associated with reels 131, 131', 131'', respectively, are preferably identical, and reel spinning means 150 is best illustrated in FIG. 8. The spinning means 150 is comprised of a spinning lever arm 151 normally held in a lowered or retracted position out of engagement with the ratchet wheel 144 by suitable resilient means 152 and by the fulcrum control means 153 which normally allows the fulcrum 154 of the lower end of the arm 151 to remain in its lowermost position of vertical adjustment, but which raises the fulcrum 154 sufficiently to allow the transverse pin 155 on the upper end of the lever arm 151 to engage the wheel 144 when the fulcrum solenoid 156 pivotally moves the outer end of lever member 157 upwardly. The lever arm 151 is operatively connected with a spin solenoid 158 through the piston element thereof which is connected to the lever arm 151 by linkage means 159. When the solenoids 156 and 158 are activated by means of switch means 160 as hereinafter described, the lever means 157 and linkage means 159 rapidly cause the pin 155 on the upper end of the spinning lever arm 151 to engage the ratchet wheel 144 and cause the ratchet wheel 144 and reel 131 associated therewith to rotate relatively rapidly in a counterclockwise direction. The fulcrum solenoid 156 and the spin solenoid 158 are simultaneously activated by having the indexing lever arm 145 close a leaf spring switch 162 so disposed that the switch 162 is closed when the indexing lever arm 145 and panel 146 are moved away from the ratchet wheel 144 a distance sufficient to permit the reel 131 being freely rotatable.

The reel or symbol display shift means 170 which is included preferably only in the operating mechanism of reel 131 (but, if desired, can be included with reels 131' and 131'') is adapted to permit a player to shift rotatably the reel 131 so that one of the symbols or indicia in the play combination appearing in the viewing window 140 at the end of the play cycle can be changed by rotatably shifting the reel 131, at least one step clockwise or one step counterclockwise in order to improve the value of the play combination and thereby increasing the player's participation in the play cycle. The reel shift means 170 shown in operative association with reel 131 in FIG. 8 comprises a rocker wheel 171 pivotally mounted on the support frame 136 with the wheel 171 having a rocker arm 172 extending downwardly therefrom. The rocker wheel 171 is normally held in a fixed position by the rocker wheel locking means, such as the latch means 183. The lower end of indexing lever arm 145 is pivotally secured to a stud 173 extending perpendicularly from the surface of the rocker wheel 171 adjacent the peripheral edge thereof and preferably at a point on a horizontal diameter line of the rocker wheel 171 when the wheel 171 is held in "neutral" position. When the latch means 183 is out of locking engagement with the rocker wheel 171 and the pawl 146 in engagement with the ratchet wheel 144, movement of the rocker wheel 171 clockwise causes the indexing lever arm 145 and panel 146 to be moved upwardly and rotates the reel 131 one twelfth of a revolution in a clockwise direction, and when the rocker wheel 171 is moved in a counterclockwise direction, the index arm 145 and pawl 146 are moved down-

wardly, causing the reel 131 to rotate one-twelfth of a revolution in a counterclockwise direction. The rocker arm 172 is normally held in a "neutral" or centered position by two equal and oppositely disposed rocker arm spring means 174, 175. The rocker wheel 171 is moved in a clockwise or counterclockwise direction by means of solenoid assemblies 178, 179, respectively. Spring means 180, 180' are provided between the rocker wheel 171 and the solenoid assemblies 178, 179, respectively, to prevent placing undue strain on the rocker wheel 171 by the index lever arm 145 and associated elements in the event solenoids 178 and 179 are inadvertently activated while the rocker wheel latch means 183 is in locking engagement with the rocker wheel 171.

As best shown in FIG. 8, the locking means which comprises the latch means 183 includes a latch pawl 184 which engages a recess 185 formed in the periphery of the rocker wheel 171 and in which the pawl 184 is normally seated. When the latch solenoid 186 is activated to withdraw the latch pawl 184 clear of the recess 185 in the rocker wheel 171, the rocker wheel 171 can be rotatably moved clockwise or counterclockwise by the solenoid assemblies 178, 179, respectively, in response to a suitable player actuated switch control lever mounted on the front surface of the console 130.

While the latch solenoid 186 can be controlled by a player operated switch which is operated in conjunction with the player activated means for changing a symbol at the end of each play cycle, it is preferable that the latch solenoid 186 have operatively associated therewith control means comprising a random selector means, such as selector means 44a having the structure described for the selector assembly means 44 in the embodiment of FIGS. 1-7. The control means comprising the random selector means 44a in the present embodiment is placed in the operating electrical circuit of the latch solenoid 186 and permits the latch solenoid 186 effecting withdrawal of pawl 184 and release of the shift means 170 only when the selector means 44a has connected the solenoid 186 with a source of electric current. If desired, the locking means 183 can be omitted, and the player activated symbol changing means can be rendered operative simply by having a random selector means, such as means 44a, placed in the electric circuit of solenoid assemblies 178, 179. Similarly, it should be understood that a random selector means, if desired, can also be placed in the assembly of electrical and/or electronic elements comprising the player actuated means for changing one of the images forming the first combination in the previously described embodiment using electro-optical reels.

Any conventional random selector means can be operatively connected in the electrical circuit of the latch solenoid 186. The signal light 187 in parallel with the latch solenoid 186 will be lighted only when the solenoid 186 has been activated to release the latch means 183 holds, thereby indicating that the drum or reel rotating means for changing one of the symbols of the combination can be operated by the player at the end of the play cycle.

FIG. 10 of the drawing shows a schematic diagram of the electric circuitry associated with the modified form of the apparatus shown in FIGS. 8-9. Thus, when the starter switch 185 which connects across electric lines 186, 187 is closed by depressing a starter button (not shown) mounted on the surface of an upper panel of

the cabinet 130, the solenoid actuated relays 188, 189, 190 are closed and which in turn close relay switches 191, 192, 193, respectively. The closing of relay switches 191, 192, 193 activates the indexing release solenoids 147, 147', 147'', causing lever arms 145, 145', 145'' and index pawls 146, 146', 146'' to be withdrawn from ratchet wheels 144, 144', 144'' and effect closing spin switches 162, 162', 162'', respectively, which activates the solenoid 156, 156', 156'' and 158, 158', 158'', respectively; whereby the reels 131, 131' and 131'' are rotated.

When solenoid relays 188, 189, 190 are closed, the condensers 194, 195 and 196, respectively, are charged to the voltage level which exists between the lines 201, 202. Condenser 196 has a smaller capacity than condenser 195 and condenser 195 has a smaller capacity than condenser 194. Diodes 197, 198, 199 are used between starter switch 185 and relays 188, 189, 190, respectively, to prevent interference between the respective relay circuits.

When the starter button is released so that starter switch 185 opens, the condensers 194, 195, 196 commence to discharge through the coils of relays 188, 189, 190, respectively, and as soon as a voltage level lower than the hold-in voltage of the respective relays 188, 189, 190 is reached, the relay switches 191, 192, 193 open, allowing the indexing solenoid 147, 147', 147'' controlled thereby to be de-energized, and allowing the index pawls 146, 146', 146'' associated therewith to re-engage the ratchet wheel 144, 144', 144'', respectively, and index the reels 131, 131', 131''. It will be evident that the reel 131'' associated with index solenoid 147'' and condenser 196 will be indexed first, followed in short succession by reel 131' which is associated with index solenoid 147' and condenser 195, and finally reel 131 associated with index solenoid 147 and condenser 194 will be indexed last. When all of the reels 131, 131', 131'' have been indexed, each of the reels is so disposed in the viewing window 140 to display preferably a set of three vertically arranged symbols in side-by-side relationship which form three horizontal rows with one or more of the horizontal rows comprising a play combination for the purpose of determining whether a winning combination has been made.

If the rocker wheel latch means 183 associated with reel 131 has been activated, as by a manually operated switch or by a random selector means of the type previously described, the latch solenoid 186 will be activated and release the rocker wheel 171, permitting stepwise rotatable movement thereof in a clockwise or counterclockwise direction when the operator operates a switch means 200, such as a dipole switch, to electrically activate either solenoid 178 or 179 to effect movement of the rocker wheel 171 and the index lever arm 145 associated therewith, either upwardly or downwardly, respectively, one-twelfth of a revolution so as to change the symbols displayed by the reel 131 in the viewing window 140.

While the foregoing embodiments of the present invention employ electro-mechanical means to effect displaying the sequence of symbols and stopping the sequential change of symbols or "indexing" of the symbol display means to form in the viewing area the various visible combinations of symbols or indicia some of which are designated as being winning combinations having a predetermined value and also employ electro-

mechanical means for shifting certain of the symbols visible in the viewing area of the apparatus at the end of the play cycle, it will be understood by those skilled in the electronic art that the foregoing operations with the electrooptical reel can be performed entirely by electronic means. Thus, for example, the various symbols appearing in the viewing area of the amusement apparatus of the present invention can be formed by projecting onto a read-out screen of an electronic reel controlled by an integrated circuit which is fully transistorized to provide the desired combinations of symbols without the use of any moving parts. The means for shifting one or more of the symbols appearing in the viewing window of the amusement apparatus at the end of each play cycle will, however, always be controlled by a player actuating a control lever or buttons which will, if not temporarily inactivated by a random selector means, produce the desired shift or change of at least one of the symbols preferably at the end of the play cycle in order to produce a new winning combination or one having a higher value.

It should also be understood that the symbol changing means with which the control lever or button actuated by the player is operatively associated can be a mechanical or electro-mechanical combination or an electric or electronic circuit which functions when actuated by a player to change at least one of the symbols

of the play combination formed in the viewing area on at least random selected occasions during a series of plays of the apparatus.

We claim:

1. A slot machine-type amusement device having a plurality of display elements operative during a play cycle for displaying sequentially in a viewing area a plurality of slot machine-type symbols with each of said elements displaying in a selected portion of said viewing area a randomly selected slot machine-type symbol which together display at the end of the sequential display period a first combination of said symbols having a predetermined play value, the improvement comprising; a player actuated symbol changing means associated with one of said display elements which removes one of the said randomly selected symbols from one selected portion of said viewing area without introducing the said symbol into another portion of said viewing area and which thereafter displays another slot machine-type symbol in said one selected portion of the viewing area to form a second combination which can have an increased play value, and said player actuated symbol changing means having associated therewith a random selector means for rendering inoperative at random the said player actuated symbol changing means.

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