

Jan. 11, 1966

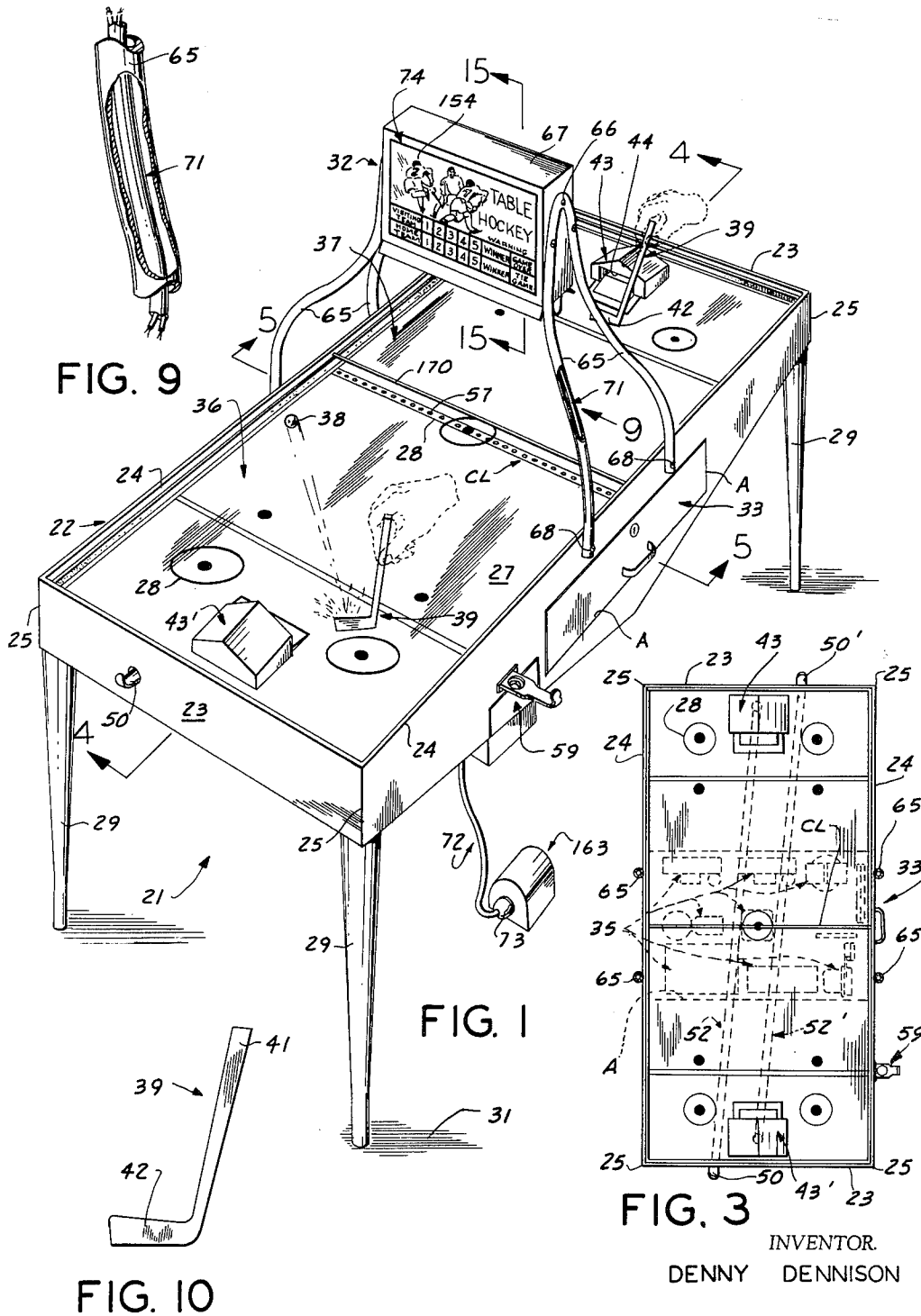
D. DENNISON

3,228,688

GAME APPARATUS INCLUDING SCORING AND TOTALIZING MEANS RESPONSIVE
TO THE STATE OF A GAME BEING PLAYED AND VISIBLY
OBSERVABLE SCORE DISPLAY MEANS COUPLED THERETO

Filed Dec. 18, 1962

5 Sheets-Sheet 1



INVENTOR.
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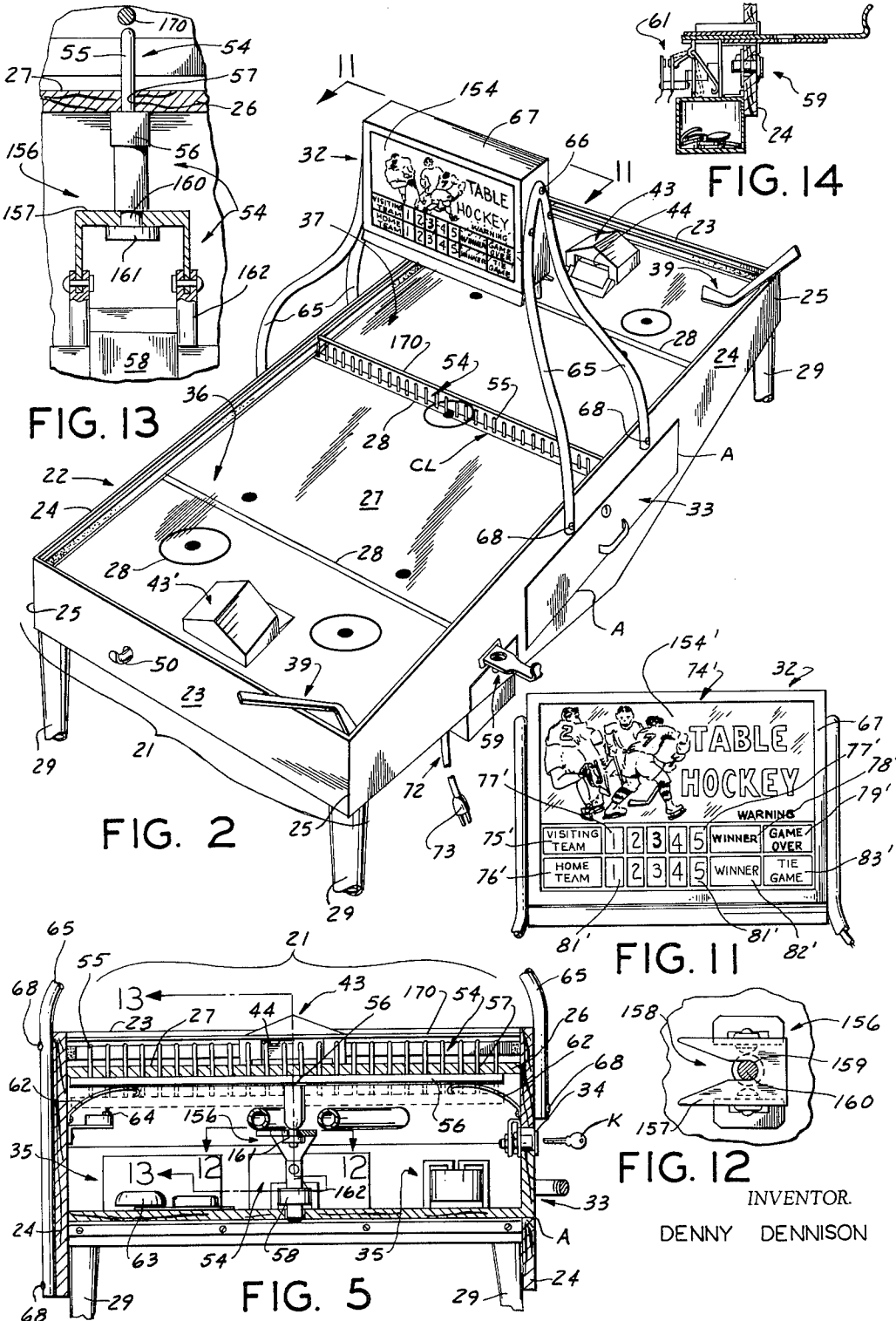
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5 Sheets-Sheet 5

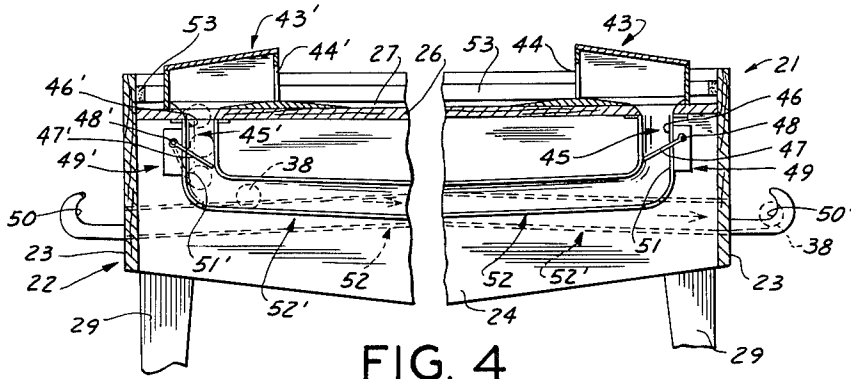


FIG. 4

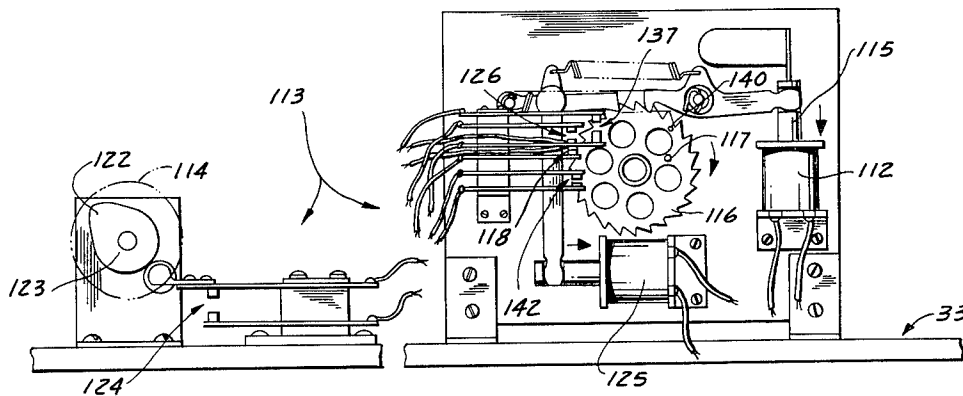


FIG. 7

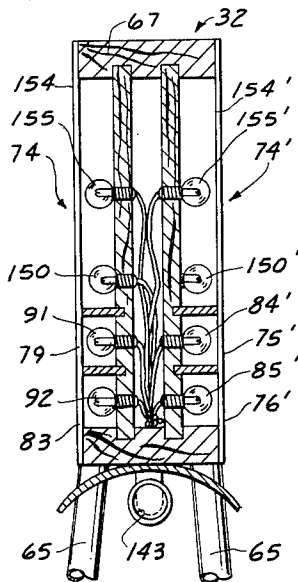


FIG. 15

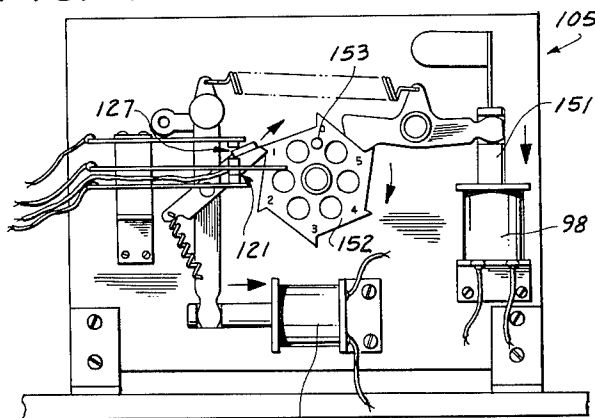


FIG. 8

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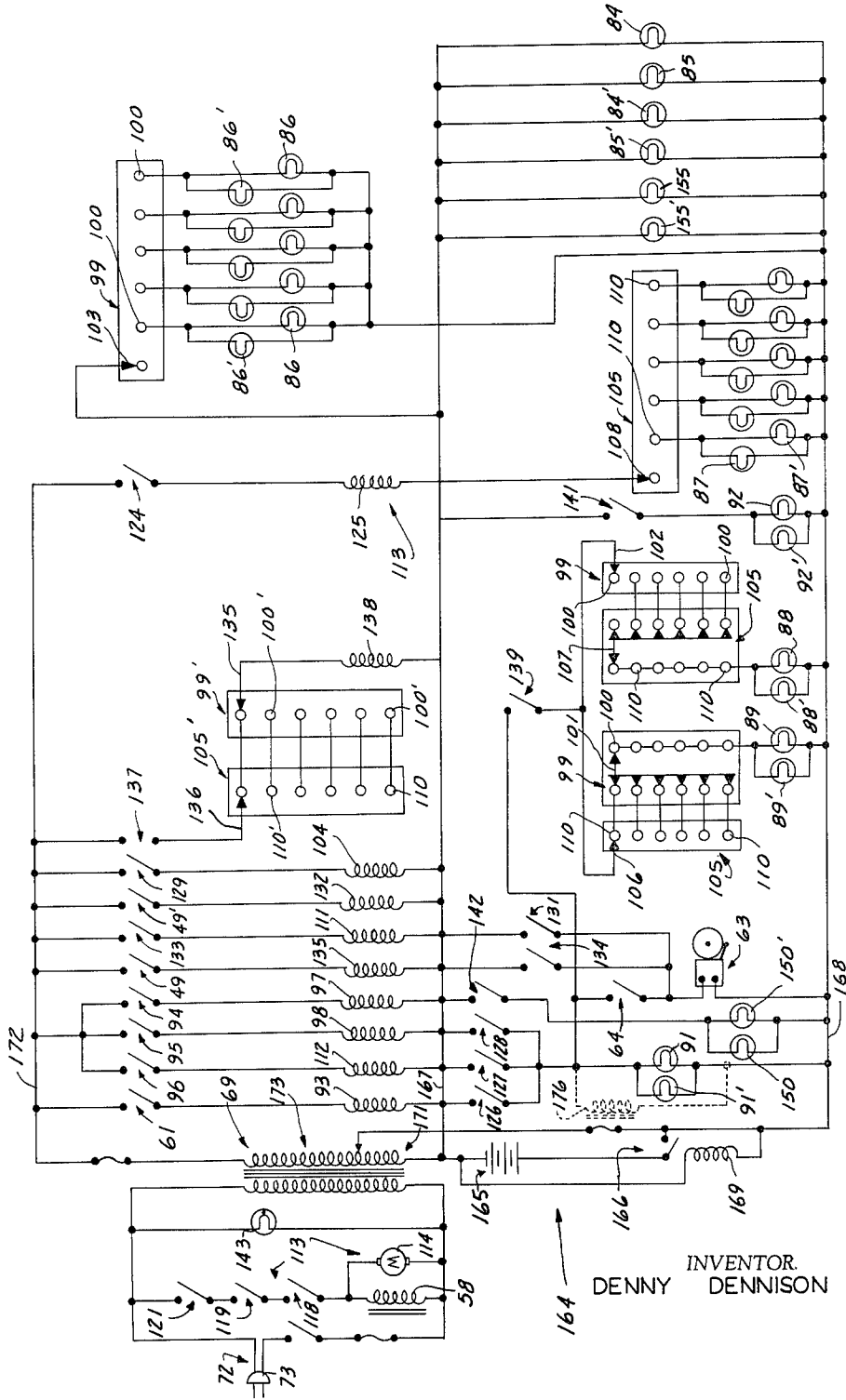
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FIG. 6



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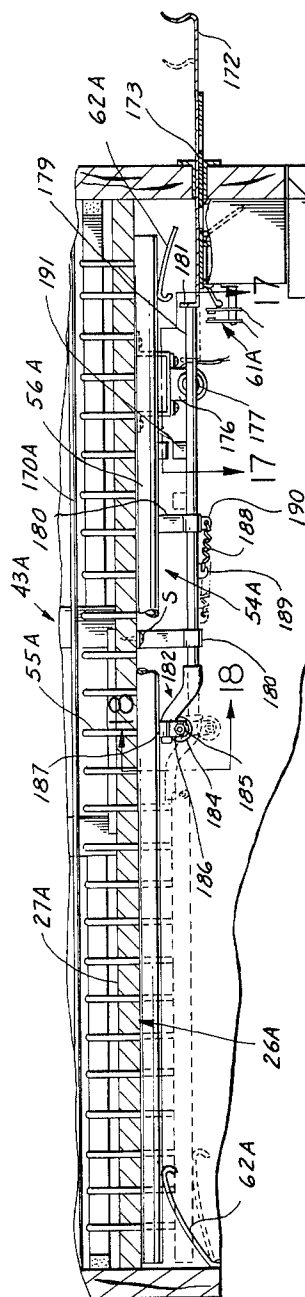


FIG. 16

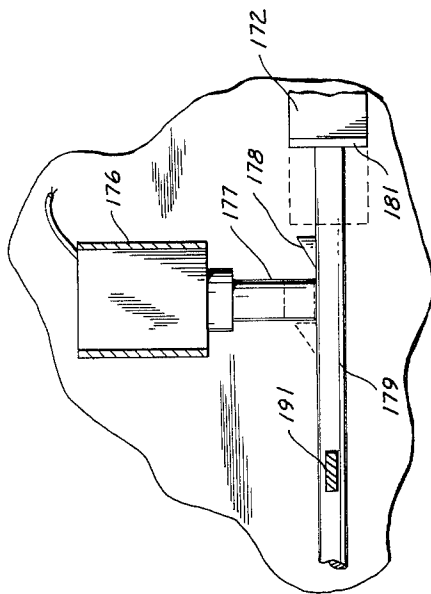
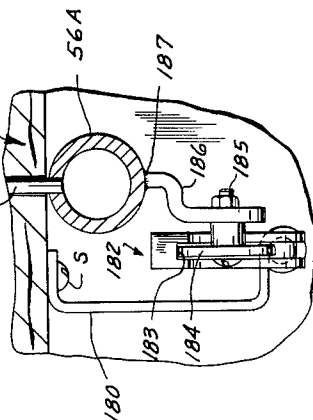


FIG. 17



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GAME APPARATUS INCLUDING SCORING AND TOTALIZING MEANS RESPONSIVE TO THE STATE OF A GAME BEING PLAYED AND VISIBLY OBSERVABLE SCORE DISPLAY MEANS COUPLED THERETO

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2 Claims. (Cl. 273—85)

Generally speaking, the present invention comprises a game apparatus and, more particularly, in one preferred exemplary form, it comprises a coin-activated table hockey game apparatus provided with means for automatically scoring the game as it progresses, for automatically totalizing the game score as it progresses, and for visibly displaying the score of each of the players of the game at all times up to and including the end of the game, at which time it visibly indicates which player has won the game.

It is an object of the present invention to provide game apparatus of the character referred to above which, in one preferred form, also includes unauthorized game-play-prevention barrier means adapted to be effectively operative after completion of each authorized game and to thereby effectively divide the playing surface of the game into two portions in a manner which effectively prevents the game from being played during such periods. Upon the beginning of the next authorized game play period (such as by the insertion of an acceptable coin (or plurality of coins) into the coin receiver, or upon any other type of predetermined game-play-initiating authorization action) the unauthorized game-play-prevention barrier means is automatically retracted so that the game is placed in playable condition.

It is a further object of the present invention to provide game apparatus of the character referred to above including score display means for visibly indicating the score, at any time, of each individual player and for indicating which player is the winner of the game at the end of the game, as mentioned above; said score display means being additionally provided with means for indicating that the game ended in a tie.

It is a further object, in one preferred form of the invention, to provide the score display means with means for visibly indicating that a game is over.

It is a further object of the present invention to provide game apparatus of the character referred to above including game terminating means for automatically terminating the game when either player has reached a predetermined game-winning score or when a predetermined game-play period of time has elapsed, whichever event occurs first.

It is a further object to provide game apparatus of the character referred to hereinbefore wherein the coin-receiver includes coin-operable effective switch means and associated reset means for automatically resetting the entire game apparatus to beginning-play relationship upon receipt of the proper coin (or plurality of coins).

It is a further object of the present invention to provide a novel electrically operated game apparatus embodying the broad generic features referred to above, and/or any of the specific aspects thereof referred to above, and which is of relatively simple, inexpensive, foolproof, easy-to-service construction as compared to prior art game apparatuses whereby to be conducive to widespread use thereof.

Further objects are implicit in the detailed description which follows hereinafter (which is to be considered as exemplary of the invention but not specifically

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limiting it) and said objects will be apparent to persons skilled in the art after a careful study of the detailed description which follows hereinafter.

For the purpose of clarifying the nature of the present invention, one exemplary embodiment is illustrated in the hereinbelow-described figures of the accompanying drawings and is described in detail hereinafter.

FIG. 1 is a reduced-size perspective view of one exemplary embodiment of the game of the present invention in play position or relationship, with a simulated puck (actually comprising a small marble or the like, although not specifically so limited) on the hockey field-simulating surface and with one offensive player's hockey stick in the position which it has assumed as a result of propelling the puck toward the opposite goal and with the other defensive player's hockey stick in a defensive position for the purpose of protecting his goal.

FIG. 2 is a fragmentary perspective view generally similar to FIG. 1, but it shows the apparatus in non-playing position or relationship, with the unauthorized game-play-prevention barrier means in an upwardly extending position across the center of the playing field whereby to prevent unauthorized play of the game. This view also shows the score display means clearly displaying information as to the score and winner of the last preceding game.

FIG. 3 is a reduced-size top plan view of the table hockey game (with the score display means removed for drawing simplification reasons) with the centrally positioned, laterally extendable and retractable drawer which carries the chassis and the majority of the electrical components of the apparatus being shown in broken lines in the position in which it lies below the level of the playing surface of the simulated hockey field. This view also shows, in broken lines, the return channel means underlying the playing surface of the simulated hockey game board and effectively connected between each of the goal cage means and the corresponding ball-return port means positioned at the corresponding opposite ends of the game so that a player who has scored a goal will automatically have the ball returned to him for initiating subsequent play with the objective of again scoring.

FIG. 4 is a fragmentary, partly broken-away view taken in the direction of the arrows 4—4 of FIG. 1, illustrating the goal cages and the respective return chutes and return ports and also illustrating the first and second switch means of the first and second sensing means positioned so as to sense the return of a ball through either of said ball return passages after a goal has been scored in either of the goal cages.

FIG. 5 is another fragmentary, partly broken-away, partly sectional view taken in the direction of the arrows 5—5 of FIG. 1 and clearly showing the relationship of the unauthorized game-play-prevention barrier means with respect to the game board and the upper playing surface thereof and also clearly showing the two different ball return chutes connected between the two different goal cages and the corresponding oppositely positioned two different ball return ports. The score display means carried above the game board, as is clearly shown in FIGS. 1 and 2, is broken away in this view for space conservation reasons. Also, the drawer-locking key is shown in exploded relationship with respect to the drawer lock in this view.

FIG. 6 is a circuit schematic view illustrating the electrical apparatus and the interconnecting circuitry of the entire game in a typical diagrammatic manner.

FIG. 7 illustrates, in a fragmentary, partly broken away elevational view, one typical embodiment of the timer means which includes the timing or timer motor means which drives a cam having an eccentric portion which closes switch contact means intermittently as a function of the revolution of the timing motor and which,

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therefore, sequentially and correspondingly intermittently energizes the advancement coil comprising a linear motor means of the timer means stepper unit and causing the multiple-tooth stepper gear or ratchet thereof to advance one tooth for each such energization until a predetermined rotative advancement (in this case, advancement to the 20th tooth position) has occurred, where a de-energizing switch-opening operation occurs as a result of the engagement of the offset projecting pin or dog carried by said stepper gear with a normally closed switch through which electrical power is supplied to the timing motor. In addition to clearly showing the stepper unit linear motor advancement coil for causing tooth-by-tooth advancement of the stepper gear in correspondence to the energizations of said advancement coil, this view also clearly shows the timer means reset coil for resetting the stepper unit and the stepper gear back to an initial starting position in response to operation of the coin-operated switch, shown in electrical schematic form in FIG. 6, and in one exemplary physical embodiment in FIG. 14, as a result of the insertion therein of an acceptable coin (or plurality of coins).

FIG. 8 is a fragmentary elevational view generally similar to FIG. 7, but shows a typical stepper unit exemplary of the "Visiting Team" stepper unit and also exemplary of the "Home Team" stepper unit—it being understood that the timer stepper unit shown in FIG. 7, the "Home Team" stepper unit and the "Visiting Team" stepper unit shown in electrical schematic form in FIG. 6 and exemplified in one structural form by the stepper unit shown in FIG. 8, together comprise the automatic scoring and totalizing means and reset means which are largely responsible for the effective operation of the game in the manner detailed hereinafter.

FIG. 9 is an enlarged fragmentary perspective view taken in the direction of the arrow 9 of FIG. 1 and illustrates the connection of the electrical lead means between the electrical components carried within the drawer underlying the game board and the lamps carried within the score display means positioned above the game board.

FIG. 10 is an elevational view of one exemplary form of the playing stick means which is shown as simulating a conventional hockey stick, although very much smaller.

FIG. 11 is a slightly enlarged elevational view, taken in the direction of the arrows 11—11 of FIG. 2, and clearly shows the opposite face of the score display means carried above the game board, the arrangement being such that either player position at either end of the game board will be able to visibly see the exact status of the game as it progresses (in the example illustrated, showing the status at the end of a game).

FIG. 12 is an enlarged fragmentary top view, partly in elevation and partly in section, illustrating one form of controllably engageable and disengageable coupling of the solenoid comprising the driving linear motor means for operating the unauthorized game-play-prevention barrier means or gate. This slidable engagement occurs when the drawer carried underneath the game board is slidably moved into closed relationship underneath said barrier means, at which time the slidable engagement means shown in detail in FIG. 12 becomes engaged with respect to a downward projecting headed coupling element centrally connected to said barrier means.

FIG. 13 is an enlarged fragmentary sectional view taken in the direction of the arrows 13—13 of FIG. 5 and clearly illustrates the mounting and operation of the unauthorized game-play-prevention barrier means, which is shown in the de-energized up position whereby the projections or tines thereof project upwardly above the playing surface of the game board across the center thereof, as is clearly shown in FIGS. 2 and 5, whereby to prevent the hockey game from being played.

FIG. 14 is an exemplary fragmentary view of one typical type of coin receiver which may be employed for receiving an acceptable coin and for operating the coin-

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actuated or coin-operated switch shown in the electrical circuit schematic view comprising FIG. 6 for resetting the entire game and placing it in condition for subsequent play. It should be noted that this coin receiver is exemplary only, and that various other types of coin receivers provided with various types of improper coin rejecters, or the like, may be employed in lieu thereof.

FIG. 15 is a fragmentary sectional view taken in the direction of the arrows 15—15 of FIG. 1 and illustrates the interior detail of the score display means carried above the game and having opposite display surfaces.

FIG. 16 is an enlarged fragmentary sectional view like FIG. 5 but with non-pertinent parts removed for simplification and showing a modified barrier operating means.

FIG. 17 is an enlarged fragmentary view taken in the direction of the arrows 17—17 of FIG. 16.

FIG. 18 is an enlarged view taken in the direction of the arrows 18—18 of FIG. 16.

Referring to the figures for exemplary purposes, one illustrative embodiment of the invention is shown in a typical exemplary, but non-limiting, form wherein it comprises the coin-activated or coin-operated table hockey game apparatus, generally designated by the reference numeral 21, which includes a housing or box-like structure, generally designated by the reference numeral 22 and which comprises opposed, longitudinally spaced, substantially parallel, upstanding end walls 23 at opposite ends of the game and opposed transversely spaced, substantially parallel, upstanding side walls 24 effectively joined together in any suitable manner at the four corners 25 of the housing 22 whereby to define a substantially rectangular structure, as seen in top plan view, enclosing and containing therein a substantially flat, horizontal game board means 26 having a substantially flat, horizontal upper playing surface means 27 surrounded by the substantially upstanding edge wall means comprising the end and side walls 23 and 24. This effectively defines a playing area or region within said edge wall means. The upper playing surface means 27 is suitably marked to simulate a hockey field, as indicated in part by the reference numeral 28. These markings may be of standard type or of any desired type.

The entire housing means 22 is shown as being supported by four tapered legs 29 so as to be positioned at an appropriate height above an underlying ground surface or floor surface, shown in part at 31. However, the invention is not specifically so limited and the housing means 22 may be supported and positioned in any desired manner as long as the playing surface means 27 is suitably positioned for playing the game (usually lying in a substantially horizontal plane, although not specifically so limited).

The game apparatus, generally designated by the reference numeral 21, is provided with a plurality of electrical components for automatically scoring and totalizing the score of the players of the game and for automatically causing the totalized scores of the individual players, and designations as to the winning player or a tie game or the fact that a game is over, to be visibly displayed on the scoring means, generally designated by the reference numeral 32, which will be described in greater detail hereinafter. Said electrical components are adapted to be suitably mounted within a slidable drawer, generally designated by the reference numeral 33, which slides within an aperture A extending through one of the side walls 24 of the housing 22 as is clearly shown in FIGS. 1, 2 and 5. This provides an arrangement which makes it easy to remove the entire assembly of electrical components for repair or replacement of parts if and when this may become necessary.

Normally speaking, the drawer 33 will be locked in fully inserted relationship by suitable lock means, such as indicated at 34 (which is controllably unlockable by the key K), to prevent unauthorized removal of the drawer 33.

The electrical components carried by the drawer 33 are generally designated in broken diagrammatic form by the reference numeral 35 in FIG. 3 and are clearly shown in electrical schematic form in FIG. 6. It is believed that further detailed showing of each actual electrical component is unnecessary and would be redundant in view of the fact that said components are well known in the art and do not comprise the present invention individually or per se—the invention lying in the combination thereof and the interrelationships thereof which are clearly shown in the electrical schematic view comprising FIG. 6.

The playing surface means or portion 27 of the game board 26 has a first end region 36 and a second end region 37 which are in longitudinally adjacent relationship and which are effectively separated by the center line CL extending across the center of the playing surface 27 and comprising part of the markings indicated by the reference numeral 28.

The game is played with a freely movable playing piece means, such as the marble shown at 38 in FIG. 1 (although other forcibly displaceable objects may be employed) which is adapted to rest upon the playing surface 27 and to be rolled therealong, in response to forced actuation thereof by either player's playing stick means, such as indicated generally by the reference numeral 39 in FIG. 1.

Each of the playing stick means 39 has a manually graspable handle portion 41 at the rear end thereof and an angularly positioned striking portion 42 remote from the handle portion 41 and adapted to be used in impelling the ball 38 toward the opposite one of the goal cage scoring means, generally designated by the reference numeral 43. This is primarily true of the offensive player comprising the near player in the case of the position of the apparatus in FIG. 1.

Normally speaking, the defensive player, who would be in the most remote position when the apparatus is in the relationship shown in FIG. 1, would position his playing stick means 39 so as to have the striking portion 42 thereof positioned directly in front of the port means 44 of the goal cage means 43 which he is defending, as is clearly shown in FIG. 1.

Said defensive player, upon receiving the playing piece or marble 38, will of course, in turn, attempt to direct it through the entry port means 44' of the other goal cage scoring means 43' at the other end of the playing surface means 27.

The playing of the game will progress in this manner until one or the other of the two players manages to cause the playing piece means or marble 38 to enter the oppositely positioned port means 44 (or 44') of the oppositely positioned goal cage scoring means 43 (or 43'), which will then cause the scoring and totalizing means of the electrical components, indicated in broken diagrammatic form at 35 in FIG. 3 and clearly shown in the electrical circuit schematic view comprising FIG. 6, to be actuated in a manner which will cause the score display means, generally designated by the reference numeral 32, to clearly indicate that said particular player has scored one goal. This will be true for either player, and the score display means 32 will appropriately indicate such scoring for each player and will effectively totalize same until a game is completed, at which time said score display means 32 will visibly indicate which player has won the game or that the game has ended in a tie, and will also indicate that the game is over. This will be described in greater detail hereinafter.

In the preferred form of the invention illustrated, it will be noted that each of the port means 44 (and 44') has a transverse dimension in the width direction of the game board 26 and playing surface 27 greater than the horizontal dimension of any of the playing pieces and greater than the corresponding length dimension of the striking portion 42 of each of the playing stick means

39. This is primarily so that it will be impossible for a defensive player to merely place the striking portion 42 of his playing stick means 39 on the playing surface 27 a short distance in front of the port means 44 (or 44') which he is defending in a manner such as to completely block the entry therinto of the playing piece or marble 38. It is obvious that this type of defensive action would greatly hamper the competitive aspect of the play. However, while this relationship of the width of the port means 44 (or 44') to the length of the striking portions 42 is desirable, the invention is not specifically so limited in all of its forms.

When a goal is scored by either player in the manner described hereinbefore and the playing piece or marble 38 enters one of the port means 44 (or 44') of one of the goal cage scoring means 43 (or 43'), it is adapted to effectively operate corresponding first and second sensing means, generally designated by the reference numeral 45 (and 45'), as best shown in FIG. 4, which comprises a part of the corresponding scoring means 43 (and 43'), whereby to cause activation of the corresponding electrical components shown in the electrical schematic view comprising FIG. 6 and which will be described in detail hereinafter.

Each of said first and second sensing means 45 (or 45') comprises a tubular passage portion 46 (or 46') through which the playing piece or marble 38 is adapted to roll or to fall after it enters the corresponding port means 44 (or 44') whereby to strike the spring wire actuating arm 47 (or 47') extending into said tubular passage portion 46 (or 46') and coupled at its rear end, as indicated at 48 (and 48') to a microswitch, or other effective switch means generally indicated at 49 (or 49'). This is made possible by entering the actuation arm 47 (or 47') through a slot 51 (or 51') in the tubular passage portion 46 (or 46'). The microswitch 49 (or 49') is of the normally open type adapted to be momentarily closed by the passage of the playing piece means or marble 38.

For purposes of convenience in description, the player at the far end of the game apparatus 21 as shown in FIG. 1, will be considered to be the "Visiting" player or so-called "Visiting Team," as designated on the score display means 32, while the player at the near end of the game apparatus 21 when positioned as shown in FIG. 1, will be considered to be the "Home" player or so-called "Home Team," as designated on the score display means 32. This is merely for designation purposes so as to correspond to the display on the score display means 32.

The reference numeral 45 designates the sensing means which will sense a goal made by the "Home" player or "Home Team" player, while the reference numeral 45' designates the other sensing means which will sense a goal made by the "Visiting" or "Visiting Team" player. Therefore, all elements associated with the sensing means 45 and electrical components connected thereto will be considered to be those rendered operable by a goal by the "Home" or "Home Team" player and will be designated by unprimed numbers, while all corresponding elements associated with, or connected with respect to, the other sensing means 45' operable in response to a goal scored by the "Visiting Team" will be designated by similar numbers, primed, however.

Each of the goal cage scoring means 43 and 43' is provided with a corresponding one of two return channel means 52 and 52' connected from the corresponding scoring means 43 and 43' and passing along the length of the game apparatus underneath the game board 26 to the opposite end wall 23 of the housing 22 where it stops at a small receiving trough 50 or 50' so that the player who has just scored a goal may again place the playing piece or marble 38 in play by placing it on the playing surface 27 and impelling it by his playing

stick means 39 toward the opposing goal cage scoring means 43 or 43' as the case may be.

The inner surface of the upwardly projecting edge wall means comprising the end and side walls 23 and 24 may be provided with a compressible and/or resilient bounce surface or liner 53 if desired. This may comprise cork, rubber, various elastomeric materials, or functional equivalents thereto. However, the game is not specifically limited thereto.

The game apparatus 21 is shown in a form where it is provided with unauthorized game-play-prevention barrier means, generally designated by the reference numeral 54, positioned so that it will normally effectively prevent the game from being played except when authorized.

In the specific example illustrated, said unauthorized game-play-prevention barrier means 54 comprises a fence 55 consisting of a plurality of upwardly directed tines carried by a transverse base member 56 and positioned with said base member 56 lying below a plurality of small holes 57 extending along the center line CL demarcated on the playing surface 27 of the game board 26.

The arrangement is such that normally, during authorized game play, the plurality of tines 55 are maintained so that they do not project above the level of the playing surface 27. This is done by a solenoid-type, electromagnetic, linear motor means 58 when the coin-receiver, indicated generally at 59, has received and accepted a proper coin (or plurality of coins) whereby to cause momentary energization of the coin-actuated normally open game-play-initiation effective switch means 61 (best shown in FIGS. 6 and 14).

Upon completion of a game at the end of either a predetermined game play time or the attainment by either player of a predetermined winning game score, whichever event occurs first, the solenoid 58 is de-energized (in a manner which will be described hereinafter) and the plurality of tines 55 of the barrier means 54 move upwardly through the plurality of holes 57 under the action of biasing spring means 62 so as to project upwardly above the playing surface 27 in a manner which effectively prevents unauthorized play of the game.

It will be noted that, in the event that an attempt is made to play the game in an unauthorized manner—that is, without inserting the proper coin or coins into the coin-receiver 59, by manually depressing the barrier means 54, this causes the actuation of a perceptible alarm such as a buzzer or bell, as indicated at 63 in FIG. 6, by reason of the fact that the normally open switch means 64 (best shown in FIGS. 5 and 6) is automatically closed by such manual depression of the barrier means 54.

In the exemplary form of the invention illustrated, the score display means 32 is mounted with respect to the side walls 24 by suitable support standards 65 fastened by suitable fastening means 66 at the top thereof to opposite end walls of housing 67 of the scoring means 32, and with the bottom ends of the support standards 65 being suitably affixed, as indicated at 68, with respect to the side walls 24. It will be noted that the connection at 68 of the support standard 65 on the side containing the drawer entry aperture A, is shorter than is the case on the opposite side of the housing 22.

It should also be noted that electrical lead means for powering the score display means 32 extends upwardly from the interior of the drawer 33, where it is connected to the electrical components contained therein (including the power transformer generally designated at 69 in FIG. 6) and generally designated by the reference numeral 35 in FIG. 3. Said electrical lead means is generally designated by the reference numeral 71.

The electrical input to the entire system comprises the electrical lead means, generally designated by the reference numeral 72, which enters the bottom of the drawer 33 and which connects to the input side of the power transformer 69 shown in FIG. 6. This provides an arrange-

ment such that the plug 73 on the end of the input cord 72 may be plugged into any suitable female receptacle electrically connected to a conventional electrical power source (usually 110–120 volt 60 cycle alternating current, although the invention is not specifically so limited).

It should be noted that the score display means, generally designated at 32, has two oppositely directed faces 74 and 74' for the "Home Team" and the "Visiting Team" (which, as previously pointed out, actually means the "Home" player and the "Visiting" player—team designations being used merely to simulate actual hockey games where teams are used).

The "Visiting Team" side or portion 74' of said score display means 32 will now be described, it being understood that the "Home Team" opposite side thereof is identical and is designated by corresponding, but unprimed, reference numerals.

The surface 74' of the score display means 32 is provided with two light-transmissive panels 75' and 76' bearing indicia or markings designating "Visiting Team" and "Home Team," respectively. The panel 75' has a row of five additional light-transmissive panels 77' extending to the right thereof and carrying indicia means thereon comprising the integers ranging from 1 through 5 for the purpose of indicating the total goals scored by the "Visiting Team." To the right of the last of the score indicating panels 77' is an additional light-transmissive panel 78' which bears indicia for the purpose of indicating that the "Visiting Team" is the "Winner" of the game. Immediately to the right thereof is another light-transmissive panel 79' which bears indicia indicating that the game is over.

The panel 76' has positioned immediately to the right thereof a plurality of five additional light-transmissive panels 81' similar to those designated at 77' and bearing corresponding indicia comprising the integers ranging from 1 through 5 for indicating the total goals scored by the "Home Team." Immediately to the right of the last panel 81' is another light-transmissive panel 82' similar to the panel 78' immediately thereabove and also bearing the indicia designating the "Winner," meaning that the "Home Team" has won the game.

Immediately to the right of the panel 82' is another panel 83' which bears indicia designating "Tie Game" for indicating that the "Visiting Team" and the "Home Team" have attained identical scores when the game ended, as determined by the fact that a predetermined game play time has elapsed.

As previously pointed out, the other side 74 of the score display means 32 bears a similar number of light-transmissive panels designated by similar reference numerals, unprimed, however.

Each of the light-transmissive panels described above is provided with corresponding illuminating means positioned therebehind for controllably illuminating the corresponding indicia means carried by the corresponding panel in a manner which is visibly perceptibly distinct from the appearance of non-illuminated panels so that either player can immediately determine by looking at either face 74 or 74' of the score display means 32 precisely what his score is. Furthermore, at the end of the game, the appropriate "Winner" panel or "Tie Game" panel and the "Game Over" panels are illuminated in accordance with the factual situation at the end of the game.

These illuminating means are shown, for exemplary purposes, as individual lamps and are indicated, with respect to those carried by the surface 74 of the scoring means 32, by the following reference numerals. The "Visiting Team" and "Home Team" lamps behind the panels 75' and 76' are indicated by the reference numerals 84' and 85', respectively. The score-indicating lamps for the "Visiting Team" and for the "Home Team" positioned behind the five panels 77' and the five panels 81', respectively, are designated by the reference numerals 86' and

87', respectively. The "Winner" lamp for the "Visiting Team" and the "Winner" lamp for the "Home Team" positioned behind the panels 78' and 82', respectively, are designated by the reference numerals 88' and 89', respectively.

The "Game Over" lamp positioned behind the panel 79' is designated by the reference numeral 91', while the "Tie Game" lamp positioned behind the panel 83' is designated by the reference numeral 92'. The corresponding lamps for the other surface 74 of the score display means 32 are designated by similar reference numerals, unprimed, however, and, therefore, need not be described in detail.

The electrical circuit components generally designated by the reference numeral 35 in FIG. 3 and shown in electrical schematic form in FIG. 6 comprise in part first and second score information storing and totalizing means effectively connected, respectively, relative to said first and second sensing means 45 and 45' and responsive to operation thereof by closure of the corresponding switch means 49 and 49', respectively, by the playing piece or marble 38 as a result of the scoring of a goal and operative for the purpose of storing and totalizing information corresponding to the number of goals which have been scored by reception, a corresponding number of times, of the playing piece means or marble 38 by corresponding ones of the goal cage scoring means 43 and 43'. This apparatus, and the operation thereof, will now be described in detail, with particular reference to FIG. 6, which is to be considered in the light of the description set forth hereinbefore of the operation of the game.

When an appropriate coin is inserted into the coin-receiver 59 and is accepted by said coin-receiver (which may be of a conventional type including a slug rejecter and a coin return, which are not shown since they are well known in the art), the normally open coin-operated game-play-initiating switch 61 is momentarily closed. This energizes the relay winding 93, which is electromagnetically coupled to the three normally open relay switches, indicated generally at 94, 95, and 96, for momentary closure thereof. Momentary closure of the switches 94 and 95 sends current momentarily through the two score-totalizing stepper means reset coils 97 and 98, respectively.

Each of these reset coils 97 and 98, when momentarily actuated, pulls down a plunger (of the type shown at 151 in FIG. 8) of a corresponding "Visiting Team" and "Home Team" multi-position, rotary type, stepper means (each of the type shown at 105 in FIG. 8 and designated by the reference numerals 105 and 105' in FIG. 6) whereby to release the corresponding stepper gear or ratchet (of the type shown at 152 in FIG. 8) whereby to allow it to be returned by a corresponding stepper unit biasing spring (not shown) to an initial beginning or starting position.

Since such stepper units or means are conventional and are well known in the art, the full and complete interior structural detail of each of them is not shown because it is believed that it would be redundant and because the present invention is not specifically directed thereto, but rather to the combination of such conventional units with the remainder of the elements of the invention. In other words, the inventive concept lies in the combination and interrelationships depicted in electrical schematic form rather than in the specific details of any of the individual components thereof. However, for purposes of identification the stepper means or unit released or reset to an initial starting position by the momentary energization of the "Visiting Team" reset coil 97 is generally designated in block diagrammatic form by the three separate blocks indicated by the reference numeral 99 in FIG. 6, with the movable switch elements of the unit being indicated by the reference numerals 101, 102 and 103. It will be noted that each of the three elements of the "Visiting Team" stepper unit or means 99 includes six fixed contacts 100

cooperable in sequence with the corresponding movable contact element 101, 102, and 103, as forward individual stepping operation thereof is accomplished by energization of the "Visiting Team" stepper means advancement coil 104 in a manner which will be described hereinafter.

Also, for purposes of identification, the stepper means or unit released or reset to an initial starting position by the momentary energization of the "Home Team" reset coil 98 is generally designated in block diagrammatic form by the three separate blocks indicated by the reference numeral 105 in FIG. 6, with the movable switch elements of the unit being indicated by the reference numerals 106, 107, and 108. It will be noted that each of the three elements of the "Home Team" stepper unit or means 105 includes six fixed contacts 110 cooperable in sequence with the corresponding movable contact elements 106, 107, and 108, as forward individual stepping operation of the stepper unit 105 is accomplished by energization of the "Home Team" stepper means advancement coil 111 in a manner which will be described hereinafter.

It should be noted that the above described resetting of the "Visiting Team" stepper unit or means 99 as a result of the momentary energization of the "Visiting Team" stepper unit reset coil 97, effectively causes each of the movable switch elements 101, 102, and 103 to be reset back to the zero position with respect to the fixed contacts 100 thereof, which effectively sets the score back to the zero position. This is also true of the "Home Team" stepper unit or means 105 whenever it is reset by momentary energization of the "Home Team" reset coil 98, which causes the movable switch elements 106, 107, and 108 to be returned to the zero position with respect to the fixed contacts 110 of said stepper unit 105. In other words, the closure of the relay switches 94 and 15 causes the resetting of the score display means 32 to a new game starting condition.

The above-mentioned closure of the switch means 96, which occurs simultaneously with the above-mentioned closure of the switch means 94 and 15, energizes a timer means reset coil 112 and effectively starts a timer or timing means, generally designated by the reference numeral 113, by closing a circuit to the timing motor 114. This also closes a circuit to the previously mentioned solenoid coil 58, which lowers the unauthorized game-play-prevention barrier means 54 so as to place the game in a condition such that it can be played.

The resetting of the timer means 113 is accomplished by reason of the fact that the timer means reset coil 112, when momentarily energized, pulls the conventional stepper unit plunger 115 down to allow the timer unit stepper gear or ratchet 116 to return to the initial or starting position under the action of a biasing return spring.

As this timer unit stepper gear or ratchet 116 returns to the initial or starting position, a different normally closed switch means, indicated generally at 118, attached to the timing stepper unit 113 and held open when the game is in a non-play condition and controlled by a projecting lug or pin 117 on the timing unit stepper gear or ratchet 116, is allowed to close since it is a normally closed switch.

The normally closed switch means 119 is effectively allowed to close (if it has been held open as a result of the "Visiting Team" having made five goals) by the resetting of the "Visiting Team" stepper unit 99 in response to the previously described momentary closure of the normally open switch means 94.

The normally closed switch means 121 is effectively allowed to close (if it has been held open as a result of the "Home Team" having made five goals) by the resetting of the "Home Team" stepper unit 105 in response to the previously described momentary closure of the normally open switch means 95.

Thus the closure of the coin-operated switch 61 by the insertion of a proper coin has resulted in the complete

closure of the circuit to the timer motor 114 whereby to start it operating, and has also resulted in the energization of the coil 58 for lowering the barrier means 54 and placing the game in condition for play.

The timer motor 114 is preferably a five r.p.m. motor with the eccentric or projecting portion 122 on the cam 123 being positioned adjacent to the normally open switch means 124 for intermittent closure of said switch means 124 once for each revolution of the timer motor 114. Thus the closure of the switch means 124 will occur once every twelve seconds in this particular arrangement and will effectively momentarily energize the timer stepper unit advancement coil 125 whereby to advance the multi-tooth timer stepper unit gear or ratchet 116 one tooth for each such energization. Thus the timer unit stepper gear or ratchet 116 will be advanced 20 teeth or notches in four minutes. When this occurs, the lug or pin 117 on the timer unit stepper gear or ratchet 116 effectively opens the switch means 118, as previously described, and de-energizes both the timer motor 114 and the coil 58 holding the barrier means 54 down. This causes the game to end and the barrier means 54 to rise above the playing surface 27 whereby to prevent subsequent unauthorized play.

When the "Visiting Team" stepper unit 99, the "Home Team" stepper unit 105, and the timer stepper unit 113 have all been reset in the manner described above, the game is ready to play until either the play period of four minutes has passed and the timer means 113 terminates the game in the manner mentioned above, or until either player has scored five goals whereby to cause either the "Visiting Team" stepper unit 99 or the "Home Team" stepper unit 105 to have sequentially stepped through five sequential positions which, of course, causes the corresponding energization of the corresponding lamp means 86 and 86' or 87 and 87' whereby to cause the corresponding display panels 77 and 77' or 81 and 81' to visibly display said score and to also illuminate the proper "Winner" panel 78 or 82 (and also 78' or 82') by energization of the corresponding lamps 88 or 89 (and also 88' or 89').

When either the above four-minute game play period has passed or either player has scored five goals the game is automatically terminated. In the case of the time period elapsing, it is terminated in the manner described above.

In the case where the termination is by reason of the fact that the "Visiting Team" has scored five goals and the "Visiting Team" stepper unit 99 has advanced through five steps to the final position corresponding to five goals, the end of the game is accomplished by reason of the opening of the previously mentioned switch 119 as a result of the "Visiting Team" stepper unit 99 having advanced to the final position corresponding to a score of five.

In the event that the game is terminated as a result of the "Home Team" having scored five goals and having caused the "Home Team" stepper unit 105 to advance through five successive steps to the final position corresponding to five goals, the ending of the game is effectively accomplished by the opening of the previously mentioned switch 121, which opens in response to said "Home Team" stepper unit having attained the fifth position corresponding to five goals. This is accomplished by the pin 153 carried by the stepper gear or ratchet 152; said pin striking and opening the switch 121 when the fifth position is reached. The previously mentioned switch 119 is opened in substantially the same manner.

Whenever the game is ended in any of the three manners mentioned above, the "Game Over" lights 91 and 91' are effectively energized to illuminate the two "Game Over" panels 79 and 79' by reason of the closure of any one of three normally open switches 126, 127, or 128. The closure of the first switch 126 occurs when the game is terminated by having continued for the predetermined maximum game play time so that the timer unit 113 effectively opens the switch 118 in the manner previously described. When this occurs it also causes closure of the

switch 126 by reason of the action of the pin 117 shown in FIG. 7.

When the game termination occurs as a result of the "Home Team" scoring five goals whereby to cause the switch 121 to be opened, in the manner previously described, by the "Home Team" stepper unit 105, the switch 127 is also closed by reason of the action of the pin 153 shown in FIG. 8.

When the game termination occurs as a result of the "Visiting Team" scoring five goals whereby to cause the switch 119 to be opened, in the manner previously described, by the "Visiting Team" stepper unit 99, the switch 128 is also closed in a manner similar to the previously described closing of the switch 127 by the pin 153, as shown in FIG. 8.

Closure of any of the switch means 126, 127, or 128 effectively energizes the "Game Over" lights 91 and 91' and also places warning buzzer or bell alarm means 63 in condition for energization whenever the normally open switch means 64 is closed by forcible downward depression of the barrier means 54. The sounding of this alarm will immediately notify any adjacent persons or the proprietor of an establishment in which the game is located that unauthorized play is being attempted.

It should be noted that the previously described energization of the "Visiting Team" score-totalizing advancement coil 104 is effected by closure of the normally open relay switch means 129, which is closed simultaneously, along with the normally open relay switch means 131, by the relay coil 132 connected to the second sensing means' switch 49', which is operated by the playing piece means or marble 38 when the "Visiting Team" scores a goal, as indicated in broken lines in FIG. 4.

It should be noted that the previously described energization of the "Home Team" stepper unit advancement coil 111 is effected by closure of the normally closed relay switch means 133, which is closed simultaneously, along with the normally open relay switch means 134, by the relay coil 135 connected to the first sensing means' switch 49, which is operated by the playing piece means or marble 38 when the "Home Team" scores a goal.

Closure of either of the normally open switch means 131 or 134, as a result of the "Visiting Team" scoring a goal or of the "Home Team" scoring a goal, respectively, will effectively energize the buzzer or bell alarm means 63 so that an audible signal will indicate each goal. Of course, as previously pointed out, the corresponding lamps 86 or 87 (and also 86' or 87') will be energized to visibly indicate the score of the game as it progresses.

As either of the stepper units 99 or 105 advances one step for each goal scored by the corresponding team, the corresponding stepper gear (of the type of the one shown at 152 in FIG. 8) is moved one notch and the corresponding movable switch elements 101, 102, and 103, in the case of the stepper unit 99, and the switch elements 106, 107, and 108, in the case of the stepper unit 105, are correspondingly moved with respect to the corresponding six fixed contacts, 100 in the case of the stepper unit 99, and 110 in the case of the stepper unit 105.

The first team to score five goals is the winner and, as previously pointed out, the corresponding "Winner" lamp 88 or 89 (and 88' and 89') will be energized to illuminate the corresponding "Winner" panel 78 or 82 (and also 78' or 82').

This will also occur if the game ends as a result of the timer unit 113 terminating it in the manner described hereinbefore. Whenever any of these types of terminations occur, the "Game Over" lamps 91 and 91' are energized by closure of any one of the three normally open switches 126, 127, or 128, in the manner previously described.

The game apparatus also includes means for indicating when the game has terminated in a tie. As shown in FIG. 6, this includes additional "Visiting Team" stepper unit multiple-position switch means indicated at 99' and

additional "Home Team" stepper unit multiple-position switch means indicated at 105', including six spaced fixed contacts 100', in the case of the "Visiting Team" stepper unit portion 99' and six spaced fixed contacts 110', in the case of the "Home Team" stepper unit additional portion 105', with the corresponding fixed switch contacts 100' and 110' being interconnected.

The "Visiting Team" stepper unit additional portion 99' carries an additional movable switch element 135, which moves along the fixed contacts 100' along with the other "Visiting Team" stepper unit movable switch elements 101, 102, and 103, while the "Home Team" stepper unit additional portion 105' has a movable switch element 136, which moves along and successfully makes contact with the fixed switch elements 110' at the same time as the other movable switch elements 106, 107, and 108 of the "Home Team" stepper unit 105 move through the sequence of steps previously described.

This provides an arrangement which effectively breaks the circuit between the movable switch element 135 and the movable switch element 136 except when both the "Visiting Team" and the "Home Team" have scored an equal number of goals when the game is terminated by the timer unit 113. When this occurs, by reason of the fact that the timer unit 113 has advanced the timer means stepping gear 116 to the 20th step position, the normally open switch means 137 is closed at the same time that the normally closed switch means 118 is opened and the normally open switch means 126 is closed, as previously described. This supplies energy to the "Tie Game" relay coil 138 which is coupled to the normally closed relay switch means 139, whereby to open same, and is also coupled to the normally open relay switch means 141 whereby to close same. This will remove power from the "Home Team" and "Visiting Team" winning lamps 89 and 88 (and 89' and 88') and will apply electrical power to the "Tie Game" lamps 92 and 92', which are positioned behind the "Tie Game" panels 83 and 83', whereby to energize same to indicate that the game has ended in a tie.

The timing unit stepper gear 116 may also be arranged to close an additional normally open switch 142 a predetermined relatively short length of time before the four-minute game play period terminates so that the players will be warned that the game is approaching its close and they may hurry to attempt to score some goals. However, this is optional and may be eliminated if desired.

In the particular exemplary form of the invention illustrated in FIGS. 1-15 the above-mentioned warning period arrangement takes a particular and non-specifically limiting form wherein it comprises an additional pin 140 carried by the timing unit stepper gear 116 and very similar to the other pin 117 carried thereby and described hereinbefore.

However, it will be noted that the pin 140 is so positioned as to be adapted to close the normally open switch 142 a relatively short period of time (such as ten seconds or the like, for example, although not specifically so limited) before the four-minute game play period terminates as determined by the other pin 117 effectively opening the main switch 118 in the manner previously described. The closing of the normally open warning switch 142 approximately ten seconds before the four-minute time period runs out and the game becomes unplayable, causes effective energization of the warning lights 150 and 150' which are shown in FIG. 6 as being effectively connected in parallel with the "Game Over" lamps 91 and 91'. Each of said warning period lamps 150 and 150' are positioned behind corresponding light-transmissive or translucent panel portions 160 and 160' of the corresponding faces 74 and 74' of the score display means 32 and each of which bear appropriate indicia designating the expression "Warning" which will become effectively illuminated and clearly visible to each of the two players ap-

proximately ten seconds before the four-minute game play period is due to end.

It should also be noted that the dual lamps in the score display means 32 for opposite faces 74 and 74' thereof may be eliminated in certain forms of the invention if desired and a single centrally positioned lamp for each of the opposed panels and adapted to illuminate them simultaneously may be employed in lieu thereof.

It should also be noted that the bottom of the score display means 32 may be additionally provided with lamp means 143 for casting illumination downwardly onto the playing surface 27. This may be any type of lamp and, in the event that it is a fluorescent lamp, it may be provided with its own starter and/or transformer in certain cases, although such is not shown since such arrangements are well known in the art.

It should also be noted that, in the specific example illustrated, the score display means 32 is additionally provided with upper panels 154 and 154' which bear suitable identification means comprising the words "Table Hockey" and a pictorial representation of several hockey players (presumably of two opposing teams) in active play. The two identification panels 154 and 154' are of light-transmissive material similar to the other panels previously described and are back-lighted for contrasting display of the words and pictorial scene by two lamps 155 and 155' (shown in the electrical schematic view comprising FIG. 6 and also shown in the cross-sectional view comprising FIG. 15).

It should be noted that FIG. 12 illustrates, in enlarged, fragmentary form, one exemplary type of controllably engageable and disengageable coupling means for effectively coupling the solenoid 58 with respect to the barrier means 54. This arrangement is provided in order to allow the drawer 33 to be removed whenever the lock 34 is unlocked by the key K without requiring that the barrier means 54 move with the drawer 33, which would be the case without such controllably engageable and disengageable coupling means for coupling the solenoid 58 with respect to the barrier means 54.

The exemplary form of said controllably engageable and disengageable coupling means is generally designated by the reference numeral 156 and is shown in FIGS. 5, 12, and 13.

In the exemplary and non-limiting form illustrated, said controllably engageable and disengageable coupling means 56 comprises a bifurcated member 157 having a rearwardly converging entry portion 158 terminating in a relatively narrow rear recess portion 159, which is adapted to be horizontally slidably moved into vertically retaining engagement with a downwardly projected coupling element 160, which is headed at the lower end, as indicated at 161, and which is connected at its upper end to the transverse bar 56 of the barrier means 54.

It should be clearly noted that the bifurcated member 157 is, in turn, attached to the upwardly directed plunger or armature element 162 of the solenoid 58 whereby to be downwardly actuated thereby when the solenoid 58 is energized in the manner previously described upon receipt of the proper coin in the coin receiver 59, whereby to lower the barrier means 54 so that the game will be in condition for subsequent play.

It should be clearly noted that when the lock 34 is unlocked by the key K and the drawer 33 is transversely extended toward the right or removed, the bifurcated member 157 merely becomes slidably disengaged from the headed coupling element 160 and that, conversely, when the drawer 33 is reinserted, the bifurcated member 157 becomes re-engaged with the headed coupling element 160.

It should be clearly noted that the above-described controllably engageable and disengageable coupling means 156 is exemplary only and is not to be construed as limiting the invention to said specific structure—this form merely comprising one of the many possible arrangements

for coupling the solenoid coil 58 with respect to the barrier means 54. Indeed, it should be noted that various other coupling arrangements may be used or the solenoid 58 may be mounted within the housing 22 in a manner such that it does not need to be disengaged from the barrier means when the drawer 33 is removed—this being so because it is not carried by the drawer 33 in such a modification. Also, it should be noted that the coupling may be entirely electromagnetic in nature if desired.

It should also be noted that the invention may optionally be provided with means for causing the alarm 63 to be operated whenever the barrier means 54 is manually depressed during an unauthorized play period by some person who wishes to play the game without inserting the proper coin (or coins) in the coin receiver 59, irrespective of whether or not the plug 73 is plugged into an appropriate electric power supply receptacle, such as that generally indicated at 163 in FIG. 1 (or any other equivalent) and also irrespective of whether or not said power supply may fail.

This arrangement is illustrated in the left portion of FIG. 6 and is generally designated by the reference numeral 164. In the form illustrated in FIG. 6, said means 164, which may be termed auxiliary power supply means, comprises an auxiliary battery 165 (or the functional equivalent thereof) connected, by way of normally open relay switch means 166, between the upper and lower leads 167 and 168 whereby to be connected across the lower voltage secondary winding portion 171 of the step-down transformer 69. Said means 164 also comprises a relay coil 169 connected between said lower lead 168 and a lead 172 whereby to be connected across the higher voltage secondary winding portion 173 of the step-down transformer 69 and to be energized whenever the plug 73 is connected to the power supply receptacle 163 or any other suitable electric power source and is supplied with conventional A.C. electric power in the manner described hereinbefore.

The energization of the relay coil 169 holds the normally closed relay switch means 166 open as long as the main power supply is operative and this effectively renders the auxiliary power supply means 164 effectively inoperative.

However, if the main power supply should fail for any reason whatsoever, the relay coil 169 will become de-energized and the relay switch 166 will close, since it is a normally closed switch and is effectively biased into said position. This will immediately effectively connect the battery 165 to the above-mentioned lead 168 which will cause current to flow through one of the switches 126, 127, or 128 (whichever one is closed as a result of the fact that the game is in a non-authorized play condition), to then flow through the normally open switch 64 if it is closed by the unauthorized manual depression of the barrier means 54, and to then flow through the other lead 168 and the closed relay switch means 166 back to the battery 65. This will, of course, operate the alarm 63 and will do so even though the main power supply has failed.

It should be noted that the relay coil 169 is such that it requires a larger voltage than that provided by the battery 165 for operation in a manner such as to hold the normally closed relay switch means 166 open. Therefore, when the auxiliary power supply means 164 becomes effectively connected and operative by closure of the switch means 166 as a result of failure of the main power supply, the battery 165 will not again energize the relay coil 169 to an extent sufficient to open the normally closed relay switch means 166 and again disconnect the auxiliary power supply means 164 from the circuit.

In the specific example illustrated the low voltage secondary winding portion 171 may supply approximately six volts, while the higher voltage secondary winding portion 173 may supply approximately 24 volts. However,

these values are not to be construed as specifically limiting the invention thereto.

This is merely one exemplary form of the auxiliary power supply means and is not to be construed as specifically limiting the invention thereto.

In the exemplary and non-specifically limiting form of the invention shown in FIGS. 1-15, foul line means may be provided in a physical form so positioned as to not only clearly indicate a foul line beyond which neither player should move his hockey stick 39, but it may also be so arranged as to make it virtually physically impossible for either player to do so while in the process of propelling the playing piece or ball 38 toward the opposite end of the playing surface 27.

In the specific form of the invention illustrated, said foul line means takes the form of a transversely directed bar or member which may be of solid or tubular construction, as indicated at 170, which is carried above the center line CL of said playing surface 27 at a location high enough thereabove to avoid interference with the unauthorized game-play-prevention barrier means 54 when upwardly extended into operative position as shown in FIGS. 2, 5, and 13. In the exemplary form of the invention illustrated, said foul line means 170 may be connected at each end to the upstanding side walls 24 of the game apparatus 21. However, it may be mounted in any suitable manner.

Incidentally, it should be clearly noted that the relative positioning of the unauthorized game-play-prevention barrier means 54 in lowermost position underneath the game board 26 when inoperative and in uppermost position when operative, is not to be construed as specifically limiting the invention to this particular arrangement. Actually, it may be positioned above the game board 26 and normally spaced in an uppermost inoperative position and adapted to be moved downwardly when it is to become operative for game-play-prevention purposes. It should be clearly noted that the apparatus of the present invention may be readily adapted to so operate the unauthorized game-play prevention barrier means 54 in this manner, and this type of arrangement is intended to be included and comprehended within the board scope of the present invention as are similar modifications of various other elements of the invention which basically lie within the broad scope and teachings of the present invention.

Incidentally, it should be noted that the unauthorized game-play-prevention barrier means 54 need not necessarily be electrically forcibly lowered by the solenoid coil 58 shown in FIGS. 5, 6, and 13, pulling same downwardly against the upward force exerted thereagainst by the biasing springs 62 (best shown in FIG. 5). Actually, the barrier means 54 may operate with the spring means normally biasing it downwardly into inoperative relationship, and with means being provided for controllably forcing it upwardly against the action of the spring means after an authorized game play period has ended and the "Game Over" lights 91 and 91' of FIG. 6 become energized. Said means may comprise a solenoid coil (including a movable armature) which becomes energized upon the ending of an authorized game play period—that is, whenever the "Game Over" lights 91 and 91' of FIG. 6 are energized—and may be of the same type as that shown at 58 in the first form of the invention, but arranged to effectively upwardly extend the barrier means 54 against the action of downwardly biasing spring means similar to those shown at 62 in the first form of the invention except oppositely directed insofar as biasing force is concerned. Such a modified solenoid coil 58 (or rectilinear-movement electromagnetic motor means) would then be arranged to be de-energized by relay switch means in circuit therewith upon the next closure of the game-play-initiation effective switch means 61 shown in FIGS. 6 and 14, thus allowing the downwardly biasing spring means to return the barrier means 54 to inoperative position during

the succeeding authorized game play period. This arrangement is not illustrated in detail since it merely comprises a reversal of the arrangement illustrated in the first form of the invention shown in FIGS. 1-15 and it is believed that detailed illustration thereof would be redundant in view of this fact.

It is also possible to use an arrangement similar to that illustrated in the first form of the invention shown in FIGS. 1-15 wherein the spring means is upwardly biased and the invention includes means for manually controllably forcibly deflecting the unauthorized game-play-prevention barrier means downwardly against the action of the spring means only during authorized game play periods, thus allowing the spring means to return said barrier means to a game-play-prevention position immediately after the end of an authorized game play period.

One such exemplary, but non-specifically limiting, modified form of the means for rendering operative and inoperative the game-play-prevention barrier means is illustrated fragmentarily in FIGS. 16, 17, and 18. In this modified form, parts which correspond to those of the first form of the invention illustrated in FIGS. 1-15 are indicated by similar reference numerals followed by the letter "A," however. It should further be understood that, in these fragmentary views, numerous parts of the apparatus are not shown for reasons of drawing simplification and clarity.

In this modification, the unauthorized game-play-prevention barrier means 54A has upwardly biasing spring means 62A functionally similar to those clearly shown in FIG. 5 illustrating the first form of the invention.

It will also be noted that, in this modified form of the invention, there is no downwardly acting solenoid coil, such as that shown at 58 in the first form of the invention, for pulling the barrier means 54A downwardly, since this is unnecessary in view of the fact that other mechanical means is provided in lieu thereof. However, in this modified form of the invention, the coin-receiver 59A is centrally positioned relative to the center of the playing surface 27A and the manually reciprocable coin-receiving slide member 172 thereof is adapted to be effectively mechanically coupled with respect to the barrier means 54A when the coin aperture 173 therein has received a proper coin and said member 172 has been manually forcibly slidably moved inwardly so that a coin 174 can be dropped into the coin receiving box 175 and, in the process of doing so, acts to momentarily effectively close the game-play-initiation effective switch means 61A in a manner fully analogous to that described hereinbefore in connection with the first form of the invention. However, in this modification, when said slide member 172 is forcibly manually inserted inwardly in the manner described above, it acts to effectively force the unauthorized game-play-prevention barrier means 54A downwardly into inoperative position against the action of the upwardly biasing spring means 62A where it will be retained until the release solenoid coil 176 is energized by closure of any of the switches 126, 127, or 128 shown in FIG. 6, which occurs at the end of a game play period.

In other words, said released solenoid coil 176 will be energized whenever the "Game Over" lights 91 and 91' of FIG. 6 are energized at the end of a game. In fact, in order to avoid the necessity of another drawing, said release solenoid coil 176 is shown so connected in phantom in FIG. 6 and it should be clearly understood that it is not intended to be included in FIG. 6 except in this modified form of the invention, in keeping with the principles disclosed in FIGS. 16 and 17.

It should be noted that the solenoid coil 176 is provided with a spring-biased projecting catch or locking pin member 177 which is normally spring biased outwardly into a projecting position, such as is best shown in FIG. 17, where it tends to engage a corresponding lug 178 carried by a coupling member 179. It should be noted that the manually reciprocable member 172 of

the coin-receiving means 59A is provided with a projecting ear or lug 181 which is adapted to abut the back end of the coupling member 179 when forcibly inserted after the reception of a coin 174 whereby to forwardly manually drive said coupling member 179 so that the effective cam means 182 carried thereby can cooperate with corresponding cam follower means 184 connected with respect to the bottom of the barrier means 54A so as to effectively force said barrier means 54A downwardly against the action of the upwardly biasing spring means 62A. This will effectively force the barrier means 54A downwardly into an inoperative position. It will be noted that when the lug 178 passes the projecting catch or locking pin 177 coupled to the solenoid release coil 176, this prevents said coupling member 179 from returning under the action of its biasing spring means 188 into its former position where it would allow the upwardly biasing spring means 62A to erect or upwardly move the barrier means 54A into operative position. This condition will continue until such time as the release solenoid coil 176 is energized in the manner previously described by closure of any of the switch means 126, 127, or 128 of FIG. 6, at which time the projecting spring loaded catch or locking pin 177 will be retracted whereby to allow the coupling member 179 to be retracted by the spring means 188 into its former position. In this position the opposition of a pair of locking lugs 191 prevents forcible manual downward depression of the unauthorized game-play-prevention barrier means 54A so that it will not be possible for unauthorized persons to play the game until the next game-play-initiation as a result of the insertion of a proper coin into the coin aperture 173 and the forcible manual inward reciprocation of the slide member 172 occurs, at which time the above cycle of operations will again be repeated.

It should be noted that, in the exemplary but non-specifically limiting modified form illustrated in FIGS. 16-18 the above-mentioned cam follower means 184 takes the form of a wheel horizontally rotatively carried by a mounting pin or bolt 185 which is firmly fastened to an upwardly extending hanger or attachment member 186 fastened, as indicated at 187, to the lower tubular rod member 56A of the barrier means 54A.

Also, in said exemplary but non-specifically limiting modified form illustrated in FIGS. 16-18 the effective cam means 182 comprises a curved member carried at the forward end of the coupling member 179 and having a curved downwardly directed track means 183 (best shown in FIG. 18) adapted to engage the upper edge of the cam follower wheel means 184 during reciprocating movement of said effective cam means 182, the coupling member 179 and the manually reciprocable member 172 of the coin-receiving means 59A—the arrangement being such that inward reciprocation of said member 172 causes said cam follower wheel means 184 and the attached barrier means 54A to be moved downwardly to the broken line position shown in FIG. 16, while the return of said coupling member 179 to its normal position, as shown in solid lines in FIG. 16, allows said barrier means 54A to be returned to its normal upwardly extended position, as shown in solid lines in FIG. 16, under the action of the biasing spring means 62A.

In the exemplary but non-specifically limiting modified form illustrated in FIGS. 16-18, the coupling member 179 is horizontally slidably mounted by hanger members 180, which are fastened by suitable fastening screw means S, or functional equivalent thereof, to the underside of the game board 26A. However, various other slidable mounting means may be employed.

In the exemplary but non-specifically limiting modified form illustrated in FIGS. 16-18, the above mentioned biasing spring means 188 is fastened between the ear 189 carried by the coupling member 179 and another ear 190 carried at the bottom of one of the hangers 180. This arrangement is best shown in FIG. 16 and is merely

exemplary of one of the various functionally equivalent spring basing arrangements which may be employed.

The above merely illustrates one form of cam means, cam follower means, coupling means, mounting means therefor, and biasing means therefor, and various functional equivalents may be employed in lieu thereof and are intended to be included and comprehended herein.

It should be noted that the above-described modification of the invention is not to be construed as specifically limiting the invention thereto. Actually a variety of mechanical and/or electrical arrangements for rendering game-play-prevention means either operative or inoperative, or both, may be employed and all such, within the broad scope and teachings of the present invention, are intended to be included and comprehended herein.

It should be understood that the figures and the specific description thereof set forth in this application are for the purpose of illustrating the present invention and are not to be construed as limiting the present invention to the precise and detailed specific structure shown in the figures and specifically described hereinbefore. Rather, the real invention is intended to include substantially equivalent constructions embodying the basic teachings and inventive concept of the present invention.

I claim:

1. Game apparatus including means responsive to the state of a game being played for visibly observably indicating the scoring of a game as it is played and the outcome of the game at the termination thereof, comprising: game board means having a playing surface surrounded by edge wall means; freely movable playing pieces co-operable to rest upon said playing surface and to move therealong in response to forced actuation thereof; said playing surface being spacedly provided with first and second goal scoring means, said first and second scoring means also including corresponding first and second score sensing means positioned in a predetermined relationship with respect to the corresponding first and second goal scoring means whereby to sense the reception thereby of one of said freely movable playing pieces in a goal-scoring manner, each of said score sensing means comprising effective switch means positioned for operation in response to the reception, by the corresponding goal scoring means, of the freely movable playing piece in a goal-scoring manner; first and second score information storing and totalizing means effectively connected, respectively, relative to said first and second sensing means and responsive to operation thereof by said playing piece for storing and totalizing information corresponding to the number of goals which have been scored by reception of said playing piece by the corresponding goal scoring means; score display means effectively coupled with respect to said first and second score information storing and totalizing means and responsive thereto for correspondingly visibly displaying each player's score as the game progresses; each of said first and second score information storing and totalizing means comprising multi-position score-totalizing stepper means provided with electrically energizable advancement actuating means, a multi-positionable score-totalizing member effectively coupled in driven relationship with respect to said actuating means, multi-contact switch means effectively and individually closable in sequence by said multi-positionable score-totalizing member, and corresponding circuit means connected between corresponding portions of said multi-contact switch means and corresponding portions of said score display means for electrically energizing said score display means in correspondence to the position of said multi-positionable score-totalizing member whereby to

visibly indicate the score of each player of the game as the game progresses, each of said multi-position score-totalizing stepper means also including electrically energizable reset means for returning the corresponding multi-positionable score-totalizing member to an initial predetermined position corresponding to a game-play-starting position; and including timer means for effectively terminating an authorized game play period of predetermined length irrespective of the scores of the players of the game at that time by effectively inactivating said first and second score sensing means for subsequent score storing and totalizing input operation with respect to said first and second score information storing and totalizing means and for effectively causing said score display means to visibly indicate the score at the termination of a game, said timer means comprising multi-position time-totalizing stepper means provided with electrically energizable advancement actuating means, means for intermittently electrically energizing said advancement actuating means at a predetermined timed rate of repetitions, a multi-positionable time-totalizing member effectively coupled in driven relationship with respect to said actuating means, and switch means effectively in circuit with said advancement actuating means and effectively openable by said multi-positionable member after a predetermined period of game play time has elapsed whereby to inactivate the game, said multi-position time-totalizing stepper means also including electrically energizable reset means for returning the multi-positionable time-totalizing member to an initial predetermined position corresponding to a game-play-starting position; and including coin-operable effective game-play-initiation switch means effectively coupled with respect to all of said reset means for momentarily energizing same and returning said multi-positionable score-totalizing members of each of said score-totalizing stepper means and said multi-positionable time-totalizing member of said time-totalizing stepper means to said initial predetermined positions corresponding to the starting of game play, said switch means also effectively activating said first and second score sensing means for subsequent operation in response to the reception by the corresponding goal scoring means of the playing piece means for causing the score display means to visibly indicate all such scoring plays.

2. Game apparatus as defined in claim 1 including unauthorized-game-play-prevention barrier means provided with biasing means normally positioning it in a manner effectively preventing unauthorized game play and being provided with inactivating motor means for effectively inactivating said barrier means in response to energization of said inactivating motor means; said game-play-initiation switch means being also connected for effective energization of said inactivating motor means of said unauthorized-game-play-prevention barrier means in a manner effectively inactivating same by retracting said barrier means into a position which does not interfere with subsequent game play.

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