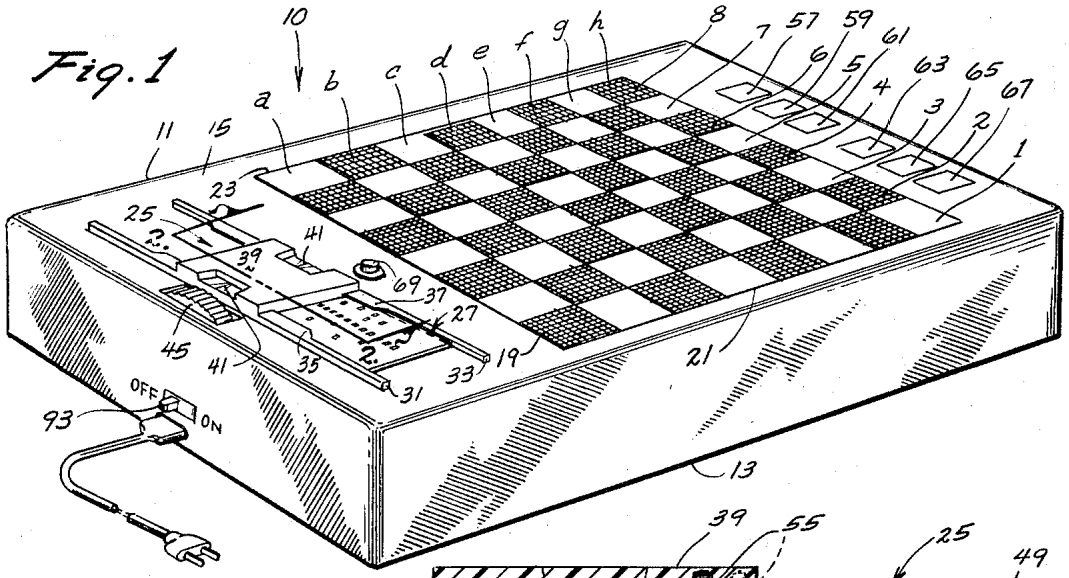
Aug. 6, 1968 D. G. WORDEN ET AL 3,395,463

CHESS MACHINE

Filed April 21, 1966 3 Sheets-Sheet 1

Fig. 1



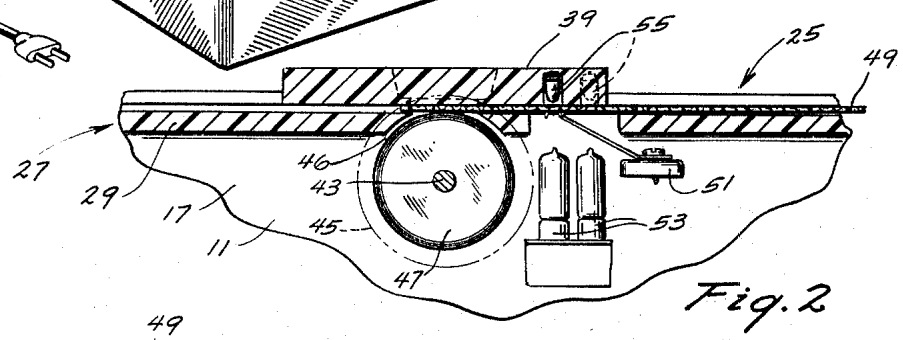


Fig. 2

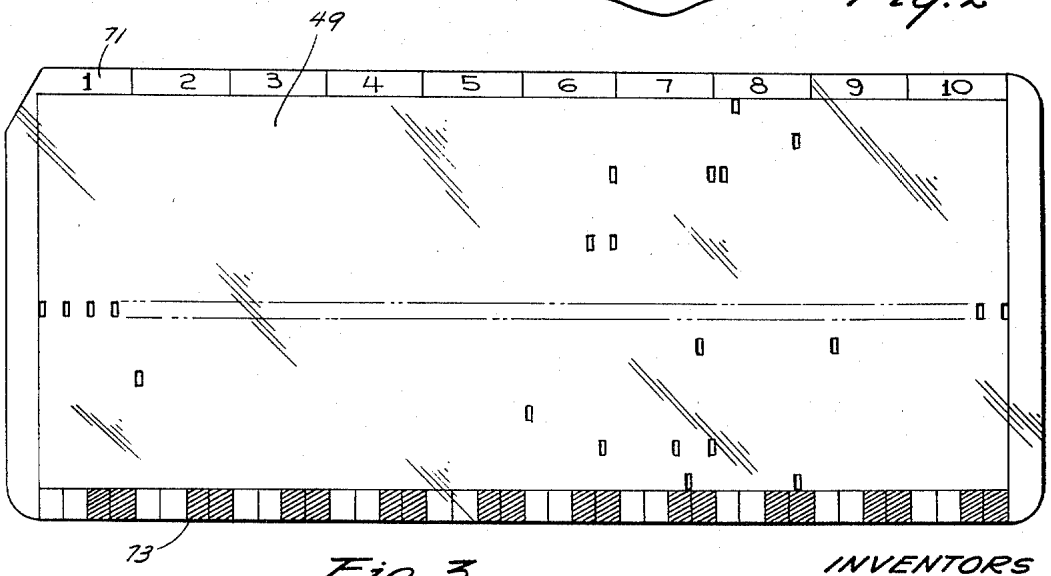


Fig. 3

INVENTORS
DONALD G. WORDEN
FRED C. WORDEN
ROBERT O. DIEDRICHS
ROBERT E. TROWBRIDGE
BY
Dick, Zarley, McKee & Thomte
ATTORNEYS

Aug. 6, 1968 D. G. WORDEN ET AL 3,395,463

CHESS MACHINE

Filed April 21, 1966 3 Sheets-Sheet 2

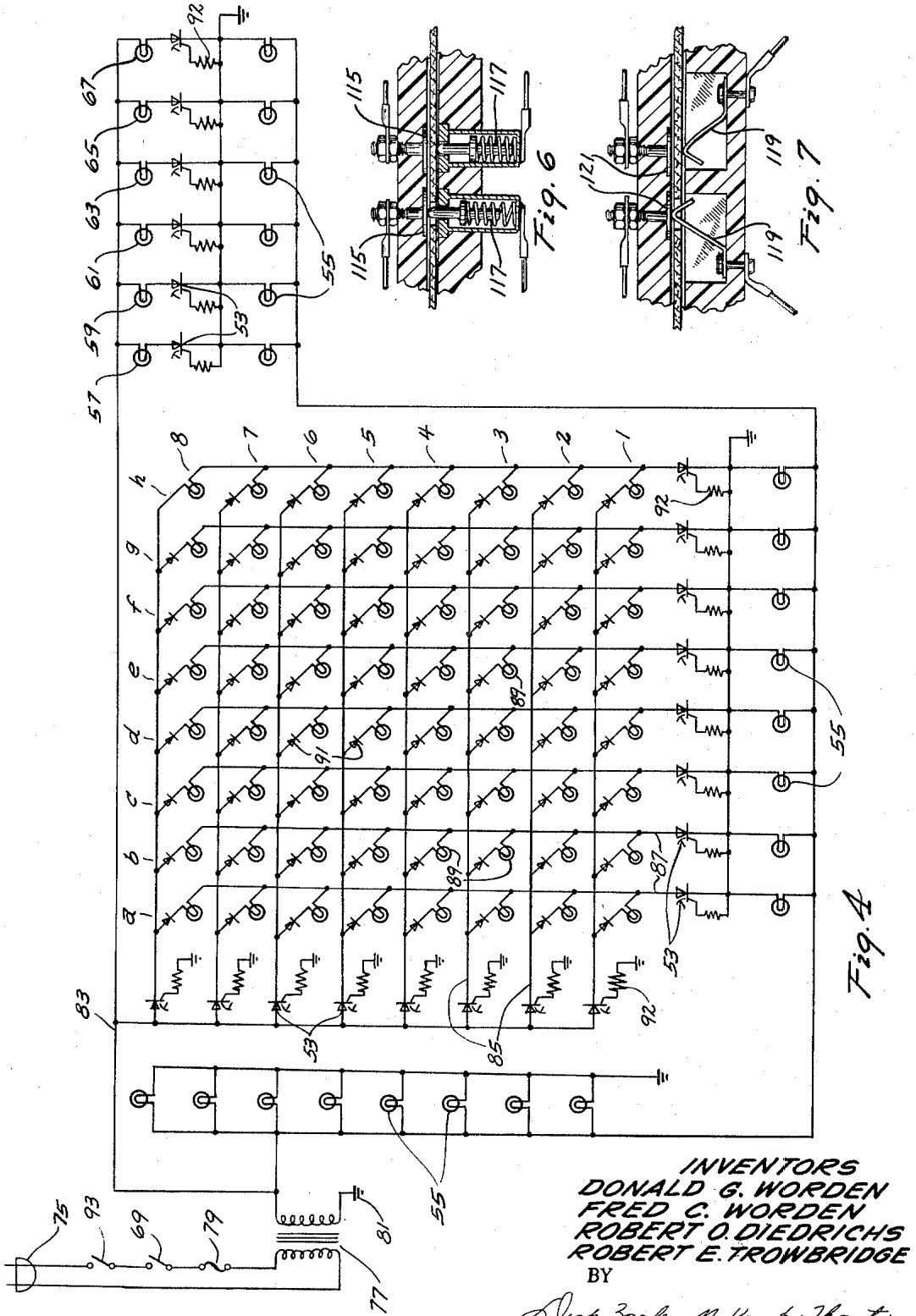


Fig. 6

Fig. 7

Fig. 4

INVENTORS
DONALD G. WORDEN
FRED C. WORDEN
ROBERT O. DIEDRICHS
ROBERT E. TROWBRIDGE
BY
Dick, Earley, McKee & Thomte
ATTORNEYS

Aug. 6, 1968 D. G. WORDEN ET AL 3,395,463

CHESS MACHINE

Filed April 21, 1966 3 Sheets-Sheet 3

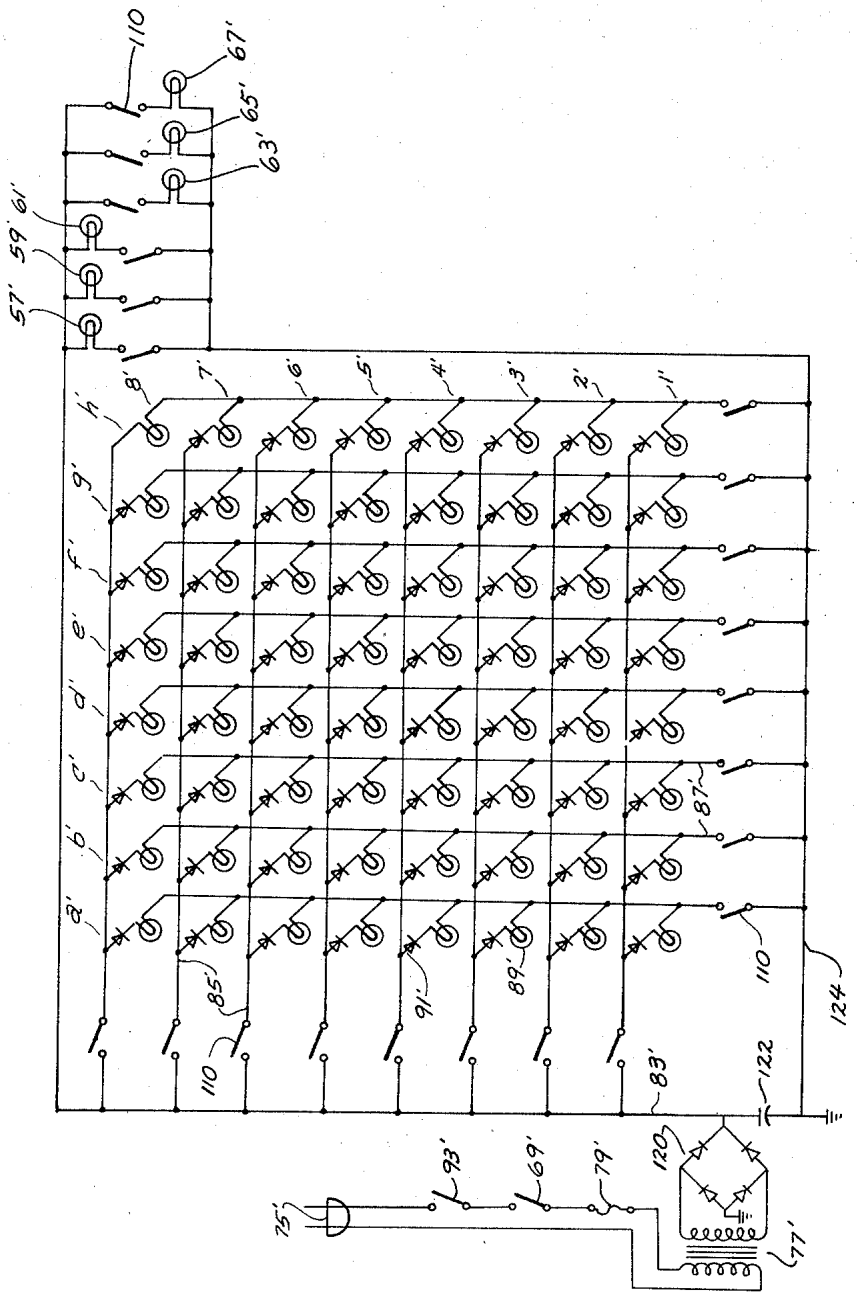


Fig. 5

INVENTORS
DONALD G. WORDEN
FRED C. WORDEN
ROBERT O. DIEDRICHS
ROBERT E. TROWBRIDGE

BY

Dick, Zarley, McKee & Thomte

ATTORNEYS

United States Patent Office

3,395,463

Patented Aug. 6, 1968

3,395,463

CHESS MACHINE

Donald G. Worden, Fort Lauderdale, Fla., and Fred C. Worden, Des Moines, and Robert O. Diedrichs and Robert E. Trowbridge, Cedar Falls, Iowa, assignors to Donald G. Worden, Fort Lauderdale, Fla., and Fred C. Worden, Des Moines, Iowa

Filed Apr. 21, 1966, Ser. No. 544,289

9 Claims. (Cl. 35—8)

ABSTRACT OF THE DISCLOSURE

A chess machine which communicates information to the players by means of a data card which activates various lights on the chess board. The machine consists of a game board of the chess or checkers type having a signal light adjacent each of the game positions. The data card is fed into the machine and the bit locations thereon causes switch elements to light various of the lights to indicate the various moves to be completed.

Chess is an extremely sophisticated and complicated game which is enjoyed by millions of persons throughout the world. The complexity of chess makes it difficult for a person to learn the game. The player who is attempting to learn chess usually refers to books which explain the rules of the game. Likewise, chess players constantly refer to books in an attempt to advance their knowledge of the game. The books referred to above annotate the moves and strategy through the use of standardized notation systems. The games previously played by masters are frequently annotated in these books to enable the player to replay these games in an attempt to advance his knowledge of the game and also to compare his strategy with that of the masters. However, in replaying the games of the masters, the player must constantly refer to the book, then to the chess board, then to the book, etc., which makes it difficult for the player to follow the sequence, moreover, the cumbersome coding system.

Therefore, it is a principal object of this invention to provide a chess machine.

A further object of this invention is to provide a chess machine having a data card associated therewith which controls lights on the chess board to communicate information to the players.

A further object of this invention is to provide a chess machine which has sixty-four (64) squares thereon, the squares being selectively lighted by a data card associated therewith.

A further object of this invention is to provide a chess machine which has at least six auxiliary lights thereon, the operation of which is controlled by a data card associated therewith.

A further object of this invention is to provide a chess machine which aids a player in learning the royal game of chess.

A further object of this invention is to provide a chess machine which enables a player or players to replay games of the masters.

A further object of this invention is to provide a chess machine which visually communicates to the player all of the elements of a chess game which can be conveyed by a book or the like.

A further object of this invention is to provide a chess machine which is economical of manufacture, durable in use and refined in appearance.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device,

whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of the chess machine;

FIG. 2 is an enlarged sectional view of the machine as would be seen on line 2—2 of FIG. 1, the data card having been inserted thereinto for purposes of illustration;

FIG. 3 is a perspective view illustrating a data card;

FIG. 4 is a schematic view of the electrical circuitry of the chess machine;

FIG. 5 is a schematic view of the electrical circuitry of a modified chess machine;

FIG. 6 is a sectional view of a modified data card reader means; and

FIG. 7 is a sectional view of another modified data card reader means.

The numeral 10 generally refers to the chess machine as best illustrated in FIG. 1. Machine 10 is comprised of a housing 11 having a bottom 13, top surface 15 and an interior 17.

Top surface 15 is provided with a square board 19 which consists of 64 individual squares, usually colored ivory and brown alternately. However, the board is described as having a White side and a Black side. For purposes of description, the numeral 21 indicates White's side and the numeral 23 indicates Black's side. Also for purposes of description, the board will be described by the algebraic notation system rather than the descriptive notation system. Viewing the board 19 from White's side, the board 19 is arranged in eight files from left to right which are designated by the letters *a, b, c, d, e, f, g* and *h* respectively, and the eight ranks on the board from the lower to the upper side are denoted by the eight numbers 1, 2, 3, 4, 5, 6, 7 and 8 respectively. A square is named by use of both its file letter and rank number, for instance, *a*1 is the square in the lower left hand corner of the board while *h*8 is the square in the upper right hand corner of the board.

Each player is provided with 16 men, all of the same color, White or Black. Eight of each group are called pawns while the other eight are called pieces. The eight pieces in each group are called: the King, the Queen, two Castles or Rooks, two Bishops, and two Knights. At the commencement of the game, each player places his 16 men on the board in a definite order. In the initial position, White would place the following men in the following squares: Queen's Rook in *a*1, Queen's Knight in *b*1, Queen's Bishop in *c*1, Queen in *d*1, King in *e*1, King's Bishop in *f*1, King's Knight in *g*1, King's Rook in *h*1, and the eight pawns are placed in *a*2, *b*2, *c*2, *d*2, *e*2, *f*2, *g*2 and *h*2 respectively. Black would initially place the following men in the following squares: Queen's Rook in *a*8, Queen's Knight in *b*8, Queen's Bishop *c*8, Queen in *d*8, King in *e*8, King's Bishop in *f*8, King's Knight in *g*8, King's Rook in *h*8 and the eight pawns are placed in *a*7, *b*7, *c*7, *d*7, *e*7, *f*7, *g*7 and *h*7 respectively.

Housing 10 is provided with a data card reader means 25 adjacent one end thereof. Data card reader means 25 can be of any suitable design but the embodiment of FIGS. 1, 2, 6 and 7 are the preferred designs.

Card reader means 25 is provided with a tray 27 having a bottom 29 and upstanding sides 31 and 33. Sides 31 and 33 are provided with inwardly extending lips 35 and 37 respectively. A transparent hold-down 39 is secured to and extends between sides 31 and 33 as best seen in FIGS. 1 and 2 and has pointer or hairlines 41 at opposite ends thereof. A shaft 43 is rotatably mounted on tray 27 beneath bottom 29 and has a thumbwheel 45 secured at one end thereof, the upper end of which protrudes upwardly from the top of housing 11. Bottom

29 of tray 27 is provided with cut away portion 46 beneath hold-down 39 to permit a drive wheel 47 which is secured to shaft 43 to protrude from the upper surface of bottom 29. The numeral 49 designates a data card preferably having 80 columns of 12 bits each. Card 49 is inserted into card reader means 25 from one end thereof. Sides 31 and 33 guide the card while lips 35 and 37 hold the card down. Drive wheel 47 engages the underside of card 49 and the rotation of thumbwheel 45 causes drive wheel 47 to move the data card through card reader means 25. Drive wheel 47 and thumbwheel 43 are optional equipment in card reader means 25. A detent spring means 51 is secured to the bottom surface of bottom 29 of tray 27 and is adapted to successively engage bits in one of the rows of the card to position the card in card reader means 25. A plurality of photoelectric cells or light sensitive switches 53 are secured to card reader means 25 beneath cut away portion 46 and a plurality of lights 55 are secured to the bottom surface of hold-down 39. It should be understood that photoelectric cells 53 would be positioned closer towards shaft 43 than is shown in FIG. 2. This is necessary to position cells 53 closer to the hairlines 41 for the proper relationship therebetween.

Housing 11 is provided with six auxiliary lights 57, 59, 61, 63, 65 and 67 at one end thereof. Housing 11 is also provided with a read switch 69 adjacent card reader means 25.

As previously stated, data card 49 is preferably provided with 80 columns each of which have space for 12 bits of binary digits. Card 49 has a top margin area 71 and a bottom margin area 73. Top margin area 71 is preferably divided into ten sub areas which are numbered 1–10. However, when additional cards 49 are needed for a particular game, the top margin areas thereof would be consecutively marked, that is, 11–20, 21–30, etc. Bottom margin area 73 is divided into forty sub areas, each group of four having the same width as a sub area in top margin area 71. In other words, sub area No. 10 in top margin area 71 would have four sub areas positioned therebelow in bottom margin area 73. The sub areas at the top margin area indicate the particular "move" to which the game has progressed. Each "move" therefore represents a "from" readout and a "to" readout for both White and Black as identified at bottom margin 73.

FIG. 4 illustrates the preferred circuitry for the machine but any number of different circuits can also be used. In FIG. 4, the reference numeral 75 designates a 115–120 volt power source which is series connected to a step-down transformer 77. Read switch 69 and a fuse 79 are imposed in the circuit between power source 75 and transformer 77. Transformer 77 is grounded at 81 and a wire 83 extends to and is selectrically connected to 22 lights generally designated by the reference numeral 55. Each of the photoelectric cells 53 are imposed in the circuitry of FIG. 4 so as to be positioned opposite a light 55. As previously stated, card 49 is preferably provided with 80 columns of 12 bits. The card reader means is designed to read from awo adjacent columns at each readout. In other words, 24 bits can be read at one time but 22 bits are all that are needed for this particular design. Therefore, 22 photoelectric cells 53 are positioned beneath the 22 information bits in card 49 and 22 lights 55 are positioned above the 22 information bits in the card at each readout. If the card 49 has been punched in one of its bits, light will shine through the bit to energize the photoelectric cell therebeneath.

In FIG. 4, eight horizontal buss wires, generally referred to by the reference numeral 85, are electrically connected to the eight photoelectric cells 53 located adjacent the left side of FIG. 4. The eight horizontal buss wires 85 are electrically connected to eight vertical buss wires 87, as indicated in FIG. 4, which are electrically connected to the eight photoelectric cells 55 located at the bottom of FIG. 4. A pilot lamp 89 is connected between each junction of a horizontal buss wire and vertical buss wire as clearly shown in FIG. 4. Sixty-four pilot lamps are provided and a pilot lamp would be positioned beneath each of the 64 trauslucent squares in board 19.

Each of the 64 pilot lamps has a diode 91 connected in series to prevent unwanted current pathes from lighting additional pilot lamps. In FIG. 4, the numeral 92 generally designates various resistors which are provided in the circuit as illustrated. As seen in FIG. 4, the six auxiliary lights 57, 59, 61, 63, 65 and 67 are controlled by six photoelectric cells 53 which are energized by six lights 55 respectively.

FIG. 5 illustrates the electrical circuitry of a modified form of the chess machine. In FIG. 5, it can be seen that the photoelectric cells and lights of FIG. 4 have been replaced by mechanical switches.

In FIG. 5, the symbol "'" will be used to designate those elements which are identical to that which is shown in FIG. 4.

In FIG. 5, the reference numeral 75' designates a 115–120 volt power source which is series connected to a step-down transformer 77'. An optional read switch 69', optional on-off switch 93' and a fuse 79' are imposed in the circuit between power source 75' and transformer 77'. Operatively electrically connected to transformer 77' is a DC rectification means 120 which is electrically connected to one contact of 11 switches generally referred to by the reference numeral 110 and to one side of auxiliary lights 57', 59' and 61' by means of wire 83'.

A capacitor 122 is connected to rectification means 120 and is connected to one contact of 11 switches 110 and to one side of auxiliary 110 and to one side of auxiliary lights 63', 65' and 67' by wire 124. Switches 110 are of the mechanical type and can be of any suitable design. For example, 22 terminals 115 (FIG. 6) could be positioned over the 22 information bits on the card and 22 spring loaded contact pins 117 could be positioned below the 22 information bits. When any of the bits are punched, pin 117 would make contact terminal 115 therethrough to energize a particular light. Also, 22 spring contacts 119 (FIG. 7) could be positioned at one side of the card, the switches being closed upon the spring contact pin extending through a punched hole in the card and engaging a terminal 121. It should be understood that the switches of FIGS. 6 and 7 are designated by the numeral 110 in FIG. 5. As previously stated, card 49 is preferably provided with 80 columns of 12 bits. The card reader means is designed to read from two adjacent columns at each readout.

In FIG. 5, eight horizontal buss wires, generally referred to by the reference numeral 85', are electrically connected to one side of the eight switches 110 located adjacent the left side of FIG. 5. The eight horizontal buss wires 85' are electrically connected to eight vertical buss wires 87', as indicated in FIG. 5, which are electrically connected through 64 diodes and lights to one side of the eight switches 110 located at the bottom of FIG. 5. A pilot lamp 89' is connected between each junction of a horizontal buss wire and vertical buss wire as clearly shown in FIG. 5. Sixty-four pilot lamps are provided and a pilot lamp would be positioned beneath each of the 64 translucent squares in board 19.

Each of the 64 pilot lamps has a diode 91' connected in series to prevent unwanted current paths from lighting additional pilot lamps. As seen in FIG. 5, six auxiliary lights are generally designated by the reference numerals 57', 59', 61', 65' and 67' and are controlled by six switches 110.

With respect to FIGS. 1–4, the normal method of operation is as follows: Data card 49 is previously prepared by punching out certain of its bits. The machine is connected to the power source 75 and the machine is turned on by means of an optional switch 93.

Card 49 is inserted into data card reader means 25 as

previously described. Thumbwheel **45** is rotated to cause drive wheel **47** to move card **49** into the card reader means **25** due to its engagement therewith. Thumbwheel **45** is rotated until the first white square in bottom margin area **73** is positioned under one of the pointers **41** and the sub area **1** of top margin area **71** is positioned under the other pointer **41** which places the card in its initial starting position.

White is the first player to move one of his men and he woud contemplate which piece or pawn should be initially moved. After the player has determined which piece or pawn to move, he will press the read switch **69** to compare his strategy with that of a previously played game which has been recorded on the data card. The closing of read switch **69** causes the lights **55** on one side of the data card **49** to be lighted. The light from the lights **55** will pass through any punched bits in card **49** to activate the photoelectric cells **53** therebeneath. For example, if White's pawn on square *e***2** is the man which should be moved, the data card **49** would be punched so that the photoelectric cell in rank two and the photoelectric cell in file *e* are energized. The energization of the photoelectric cell in rank two would cause current to flow through the horizontal buss wire **85** which is connected therewith. The energization of the photoelectric cell in file *e* would cause current to flow through the vertical buss wire **87** which is connected thereto. The pilot lamp **89** which is positioned at the junction of the two beforementioned buss wires (square *e***2**) will be lighted to indicate that the piece or pawn on *e***2** is the piece or pawn to be moved, or in other words, the "from" position. After having determined that the piece or pawn on *e***2** is the piece to be initially moved, White then determines where he should move the particular piece or pawn. White then turns thumbwheel **45** to cause the card to be moved to the next position which is the second white square on the bottom margin area. White then compares his strategy with the move recorded on the card **49** by again pressing read switch **69** to learn his "to" move. For example, if the piece or pawn on square *e***2** is to be moved to square *e***4**, card **49** would have been punched to permit light to pass therethrough to energize the photoelectric cells in file *e* and rank four which would light the pilot lamp beneath the square *e***4**. Black would then determine his "from" and "to" moves in identical fashion as did White. Data card **49** is also punched so as to energize the auxiliary lights at times to convey additional information to the players. The auxiliary lights are controlled directly by photoelectric cells as is obvious from FIG. 4. As previously stated, 22 bits in data card **49** are all that are needed for each read out. Sixteen bits select one or more of the 64 pilot lamps and six bits select one or more of the auxiliary lamps. The six auxiliary lights can be entitled: (1) Comment; (2) Check; (3) Good Move; (4) Bad Move; (5) Capture; and (6) Game End. The moves would be continued until the game ended. If the game required more moves than are on the data card **49**, a second card would be inserted into card reader means **25**, etc.

Detent spring means **51** accurately positions data card **49** over the photoelectric cells by simply successively engaging punched bits in one of the rows therein.

The embodiments of FIG. 5 operates like the embodiments of FIGS. 1–4, the only difference being in the substitution of mechanical switches **110** for the photoelectric cells and lights associated therewith. Additionally, if desired, read switch **69'** can be omitted and the card reader means could be designed so that the mechanical switches **110** are normally open. The card reader means can be designed so that the upper portion of the tray means which carries one contact of 22 switches **110** may be pressed downwardly to create contact between the opposing contacts of the switches **110** when the data card permits.

Thus it can be seen that the machine permits the players to replay games of the masters. Also, the machine permits a player to learn the game of chess without constantly referring to books, etc. The machine simply indicates the "from" and "to" moves for each player through the used of a data card means. The machine conveys substantially all of the information to the players which could be conveyed to them by books, etc. without the constant reference to these books, etc. The players are continuously aware of the progress of the game due to the information contained on the top and bottom margin areas of the card, said information being aligned with the pointers **41**.

Thus it can be seen that the device accomplishes at least all of its stated objectives.

Some changes may be made in the construction and arrangement of our chess machine without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim:

1. In a game device,

a housing having a top surface,

a game board on said housing top surface defining a plurality of game positions each adapted to receive a playing piece placed thereon,

a signal element in said housing positioned beneath each of said game positions,

control means on said housing including an electrical circuit connected to said signal elements,

means on said housing adapted to receive a flat data card,

said control means including a sensing means operatively connected to said electrical circuit, said sensing means adapted to sense the bit location of the data card to actuate one or more of the signal elements as said data card is successively moved into its read-out positions with respect to said sensing means.

2. The game device of claim **1** wherein said game board defines a chess board, one or more of said game positions being lighted when one or more of the signal elements are actuated to indicate playing information to the players.

3. The game device of claim **1** wherein said means receiving a data card includes means to successively move said data card in predetermined increments to enable said sensing means to successively actuate various of said signal elements to indicate the various moves to be completed.

4. The game device of claim **1** wherein a plurality of auxiliary signal elements are provided on said housing top surface adjacent said game board, said sensing means adapted to sense the bit location of the data card to actuate various of the auxiliary signal elements to indicate auxiliary information.

5. The game device of claim **1** wherein said sensing means includes sensing elements which are actuated by the bit location in the data card to actuate various of the signal elements.

6. The game device of claim **5** wherein a card positioning means is provided on said housing adapted to successively position the data card with respect to said sensing elements as the data card is intermittently moved to its read-out positions.

7. The game device of claim **1** wherein said control means includes a read switch means which is normally open and which may be selectively closed to actuate said sensing means.

8. The game device of claim **5** wherein said sensing elements are comprised of photoelectric cell means positioned adjacent one side of said data card and being responsive to light passing through the punched bits in the data card to actuate various of the signal elements.

9. The game device of claim **5** wherein said sensing elements are comprised of opposing switch elements positioned adjacent opposite sides of said data card whereby

said certain pairs of opposing switch elements will electrically engage each other when a punched bit is positioned therebetween.

References Cited

UNITED STATES PATENTS

1,607,226	11/1926	Wood	35—8
1,642,810	9/1927	Grimald	35—8
2,298,456	10/1942	Benko	35—8
2,490,092	12/1949	Rippenbein	35—8

2,647,749	8/1953	Wales	273—136
2,944,734	7/1960	Martin	35—48
3,191,315	6/1965	Hannah	35—9
3,319,356	5/1967	Berkeley	35—9

FOREIGN PATENTS

1,066,495	6/1954	France.

EUGENE R. CAPOZIO, *Primary Examiner.*

W. NIELSEN, *Assistant Examiner.*