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(54) Electronic board game

(57) An electronic board game, such as chess, comprises a LCD display (7) having a number of multi-segment regions (11), thereon which are representative of playing positions on the board. The display (7) is capable of displaying in each region (11, 12) each of the chess pieces of each player. Each playing piece in each region (11, 12) is represented by a respective of single segment 13-18 of the multi-segment display. A microcomputer (4) which is programmed to play the game enables the player to remove any of his playing pieces from one region to another region by deactivating the representation of the one region and activating the representation of the other region.

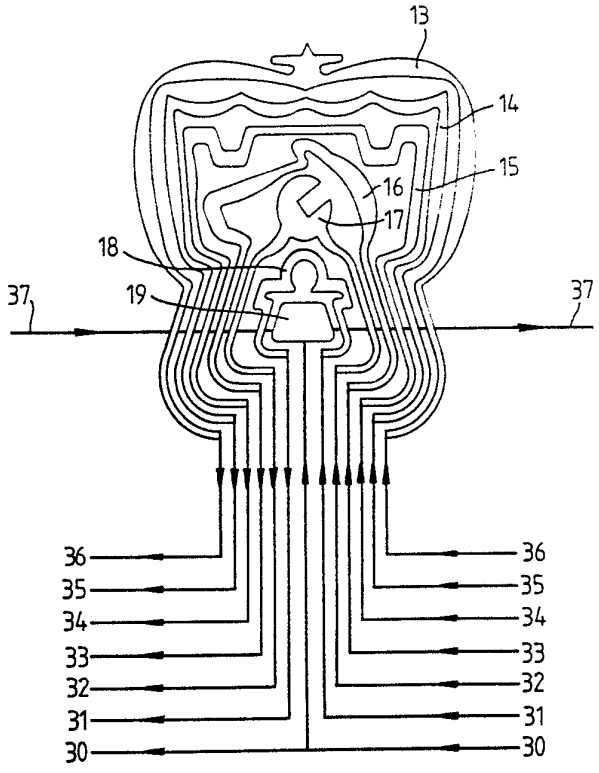

Fig. 3.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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Fig. 1.

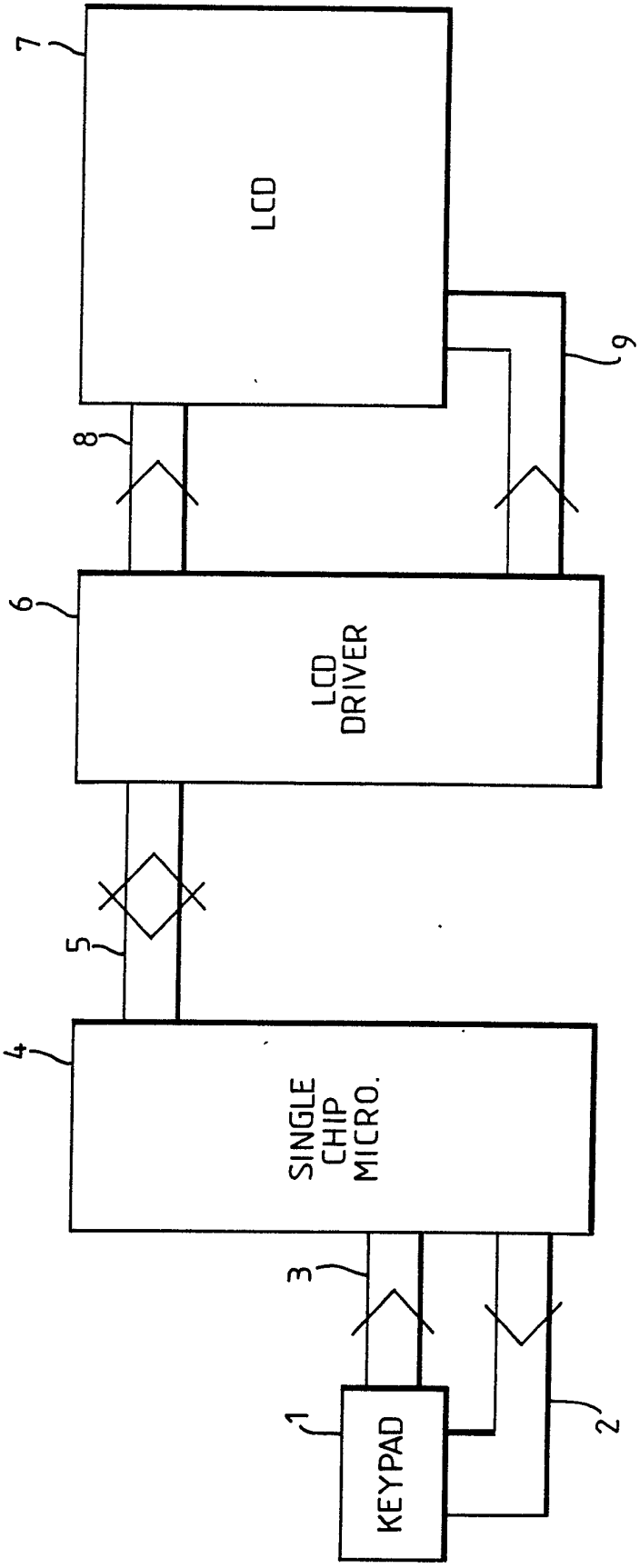


Fig. 2.

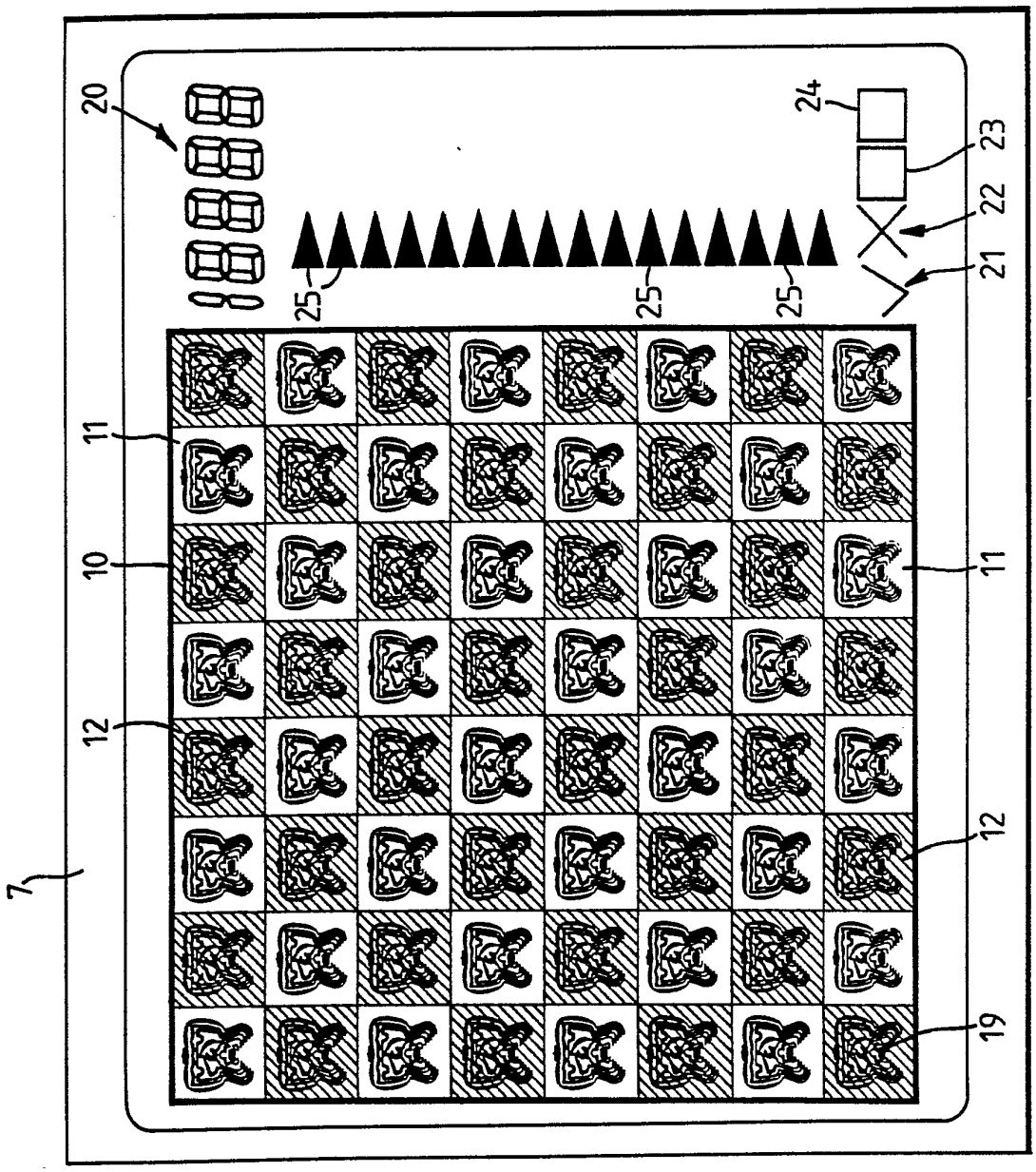
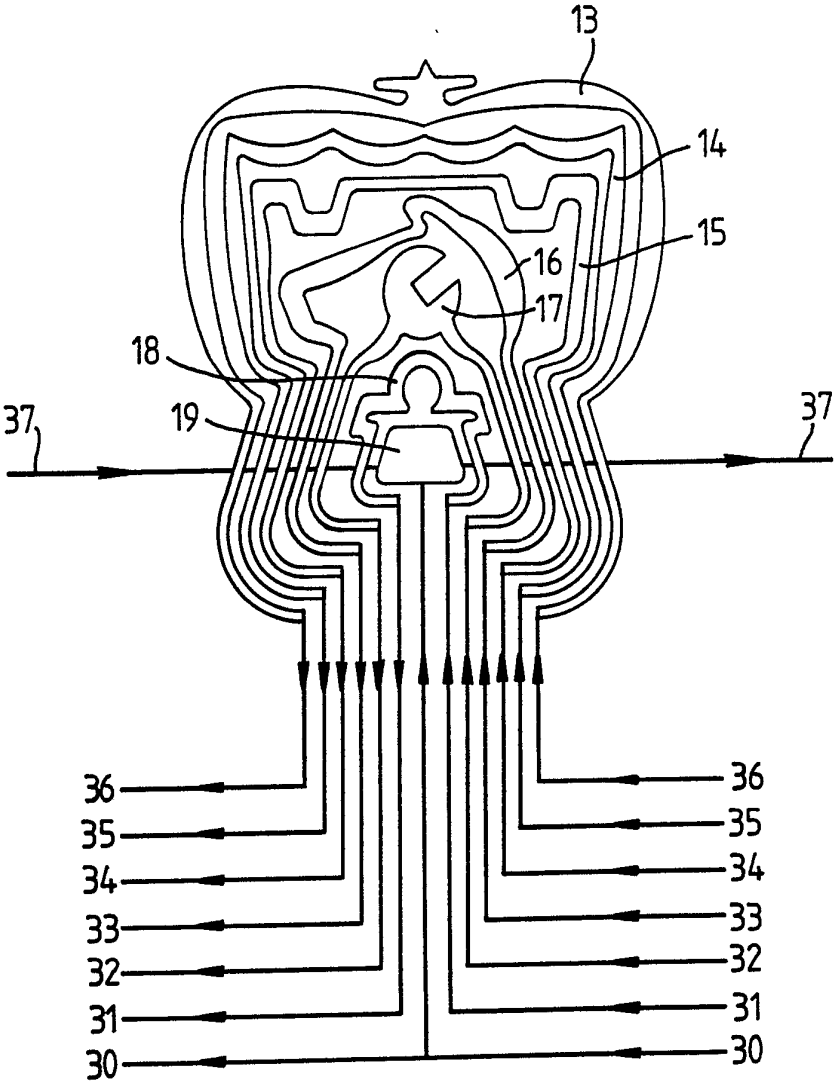


Fig. 3.



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Board Game Apparatus

The invention relates to apparatus for playing a board game, and in particular a game of chess.

Recently, with the improvements in microprocessor technology, electronic games have become an important section of the games market. One of the sections of this market is electronic games for playing and/or teaching chess and other board games where a representation of the board is displayed on a display device.

One example of how this may be achieved is disclosed in British Patent No. 2,053,701 which uses a liquid crystal display to form the board and the different chess pieces are displayed in each square by additional segments which are added to a basic piece outline.

However, by forming the different pieces in this manner it is difficult to differentiate between the types of pieces due to the small changes in the shape and size of the different types of chess pieces. By using this method of creating pieces it is also impossible to create representations of the pieces which resemble real chessmen or the traditional diagrammatic representations used in chess books and magazines.

In accordance with the present invention, apparatus for playing a board game, the board game using at least two different types of playing pieces for each player, comprises a display having a number of multi-segment regions thereon which are representative of playing positions on a board; the display being capable of displaying in each region each of the at least two playing pieces of each player, and of indicating to which player the playing piece displayed belongs, wherein each playing piece in each region is represented by a

respective single segment of the multi-segment display; and further comprising control means to enable a player to move any of his playing pieces from one region to another region by deactivating the representation at the one region and activating the representation at the other region.

By representing each playing piece by a respective single segment, each representation can closely resemble the three dimensional version of the real playing piece and the two-dimensional representation of each playing piece commonly used in diagrams in chess books and chess magazines. This means that a player can easily differentiate between the types of playing pieces on the board.

Typically, each different type of playing piece has a different value and thus preferably the representation of playing pieces of higher values are larger than the representation of playing pieces of lower values.

As playing pieces of different values are a different size from each other this helps to facilitate the differentiation of the pieces by a player.

Typically, there are six different types of playing pieces each of different values for each player and in this case the board game may be chess.

In the preferred embodiment there are sixty four regions on the display which are representative of sixty four playing positions on the board.

Typically, in one region the segments to represent the playing pieces are nested within each other so that the segment representing the playing piece of the highest value is on the outside and the segment representing the playing piece of least value is innermost. Preferably, within the segment representing the playing piece of lowest value is another single segment which indicates to which player the playing piece displayed belongs. In the

case of a game of chess the indicating segment could be activated to represent a black piece and deactivated to represent a white piece.

In the preferred embodiment, the display is a liquid crystal display (LCD).

Typically, in the preferred embodiment, the control means comprises an LCD driver to control the LCD, a processor adapted to play the board game and a keyboard interface to enable a player to input instructions to move any of his playing pieces.

Alternatively, the control means may comprise a tactile board or magnetic sensitive board, instead of a keyboard, in which the players' moves are entered by moving actual physical playing pieces.

Preferably, the LCD may also be used to display a clock for timing the game, a legal move indicator and means to indicate which player is to move next.

An example of apparatus for playing a board game in accordance with the invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a circuit block diagram of apparatus for playing a board game;

Figure 2 is a diagram of the segments of the LCD shown in Figure 1 when the apparatus in Figure 1 is used for a game of chess; and,

Figure 3 shows in greater detail one of the regions of the board shown in Figure 2.

As shown in Figure 1 the apparatus comprises a keypad 1 which is connected via an input line 3 and an output line 2 to a single chip microprocessor 4. The single chip microprocessor 4 includes an "on chip" read only memory (ROM) and an "on chip" random access memory (RAM) and is programmed to play a game of chess against a human opponent, play a demonstration game of chess and to teach chess.

Although the apparatus in Figure 1 uses a single chip microprocessor 4, almost any conventional multichip microprocessor combination could be used instead, for example a 6502 processor in combination with a ROM, a RAM and decoding logic.

The keypad 1 is scanned via the input line 2 and output line 3 by the processor 4. As an alternative to a keypad 1 for inputting a player's moves a tactile board could be implemented to allow the player's moves to be entered by moving actual physical pieces.

The single chip microprocessor 4 is connected via a bidirectional line 5 to a liquid crystal display (LCD) driver 6.

The LCD driver 6 is connected to an LCD 7 via two connection lines 8, 9, in order to enable the LCD driver to activate and deactivate the segments of the LCD 7 by 16-way multiplexing. Storage of the current display on the LCD and the LCD 16-way multiplexing are carried out entirely by the LCD driver which is a single large scale integration (LSI) chip LCD driver. Alternatively, the microprocessor 4 may itself drive the LCD with or without some external support circuitry which may be in the form of some other dedicated LCD display driver chip or discrete components.

If the apparatus is used to play a game of chess then the LCD 7 may be designed as shown in Figure 2. As shown in Figure 2 the LCD 7 displays a chess board 10 having sixty-four squares. The squares 11 represent white squares on the board and the shaded squares 12 represent black squares on the board 10. Each square 11, 12 is capable of displaying any one of six different types of chessmen by means of the segments 13 - 18, as shown in Figure 3. These are a king segment 13, a queen segment 14, a rook (or castle) segment 15, a knight segment 16, a bishop segment 17 and a pawn segment 18.

As each of the six different types of chessmen comprise a single LCD segment, it is only necessary for the LCD driver 6 to activate one segment in a square 11, 12 at any one time. Each square 11, 12 also has a segment 19 which is activated to indicate that the chessman on that square is a black piece and remains deactivated to indicate that the chessman on the square is a white piece.

The segments 13 - 19 are activated via lines 30 - 36 and line 37. Lines 30 - 36 connect the segments 19 -13 respectively in each square 11, 12 in a vertical column of the board 10. Hence, there are eight sets of lines 30 - 36, one set for each vertical column. The line 37 connects all the segments 13 - 19 in four squares 11, 12 in half of a horizontal row of the board 10. A separate line 37 connects the four squares in the other half of the horizontal row. Hence, there are sixteen horizontal lines 37 for the board 10, each line 37 connecting four squares.

As can be seen in Figure 2 and Figure 3 the king 13, which is the physically largest piece in real chess sets and is the most valuable piece in a game of chess is represented by the outermost segment 13. The segments for the other pieces decrease in size according to their physical size in a real chess set and according to their value in a game of chess, down to the smallest and least valuable piece, the pawn. This is represented by the segment 18 which is inside all the other segments 13 - 17 and which is immediately adjacent to the colour indicating segment 19.

This design of the representations of the chessmen means that it is possible to use the difference in LCD segment size to indicate the order of value of the pieces. For example, a queen is more valuable than a rook, and a knight and a bishop are of roughly equal

value. In addition, by using only one segment to represent each chessman it is possible to represent the chessmen in a similar manner to the method used for representing chessmen in books, newspaper columns and other printed diagrams.

A similar type of LCD segment configuration to that shown in Figure 3 could be used on an LCD in which a board with a different number of squares is used, or in which part of a chess board or several chess boards are displayed for teaching chess theory, for some other display purpose or for some other game which utilises chess pieces on squares.

In addition, to the main part of the display which displays the chess board 10, optional indicators may be used to display other game parameters such as a clock 20 for timing a game of chess and for playing chess against the clock, illegal move indicators 21, 22 the indicator 21 being used to indicate a legal move and the indicator 22 being used to indicate an illegal move. Other indicators 23, 24 may be used to indicate whether it is white's turn to move or black's turn to move. There may also be a number of arrows 25 which may be activated individually or collectively to indicate instructions to a player.

In order to activate and deactivate each of the segments 13 - 19 in each square 11, 12 the segments 13 - 19 may be wired on an individual basis, that is one driving line for each segment on the display. Alternatively, they may be matrixed in a multiplexed fashion so that activation of one segment requires two driving lines to be energised. In the apparatus shown in Figure 1 and Figure 2 the latter method is used with 16-way multiplexing. In this method of multiplexing each of the sixteen horizontal row lines 37 is activated in turn so that at any one instant only four of the

sixty-four squares 11, 12 may display a representation of a chessman. When a line 37 is activated, the appropriate lines 30 - 36 are also activated to activate the appropriate segments 13 - 19 to represent the chessmen. If there is no chessman in a square then none of the lines 30 - 36 to the segments 13 - 19 in that square are activated.

Although the segment 19 which indicates the colour of a playing piece is the large segment near the centre of each square 11, 12, around which the segments 13 - 18 which represent the chessmen have been arranged, the segment 19 may be placed anywhere within the square in relation to the chessmen segments 13 - 18.

The black squares 12 on the chess board 10 are represented by overprinting the top surface of the LCD with a blue shaded checker board pattern in order to differentiate black squares 12 from white squares 11.

In use, a player switches on the apparatus shown in Figure 1 and initialises the microprocessor 4 by means of the keyboard 1 to start playing a game of chess. When a game of chess has been initialised the microprocessor 4 displays on the LCD 7 via the LCD driver 6 the initial starting positions of the pieces in a game of chess. The player may then choose whether he wishes to be "black" or "white". If the player chooses to be white then he moves first by indicating his move to the microprocessor 4 by using the keypad 1. The microprocessor 4 will then show the player's move on the chess board 10 by deactivating the segment of the piece moved in its original position and activating the appropriate segment in the square to which the chessman has been moved. The computer will also indicate whether this is a legal move or an illegal move by activating the appropriate segment 21, 22.

If the move is an illegal move then the microprocessor returns the chessman to its original

square after an appropriate time delay and the player must then choose a legal move. If the move is a legal move then the microprocessor 4 indicates via the LCD driver 6 that it is black's turn to move by activating the indicator 24 and the single chip microprocessor 4 then computes its move according to the move made by the player.

The game then continues in this manner until the player checkmates the computer, the computer checkmates the player or a stalemate is reached.

CLAIMS

1. Apparatus for playing a board game, the board game using at least two different types of playing pieces for each player, the apparatus comprising a display having a number of multi-segment regions thereon which are representative of playing positions on a board; the display being capable of displaying in each region each of the at least two playing pieces of each player, and of indicating to which player the playing piece displayed belongs, wherein each playing piece in each region is represented by a respective single segment of the multi-segment display; and further comprising control means to enable a player to move any of his playing pieces from one region to another region by deactivating the representation at the one region and activating the representation at the other region.

2. Apparatus according to claim 1, wherein each different type of playing piece has a different value, the representation of playing pieces of higher values being larger than the representation of playing pieces of lower values.

3. Apparatus according to claim 1 or claim 2, wherein the multi-segment regions are nested one within the other.

4. Apparatus according to any of the preceding claims, the apparatus being adapted to play chess, wherein there are six different types of playing pieces.

5. Apparatus according to claim 4, wherein the multi-segment regions generate representations of the playing pieces which are substantially the same as conventional two-dimensional representations of chess pieces.

6. Apparatus according to any of the preceding claims, wherein within the segment representing the playing piece

of lowest value is another single segment which indicates to which player the playing piece displayed belongs.

7. Apparatus according to any of the preceding claims, wherein the display is a liquid crystal display (LCD).

8. Apparatus according to claim 7, wherein the control means comprises an LCD driver to control the LCD, a processor adapted to play the board game and a keyboard interface to enable a player to input instructions to move any of his playing pieces.

9. Apparatus according to claim 7 or claim 8, wherein the LCD can display a clock for timing the game, a legal move indicator and means to indicate which player is to move next.

10. Apparatus for playing a board game substantially as hereinbefore described with reference to the accompanying drawings.

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