

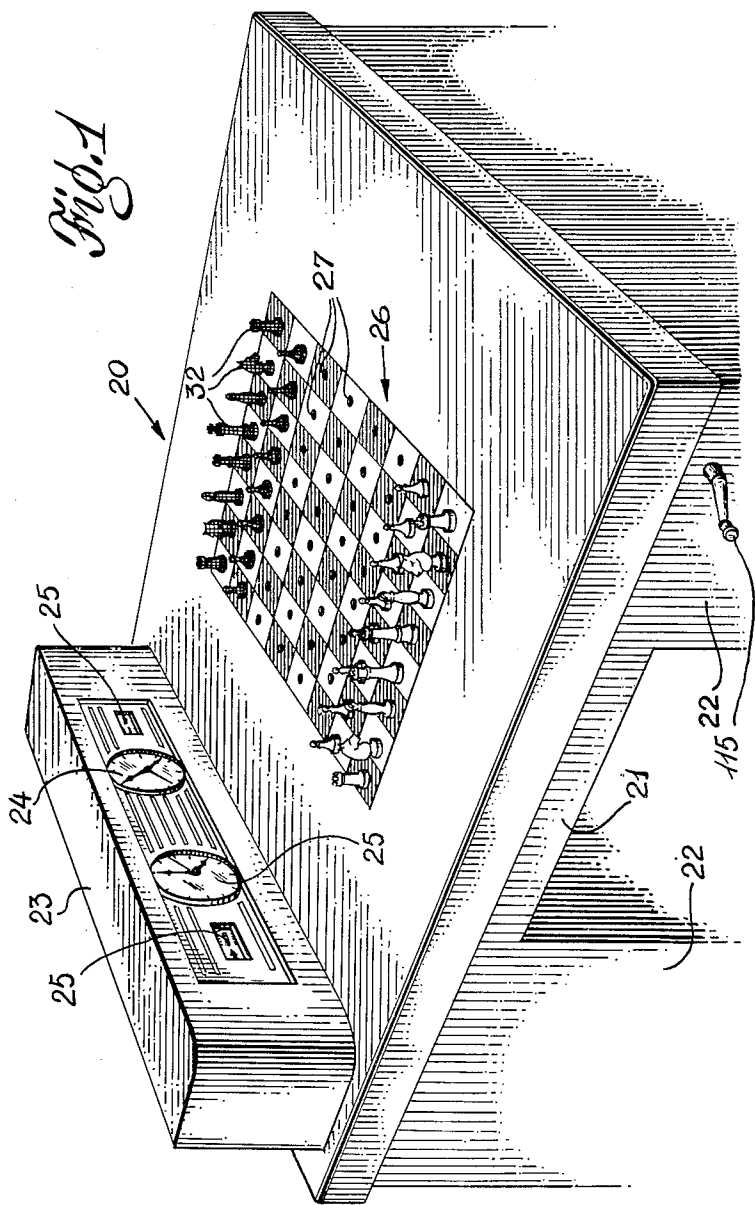
April 15, 1952

L. HEINOO
GAME RECORDER

2,592,897

Filed May 11, 1949

5 Sheets-Sheet 1



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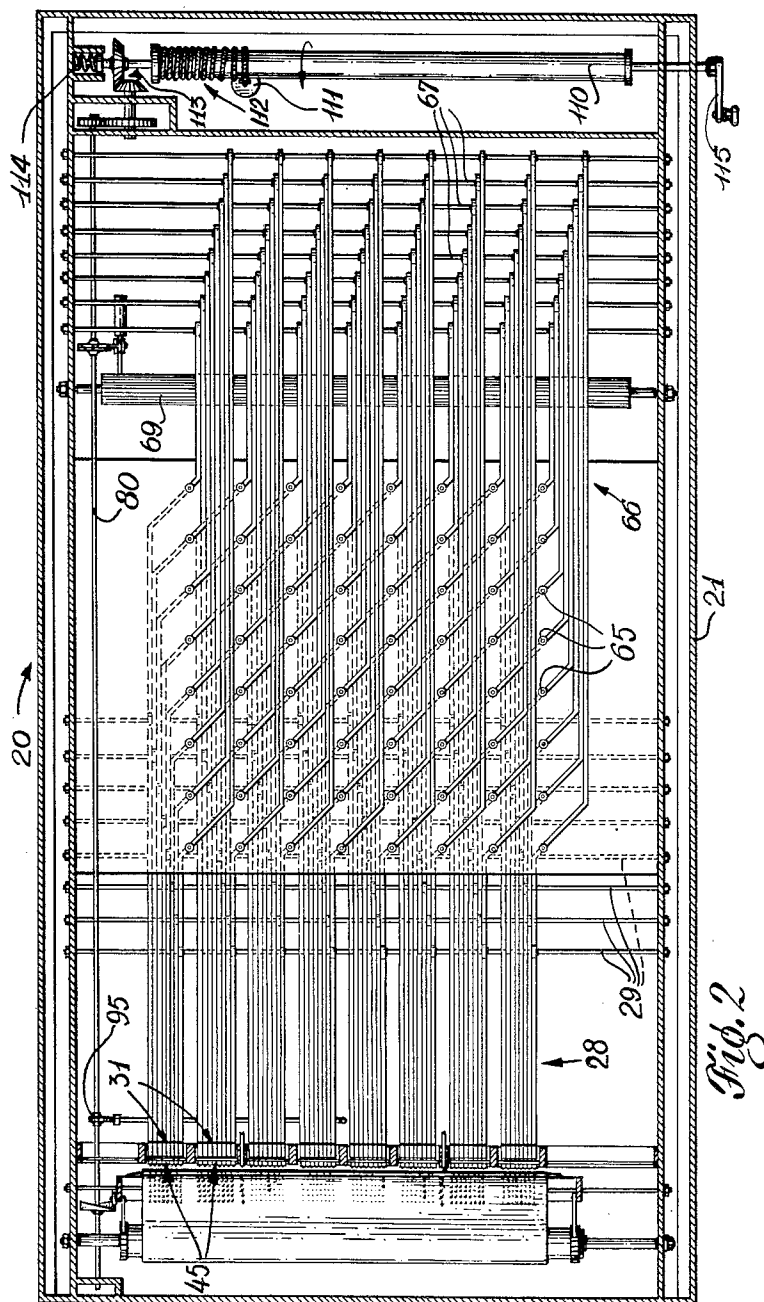
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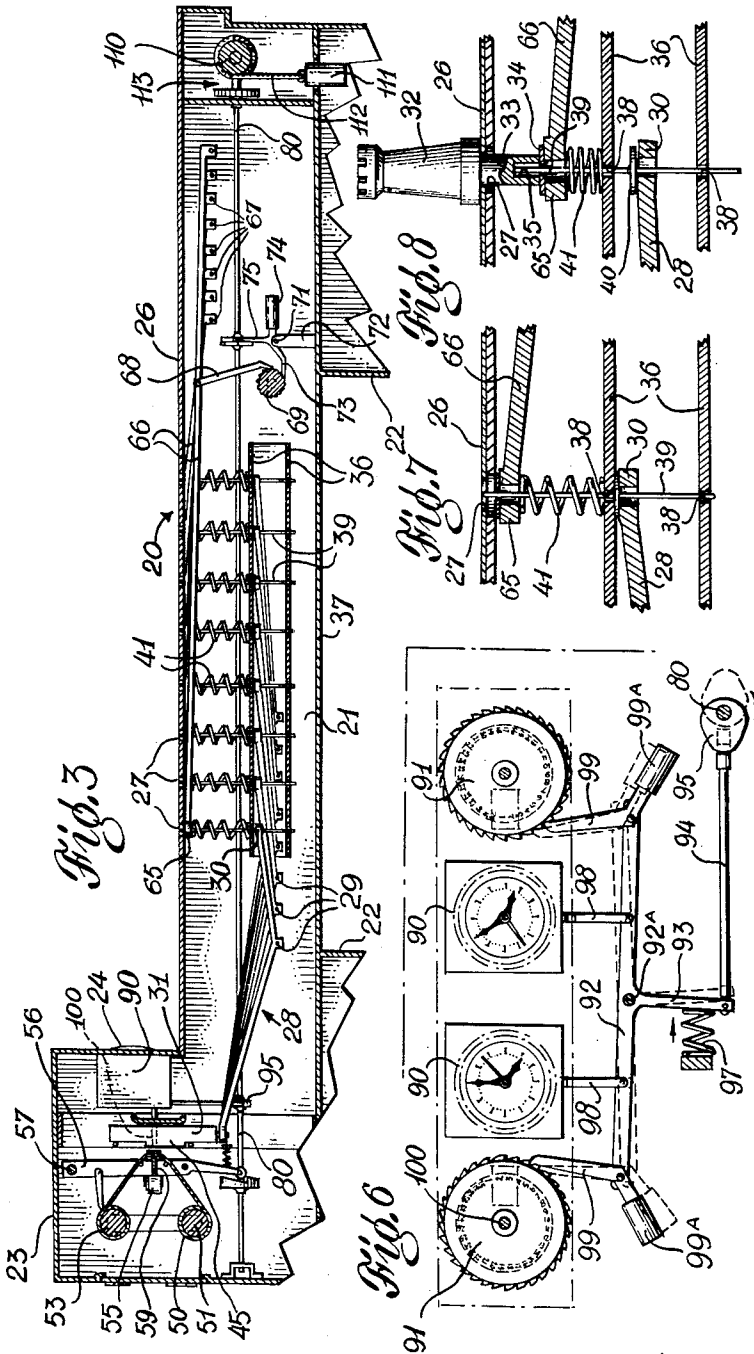
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GAME RECORDER

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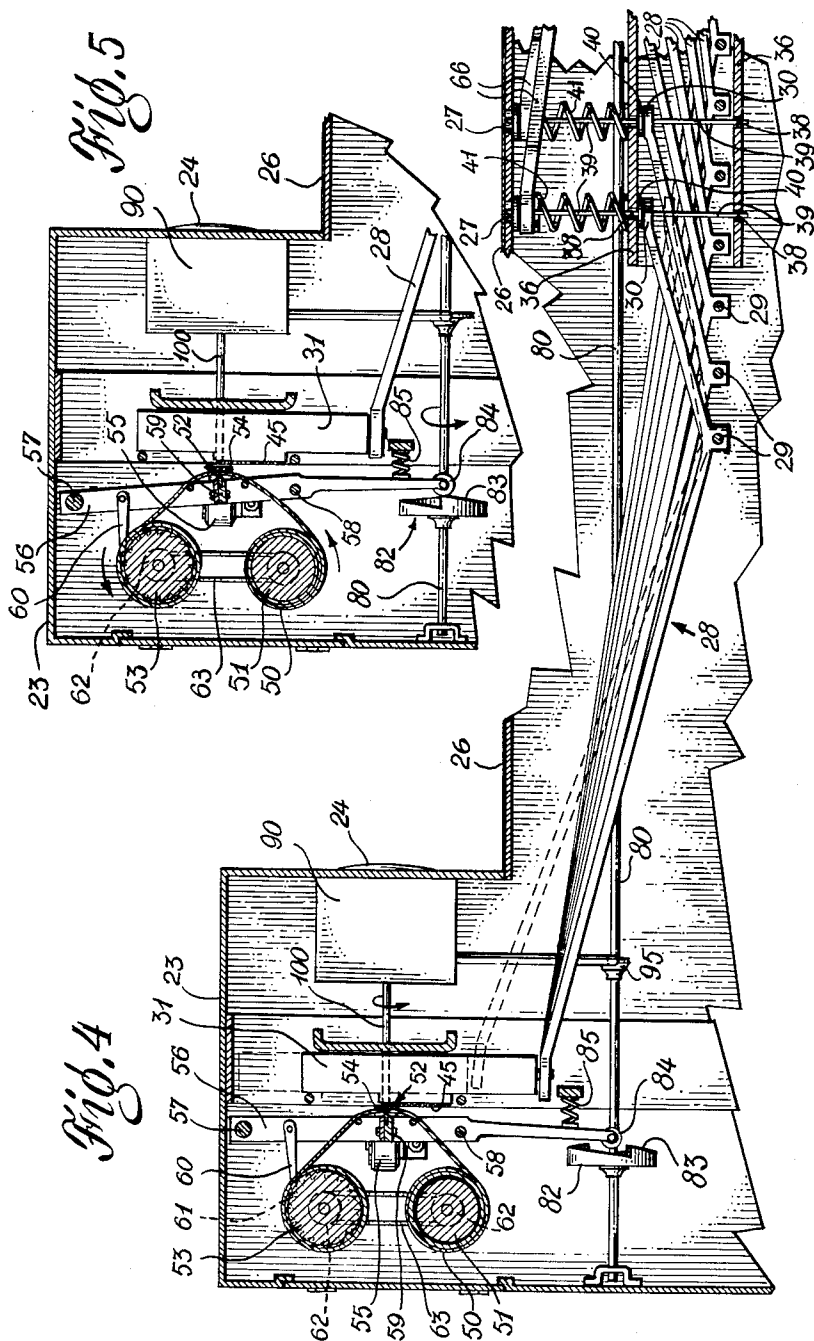
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GAME RECORDER

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5 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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GAME RECORDER

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8 Claims. (Cl. 346—33)

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The present invention relates to a game recorder.

More specifically, this invention concerns an apparatus designed to keep a complete record of a game such as chess or the like, every move by each player being recorded as well as the interval of time between successive moves. The apparatus is particularly suitable for use in chess playing but may be modified, or even simplified within certain limits, for the recording of other games played on a limited playing surface of chequered or similar design.

The main object of the present invention is to provide an apparatus capable of recording, in a game wherein a plurality of game pieces are moved about a limited playing area according to standardized rules, the actual position of each piece at each move.

It is another important object to provide apparatus of the character described which records also the interval of time which has elapsed between successive movements of the pieces.

Another important object of the invention resides in the provision of apparatus of the type set forth above which is especially suitable for recording purposes in the playing of chess, and thus advantageously usable in chess competitions or tournaments where it is often necessary to review the games or to ascertain that each player has obeyed the rules.

Yet another object resides in the provision of apparatus of this nature wherein the actual position of all pieces in the playing area are recorded, automatically and preferably on paper, as each movement is completed. Thus each recording on the paper is a complete picture of the game at that movement.

Still another object is to provide apparatus of the type described, which is practical, fool proof in operation, and is capable of embodiment in an attractive, compact unit—a unit which may resemble a desk including a chess board on top and at opposite sides of which two opponents may be seated conveniently for play.

And still another object resides in the provision of apparatus of the character set forth which is of simple, durable design and whose operation may be understood by any intelligent individual.

Other objects and advantages will become apparent or be further pointed out in the description to follow.

As an example, and for purposes of illustration only, a preferred embodiment of my apparatus as designed for the recording of chess

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games is shown in the annexed drawings, wherein:

Figure 1 shows a perspective view of the apparatus as enclosed in a table or desk, looking down towards the playing surface thereof;

Figure 2 shows a plan view of the apparatus of Figure 1 with the top-enclosing covers removed;

Figure 3 shows a longitudinal section through the apparatus;

Figure 4 shows an enlarged view of part of Fig. 3 illustrating some features of the apparatus in greater detail;

Figure 5 shows a detail similar to a portion of Fig. 4 at another point of operation of the apparatus;

Figure 6 is a transverse elevation view, somewhat diagrammatic in representation, illustrating the time-interval recording mechanism;

Figure 7 shows a detail sectional view, longitudinally of one of the positions of the playing area, indicating when in inoperative position the members beneath the playing surface adapted to be actuated by the chessman;

Figure 8 is a view similar to Figure 7 with a chessman occupying the position;

Figure 9 is a detail sectional elevation, longitudinally through the record-printing release mechanism, indicating operation thereof;

Figure 10 shows diagrammatically and in detail a section transverse to that of Fig. 9;

Figures 11, 12 and 13 are similar views taken longitudinally through one point of the release mechanism illustrating modifications necessary to this mechanism to permit the "castling" move in chess, and these views show in three stages how the modified portion of the mechanism operates;

Figure 14 is a diagrammatic detail elevation view taken transversely to Figs. 11, 12 and 13.

It may be emphasized that the apparatus herein shown and described has been devised to record only the game of chess, with its plurality of pieces having different values and limits of movement, and with its involved rules and complications thereto such as in the case of the castling move. After an examination of the operation of the recorder when used for this elaborate game, it will immediately be apparent how the principles of the invention are embodied for simpler games such as checkers and others.

The principle of the recording mechanism is that each position in the playing area is accorded a separate column on specially-ruled re-

cording paper, this paper being provided in quantity, say in rolls, for the printing machine. As each move is made, the printing mechanism will print, in a horizontal line across the page, a mark for each square, these marks indicating whether a chessman is located in the square and, if so, the nature of the piece.

Obviously, then, the positions of all pieces in the game will be recorded in one printing operation, such operation occurring automatically, as will be apparent below, after each movement by either player. In a game of chess, there are twelve different pieces (since each player has a king, queen, bishop, knight, rook and pawns) which must be represented by different printing marks, a thirteenth symbol being provided to indicate when any square is unoccupied.

Referring now to the drawings, wherein the same reference characters indicate corresponding parts throughout, Figure 1 shows that the unit may be conveniently enclosed in a sort of desk or table 20 having a rectangular top portion 21 of sufficient depth to contain the apparatus moving parts and supported chests or the like 22 at each end between which the knees of players seated on each side of the desk may be accommodated. At one end of the desk a clock-cabinet 23 may rise above the top surface thereof to hold the time-interval recording mechanism, the printing mechanism and the record paper. On the side facing the players, cabinet 23 may have displayed-clock dials 24 and movement-tabulating indicators 25 corresponding to each player.

The playing area 26 is seen in Fig. 1 to be a conventional chequered design marked on the desk top, which latter has an aperture 27 there-through in each position square. The game pieces or chessmen used with the recorder will have bases adapted to enter into said aperture when moved into any position so as to actuate mechanisms below the top cover of desk 20. Chessmen of different identities (there are twelve different identities, as noted above) will have differently shaped bases in order to actuate the mechanisms below the playing surface to a different degree.

Figures 2, 3, 7 and 8 best illustrate the construction of preferred mechanisms underneath the playing surface to be actuated by the chessmen. The most important of these is the mechanism for transmitting information concerning the identity of a chessman in any position to the printing bar corresponding to that position. These identity transmitters constitute a plurality of levers 28 (one for each square) which are pivoted on rods 29 transverse the apparatus casing. One end of each lever is disposed directly under the aperture 27 of its square, preferably being formed in a horizontal ring 30, whilst the other end is coupled to the lower end of a type bar 31.

The base of each chessman 32 (Fig. 8) is preferably shaped with a downwardly-projecting sleeve 33 of reduced dimensions and capable of entering aperture 27, whilst an axial bore 35 will extend inward and upward from the outer end of the sleeve 33 for a distance corresponding to the identity of the chessman. The sleeve is adapted to rest over a washer 34 which, in its uppermost position (Fig. 7) closes the aperture 27 to enhance the appearance of the board when the chessmen are removed. There being twelve different identities, accordingly the several pieces will have interior bores of twelve different lengths

from bottom to top, the length of sleeve 33 being the same for all pieces.

Underneath the playing surface, a pair of horizontal partitions 36 may be supported between surface 26 and the bottom 37 of desk casing 21. Through each of these partitions, apertures 38 are provided which are directly below a corresponding aperture 27. An upright rod 39 is slidable in these apertures and carries a washer 40 secured thereon at a point between partitions 36. A spring 41 above upper partition 36 is coiled around the rod and under member 56 to urge it upwards. When the rod is pushed up until its flange 43 abuts the upper partition 36, the upper extremity of the rod should extend to the playing surface 26 whilst the lower end may approximate the bottom of lower partition 36. The ringed end 30 of each lever 28 will encircle loosely its corresponding rod below flange 40, and, as the rod is pushed down by the insertion of a chessman into any square, this end of lever 28 will be depressed accordingly and to an extent inversely proportional to the length of the axial bore 35 of the chessman.

Since a chess playing surface is eight rows square, naturally there will be sixty-four levers 28 and type bars 31, and eight transverse rods 29 upon which the levers are pivoted. The positions of the rods and lengths of the lever arms will be such that a chessman will cause the same depression of a lever and lifting of a type bar regardless of where in the playing area it is positioned. The type bars will have on their printing surfaces 45 thirteen symbols spaced vertically, the correct symbol being positioned with respect to the printing mechanism according to the elevation of the bar, the latter being in its lowest limiting position when no chessman is in the square.

The type bars having been positioned, the printing mechanism may be of any desired conventional type although a preferred arrangement is shown best in Figs. 4 and 5. Here the record paper is supplied in a roll 50 carried on transverse feed roller 51 and feeding up through the printing station 52 to an upper transverse drawing roller 53. The inking tape 54 may extend between a pair of rollers 55 one at each end of the record paper and journaled on upright axes. To force the paper and tape against the type bars in a horizontal line at the printing station, a pair of bars 56 may be pivotally suspended from each end of an axle 57 transverse the top of the cabinet, these bars being rigidly connected by transverse rod 58 and printing bar 59, the latter extending transverse the apparatus behind paper and tape and at the level of station 52. If the bars 56 and hence bar 59 be swung smartly to the right (Fig. 5) this will cause the paper and tape to be pressed against the type bars at the level of station 52 for printing purposes. As the bars 56 and 59 retreat, a pawl 60 pivoted on one of the former (56) will co-operate with ratchet wheel 61 at one end of upper roller 53 in order to displace the latter angularly. Roller 53 may be coupled to roller 51 by means of pulleys 62 and belt 63 and, accordingly, after each movement of a piece has completed a printing operation, the paper will have been displaced further onto the upper roller in order to present a new, clean, horizontal line to printing station 52.

In order to operate the printing mechanism in the manner described, obviously any method might be used or the cycle of operation might be carried out manually after each movement by a

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player. It is proposed, however, that the mechanism functions automatically upon movement of a chessman, and that this same automatic motion actuates the time-interval recording mechanism.

To this end, a second set of levers is pivoted below the top cover of desk 21 in the manner shown in Figs. 2 and 3. The free ends 65 of these levers 66 are formed in rings encircling rods 39 above springs 41 and below the top cover of the desk. The levers extend to the right and are pivoted on eight spaced rods 67 extending transverse the apparatus casing. When a chessman is inserted in position in a square, the sleeve thereof will force end 65 of the corresponding lever 66 downward, spring 41 urging the lever up upon removal of the piece.

In a transverse line across the casing and pivotally suspended from the levers 66 intermediate their ends is a row of pawls 68. The spacing of rods 67 is such that no matter in which playing position a piece is inserted, it will cause the lever pawls to be depressed an identical distance. And the lower ends of all the pawls are maintained by their own weight in engagement with a ratchet-shaped cylinder 69 journaled on a shaft 70 transverse the casing and below the levers.

Figs. 9 and 10 show that when a pawl is depressed, it causes ratchet cylinder 69 to rotate a distance equivalent to the pitch of one tooth. The pawls corresponding to levers 66 in raised position are permitted by their pivotal suspension to slip one tooth and hence remain in readiness for when a chessman is inserted in the corresponding square. Near one end of the cylinder 69, a transverse pivot 71 is arranged in a pair of supports 72 extending up from the bottom 37 of the casing. Another pawl member 73 is journaled on this pivot and is held in contact with the bottom of the cylinder by a rightwardly-extending (Fig. 9) weighted arm 74. The engagement of pawl 73 with the cylinder helps to keep the latter constantly under control and prevents any rotation in a sense reverse to that described. However, when positively driven around by depression of one of the levers 66, the cylinder depresses pawl 73 against the counterbalancing of member 74 and tilts to the left (Fig. 9) an arm 75 extending vertically upward from the pawl 73 at its pivotal point.

Figures 2, 3 and 10 show the effect of this tilting of arm 75. On its upper end, this latter carries an offset pin 76 engaging and holding against rotation a circular member 77 carrying segmental abutments on portions of its circumferences. That is, the member 77 carries a raised segmental abutment 78 on over one-half of its width for less than a quarter of its circumference, there is a space across the circumference and then another abutment 78 on the other side thereof, another space, and so on; there being four spaced abutments in all alternating as to the side on which they are located.

The member 77 is keyed to a shaft 80 extending longitudinally on one side of the casing with means described below urging rotation thereof. Thus, as pin 76 is displaced laterally from its holding position against the end of one abutment 78 (by depression of lever 66, rotation of cylinder 69 and depression of pawl 73) member 77 rotates through a quarter of a circle, allows pin 76 to return to its original position (upon completion of the movement of cylinder 69 and subsequent elevation of pawl 73 under weight of member 74) and rotates through another quarter of a

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circle until pin 76 again abuts against one of the raised portions 78.

The semi-circular displacement permitted shaft 80 causes operation of the printing mechanism and time-interval controlling mechanism. In the former case (see Figs. 4 and 5) the shaft extends leftward and has keyed thereto in co-operation with the lower end of one bar 56 a cam member 82. This cam member is circular in outline with a flanged circumference 83, the flange shaped with two slopes thereon, end to end and each occupying half of the circumference. A roller 84 may be provided on the lower end of bar 56 which will normally be held, as by spring 85, with the roller slightly away from one of the depressed portions of the cam surface when the latter is at rest. Upon rotation of the cam, however, the sloped portion thereof forces the lower end of 56, and hence transverse bar 59, to the right, thus causes the printing operation to take place. Upon completion of a semi-circular displacement, the roller reaches the recessed portion of the cam and so is permitted to move leftward, carrying its associated parts therewith.

Figure 6 shows the elements of the time-interval recording mechanism, including a pair of timing clocks 90 and a pair of movement indicators 91 for the players. A bar 92 extends transverse the apparatus below the clocks and is pivoted centrally (on a fixed pivot 92A), having also a downwardly extending arm 93. The lower end of arm 93 is coupled to one end of a transversely-slidable rod 94, the other end of which abuts against the surface of a cam 95 keyed to shaft 80. A spring 97 presses against arm 93 so that contact between cam and rod end is maintained, and the cam is designed to cause a rocking of arm 93 past the vertical from one side to the other with each semi-circular angular displacement. Accordingly one end or the other of bar 92 will be in an upper position, depending on the disposition of the cam.

On each end portion of bar 92, an upwardly extending rod 98 will act as a stop arm locking and releasing the escapement to the corresponding clock at the right moment whilst a pawl 99, pivoted on the extremity of 92 and held in engagement with the ratcheted exterior of the movement indicator by a counterbalancing arm 99A will control the movement of the indicator.

The mechanism will be adjusted so that, as a player moves a piece and releases shaft 80, cam 95 will cause the end of bar 92 corresponding to this player to move up. The pawl 99 thus being actuated causes the indicator 91 to move angularly one division, showing the player to have made one more move. The rod 98 moves up and stops the clock. At the same time, through the depression of that end of bar 92 corresponding to the other player, the latter's clock commences to record time and his pawl 99 retreats in readiness for another upward movement.

It is proposed that from each clock 90 a rod 100 extends centrally rearward to the printing station, this rod rotating in unison with, say, the minute hand of the clock, and adapted to mark on the record paper an arrow indicating the position of this hand.

It will be remembered that in chess there is a movement known as "castling," in which both the king and a rook are moved at once. Figures 11 to 14 inclusive show modifications which are applicable to the apparatus and which prevent such a complicated move from interfering with the recording operation of the machine. In this

case, it is essential that the king be moved first, the idea being to prevent recording by the machine until the rook also has been moved in the event that "castling" is to be employed.

Normally, when the king is moved, it can only travel one square at a time. During "castling" however, the king should jump right or left two squares. Thus the mechanism should be prevented from recording only when the king is moved in the latter manner. Looking at Figs. 11 and 14, it is seen that the alternative squares to which the king might be moved during castling are characterized by the elongated lower ends 68A extending down from the pawls 68 of their respective levers 66. Underneath the lever 66 corresponding to each king's starting position, a lever 101 is freely pivoted to the bottom of the casing and extends up therefrom, having a transversely projecting rod 102 engaged (at the start) under extensions 68A. The upper extremity 103 of lever 101 abuts, at the start, against a finger 104 depending from the king's lever 66, this finger thus preventing lever 101 from toppling to the right.

When the king, is lifted from its starting position, however, finger 104 is elevated and no longer holds lever 101. The latter falls towards the right and, by virtue of rod 102, lifts the pawls 68 having extremities 68A out of engagement with the cylinder. A bell crank 105 is pivoted at 106 below cylinder 69 and has one pawled extremity 107 in engagement with the latter and another toothed extremity 108 engaging a toothed hub 109 on the base of lever 101. The normal position of the bell crank, when the cylinder is stationary, is such that tooth 108 will allow lever 102 to fall only a limited distance to the right upon being released by finger 104. This limiting position is shown in Fig. 12 and indicates that the lever has fallen just far enough to lift the elongated pawls 68 as described above.

If the king is now placed in either "castling" position, no recording will take place since the pawls 68 corresponding to these positions are not in engagement with the cylinder 69. On the other hand, if the king makes any other legal move, it will cause rotation of cylinder 69 upon being set down, and this will displace bell crank 105, lift tooth 108 out of engagement, allow (Fig. 13) lever 101 to topple to the right, and return pawls 68—68A to engagement with the cylinder. The "castling" mechanism will then be inoperative, but "castling" is illegal after the king has once been moved.

On the other hand, if "castling" is carried out, the subsequent movement of the rook will also cause the machine to operate in the manner noted immediately above, the movement being recorded and the "castling" mechanism being rendered subsequently inoperative until reset manually at the beginning of a new game.

It is proposed that shaft 80 be continually urged to rotate by some means. A suitable arrangement is shown in Figs. 2 and 3, wherein a drum 110 is disposed transverse one end of the apparatus and carries a weight 111 on the end of a cord 112 wound therearound. The weight will urge rotation of the drum which may be imparted to the shaft through a suitable chain of gears 113 at one end of the drum, said gears held in clutched position by spring 114. A handle 115 at the other end permits rewinding of the cord on the drum, inward pressure on the handle serving to declutch the drum.

Obviously, from the foregoing, the present in-

vention fulfills the objectives hereinbefore set forth. A practical apparatus, capable of embodiment in a convenient attractive unit, has been disclosed for the recording of all the movements in such games as chess, checkers, etc. The operation of the apparatus is foolproof, and it is capable of recording even in the face of the complicated rules employed in such a game as chess.

It may be emphasized that the fundamental parts of the apparatus are the following:

A game board including a divided playing area; Game pieces having bases characteristic of their identity;

Lever corresponding to all the board divisions which are acted upon by the pieces to set up in a printing mechanism symbols, one for each division, which indicate what piece if any is located at each division.

Means for operating the printing mechanism after each move, manually or automatically.

These fundamental mechanisms may be elaborated, as in the present instance, to record automatically and to provide for games having more complicated rules.

It will therefore be understood that I do not limit myself to the particular embodiment of my invention herein shown and described, since obviously various alterations might be made in the size, shape and arrangement of parts without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention I claim:

1. In a device of the character described, a game board having a divided playing area thereon and an aperture therethrough in each division, game pieces movable according to the rules of the game and having base formations characteristic of their identity adapted to project downward through said apertures, a printing mechanism which, when actuated, selectively prints for each division simultaneously one of a number of marks and means displaceable by the base formations of the pieces to set up an appropriate mark in the printing mechanism for each division, and to actuate said printing mechanism, said printing mechanism normally held inoperative, said printing mechanism actuating means including members under each division operable by the base of a piece to momentarily release the mechanism for printing purposes whereby the positions of all pieces are recorded by the printing mechanism after each movement of a piece.

2. In a device of the character described a plane horizontal member having a chequered playing area inscribed thereon and an aperture therethrough in each division of said area, game pieces movable about the playing area having elongated base formations adapted to project downward through said apertures and said formations characteristic of the identity of the piece, record paper having a space corresponding to each division of said area, a printing mechanism to print simultaneously a symbol in each of said spaces, and movable means below each of the divisions of the playing area cooperable with the base formation of the pieces to set up in the printing mechanism a symbol appropriate to the identity of the piece in any division.

3. In a device of the character described, a game board having a divided playing area thereon and an aperture therethrough in each division, game pieces movable according to the rules of the game and having base formations char-

acteristic of their identity adapted to project downward through said apertures, a printing mechanism, which when actuated selectively prints for each division simultaneously one of a number of marks and means displaceable by the base formation of the pieces to set up an appropriate mark in the printing mechanism for each division, and means to actuate said printing mechanism, said printing mechanism normally held inoperative, and said printing mechanism actuating means including levers under each division depressible by the base of a piece to momentarily release the mechanism for printing purposes, whereby the positions of all pieces are recorded by the printing mechanism after each movement of a piece.

4. In a device as claimed in claim 1, said means to set up an appropriate mark in the printing mechanism including levers pivoted beneath the board each extending at one end to beneath one division, the printing mechanism having a type bar corresponding to and actuated by the opposite end of each lever, and said lever positively displaced by the base of a piece positioned in the corresponding position so as to displace, in turn, its type bar and bring the mark appropriate to the identity of the piece in position for printing.

5. In a device as claimed in claim 1, said printing mechanism recording on paper, when actuated, in a row thereacross, a mark corresponding to each division indicating the identity of the piece positioned thereat, if any, and said mechanism comprising means to move the paper along after each printing operation to expose a fresh portion of the paper for printing.

6. In a device as claimed in claim 1, said printing mechanism normally held inoperative, said printing mechanisms actuating means comprising levers pivoted beneath the board each extending at one end to beneath one division, said end depressible by the base of a piece, a ratchet

cylinder transverse the levers, a pawl hanging from each lever in engagement with said cylinder to angularly displace the latter upon depression of any lever, a shaft, means urging rotation of said shaft, means holding said shaft against rotation and in engagement with said cylinder, said cylinder momentarily releasing said holding means and hence the shaft upon being displaced, said holding means reengaging the shaft after partial rotation thereof, and said shaft coupled to the printing mechanism to actuate same when released, whereby the position of all the pieces are recorded by the printing mechanism after each movement of a piece.

7. In a device as claimed in claim 6, a clock for each player, a rocking arm below said clocks and connected thereto for starting and stopping same, the shaft coupled to said rocking arm to tilt same in opposite directions in successive periods of rotation, whereby after each movement of a piece the clock timing one player is stopped and the other is allowed to start.

8. In a device as claimed in claim 7, a rod extending into the printing mechanism from each clock, said rod rotating with the hour hand of the clock to record the position of same in each printing operation.

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