United States Patent [19]

Hellmann

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[45] **Jan. 22, 1974**

[54] **AIRCRAFT TRAFFIC CONTROL BOARD GAME APPARATUS**

[76] Inventor: **Richard L. Hellmann,** 112 Varsity Ct., Crestview Hills, Ky. 41017

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[52] **U.S. Cl.** ..... **273/134 C,** 273/134 D, 273/137 R, 273/145 B

[51] **Int. Cl.** **A63f 3/00**

[58] **Field of Search** 273/134, 145

[56] **References Cited**

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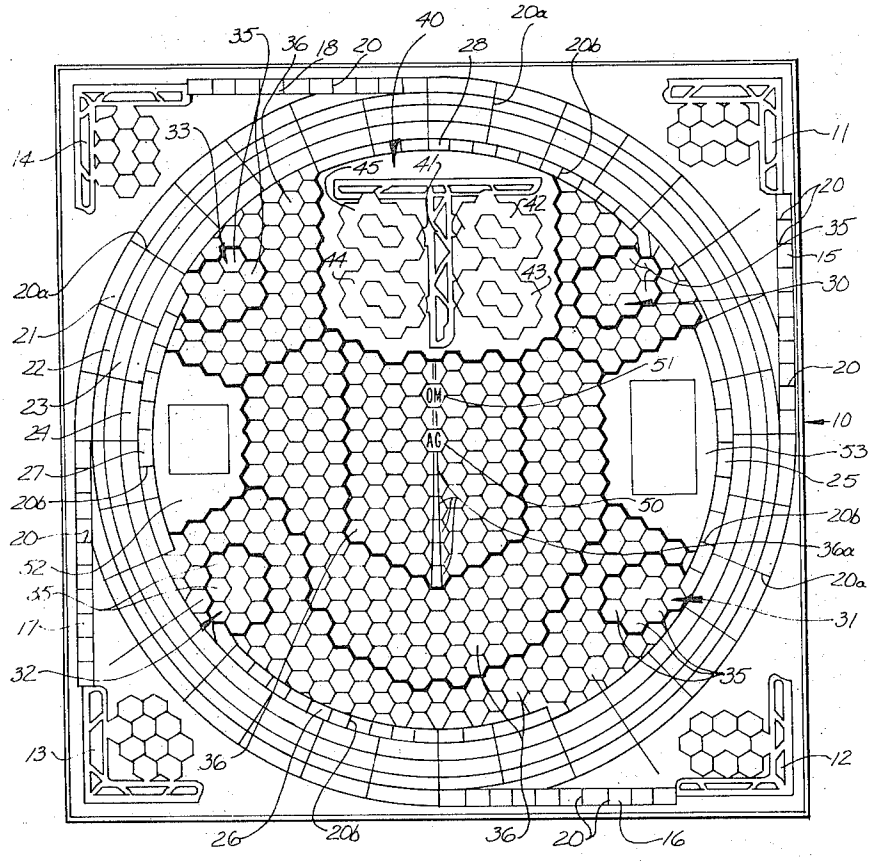
Primary Examiner—Delbert B. Lowe

Attorney, Agent, or Firm—Melville, Strasser, Foster & Hoffman

[57] **ABSTRACT**

A game device for simulating aircraft traffic control procedures between departure airports and a destination airport, comprising a game board having delineated thereon simulated departure terminals, playing spaces connecting said terminals with concentric flight routes, playing spaces within said flight routes, and a simulated destination airport; a plurality of playing pieces simulating aircraft; means to determine by chance the extent of movement of the playing pieces on the game board; and means to determine by chance simulated take-off and landing clearances for the playing pieces. The game provides entertainment and an introduction to fundamental rules of aircraft traffic control.

4 Claims, 7 Drawing Figures



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SHEET 1 OF 3

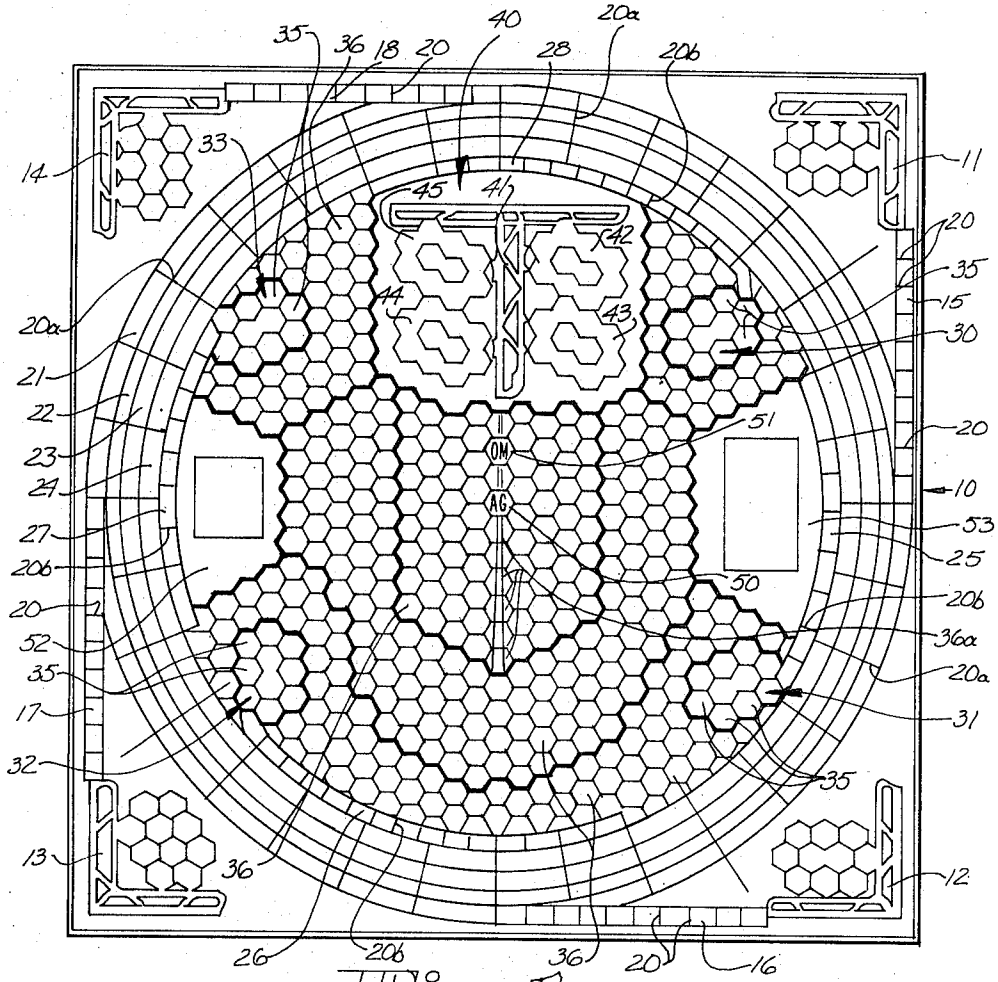


FIG. 1

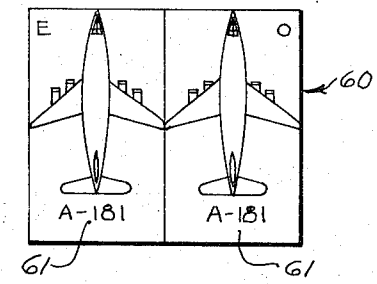


FIG. 2

INVENTOR/S

RICHARD L. HELLMANN

BY Melville, Strasser, Foster and Hoffman
ATTORNEYS

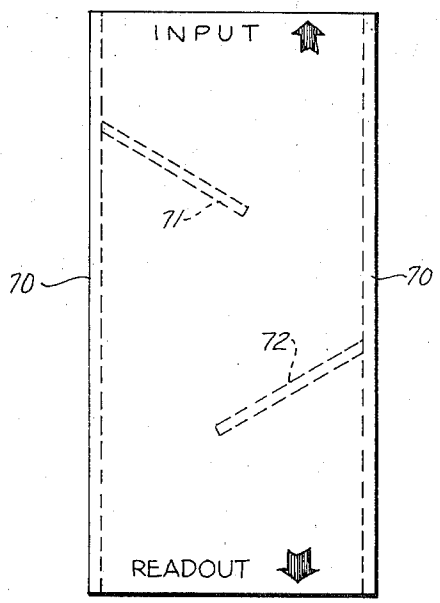


FIG 3

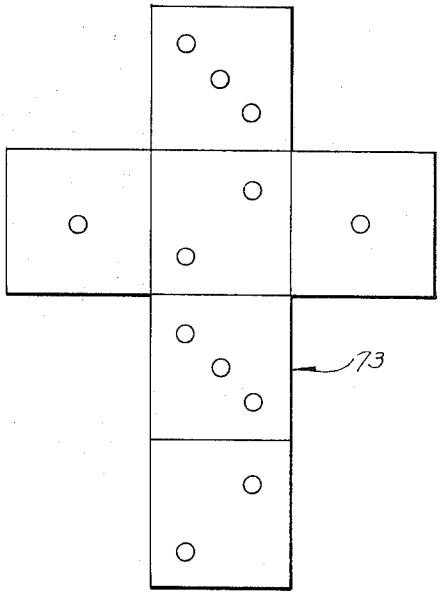


FIG 4

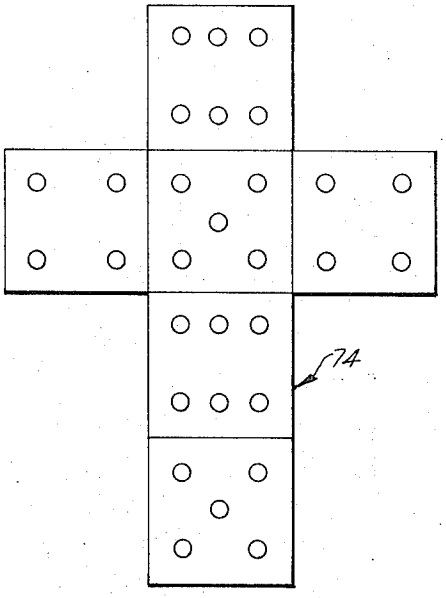


FIG 5

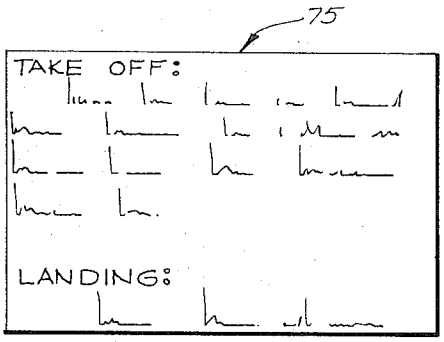


FIG 6

INVENTOR/S

RICHARD L. HELLMANN

BY Melville, Strasser, Foster and Hoffman
ATTORNEYS

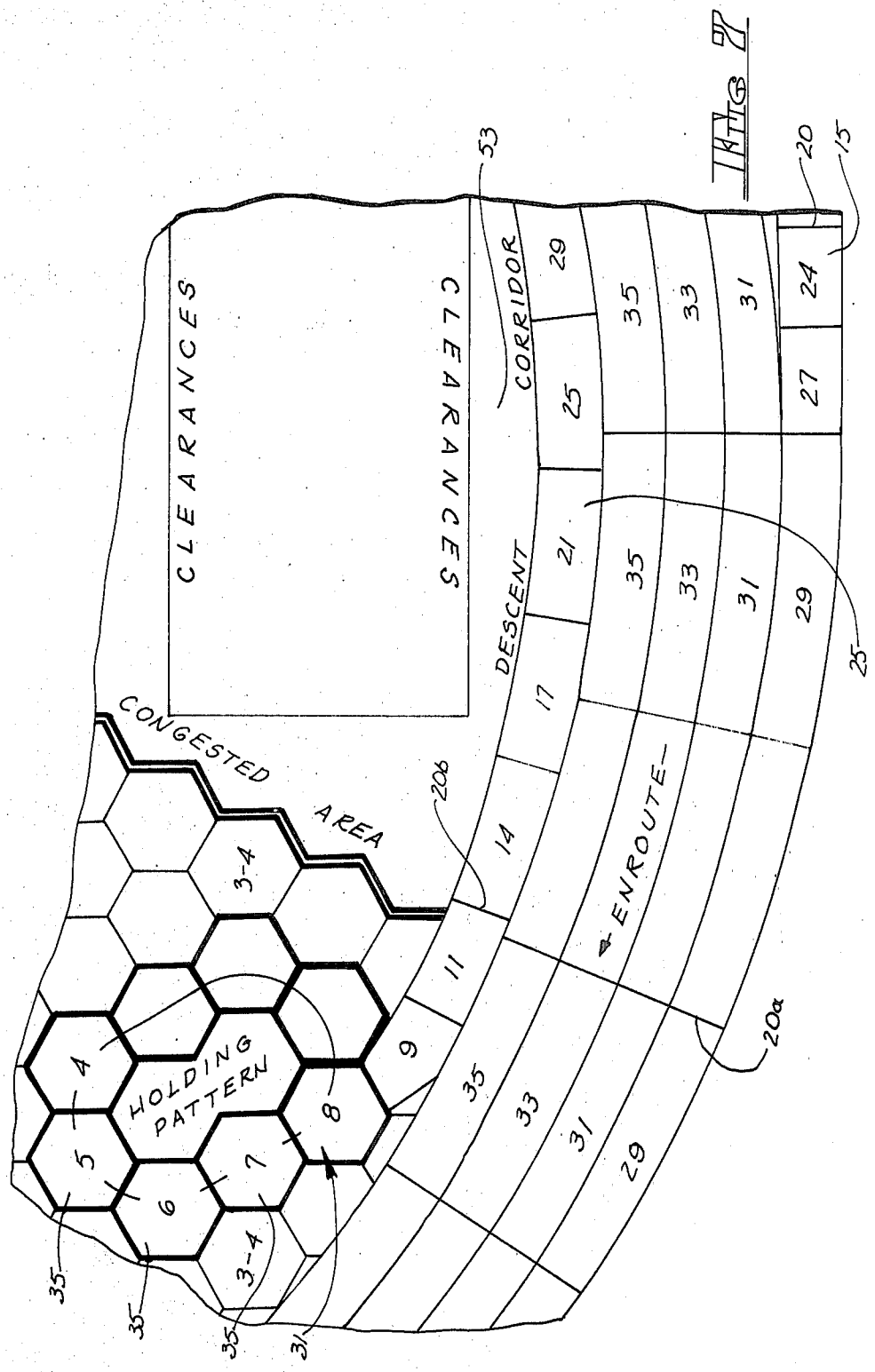

CLEARANCES
CLEARANCES
CORRIDOR
DESCENT
CONGESTED AREA
ENROUTE
HOLDING PATTERN
53
20
15
25
20a
206
35
31
3-4
4
5
6
7
8
9
11
14
17
21
24
25
27
29
31
33
35

FIG 7

AIRCRAFT TRAFFIC CONTROL BOARD GAME APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to games and in particular to an aircraft traffic control game wherein the players have the opportunity to engage in simulated activities of airline flight personnel carrying out flights between airports under conditions similar to those encountered in actual airline operation.

2. Description of the Prior Art

While numerous games are available in which simulated aircraft or missile flights are involved, no game devices are known to exist which simulate the actual conditions under which airline flights are conducted at the present time.

U. S. Pat. No. 3,167,313, issued Jan. 26, 1965, to K. J. Davenport et al., discloses a game board over which simulated aerial combat occurs, with movable altitude standards to which aircraft models are coupled by means permitting adjustment of altitude, attitude and orientation of the aircraft models.

U. S. Pat. No. 3,514,111, issued May 26, 1970, to P. D. Crawford, discloses a game device for simulated space flight, including a horizontally disposed board, numbers on the board simulating a flight path track, a vertical tracking board, an orbital flight path track disposed in a horizontal plane above the tracking board, and a plurality of simulated capsules adapted to be moved along the orbital flight path track.

SUMMARY

It is an object of the present invention to provide a game which is both entertaining and educational by reason of introducing the players of the game to the fundamental activities and duties of airline pilots and aircraft traffic control personnel.

The present invention provides a game device for simulating aircraft traffic control between a plurality of departure airports and a destination airport. A game board has designations thereon simulating departure terminals, an ascent corridor from each terminal, a plurality of concentric circular flight routes, the outermost one of which connects with each of the ascent corridors at spaced locations, a plurality of descent corridors leading from the innermost one of the flight routes at spaced locations, a plurality of playing spaces within the circular flight routes simulating oval holding patterns at spaced locations, additional playing spaces occupying the central portion of the board and simulating a radar control sector. An instrument landing path is also designated on the game board, with a playing space in the instrument landing path being designated as an approach gate. A destination aircraft terminal having a simulated runway in alignment with the instrument landing path and approach gate is further designated on the game board. A plurality of playing pieces simulating aircraft is provided, each piece having appropriate identification. Means operated by a player are provided to determine by chance the extent of movement of each of the pieces on the board, and second means are provided to determine by chance simulated take-off and landing clearances for each of the playing pieces.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view of a game board embodying the invention;

FIG. **2** is a view of the top and bottom surfaces of a playing piece of the invention;

FIG. **3** is a sectional view of means to determine the extent of movement of playing pieces on the game board;

FIGS. **4** and **5** are views of dice used in the means illustrated in FIG. **3**;

FIG. **6** is an illustration of means to determine simulated take-off and landing clearances; and

FIG. **7** is a fragmentary enlarged scale view of the game board of FIG. **1** showing imprinted simulated altitude requirements (in thousands of feet) in playing spaces of ascent corridors, circular flight routes, descent corridors and hexagonal playing areas, including a holding pattern.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference is made to FIG. **1** wherein a game board according to the invention is indicated generally at **10.** Preferably the board is substantially square in order that the distances traversed by each playing piece from a departure terminal to the destination terminal be substantially equal. Adjacent each corner of the board **10** are areas delineated as departure airport terminals **11, 12, 13** and **14** which are substantially identical. The departure terminals have simulated take-off runways in alignment with ascent corridors **15, 16, 17** and **18** adjacent each edge of board **10.** The ascent corridors have a plurality of playing spaces delineated by lines **20** within which playing pieces are moved. Preferably the playing spaces have altitude designations imprinted thereon ranging, e.g., from 1000 feet to 27,000 feet in 3000 foot increments.

Each ascent corridor connects with the outermost one of a plurality of circular concentric flight routes, hereinafter designated for convenience by the coined expression "enroute airways". For purposes of illustration four such enroute airways **21, 22, 23** and **24** are shown in FIG. **1.** Playing spaces within which playing pieces are moved are delineated in the enroute airways by lines **20***a*. Preferably altitude designations are imprinted within the playing spaces of the enroute airways, e.g., ranging from 29,000 feet to 35,000 feet.

In the ascent corridors **15–18** each successive playing space leading away from the departure airports is at a higher simulated altitude, e.g., 1000, 4000, 7000 feet, etc. In contrast to this, each circular flight route has the same simulated altitude designation throughout its length, e.g., the outermost route **21** may be 29,000 feet, route **22** may be 31,000 feet, route **23** may be 33,000 feet, etc.

Adjacent the innermost circular airway **24** a plurality of descent corridors is designated at spaced locations, indicated at **25, 26, 27** and **28** in FIG. **1.** Each descent corridor is arcuate, concentric with and contiguous to the innermost circular airway **24.** Each descent corridor has delineated therein a plurality of playing spaces designated by lines **20b** within which playing pieces are moved. Preferably simulated altitude designations are imprinted in the playing spaces of the descent corridors in successively decreasing levels, e.g., from 33,000 feet down to 9000 or 7000 feet.

Each descent corridor leads to an area designated as a holding pattern said patterns being positioned at spaced locations within the circular enroute airways and indicated generally at **30, 31, 32** and **33** in FIG. **1.** Each holding pattern is generally oval in shape and is comprised of a plurality of adjoining hexagonal playing spaces **35,** each of which is preferably imprinted with a simulated altitude designation, which may vary, e.g., from 8000 feet to 4000 feet.

A substantial portion of the playing board within the periphery defined by the circular flight routes and within the areas designated as holding patterns is delineated by additional adjoining hexagonal playing spaces **36** in the form of a honeycomb pattern. Preferably simulated altitude designations are imprinted within certain groups of the hexagonal playing spaces.

A portion of the remaining area within the circular flight routes is delineated as a destination airport terminal, indicated generally at **40** in FIG. **1.** A landing runway and connecting taxi strips at the destination airport are indicated at **41.** A plurality of simulated parking ramps connecting to the runway and taxi strips **41** is indicated at **42, 43, 44** and **45.**

A plurality of hexagonal playing spaces in alignment with landing runway **41,** indicated at **36***a*, is designated as a simulated instrument landing system (ILS). As shown in FIG. **1,** the ILS preferably extends along the middle of the board. At about the midpoint of the ILS a hexagonal space **50** is designated as an approach gate. Another hexagonal space **51** between the approach gate **50** and the end of the runway **41** and separated from the approach gate by at least one hexagonal playing space is designated as an outer marker. All aircraft must pass over the approach gate when on final approach to the destination runway **41,** and must be at the lowest assigned altitude when passing over the outer marker. Control tower clearance is issued either to land or to execute a missed approach at the outer marker **51.**

The entire area occupied by the hexagonal playing spaces **35** and **36** is designated as a simulated radar control sector.

Two areas within the circular airways each adjacent a descent corridor, indicated at **52** and **53** in FIG. **1,** are designated as restricted airspace areas for purposes which will be hereinafter explained.

Referring to FIG. **2,** a playing piece indicated generally at **60** is illustrated. It is preferably rectangular in shape and has a silhouette of a specific type of aircraft imprinted on the top and bottom surfaces thereof. Identifying indicia are also imprinted on both surfaces thereof. Identifying indicia are also imprinted on both surfaces as indicated at **61** and will include a letter and several digits. The letter may identify an airline (e.g., A for Alpha Airline, B for Beta Airline, etc.) while the digits indicate the order in which each playing piece will be moved. Finally, on one surface the letter E indicates that the playing piece is at a simulated even altitude while the letter O on the opposite surface indicates that the playing piece is at a simulated odd altitude.

Means for determining by chance the extent of movement of playing pieces in playing spaces are illustrated in FIGS. **3, 4** and **5.** In FIG. **3,** a simulated "Computer" is shown in vertical section and comprises an elongated open ended tubular structure having side walls **70** and at least two internal, downwardly inclined baffles **71** and **72** projecting from opposite side walls, thereby providing a tortuous passage from the top or "input" end to the bottom or "readout" end.

A pair of dice, illustrated in FIGS. **4** and **5,** is provided for use in connection with the computer illustrated in FIG. **3.** The dice are dropped into the top or input end and are caused to tumble when contacting the baffles **71** and **72.** The values on the dice are read by lifting the tubular structure upwardly. The computer will occupy the restricted area **52** on the board during play.

As shown in FIG. **4,** one die indicated generally at **73** has six faces with values ranging from **1** through **3.** The other die, indicated generally at **74** in FIG. **5,** has six faces with values ranging from **4** through **6.** These values are used to determine the extent of forward movement of playing pieces in playing spaces.

FIG. **6** illustrates means indicated generally as **75** for determining by chance directions relating to simulated take-off and landing. A plurality of cards is provided with take-off and landing instructions imprinted on one surface of each card. The cards are shuffled and stacked face down and placed in the restricted area **53** of the board **10** for individual selection by each player during the course of play.

RULES OF PLAY

Ordinarily the game will be played by from **2** to **4** players, and each player may handle one or more airlines, it being understood that each airline will have the same number of playing pieces representing aircraft, e.g., eight for each airline.

Each player positions the playing pieces of his aircraft equally at different departure airports. If eight aircraft of an airline are being used, the player positions two at each of the four departure airports. Simulated parking ramps for the playing pieces are designated by hexagonal spaces adjacent the runways of departure airports **11–14.**

The playing pieces are numbered in a manner which will indicate the sequence in which each piece will be moved. For example, a playing piece designated as A–**181** would be the first to be moved, A–**252** second, A–**373** third, A–**484** fourth, etc.

At the start of play each player interrogates the computer and the one with the highest total of values on the dice will start first and be the initial computer operator. This player then selects a take-off clearance card in order to ascertain whether his first aircraft is cleared for take-off. Thereafter, this player then interrogates the computer and advances his first aircraft the number of spaces in the ascent corridor indicated by the dice.

Play may then proceed either in clockwise or counterclockwise manner. The second player selects a card which determines whether his first aircraft will obtain clearance for take-off. If so, the second player advances his first aircraft using the same values as the first player.

The remaining players follow the same procedure and use the same values for determining the number of playing spaces to advance in the ascent corridors, if take-off clearance is obtained.

The first player next interrogates the computer and obtains a new readout value for all the first aircraft of each player. Each player moves his first aircraft in sequence from the ascent corridor into the outermost enroute airspace.

Each player then selects a card in order to determine take-off clearance for his second aircraft. The first player again interrogates the computer and each player will advance his second aircraft and number of playing spaces in tha ascent corridor determined by the dice, if cleared for take-off.

The first player again interrogates the computer for a new readout value for all the first aircraft of each player, then interrogates the computer again for a new readout value for all the second aircraft of each player. Each player then selects a card in order to determine take-off clearance for his third aircraft. The first player again interrogates the computer, and each player will advance his third aircraft the number of playing spaces in the ascent corridor determined by the dice.

This procedure is repeated, restarting with the first aircraft, until all aircraft have had an opportunity to advance, after which all aircraft are moved in numerical sequence without using the pyramiding of the initial start.

If any player selects a card which refuses tower clearance for take-off, that aircraft must remain at the departure airport until the turn of that aircraft (e.g., first, second or third aircraft) comes around again.

The computer operation is then passed on the next player after all aircraft have had an opportunity to advance. The play will continue in this manner until all aircraft have moved from the ascent corridors, around the circular enroute airways, through the holding patterns, to the ILS playing spaces and have obtained clearance to land at the destination airport.

The player who gets all his aircraft to the destination airport terminal first is the winner.

When climbing in the ascent corridors, each aircraft may either move a number of playing spaces indicated by the computer values, or substitute only one space for one or both of the computer values. This alternative is necessary in order to avoid having one aircraft pass a preceding aircraft in he ascent corridor. Each aircraft must advance in turn and if another aircraft is ahead, the following aircraft cannot pass it while in the ascent corridor. When the circular enroute airspace is reached, each aircraft must climb into the outermost airway above the designated minimum altitude, e.g., 29,000 feet. If the playing space in the outermost enroute airway is occupied by the aircraft of another player, the aircraft attempting to leave the ascent corridor must return and land at its departure terminal.

When proceeding into the circular enroute airway each playing space is considered sufficient separation between aircraft at the same altitude. One aircraft may not pass another in the airspace at the same altitude, but it is permissible to climb or descend to pass over or under a preceding aircraft. Climb or descent is effected by forfeiting the value of one of the two dice, but the aircraft which is climbing or descending must move forward the number of spaces indicated by the other die. It is immaterial whether climb or descent is made first followed by forward movement, or vice versa. If at any time an aircraft cannot climb or descend or move ahead using both computer values by reason of other aircraft ahead in the enroute airway, then the clearance for that aircraft is canceled and it must return and land at the nearest departure terminal. It must then await its next turn to start again.

All aircraft proceed in one direction, i.e. clockwise, in the arrangement shown in FIG. 1.

The aircraft progress around the enroute airways from the outermost to the innermost one in accordance with the value determined by the dice. Upon reaching the innermost airway, an aircraft must arrive at a playing space opposite the entrance to a descent corridor and use the value of the other die to descend into the corridor entrance space, or use the first value of the dice on the next turn for that aircraft.

Descent in the descent corridors is effected in the same manner as the climb in the ascent corridors, i.e., using the full indicated values to advance, or substituting one space only for one or both of the computer values. When an aircraft reaches the holding pattern which connects to the descent corridor, it is considered to be within the radar control sector and hence on the radarscope. Rules governing advance by radar must be followed thereafter.

To climb or descend in the holding pattern the player forfeits the computer values and climbs or descends only to the next indicated altitude in the adjacent playing space. However, several playing spaces in the oval holding pattern do not have altitude designations therein, and it is permissible to move an aircraft the number of spaces indicated by the computer values when such a playing space is reached.

The holding pattern is the only place in the game wherein a player may refuse to move an aircraft if it is in a space with a designated altitude. If it is to the advantage of the player, he can forfeit his turn for that aircraft and remain in the holding pattern. No other aircraft may descend in that holding pattern through that altitude, or pass it in the holding pattern. Consequently, the entire descent corridor may be blocked by holding one aircraft in a playing space in a holding pattern having a designated altitude.

When departing a holding pattern to progress toward the ILS, the extent of advance is determined by computer values, and it is also necessary that each aircraft indicate whether it is at odd or even thousands of feet. The hexagonal playing spaces comprising the radar control sector contain altitude designations which may be odd or even and must be conformed to by each aircraft. When climbing or descending in the radar control area, a player forfeits the forward movement of one computer value only, remains in the same playing space, but changes the aircraft to odd or even to confrom to the altitude to which the aircraft is climbing or descending. The aircraft then must advance the amount determined by the other computer value.

Two aircraft may occupy the same or adacent hexagonal playing spaces so long as they are at different altitudes, or one aircraft may pass over or under another so long as they are at different altitudes. Whenever two aircraft are at the same altitude, there must be at least one block between them which does not have an aircraft therein at the same altitude. This constitutes the necessary minimum separation between aircraft, and each hexagonal playing space is intended to represent a three mile separation of aircraft.

When advancing by radar vector, the player must advance the number of spaces indicated by the computer values, or may advance with one of the values and change altitude with the other value. Since hexagonal playing spaces are provided, the aircraft may either move straight ahead, or to a playing space immediately to the right or to the left of the direction in which the aircraft nose is pointed. Thus, if an aircraft made a con-

tinuous 360° turn, it would move in a circle around one centered hexagonal playing space. Whenever an aircraft is vectored to a playing space, it must be positioned therein so that the tail of the aircraft is pointing toward the playing space it came from, so that the players will know which spaces that aircraft can move to on the next radar vector advance.

To make a landing approach at the destination airport, the player advances an aircraft by radar vector, conforming to the prescribed altitudes shown on the various hexagonal playing spaces and passes over the hexagonal playing space designated as the approach gate. The aircraft is then advanced along the ILS to the hexagonal space designated as the outer marker, at which time the aircraft must be at the minimum allowable altitude.

When over the outer marker, the player must select a card which will determine whether clearance to land is granted. If the card says "Cleared to land", the aircraft is considered to have landed without awaiting another turn and may be positioned immediately at the terminal ramp of the player's airline.

If a control tower clearance is selected which indicates a missed approach, the aircraft must conform to the clearance and re-enter the radar control sector or take such other action as directed by the missed approach clearance.

When an aircraft has landed, the next time the turn of that aircraft is reached, the player may move any of his other aircraft by the same computer values as the landed aircraft would have had.

Any violation of one of the rules, either intentionally or by inadvertence, results in cancellation of the clearance for that aircraft, and the player must return the aircraft to a departure airport ramp and re-enter the ascent corridor from the start.

It will be understood that the minimum vertical separation beteen aircraft is 1000 feet. Since aircraft in a playing space in the ascent or descent corridors are separated from adjoining playing by more than 1,000 feet, two aircraft may occupy adjoining playing spaces. In the circular enroute airways, a playing space is considered to constitute more than the minimum three mile separation for aircraft at the same altitude, and two aircraft may thus occupy adjoining playing spaces in the circular airways even though at the same altitude.

It will be clear that modifications may be made without departing from the spirit of the invention. No limitations not specifically set forth in the appended claims are intended or implied.

I claim:

1. A game device for simulating aircraft traffic control between departure airports and a destination airport, comprising:

1. a planar game board having delineated thereon:
   - a plurality of imprinted areas defining departure terminals at spaced locations adjacent the periphery of the board,
   - parallel lines defining a straight ascent corridor from each of said departure terminals,
   - a plurality of arcuate, concentric lines defining a plurality of circular flight routes the outermost one of which connects with each of said ascent corridors at spaced locations at the ends of said corridors remote from said departure terminals,
   - a plurality of arcuate, concentric lines defining a plurality of descent corridors contiguous to the innermost one of said flight routes at spaced locations,
   - transverse lines imprinted in said ascent corridors, circular flight routes, and descent corridors defining playing spaces therein,
   - a plurality of angularly arranged straight lines defining a plurality of adjoining hexagonal playing areas within said flight routes, certain of said straight lines defining generally oval areas simulating a plurality of holding patterns at spaced locations, each of said holding patterns connecting with a different descent corridor,
   - a plurality of additional angularly arranged straight lines defining a plurality of additional adjoining hexagonal playing areas occupying a substantial portion of the central area of said board adjoining said holding patterns,
   - indicia defining certain of said additional hexagonal playing areas in alignment with one another in the center of said board as an instrument landing path,
   - one of the hexagonal areas at about the midpoint of said landing path having indicia therein identifying it as an approach gate,
   - another of said additional hexagonal playing areas in said landing path having indicia therein identifying it as an out marker,
   - an imprinted area defining a destination aircraft terminal having parallel lines defining a landing runway in alignment with said landing path, approach gate and outer marker;
2. a plurality of playing pieces of rectangular configuration each having a silhouette of a specfic type of aircraft imprinted on the two major surfaces thereof and identification indicia distinguishing each piece from each other piece,
   - the dimensional relation of each rectangular playing piece and the aircraft silhouette imprinted thereon to each hexagonal playing area being such as to facilitate movement of each playing piece in a random track selected by a player to another hexagonal area straight ahead of, immediately to the right of, or immediately to the left of, the direction in which the nose of the aircraft silhouette is pointed;
3. means to select by chance one of a plurality of numbers; and
4. a plurality of cards having imprinted on one surface of each varying instructions governing take-off and landing clearances.

2. The device claimed in claim **1**, wherein the game board is substantially square, said departure terminals being located adjacent the corners of said board, and wherein at least some of said playing spaces and said hexagonal areas having simulated required altitudes imprinted therein, whereby to provide simulated three-dimensional control of said playing pieces by players.

3. The device claimed in claim **2**, wherein the playing spaces in said ascent corridors have successively increasing simulated required altitudes imprinted therein, wherein the playing spaces in each circular flight route have the same simulated required altitude imprinted therein, with each circular flight route having a different simulated altitude from an adjoining circular flight route, and wherein said descent corridors have successively decreasing simulated required altitudes imprinted therein.

4. The device claimed in claim **1**, wherein said identification insignia comprises successively increasing numbers.

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