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(54) **MULTIPLAYER ELECTRONIC GAMES**

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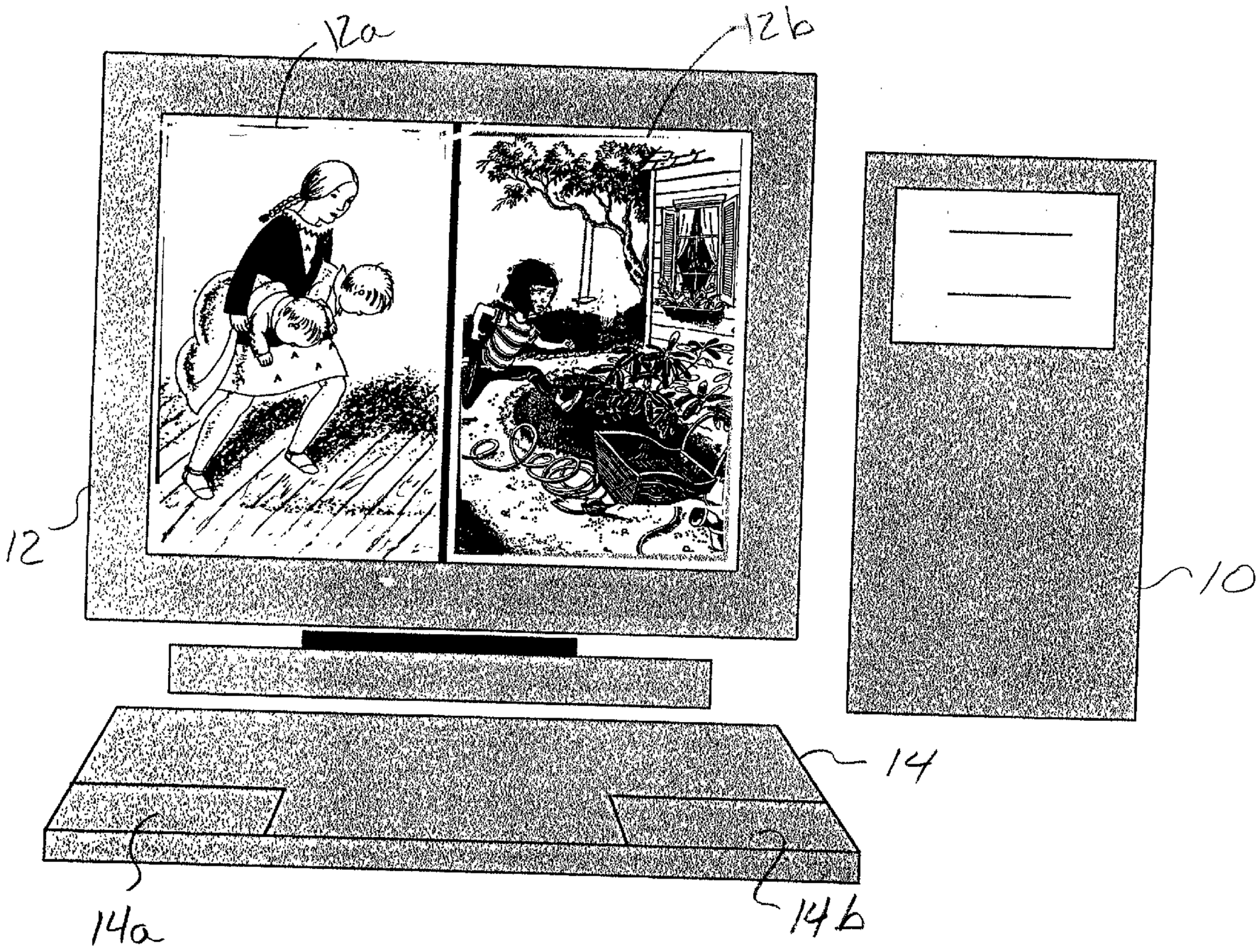
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(57) **ABSTRACT**

An electronic game for multiple, preferably two, players requires that the players act independently and cooperatively at different points in the game in order to complete the game. Different modes of cooperation are provided within the context of the game story and include, for example, holding a door for a player, handing a tool to a player, giving an item to a player, helping a player lift an object, etc. The cooperation required by the game includes requiring the result that only both players can complete the game together; neither player can complete the game without the other. A split-screen mode and a single-screen mode are utilized to enhance the difference between independent action and cooperative action. When players are cooperating, generally a single-screen mode is used and when players are acting independently, generally a split-screen mode is used. The game is preferably embodied in a medium readable by a personal computer such as a CDROM or DVD. However, the game may be embodied in any of several types of electronic game formats such as video game cartridges, dedicated hardware device, etc.



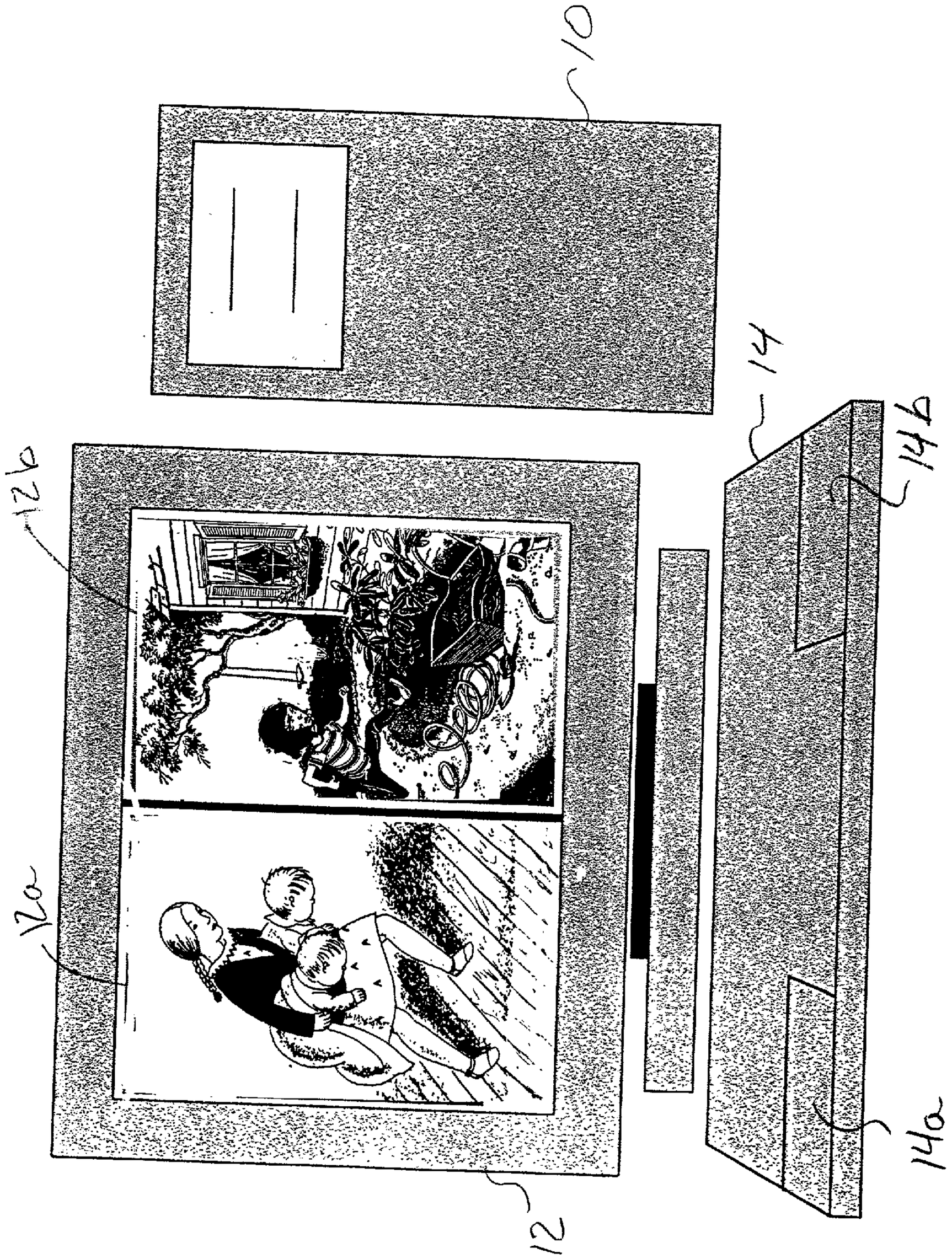


Figure 1

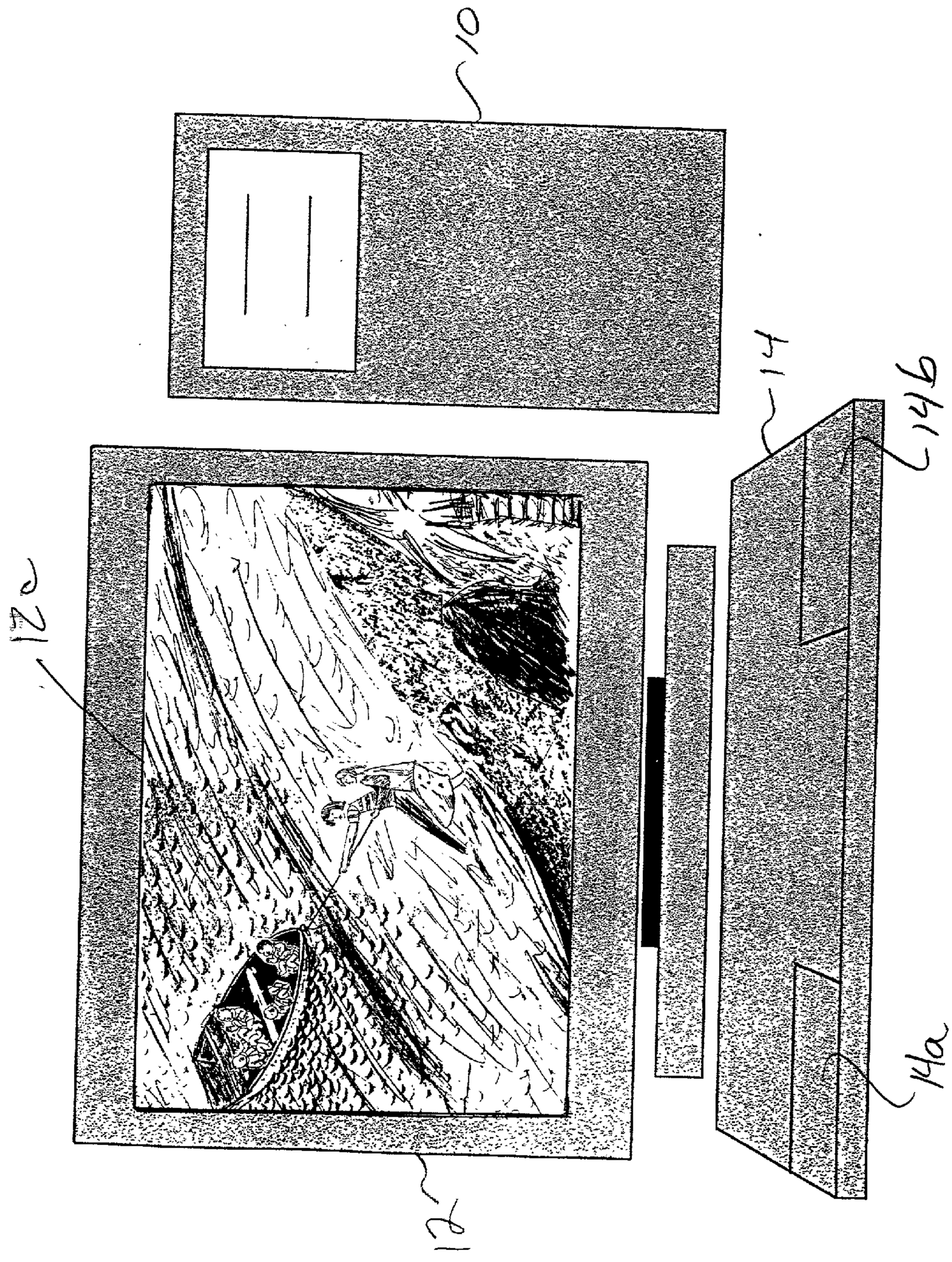


Figure 2

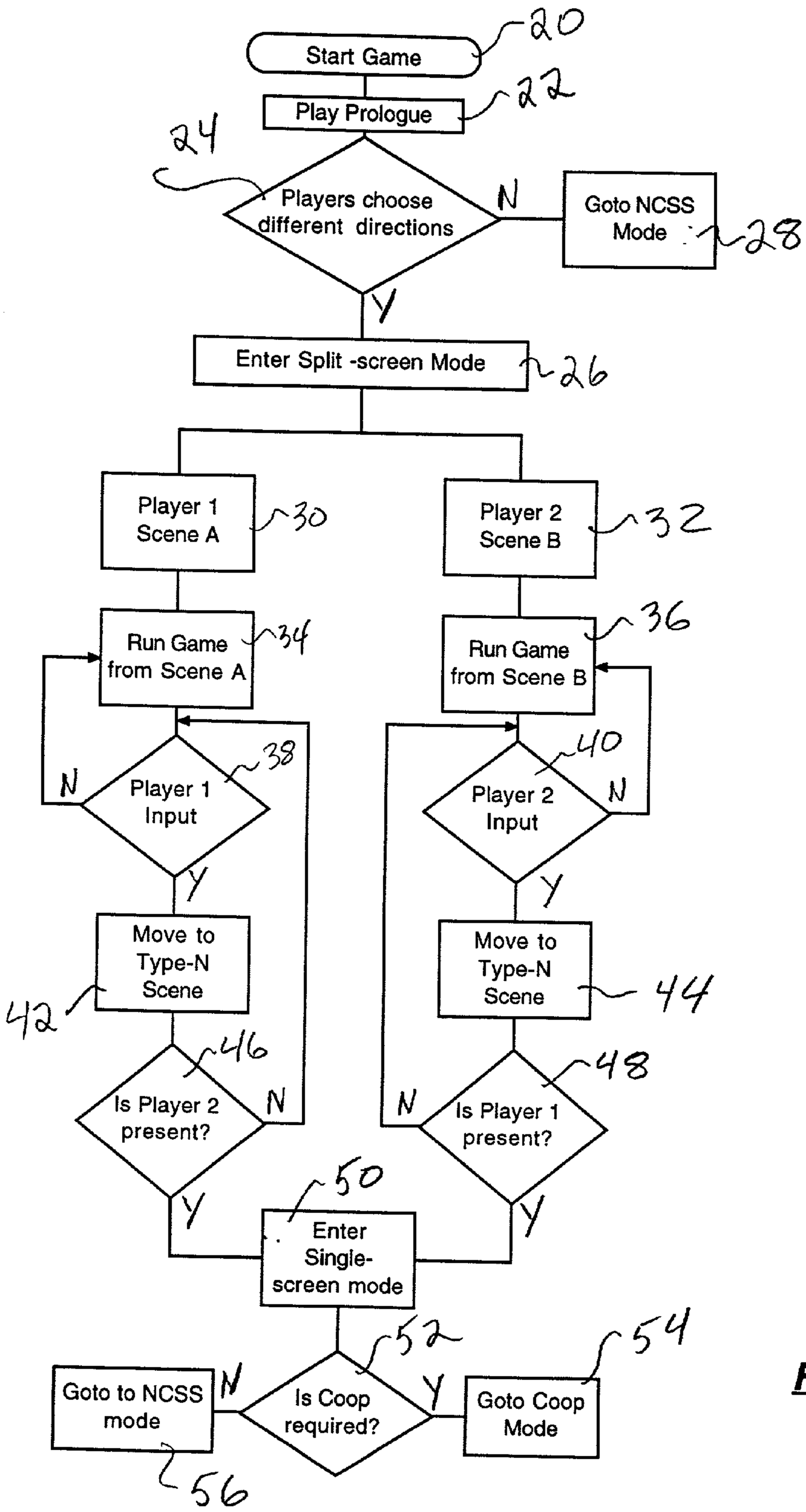

Start Game
20
Play Prologue
22
24
Players choose different directions
N
Goto NCSS Mode
28
Y
Enter Split -screen Mode
26
Player 1 Scene A
30
Player 2 Scene B
32
Run Game from Scene A
34
Run Game from Scene B
36
Player 1 Input
38
N
Y
Player 2 Input
40
N
Y
Move to Type-N Scene
42
Move to Type-N Scene
44
Is Player 2 present?
46
N
Y
Is Player 1 present?
48
N
Y
Enter Single-screen mode
50
Is Coop required?
52
N
Y
Goto to NCSS mode
56
Goto Coop Mode
54

Figure 3

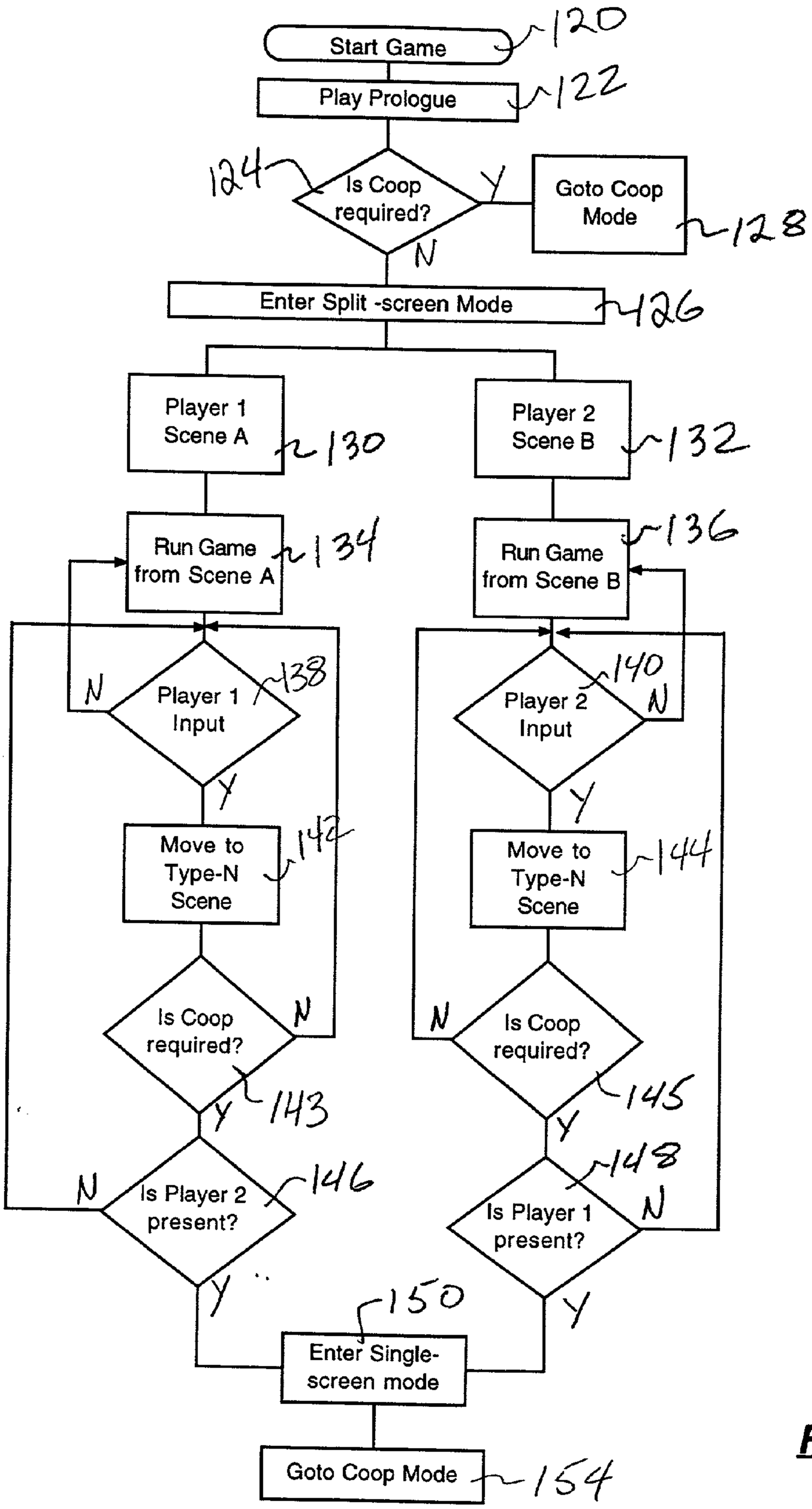

Start Game
120
Play Prologue
122
124
Is Coop required?
Y
Goto Coop Mode
128
N
Enter Split -screen Mode
126
Player 1 Scene A
130
Player 2 Scene B
132
Run Game from Scene A
134
Run Game from Scene B
136
N
Player 1 Input
138
Y
Move to Type-N Scene
142
Is Coop required?
N
Y
143
N
Is Player 2 present?
146
Y
150
Enter Single-screen mode
Goto Coop Mode
154
Player 2 Input
140
N
Y
Move to Type-N Scene
144
N
Is Coop required?
145
Y
148
Is Player 1 present?
N
Y

Figure 4

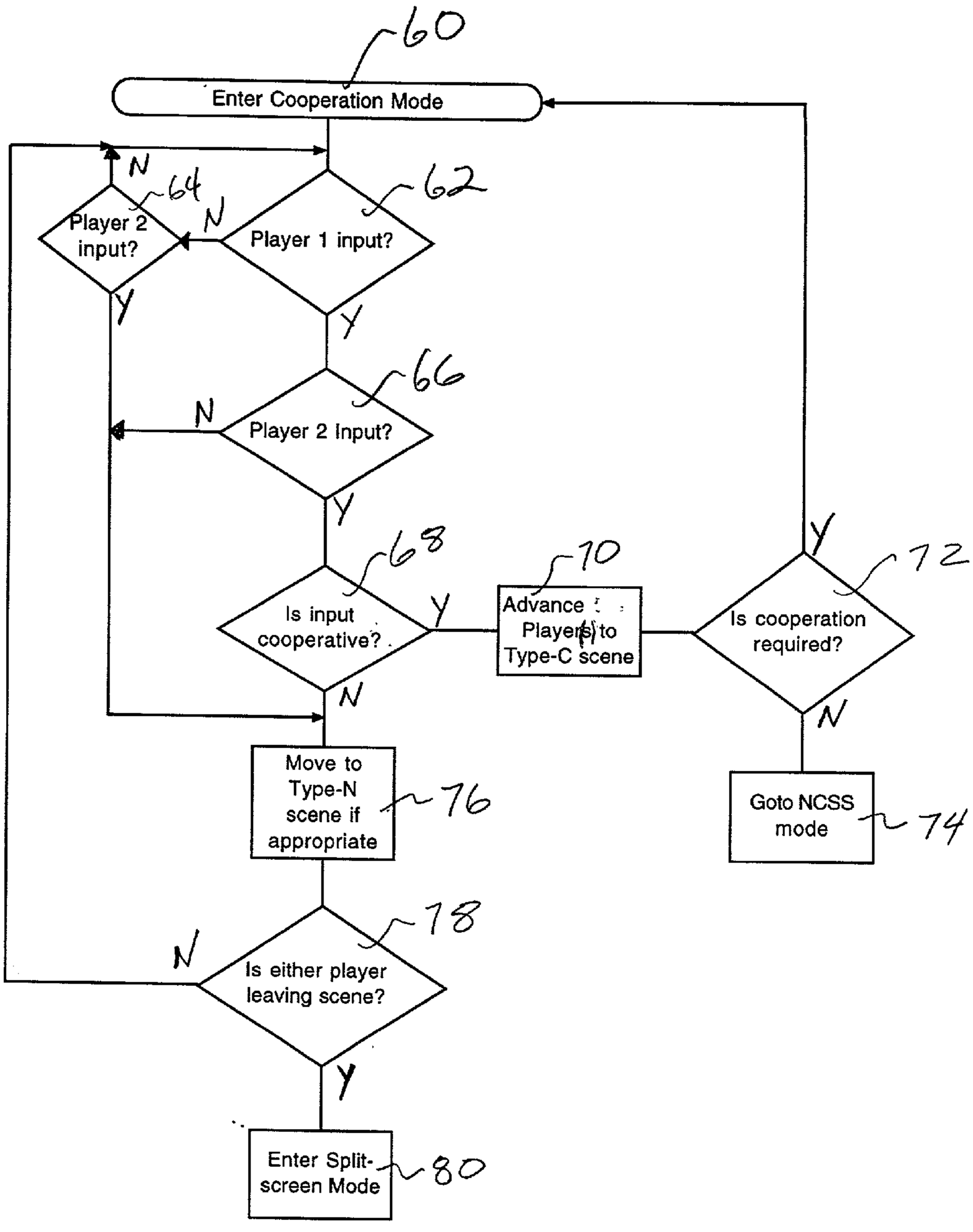

60
Enter Cooperation Mode
62
Player 1 input?
64
Player 2 input?
66
Player 2 Input?
68
Is input cooperative?
70
Advance Player(s) to Type-C scene
72
Is cooperation required?
74
Goto NCSS mode
76
Move to Type-N scene if appropriate
78
Is either player leaving scene?
80
Enter Split-screen Mode
N
Y

Figure 5

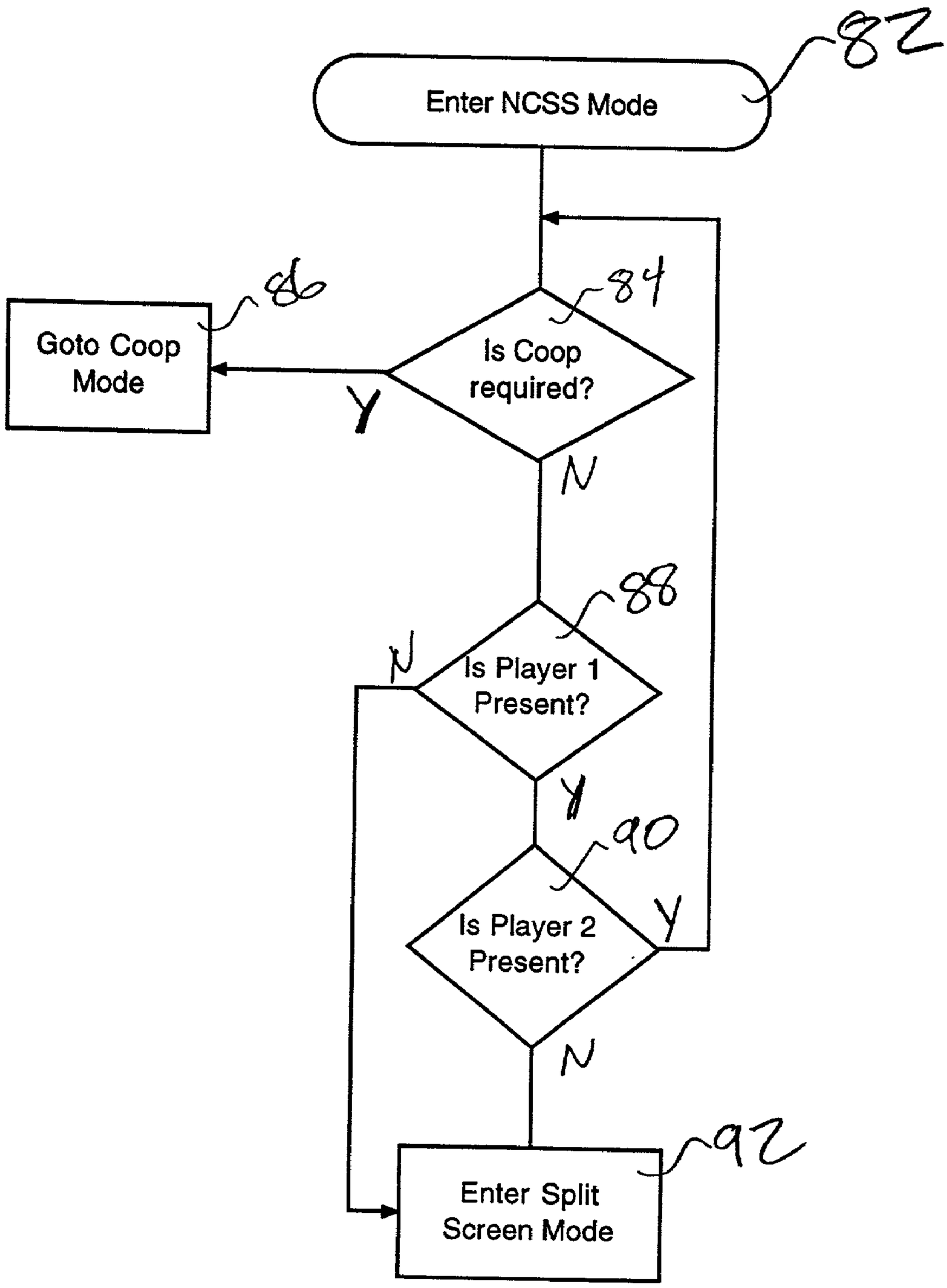

Enter NCSS Mode
82
Goto Coop Mode
86
Is Coop required?
84
Y
N
Is Player 1 Present?
88
N
Y
Is Player 2 Present?
90
Y
N
Enter Split Screen Mode
92

Figure 6

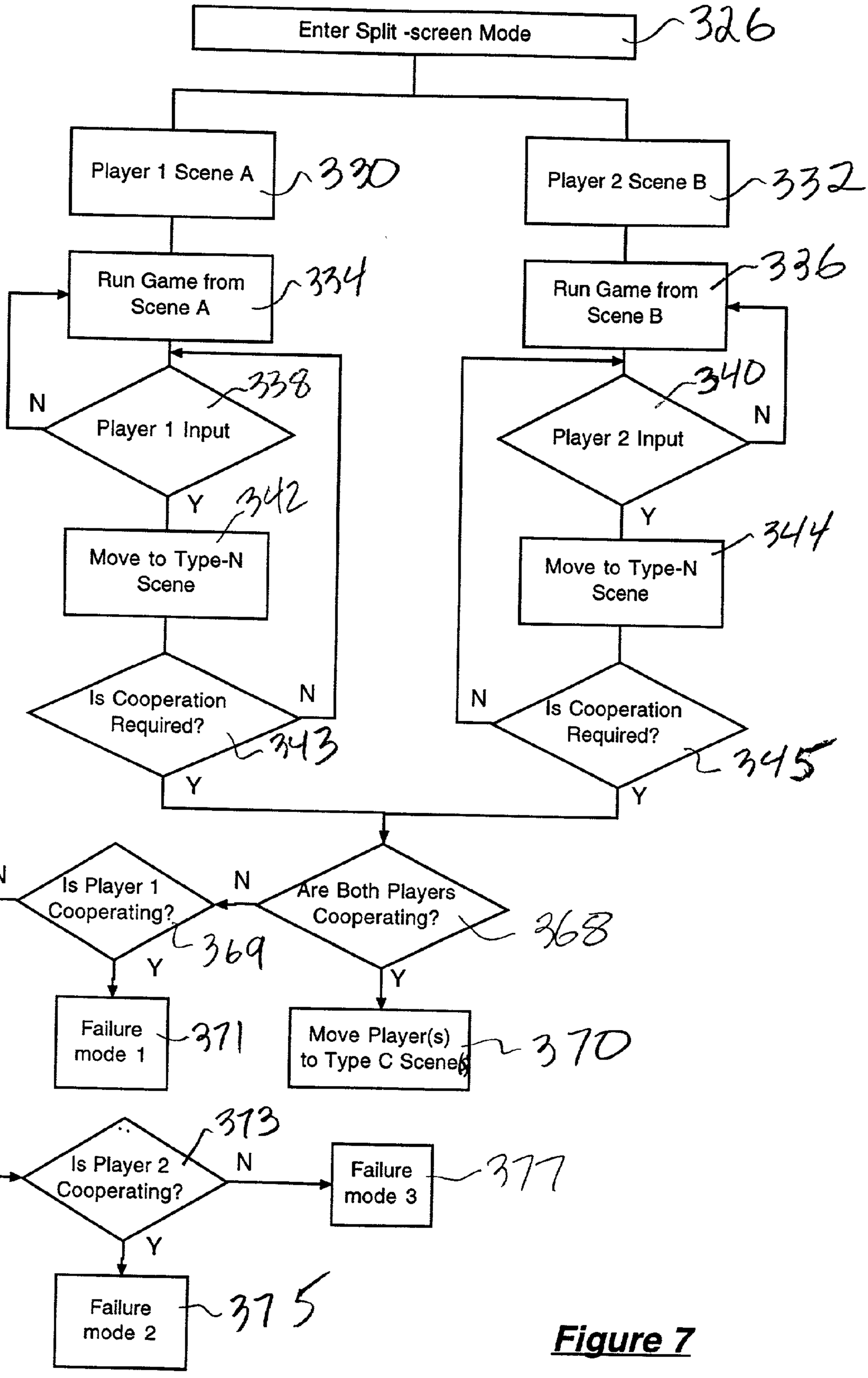

Enter Split -screen Mode
326
Player 1 Scene A
320
Player 2 Scene B
332
Run Game from Scene A
334
Run Game from Scene B
336
Player 1 Input
338
Player 2 Input
340
N
Y
Move to Type-N Scene
342
Move to Type-N Scene
344
Is Cooperation Required?
343
Is Cooperation Required?
345
Are Both Players Cooperating?
368
Is Player 1 Cooperating?
369
Is Player 2 Cooperating?
373
Move Player(s) to Type C Scenes
370
Failure mode 1
371
Failure mode 3
377
Failure mode 2
375

Figure 7

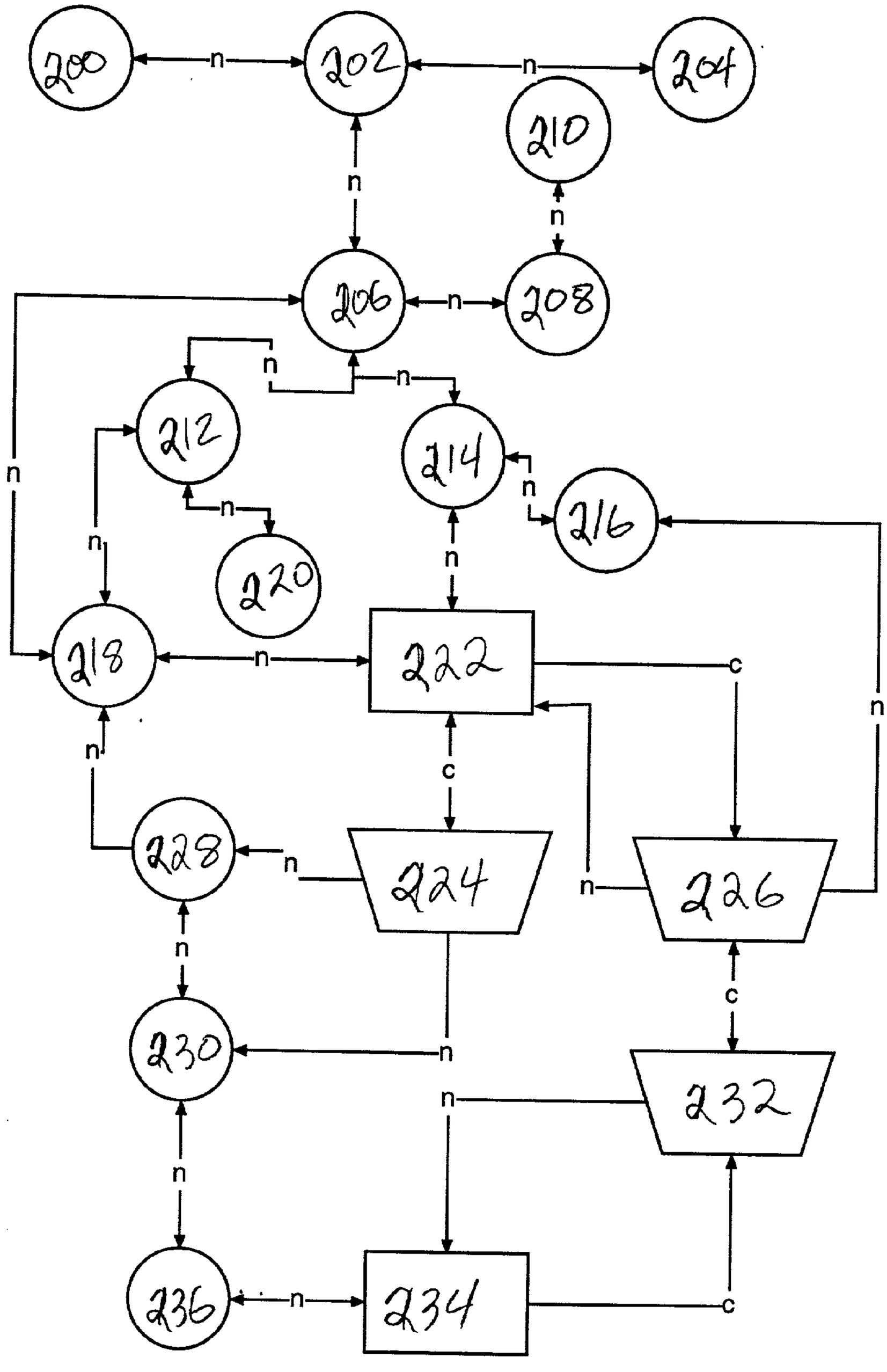

200
202
204
210
206
208
212
214
216
220
218
222
228
224
226
230
232
236
234
n
c

Figure 8

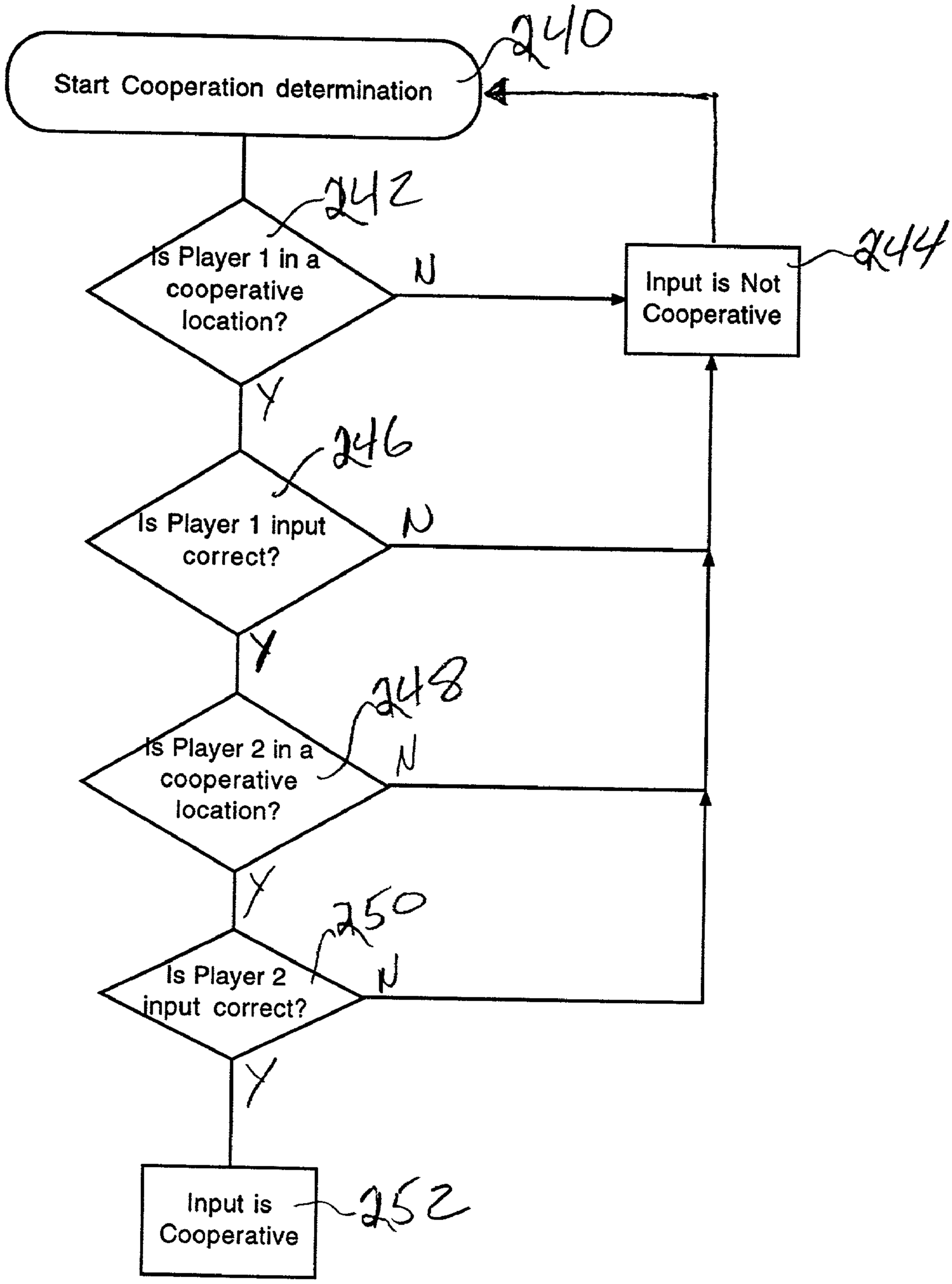

240
Start Cooperation determination
242
Is Player 1 in a cooperative location?
N
244
Input is Not Cooperative
Y
246
Is Player 1 input correct?
N
Y
248
Is Player 2 in a cooperative location?
N
Y
250
Is Player 2 input correct?
N
Y
Input is Cooperative
252

Figure 9

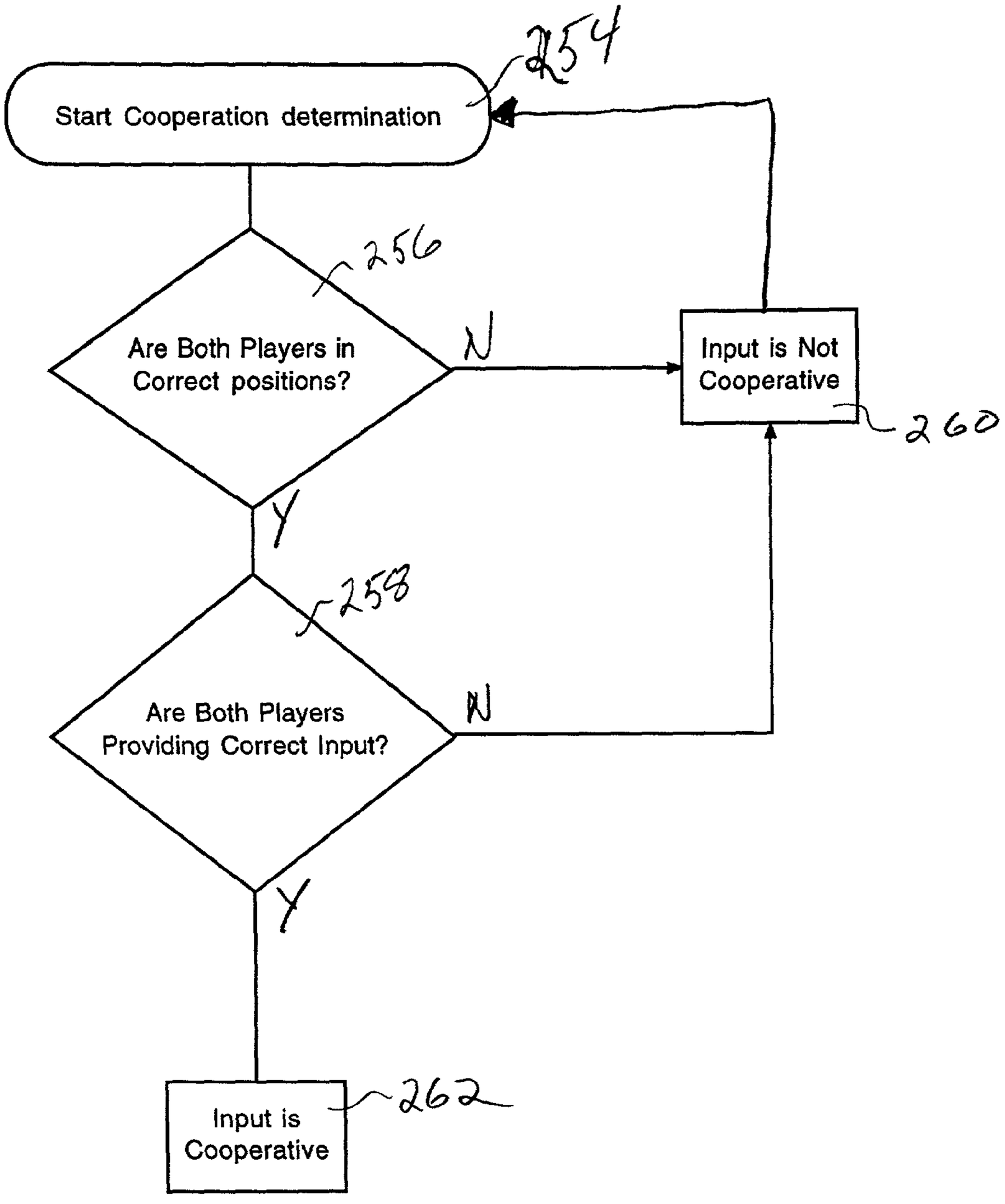

Start Cooperation determination
254
Are Both Players in Correct positions?
256
N
Input is Not Cooperative
260
Y
Are Both Players Providing Correct Input?
258
N
Y
Input is Cooperative
262

Figure 10

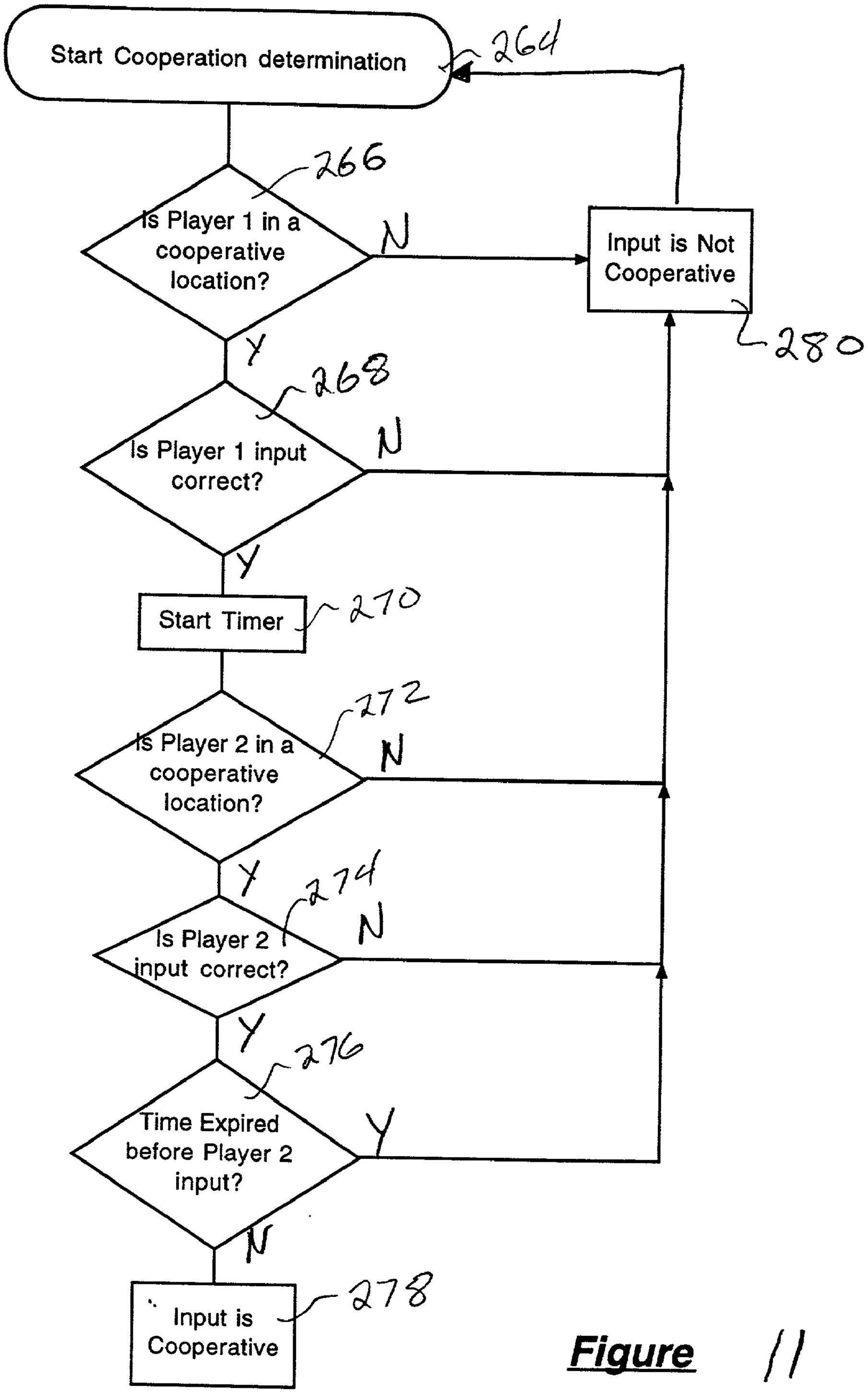

Start Cooperation determination
264
Is Player 1 in a cooperative location?
266
N
Input is Not Cooperative
280
Y
Is Player 1 input correct?
268
N
Y
Start Timer
270
Is Player 2 in a cooperative location?
272
N
Y
Is Player 2 input correct?
274
N
Y
Time Expired before Player 2 input?
276
Y
N
Input is Cooperative
278

Figure 11

MULTIPLAYER ELECTRONIC GAMES

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates broadly to computer (or "video") games. More particularly, the present invention relates to computer games for play by two or more players at the same time, and, preferably at the same location.

[0003] 2. State of the Art

[0004] With the advent of relatively inexpensive desktop computers, the computer game has become a major source of entertainment for both children and adults. Many of the original computer games were games for single players, and many computer games today remain oriented to the individual player. Other older computer games allowed two players to take turns competing against the computer or to compete against each other for high scores. More recently, computer games such as Acrophobia by Berkley Systems have provided for multiple competing players over the Internet.

[0005] While multiplayer games have proliferated, the computer game market tends to be driven by action games which attract boys. Indeed, to date, almost all commercially successful computer games have been written for and marketed to boys of all ages. Institutes have been set up, research conducted on, and even a company devoted to attracting girls to the computer game market. (See, e.g., Research Highlights of Purple Moon Web Site—Summary of National Research: Process and Results, How Gender Differences Affect Play Behavior of Girls and Boys Ages 7-12.) However, to date the successes have been few. Indeed, while the research has suggested that at least five criteria (set forth in Chart A below taken from the Purple Moon Web Site) are required to produce a successful computer game for girls, the games that have been produced have still not been particularly successful.

Chart A

[0006] a) Leading characters are everyday people that girls can easily relate to, and are as real to girls as their best friends

[0007] b) Goal is to explore and have new experiences, with degrees of success and varying outcomes

[0008] c) Play focuses on multi-sensory immersion, discovery, and strong story lines

[0009] d) Feature everyday "real life" settings as well as new places to explore

[0010] e) Success comes through development of friendships

[0011] It is the hypothesis of the present inventors that while the criteria set forth in Chart A are desirable and perhaps necessary for a successful computer game for girls, the criteria are either insufficient; or those skilled in the art have been unable to provide games based on the listed criteria because new game techniques and concepts are required.

[0012] U.S. Pat. No. 4,738,451, reissued as Re. 35,314, discloses a video maze game for multiple players where the players must cooperate at points in the game in order to complete the game. Only one mode of cooperation is required and it is relatively simple. The entire game field is larger than the video display but is scrollable in four directions. Each player appears as a character on the game field. Limited cooperation among players is forced by requiring that all characters be visible at all times. Thus, in order to scroll the game field, all of the characters must cooperate (either knowingly or inadvertently) to move in the same direction.

[0013] U.S. Pat. No. 5,405,151 also discloses a multi-player video game which has "a cooperative mode" and a "competition mode". Unlike, the '451 patent, the game disclosed in this patent does not require any cooperation among the players and the "cooperative mode", does not involve cooperation among players as that term is used in the '451 patent. The "cooperative mode" disclosed in the '151 patent is when one player takes control of more than one character on the game field. In the '151 patent "cooperative mode" means that two characters perform the same actions in response to the control by a single player. In the '451 patent, and as used herein generally, "cooperation" among players means that players perform acts which complement each other to achieve what could not be achieved by a single player.

[0014] U.S. Pat. No. 5,730,654 discloses as prior art a multi-player video game for health education. In the prior art video game, each player controls a character whose health may depend on the healthy behavior of other characters. Thus, in order to successfully complete the game, players must cooperate in general ways such as sharing common resources and engaging in healthy behavior.

[0015] U.S. Pat. No. 5,470,080 discloses a video game apparatus with a single screen mode and a split screen mode. The game involves moving a game character across a scrolling background. The single screen mode is used when the game is played by a single player and the split screen mode is used when the game is played by two players. In the split screen mode, each player controls a game character which moves across an independently scrolling background.

SUMMARY OF THE INVENTION

[0016] It is therefore an object of the invention to provide interactive multiplayer computer games.

[0017] It is another object of the invention to provide computer games with two characters separately controllable by two players.

[0018] It is a further object of the invention to provide a computer game with two separately controllable characters where the characters must cooperate at times in order to be successful in completing the game.

[0019] It is an additional object of the invention to provide an interactive computer game which is simultaneously played by two players at a single computer.

[0020] Another object of the invention is to provide an interactive computer game with two separately controllable characters where a single computer monitor is controlled to show separate screens when the characters are in different locations, and a single screen when the characters are at the same location.

[0021] A further object of the invention is to provide new interaction mechanisms for characters in an interactive computer game.

[0022] An additional object of the invention is to provide a computer game with two input devices to a single computer which is controlled by two players, where the players will interact with each other to cause two characters to cooperate with each other in order to advance the game.

[0023] Yet another object of the invention is to provide a computer game which fosters interaction and cooperation between the players and where the outcome of the game is win-win or lose-lose rather than win-lose.

[0024] Even a further object of the invention is to provide a computer game with at least two separately controllable characters, where the characters must be made to work both independently and together in order to complete the game.

[0025] In accord with the objects of the invention, a computer game is provided which includes at least two characters which are separately controllable. According to a first preferred aspect of the invention, in order to advance or complete the game, the characters must cooperate with each other. The cooperation may take a simple form such as one character holding a door open while another searches a room; or a more complex form such as two characters pulling on a single object together (requiring a "click and drag" at the same time); or even a more complex interaction form such one character handing an object to the other which requires a "take" click from the "handee" within a given time period (e.g., 0.1 seconds) of a "release" click from the "hander" to avoid dropping the object. Further, the cooperation required of the players may involve a "division of labor" cooperation where the characters work separately but dependently.

[0026] According to a second preferred aspect of the invention, not only must the characters cooperate with each other to complete the game, but there are portions of the game where the characters must work separately and/or independently.

[0027] According to a third preferred aspect of the invention, the screen coupled to the computer is controlled to provide two separate pictures; i.e., a split screen, with one of the separately controllable characters working in one environment, and the second working in another environment. When the characters are functioning in the same environment, the screens are merged into a single picture. Also, according to a preferred embodiment of the invention, the actions of a first character in a first environment will have a causation effect with respect to the other character. In other words, if a first character cuts down a tree at a particular location, if the second character goes to that location at a later time, the second character will see a cut down tree.

[0028] According to a fourth preferred aspect of the invention, the at least two separately controllable characters are controlled by at least two input devices coupled to a single computer. The at least two input devices may include a first mouse and a second mouse, a mouse and another input device, or two or more input devices such as joysticks, trackballs, gamepads, etc. Alternatively, certain keys at opposite ends of a single keyboard may be utilized to control the separately controllable characters.

[0029] The preferred aspects of the invention are preferably utilized in conjunction with a strong story line which includes two or more controllable characters. The requirement that the characters cooperate in order to advance or complete the game requires interaction and cooperation between the players. This required interaction and cooperation between players is believed by the inventors to be an ingredient or criteria which is missing from the prior art but which is necessary for the success of a girl-directed computer game. In addition, incorporation of the criteria of Chart A into the computer game is desirable in providing a computer game which girls will want to play. Furthermore, it is believed that the split-screen/merged-screen aspect of the invention is a desirable tool for fostering a playing environment which indicates separate and/or independent play, and cooperative play, which are both required for advancing the game. Further yet, it is believed that various aspects of the invention can be used alone or together to provide a new genre of computer games which will be popular with both genders and all ages of computer game players.

[0030] Additional objects and advantages of the invention will become apparent to those skilled in the art upon reference to the detailed description taken in conjunction with the provided figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] **FIG. 1** is a schematic diagram of a two player game according to the invention with a split-screen separate view for each player;

[0032] **FIG. 2** is a schematic diagram of a merged-screen single view for both players;

[0033] **FIG. 3** is a simplified flow chart illustrating game play from the start of a game entering into split-screen mode;

[0034] **FIG. 4** is a chart similar to **FIG. 3** showing an alternate embodiment of game play;

[0035] **FIG. 5** is a simplified flow chart illustrating game play during cooperation mode;

[0036] **FIG. 6** is simplified flow chart illustrating game play during a non-cooperation mode in single-screen mode;

[0037] **FIG. 7** is a simplified flow chart illustrating game play which includes a split-screen cooperation mode;

[0038] **FIG. 8** is a simplified map of game scenes indicating moves which may be made without cooperation and moves which require cooperation;

[0039] **FIG. 9** is a simplified flow chart of software control for an example of simple cooperative interaction between characters;

[0040] **FIG. 10** is a simplified flow chart of software control for an example of coordinated cooperative action between characters; and

[0041] **FIG. 11** is a simplified flow chart of software control for an example of complex coordinated cooperative action between characters.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0042] Referring now to **FIGS. 1 and 2**, the electronic game according to the invention is preferably embodied as

software which is designed to be used with a conventional personal computer. The software may be distributed on CDROM, DVD, diskette, or via the Internet. However, the game according to the invention may also be embodied in a dedicated hardware unit or in a "video game cartridge" or the like. In any case, in order to play the game, it is necessary to provide a processor **10**, a video display **12**, and one or more input devices **14** for receiving input from at least two players. According to one aspect of the game, the video display **12** and the processor **10** must be able to change the display from a split-screen as shown in **FIG. 1** with two different images **12***a* and **12***b* to a single-screen as shown in **FIG. 2** with a single image **12***c* and vice versa depending on factors which are described below with reference to FIGS. **3-7**. As shown in the Figures, the input device **14** may be a conventional keyboard where some keys **14***a* at the left end of the keyboard receiving input from "Player 1", and some keys **14***b* at the right end of the keyboard receiving input from "Player 2". Accordingly, when the display **12** is in the split-screen mode, the image **12***a* on the left side of the screen will be associated with "Player 1" and will respond to the input keys **14***a* whereas the image **12***b* on the right side of the screen will be associated with "Player 2" and will respond to the input keys **14***b*. Those skilled in the art will appreciate that the input device need not be a shared keyboard and that each player may be provided with a separate input device. A suitable input device includes a mouse, a joystick, a trackball, a gamepad controller, etc. Preferably both players utilize the same type of input device, although different input devices can be utilized.

[**0043**] The presently preferred embodiment of the electronic game according to the invention is what is often referred to as an "adventure game". As used herein, "adventure game" means a game where the players must traverse different landscapes, find things, solve puzzles, and perform tasks in order to complete (win) the game. Those skilled in the art will appreciate that known electronic adventure games often utilize a "first person" display. That is, the player sees the world of the adventure on the screen bud does not see herself as a character on the screen. However, it is not uncommon in the art to utilize a third person display where the player views a character on the screen and controls the movements of the character with the input device. Further, it is known in the art to provide a kind of hybrid first-third person display where the player sees her character at some times and sees through the eyes of her character at other times. The present invention may utilize either a first person display, a third person display, or a hybrid first-third person display. The exemplary displays shown in **FIGS. 1 and 2** are illustrated as third person displays. In particular, as shown in **FIG. 1**, "Player 1" sees herself walking and carrying two infants and "Player 2" sees herself running towards a house. As shown in **FIG. 2**, both players see each other pulling a small boat carrying children onto a shore. As will be appreciated from the description which follows, a third person or hybrid first-third person display is preferred, particularly when the game is in single screen mode so that the players can see each other.

[**0044**] Although the invention may provide for more than two players, the presently preferred embodiment is a two player game and the game will be described herein with reference to only two players. From the description given herein, however, those skilled in the art will appreciate how the inventive aspects of the game may be applied to a game for more than two players. Further, the presently preferred embodiment of the game utilizes a single video display and switches between single-screen and split-screen modes in an inventive manner as described below with reference to FIGS. **3-7**. As mentioned above, the game according to the invention is designed to appeal particularly to girls. The inventors believe that the use of a single video display with single-screen and split-screen modes for two players will be appealing to girls because it allows close interaction between the two players as well as interaction between the players (individually and jointly) and the game. From the description given herein, however, those skilled in the art will appreciate that many of the inventive aspects of the game may be applied while using multiple video displays and that the video displays and respective players may be located close together or far apart.

[**0045**] Turning now to **FIG. 3, a** simplified embodiment of game play according to the invention will be described with reference to different types of "scenes". As used herein the term "scene" is intended to mean a point in the game where certain actions and results are possible as well as different images such as the images **12***a*-**12***c* shown in **FIGS. 1 and 2**. Those skilled in the art of adventure games will appreciate that during game play a change in the image on the screen does not always provide a change in the actions and results which are possible at that point in the game. Changes in the screen image which are irrelevant to the completion of the game are sometimes referred to as "eye candy". In addition, different points in the game may display the same image but are different "scenes" because actions and results are possible. For example, a scene of a door to a room may look identical on the video display regardless of whether the player is carrying a key to the door. In the description which follows, the term "scene" may have different meanings depending on the context of the game. Generally, it is intended that the term "scene" include both changes in the displayed image as well as imperceptible changes in the player's position in the game where the actions or results which are possible have changed even though the image on the screen remains the same. In some instances, however, the term "scene" will only refer to the visual display. The scenes described below are defined as being either a "Type-N" scene or a "Type-C" scene. As used herein a "Type-N" scene is a scene which may be entered by one player without the cooperation of the other player. A "Type-C" scene is one which may be entered only if both players cooperate. In some instances cooperation of the players will permit both players to enter the "Type-C" scene and in other instances cooperation of the players will permit only one of the players to enter the "Type-C" scene. Generally, according to the simplified embodiment illustrated in **FIG. 3**, whenever cooperation is required, the video display is in single-screen mode. However, when cooperation is not required, the display may be in either single-screen or split-screen mode depending on the relative locations of the players. Thus, according to this embodiment, there may be scenes which are displayed in the single-screen mode even though cooperation is not required. To distinguish these two different modes using a single-screen display, the latter is referred to herein as non-cooperative single screen mode or NCSS mode.

[**0046**] With these definitions in mind, **FIG. 3** shows that after starting the game at **20**, a prologue animation is preferably played at **22** in single-screen mode. The prologue

introduces the players to the story which will be played out in the game and may also include instructions for playing the game, hints, etc. The prologue ends at **24** where the players, using their input devices, choose a direction in which to move. (It will be appreciated, however, that the prologue could end by presenting a split screen mode where each player has little or no choice as to which direction to move.) For example, if the input device is a mouse, moving the mouse to the right side of the screen will cause the display to scroll to the left revealing what was to the right of the initial display. If the players choose different directions, the display changes to split-screen mode at **26**. If the players choose to move in the same direction, the display will remain in single screen mode as indicated at **28** even though cooperation may not be required at this stage of the game. Following the switch to split-screen at **26**, the left side of the video display will display "Scene A" for "Player 1" (illustrated at **30** in **FIG. 3**) and the right side of the video display will display "Scene B" for "Player 2" (illustrated at **32** in **FIG. 3**). The game is then run in two parallel threads as illustrated in **FIG. 3**. Specifically, for "Player 1", the game is run at **34** from "Scene A" and for "Player 2", the game is run at **36** from "Scene B". Input from "Player 1" is determined at **38** and input from "Player 2" is determined at **40**. If "Player 1" enters input at **38**, she is moved at **42** to a different "Type-N" scene. Similarly, if "Player 2" enters input at **40**, she is moved at **44** to a different "Type-N" scene. As will be described in more detail below with reference to **FIG. 7**, it is possible and desirable that both players will eventually arrive at the same "Type-N" scene. This determination is made for each player at **46**, **48** respectively in **FIG. 3**. At this point it is worth mentioning that according to the presently preferred embodiment, if interaction by either player with the "world" of the game changes the world in any way, those changes are perceived by both players. For example, if one player cuts down a tree to make fire wood, when the other player goes to the site of the tree, it is seen to have been cut down.

[**0047**] When it is determined that both players have entered the same scene, the game switches to single-screen mode as illustrated at in **FIG. 3**. In this instance, the term "scene" means the same visual display. As explained above, the input and movement indicated at **38**, **42** and **40**, **44** in **FIG. 3** is intended to include all of the typical types of actions and results encountered by a player of an adventure game. In one sense, when in the split-screen mode, the game of the invention seems to provide two separate adventure games, one on either side of the screen, one for each player. In another sense, each player is playing a different part of the same game. Once it is determined at **46** or (either player may enter the scene of the other) that both players are at the same scene and single-screen mode is entered at **50**, it may be immediately determined at **52** that cooperation is required and the game will enter the "cooperation mode" at **54**. Alternatively, as mentioned above, both players may enter the same scene where no cooperation is required. If such is determined at **52**, the game will enter NCSS (non-cooperation single-screen) mode at **56**.

[**0048**] From the foregoing, it will be appreciated that the players must discover when cooperation is required to advance the game play. According to a preferred aspect of the invention, aural or visual hints may be presented at scenes where cooperation is required, but it is preferred that the players be required to use intuition to discover when cooperation is necessary. In an alternate, less preferred embodiment of the invention, it may be clearly indicated to the players when cooperation is required. This alternate embodiment is illustrated in **FIG. 4** where there is no NCSS mode. That is, whenever the display changes to single-screen mode, an action requiring cooperation is required to advance in at least one direction. More specifically, as shown in **FIG. 4**, after the game is started at **120** and the prologue is played at **122**, it is determined at **124** whether the first single-screen scene requires cooperation. This determination is made by the game programmer, of course, and may be fixed for any particular game or may be different each time the game is started. For example, if the game may be started from different points in the game play, it may sometimes be started at a point where cooperation is needed and other times be started at a point where no cooperation is necessary. If cooperation is necessary the game enters cooperation mode at **128**. If not, the game enters split-screen mode at **126** and the game proceeds in two threads as illustrated at **130-144** (much the same as described above with reference to **30-44** in **FIG. 3**). According to this embodiment, however, the game only enters single-screen mode at **150** after two conditions are met: it must be determined at **143** and **145** that both players have reached a scene where cooperation is required and it must be determined at **146** and **148** that both players have reached the same scene. As stated above, according to this embodiment, once single-screen mode is entered at **150**, the game immediately enters cooperative mode at **154**.

[**0049**] In either of the embodiments described above with reference to **FIGS. 3 and 4**, the cooperation mode preferably operates as described with reference to **FIG. 5**. Once the cooperation mode is entered at **60**, input from both users is polled at **62**, **64**, **66**. Only if it is determined at **66** that both players have entered input is it determined at **68** whether the input was cooperative. As mentioned above, one of the inventive aspects of the game is that different kinds of cooperation are required to complete the game. Thus, the determination made at **68** will depend on the type of cooperation required at the scene. Examples of different types of cooperation are described below with reference to FIGS. **9-11**. If the cooperation between the players is successful at **68**, one of the players or both of the players (depending on what type of cooperation was required) will advance to a "Type-C" scene (i.e. a scene which can only be reached with cooperation). Regardless of whether one player advances to the scene or both players advance to the scene, the scene may or may not require cooperation to exit. This determination is made at **72** whether the scene entered at **70** requires cooperation to exit. An example of game play involving the determinations made at **68-70** would be where in order to enter a room, one player must hold the door open while the other enters. The door cannot be opened from inside the room and it is spring loaded so that it will close unless being held open. In this example, the determination of cooperation at **68** involves determining whether one player is holding the door open while the other player is entering the room. Clearly, in this example, only one player will advance to the "Type-C" scene (interior of the room) at **70**. The determination at **72** will be that cooperation is required to exit the room. Thus, after entering the room, the game will remain in cooperation mode for the player to exit the room. The game may be written so that the player who entered the room may do things in the room (such as pick up objects)

without cooperation of the other player. In this case, the game will enter NCSS mode at **74** until the player attempts to exit the room. Alternatively, the game may be written so that the player who entered the room can do nothing if the other player lets go of the door and the game will remain in cooperation mode until the player exits the room.

[**0050**] While the game is in cooperation mode, if only one player supplies input as determined at **62**, **64**, **66**, that input may move the player to another "Type-N" scene as illustrated at **76**. Similarly, if both players supply input which is not cooperative, both players may be moved to the same or separate "Type-N" scenes as illustrated at **76**. In either case, it will be determined at **78** whether both players remain in the same scene or whether one has left to go to another scene. If either player has moved out of the scene, the game will enter split-screen mode at **80**. If both players remain in the same scene, the game remains in cooperation mode.

[**0051**] As mentioned above, according to a preferred embodiment, the game may enter single-screen mode when no cooperation is required but when the two players have entered upon the same scene. This non-cooperation single-screen (NCSS) mode is illustrated in **FIG. 6**. When NCSS mode is entered at **82**, the game checks at **84** whether cooperation is required and if it is, the game changes to cooperation mode at **86**. In NCSS mode the game also checks at **88** and **90** whether either player has left the scene, in which case the game returns at **92** to split-screen mode. So long as both players remain in the same scene and so long as cooperation is not required the game remains in NCSS mode.

[**0052**] According to a presently preferred embodiment, cooperation may also be required when the players are in the split screen mode. Split-screen cooperation mode may be utilized in cooperative situations which require, e.g. division of labor. For example, a situation where one player must mind something where another player goes to get something. Split-screen cooperation mode is illustrated in **FIG. 7**. The game play illustrated in **FIG. 7** is similar in part to the game play illustrated in parts of **FIGS. 3 and 4** with similar reference numerals indicating similar game play issues. In particular, after the game enters split-screen mode at **326** and the game proceeds in two threads as illustrated at **330-344** (much the same as described above with reference to **30-44** in **FIGS. 3 and 130-134** in **FIG. 4**). According to this embodiment, however, the game may enter cooperative mode for either player while in split-screen mode. At **343** it is determined whether player 1 has entered a scene where cooperation is required and at **345** it is determined whether player 2 has entered a scene where cooperation is required. In either case, it will then be determined at **368** whether both players are cooperating as required by the game program. If they are both performing the required cooperation, one or both players (depending on the program context) will advance to the Type-C scene at **370**. If it is determined at **368** that one player is not cooperating, it is determined at **369** and **373** which player(s) is not cooperating. For example, it may be determined at **369** that player **1** is attempting cooperative game play but player **2** is not (for any of a number of reasons) cooperating. In that case, the game will enter a failure mode **1** as indicated at **371** in **FIG. 7**. What failure mode **1** entails will depend on the game program, at what point the players are in the game, whether the cooperative game play is critical, and other factors chosen by the game programmer. A failure mode may be fatal in which case the game will end or it may be repairable in which case the players will have an opportunity to correct it. A similar determination is made at **373** whereby the game enters failure mode **2** at **375** if player 2 is attempting cooperative game play but player 1 is not (for any of a number of reasons) cooperating. If neither player is attempting cooperative game play, as determined at **373**, the game enters failure mode **3** at **377**.

[**0053**] For purposes of determining when single-screen mode is activated, the term "scene" means the same graphical display. However, for purposes of advancing the game and determining when cooperation is required, the term "scene" includes imperceptible changes in the state of the game. For example, if one scene shows a visual display of a locked door and a player inserts a key, unlocks the door, and removes the key, the visual display may be identical to the locked door, but the player has entered a new "scene" in the game because now the door can be opened. Examples of movement from scene to scene in this sense are illustrated in **FIG. 8**.

[**0054**] The diagram of **FIG. 8** shows circles, rectangles, and trapezoids linked by lines with arrows and the indication "n" or "c". The trapezoids indicate "Type-C" scenes. The circles and rectangles indicate "Type-N" scenes. The rectangles indicate "Type-N" scenes where cooperation may be used to enter a "Type-C" scene. Movement by players from one scene to another is shown by the lines with arrows. A line with an arrow at one end shows a movement which is only "one-way". A line with an arrow at both ends illustrates that movement can occur in both directions. Lines labelled "n" indicate movements which can be accomplished without cooperation. Lines labelled "c" indicate movements which can only be accomplished with cooperation. Movement from a "Type-C" scene may or may not require cooperation. Those skilled in the art will appreciate that in an adventure game, it is preferable that some scenes present many opportunities to advance in different directions and that some scenes provide only a few opportunities. In other words, some scenes will present many challenges whereas some scenes are merely "eye candy".

[**0055**] Referring now to **FIG. 8**, the starting point of the game could be any scene shown in **FIG. 8** except for **224**, **226**, and **232** since those scenes can only be entered with cooperation. However, if the game is started from a point in mid-play as explained above, the "resumed" game could open in one of the "Type-C scenes". In any event, as shown in **FIG. 8** scenes **200**, **204**, **210**, and **220** are "dead end" scenes where they must be exited back to the scene from which they were entered. Scenes **208**, **216**, and **236** are "two door" scenes. When one of these scenes is entered the player can exit back to the scene from which she entered or proceed to another different scene. Scenes **202**, **206**, **212**, **214**, and **218** are "multi-ported" in that many different scenes may be entered from any one of these scenes. Multiported scenes are the most interesting. Therefore, according to a preferred embodiment, the scenes where cooperation is required are preferably multiported with some ports requiring cooperation and some not. For example, scene **222** may be entered without cooperation from either scene **214** or **218** and either scene **214** or **218** may be entered from scene **222** without cooperation. However, if and only if cooperation is used, either scene **224** or **226** may be entered from scene **222**. Both

"Type-C" scenes **224** and **226** are also multiported and require cooperation for only some ports. From scene **224** one may enter either scene **228** or **230** without cooperation but may not return to scene **224** from either scene **228** or **230**. In order to exit scene **224** back to scene **222** from which it was entered, cooperation is required. From scene **226**, one may enter either scene **216** or return to scene **222** from which it was entered without cooperation. In order to advance to scene **232** from scene **226** cooperation is required. It will be noted however, that unlike the "Type-C" scenes **224** and **226**, scene **232** may be entered in two different ways, either from scene **226** or from scene **234**, but in both ways cooperation is necessary. Once in scene **232**, movement to scene **234** does not require cooperation, but movement to scene **226** does require cooperation. As illustrated in **FIG. 8**, entry into some scenes may behave as "Type-N" scenes if entered in one way and behave as a "Type-C" scene if entered in another way. For example, scene **222** is a "Type-N" scene which can be entered from scene **214**, **218**, or **226** without cooperation. However, from scene **224**, entry into scene **222** requires cooperation. As used in the example of **FIG. 8, a** scene is called a "Type-C" scene only if it cannot be entered without cooperation from any other scene. However, whether or not a scene is called "Type-C" or "Type-N" is not important. The important part of the invention is that some scenes require cooperation for entry and that others do not. The "hybrid" type of scene shown at **222** is neither necessary nor sufficient for the game, but is an interesting addition. What is necessary is that the game cannot be completed without cooperation. For example, if game completion occurs at scene **232**, the players must cooperate at least once (if entering from scene **234**), and possibly twice (if entering from scene **226**) in order to complete the game. According to a preferred embodiment, both players advance to the completion scene together so that the game cannot be completed by one player without the other player also completing the game. An alternative, less preferred embodiment is that in order to enter the final scene, one player must remain behind. Which player remains behind may be determined by other game activity which precedes the final scene or may be a decision which is made by the players at the entry to the final scene.

[**0056**] As mentioned above, an important distinguishing aspect of the presently preferred embodiment of the invention is that different types of cooperation are required for the players to complete the game. FIGS. **9-11** illustrate the determination (e.g., **68** in **FIG. 5**) of three different types of cooperation which are contemplated by the invention. The determination of a first, simple type of cooperation, such as one player opening a door for the other, is illustrated in **FIG. 9**. In this simple example both players must be at a correct location and must enter the correct input for there to be a determination that their input was cooperative. Timing is not critical in this example. Thus, the determination begins at **240** and looks at **242** to determine whether Player 1 is in the correct location to input, e.g. at the door to be opened. At **246** it is determined whether Player 1 input is correct, e.g. click mouse button with pointer on doorknob. If either of these criteria are not met, the game determines that the input is not cooperative at **244**. If both criteria are met, the same kind of inquiry is made with respect to Player 2. In particular, it is determined at **248** whether Player 2 is in the correct location to input, e.g. at the door. At **250** it is determined whether the Player 2 input is correct, e.g. click mouse button with pointer in doorway. If all criteria are met, it is determined at **152** that the players have entered cooperative input.

[**0057**] A more complex form of cooperation may require that both players execute the correct input at the same time in the same place, e.g. both players must simultaneously push a boulder to move it out of the way or pull a rope together to move a boat as shown in **FIG. 2**. An example of determining this type of cooperation is illustrated in **FIG. 10**. Beginning at **254**, both players are simultaneously (or nearly simultaneously) polled to determine at **256** whether both players are in the correct position, e.g. at the boulder, and at **258** whether both players are providing correct input, e.g. clicking and dragging in the same direction simultaneously. If both criteria are met, it is determined at **262** that the input was cooperative. If either criteria is not met, it is determined at **260** that the input was not cooperative.

[**0058**] An even more complex form of cooperation may require that each player enter the correct input in the right place, at the right time, and in the right sequence, e.g. Player 1 hands a tool to Player 2 who must grab it without dropping it. An example of determining this type of cooperation is illustrated in **FIG. 11** Beginning at **264**, it is first determined at **266** whether Player 1 is in the right location, e.g. hand or pointer close enough to Player 2 hand or pointer. It is next determined at **268** whether Player 1 has entered the correct input, e.g. release mouse button to drop the tool. If Player 1 has failed to meet either of these criteria, it is determined at **280** that no cooperative input has occurred. If Player 1 drops the tool at the right place, Player 2 must catch the tool before it hits the ground. Thus, at **270** a timer is started and it is determined at **274** and **276** whether Player 2 is in the right place entering the right input, e.g. hand or pointer close to Player 1 hand or pointer and pressing mouse button after Player 1 releases the tool. If, as determined at **276**, Player 2 has not acted fast enough, it is determined at **280** that no cooperative input has occurred. If both players have entered the correct input in the correct places, in the correct order, in a timely manner, it is determined at **278** that the input was cooperative.

[**0059**] Still another type of cooperation contemplated by the invention has been referred to above as a "division of labor" cooperation which may take place in a single screen mode or a split screen mode. The concept of this type of cooperation is easy to explain without the use of a diagram. For example, a typical "division of labor" cooperation may require that one player keep a campfire alive while the other go get more wood to burn. Those skilled in the art of game programming will appreciate from this example how other game play scenarios could be made into a "division of labor" cooperation requirement.

[**0060**] Those skilled in the art will appreciate that most successful computer games have a soundtrack which includes sound effects and music. From the foregoing, it will be understood that when the game is in split screen mode, it may require the playing of two soundtracks, one for each player. This may be accomplished in several ways. The simplest way is to simply play the two soundtracks simultaneously. However, it may be desirable, where the game computer is provided with stereo speakers, to play one soundtrack through the right speaker and the other through the left speaker. Alternatively, separate soundtracks may be provided for two headsets (one for each player) which are

coupled to the computer. Technology for implementing multiple simultaneous soundtracks is disclosed in U.S. Pat. No. 5,556,107 the complete disclosure of which is hereby incorporated by reference herein.

[0061] As mentioned above, another important aspect of the presently preferred embodiment of the invention is that the game play be related to a story and that the cooperation between the players be closely related to aspects of the story. A good example of a story which is well suited to adaptation for use as a game scenario according to the invention is "Baby Island" by Carol Ryrie Brink, ©1937 The Macmillan Company, the complete text of which is hereby incorporated by reference herein.

EXAMPLE

[0062] The Baby Island story begins with two characters taking a voyage from San Francisco to Australia. What follows herein is a synopsis of a portion of the Baby Island story with comments regarding how the story can be adapted for use with the invention.

[0063] The Prologue of the Game

[0064] The first chapter of the Baby Island story serves well as the opening prologue of a game according to the invention.

> [0065] On a boat from San Francisco to Australia, two motherless girls, Mary Wallace, age 12, and her sister Jean, age 10, have left their Aunt Emma after two years to go live with their father on the new ranch he had started. Hit by a tropical storm, the boat began to sink. Mary, who had been amusing herself on the boat trip by playing with the 3 Snodgrass babies, 20-month-old twins Elisha and Elijah and 4-month-old Jonah, plus little Ann Elizabeth Arlington, age 1 year, kept her wits about her in the chaos of the sinking boat. She rounded up the 4 babies and Jean and got them all into a lifeboat to await the babies' parents. Amidst much confusion, their lifeboat was cast off. Fog and darkness closed in and "at last Mary realized with a strange thrill that she and Jean were adrift on an unknown sea with a boat full of parentless babies."

[0066] One can easily imagine how this introduction would make an excellent animated prologue to a game made in accord with the present invention. At the end of the prologue, a game for two players begins based on the story which follows in the second chapter of Baby Island. One player plays the part of Mary and the other player plays the part of Jean.

[0067] The First Game Scene-Example of Division of Labor Cooperation

[0068] The first game scene is drawn from the second chapter of the Baby Island story.

> [0069] The next morning, the sun rose, the seas calmed, and 4 babies woke up and screamed for milk. Mary instructed Jean to either look for something to eat or to hold and rock the babies. Jean found under the seat of the lifeboat: 2 hatchets, a lantern, a can of oil, blankets, a coil of rope, canvas which seemed intended for a sail, a tin bucket, canvas bucket, wrench, bailing tins, and a tin box of matches.

[0070] This scene from the second chapter of the story is readily adapted to the game according to the invention with some modifications. In the game, Mary need not "instruct" Jean. However, one of the players must hold and rock the babies while the other player searches. This is the first cooperative game play required by the invention and it is a "division of labor" type of cooperation. The discovery of the supplies under the seat of the lifeboat is a classic adventure game scenario. It will be understood that at least some of the supplies will be required at some point in the game. According to the invention, the game will not advance unless one player is holding and rocking the babies while the other player searches. There are various ways the game can be programmed to accomplish this. One possibility is that the seat of the lifeboat will not be able to be moved by one player unless the other player is holding and rocking the babies. Another possibility, though perhaps too morbid, is that the babies fall overboard and drown unless one player holds and rocks them. The division of labor game play in this scene is most suited to take place in a single screen mode.

[0071] The second chapter of the Baby Island story contains several other scenes in which cooperative behavior of the two players will be required including finding other supplies and feeding the babies. The Baby Island story also contains many scenes which are readily adapted to provide individual game play for each of the players.

[0072] Examples of Individual Game Play and "Temporal Cooperation"

[0073] The third chapter of Baby Island includes several scenes which are readily adapted to provide individual (non-cooperative) game play according to the invention.

> [0074] In Jean's pockets were found more supplies: ball of string; piece of tin foil; chain of safety pins; a pencil; and a half-written postcard to Aunt Emma. Jean had promised Aunt Emma she would write her every week, so she wrote the rest of the post card: "We are on our way to a desert island with the Snodgrass babies and Ann Elizabeth Arlington. The boat in the picture was wrecked. We're in a fine little lifeboat". She folds the notecard, wraps it in the tin foil, puts it in the empty beef can, bends down the cover and sets the can floating across the water.

[0075] As it turns out in the Baby Island Story, it is crucial that Jean continue to send notes floating across the water every week in order for the children to be found and rescued. Therefore, the player who plays the part of Jean must, throughout parts of the game, send such a note. It will be appreciated that the game could provide some hint that this must be done. A hint can be provided by showing that the note on the first note card says something like "As I promised to write to you each week . . . ". Another interesting way to provide a hint would be to show an audio-video animation in a cloud above Jean's head when she finds the note cards. The animation would show Jean promising Aunt Emma that she would write weekly. In addition to requiring Jean to write weekly notes, the Baby Island story provides a separate activity for Mary.

> [0076] In Mary's pockets were found: a purse with a few coins; a notebook with a calendar; and a case with scissors, thimble, needles and thread. Mary began keeping a ship's log: "September 21-At sea-expect to reach a desert island soon."

[0077] Mary's keeping track of the calendar is also an important part of the game. As the game obviously will not be played for weeks at a time, periodically Mary's calendar will show what date it is. The calendar plays an important role later in the story. These independent activities of the players may take place in a single screen or in a split screen mode. Moreover, these "independent" activities may be temporally related so that performing these activities in sequence is a type of cooperation. For example, Mary may be required to tell Jean when it is time to send another postcard, based on the date indicated in Mary's calendar.

[0078] In other words, cooperative game play can be defined to mean a situation in which there is a required temporal relationship between activity X by player A and activity Y by player B such that the game can only be completed if the temporal relationship is satisfied. According to this definition, non-cooperative game play can be understood to be when player A can perform activity X without dependence on player B or negative impact on the successful completion of the game.

[0079] Some independent activities may be "assigned" by the story to the players. Other independent activities may be performed by either player at their option.

[0080] The day goes on with no land in sight. During the heat, the girls stretch the canvas over one end of the boat to shelter the babies from the sun. As they nap, Mary washes their clothes. Night falls; all asleep with blankets as it gets cooler. Baby Jonah begins screaming with colic, and screams till Mary figures out she needs to burp him.

[0081] According to the invention, either Mary or Jean may wash the clothes so long as one of them does. In addition, either Mary or Jean may burp baby Jonah so long as one of them does.

[0082] Single Screen Coordinated Cooperation

[0083] According to the description of the invention, one form of cooperation envisioned by the inventors is a coordinated cooperation in which both players must act simultaneously on a particular object in order to accomplish a task. The Baby Island story provides scenes where this type of cooperation can also be mandated in a game. For example, in chapter four, both players must pull the lifeboat ashore.

[0084] They sail through the night and then, with a gentle bump, the boat is grounded on a sandy island. Jean wakes up first and leaves the others sleeping in the boat, disappears and comes back having found bananas—breakfast for all.

[0085] They decide to pull the boat as far up shore as possible, so the wind won't carry it out to sea. They leave the babies on the sand and with all the strength of the 2 of them together, they pull and push the boat up the dry sand.

[0086] Unless both players pull and push together the boat will not be beached and the game will not be completed. Clearly, this cooperation is most likely to require single screen mode.

[0087] Complex Coordinated Cooperation

[0088] Chapters six and seven of Baby Island provide many opportunities to implement complex coordinated cooperation requirements. In these chapters, Mary and Jean undertake several building projects.

[0089] They decide to build a tepee. First they need poles: Jean goes off and finds a bamboo grove and cuts down some bamboo poles with the hatchet and brings them back. They strip the leaves off and stick them in the ground in a circle and tie the tops together with a piece of rope, then use the canvas sail as a tepee cover. They make beds of boughs and leaves and spread the tarpaulin over them to keep them dry, then put blankets on top.

[0090] They build a "pen" to keep the babies from wandering—they drive sharpened sticks into the ground close together.

[0091] They build a "pram" to transport the babies without having to carry them. They take a litter of boughs and tie them together with vines and a little of the rope. More vines and rope are made into a double harness for the girls to put around their shoulders.

[0092] Each of these building projects may be made to require complex coordination such as one player handing an object to another, etc.

[0093] There have been described and illustrated herein several embodiments of a multiplayer electronic game. While particular embodiments of the invention have been described, it is not intended that the invention be limited thereto, as it is intended that the invention be as broad in scope as the art will allow and that the specification be read likewise. In particular, while several different types of cooperative game play have been disclosed, it will be appreciated that other types of cooperative game play may be implemented within the scope of the invention. Also, while the split screens were shown as side-side split screens, it will be appreciated that the screen could be split into upper and lower sections, or in a diagonal matter. It will therefore be appreciated by those skilled in the art that yet other modifications could be made to the provided invention without deviating from its spirit and scope as so claimed.

1. A multiplayer electronic game for use with a processing apparatus having a graphical display and input means for receiving input from at least two players simultaneously, said game comprising:

a) player location means for associating a game location with each player such that as each player moves through said game, each player's game location is updated; and

b) split screen means for dividing the graphical display into separate portions of each player, said split screen means being responsive to said player location means such that when two players' game locations are within a preset range, the separate portions of the graphical display for the two players are merged into a single portion of the graphical display, and when the two players' game locations are outside the preset range, the graphical display for the two players is split into separate portions.

2. A game according to claim 1, further comprising:

c) joint action means for requiring said at least two players to act jointly with each other at certain points in said game.

3. A game according to claim 2, further comprising:

d) individual action means for requiring said at least two players to act individually at certain points in said game.

4. A game according to claim 2, wherein:

said joint action means requires said at least two players to act jointly in separate locations while said split screen means divides the display into separate portion for each player.

5. A game according to claim 2, wherein:

said joint action means requires said at least two players to act jointly in the same location while said split screen means merges the display into a single portion.

6. A game according to claim 2, wherein:

no player can complete the game without all players also completing the game.

7. An electronic game for use with a processing apparatus having a graphical display and input means for receiving input from two players simultaneously, said game comprising:

a) split screen means for dividing the graphical display into separate portions for each player and for merging the separate portions into a single graphical display shared by both players; and

b) game logic which requires each player to act individually and jointly with the other player at different points in said game, wherein

said split screen means is responsive to said game logic such that the graphical screen is split into separate portions when the players are acting individually and the separate portions are merged into a single portion when the players are acting jointly.

8. A game according to claim 7, wherein:

said game logic requires the players to act jointly in different ways at different points in said game.

9. A game according to claim 7, wherein:

no player can complete the game without all players also completing the game.

10. An electronic game for use with a processing apparatus having a graphical display and input means for receiving input from two players simultaneously, said game comprising:

a) character generator means for generating a separate character or pointer for each player;

b) split screen means for dividing the graphical display into separate portions for each player and for merging the separate portions into a single graphical display shared by both players; and

c) game logic which provides opportunities for each player to act individually and jointly with the other player at different points in said game, wherein

said split screen means is responsive to said game logic such that the graphical screen is split into separate portions when the players are acting individually and the separate portions are merged into a single portion when the players are acting jointly, said separate characters or pointers being separately controllable when the players are acting jointly and when the players are acting individually.

11. A game according to claim 10, wherein:

said game logic requires the players to act jointly in different ways at different points in said game.

12. A game according to claim 10, wherein:

no player can complete the game without all players also completing the game.

13. An electronic game for use with a processing apparatus having a graphical display and input means for receiving input from two players simultaneously, said game comprising:

a) individual action means for requiring the two players to act individually at certain points in said game; and

b) joint action means for requiring the two players to act jointly with each other at certain other points in said game, wherein

joint action required by said joint action means includes a plurality of different kinds of joint actions.

14. A game according to claim 13, further comprising:

c) split screen means for dividing the graphical display into separate portion for each player at some points in said game and for merging the display into a single portion for both players at other points in said game.

15. A game according to claim 14, wherein:

said joint action means requires the two players to act jointly in separate locations while said split screen means divides the display into a separate portion for each player.

16. A game according to claim 14, wherein:

said joint action means requires said at least two players to act jointly in the same location while said split screen means merges the display into a single portion.

17. A game according to claim 13, wherein:

neither player can complete the game without the other player also completing the game.

18. An electronic game for use with a processing apparatus having a graphical display and input means for receiving input from two players simultaneously, said game comprising:

a) individual action means for requiring the two players to act individually at certain points in said game; and

b) cooperative action means for requiring the two players to act cooperatively with each other at certain other points in said game, wherein

cooperative action required by said cooperative action means includes at least one cooperative action selected from the group consisting of both players operating on the same object at the same time, each player operating on a different object at the same time, one player operating on a first object before the other player operates on said first object, one player accomplishing one task while the other player accomplishes another task, one player accomplishing a first task before the other player accomplishes a second task.

19. A game according to claim 18, wherein:

cooperative action required by said cooperative action means includes at least one cooperative action selected from the group consisting of holding a door for a player, handing a tool to a player, giving an item to a player, helping a player lift an object.

20. An electronic game for use with a processing apparatus having a graphical display and input means for receiving input from two players simultaneously, said game comprising:

a) individual action means for requiring the two players to act individually at certain points in said game; and

b) cooperative action means for requiring the two players to act cooperatively with each other at certain other points in said game, wherein

neither player can complete the game without the other player also completing the game.

21. A game according to claim 20, wherein:

joint action required by said joint action means includes a plurality of different kinds of joint actions.

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