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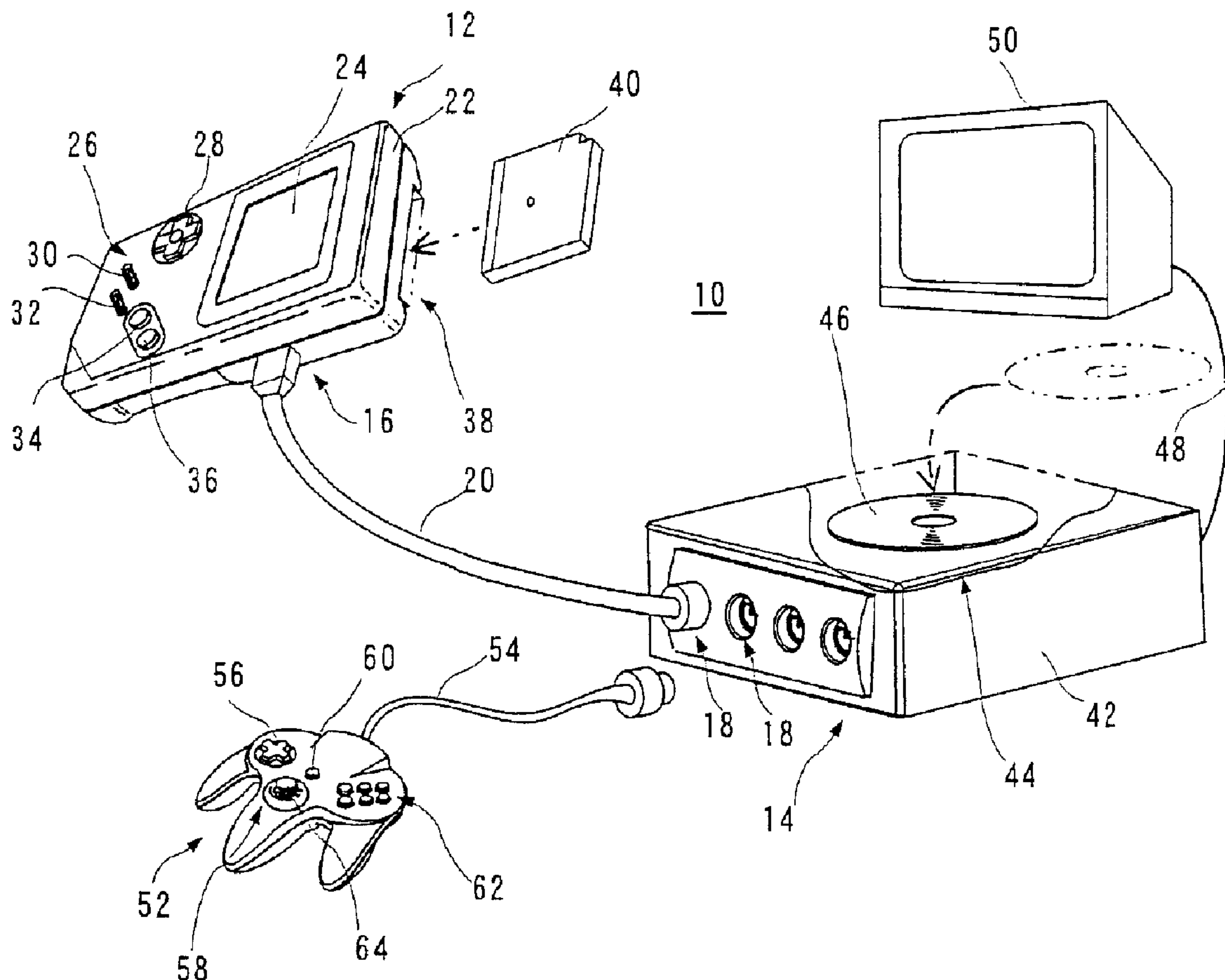
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(54) Titre : SYSTÈME DE JEU ET APPAREIL DE JEU PORTATIF

(54) Title: GAME SYSTEM AND PORTABLE GAME MACHINE



(57) Abrégé/Abstract:

A portable handheld computing device includes a housing capable of being operated while being held in and supported by the hand. The housing is adapted to receive an interchangeable memory cartridge. The device further includes a graphical liquid



(57) **Abrégé(suite)/Abstract(continued):**

crystal display disposed on the housing, a processor disposed within the housing and coupled to control the graphical information displayed on the display, a communications port coupled to the processor, and a boot ROM disposed within the housing and coupled to the processor. The boot ROM includes a routine for execution by the processor that allows the processor to receive and execute code blocks when no memory cartridge is received by the housing.

ABSTRACT

A portable handheld computing device includes a housing capable of being operated while being held in and supported by the hand. The housing is adapted to receive an
5 interchangeable memory cartridge. The device further includes a graphical liquid crystal display disposed on the housing, a processor disposed within the housing and coupled to control the graphical information displayed on the display, a communications port coupled to the processor, and a boot ROM disposed within the housing and coupled to the processor. The boot ROM includes a routine for execution by the processor that allows the processor to
10 receive and execute code blocks when no memory cartridge is received by the housing.

TITLE OF THE INVENTION

Game System and Portable Game Machine

BACKGROUND OF THE INVENTION

5 Field of the invention

This invention relates to game systems and portable game machines and, more particularly, to a game system communicatably connecting a portable game machine and video game machine, and to a portable game machine to be used for same.

Description of the prior art

10 There is a well-known portable game machine that makes use of a cartridge, for example, "GAMEBOY" (product name).

The portable game machine of this kind has a boot ROM storing a boot program. The boot program is a program for initializing a portable game machine main body (processing to write zero to the memory cell, or so) and starting, after initialization, to
15 execute a game program installed on a cartridge. Accordingly, the CPU on the portable game machine first executes the boot program upon turning on of a power to the main body. After the initialization process executed by the boot program, the CPU then processes a game program.

Meanwhile, such a portable game machine has a communication port to
20 communicate with the other game machines or communication setups. The communication port is utilized to get game data, game programs and the like in the course of executing a cartridge game program by the CPU.

In the conventional portable game machines, there are advantages of exchanging game data and playing network games owing to their capabilities of acquiring game data
25 and programs from other game machines.

However, the communication port cannot be utilized without inserting a cartridge in the portable game machine. There exists a problem that cartridges have to be prepared on the machine-by-machine basis in order for communicating data between the portable game machines through communication ports. For playing a network game over a plurality of portable game machines, there is a necessity to prepare, on machine-by-machine basis, cartridges installed with a network-game program.

It is to be considered that an auxiliary program such as communication software be previously stored on the portable game machine main body in order to avoid the necessity of preparing cartridges on the machine-by-machine basis. In such a case, however, there is a necessity to increase the capacity for storing the auxiliary program. This however results in a problem that manufacture cost be increased for the portable game machine itself. On the other hand, where an auxiliary program is stored in advance in the portable game machine, there also arises a problem that such apparatuses and game machines cannot be coped with in the event that apparatuses or game machines in different type utilizing communication ports be newly developed. Furthermore, there may arise a problem that communications and the like be made impossible between the portable game machines storing different versions of auxiliary program when the auxiliary program version is improved due to bug fix or functional extension.

SUMMARY OF THE INVENTION

Illustrative embodiments of the present invention may provide a novel game system and portable game machine.

Illustrative embodiments may provide a game system and portable game machine to be used for same, which is capable of communicating data by utilizing a communication port without a cartridge loaded on the portable game machine.

A game system according to an illustrative embodiment is structured by communicatably connecting between a receiving portion for removably receiving an information storage medium and another game machine. The portable game machine includes readable/writable storing means capable of electrically reading/writing, to, in response to turning on a power, start execution of a first program stored in a first information storage medium when the first information storage medium is loaded in the receiving portion and request the other game machine to transfer a second program when the first information storage medium is not loaded in the receiving portion but communication is possible to the other game machine. The other game machine is removably loaded a second information storage medium storing the second program and a third program to be executed on the other game machine, and reading the second program out of the second information medium and transferring same to the portable game machine in response to a program transfer request from the portable game machine; and the portable game machine writing the second program transferred from the other game machine into the readable/writable storing means in response to the transfer request, and starting execution of the second program written in the readable/writable storing means.

In this case, the second information storage medium further stores a first game program for portable game machine to be executed by the portable game machine, the second program including a download program to be executed by the portable game machine to thereby download the first game program to the portable game machine.

Also, where the first game program stored in the second information storage medium has a capacity greater than a storage capacity of the readable/writable storing means, the download program downloading the first game program by division to a data amount smaller than the storage capacity of the readable/writable storing means.

A game system according to an illustrative embodiment is structured by communicatably connecting at least one portable game machine and another game machine. The portable game machine comprises first receiving means for removably receiving a first information storage medium storing a program to be executed on a portable game machine main body; a first communication port for communicatably connecting the other game machine; program storing means storing a startup program to be executed when a power is turned on; readable/writable storing means for readably/writably storing an auxiliary program transferred from the other game machine; and first processing means executing the startup program stored in the program means in response to turning on a power, to start execution of a program of a first information storing means according to the startup program when the first information storage medium is loaded in the first receiving means, and forward a transfer request command through the first communication port according to the startup program thereby storing in the readable/writable storing means an auxiliary program transferred from the other game machine and processing to start execution of the auxiliary program when the first information storage medium is not loaded in the first receiving means and the other game machine is communicatably connected to the first communication port. The other game machine comprises: a second information storage medium storing at least the auxiliary program to be executed on the portable game machine and a providing program to be executed on the other game machine in order to provide the auxiliary program to the portable game machine; second receiving means for removably receiving the second information storage medium; a second communication port for communicatably connecting the portable game machine; and second processing means for executing the providing program of the second information storage medium loaded on the second receiving means in response to receiving a transfer request command given from the

portable game machine through the second communication port, and processing to transfer the auxiliary program to the portable game machine through the second communication port according to the providing program.

In one embodiment, the auxiliary program is processed to display a message in a predetermined language on the portable game machine.

Also, the auxiliary program is processed to provide the operational information by a player operating the portable game machine to the other game machine through the communication port.

The second information storage medium loaded on the other game machine further stores a game program to be executed on the portable game machine, the providing program transferring the auxiliary program prior to transfer of the game program to the portable game machine.

A game system according to an illustrative embodiment is loaded with a game information storage medium storing a game program to display a game space on display means by executing a game program of the game information storage medium so that a player can operate a character appearing in the game space by operating means thereby playing a game, comprising: receiving means for receiving the game information storage medium; a communication port for communicatably connecting another game machine; startup program storing means storing a startup program to be executed when a power is turned on; processing means for executing the startup program stored in the startup program storing means in response to turning on a power and start execution of a program storing means in response to turning on a power and start execution of a program designated by the startup program; and readable/writable storing means readably/writably storing an auxiliary program transferred through the communication port. The startup program causes processing means to start execution of a game program of the game information storage medium when the game information storage

medium is loaded in the receiving means, and forward to the other game machine a transfer request command requesting for transferring the auxiliary program thereby storing in the readable/writable storing means the auxiliary program transferred through the communication port and starting execution of the auxiliary program.

5 When the power is on to the portable game machine, the CPU of the portable game machine executes the startup program. The first information storage medium is detected according to the startup program. When the first information storage medium is loaded in the receiving portion, the CPU starts to execute the first program according to the startup program.

10 When the first information storage medium is not loaded in the receiving portion, it is determined according to the startup program whether or not communication is possible with another game machine through utilization of the communication port. When the first information storage medium is not loaded and communication is possible with another game machine, the other game machine is requested to transfer a second
15 program according to the startup program.

 In response to the transfer request from the portable game machine, the other game machine reads the second program out of the second information storage medium and transfer same to the portable game machine.

 Transferred with the second program, the portable game machine writes to the
20 readable/writable storing means the second program transferred from the other game machine in compliance with the transfer request according to the startup program, and starts to execute the second program written onto the readable/writable storing means.

 In an illustrative embodiment, when the information storage medium is loaded in the portable game machine, the program stored on the information storage medium is first
25 executed. Accordingly, there is no delay in starting a game as a principal usage on the

portable game machine. On the other hand, when the information storage medium is not loaded, a program is taken from another game machine. This accordingly provides the portable game machine with a function in accordance with the program.

In accordance with another illustrative embodiment of the invention, a portable handheld
5 computing device includes a housing capable of being operated while being held in and supported by the hand. The housing is adapted to receive an interchangeable memory cartridge. The device further includes a graphical liquid crystal display disposed on the housing, a processor disposed within the housing and coupled to control the graphical information displayed on the display, a communications port coupled to the processor, and a boot ROM disposed
10 within the housing and coupled to the processor. The boot ROM includes a routine for execution by the processor that allows the processor to receive and execute code blocks when no memory cartridge is received by the housing. The boot ROM further includes a reboot routine for execution by the processor, the reboot routine being performed repeatedly to allow the portable handheld computing device to receive multiple successive downloads of code for execution.

15 The above and other features, aspects and advantages of illustrative embodiments of the present invention will become more apparent from the following detailed description of such embodiments when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an illustrative view showing an embodiment of the present invention;

Figure 2 is a block diagram showing the Figure 1 embodiment;

5 Figure 3(A) is a memory map showing a boot ROM of a portable game machine,

Figure 3(B) is a memory map showing a work RAM of the portable game machine, and

Figure 3(C) is a memory map showing a ROM of a cartridge;

Figure 4(A) is a memory map showing a boot ROM of a video game machine and

Figure 4(B) is a memory map showing a DVD-ROM;

10 Figure 5 is an illustrative view showing the program data of the DVD-ROM divided and transferred to the work RAM of the portable game machine;

Figure 6 is a flowchart showing the overall operation of the embodiment;

Figure 7 is a flowchart showing a cartridge detecting process;

15 Figure 8 is a flowchart showing the operation to execute a game in the portable game machine according to the program data of the work RAM;

Figure 9 is an illustrative view showing an embodiment of the invention;

Figure 10 is an illustrative view showing another embodiment of the invention;

Figure 11 is an illustrative view showing a memory map of a master portable game machine and slave portable game machine in the Figure 10 embodiment;

Figure 12 is a flowchart showing the operation of the master portable game machine and slave portable game machine in the Figure 10 embodiment; and

Figure 13 is an illustrative view showing one example of a demonstrative screen when a demonstrative-screen-display processing program transferred from the master portable game machine is executed on the slave portable game machine in the Figure 10 embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figure 1, a game system 10 of an embodiment of the present invention includes a portable game machine 12 and a video game machine 14. Connection is provided through a communication cable between a communication port 16 on a portable game machine 12 and a communication port 18 on a video game machine 14.

The portable game machine 12 has a game-machine main body having such a size as can be held by the hand, e.g. in a rectangular form vertically or horizontally long. The main body 22 has an LCD (Liquid Crystal Display) 24 constituting a display in an upper portion on a surface thereof. The LCD 24 is to display a game space and game characters existing in the game space, together with required messages. A communication port 16, as mentioned before, is provided in a side surface of the main body. A controller 26 is arranged in a lower portion on the surface of the main body 22. The controller 26, in this embodiment, includes five operation keys 28, 30, 32, 34 and 36. These operation keys 28 - 36 are to be manipulated, typically, by the thumb of a game player who is holding the main body 22.

The operation key 28 is a cross key having a function of a digital joystick. By pressing one of four pressing points, it is possible to designate a moving direction of a

game character displayed on the LCD 24 or move a cursor. The operation key 30 is a select key structured by a push switch, and to be utilized in selecting a game mode or so. The operation key 32 is a start key structured by a push switch, and to be utilized to instruct for starting a game or so. The operation key 34 is an A button key structured by a push switch, and to be utilized to make a game character on the LCD 24 arbitrarily act, e.g. hit, throw, grab, ride or so. The operation key 36 is a B button key structured by a push switch, and to be utilized to change the game mode as selected by the select key 30 or cancel the action as determined by the A button key 34.

In the portable game machine 12, an insertion aperture 38 is formed in an upper end of a backside of the main body 22. In the insertion aperture 38 is to be inserted a game cartridge 40 as a first information storage medium. Although not shown, connectors are provided respectively in a deep portion of the insertion aperture 38 and at a tip of the game cartridge 40 with respect to an insertion direction thereof. When the cartridge 40 is inserted in the insertion aperture 38, these two connectors are put into electrical connection with each other. This enables the CPU (Figure 2) of the portable game machine 20 to access the cartridge 40.

On the other hand, the video game machine 14 is a game machine to function as "another game machine" and includes a flat, rectangular main body 42 to have a communication port 18, as mentioned before, arranged in a front surface of the main body 42. In this embodiment, four communication ports 18 are provided.

The main body 42 has a disk drive 44 provided on a top surface thereof. A DVD-ROM 46, as a second information storage medium in this embodiment, is placed on the disk drive 44.

An AV (Audio-Video) terminal, not shown, is provided in a rear surface of the main body 42. The AV terminal is connected to an AV terminal of a TV monitor 50

through a cable 48. It is noted that the AV terminal may, besides for deliver video signals and audio signals, transmit modulation signals of them.

Although the communication port 18 provided in the front surface of the main body 42 is connected with a communication cable 20 as mentioned before, this
5 communication port 18 is also to be connected with a controller cable 54 extended from an external controller 52. The external controller 52 is for the video game machine 14 and, in this embodiment, includes a cross key 56, an analog joystick 58, a start key 60 and a push button key group 62.

The cross key 56 and the start key, respectively, have the structure and function
10 similar to those of the cross key 28 and the start key 32 of the portable game machine 12. The analog joystick 58 includes an operation lever 64 that is standing upright during released but to be inclined in a direction an external force is applied by the finger. By inclining this operation lever 64 in an arbitrary direction, designation to an arbitrary
15 direction can be given in a range of 360 degrees. The analog joystick 58 is utilized to move a game character or a cursor, similarly to the cross key 56. The push button key group 62, in this embodiment, includes four push button keys to point directions of up, down, left and right, besides two keys corresponding to the A button key 34 and B button
20 key 36 on the portable game machine 12.

An electrical configuration of the Figure 1 embodiment is shown in Figure 2. The
20 portable game machine 12 has a CPU 66 as mentioned before. The CPU 66 administers overall control for the portable game machine 12. That is, the CPU 66 is coupled with the above-explained communication port 16, LCD 24 and controller 26, and further with a cartridge 40 through the connector 68. In relation to the CPU 66, the portable game
25 machine 12 is also provided with a work RAM 70 formed, e.g. by an SRAM or the like and a boot ROM 72 formed, e.g. by a mask ROM. The work RAM 70 is utilized as a

working area when the CPU 66 executes a program. The boot ROM 72 stores, in advance, a boot program (start up program) to initialize a portable game machine 12, i.e. the work RAM 70, registers of the CPU 66 and so on.

5 The game cartridge 40 includes a ROM 74, e.g. of a mask ROM, and a RAM 76, e.g. of an SRAM. The ROM 74 stores a game program as an example of a first program while the RAM 76 is built up with backup data. Incidentally, although not shown in Figure 1, the portable game machine 12 is provided with a speaker 25 so that a sound signal from the CPU 66 is delivered to the speaker 25. Accordingly, sound can be outputted through the speaker 25.

10 The video game machine 14, also, has a CPU 78. The CPU 78 is coupled with four communication ports 18, a disk drive 44 and a TV monitor 50. The CPU 78 is further coupled with a work RAM 80 and boot ROM 82 similarly to the work RAM 70 and boot ROM 72 of the portable game machine 12.

15 The memory maps of the boot ROM 72 of the portable game machine 12, the work RAM 70 of the portable game machine 12 and the ROM 74 of the cartridge 40 are respectively shown in Figure 3(A), Figure 3(B) and Figure 3(C).

20 The boot ROM 72 of the portable game machine 12 has a comparatively small capacity, e.g. 16 K bytes, and includes an initialize program area 72a. This area 72a stores an initialize program to initialize the work RAM 70 or CPU registers and so on, as mentioned before. The initialize program area 72a includes an authentication code area 72a. The authentication code area 72b stores an authentication code such as image data (dot data or pixel data) representative, e.g., of "NINTENDO". Incidentally, the authentication code is preferably encrypted or data-compressed.

25 The boot ROM 72 further includes a cartridge detect program area 72c. According to the cartridge detect program on this area 72c, the CPU 66 (Figure 2)

executes a cartridge detecting operation to be represented in a flowchart hereinafter referred in Figure 7. The communication port check program stored in the area 72d of the boot ROM 72 checks as to whether or not the communication cable 20 is connected to the communication port 16 of the portable game machine 12 and whether or not normal data exchange is possible to implement through the communication port 16, i.e. whether or not the communication port 16 is utilizable or not.

The transfer request command issuing program is a program for issuing a transfer request to the CPU 78 (Figure 2) of the video game machine 14, as hereinafter explained. The error check program provided in an error check program area 72f is, e.g., a CRC check program for executing error check on transferred data (game data or program data).

The authentication program stored in an area 72g of the boot ROM 72 is a program for carrying out authentication by the utilization of an authentication code provided in the area 72b. The start program in an area 72h is a program for starting the execution of a game program transferred to the work RAM 70 or a game program in the cartridge 40.

The work RAM 70 of the portable game machine 12 includes an authentication code area 70a, a message area 70b, a download area 70c and a game processing area 70d. In the authentication code area 70a is stored an authentication code read out of the area 46Ba (Figure 4(B)) of the DVD-ROM 46 upon executing the authentication program. In the message area 70b is stored message data for delivering various messages through the LCD 24 to a game player on the portable game machine 12. The download area 70c is an area to store a game program downloaded from the video game machine 14 as described later. Also, the work RAM 70 includes, though not shown, a working memory area to be utilized by the CPU as required upon executing a game program transferred to the download area 70c or game program of the cartridge 40.

Incidentally, the ROM 74 of the game cartridge 40 is formed with an

authentication code area 74a and program data area 74b. The authentication code area 74a stores, in advance, an authentication code for comparison with the authentication code stored in the area 70a of the work RAM 70 upon executing the authentication program of the area 72g (Figure 3(A)). In the program data area 74b is stored program data (character data and program data).

As shown in Figure 4(A), an area 82a is provided in the boot ROM 82 of the video game machine 14. This area 82a stores, in advance, an initialize program.

Meanwhile, the DVD-ROM 46 shown in Figure 4(B) is formed roughly with two areas 46A and 46B. The area 46A is an area for storage of a program for the video game machine 14 while the area 46B is an area for storage of a program for the portable game machine 12. The DVD-ROM 46 used in the embodiment has a large capacity as well known. There is accordingly no especial inconvenience in forming a program storage area 46B for the portable game machine because of comparatively sufficient storage capacity. This would be similar where using a CD-ROM in place of the DVD-ROM 46 though depending upon the amount of data of a video game machine program and portable game machine program.

The video-game-machine program storage area 46A includes a program data area 46Aa for storing therein the game data or game program data (including character data) for the video game machine 14.

The portable-game-machine program storage area 46B includes an authentication code area 46Ba, a message area 46Bb, a download area 46Bc and a program data area 46Bd. The authentication code area 46Ba stores an authentication code (e.g. image data representative of the trademark "NINTENDO") for download onto the area 70a in the work RAM 70 of the portable game machine 12. Incidentally, this authentication code is preferably encrypted or data-compressed.

The message area 46Bb stores the message data for download onto the area 70b in the work RAM 70 of the portable game machine 12. The download area 46Bc is an area for storing a download program as an example of a second program or auxiliary program for downloading the game program of the area 46Bd onto the area 70c in the work RAM 70 of the portable game machine 12. The download program is a program for executing various processes, such as process for detecting a communication cable 20, process for detecting communication abnormality, process for transferring data, encrypting process, error process and authentication process. The area 46Bd stores a program data for download to the portable game machine 12 by the download program.

Incidentally, where a game for the portable game machine includes a plurality (n) of stages, the area 46Bd of the DVD-ROM 46 stores, as shown in Figure 5, first stage data, second stage data, ..., n-th stage data together with the game basic processing program data, wherein the data area 70d of the portable-game-machine work RAM 70 stores game basic processing program data and i-staged data required as necessary. Herein, the game basic processing program is an essential program for executing the game program on the portable game machine 12, and includes an auxiliary program or the like to acquire, e.g., the data or state of a controller 26.

That is, where the storage capacity of the area 46b (Figure 4) in the DVD-ROM 46 as a second information storage medium is greater than the storage capacity of the work RAM 70 (readable/writable storage means) of the portable game machine 12, i.e. when the amount of data to be downloaded from the DVD-ROM 46 to the portable game machine 12 exceeds the storage capacity of the work RAM 70 (e.g. 256 K bytes), the download program allows for download per data section as divided. In such a case, however, the game basic processing program must be first downloaded. It is satisfactory for each of staged data to download when required, i.e. in a time with deviation.

Incidentally, where the area 70d of the work RAM 70 is overwritten each time of download, there is a need of processing so as not to erase the game basic processing program or again downloading a game basic processing program positively upon downloading each staged data.

5 However, where the amount of data to be downloaded is less than the storage capacity of the work RAM 70 (e.g. 256 K bytes), it is of course satisfactory to download at one time all the program data including game basic processing program.

10 In the game system 10 of Figure 1, where playing on the portable game machine 12, in the first step S1 of Figure 6, the CPU 66 (Figure 2) of the portable game machine 12 executes a required initialize process such as memory clear, according to the initialize process stored in the area 72a of the boot ROM 72.

Next, in step S3 is executed a cartridge detecting program stored in the area 72c of the boot ROM 72. This cartridge detecting program is shown in Figure 7.

15 In the first step S31 of Figure 7, the CPU 66 outputs an address corresponding to the area 76a where the authentication code is stored in the cartridge 40, e.g. a head address, onto an address bus (not shown) and reads in the data on a data bus (not shown). If the cartridge 40 is loaded, the data to be read in at that time will be an authentication code (dot data for displaying the trademark "NINTENDO"). If the cartridge 40 is not loaded, no data is read in at that time.

20 Then, in the next step S32, an image corresponding to the data read in the step S31 is displayed on the LCD 24 (Figure 1). When an authentication code is read in the step S31, the letter of the authentication code (trademark "NINTENDO") is displayed. When no data is read in the step S31, in step S32 an all-black image, as an example, is displayed in the area for displaying authentication code letter.

25 In step S33, the CPU 66 compares the data read in the step S31 with the

authentication code previously set in the area 72b of the boot ROM 72. In the embodiment, a check sum of the authentication code is compared. If the cartridge 40 is not inserted, no data is read and accordingly "NO" is determined in step S34.

Consequently, in step S35 a flag of "No cartridge" ("0") is sent back to the step S5 of Figure 6. Also, if the cartridge 40 is inserted, an authentication code is read into the CPU 66 as mentioned before. The two authentication codes are in agreement, and "YES" is determined in step S34. Accordingly, in step S36 a flag of "cartridge exists" is sent back to the step S5 of Figure 6.

In this manner, the cartridge 40 is detected in the step S3. Then, in step S5, reference is made to the cartridge flag sent back from the Figure 7 subroutine, to determine whether there is a cartridge or not. In this case, if the cartridge 40 is inserted, in step S7 is executed the start program in the area 72h of the boot ROM 72, and the process jumps to the start address in the game data area 74b (Figure 3(B)) of the ROM 74 of the cartridge 40. Accordingly, in this case, a game is to be played according to a game program in the cartridge inserted in the portable game machine 12.

Where "NO" is determined in step S5, the CPU 66 in the next step S9 executes the program in the area 72c of the boot ROM 72 to check the communication port. That is, the CPU 66 checks for whether a cable 20 (Figure 1) is connected between the communication port 16 of the portable game machine 12 and the communication port 18 of the video game machine 14, and, in the case of the cable 20 is connected, whether normal data transmission and reception can be made or not. When the two conditions are satisfied, "YES" is determined in step S9. When at least one of the two conditions is not fulfilled, "NO" is determined in the step S9.

If "YES" is determined in the step S9, the CPU 66 in step S11 executes the program in the area 72e of the boot ROM 72 and issues a transfer request command to

(the CPU 78) of the video game machine 14 (e.g. also called negotiation). In response, the CPU 78 of the video game machine 14 transfers all the data in the areas 46Ba, 46Bb and 46Bc of the DVD-ROM 46 shown in Figure 4(B) and at least part of data in the area 46Bd to the work RAM of the portable game machine 12 through the cable 20.

5 Accordingly, in step S13 the data thus transferred from the video game machine 14 is stored in the work RAM 70.

Thereafter, in step S15 an authentication process similar to that of the step S34 of Figure 7 is executed. In this case, it is the authentication code having been transferred from the DVD-ROM 46 to the area 70a of the work RAM 70 that is compared with the
10 authentication code given from the area 72b of the boot ROM 72. If the two authentication codes are not in agreement as a result of the authentication process in step S15, this results in authentication NG. In such a case, the CPU 66 in step S19 provides error display with the suspension of flickering authentication code letter or so.

The two authentication codes if agreed result in authentication OK, resulting in
15 determination "YES" in step S17. Consequently, the CPU 66 in step S21 executes the start program in the area 72h of the boot ROM 72, jumping the process to a start address of the program data transferred to the area 70d of the work RAM 70. Accordingly, in this case, it is possible to play a game on the portable game machine 12 according to the program data transferred or downloaded from the DVD-ROM 46 onto the portable game
20 machine 12.

In the case of executing the program within the work RAM 70, the game basic processing program shown in Figure 5 is executed in step S41 of Figure 8 thereby executing a game based on the stage data. Then, the CPU 66 in step S42 determines whether the game stage under execution could have been cleared or not. If "YES" is
25 determined in step S42, the CPU 66 in the next step S43 determines whether the cleared

one in the step S42 has been a final or n stage or not.

If "YES" is determined in the step S43, the game ends. However, if "NO", the CPU 66 in step S44 executes the download program transferred from the DVD-ROM 46 to the area 70c of the work RAM 70 to download the next stage data from the DVD-ROM 46. The step S44 is executed each time of stage clear until determining "YES" in the step S43. Thus the stage data is sequentially downloaded onto the area 70d of the work RAM 70. In this case, a message, for example, of "Downloading" or "Now Loading" may be displayed, in the step S45, on the LCD 24 by utilizing the message data provided from the video game machine 14 to the message area 70b of Figure 3(B).

In this embodiment, when the cartridge 40 is loaded in the portable game machine 12, the program stored on the cartridge 40 is executed. Therefore, there is no delay in starting the game as a major use on the portable game machine 12.

On the other hand, when the cartridge 40 is not loaded, because a program has been extracted from another game machine 14 connected to the communication port 16, it is possible to provide the portable game machine 12 with a function dependent upon that program. Accordingly, if change is made to the program or data for download onto the portable game machine 12, the portable game machine in a single kind can be easily coped with various languages or various apparatuses. In this manner, it is possible to supply a required program from another game machine to the portable game machine when required by the use of a small program, such as the boot ROM, without the necessity of providing each portable game machine, in advance, with a great deal of programs. Incidentally, where the foregoing auxiliary program is previously installed on the portable game machine, for the messages in Japanese the portable game machine could be used only within the Japanese territory. However, if the auxiliary program is sent as required from another game machine to the portable game machine as in the

embodiment, the portable game machine having been sold in any country can be utilized by single game software sold for another game machine in the same-language territory.

Meanwhile, the Figure 1 embodiment allows for playing an interactive game with the portable game machine 12 and video game machine 14. For example, if downloading
5 from the video game machine 14 onto the portable game machine 12 a device driver program as an example of a second or auxiliary program to take the data of the controller 26 of the portable game machine 12 into the video game machine 14 similarly to the above game data, the video game machine 14 can acquire the information on the controller 26 through the cable 20. Accordingly, (the controller 26) of a portable game
10 machine 12 can be used in place of the controller 52 of the video game machine 14. Incidentally, the conventional portable game machine when not loaded with a cartridge will not accept a key input. Furthermore, if image data is delivered from the video game machine 14 to the portable game machine 12 through the cable 20, the LCD 24 of the portable game machine 12 can be utilized as a sub-screen for displaying game-player
15 personal information, e.g. piece hand in mahjongg game. In this case, the monitor 50 is utilized as a main screen for displaying overall information.

Furthermore, as shown in Figure 9, the game system 10 can be configured by communicatably connecting a plurality of two or more portable game machines 12 to the video game machine 14. In this embodiment, two portable game machines 12 are
20 connected to the video game machine 14 wherein the cartridge 40 (Figure 1) is not inserted in any of them. The both portable game machines 12 receive the program data downloaded from the video game machine 14 by a manner similarly to the foregoing explanation. Accordingly, it is possible in this embodiment to play the common network game on a plurality of portable game machines 12. In this case, because the portable
25 game machines 12 execute the same program, the program for the portable game

machines 12 can be easily unified in version. This eliminates the inconvenience in using different versions of cartridges for the respective portable game machine as encountered in the conventional.

Incidentally, in the above embodiment, the video game machine was shown as
5 "another game machine". However, "another game machine" in the invention may be a game machine to use an information storage medium storing an auxiliary program (authentication code, message data, download program, etc. shown in Figure 4(B)), including various game machines, such as portable game machines, stand-alone video game machines, etc. It is noted that the "information storage medium" herein means an
10 arbitrary medium capable of physically or electronically storing information, such as CD-ROM, semiconductor ROM, semiconductor RAM, hard disks, memory cards and cartridges, besides the DVD-ROM in the embodiment.

Figure 10 shows an embodiment using a portable game machine as "another game machine" as mentioned above. This embodiment uses, as an "information storage
15 medium", a cartridge 40 incorporating a semiconductor memory. A portable game machine 12A loaded with the cartridge 40 is used as a master machine or "another game machine". Another portable game machine 12B not loaded with a cartridge 40 receives the transfer of a program from the master portable game machine 12A. Consequently, it is possible to play the same communication battle game programmed in the one cartridge
20 40 (one-cartridge play), on all the (four, in this embodiment) portable game machines 12A and 12B.

In the embodiment of Figure 10, the cartridge 40 on the master portable game machine 12A incorporates a ROM. The ROM 74 includes, as shown in Figure 11, three program storage areas 74a1, 74a2 and 72a3.

25 On the program storage area 74a1 is stored a main program and master

communication battle game processing program. This main program includes a providing program for transferring programs or graphics data from the master portable game machine onto the slave portable game machine. The master communication battle game processing program is a program to be executed by the CPU 66 of the master portable game machine 12A for processing a communication battle game.

The program storage area 74a2 in the ROM 74 stores an auxiliary program. In this embodiment, the auxiliary program is a demonstrative screen display processing program. The demonstrative screen display processing program is a program for executing demonstrative screen display shown in Figure 13, as hereinafter referred. That is, the demonstrative screen display processing program is a program for displaying a demonstrative screen for allowing the game player on the slave portable game machine 12B to know a program transfer state by images and/or sound until the program transfer has been completed from the master portable game machine 12A to the slave portable game machine 12B. The demonstrative screen display processing program is transferred from the master portable game machine 12A to the slave portable game machine 12B.

Also, the program storage area 74a3 stores a slave communication battle game processing program to be transferred similarly to the slave portable game machine 12B. The slave communication battle game processing program is a program for processing the relevant communication battle game by the CPU 66 of the slave portable game machine 12B, similarly to the master communication battle game processing program in the above game program storage area 74a1.

Incidentally, the work RAM 70 of the master portable game machine 12A is appropriately utilized by the CPU 66 (Figure 2) of the master portable game machine 12A. Also, the boot ROM 72 of the master portable game machine stores a startup program as shown in Figure 3(A).

Furthermore, the work RAM 70 of the slave portable game machine 12B is utilized to store a demonstrative screen display processing program and slave communication battle game processing program to be transferred from the master portable game machine 12A. Also, the boot ROM 72 of the slave portable game machine 12B stores startup program as shown in Figure 3(A), similarly to the master portable game machine.

In the embodiment shown in Figure 10, the startup program stored in the boot ROM 72 (Figure 3(A)) is executed to detect a portable game machine loaded with a cartridge 40 that is to operate as a master portable game machine 12A. A portable game machine that cartridge is not loaded is detected to operate as a slave portable game machine 12B. The master portable game machine executes the operation shown in Figure 12(B) while the slave portable game machine executes the operation shown in Figure 12(A).

Specifically, the master portable game machine 12A loaded with the cartridge 40 in the first step S51 executes the main program in the program storage area 74a1 of the ROM 74 incorporated therein. The slave portable game machine 12B and the master portable game machine 12A in steps S52 and S53 execute negotiation with each other and establish a communication state using communication port 16 thus providing a state for bi-directional data transfer. Because of reception of program and data transfer from the master portable game machine 12A as hereinafter described according to the above negotiation, it is apparent that the step S52 serves as a transfer request or transfer request command from the slave portable game machine 12B to the master portable game machine 12A.

Incidentally, in the embodiment of Figure 10, a communication cable as shown in the Figure 1 embodiment is connected between the respective communication ports 16

(Figure 2) of the master portable game machine 12A and the slave portable game machine 12B. Consequently, the negotiation and data transfer between the master portable game machine 12A and the slave portable game machine 12B are made by the utilization of the communication ports 16 and a communication cable provided between them.

5 If a communicatably state is established as a result of the negotiation, the master portable game machine 12A in step S54 transfers (transfer 1) the demonstrative screen display processing program stored in the program storage area 74a2 (Figure 11) of the ROM 74 to the communication port 16 of the slave portable game machine 12B, and in step S55 transfers (transfer 2) the slave communication battle game processing program
10 stored in the program storage area 74a3 of the ROM 74 to the communication port 16 of the slave portable game machine 12A.

After the negotiation step S52, the slave portable game machine 12B in step S56 waits for the data to be transferred to its communication port 16. If it is detected in the step S56 that the data has been transferred to the communication port 16, (the CPU of) the
15 slave portable game machine 12B stores the data transferred to the communication port 16, i.e. the demonstrative screen display processing program, into the work RAM 70 (step S57) and, in step S58, starts the execution of the demonstrative screen display processing program stored in the work RAM 70. The demonstrative screen display processing program, for example, displays a demonstrative screen as shown in Figure 13.

20 Figure 13 shows a demonstrative screen. The demonstrative screen sequentially varies in display as shown in Figure 13(A) to Figure 13(D) during the period data transfer from the master portable game machine 12A to the slave portable game machine 12B. Furthermore, sound is outputted through the speaker 25 (Figure 2, Figure 10), as shown in Figure 13(A) to Figure 13(D), thereby knowing the game player on the slave portable
25 game machine 12B that data is under transfer.

The slave portable game machine 12B, in step S58 of FIG. 12, starts the execution of the demonstrative screen display processing program as shown in FIG. 13, and in the succeeding step S59, stores the slave communication battle game processing program transferred from the master portable game machine 12A to the communication port 16 in the step S55 onto the work
5 RAM 70 as shown in Figure 11. If it is determined in step S60 that the transfer of the slave communication battle game processing program is completed, in step S61 the execution of the demonstrative screen display processing program on the slave portable game machine 12B is ended at that time point.

The slave portable game machine 12B in step S62 executes the slave communication
10 battle game processing program. The master portable game machine 12A in step S63 executes the master communication battle game processing program. Due to this, a communication game can be played on multiple portable game machines using the cartridge 40 loaded in the master portable game machine.

While specific embodiments have been described and illustrated, such embodiments
15 should be considered illustrative only and not as limiting the invention as defined by the accompanying claims.

THE SUBJECT-MATTER OF THE INVENTION FOR WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED IS DEFINED AS FOLLOWS:

1. A portable handheld computing device comprising:
 - 5 a housing capable of being operated while being held in and supported by the hand, the housing adapted to receive an interchangeable memory cartridge;
 - a graphical liquid crystal display disposed on said housing;
 - a processor disposed within said housing and coupled to control the graphical information displayed on said display;
 - 10 a communications port coupled to said processor; and
 - a boot ROM disposed within said housing and coupled to said processor, the boot ROM including:
 - a routine for execution by said processor that allows the processor to receive and execute code blocks when no memory cartridge is received by said housing; and
 - 15 a reboot routine for execution by said processor, said reboot routine being performed repeatedly to allow the portable handheld computing device to receive multiple successive downloads of code for execution.
2. The portable handheld computing device as in claim 1 wherein the routine allows the
20 portable handheld computing device to receive a succession of appropriately sized blocks of executable code to be successively downloaded into and executed by the portable handheld computing device.
3. The portable handheld computing device as in claim 1 wherein the processor includes a
25 graphics engine that efficiently performs 2D video game display functions.

FIG. 1

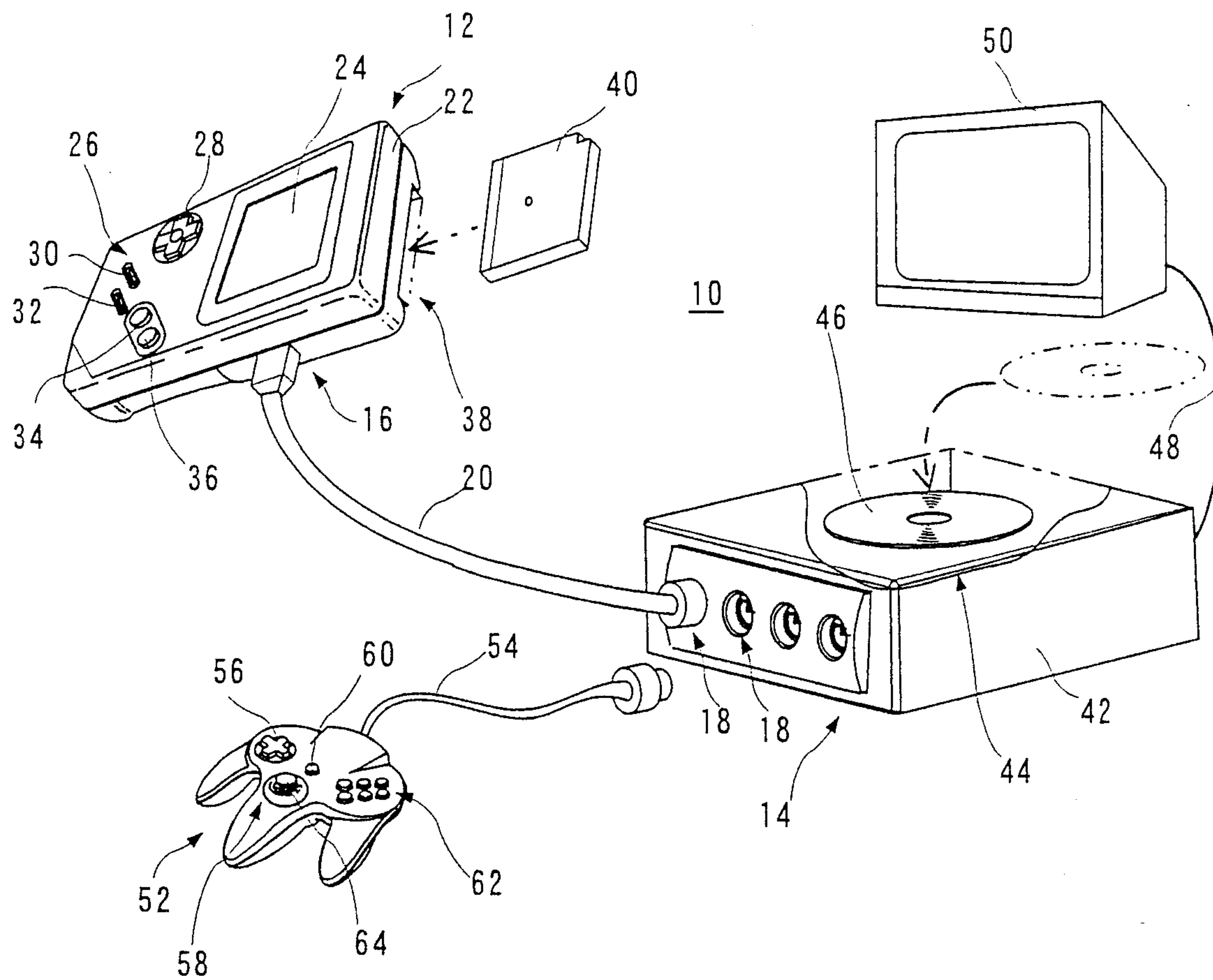


FIG. 2

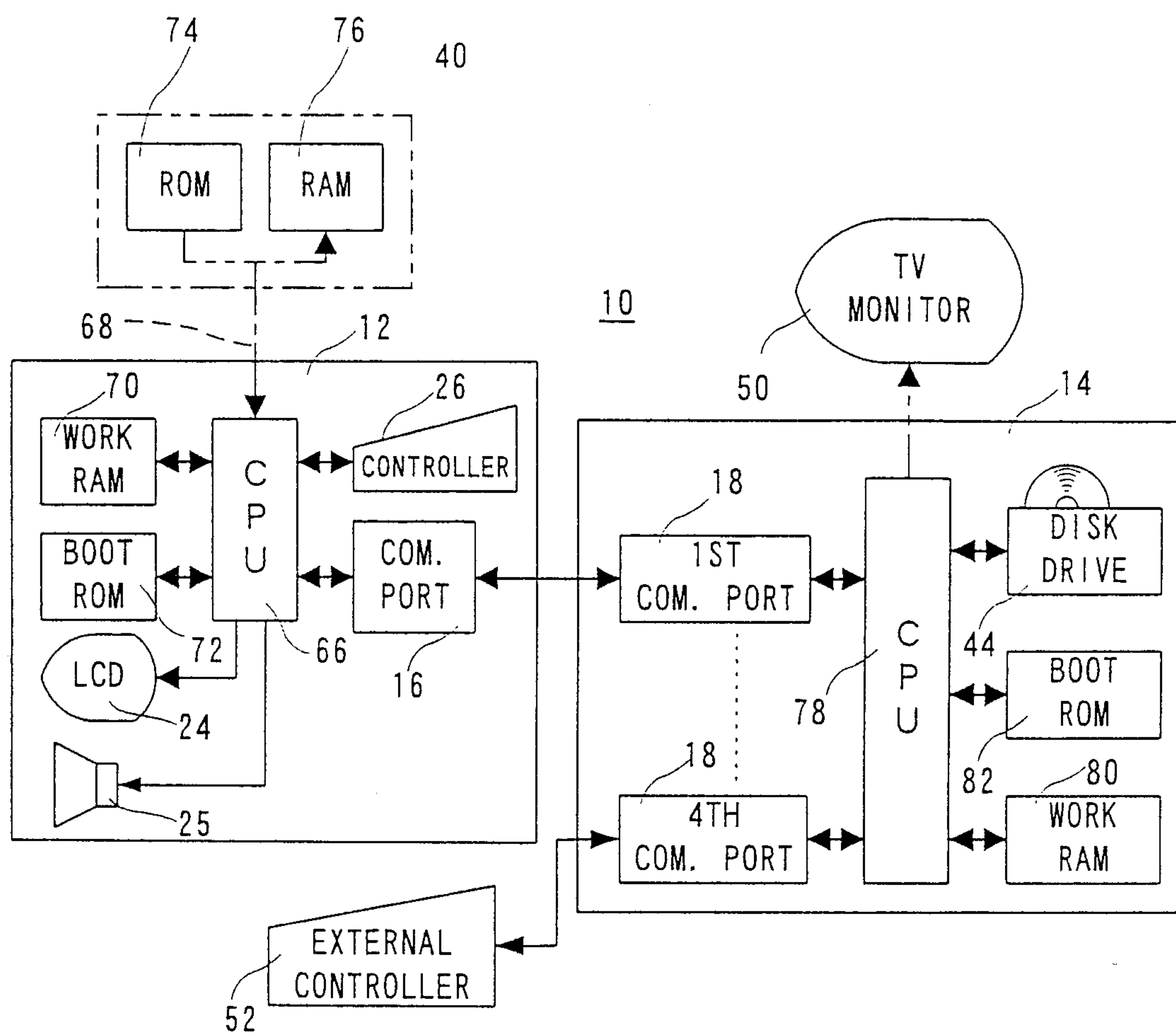


FIG. 3

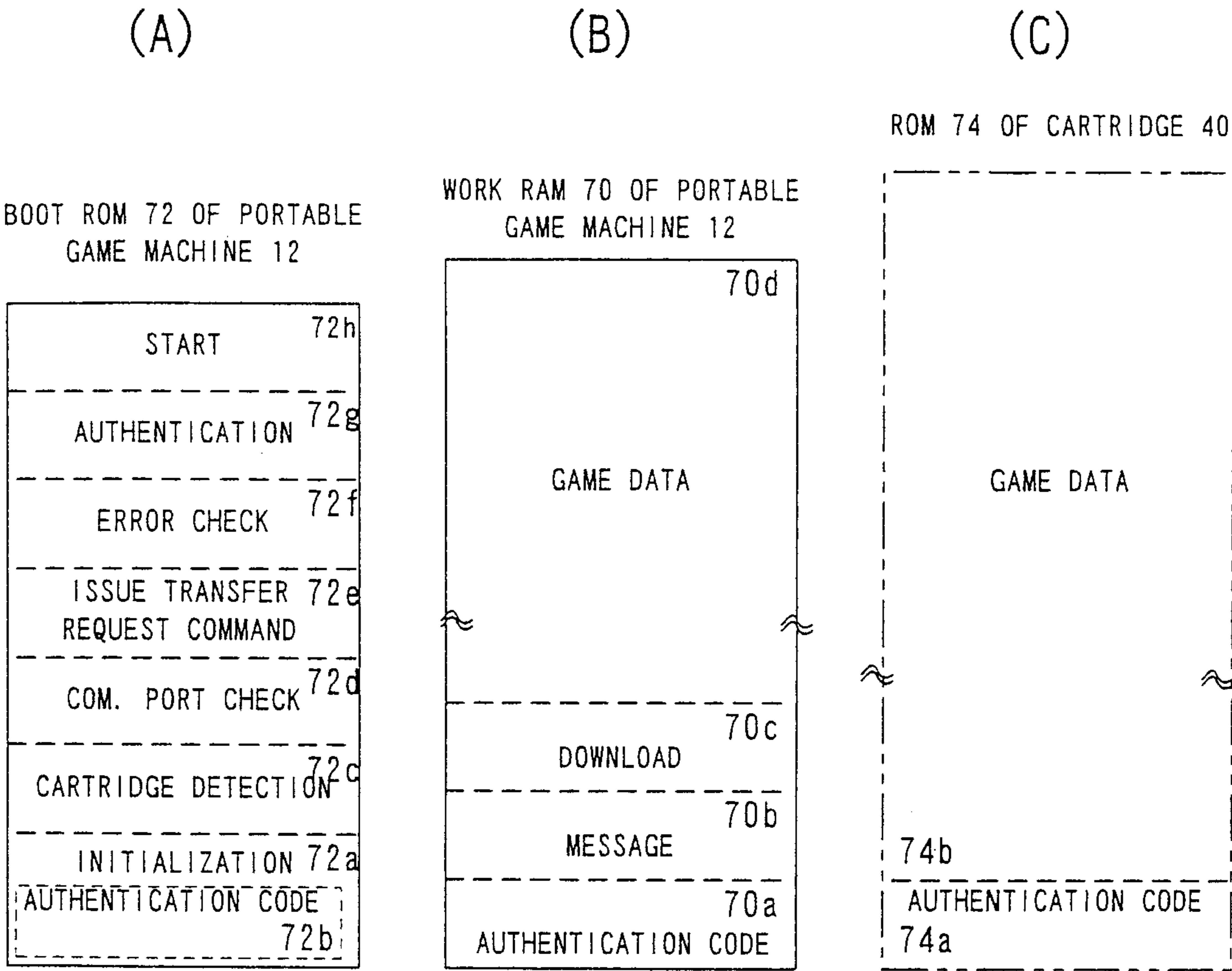


FIG. 4

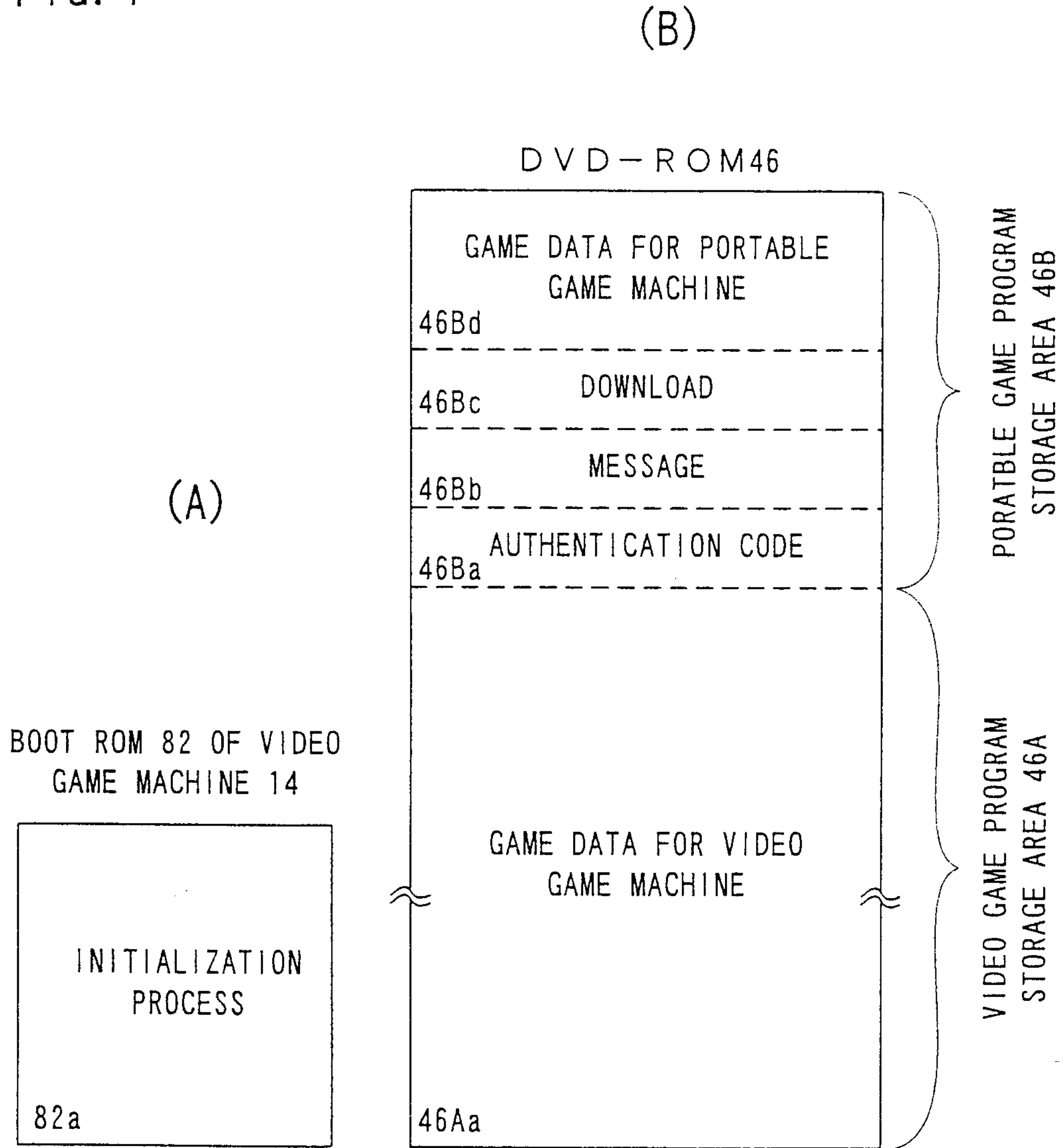


FIG. 5

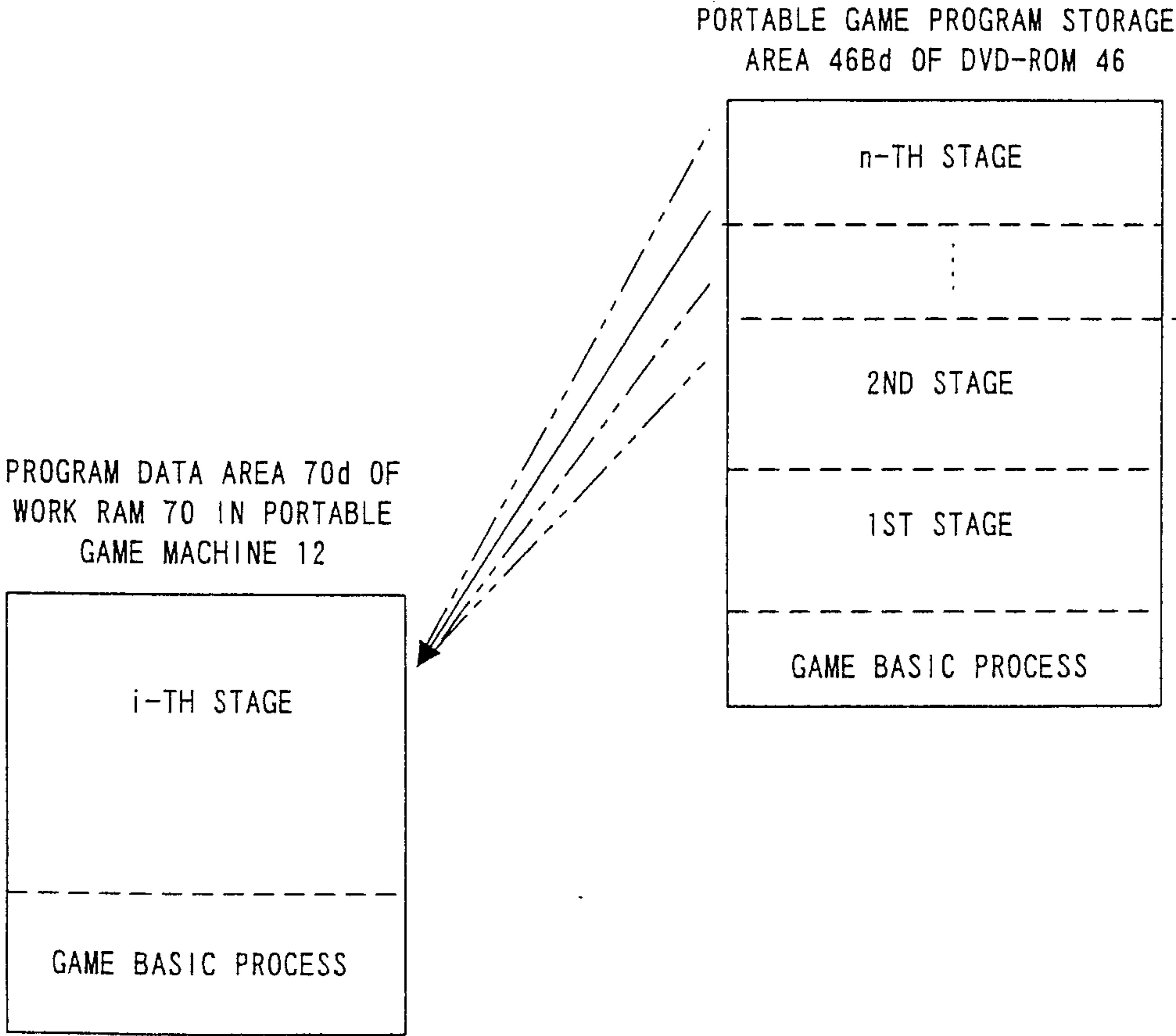


FIG. 6

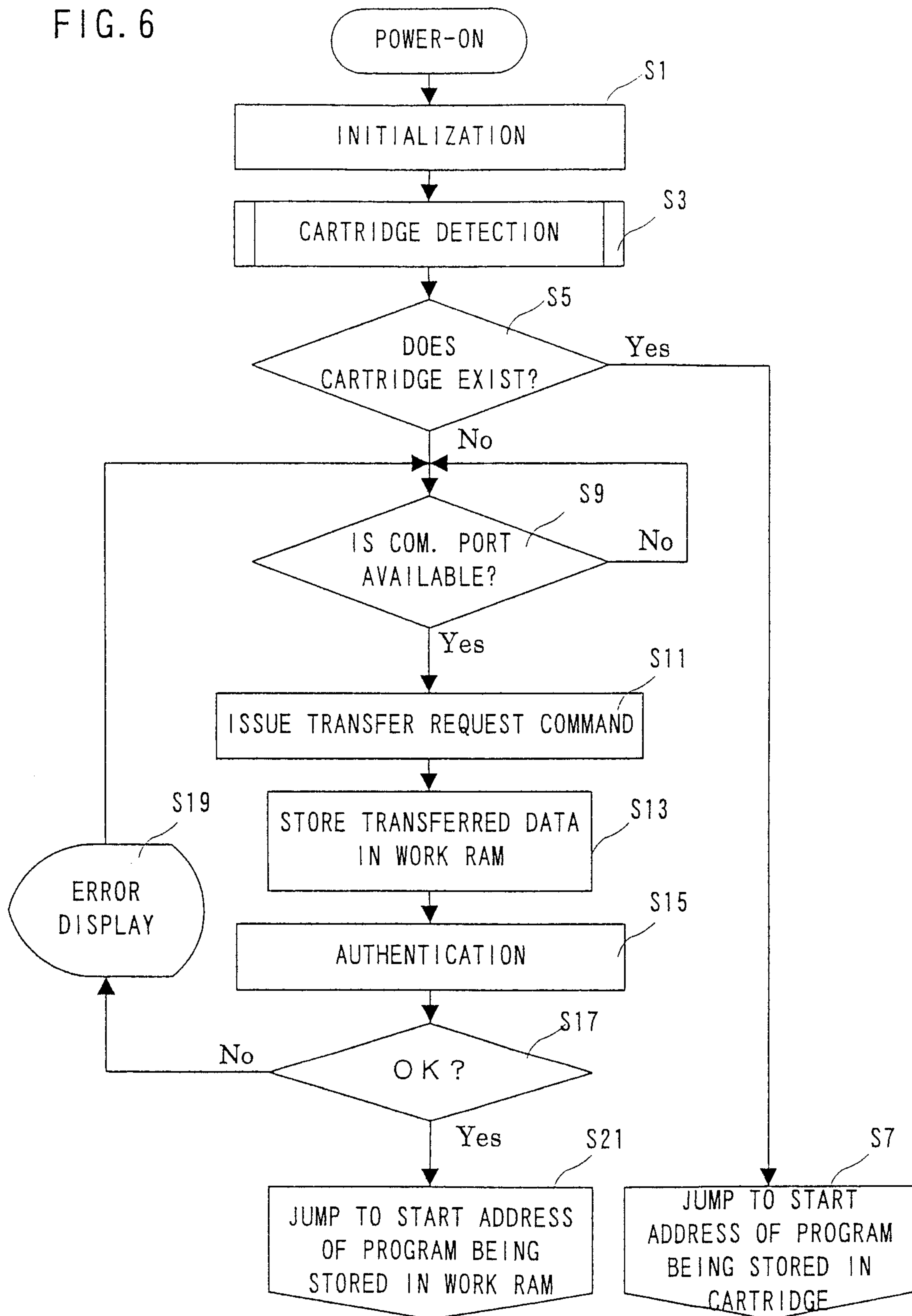


FIG. 7

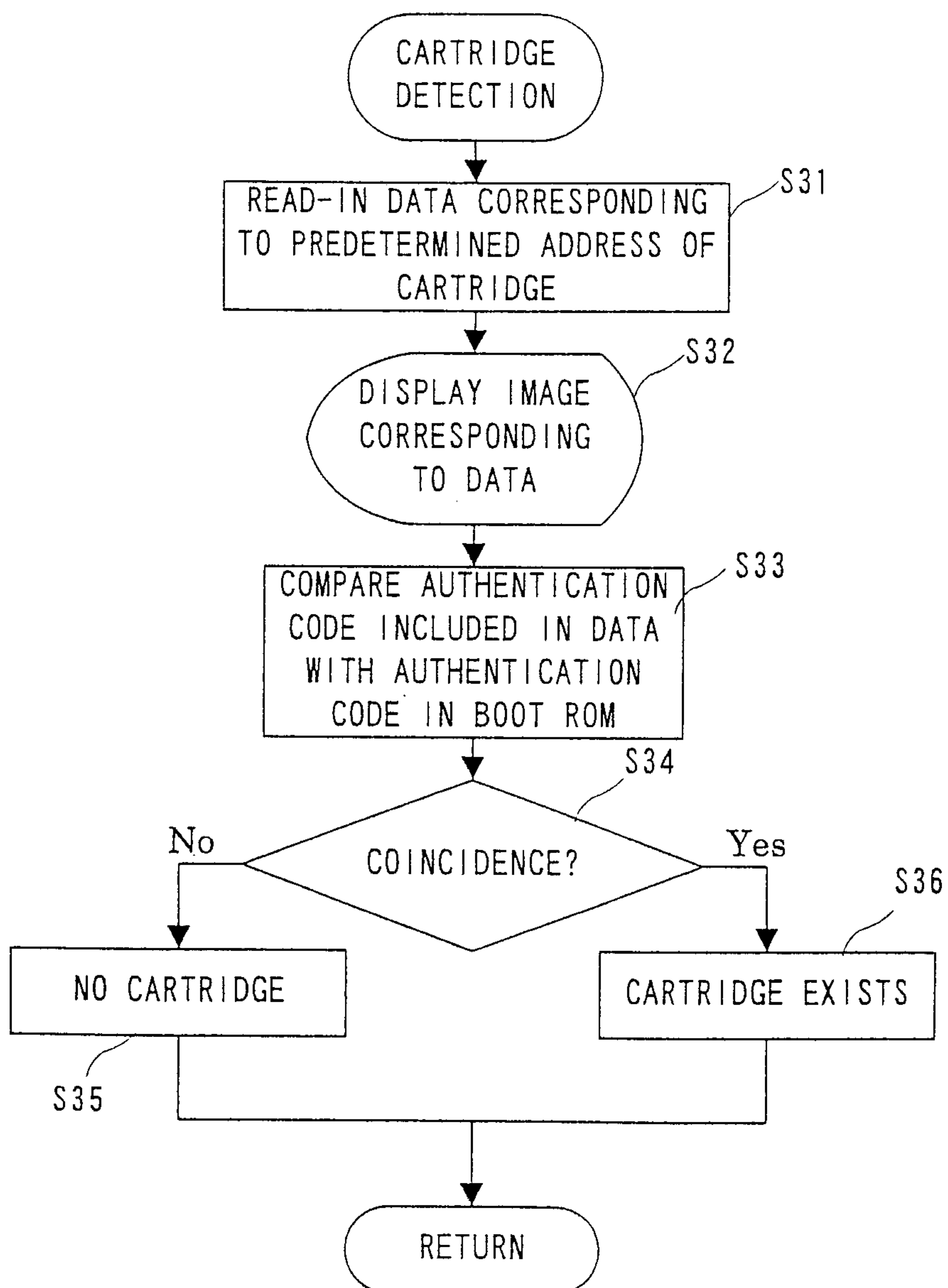


FIG. 8

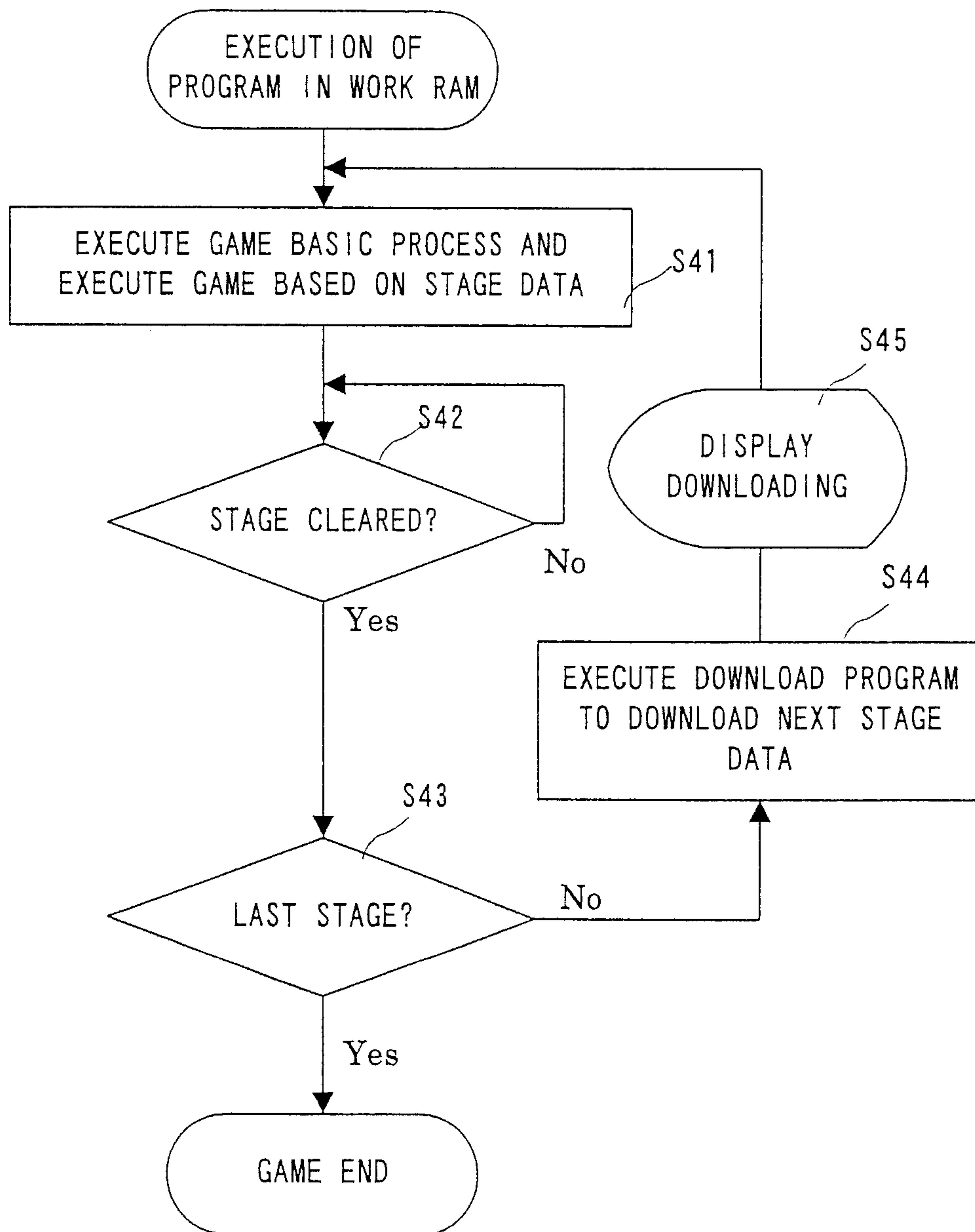


FIG. 9

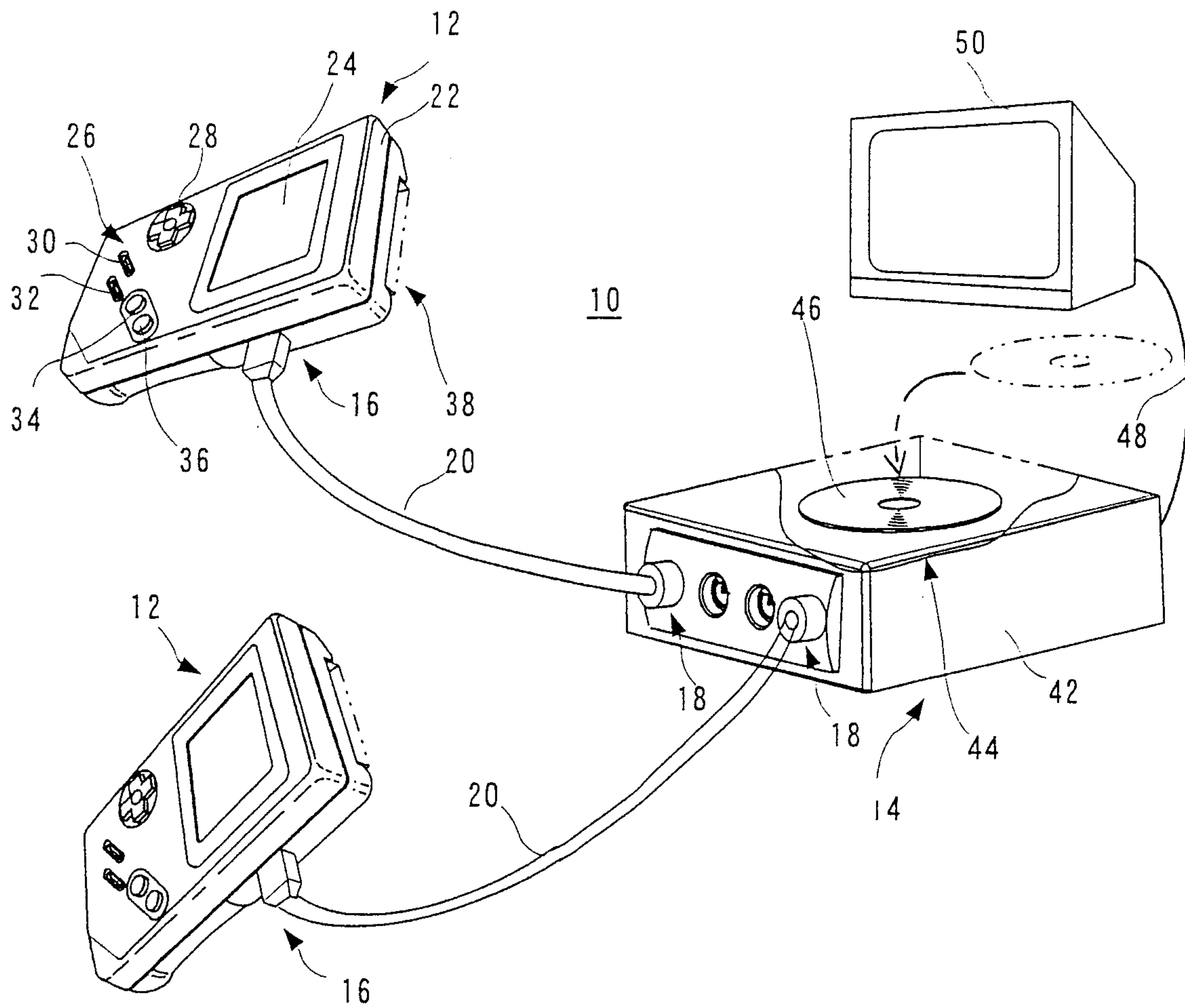


FIG. 10

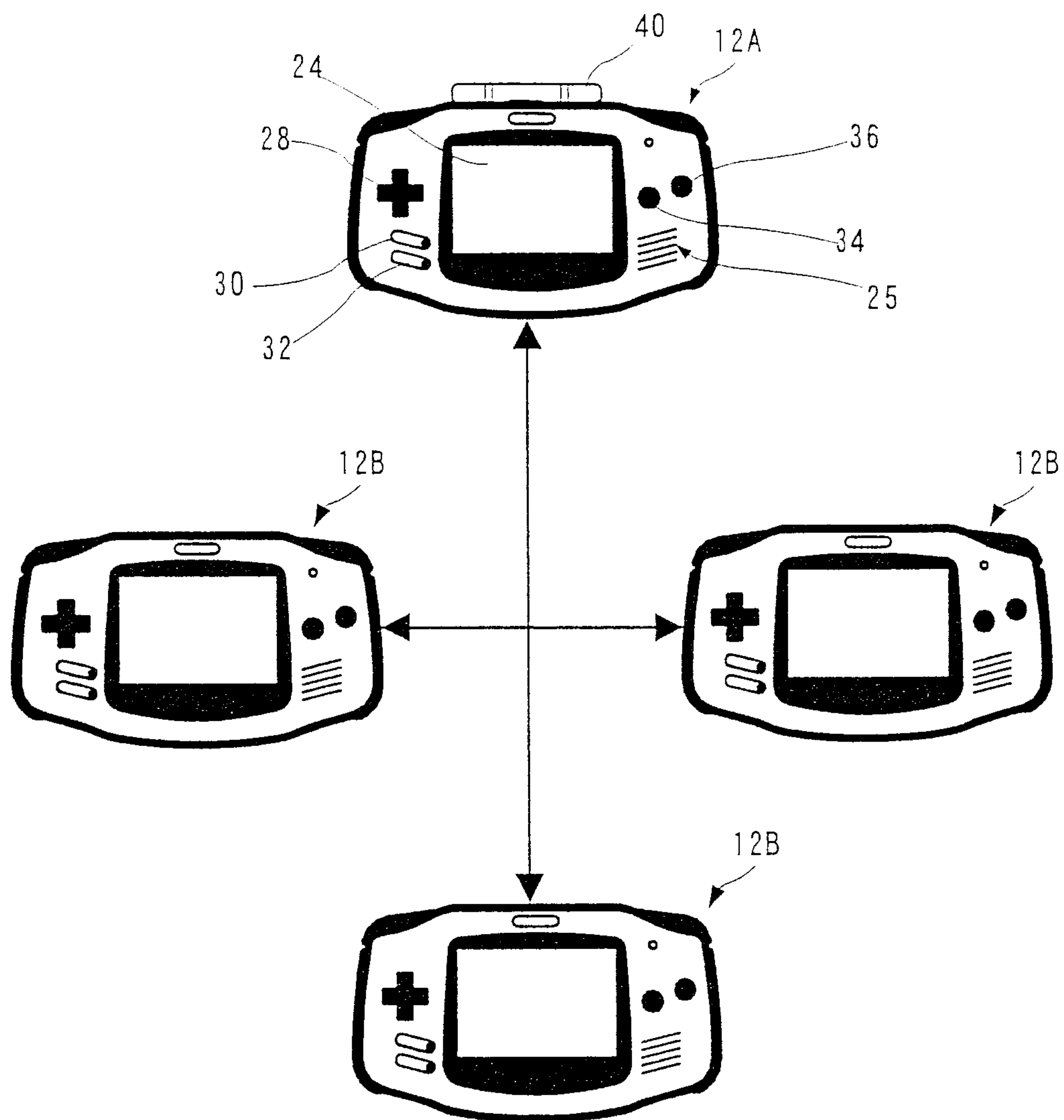


FIG. 11

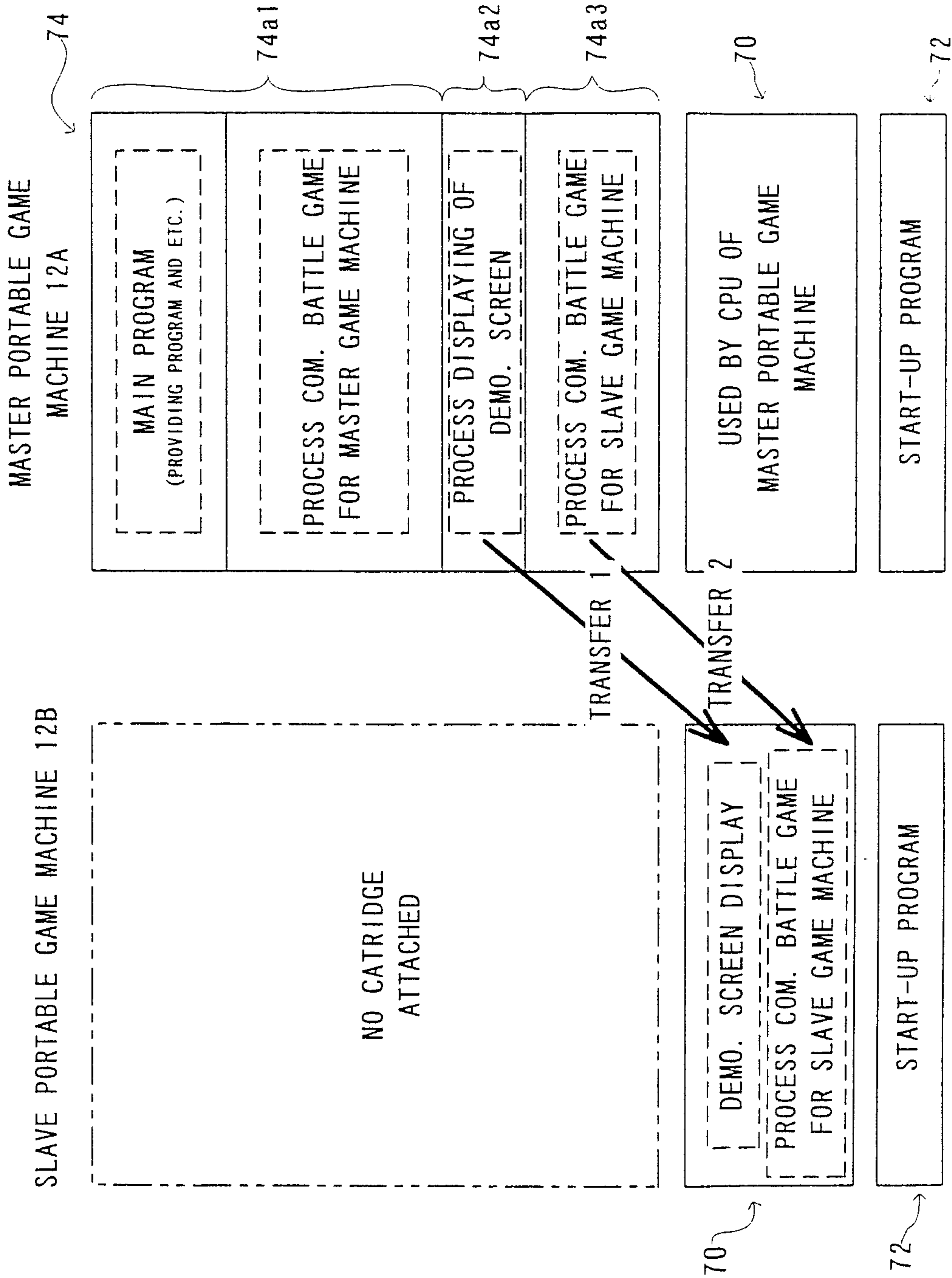


FIG. 12

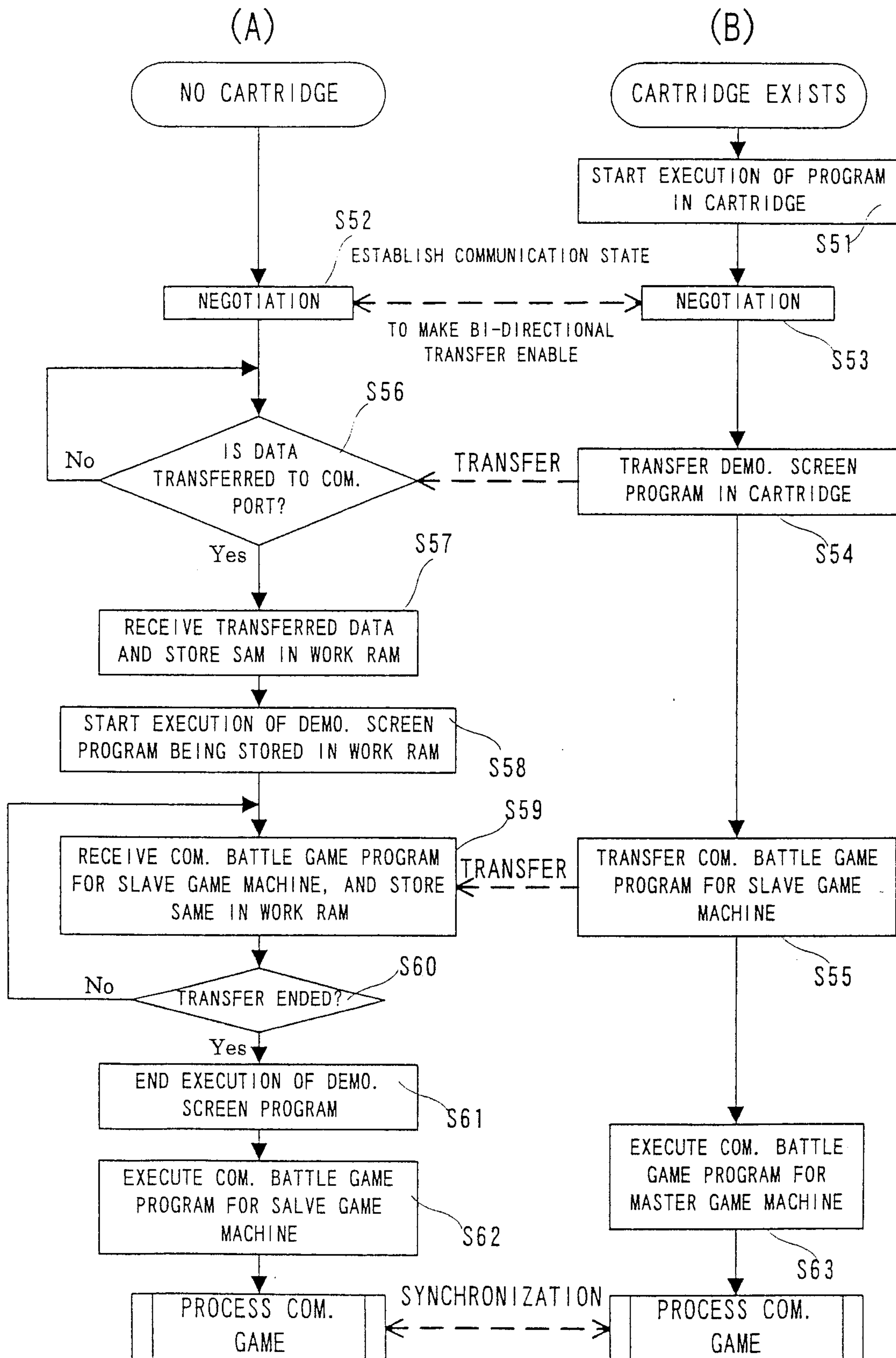


FIG. 13

