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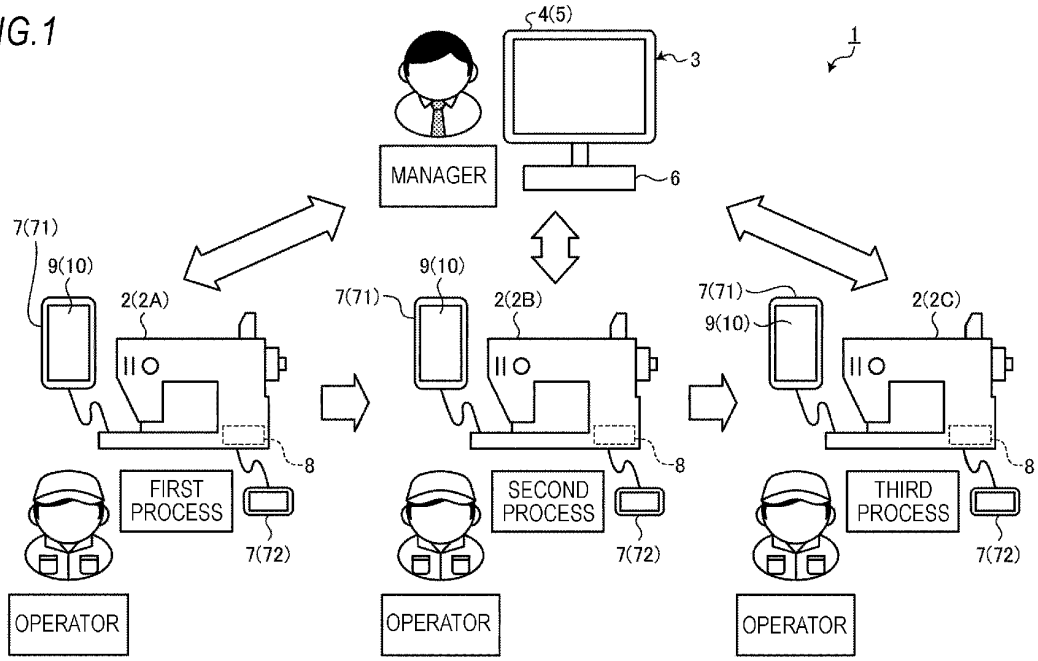
(54) **SEWING MACHINE AND SEWING MACHINE MANAGEMENT SYSTEM**

(57) The operability of an operation panel is improved. A sewing machine includes a plurality of operation panels, and a sewing machine controller configured to perform communication with each of the plurality of operation panels and receive operation data generated according to an operation on at least one of the operation panels to control a sewing machine operation part.

FIG.1

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## Description

TECHNICAL FIELD

**[0001]** A technique disclosed in the present specification relates to a sewing machine and a sewing machine management system.

BACKGROUND ART

**[0002]** In the technical field related to sewing machines, a sewing machine having an operation panel as disclosed in Patent Literature 1 is known.

CITATION LIST

PATENT LITERATURE

**[0003]** Patent Literature 1: JP2020-130767A

SUMMARY OF INVENTION

TECHNICAL PROBLEM

**[0004]** The operation conditions of the sewing machine are changed according to an operation on the operation panel by an operator of the sewing machine. There is a demand for improving the operability of the operation panel.

**[0005]** An object of the technique disclosed in the present specification is to improve the operability of an operation panel.

SOLUTION TO PROBLEM

**[0006]** The present specification discloses a sewing machine. The sewing machine includes a plurality of operation panels, and a sewing machine controller configured to perform communication with each of the plurality of operation panels and receive operation data generated according to an operation on at least one of the operation panels to control a sewing machine operation part.

ADVANTAGEOUS EFFECTS OF INVENTION

**[0007]** According to the technique disclosed in the present specification, the operability of the operation panel is improved.

BRIEF DESCRIPTION OF DRAWINGS

**[0008]**

FIG. 1 is a diagram schematically showing a sewing machine management system according to an embodiment.
FIG. 2 is a block diagram showing the sewing machine management system according to the embodiment.
FIG. 3 is a diagram showing a sewing machine according to the embodiment.
FIG. 4 is a flowchart illustrating an operation of the sewing machine according to the embodiment.
FIG. 5 is a diagram showing a login screen according to the embodiment.
FIG. 6 is a diagram showing an operation screen according to the embodiment.
FIG. 7 is a diagram illustrating a procedure for customizing the operation screen according to the embodiment.
FIG. 8 is a diagram illustrating an operation of a management apparatus according to the embodiment.
FIG. 9 is a diagram illustrating an operation authority according to the embodiment.
FIG. 10 is a diagram showing an operation of the sewing machine management system in a case where an error occurs in the sewing machine according to the embodiment.
FIG. 11 is a block diagram showing a computer system according to the embodiment.
FIG. 12 is a diagram showing a sewing machine according to another embodiment.
FIG. 13 is a diagram showing a sewing machine according to another embodiment.
FIG. 14 is a diagram showing a sewing machine according to another embodiment.
FIG. 15 is a diagram schematically showing a sewing machine management system according to another embodiment.

DESCRIPTION OF EMBODIMENTS

**[0009]** Hereinafter, while an embodiment according to the present technique will be described with reference to the drawings, the present technique is not limited to the embodiment. Components of the embodiment described below can be suitably combined. Furthermore, some components may not be used.

Sewing Machine Management System

**[0010]** FIG. 1 is a diagram schematically showing a sewing machine management system 1 according to the embodiment. FIG. 2 is a block diagram showing the sewing machine management system 1 according to the embodiment. The sewing machine management system 1 includes a management apparatus 3 that manages a sewing machine 2. The sewing machine 2 is installed in a sewing factory. The sewing machine 2 operates in the sewing factory. The sewing machine 2 is an industrial sewing machine. A plurality of sewing machines 2 are installed in the sewing factory. A sewing target object is stitched with a thread by the sewing machine 2, so that a sewn product is produced. An

example of the sewing target object is a cloth. An example of the sewn product is clothes. The management apparatus 3 is installed in the same facility as the facility where the sewing machine 2 is installed. That is, the management apparatus 3 is installed in the sewing factory.

**[0011]** In the sewing factory, sewn products are produced by the plurality of sewing machines 2. In the sewing factory, a plurality of kinds of sewing machines 2 according to purposes are installed. In the sewing factory, a plurality of kinds of sewing machines 2 are installed to correspond to a plurality of processes for producing sewn products. Examples of the kind of the sewing machine 2 include a lockstitch sewing machine that seams a body part, a sewing machine for button attachment that attaches buttons to the body part, and a sewing machine for pocket attachment that attaches pockets to the body part. In one sewing factory, a large number of sewing machines 2 of many kinds are installed. To simplify the description, in FIG. 1, three sewing machines 2 are shown. A first sewing machine 2Ais used in a first process for producing a sewn product. A second sewing machine 2B is used in a second process for producing a sewn product. A third sewing machine 2C is used in a third process for producing a sewn product. In the sewing factory, a plurality of sewing machines 2 of one kind may be installed.

**[0012]** In the sewing factory, a manager and an operator work. The manager manages the operator and the sewing machine 2. The operator operates the sewing machine 2 to perform sewing processing. The manager and the operator are users of the sewing machine 2. The number of managers may be one or may be plural. The number of operators may be plural or may be one. For example, one operator may operate a plurality of sewing machines 2.

**[0013]** The management apparatus 3 has a display device 4, an input device 5, and a management controller 6. The display device 4 displays display data. The display device 4 includes a flat panel display such as a liquid crystal display or an organic EL display. The input device 5 generates input data according to an operation by the manager. The input device 5 may be operated by the operator. The input device 5 includes a touch panel (touch sensor) disposed on a display screen of the display device 4. The input device 5 may be a keyboard for a computer, may be a mouse, or may be a voice input device. The management controller 6 includes a computer system. The management controller 6 has at least one processor, and a main memory that stores a computer program executable by the processor.

**[0014]** The sewing machine 2 has a plurality of operation panels 7 and a sewing machine controller 8. The operation panel 7 includes a display device 9, an operation device 10, and a microcomputer 11. The display device 9 includes a flat panel display such as a liquid crystal display or an organic EL display. The operation device 10 generates operation data according to an operation by the operator. The operation device 10 may be operated by the manager. The operation device 10 includes a touch panel (touch sensor) disposed on a display screen of the display device 9. The operation device 10 may be a keyboard for a computer, may be a mouse, or may be a voice operation device. The microcomputer has at least one processor, and a main memory that stores a computer program executable by the processor. The sewing machine controller 8 includes a computer system. The sewing machine controller 8 has at least one processor, and a main memory that stores a computer program executable by the processor.

**[0015]** The sewing machine controller 8 is able to perform communication with each of the plurality of operation panels 7. The sewing machine controller 8 of the first sewing machine 2A is able to perform communication with each of the plurality of operation panels 7 of the first sewing machine 2A. The sewing machine controller 8 of the second sewing machine 2B is able to perform communication with each of the plurality of operation panels 7 of the second sewing machine 2B. The sewing machine controller 8 of the third sewing machine 2C is able to perform communication with each of the plurality of operation panels 7 of the third sewing machine 2C.

**[0016]** In the example shown in FIG. 1, one sewing machine 2 has two operation panels 7. The operation panels 7 provided in the sewing machine 2 include a first operation panel 71 and a second operation panel 72 having an external shape smaller than that of the first operation panel 71.

**[0017]** The sewing machine controller 8 and the operation panel 7 are connected via a cable. The sewing machine controller 8 and the operation panel 7 perform communication via the cable. That is, the sewing machine controller 8 and the operation panel 7 perform wired communication. The sewing machine controller 8 and the operation panel 7 may perform wireless communication.

**[0018]** The sewing machine controller 8 receives operation data generated according to an operation on at least one operation panel 7 among the plurality of operation panels 7 connected to the sewing machine controller 8 to control a sewing machine operation part. Examples of the sewing machine operation part include a sewing machine motor of the sewing machine 2, and a needle bar and a thread take-up lever that operate with power generated by the sewing machine motor.

**[0019]** The management apparatus 3 is shared by a plurality of sewing machines 2 in the sewing factory. The number of management apparatuses 3 may be smaller than the number of sewing machines 2. The management apparatus 3 is able to perform communication with each of the plurality of sewing machines 2. The management controller 6 of the management apparatus 3 performs communication with the sewing machine controller 8 of the sewing machine 2. The management controller 6 and the sewing machine controller 8 perform wireless communication. The management controller 6 and the sewing machine controller 8 perform wireless commu-

nication via a local area network (LAN). An example of the wireless LAN is Wifi (Registered Trademark). The management controller 6 and the sewing machine controller 8 may perform wireless communication via a personal area network (PAN). An example of the wireless PAN is Bluetooth (Registered Trademark).

**[0020]** The management controller 6 transmits a control command to the sewing machine controller 8 of at least one sewing machine 2 based on input data generated according to an operation on the input device 5.

**[0021]** The sewing machine controller 8 transmits sewing machine data to the management controller 6. The sewing machine data includes setting data of the sewing machine 2 and work data of the sewing machine 2. The setting data of the sewing machine 2 includes set values of operation conditions of the sewing machine 2. The set values of the operation conditions of the sewing machine 2 include a seam length, a seam pitch, a seam pattern, a feeding speed of a sewing target object, the number of stitches, tension of a thread, and pressing pressure of the sewing target object. The work data of the sewing machine 2 includes a work history of the sewing machine 2. The work history of the sewing machine 2 includes at least one of work date and time of the sewing machine 2, a continuous work time of the sewing machine 2, a cumulative work time of the sewing machine 2, the kind of a sewing target object sewn by the sewing machine 2, the number of stitches during sewing, occurred warning or error information, and the operator who operates the sewing machine 2.

**[0022]** The management controller 6 collects the sewing machine data of each of the plurality of sewing machines 2. The management controller 6 displays the sewing machine data of each of the plurality of sewing machines 2 on the display device 4. The management controller 6 displays the collected sewing machine data on the display device 9 of the operation panel 7.

**[0023]** A Web browser 12 as first software is installed on each of the microcomputers 11 of the plurality of operation panels 7. A Web server 13 as second software is installed on the sewing machine controller 8. The operator accesses the Web server 13 via the Web browser 12 installed on the operation panel 7. The Web server 13 provides a Web page screen as an operation screen to the Web browser 12 based on a request from the Web browser 12. The Web page screen as an operation screen is displayed on the display device 9 of the operation panel 7. The operator can operate the sewing machine 2 by operating the operation screen displayed on the display device 9 of the operation panel 7.

**[0024]** The Web browser 12 installed on the microcomputer 11 of the operation panel 7 is Web browser application software (computer program). The Web server 13 installed on the sewing machine controller 8 is application software (computer program) that provides the operation screen of the operation panel 7 of the sewing machine 2 to the Web browser 12 based on a request from the Web browser 12 installed on the microcomputer 11 of the operation panel 7. The Web server 13 receives operation data generated according to an operation on the operation screen in the operation panel 7.

**[0025]** The sewing machine controller 8 outputs a control command for controlling the sewing machine 2 based on the operation data from the Web server 13. The sewing machine controller 8 controls the sewing machine operation part based on the operation data.

**[0026]** The sewing machine controller 8 monitors the operation conditions of the sewing machine 2. The operation conditions of the sewing machine 2 include a seam length, a seam pitch, a seam pattern, a feeding speed of a sewing target object, the number of stitches, tension of a thread, and pressing pressure of the sewing target object. The sewing machine 2 is provided with a sensor that detects the operation conditions of the sewing machine 2. Examples of the sensor include a tension sensor that detects the tension of the thread, and a pressing pressure sensor that detects the pressing pressure of the sewing target object. The sewing machine controller 8 can monitor the operation conditions of the sewing machine 2 by acquiring detection data of the sensor. The sewing machine 2 has a sewing machine motor that operates a needle bar and a thread take-up lever. The sewing machine controller 8 can monitor the operation conditions of the sewing machine 2 by acquiring a drive signal of the sewing machine motor. The sewing machine controller 8 stores the monitored operation conditions of the sewing machine 2. The operation conditions of the sewing machine 2 stored in the sewing machine controller 8 include present state operation conditions and historical operation conditions. The present state operation conditions indicate present operation conditions of the sewing machine 2. The historical operation conditions indicate past operation conditions of the sewing machine 2.

**[0027]** The Web server 13 transmits parameters indicating the operation conditions of the sewing machine 2 monitored by the sewing machine controller 8 to the operation panel 7. The operation panel 7 transmits operation data to the Web server 13. The operation data for operating the sewing machine 2 includes a motor control command, a parameter change command, and a sewing machine operation mode change command of the sewing machine 2.

Sewing Machine

**[0028]** FIG. 3 is a diagram showing the sewing machine 2 according to the embodiment. The sewing machine 2 is a so-called lockstitch sewing machine. As shown in FIG. 3, the sewing machine 2 is installed on a sewing machine table 22. The sewing machine 2 has a sewing machine frame 23.

**[0029]** The sewing machine frame 23 has an arm 23A, a bed 23B, a base 23C, and a head 23D. The arm 23A is long in a right-left direction. The bed 23B is disposed below the arm 23A. The bed 23B is long in the right-left

direction. The bed 23B faces the arm 23A. The base 23C connects a right end portion of the arm 23A and the bed 23B. The base 23C is long in an up-down direction. The head 23D is provided in a left end portion of the arm 23A. The head 23D protrudes downward from the left end portion of the arm 23A.

**[0030]** The sewing machine 2 includes a needle bar 25, a thread take-up lever 26, a throat plate 27, a presser 28, a thread tensioner 29, a feed dog 30, and a sewing machine motor 31.

**[0031]** The needle bar 25 retains a sewing machine needle 24. The needle bar 25 reciprocates in the up-down direction. The needle bar 25 is supported by the head 23D. The sewing machine needle 24 has a threading hole through which a needle thread passes. The sewing machine needle 24 retains the needle thread on an inner surface of the threading hole. The needle bar 25 reciprocates in the up-down direction, so that the sewing machine needle 24 reciprocates in the up-down direction in a state of retaining the needle thread.

**[0032]** The thread take-up lever 26 supplies the needle thread to the sewing machine needle 24. The thread take-up lever 26 reciprocates in the up-down direction. The thread take-up lever 26 is supported by the arm 23A. The thread take-up lever 26 reciprocates in the up-down direction in a state of retaining the needle thread. The thread take-up lever 26 has a retention hole through which the needle thread passes. The thread take-up lever 26 retains the needle thread on an inner surface of the retention hole. The thread take-up lever 26 feeds the needle thread or pulls up the needle thread for use in sewing the sewing target object by reciprocating in the up-down direction.

**[0033]** The throat plate 27 is disposed below the needle bar 25. The throat plate 27 supports the sewing target object from below. The throat plate 27 supports the sewing target object below the needle bar 25. The sewing machine needle 24 retained by the needle bar 25 and the throat plate 27 face each other. The throat plate 27 has a needle hole through which the sewing machine needle 24 is able to pass. The sewing machine needle 24 passing through the sewing target object supported by the throat plate 27 passes through the needle hole. A shuttle is disposed below the throat plate 27. The shuttle supplies a bobbin thread to the sewing target obj ect.

**[0034]** The presser 28 presses the sewing target object supported by the throat plate 27 from above. The presser 28 is disposed in at least a part of the periphery of the sewing machine needle 24. The presser 28 is supported by the head 23D. The presser 28 is able to move in the up-down direction.

**[0035]** The thread tensioner 29 applies tension to the needle thread supplied to the sewing machine needle 24 between the thread take-up lever 26 and the needle bar 25. The thread tensioner 29 is supported by the head 23D.

**[0036]** The feed dog 30 operates to feed the sewing target object supported by the throat plate 27 to the front. The feed dog 30 feeds the sewing target object to the front by moving according to a prescribed feeding locus. The feed dog 30 is disposed below the throat plate 27. The feed dog 30 partially protrudes out from an opening provided in the throat plate 27 by moving according to the feeding locus. In feeding the sewing target object, at least a part of the feed dog 30 protrudes upward from an upper surface of the throat plate 27 via the opening provided in the throat plate 27.

**[0037]** The sewing machine motor 31 generates power for operating each of the needle bar 25, the feed dog 30, and the shuttle. The sewing machine motor 31 generates power for causing the needle bar 25 to reciprocate in the up-down direction. The sewing machine motor 31 generates power for rotating the shuttle. The sewing machine motor 31 generates power for moving the feed dog 30 according to the feeding locus. The sewing machine motor 31 includes a pulse motor. The sewing machine motor 31 is supported by a right portion of the arm 23A.

**[0038]** The second operation panel 72 is disposed at a position closer to the sewing machine needle 24 than the first operation panel 71. In the example shown in FIG. 3, the first operation panel 71 is disposed in the arm 23A. The first operation panel 71 is disposed such that a longitudinal direction of the first operation panel 71 and the right-left direction match each other. The second operation panel 72 is disposed on a left side of the bed 23B on the sewing machine table 22. The second operation panel 72 is disposed such that a longitudinal direction of the second operation panel 72 and a front-back direction match each other.

**[0039]** The first operation panel 71 may be disposed such that the longitudinal direction of the first operation panel 71 and the up-down direction match each other. The second operation panel 72 may be disposed such that the longitudinal direction of the second operation panel 72 and the right-left direction match each other.

Operation

**[0040]** FIG. 4 is a flowchart illustrating the operation of the sewing machine 2 according to the embodiment. FIG. 4 illustrates a procedure in which the operator operates the sewing machine 2 via the operation panel 7.

**[0041]** The operator inputs identification data of the sewing machine 2 scheduled to be operated to the microcomputer 11 via the operation device 10 to operate the sewing machine 2 via the operation panel 7. In a case where different ID addresses are given to the plurality of sewing machines 2 as the identification data of the sewing machine 2, the operator inputs the IP address with the operation device 10 (touch panel). The microcomputer 11 acquires the identification data of the sewing machine 2 from the operation device 10 (Step SA1). The Web browser 12 transmits a request to the Web server 13 based on the identification data from the operation device 10. The Web browser 12 requests the Web server 13 to provide the login screen (Step SA2).

**[0042]** The Web server 13 provides the login screen to the Web browser 12 based on the request from the Web browser 12 (Step SB1).

**[0043]** FIG. 5 is a diagram showing a login screen 100 according to the embodiment. As described above, in the sewing factory, a plurality of sewing machines 2 are provided to correspond to a plurality of processes for producing sewn products. The Web server 13 provides the login screen 100 for selecting a specific process from the plurality of processes to the Web browser 12. The microcomputer 11 displays the login screen 100 provided to the Web browser 12 on the display device 9 (Step SA3).

**[0044]** As shown in FIG. 5, the login screen 100 includes an input space 49 of a login ID, a login button 50, a first symbol 51 indicating a process A that is a first process, a second symbol 52 indicating a process B that is a second process, a third symbol 53 indicating a check that is a third process, and a fourth symbol 54 indicating adjustment that is a fourth process.

**[0045]** The operator operates the operation device 10 to select a process scheduled to be performed using the sewing machine 2 from the first, second, third, and fourth processes. For example, in a case where the process A that is the first process is selected, the operator inputs a login ID corresponding to the process A to the input space 49, and then taps the login button 50. With this, login data for logging in to the process A is generated as input data. The microcomputer 11 acquires the login data generated according to the operation on the login screen 100 from the operation device 10 (Step SA4). The Web browser 12 transmits a request to the Web server 13 based on the login data from the operation device 10. The Web browser 12 requests the Web server 13 to provide the operation screen (Step SA5).

**[0046]** The Web server 13 provides an operation screen 200 to the Web browser 12 based on the request from the Web browser 12 generated according to the operation on the login screen 100. The Web server 13 provides the operation screen 200 to the Web browser 12 based on the process A (Step SB2).

**[0047]** FIG. 6 is a diagram showing the operation screen 200 according to the embodiment. The Web server 13 provides the operation screen 200 that is displayed on the display device 9 of the operation panel 7, to the Web browser 12. The Web browser 12 receives the operation screen 200 from the Web server 13. The microcomputer 11 displays the operation screen 200 provided to the Web browser 12 on the display device 9 (Step SA6).

**[0048]** As shown in FIG. 6, the operation screen 200 includes a symbol 90 for specifying the process A, a movable screen 60, and a fixed screen 80. The movable screen 60 is flipped according to an operation of a screen movement button 67 or a screen movement button 68. The movable screen 60 includes a pattern list symbol 61, a counting symbol 62 indicating the number of reciprocations of the sewing machine needle, a stitch shape symbol 63 indicating a selected stitch shape, a selection button 64 enabling or disabling a start bar tacking function, a selection button 65 enabling or disabling an end bar tacking function, and a sewing pitch button 66 for selecting a sewing pitch. The fixed screen 80 includes a thread cutting symbol 81 indicating the number of times of thread cutting and a bobbin symbol 82 indicating the number of times of bobbin replacement.

**[0049]** The operator operates the operation device 10 to select the operation conditions of the sewing machine 2. The microcomputer 11 acquires operation data generated according to the operation on the operation screen 200 from the operation device 10 (Step SA7). The Web browser 12 transmits the operation data from the operation device 10 generated according to the operation on the operation screen 200 to the Web server 13 (Step SA8).

**[0050]** The Web server 13 transmits the operation data from the Web browser 12 of the operation panel 7 to the sewing machine controller 8. The operation data is transmitted from the operation panel 7 to the sewing machine controller 8 via the Web server 13. The sewing machine controller 8 controls the sewing machine 2 based on the operation data (Step SB3).

Customization of Operation Screen

**[0051]** The Web server 13 can customize the operation screen 200 based on a process for producing sewn products. The Web server 13 can provide the operation screen 200 suitable for the process A, the operation screen 200 suitable for the process B, the operation screen 200 suitable for the check, and the operation screen 200 suitable for adjustment, for example.

**[0052]** FIG. 7 is a diagram illustrating a procedure for customizing the operation screen 200 according to the embodiment. In customizing the operation screen 200, a screen 300 for customization is displayed on the operation panel 7. The operator operates the operation panel 7 on which the screen for customization is displayed. Customization data generated according to the operation on the operation panel 7 is transmitted to the Web server 13. The Web server 13 receives the customization data generated according to the operation on the operation panel 7. The Web server 13 customizes the operation screen 200 based on the customization data. The Web server 13 provides the customized operation screen 200 to the Web browser 12.

**[0053]** For example, in the operation screen 200 of the second operation panel 72, the operation screen 200 may be customized in such a manner that only the feeding speed of the sewing target object and the seam pitch are displayed.

Management Apparatus

**[0054]** FIG. 8 is a diagram illustrating the operation of the management apparatus 3 according to the embodi-

ment. The sewing machine data of each of the plurality of sewing machines 2 is transmitted to the management apparatus 3. The management controller 6 of the management apparatus 3 displays the sewing machine data of each of the plurality of sewing machines 2 on the display device 4. The management controller 6 may display the sewing machine data of each of the plurality of sewing machines 2 on each of the plurality of operation panels 7.

**[0055]** The manager can operate the input device 5 to customize the operation screens 200 of the plurality of operation panels 7 in a lump or individually. That is, the management controller 6 can customize the operation screens 200 of the operation panel 7 in a lump or individually based on the customization data generated according to the operation of the input device 5.

**[0056]** The management controller 6 can set an operation authority to the management apparatus 3 and the operation panel 7 based on authority setting data generated according to an operation on at least one of the input device 5 and the operation panel 7.

**[0057]** FIG. 9 is a diagram illustrating an operation authority according to the embodiment. For example, in a case where an operation authority is set to the management apparatus 3, that is, in a case where an operation of the management apparatus 3 is set to be given priority over an operation of the operation panel 7, when the management apparatus 3 is operated such that the feeding speed of the sewing target object becomes a first value, the feeding speed of the sewing target object is set to the first value even when the operation panel 7 is operated such that the feeding speed of the sewing target object becomes a second value. That is, the sewing machine controller 8 controls the sewing machine 2 such that the feeding speed of the sewing target object becomes the first value.

Operation in case where error occurs in sewing machine

**[0058]** FIG. 10 is a diagram showing the operation of the sewing machine management system 1 in a case where an error occurs in the sewing machine 2 according to the embodiment. In a case where a first error occurs, first warning data indicating the occurrence of the first error may be displayed on the display device 4 of the management apparatus 3, and in a case where a second error occurs, second warning data indicating the occurrence of the second error may be displayed on the display device 9 of the operation panel 7. The first warning data is not displayed on the display device 4 of the operation panel 7. The first warning data may be displayed on both the display device 4 of the management apparatus 3 and the display device 9 of the operation panel 7. The second warning data is not displayed on the display device 4 of the management apparatus 3. The second warning data may be displayed on both the display device 9 of the operation panel 7 and the display device 4 of the management apparatus 3.

**[0059]** In a case where the first error is a severe error that requires the maintenance of the sewing machine 2, the first warning data is displayed on the management apparatus 3, so that the manager can recognize that the first error occurs in the sewing machine 2. In a case where the second error is a minor error such as thread cutting, the second warning data is displayed on the operation panel 7, so that the operator can recognize that the second error occurs in the sewing machine 2.

Computer System

**[0060]** FIG. 11 is a block diagram showing a computer system 1000 according to the embodiment. Each of the management controller 6, the sewing machine controller 8, and the microcomputer 11 described above includes the computer system 1000. The computer system 1000 has a processor 1001 such as a central processing unit (CPU), a main memory 1002 including a non-volatile memory such as a read only memory (ROM) and a volatile memory such as a random access memory (RAM), a storage 1003, and an interface 1004 including an input/output circuit. The functions of each of the management controller 6, the sewing machine controller 8, and the microcomputer 11 are stored as a computer program in the storage 1003. The processor 1001 reads out the computer program from the storage 1003, loads the computer program on the main memory 1002, and executes the above-described processing according to the computer program. The computer program may be distributed to the computer system 1000 via a network.

Effects

**[0061]** As described above, the sewing machine 2 according to the embodiment includes a plurality of operation panels 7, and the sewing machine controller 8 configured to perform communication with each of the plurality of operation panels 7 and receive operation data generated according to an operation on at least one operation panel 7 to control the sewing machine operation part.

**[0062]** According to the embodiment, since the plurality of operation panels 7 are provided in the sewing machine 2, the operability of the operation panel 7 is improved. For example, the set value such as the feeding speed of the sewing target object or the seam pitch that is likely to be frequently changed is displayed or operated on the second operation panel 72 disposed close to the hand of the operator, so that the operability of the operation panel 7 is improved. Since the dimension of the external shape of the second operation panel 72 is small, obstruction of the work of the operator is suppressed.

**[0063]** In the embodiment, the Web server 13 installed on the sewing machine controller 8 provides the operation screen of the operation panel 7 to the Web browser 12 based on the request from the Web browser 12 installed on the operation panel 7. The Web server 13

receives the operation data generated according to the operation on the operation panel 7 to control the sewing machine operation part of the sewing machine 2. According to the embodiment, even though many applications are not installed on the operation panel 7, the sewing machine 2 is operated via the operation panel 7 and the Web server 13.

Another Embodiment

**[0064]** Each of FIGS. 12, 13, and 14 is a diagram showing a sewing machine 2 according to another embodiment. As shown in FIG. 12, the first operation panel 71 may be disposed in a right portion of the sewing machine table 22. The second operation panel 72 may be disposed between the throat plate 27 on the sewing machine table 22 and the operator. As shown in FIG. 13, the first operation panel 71 may be disposed on the base 23C. The second operation panel 72 may be disposed in a left portion of the head 23D. As shown in FIG. 14, the second operation panel 72 may be disposed in a right portion of the head 23D.

**[0065]** FIG. 15 is a diagram schematically showing a sewing machine management system 1 according to another embodiment. As shown in FIG. 15, the Web browser 12 may be installed on a portable terminal 500 such as a smartphone or a tablet personal computer. The Web browser 12 may be installed on a wearable terminal 600 such as a smartwatch.

**[0066]** In the above-described embodiment, the set values of each of the plurality of sewing machines 2 may be changed according to an operation on one operation panel 7.

**[0067]** In the above-described embodiment, the Web browser 12 as first software is installed on each of the microcomputers 11 of the plurality of operation panels 7, and the Web server 13 as second software is installed on the sewing machine controller 8. A client as first software may be installed on each of the microcomputers 11 of the plurality of operation panels 7, and a server as second software may be installed on the sewing machine controller 8. The client installed on the microcomputer 11 of the operation panel 7 is application software (computer program). The server installed on the sewing machine controller 8 is application software (computer program) that provides the operation screen of the operation panel 7 of the sewing machine 2 to the client based on a request from the client installed on the microcomputer 11 of the operation panel 7.

**[0068]** That is, the sewing machine management system 1 may be constructed with a client/server system. A server that implements communication with another protocol may be constructed on the sewing machine controller 8, and a client system corresponding to the server may be mounted on the operation panel 7.

REFERENCE SIGNS LIST

**[0069]**

1: sewing machine management system
2: sewing machine
2A: first sewing machine
2B: second sewing machine
2C: third sewing machine
3: management apparatus
4: display device
5: input device
6: management controller
7: operation panel
8: sewing machine controller
9: display device
10: operation device
11: microcomputer
12: Web browser
13: Web server
22: sewing machine table
23: sewing machine frame
23A: arm
23B: bed
23C: base
23D: head
24: sewing machine needle
25: needle bar
26: thread take-up lever
27: throat plate
28: presser
29: thread tensioner
30: feed dog
31: sewing machine motor
49: input space
50: login button
51: first symbol
52: second symbol
53: third symbol
54: fourth symbol
59: symbol
60: movable screen
61: pattern list symbol
62: counting symbol
63: stitch shape symbol
64: selection button
65: selection button
66: sewing pitch button
67: screen movement button
68: screen movement button
71: first operation panel
72: second operation panel
80: fixed screen
81: thread cutting symbol
82: bobbin symbol
100: login screen
200: operation screen
300: screen for customization

500: portable terminal
600: wearable terminal
1000: computer system
1001: processor
1002: main memory
1003: storage
1004: interface.

## Claims

**1.** A sewing machine comprising:

a plurality of operation panels; and
a sewing machine controller configured to: perform communication with each of the plurality of operation panels; and receive operation data generated according to an operation on at least one of the operation panels to control a sewing machine operation part.

**2.** The sewing machine according to claim 1, wherein

first software is installed on each of the plurality of operation panels,
second software is installed on the sewing machine controller, and
the second software provides an operation screen to the first software based on a request from the first software.

**3.** The sewing machine according to claim 2, wherein

the first software is a Web browser, and
the second software is a Web server.

**4.** The sewing machine according to claim 3, wherein the Web server receives customization data generated according to an operation on the operation panel to provide an operation screen customized based on the customization data to the Web browser.

**5.** The sewing machine according to claim 3, wherein

the operation panel includes a first operation panel and a second operation panel having an external shape smaller than that of the first operation panel, and
the second operation panel is disposed at a position closer to a sewing machine needle than the first operation panel.

**6.** The sewing machine according to claim 2, wherein

the first software is a client, and
the second software is a server.

**7.** A sewing machine management system comprising:

a management apparatus configured to manage the sewing machine according to claim 1,
wherein the management apparatus includes an input device, and a management controller configured to perform communication with each of a plurality of the sewing machines and transmit a control command to at least one of the sewing machines based on input data generated according to an operation on the input device.

**8.** The sewing machine management system according to claim 7, wherein

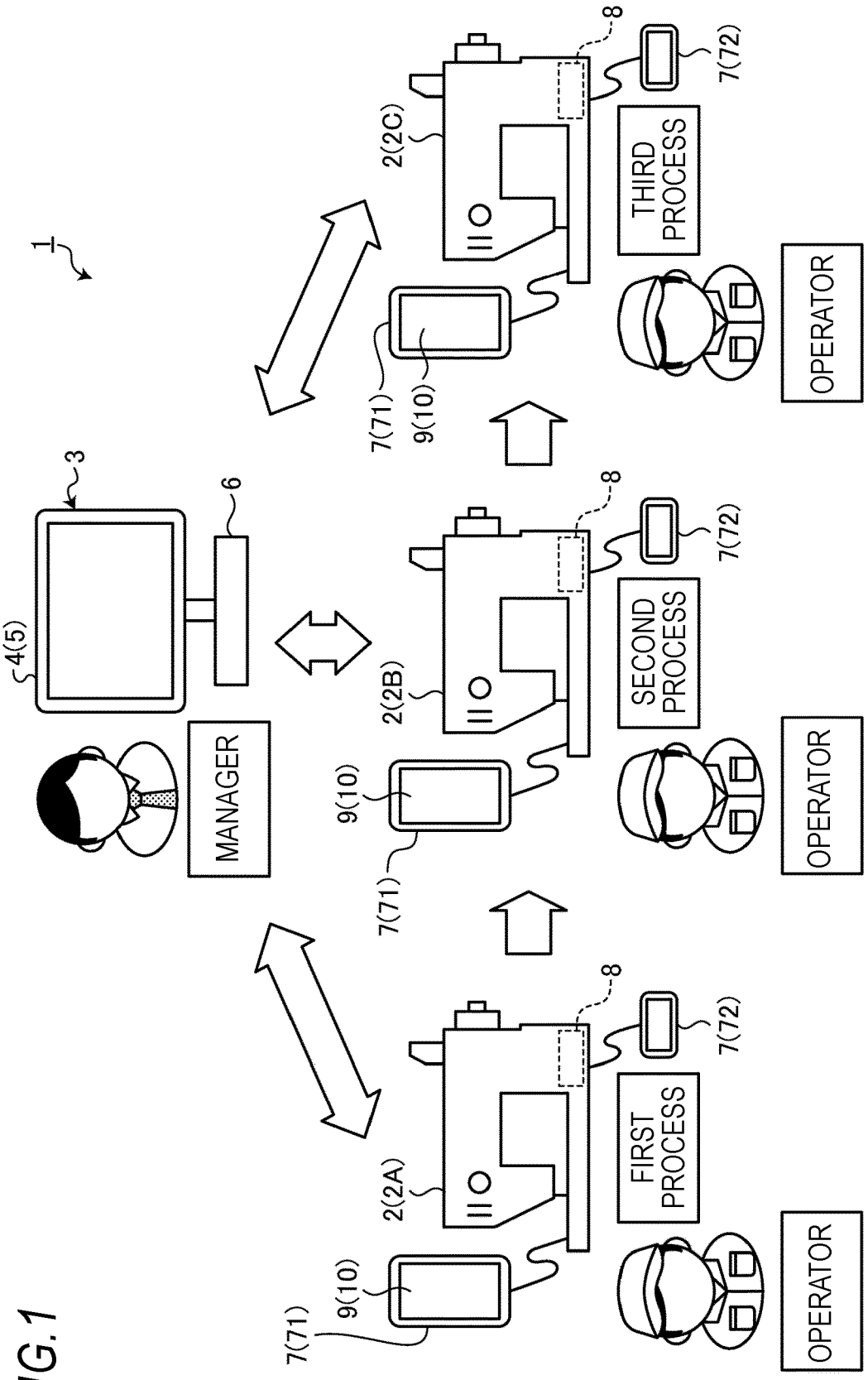
the management apparatus includes a display device, and
the management controller displays sewing machine data of each of the plurality of sewing machines on the display device.

**9.** The sewing machine management system according to claim 8,
wherein the management controller displays the sewing machine data on the operation panel.

**10.** The sewing machine management system according to claim 8,
wherein the management controller customizes an operation screen of the operation panel based on customization data generated according to an operation on the input device.

**11.** The sewing machine management system according to claim 7,
wherein the management controller sets an operation authority to the management apparatus and the operation panel based on authority setting data generated according to an operation on at least one of the input device and the operation panel.

FIG.1


1
3
4(5)
6
MANAGER
2(2A)
2(2B)
2(2C)
7(71)
9(10)
8
7(72)
FIRST PROCESS
SECOND PROCESS
THIRD PROCESS
OPERATOR

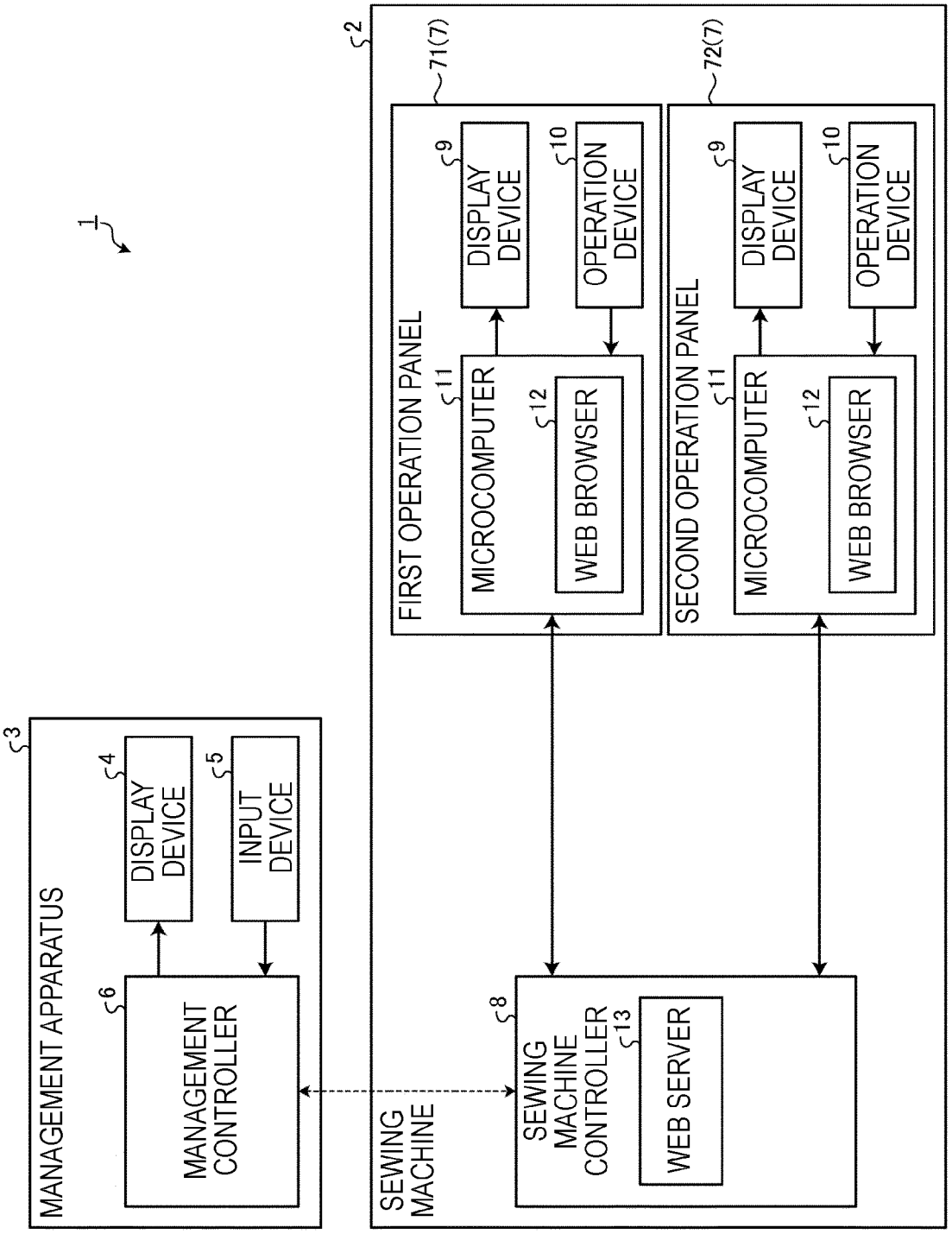

1
2
3
MANAGEMENT APPARATUS
4
DISPLAY DEVICE
5
INPUT DEVICE
6
MANAGEMENT CONTROLLER
SEWING MACHINE
8
SEWING MACHINE CONTROLLER
13
WEB SERVER
71(7)
FIRST OPERATION PANEL
9
DISPLAY DEVICE
10
OPERATION DEVICE
11
MICROCOMPUTER
12
WEB BROWSER
72(7)
SECOND OPERATION PANEL
9
DISPLAY DEVICE
10
OPERATION DEVICE
11
MICROCOMPUTER
12
WEB BROWSER

FIG.2

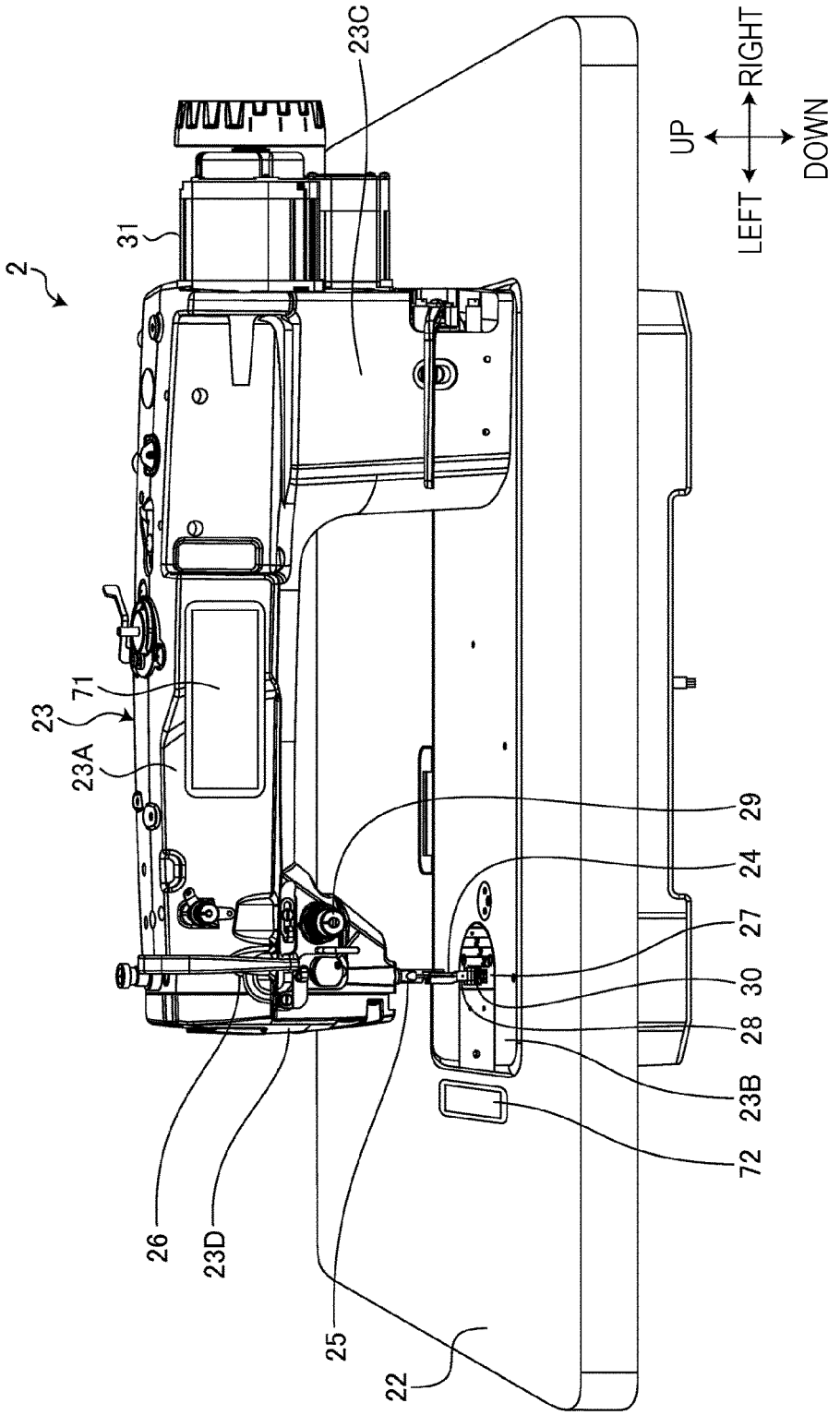

2
31
23C
UP
RIGHT
LEFT
DOWN
23
71
23A
29
24
27
30
28
23B
72
26
23D
25
22

FIG.3

FIG.4

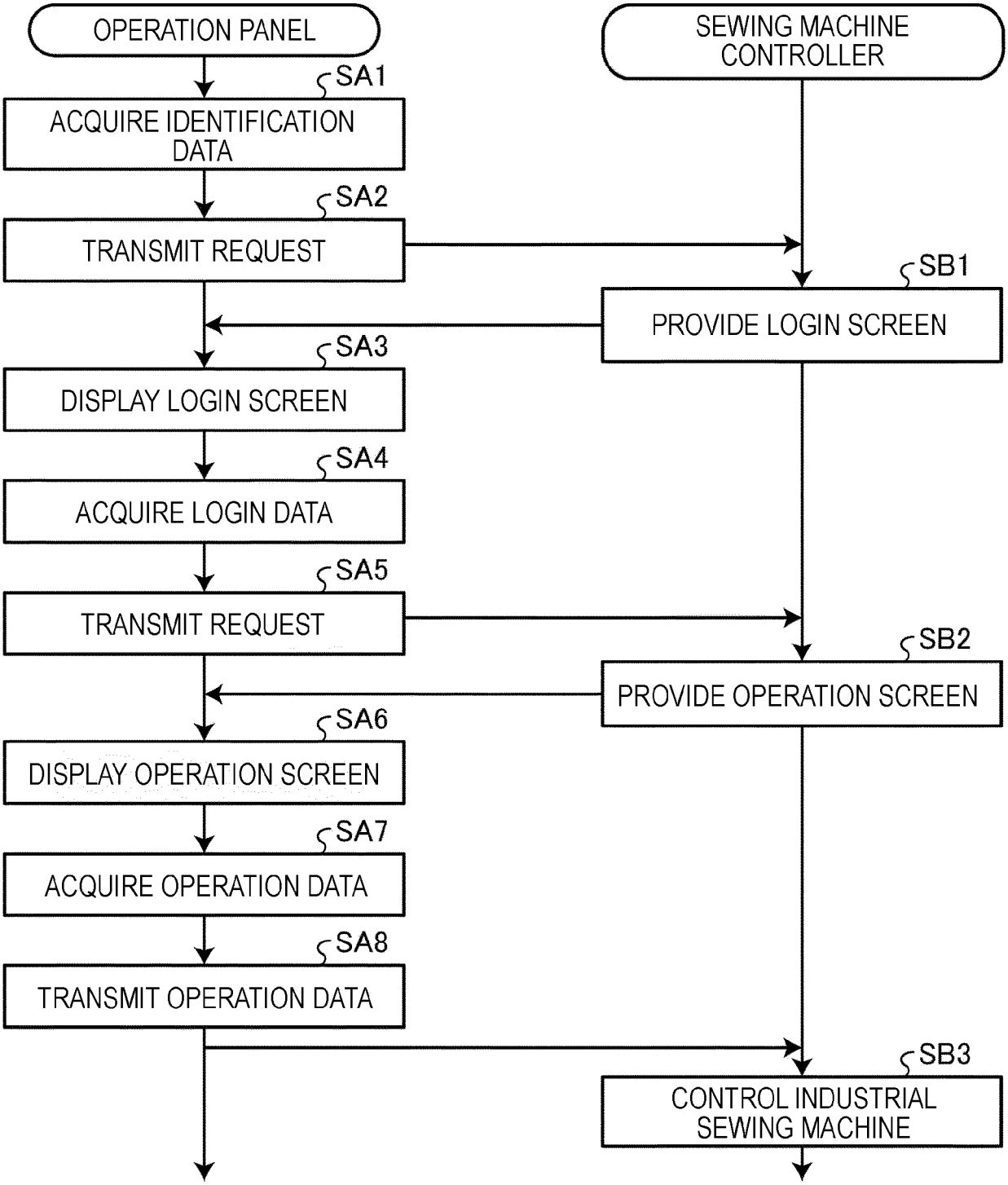

OPERATION PANEL
SEWING MACHINE CONTROLLER
SA1
ACQUIRE IDENTIFICATION DATA
SA2
TRANSMIT REQUEST
SB1
PROVIDE LOGIN SCREEN
SA3
DISPLAY LOGIN SCREEN
SA4
ACQUIRE LOGIN DATA
SA5
TRANSMIT REQUEST
SB2
PROVIDE OPERATION SCREEN
SA6
DISPLAY OPERATION SCREEN
SA7
ACQUIRE OPERATION DATA
SA8
TRANSMIT OPERATION DATA
SB3
CONTROL INDUSTRIAL SEWING MACHINE

FIG.5

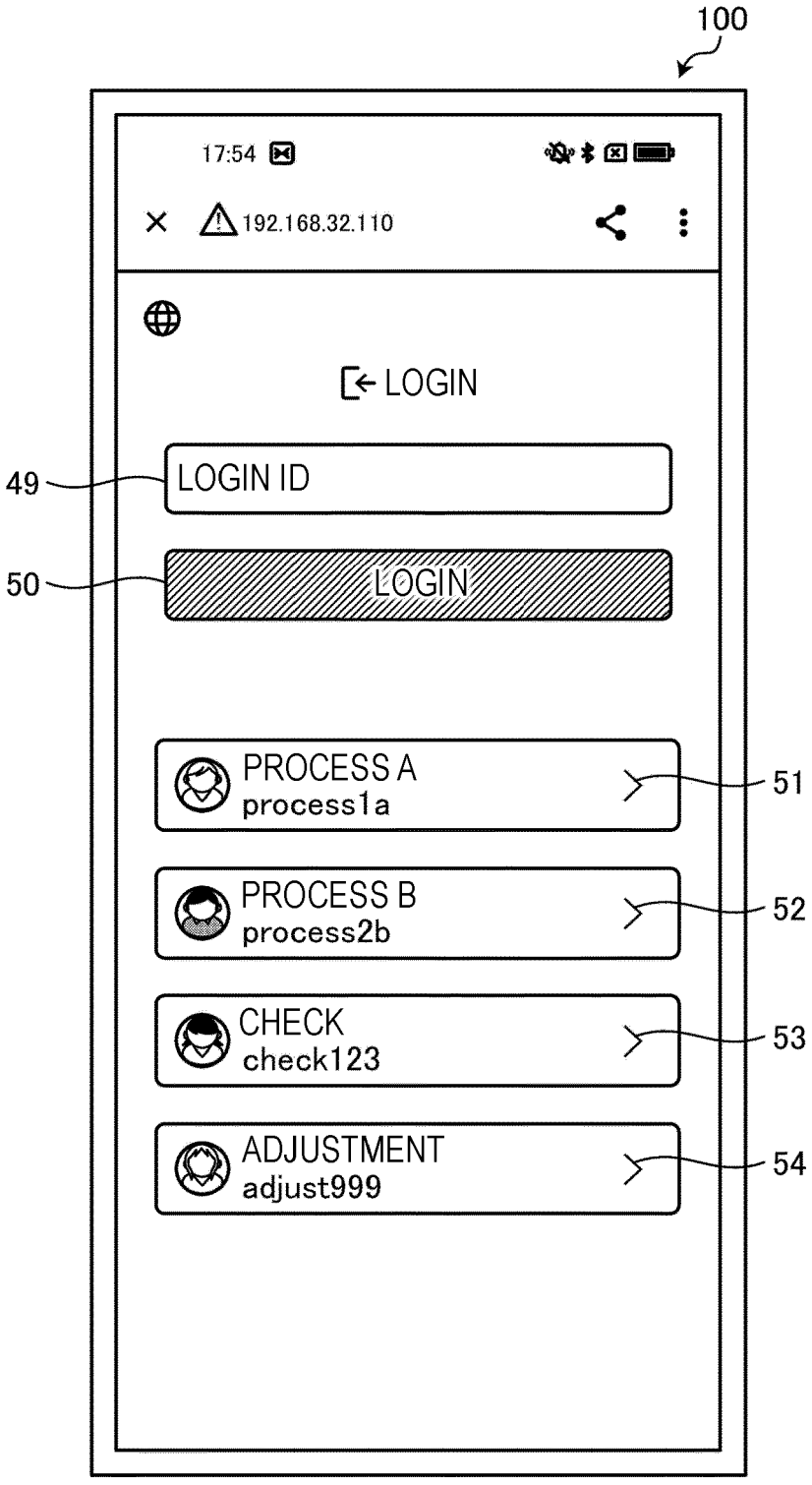

100
17:54
192.168.32.110
LOGIN
49
LOGIN ID
50
LOGIN
PROCESS A
process1a
51
PROCESS B
process2b
52
CHECK
check123
53
ADJUSTMENT
adjust999
54

FIG.6

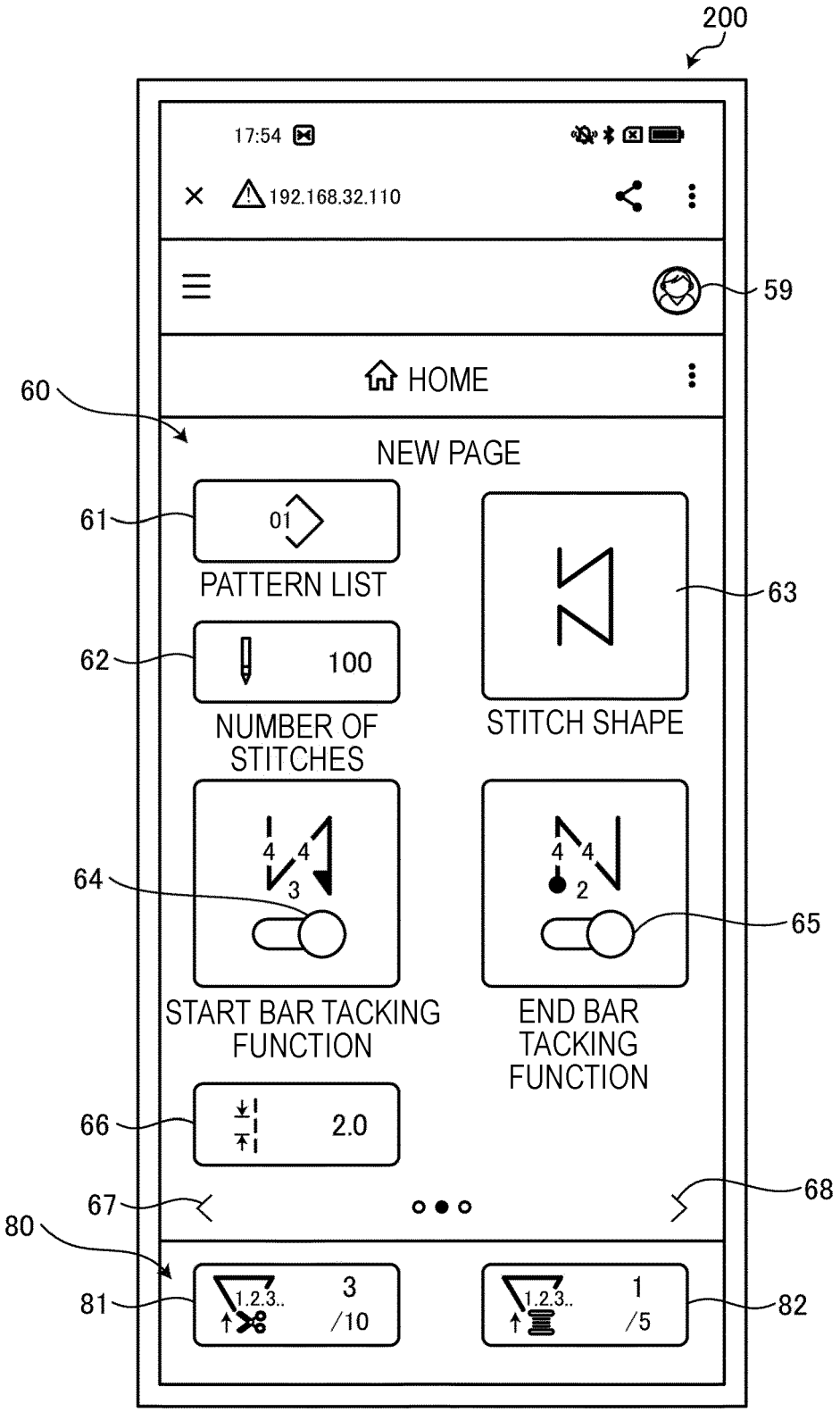
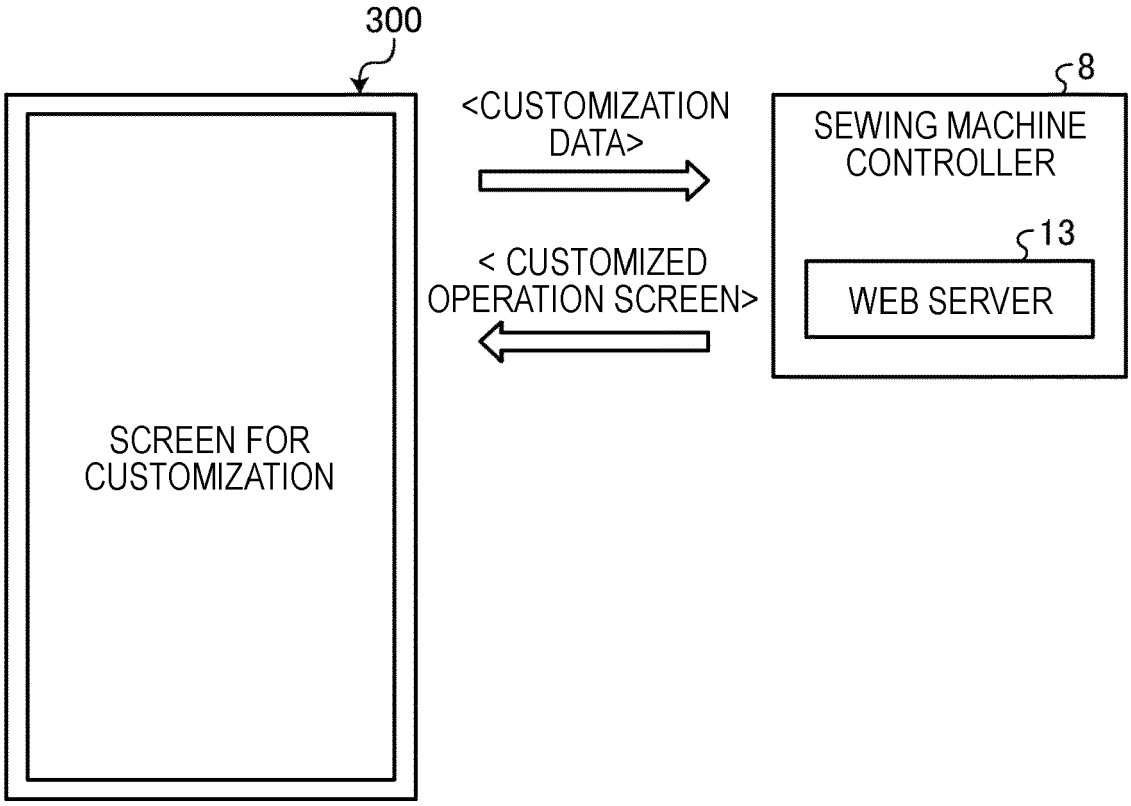

200
17:54
192.168.32.110
59
HOME
60
NEW PAGE
61
01
PATTERN LIST
62
100
NUMBER OF STITCHES
63
STITCH SHAPE
64
START BAR TACKING FUNCTION
65
END BAR TACKING FUNCTION
66
2.0
67
68
80
81
3 /10
82
1 /5

FIG.7


300
SCREEN FOR CUSTOMIZATION
<CUSTOMIZATION DATA>
< CUSTOMIZED OPERATION SCREEN>
8
SEWING MACHINE CONTROLLER
13
WEB SERVER

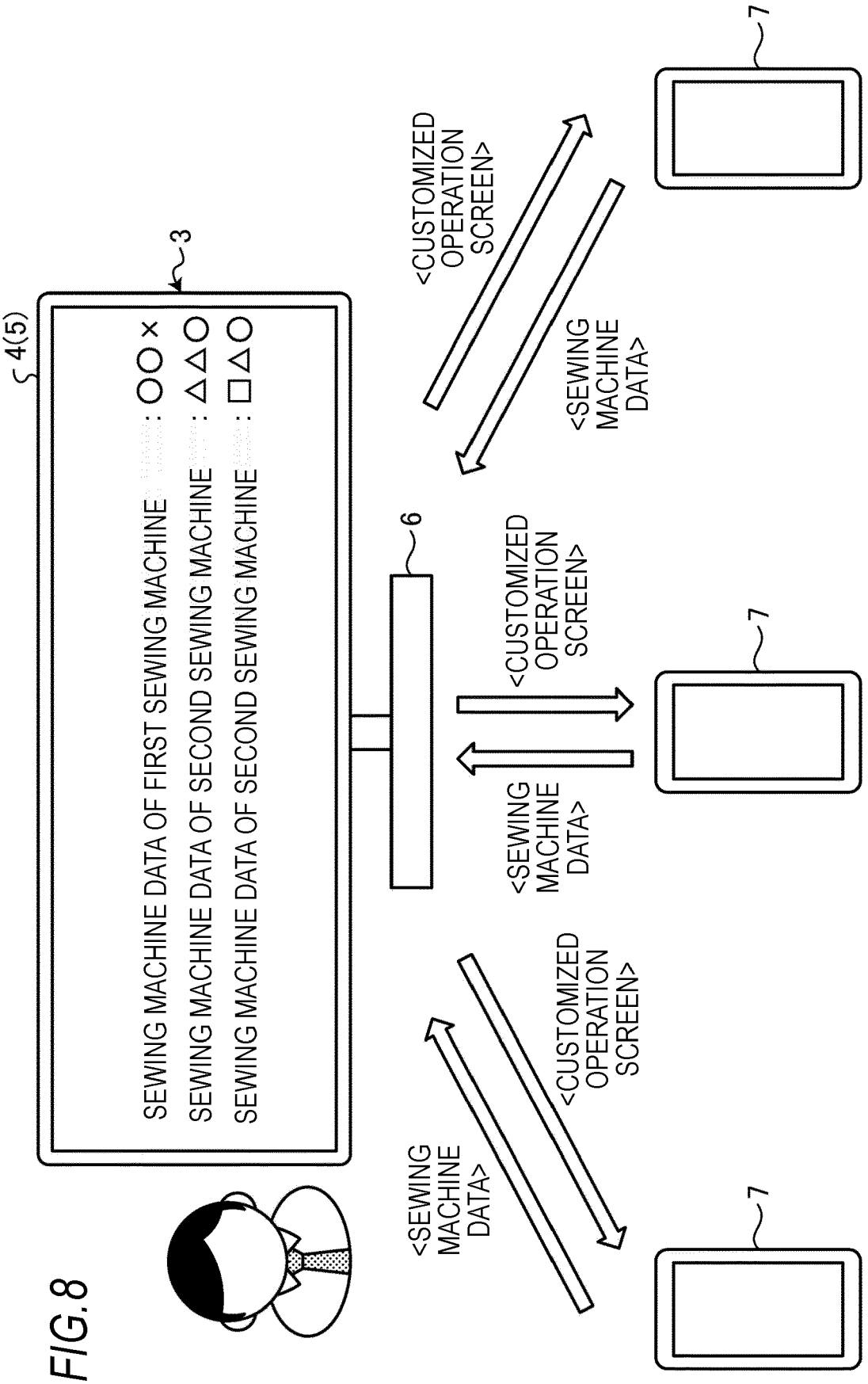

4(5)
3
SEWING MACHINE DATA OF FIRST SEWING MACHINE : ○○×
SEWING MACHINE DATA OF SECOND SEWING MACHINE : △△○
SEWING MACHINE DATA OF SECOND SEWING MACHINE : □△○
6
<CUSTOMIZED OPERATION SCREEN>
<SEWING MACHINE DATA>
<CUSTOMIZED OPERATION SCREEN>
<SEWING MACHINE DATA>
<CUSTOMIZED OPERATION SCREEN>
<SEWING MACHINE DATA>
7
7
7

FIG.8

FIG.9

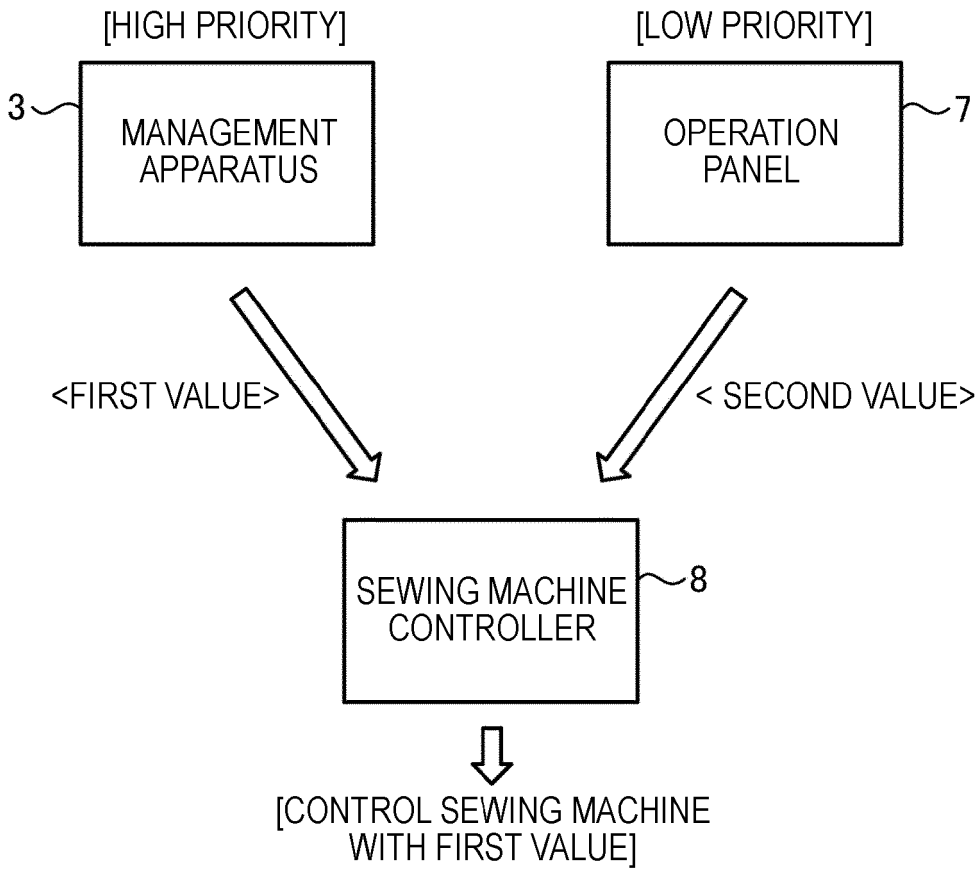

[HIGH PRIORITY]
[LOW PRIORITY]
3
MANAGEMENT APPARATUS
OPERATION PANEL
7
<FIRST VALUE>
< SECOND VALUE>
SEWING MACHINE CONTROLLER
8
[CONTROL SEWING MACHINE WITH FIRST VALUE]

FIG.10

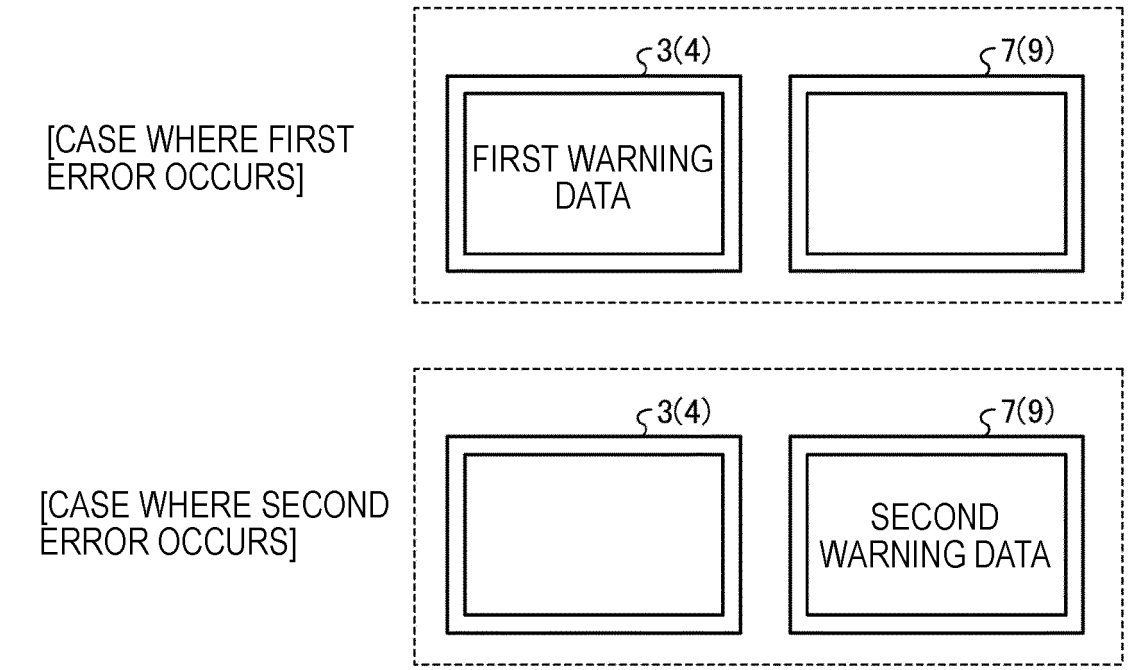
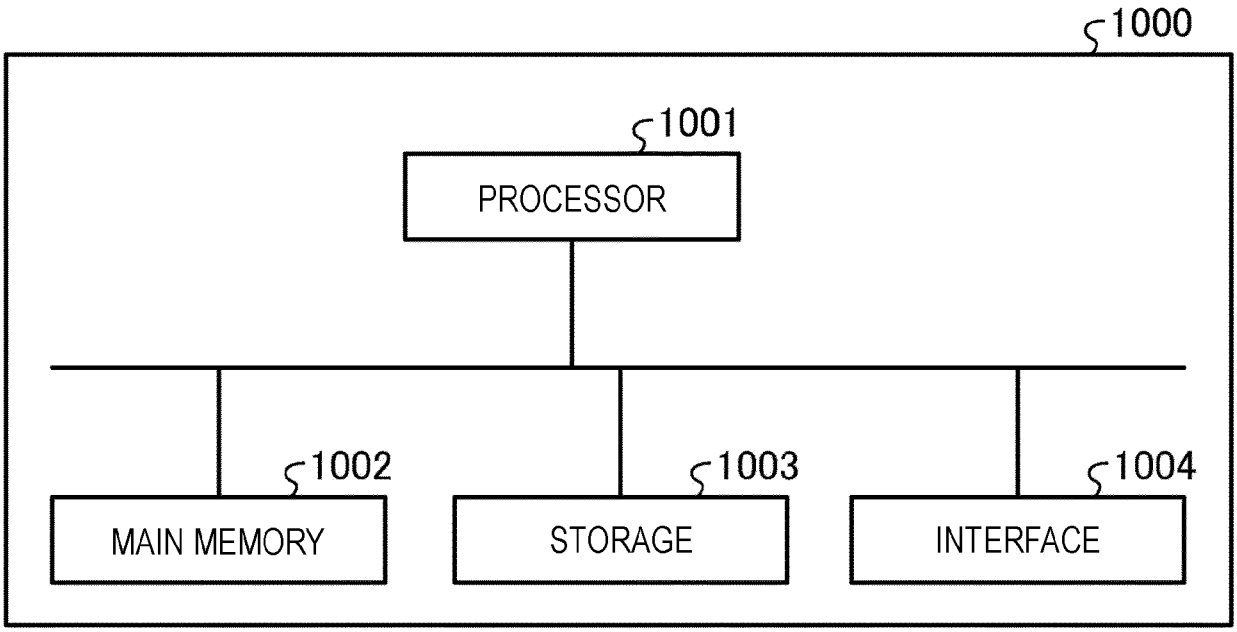

[CASE WHERE FIRST ERROR OCCURS]
3(4)
7(9)
FIRST WARNING DATA
[CASE WHERE SECOND ERROR OCCURS]
3(4)
7(9)
SECOND WARNING DATA

FIG.11


1000
1001
PROCESSOR
1002
MAIN MEMORY
1003
STORAGE
1004
INTERFACE

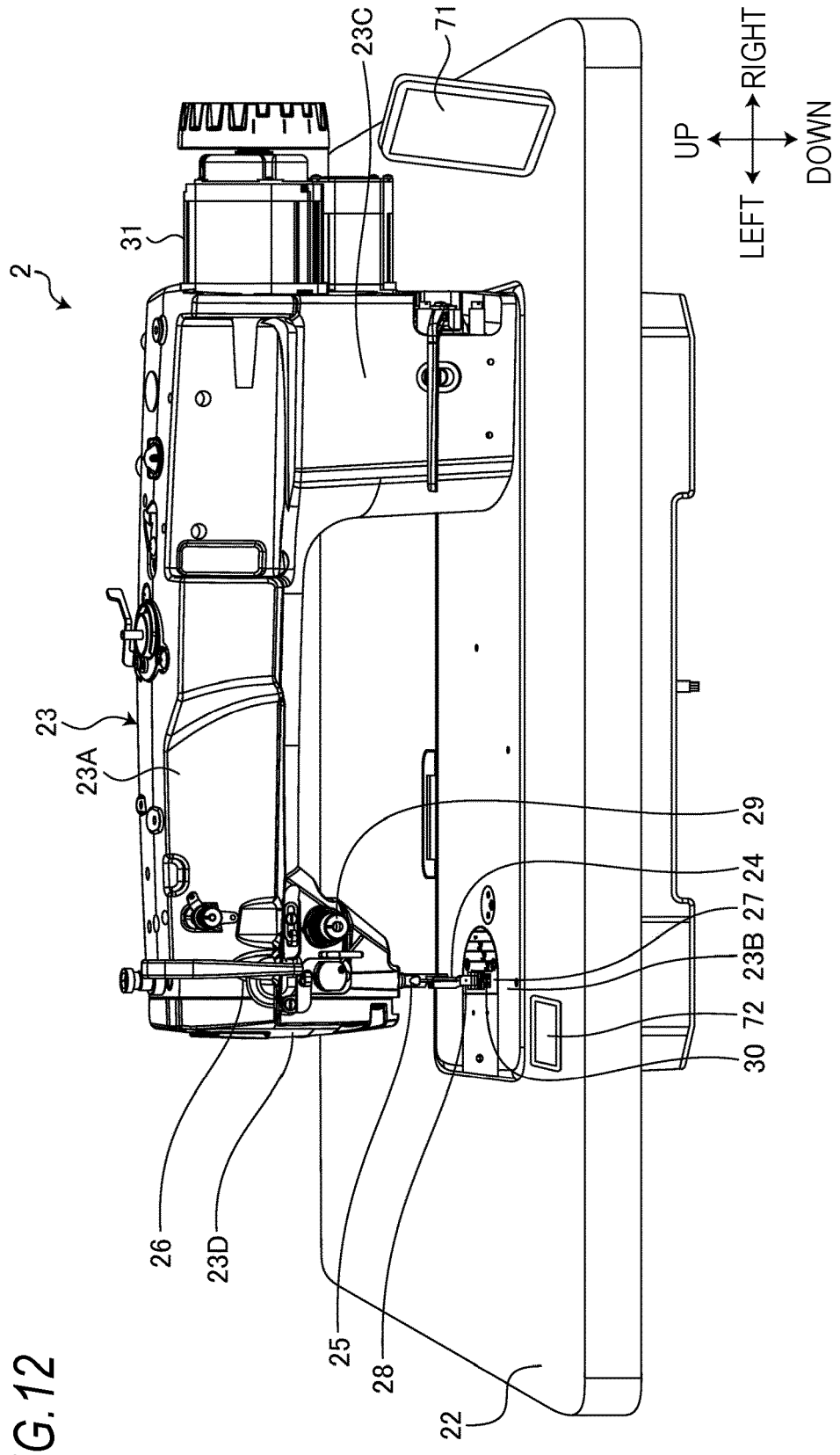

2
31
23C
71
UP
RIGHT
LEFT
DOWN
23
23A
29
24
27
23B
72
30
26
23D
25
28
22

FIG.12

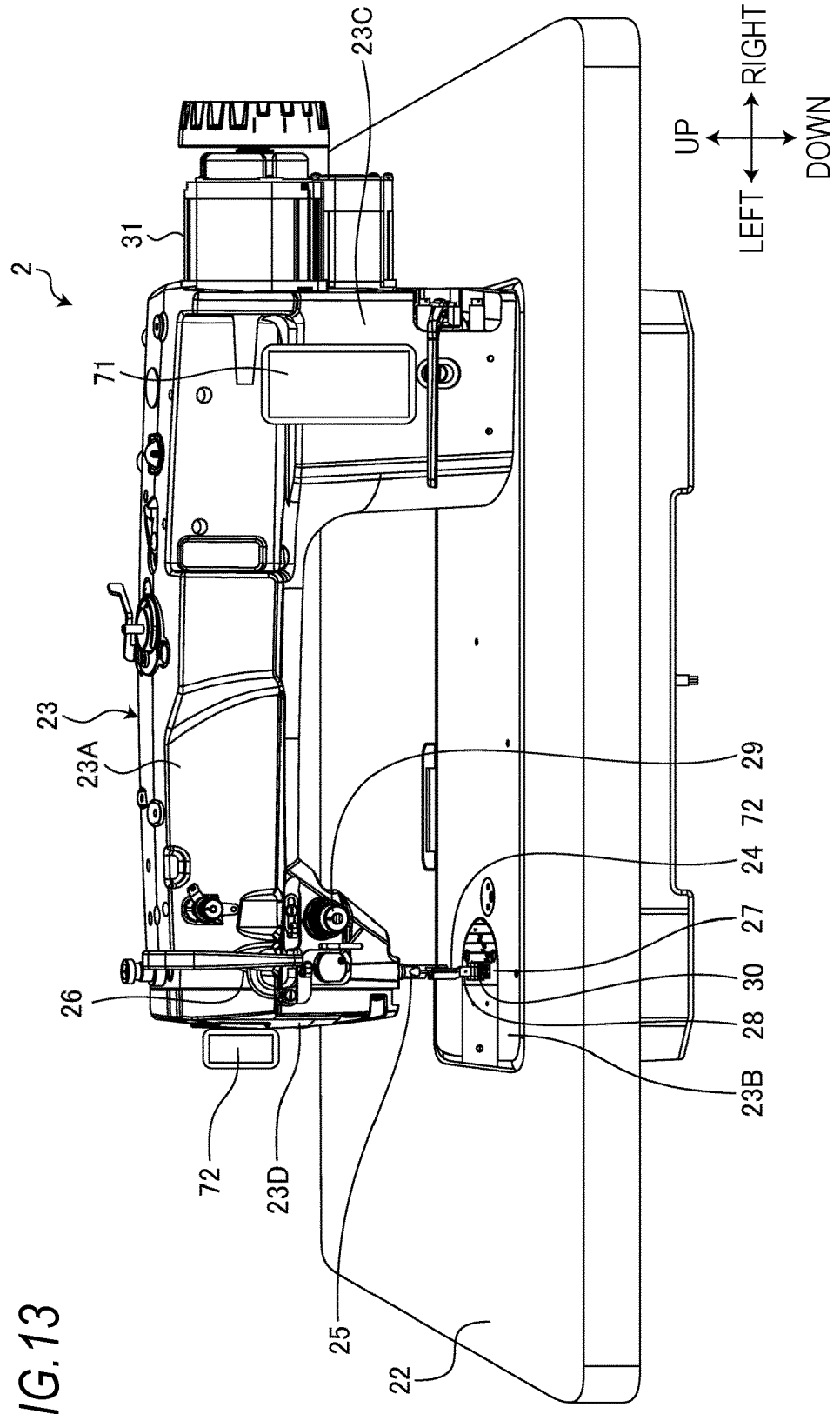

UP
RIGHT
LEFT
DOWN
2
31
23C
71
23
23A
29
72
24
27
30
28
23B
26
72
23D
25
22

FIG. 13

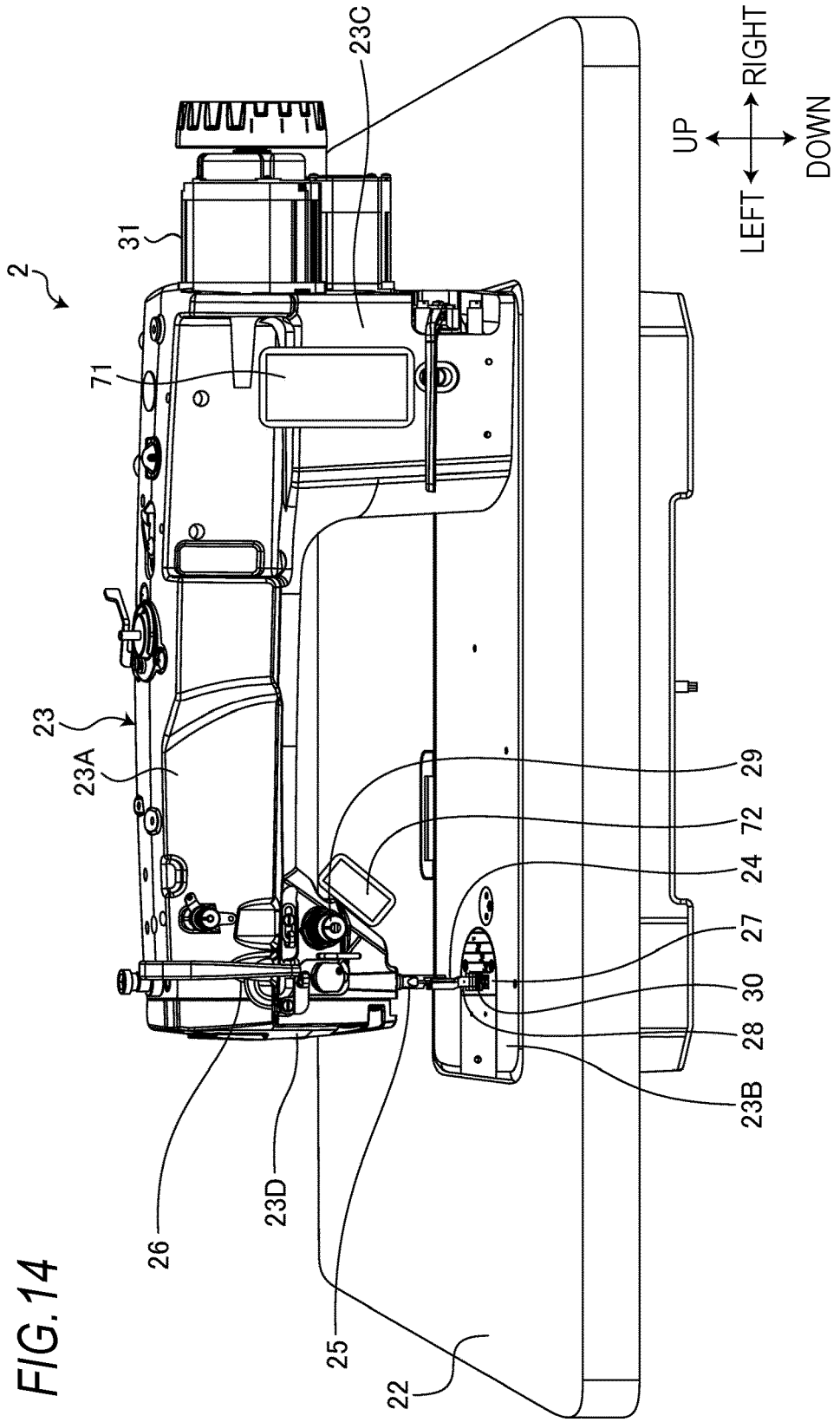
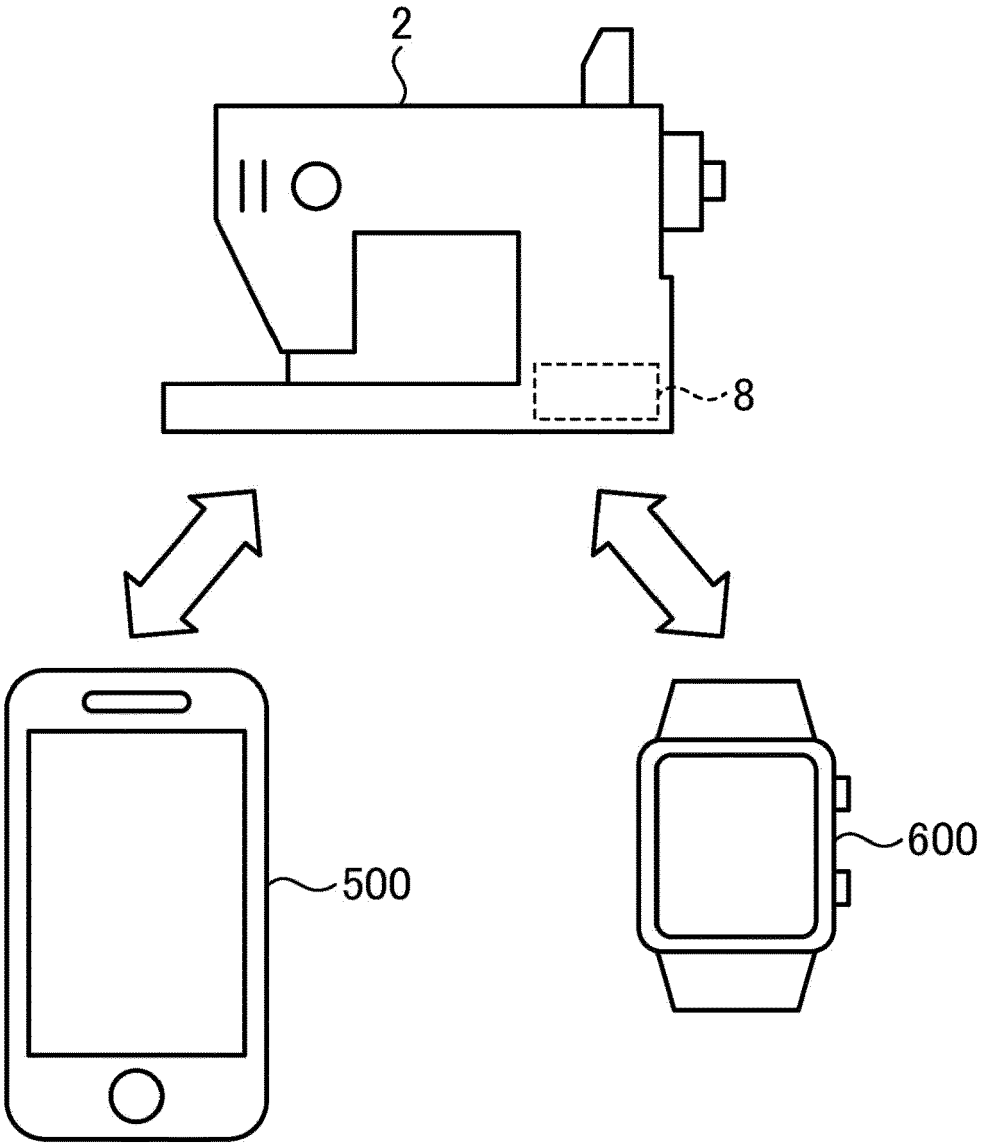

2
31
23C
71
23
23A
29
72
24
27
30
28
23B
26
23D
25
22
UP
RIGHT
LEFT
DOWN

FIG.14

FIG.15



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Application Number
EP 24 19 1923

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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 10 December 2024 | Braun, Stefanie |

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