

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an apparatus and a system for producing and packing prints. More particularly the invention relates to a print packing apparatus which eliminates labor for checking a print made with a storage medium when an image of the print is based on digital image data in the medium and a production system including such an apparatus.

Description of the Related Art

[0002] An automatic printer processor which produces a series of photoprints by developing a negative film after photographing and printing images on the developed film onto a print paper continuously has widely been used, for example, in photograph laboratories.

[0003] A type of such an automatic printer processor exists, which arranges prints made and packs them into a deposit bag together with a developed film, bill and advertisement (for example, Japanese Patent Application Laid-Open (JP-A) Nos. 5-27405 and 6-43622).

[0004] In addition to the aforementioned automatic printer processor, a digital photo printer system has widely come to be employed. In such a digital photo printer system, image information recorded on a photo film or other materials such as negative film and reversal film is read out photoelectrically, after the read image is converted to digital signals. The digital signals undergo several steps of image processing so as to obtain digital image data for recording and then, by scanning a photosensitive material such as print paper with a recording light modulated corresponding to this digital image data, a print is produced.

[0005] The digital photo print system is capable of handling digital image data obtained with a digital camera easily in addition to conventional photo films because a print is produced from the digital image data as described above.

[0006] Here, the digital image data photographed by the digital camera is usually brought into a photo laboratory in the form recorded on a medium which may be any type including SmartMedia (R) or CD-R. Then, the photo laboratory reads out a digital image data from the medium brought in for processing and produces a print (or a set of prints) based on the digital image data through the aforementioned digital photo printer system.

[0007] With widespread use of the digital camera in recent years, requests or orders for printing with a medium including a camera brought into the photo laboratory have been increasing year by year.

[0008] The medium brought in for processing is packed into a DP bag together with the prints produced by the digital photo printer system. However, checking

whether or not the medium matches the print is a very time-consuming task.

SUMMARY OF THE INVENTION

[0009] The present invention has been made to solve the above-described problem. An object of the invention is to provide a print packing apparatus and a system for producing and packing prints which eliminates checking operation.

[0010] A first aspect of the invention is an apparatus for packing prints which are produced based on digital image data. The data may be obtained from a storage medium, a device coupled to the apparatus or via a computer network. The apparatus comprises a means for accumulating prints per order, a means for packing the prints accumulated by the print accumulating means, a means for storing a sequence of total print requests and information on each single print request, and a means for controlling the print packing means based on the sequence of total print requests and the print sequence of the single print request stored in the storing means. The information includes a print sequence of the single print request.

[0011] The print packing apparatus automatically packs prints of a single print request. The packing is carried out according to a sequence of reception of print requests. Thus, manual process of packing prints by the single print request and distinguishing the single request from other requests can be eliminated.

[0012] The digital image data may be written down and stored in a remote data storage medium, and may be used via a computer network. Alternatively, the data may be acquired by reading the medium through a data reader in a photo shop.

[0013] The "sequence of print requests" means an order requested through the medium, network or data reader. This may not be equal to the sequence of requests actually received through the medium, network and reader as described later.

[0014] The "information on a single print request" includes reception number, number of prints per image of the single print request, print sizes, price calculated based on the number of prints and the print sizes and the like, in addition to the print sequence specified by the single print request. The print sequence of a single print request may not be equal to the print sequence at the time of reception.

[0015] The aforementioned medium refers to a medium generally used for recording digital image data acquired through photographing with a digital camera, such as SmartMedia (R) and CD-R.

[0016] According to the invention, the print packing means may comprise a section for accommodating bags, a section for fixing and opening a bag, a section for transferring a bag from the bag accommodation section to the bag opening section, a means for placing the prints accumulated by the print accumulating means in-

to a bag opened by the bag opening section, a means for accepting the medium, a means for placing the medium accepted by the medium accepting means into a bag opened by the bag opening section, and a section for accumulating bags each of which the prints and the medium are placed in by the print placing means and the medium placing means.

[0017] If a print request is received via a medium brought in, the medium accepting means of the print packing apparatus accepts that medium.

[0018] Prints (or a set of prints) according to the single print request are accumulated by the print accumulating means and placed into a bag by the print placing means. Then, the medium accepted by the medium accepting means is placed into the bag in which the prints are already placed by the medium placing means.

[0019] Thus, if a medium is brought in and a print request is thereby received, the medium and prints produced based on digital image data in the same medium are placed into the same print bag by the print packing apparatus.

[0020] According to the invention, the control means may control the print packing means so as to make the medium correctly correspond to the prints in the bag when the prints and the medium are placed in the bag, based on the sequence of the total print requests and the information of the single print request read out from the storing means.

[0021] If the medium accepting means accepts a medium N whose number in the sequence of the total print requests is "n" in the print packing apparatus, the control means calls print information from the storage medium. The information contains the relation between request sequence and image data, and presence/absence of a medium of a request in the sequence of the total requests. Then the control means determines what number the medium N is in the line of total print requests. If the number of the medium N is determined to be "m" in the line of total print requests, the medium placing means is controlled and makes the medium N be put into a particular print bag. In the bag, a set of prints whose number is "m" in the line of total print requests is already placed.

[0022] In this way, the medium N is placed in the bag in which the prints whose number is "m" in the line of total print request is already placed by the medium placing means.

[0023] If no medium is accepted by the medium accepting means, the medium placing means remains stopped. Thus, only the prints are put into the bag and then the bag is sent to the placed bag accumulating section.

[0024] Therefore, only the prints accumulated by the print accumulating means are packed in the bag.

[0025] In the print packing apparatus, only by placing the medium into the medium accepting means, the medium is always packed with corresponding prints. Consequently, work for checking whether or not the print

matches the medium is not required. There are cases where requests received through a medium and requests received via network distribution mix in total print requests, and where print requests are received through a network only. Even in these cases, such an accident that produced prints and a medium unrelated to those prints may be wrongly packed together is prevented.

[0026] According to the invention, the print packing means may comprise, a section which accommodates bags, a section which fixes and opens a bag, a section which transfers a bag from the bag accumulating section to the bag opening section, a means for placing the prints accumulated by the print accumulating means into a bag opened by the bag opening section, and a section for accumulating bags each of which the prints are placed in by the print placing means.

[0027] An external device or a terminal of a computer network such as a reader in a photo shop stores image data corresponding to a series of images. The print producing unit included in the system of the invention produces a set of prints corresponding to such image data.

[0028] The set of prints produced by the print producing unit are accumulated as a lump of prints by the print accumulating section included in the system for producing and packing prints.

[0029] A single print package or bag is transferred from the bag accumulating section by the bag transfer section and fixed on the bag opening section.

[0030] After being transferred to the bag opening section by the bag transfer section, the bag is fixed by the bag opening section and opened. If the bag is fixed and opened in the bag opening section, the lump of the prints are placed into the bag by the print placing means.

[0031] After the prints are placed in, the bag is accumulated on the placed bag accumulating section.

[0032] In the apparatus, a series of operation for packing prints produced by receiving a print request through the reader in a shop or a network and placing the prints into the bag and accumulating the bag is automatically carried out. In this way, an apparatus or a system using the apparatus is made capable of automating the packing of the prints without direct-obtaining of image data from the medium.

[0033] According to the present invention, the bag transfer section may include a printing section for printing at least a portion of the information of the single print request on the bag.

[0034] The print packing apparatus is an example of providing the bag transfer section with a printing section. The printing section is capable of printing the information of the single print request on the bag. The information includes reception number, price and others.

[0035] A second aspect of the present invention is a system for producing and packing prints. This system includes a unit which produces prints based on the digital image data, and a unit which packs the prints produced by the print producing unit. The data may also be obtained from a medium which stores the data, a device

coupled to the print producing unit, or via a computer network.

[0036] In the system, prints are produced by the print producing unit by receiving print requests via a medium brought in for processing, a reader in a shop or a network.

[0037] The prints produced by the print producing unit are gathered per request and will be packed with the medium corresponding to the prints by the print packing unit if the medium is brought in for processing.

[0038] If a print request is placed by a medium brought in a shop in the system, the print packing unit packs the prints with the corresponding medium. If the order is placed by receiving digital image information through a network or collecting digital image information from the medium by a reader in a shop, only prints corresponding to the image obtained through the network or the digital image information are packed.

[0039] Therefore, if prints whose print requests are placed by media and other prints whose requests are placed through a network or reader mix in total print requests, labor for checking the packed a set of prints with a corresponding medium can be eliminated.

[0040] According to the invention, the print producing unit may comprise a means for storing the sequence of total print requests and the information of the single print request in an order of reception of the print requests, a print sequence determining means which rearranges the sequence of total print requests and the print sequence in the information read out from the print request information storing means if necessary and determines the sequence of the print requests and the print sequence in the single print request, and a means for writing the sequence of the print requests and the print sequence in the print request determined by the print sequence determining means into the storing means included in the print packing unit. According to the system above, prints are produced according to the sequence of total print requests and the print sequence in the single print request set by the print sequence determining means.

[0041] If a print request is received from a medium, a photo shop reader or a network, the print request information storing means in the system for producing and packing prints stores the sequence of total print requests and print sequence in the single print request in an order of reception.

[0042] If requests received through media, a photo shop reader and a network coexist, the print sequence determining means is capable of attaching priority order to the requests and rearranging the sequence of total print requests. For example, requests via media may have a higher priority to other types of requests. If different print sizes are included in a single request like a mixture of normal size and panorama size, the print sequence in the single print request is rearranged by for example, producing larger size prints earlier to smaller size prints.

[0043] The rearranged sequence of total print requests and print sequence in a single print request are written down onto the storing means of the print packing unit by the writing means and at the same time, the information of the single print request is written down in the order of reception.

[0044] Therefore, the system for producing and packing prints is capable of sorting prints of a request in print packing process when various sizes of prints are produced.

[0045] The print sequence in a single print request may be in the order from a larger print or in the order from a smaller one.

[0046] According to the second aspect of the invention, the print producing unit may include a means for producing a print. This means produces prints by forming images on the image recording material based on digital image data obtained from a storage medium or via a network while the image recording material is being conveyed in a specified direction.

[0047] The system for producing and packing prints is capable of using an image recording material of a type in which an image is formed by forming a latent image electrostatically or optically and visualizing latent image with an appropriate means.

[0048] As such image forming means, an automatic development/printing apparatus and an electrostatic photographic image forming apparatus can be employed. In the development/printing apparatus, the photograph paper is exposed so as to form a latent image and this latent image is developed to produce a color print. In the electrostatic photographic image forming apparatus, an electrostatic image is formed on a conventional roll paper, and toner is applied and fixed to this electrostatic image to form an image. As a specific example of the electrostatic photographic image forming apparatus, a laser printer can be mentioned.

[0049] The image forming means is not restricted to a particular type of device which forms the latent image only. As the image forming means for forming no latent image, for example, an ink jet printer can be included.

[0050] According to the system of the second aspect of the invention, the image recording material may be photograph paper.

[0051] Because the print producing unit makes a silver salt photographic print in the system, beautiful fine image quality can be obtained.

BRIEF DESCRIPTION OF THE DRAWINGS

[0052]

Fig. 1 is a front view showing schematically the structure of a photo printer system according to a first embodiment.

Fig. 2 is an enlarged plan view showing the structure of a packing apparatus included in the photo print system according to the first embodiment.

Fig. 3 is an enlarged front view of the packing apparatus shown in Fig. 2.

Fig. 4 is an enlarged front view showing a condition that a print and a medium are accommodated in a print bag in the packing apparatus shown in Fig. 2.

Fig. 5 is an enlarged left side view of the packing apparatus shown in Fig. 2.

Fig. 6 is an enlarged diagram showing the structure of a medium/print transfer section and its surrounding section.

Fig. 7 is a block diagram showing the structure of a control computer 5 in the photo printer system according to the first embodiment.

Fig. 8 is a flow chart showing the procedure for packing the medium and print into a print bag in the photo printer system according to the first embodiment.

Figs. 9A through 9E are diagrams respectively showing operations of the medium convey conveyor and print medium convey section when the medium is packed in the bag.

Figs. 10A through 10C are diagrams respectively showing the operation of the medium convey conveyor and print medium convey section after the medium is packed into the bag.

Fig. 11 is a front view showing schematically the structure of the photo printer system according to a second embodiment.

Fig. 12 is an enlarged front view showing the structure of the packing apparatus included in the photo printer system according to the second embodiment.

Fig. 13 is an enlarged plan view showing the structure of the packing apparatus shown in Fig. 12 as seen from above.

Fig. 14 is an enlarged side view showing the structure of the packing apparatus shown in Fig. 11 as seen from the left side.

Fig. 15 is a block diagram showing the structure of the control computer 6 included in the photo printer system shown in Fig. 12.

DETAILED DESCRIPTION OF THE INVENTION

First Embodiment

[0053] An example of the photo printer system included in the system for producing and packing prints of the present invention will be described with reference to the accompanying drawings.

[0054] As shown in Fig. 1, a photo printer system 100 comprises a media reader 1 into which a medium is inserted to read out image data recorded in the medium M, a print producing unit 2 for producing a sheet-like print PR of each image by printing the image on a photographic paper based on image data read out by the media reader 1, and a print packing unit 3 for packing the print P produced by the print producing unit 2 with

the medium M in which internal image data is read by the media reader 1. The print packing unit 3 includes a control computer 5 for controlling the print producing unit 2 and the print packing unit 3 based on image data read out by the media reader 1. The media reader 1 and the print producing unit 2 are examples of components of the print producing unit included in the system for producing and packing prints of the invention. The print packing unit 3 is an example of the print packing apparatus included in the system for producing and packing prints of the invention. The control computer 5 is an example of components of a storing means and control means included in the print packing unit, print request information storing means included in the print producing unit, print sequence determining means and writing means. Further, the medium M is an example of medium whose image data is read out by the print producing unit.

[0055] In addition to the function of reading out image data from the medium M, the media reader 1 has the function of specifying a print size to be produced by the print producing unit 2.

[0056] The print producing unit 2, as shown in Fig. 1, is an example of the structure of image forming means. That is, the print producing unit 2 comprises magazine loading sections 22A, 22B, an exposure section 24, a developing section 26, a drying and cutting section 28, and an image processing unit 20. The magazine loading sections are loaded with magazine 72 and magazine 74 each accommodating photographic paper P in a condition that it is wound in the form of a roll. The exposure section 24 exposes photographic paper P fed out from the magazine 72 and the magazine 74 and conveyed in the direction of an arrow A. The developing section 26 develops the photographic paper exposed by the exposure section 24. The drying and cutting section 28 is the section where the photographic paper P developed by the developing section 26 is dried and cut out for each image. The image processing unit 20 corrects or processes image data read out by the media reader 1 or obtained through network as required and inputs to the exposure section 24.

[0057] The photographic paper P is wound with its photosensitive side which is coated with photosensitive emulsion facing outside and accommodated in the magazine 72 and magazine 74.

[0058] The exposure section 24 forms a latent image on the photographic paper by scanning along a direction perpendicular to the transfer direction A. The scan is performed by irradiating with three color laser beams of red, green and blue from a light source section 24A based on the image data input from the image processing unit 20.

[0059] The developing section 26 comprises a developing bath 26A for developing the photographic paper P exposed by the exposure section 24, a bleaching and fixing bath 26B for bleaching and fixing the photographic paper P developed by the developing bath 26A and a washing bath 26C for washing the photographic paper

P bleached and fixed by the bleaching and fixing bath 26B.

[0060] The drying and cutting section 28 comprises a drying heater 28A for drying with hot wind the photographic paper P washed by the washing bath 26C in the developing section 26 and a cutting machine 28B for cutting the photographic paper P dried by the drying heater 28A into sheet-like prints.

[0061] As shown in Figs. 1 to 5, the print packing unit 3 comprises a print bag accommodating section 32, a print bag fixing section 33, a print bag transfer section 34, a print bag printing section 35, a print loading base, a print conveying section 37, a bag accumulating section 38. The print bag accommodating section 32 accommodates empty print bags in folded condition. The print bag fixing section 33 fixes the bag by sucking when a print PR and a medium M are inserted into the bag. The print bag transfer section 34 transfers the bag from the bag accommodating section 32 to the bag fixing section 33. The print bag printing section 35 prints the bag transferred by the bag transfer section 34. On the print loading base 36, the prints PR produced by the print producing unit 2 are loaded and accumulated. The print conveying section 37 conveys the print PR from the print producing unit 2 to the print loading base 36. The bag accumulating section 38 accumulates the bags in which the medium M and the print PR are packed on the bag fixing section 33. The print loading base 36 and the print conveying section 37 are examples as components of the print accumulating means included in the print packing apparatus of the invention. The print bag accommodating section 32, the bag fixing section 33, the bag transfer section 34 and the bag printing section 35 are examples as components of the print packing means included in the print packing unit.

[0062] The print packing unit 3 further comprises a medium placing port 39A, a medium conveyor 30, and medium and print transfer section 31. The medium placing port 39A is the section through which the medium M after image data is read by the media reader 1 is placed. The medium conveyor 30 conveys the medium M placed into the medium placing port 39A as indicated with an arrow B in Fig. 5 downward toward the print loading base 36. The medium and print transfer section 31 is the section where the medium M conveyed by the medium conveyor 30 is loaded on the print PR loaded on the print loading base 36 and transferred toward the bag fixing section 33 with the print PR. The print bag fixing section 33 is an example of print bag opening means. A medium detecting sensor 39B for detecting that the medium M is placed in is provided just below the medium placing port 39A. The medium detecting sensor 39B may be an optical sensor or a mechanical sensor. The medium placing port 39A, the medium detecting sensor 39B and the medium conveyor 30 are examples of components of the medium accepting means included in the print packing apparatus of the invention. The medium and print transfer section 31 is an example of components

of the print placing means and the medium placing means.

[0063] As shown in Fig. 2, in the bag fixing section 33 which sucks to fix the bag, at least one print bag suction hole 33B for sucking a print bag are made on a print bag suction surface 33A. A vacuum pump (not shown) is connected to the bag fixing section 33 and a communication path (not shown) which communicates the aforementioned suction holes 33B with the vacuum pump is provided internally. As shown in Figs. 3 to 5, the bag fixing section 33 is positioned slightly lower than the print loading base 36 and a step is provided between the section 33 and the base 36.

[0064] The print bag transfer section 34 comprises a rail 34A, a traveling section 34B, and a sucking section 34C. The rail 34A extends above the bag accommodating section 32 and the bag fixing section 33 from the bag accommodating section 32 to the bag fixing section 33. The traveling section 34B travels along the rail 34A. The sucking section 34C has a pair of suction cups 34D facing downward which is provided movably in the vertical direction with respect to the traveling section. The sucking section 34C is capable of swinging on a vertical plane.

[0065] As shown in Figs. 1 to 4, the print conveying section 37 comprises two pairs of print conveying rollers 37A and print conveying rollers 37B and a pair of print guide plates 37C. The print guide plates 37C are plate-like members parallel to each other disposed horizontally and guide prints being conveyed by the print conveying rollers 37A and the print conveying rollers 37B onto the print loading base 36. The print guide plates 37C are formed such that the intake side is opened vertically for print PR produced by the print producing unit 2 to be inserted securely into a gap between the two print guide plates 37C.

[0066] As shown in Figs. 2 and 5, the medium conveyor 30 comprises a paddle section 30A on which a medium M is to be loaded and a paddle driving belt 30B for driving the paddle sections 30A vertically. The paddle section 30A is fixed to the paddle driving belt 30B and projects at right angle from the paddle driving belt 30B. A pair of slits 30C in which pawls 31B are inserted are provided in the center of the paddle section 30A. The pawl 31 B, which will be described more in detail later, is inserted from the vicinity of an edge on the side in which the paddle section is fixed to the paddle driving belt 30B to extend outwardly.

[0067] As shown in Fig. 6, the medium and print transfer section 31 comprises a shallow box-type main pusher 31A, the pawl 31B, and a spring 31C. The pusher 31A is slidable in a direction toward the bag fixing section 33 and in a direction toward the medium conveyor 30 on the print loading base 36. The pawl 31B is movable within the main pusher 31A along the sliding direction of the main pusher 31A. The spring 31C elastically urges the pawl 31B toward an end thereof facing the medium conveyor 30 in the main pusher 31A. The top end of the

pawl 31B projects upward from the top surface of the main pusher 31A and moved independently of the motion of the main pusher 31A by an actuator (not shown) provided on the main pusher 31A.

[0068] As shown in Fig. 7, the control computer 5 comprises a central control section 50 and a memory 52. The central control section 50 is an example of control means in the print packing apparatus of the invention and the memory 52 is an example of storing means in the print packing apparatus.

[0069] Image data and data about the relation between the image data and presence/absence of medium and a sequence of total print requests are input into the central control section 50 from the image processing unit 20. These data are stored in the memory 52.

[0070] If whether or not medium is detected is input from the medium detecting sensor 39B into the central control section 50, the central control section 50 reads out the data from the memory 52 and controls the print conveying section 37, the medium conveyor 30, the medium/print transfer section 31, the bag fixing section 33, and the bag transfer section 34, which are included in the print packing unit 3. The central control section 50 controls the exposure section 24, the developing section 26 and the drying/cutting section 28 and processing conditions of photograph paper and print at each position are input therein.

[0071] The operation of the photo printer system 100 will be described below.

[0072] In the print producing unit 2, photograph paper fed out from the magazine 72 or the magazine 74 is conveyed with its photosensitive surface facing outside as shown in Fig. 1 and brought to the exposure section 24.

[0073] A series of image data recorded in the medium M is read out by the media reader 1 and input to the light source section 24A in the exposure section 24 through the image processing unit 20. Image data received through network such as the Internet may also be input to the image processing unit 20. The image processing unit 20 determines whether the image data is received from the media reader 1 or through network distribution each time when the unit 20 receives the image data. Data is input about which request in the sequence of total requests that image data corresponds to and how many requests through media and requests through a network were made respectively into the control computer 5.

[0074] If different print sizes are set in the media reader 1, that setting is input to the image processing unit 20. The image processing unit 20 rearranges the input image data in the order of the print size and inputs the rearranged data to the light source section 24A.

[0075] In the light source section 24A, laser beams of three colors, red, green and blue are irradiated to the photosensitive surface of the photograph paper P based on the input image data so as to form a latent image.

[0076] After the latent image is formed in the exposure section 24, the photograph paper P is introduced into the developing section 26 and passes the developing

bath 26A, the bleaching/fixing bath 26B, and the washing bath 26C in this order. The photograph paper P is conveyed with its photosensitive surface located inside in the developing bath 26A, the bleaching/fixing bath 26B, and the washing bath 26C. When the photograph paper P passes the developing bath 26A, the bleaching/fixing bath 26B and the washing bath 26C, the paper P undergoes the developing processing, the bleaching/fixing processing and the washing processing. The latent image on the photosensitive face is converted to a manifest image or a positive image.

[0077] The photograph paper P, after passing the developing section 26, is introduced into the drying/cutting section 28 and dried by the drying heater 28A. Then, the paper P is sent to the cutting machine 28B and cut for each positive image so as to produce a series of prints PR corresponding to the image data of the medium M.

[0078] The series of prints PR produced by the print producing unit 2 is inserted into the print conveying section 37 one by one in the print packing unit 3 each time when the series of prints PR is cut by the cutting machine 28B. The cut pieces of the prints PR are stacked on the print loading base 36 as shown in Fig. 2.

[0079] While the series of the prints PR are being transferred from the print producing unit 2 to the print packing unit 3, the bag transfer section 34 transfers a print bag accommodated in the bag accommodating section 32 to the bag fixing section 33 with a process which will be described below. An example of the operation of the print opening means will be described.

[0080] As shown in Fig. 3, the traveling section 34B moves on the rail 34A toward the bag accommodating section 32. The traveling section 34B stops above the bag accommodating section 32 and then, the sucking section 34C descends to a print bag and sucks the bag located topmost with the suction cups 34D.

[0081] After the suction cups 34D suck the bag, the sucking section 34C ascends and the traveling section 34B moves toward the bag fixing section 33. When a print bag sucked by the suction cups 34D passes the printing section 35, necessary matters including reception number and price are printed by the printing section 35. Then, as shown in Fig. 4, the traveling section 34B stops above the bag fixing section 33 and the sucking section 34C descends toward the bag fixing section 33.

[0082] If the sucking section 34C descends so that the bottom face of the bag sucked by the suction cups 34D is brought into contact with the bag sucking face 33A, the bag sucking holes 33B are depressurized. Consequently, the bag is sucked by the bag sucking face 33A. If the sucking section 34C is lifted up with the bag sucked by the bag sucking face 33A, the bag is opened.

[0083] Next, if the medium M, after its image data is read out by the media reader 1, is placed into the medium placing port 39A, the medium M drops to the paddle section 30A of the medium conveyor 30 and the medium detecting sensor 39B detects that the medium M is placed into the medium placing port 39A. The detection

result of the medium detecting sensor 39B is input to the central control section 50 of the control computer 5. If the detection result is input, the central control section 50 determines to which order of sequence the medium M corresponds according to the procedure indicated in the flow chart of Fig. 8.

[0084] First, in step S2, whether or not the medium M is placed in the medium placing port 39A is determined. If the medium detecting sensor 39B detects that the medium M is placed into the medium placing port 39A, the determination result is "YES". Thus, the procedure proceeds to step S4, in which how often that medium is placed in is determined. Then, in step S6, data about how many print requests via a medium brought in and how many print requests via network have been made when the medium M is placed are read out from the memory 52. If the requests via the media are "m" times and the requests through network systems are "n" times when the medium M is placed in, whether or not the number of the placing of the medium M is "m" in the line of total print requests is determined in step S8. Then, data about what number a print PR loaded on the print loading base 36 is in the line of print request numbers, and data whether or not the print PR originates from any medium are called from the memory 52 in step S10. In step S12, whether or not the print PR corresponds to a print request whose number is "m" + "n" in the line of print request numbers is determined. After it is determined that the print PR corresponds to the print request whose number is "m" + "n" in the line of print request numbers, whether or not the print originates from image data read from the medium is determined in step S14. If the print is based on image data read out from the medium, the central control section 50 determines that the print PR corresponds to the medium M in step S16 and packs the print PR and medium M according to a following procedure in step S18.

[0085] The operations of the medium conveyor 30 and the medium/print transfer section 31 when the medium M is packed into the bag are indicated in Figs. 9A through 9E and Figs. 10A through 10C.

[0086] The medium conveyor 30 is controlled so as to convey the medium M loaded on the paddle section 30A downward toward the print loading base 36. The paddle section 30A is positioned at its highest position.

[0087] When the paddle section 30A descends in the vicinity of the print loading base 36, the pawl 31B in waiting position in the medium/print transfer section 31 engages the slit 30C provided in the paddle section 30A as shown in Fig. 9A.

[0088] When both the main pusher 31A and the pawl 31B are in waiting position in the medium/print transfer section 31 as shown in Fig. 9A, the pawl 31B engages the slit 31C in the paddle section 30A and projects upward. At this time, the pawl 31B projects between the medium M and the paddle transfer belt 30B.

[0089] Next, as shown in Fig. 9B, the main pusher 31A moves in the direction of an arrow C toward the print PR

loaded on the print loading base 36. Consequently, the medium M on the paddle section 30A is moved on the top surface of the main pusher 31A. Then, the main pusher 31A stops temporarily when it contacts with the print PR on the print loading section 36.

[0090] After the main pusher section 31A stops, the pawl 31B moves in the direction of an arrow D toward the print PR as shown in Fig. 9C and the medium M on the main pusher 31A is placed on the print PR.

[0091] After the medium M is placed on the print PR, as shown in Fig. 9D, the main pusher 31A moves toward the bag fixing section 33 and puts the medium M and print PR into the bag opened by the bag fixing section 33 and the bag transfer section 34.

[0092] If the medium M and print PR are put into the bag, as shown in Fig. 9E, suction by the bag fixing section 33 is released and the bag is pushed out toward the bag accumulating section 38 by the main pusher 31A. The pushed print bag is accumulated in the bag accumulating section 38 as shown in Fig. 5.

[0093] If the bag is pushed into the bag accumulating section 38, the paddle driving belt 30B rotates as shown in Fig. 10A and the paddle section 30A moves by half pitch. If the paddle section 30A moves by half pitch, the main pusher 31A and the pawl 31B return to initial position as shown in Fig. 10B. At the same time, a series of prints corresponding to images read out from a next medium M+1 are produced in the print producing unit 2 and placed on the print loading base 36. A next print bag is fixed on the bag fixing section 33 and opened. As shown in Fig. 10C, the paddle driving belt 30B rotates by half pitch, and the paddle section 30A loaded with the next medium M+1 descends toward the medium/print transfer section 31. Consequently, preparation for packing the next medium M+1 and the series of the prints PR is completed.

[0094] In addition to the operation indicated in Figs. 10A to 10C, the return operations of the main pusher 31A and the pawl 31 may also be achieved by after advancing the paddle section 31A by a single pitch, releasing the pawl 31B downward by an actuator (not shown) so as to return the medium/print conveying section 31 to its waiting position and returning the pawl 31B upward by the actuator.

[0095] If no medium M is placed into the medium placing port 39A (step S2) or the control computer 5 selects "NO" in steps S8, S12 and S14 of the flow chart shown in Fig. 8, the medium conveyor 30 is stopped because the print PR is a print unrelated to any medium M and then, only the print PR is packed.

[0096] When a certain number of the medium M are inserted into the media reader subsequently and prints are produced, all of the medium M after reading out image data are inserted one by one into the placing port 39A. Thus, as shown in Figs. 9A to 10C, all of the media M are placed on all the paddle sections 30A of the medium conveyor 30. In this case, the medium conveyor 30 is driven for the paddle sections 30A to descend

downward by every pitch in order to maintain a relationship between the medium M to be packed and the print PR.

[0097] According to the photo printer system 100 of the first embodiment, if image data is read out from the medium M by the media reader 1 and the print PR is produced based on this image data, the medium M and related series of the prints PR are automatically packed into the bag only by placing the medium M into the medium placing port 39A. On the other hand, if the aforementioned print PR is not print based on image data from the medium M, only the print PR is packed in the bag.

[0098] Thus, operator's work for checking the print PR with the medium M is unnecessary.

[0099] If plural print sizes are specified by the media reader 1 or the like, the print producing unit 2 produces prints in the order of print size from a larger one or a smaller one and sends them to the print packing unit 3. Consequently, the prints are packed into the bag in a condition that they are piled in the order of the print size from the older one or smaller one. Therefore, an arranged bundle of the print is formed and put in a print bag.

Second Embodiment

[0100] Another embodiment of the photo printer system included in the system for producing and packing prints of the invention will be described below.

[0101] As shown in Fig. 11, the photo printer system 102 comprises the media reader 1, the print producing unit 2, the packing unit 4 and the control computer 6. The media reader 1 and the print producing unit 2 are examples of components of the print producing unit included in the system for producing and packing prints of the invention. The print packing unit 4 is an example of the print packing apparatus included in the system for producing and packing prints. The control computer 6 is an example of components of storing means and control means included in the print packing apparatus of the invention, print request information storing means, print sequence determining means and writing means included in the print production packing unit. The media reader 1 and the print producing unit 2 are the same as described in the first embodiment.

[0102] As shown in Figs. 11 to 14, the packing unit 4 comprises a rotary drum 40 for accommodating process, a print accumulation/feeding section 41, a print bag sucking units 42, a medium placing section 43, a medium detecting sensor 43B, a medium conveying section 44, a print bag accommodation section 46, and a bag accumulating section 47. The section 41 accumulates prints produced by the print producing unit 2 and feeds them into the rotary drum 40. The print bag sucking units 42 are for opening a print bag inserted into the inside of the rotary drum 40 by sucking. The medium placing section 43 has a slit-like medium placing port 43A through

which the medium M is placed after image data is read by the media reader 1. The medium detecting sensor 43B is for detecting the medium M placed into the medium placing section 43. The medium conveying section 44 is for conveying the medium M placed into the medium placing section 43 to above the rotary drum 40. The medium drop section 45 includes an opening for dropping the medium M conveyed over the rotary drum 40 by the medium conveying section 44 toward the rotary drum 40. The print bag accommodation section 46 accommodates print bags supplied to the rotary drum 40. The bag accumulating section 47 which accumulates a print bag in which the print PR and medium M are packed by the rotary drum 40. The packing unit 4 further comprises a printing section 48, and a print bag folding section 49. The section 48 is for printing requisits including reception number and price onto a print bag supplied from the bag accommodation section 46 to the rotary drum 40. The print bag folding section 49 is located above the bag accumulating section 47 and folds a mouth of the bag in which the print PR and medium M are packed by the rotary drum 40 and seals. As shown in Fig. 13, the bag folding section 49 comprises a rotary shaft 49B and three disc-like folding rollers 49A provided at an equal interval on the rotary shaft 49B. The rotary drum 40, the bag sucking section 42, the bag accommodating section 46, the bag accumulating section 47, the printing section 48, and the bag folding section 49 are examples of components of the print packing means in the print packing apparatus. The medium placing section 43 is an example of the medium accepting means in the print packing means of the invention. The medium conveying section 44 and the medium dropping section 45 are examples of the medium conveying means in the print packing means. The print accumulation/feeding section 41 is an example of the print accumulating means in the print packing apparatus.

[0103] As shown in Figs. 11 to 14, the rotary drum 40 for accommodation process is formed in the configuration of a drum whose sides are open and comprises eight partitions 40A provided at an equal interval along the radius direction, a pair of side plates 40B provided such that they sandwich the partition plate 40A and a rotary shaft 40C which goes through the center of the side plate 40B. Eight section compartments 40D are defined by the side plate 40B and the partition plate 40A. The side plate 40B (omitted in Figs. 11 and 12) located forward of this paper in Figs. 11 and 12 is provided with a slit through which the bag is to be inserted from the bag accommodating section 46 for each section compartment 40D. Additionally, three cutout sections are provided in an outside edge of the partition 40A in order to make the folding rollers 49 free.

[0104] The rotary drum 40 rotates intermittently in counterclockwise direction around the rotary shaft 40C as indicated by an arrow E in Figs. 11 and 12.

[0105] As shown in Figs. 11 to 14, the bag accommodation section 46 comprises a print bag accommodation

box 46A which supplies a print bag into a section compartment 40D located at the bottom right of the rotary drum 40 and accommodates the bags and a roller 46B for feeding the bag accommodated in the bag accommodation box 46A into the rotary drum 40. The print bag accommodation box 46A is a shallow box whose top face and side facing the rotary drum 40 are open and urged upward by a spring 46C provided on the bottom.

[0106] The print accumulation/feeding section 41 comprises a print loading plate 41A which rotates vertically around a side edge thereof on the side of the print producing unit 2 and an actuator (not shown) which rotates the print loading plate 41A vertically. When the prints produced in the print producing unit 2 are accumulated, the print loading plate 41A is at a position rotated upward and obliquely on the left as indicated with two-dot chain line in Figs. 11 and 12. The print loading plate 41A is at another position rotated downward and obliquely when the print PR is inserted toward the rotary drum 40.

[0107] As shown in Fig. 13, the medium placing section 43 includes a vertically long slit-like medium placing port 43A provided in the rear face of the packing unit 4. A medium detecting sensor 43B is an optical or mechanical sensor.

[0108] The medium conveying section 44 includes a conveyor for conveying the medium M placed from the medium placing section 43 toward the medium drop section 45. The section 44 further includes a medium drop preventing plate 44C, a drive belt 44B, and paddle plates 44A. The plate 44C is for preventing the medium M from dropping down. The drive belt 44B is disposed along the top face of the medium drop preventing plate 44C such that its belt face is substantially at right angle to the medium drop preventing plate 44C. The paddle plates 44A are erected perpendicularly to the surface of the drive belt 44B at an equal interval. The medium drop section 45 is an opening section provided in the vicinity of an terminal of the medium conveying section 44 in the medium drop preventing plate 44C.

[0109] When the drive belt 44B is driven counterclockwise in Fig. 13, the paddle plate 44A moves from the medium placing section 43 to the medium drop section 45 in the vicinity of the medium placing section 43. The medium M placed into the medium placing section 43 is conveyed on the medium drop preventing plate 44C by the paddle plate 44A toward the medium drop section 45. Then, the medium M drops onto the rotary drum 40 at the medium drop section 45.

[0110] As shown in Fig. 15, the control computer 6 includes a central control section 60 and a memory 62. The central control section 60 is an example of the control means in the print packing apparatus of the invention. The memory 62 is an example of the storing means in the print packing unit.

[0111] Image data and data about the relation between the image data and presence/absence of any medium and a sequence of print requests are input to the

central control section 60 from the image processing unit 20. These data are stored in the memory 62.

[0112] If whether or not any medium is detected is input from the medium detecting sensor 43B, the central control section 60 reads out the data from the memory 62 and controls the print accumulation/feeding section 41, the bag sucking section 42, the rotary drum 40 and the medium conveying section 44 in the print packing unit 4. The central control section 60 controls the exposure section 24, the developing section 26 and the drying/cutting section 28 and at the same time, processing conditions of photograph paper and print at each section are input therein.

[0113] Herein, the operation of the photo printer system 102 will be described.

[0114] If the medium M is inserted into the media reader 1, a series of image data stored in the medium M is read out by the media reader 1 and input to the light source section 24A in the exposure section 24 through the image processing unit 20. Further, image data obtained through a network such as the Internet may be input to the image processing unit 20. The image processing unit 20 determines which the image data is obtained by reading the medium or by receiving through network each time when the image data is input. Then, the unit 20 inputs data about what number in the line of print request numbers the image data is and how many print requests through media and requests through network systems have been made respectively until reception of the present print request by the control computer 6.

[0115] A series of prints corresponding to the image data input in this way are produced by the print producing unit 2. If different print sizes are specified in the media reader 1, the image data are rearranged in the order of print size from a larger one or a smaller one and then, prints PR are produced in the order of the print size.

[0116] The prints PR produced in the print producing unit 2 are sent to the packing unit 4 and accumulated on the print accumulating plate 41A in the print accumulation/feeding section 41.

[0117] When the series of the prints PR are produced and accumulated on the print accumulating plate 41A, a print bag is inserted into the section compartment 40D located at the bottom on the right of the rotary drum 40 from the bag accommodation section 46 as shown in Figs. 13 and 14.

[0118] If the bag is inserted into the section compartment 40D, the rotary drum 40 rotates by 45° counterclockwise and stops. The section compartment 40D in which the bag is inserted faces the right. At this time, the bag is sucked by the bag sucking unit 42 from above and opened in the section compartment 40D.

[0119] After the bag is opened, the rotary drum 40 rotates further by 45° in counterclockwise direction and stops at a position in which the section compartment 40D is directed upward to the right. Next, the print accumulating plate 41A rotates downward and oblique to

the left. The prints PR accumulated on the print accumulating plate 41A are inserted into the bag.

[0120] If the print PR is inserted into the bag in the section compartment 40D, the rotary drum 40 rotates further by 45° counterclockwise. The section compartment 40D stops just below the medium drop section 45.

[0121] If the medium M is placed into the medium placing section 43, the medium detecting sensor 43B detects that the medium is placed in and this fact is input to the control computer 6. As described in the first embodiment, the control computer 6 determines what number in the line of print request numbers the medium M corresponds to according to the flow chart shown in Fig. 8 and at the same time, determines whether or not the print PR corresponds to the medium M.

[0122] If the medium M and the print PR are determined to have correspondence to each other by the control computer, the placed medium M is conveyed by the medium conveying section 44 toward the medium drop section 45. The medium M drops from the medium drop section 45 to the section compartment 40D. Consequently, the medium M drops into the bag held and opened in the section compartment 40D.

[0123] If the medium M is inserted into the bag in this way, the rotary drum 40 rotates further by 45° counterclockwise and the section compartment 40D is directed to the left side. Consequently, the mouth section of the bag is folded by the folding rollers 49A possessed by the bag folding section 49 and sealed.

[0124] If the bag is sealed, the rotary drum 40 rotates further by 45° in counterclockwise direction and consequently, the section compartment 40D is directed downward to the left. Thus, the bag inside slides down on the partition plate 40A toward the bag accumulating section 47. As a result, the bags containing the print PR and medium M are accumulated.

[0125] If no medium M is placed into the medium placing section 43 (step S2 in Fig. 8) or if the control computer 6 selects No in steps S8, S12, and S14 in the flow chart of Fig. 8, the medium conveying section 44 is stopped because the print PR is a print not related to the medium M and only the print PR is packed.

[0126] While the rotary drum 40 rotates by 3/4 turn counterclockwise in the photo printer system 102 according to the second embodiment, a series of operations including insertion of the bag, opening of the bag, insertion of the print PR, insertion of the medium M, sealing of the bag and discharge of the bag to the bag accumulating section 47 are executed.

[0127] Therefore, the photo printer system 102 has a simple and compact mechanism in addition to the features of the photo printer system 100 of the first embodiment.

[0128] As described above, according to the invention, a system for producing and packing prints is provided, eliminating a task for checking whether or not a medium containing data for print and print made match each other.

Claims

1. An apparatus for packing prints produced based on digital image data, comprising:

a means for accumulating the prints per request;
a means for packing the prints accumulated by the print accumulating means;
a means for storing a sequence of total print requests and information on each single print request, the information including a print sequence on each single print request; and
a means for controlling the print packing means based on the sequence of total print requests and the print sequence of the single print request stored in the storing means.

2. The apparatus of claim 1, wherein the print packing means comprises:

a means for accommodating bags;
a means for fixing and opening a bag;
a section for transferring a bag from the bag accommodation means to the bag opening means;
a means for placing the prints accumulated on the print accumulating means into a bag opened by the bag opening means;
a means for accepting a medium containing the digital image data;
a means for placing the medium accepted by the medium accepting means into a bag opened by the bag opening means; and
a section which accumulates bags each of which the prints and the medium are placed in by the print placing means and the medium placing means.

3. The apparatus according to claim 2, wherein the control means controls the print packing means so as to make the medium correctly correspond to the prints in the bag, based on the sequence of total print requests and the information on the single print request read out from the storing means, when the prints and the medium are placed in the bag.

4. The apparatus according to claim 1, wherein the print packing means comprises:

a means for accommodating bags;
a means for fixing and opening a bag;
a means for transferring a bag from the bag accumulating means to the bag opening means;
a means for placing the prints accumulated by the print accumulating means into a bag opened by the bag opening means; and
a means for accumulating bags each of which

the prints are placed in by the print placing means.

5. The apparatus according to any one of claims 2 through 4, wherein the bag transfer section includes a printing section for printing at least a portion of the information on the single print request on the bag. 5

6. The apparatus according to any one of claims 1 through 5, wherein the digital image data is obtainable from at least one of a storage medium received by the apparatus, a device coupled to the apparatus and a computer network. 10

7. A system for producing and packing prints comprising: 15
 - a print producing unit which produces prints based on digital image data obtained from a storage medium or through a computer network, and 20
 - a print packing apparatus according to any one of claims 1 through 6 that packs the prints produced by the print producing unit. 25

8. The system according to claim 7, wherein the print producing unit comprises:
 - a means for storing the sequence of total print requests and the information on the single print request in an order of reception of the print requests; 30
 - a print sequence determining means which rearranges the sequence of total print requests and the print sequence in the information read out from the print request information storing means if necessary and determines the sequence of the print requests and the print sequence of the single print request; and 35
 - a means for writing the sequence of the print requests and the print sequence in the print request determined by the print sequence determining means into the storing means included in the print packing unit, wherein 40
 - prints are produced according to the sequence of the total print requests and the print sequence of the single print request determined by the print sequence determining means. 45

9. The system according to claim 7 or 8, wherein the print producing unit includes image forming means for producing each print by forming an image on an image recording material based on digital image data while conveying the image recording material in a specified direction. 50 55

10. The system according to claim 9, wherein the image recording material is a photograph paper.

FIG.1

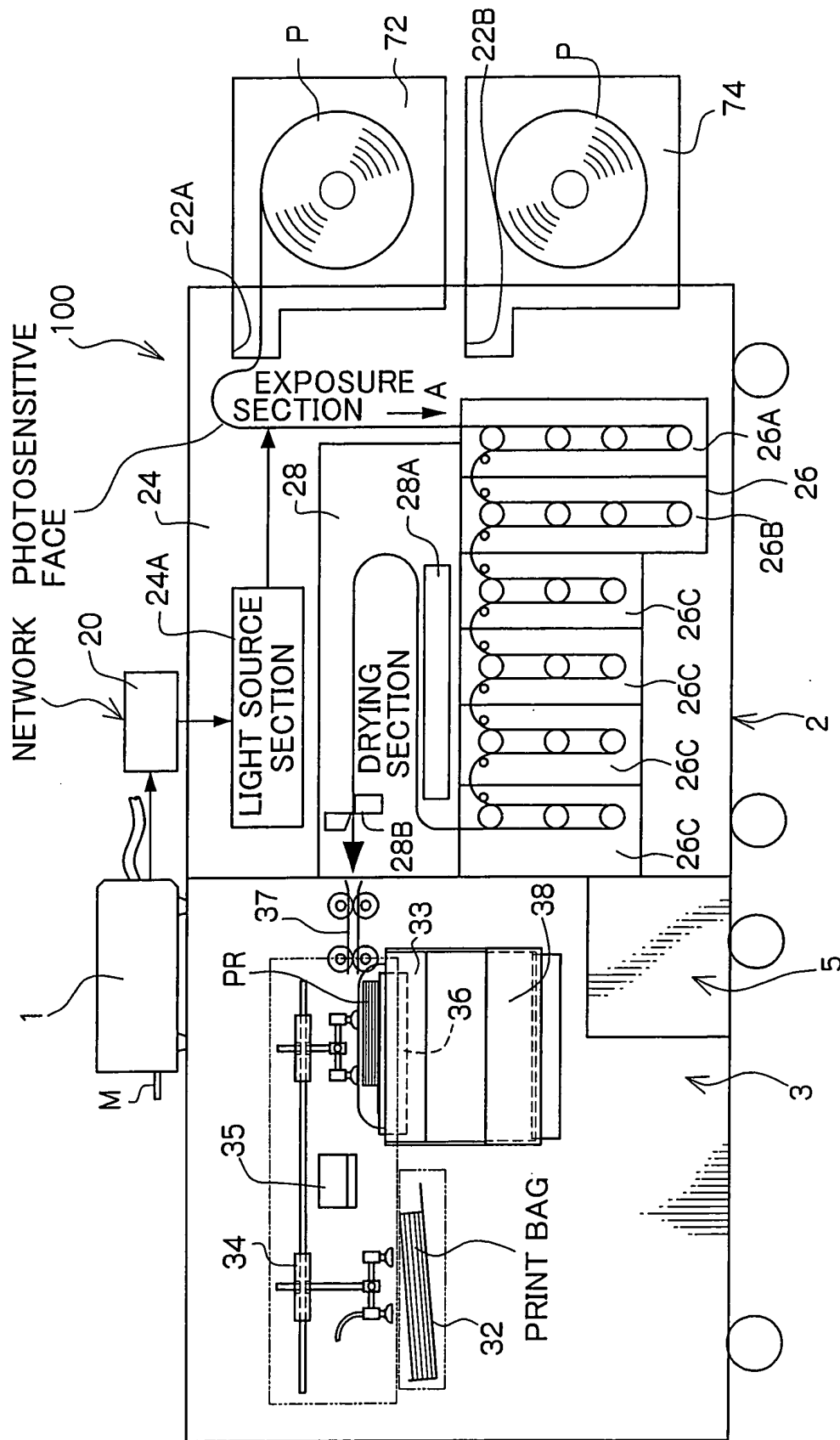


FIG.2

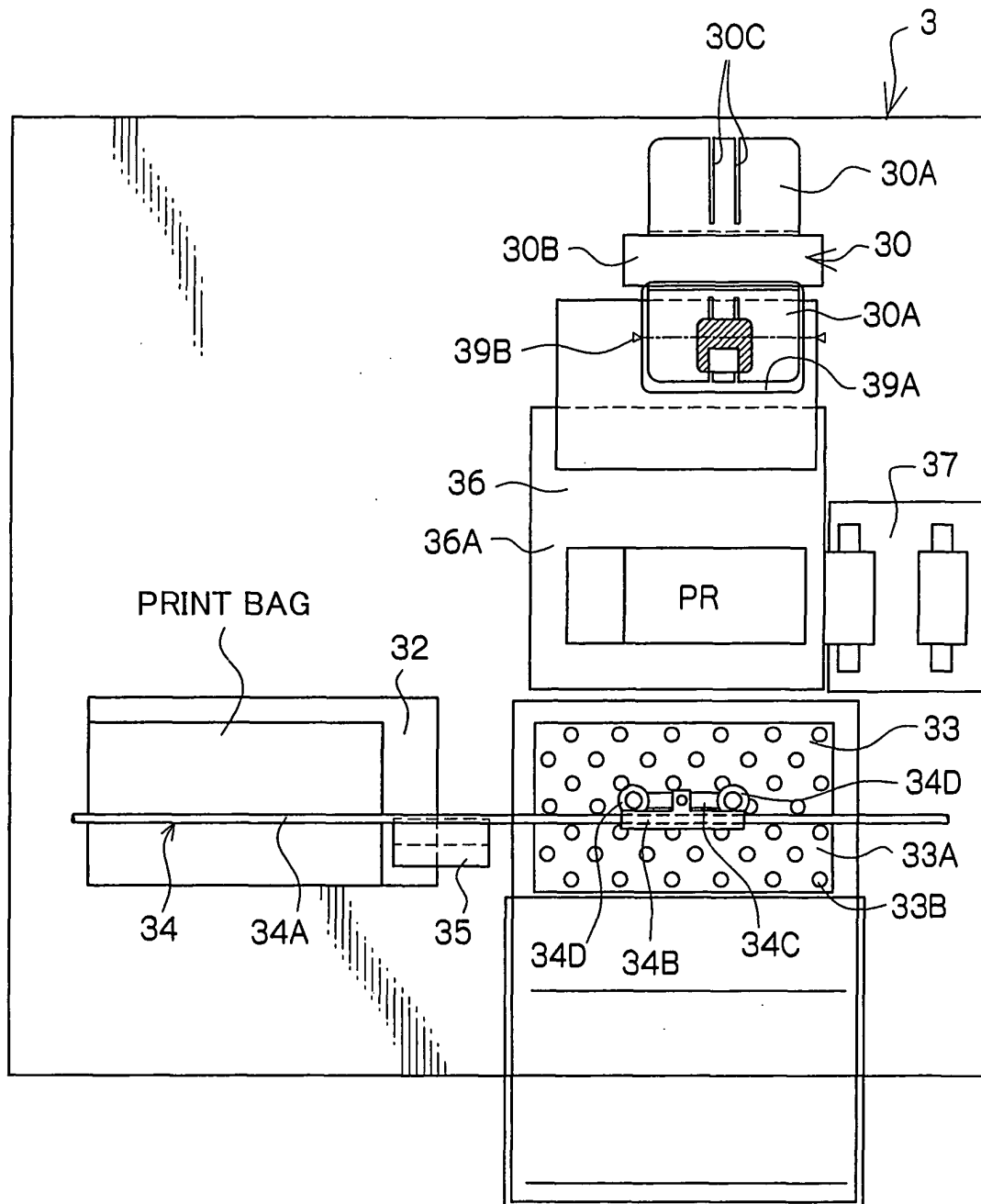


FIG.3

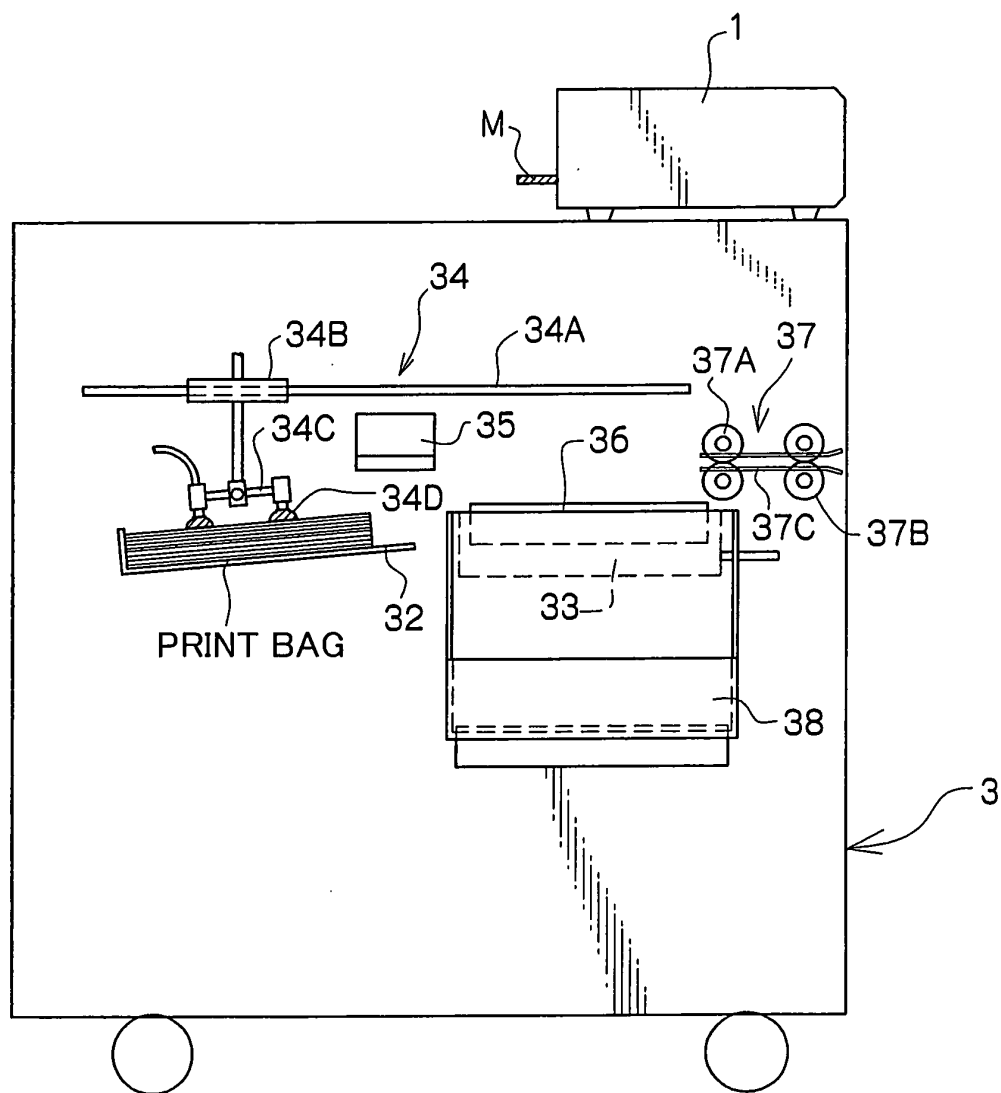


FIG.4

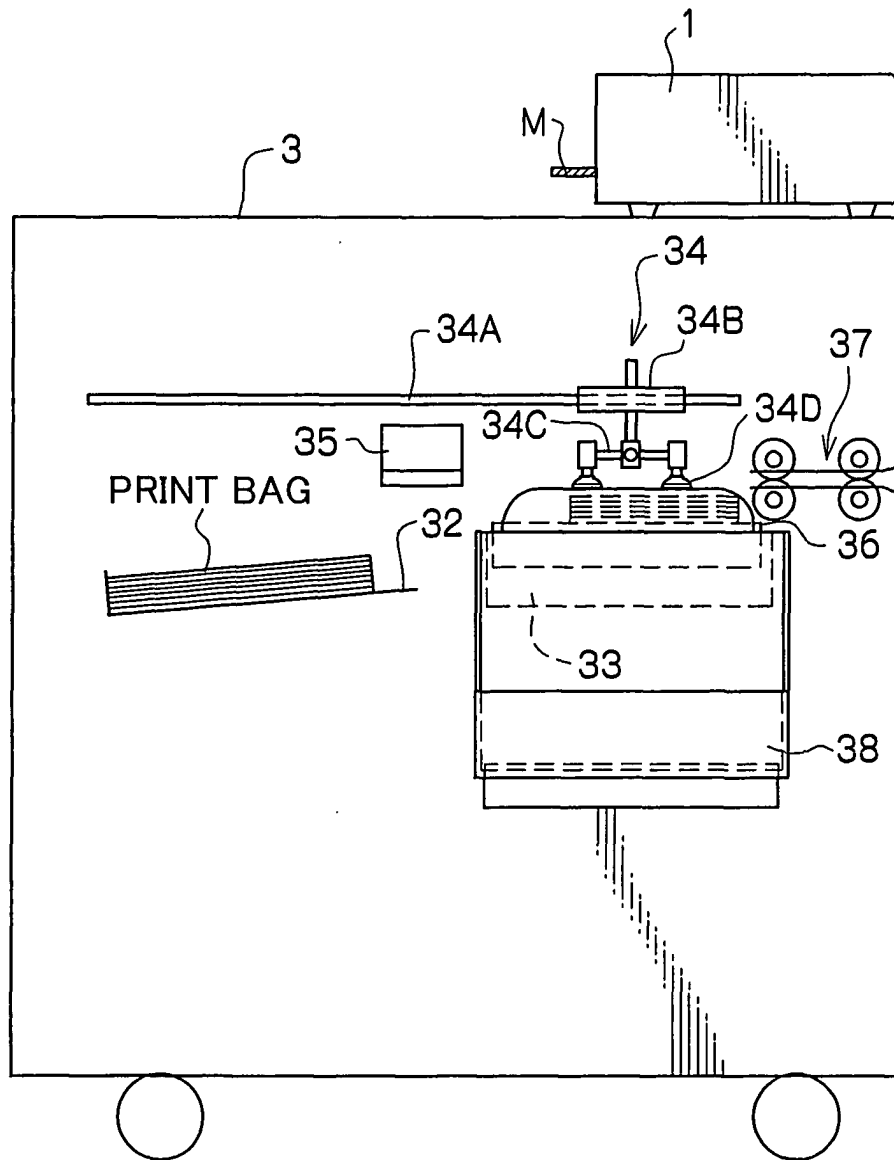


FIG.5

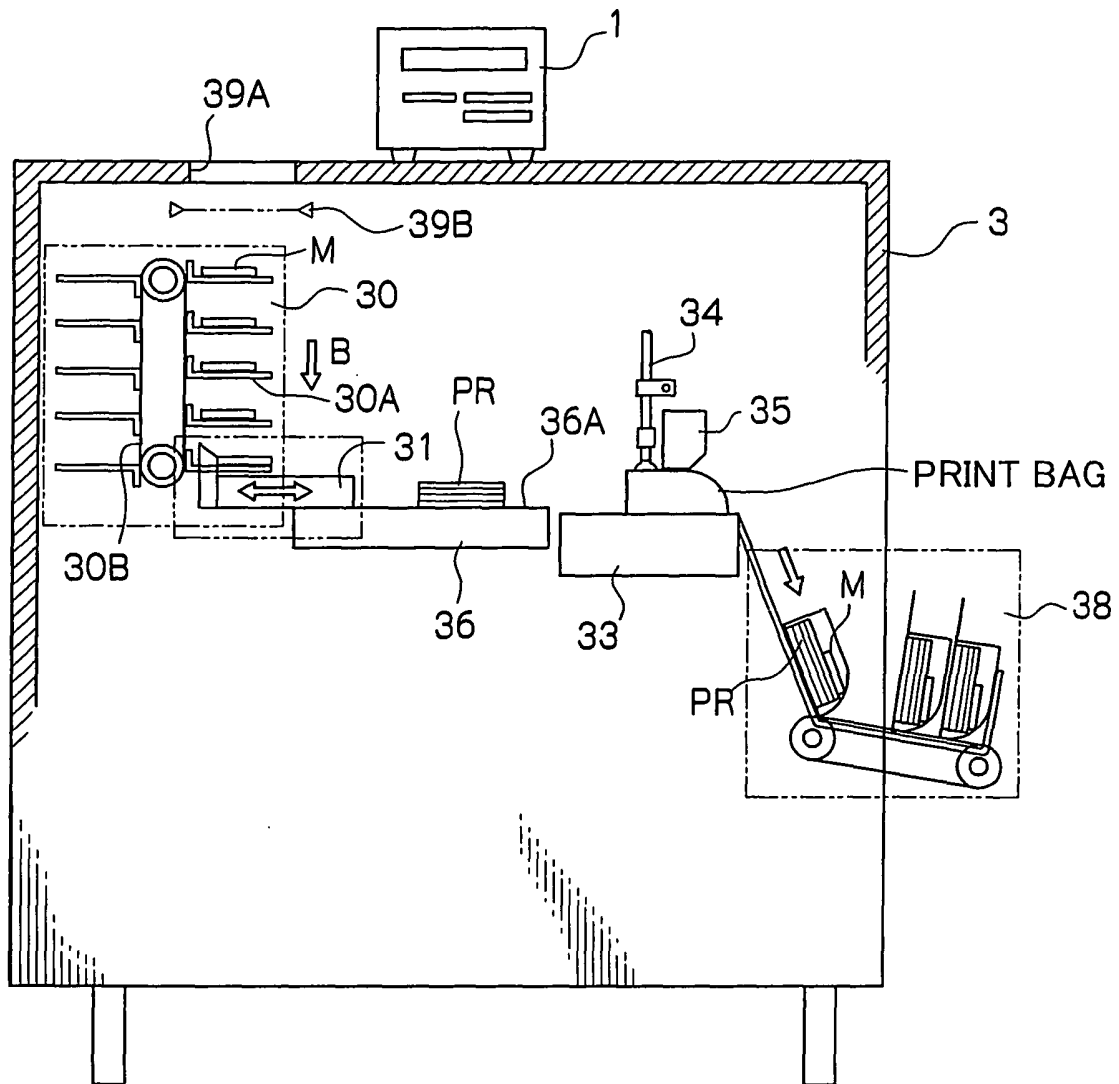
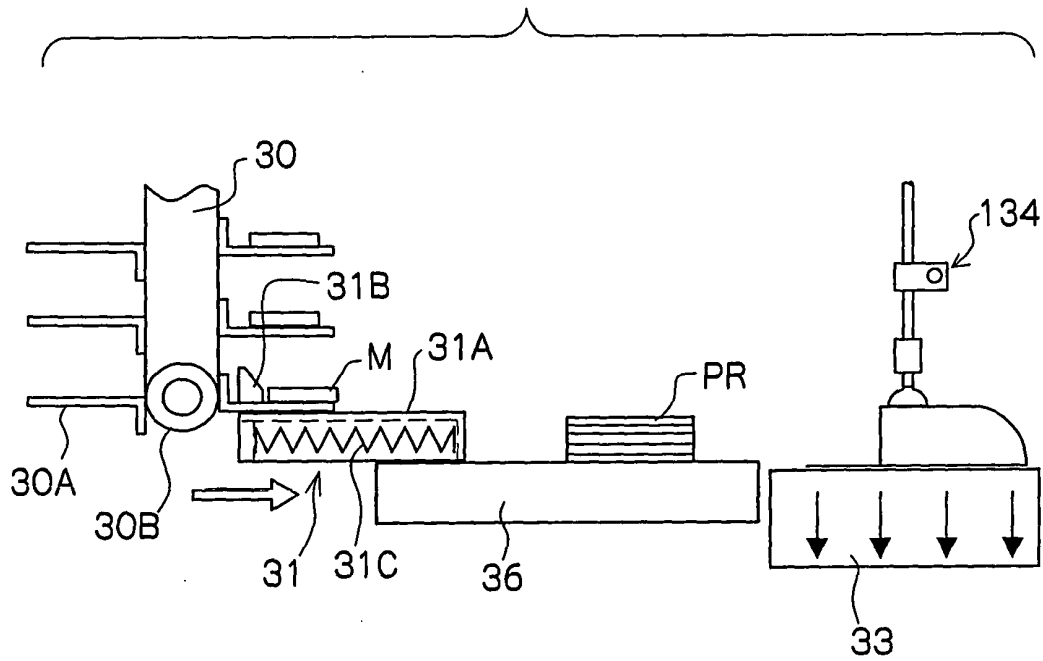


FIG.6



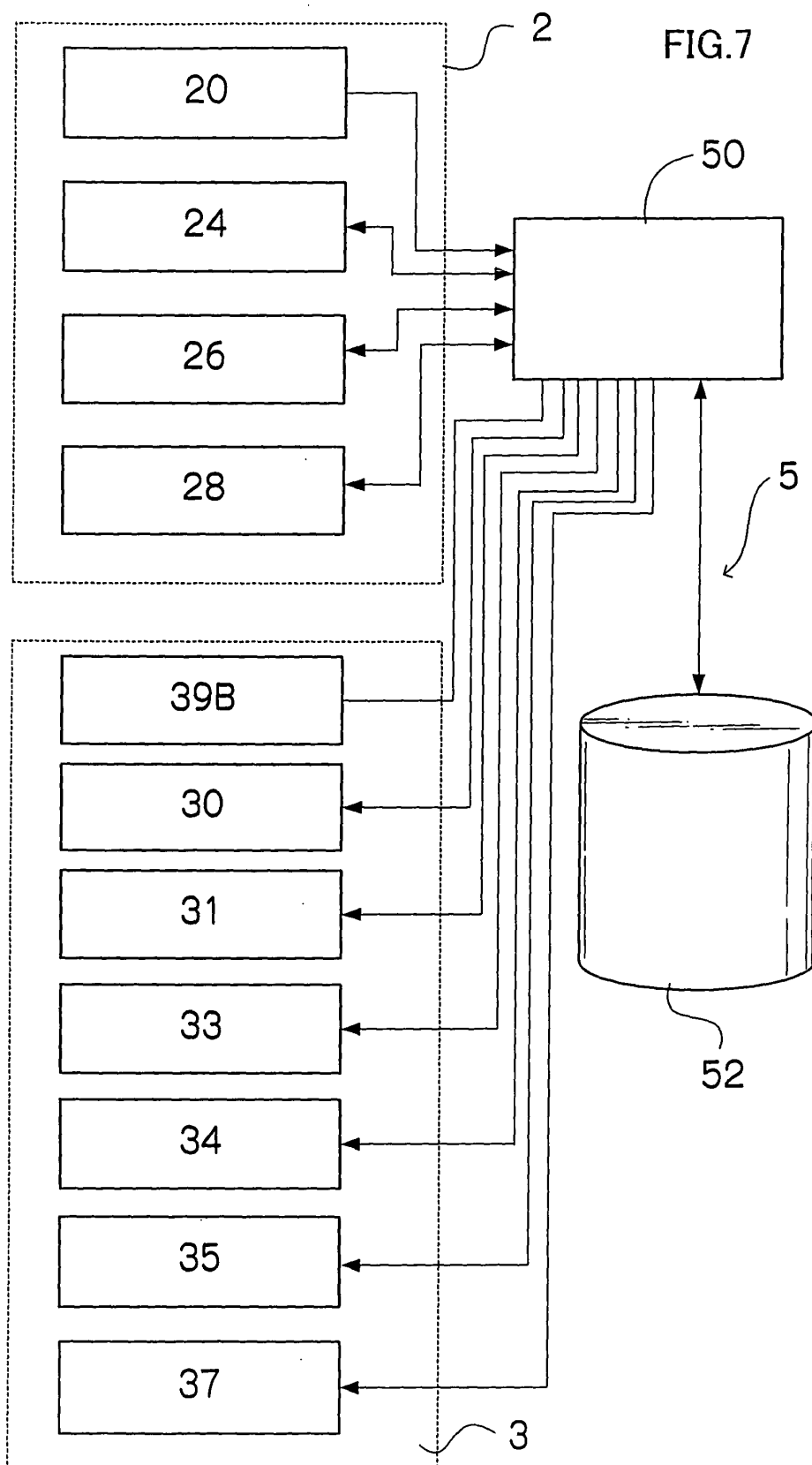


FIG.8

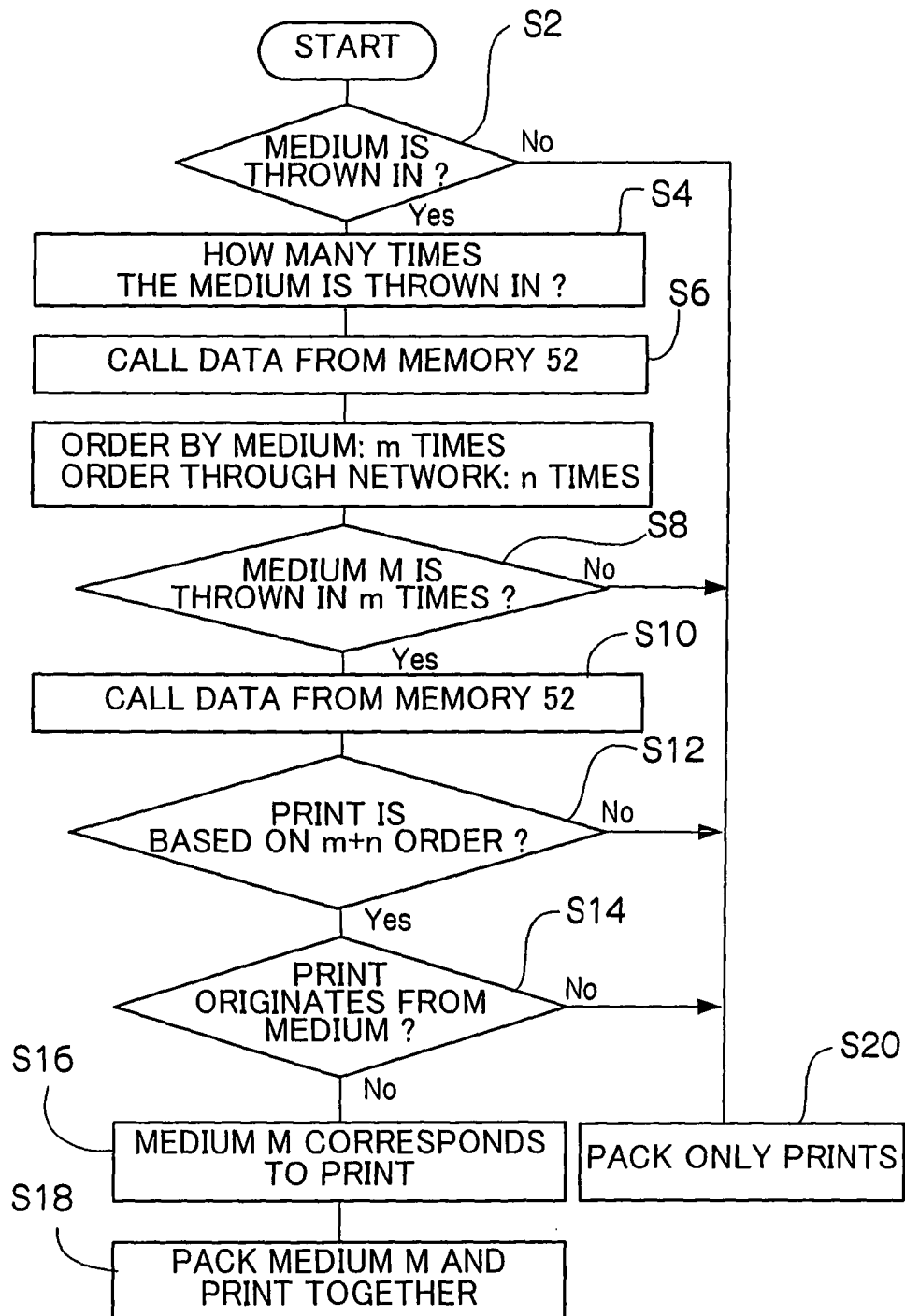


FIG.9A

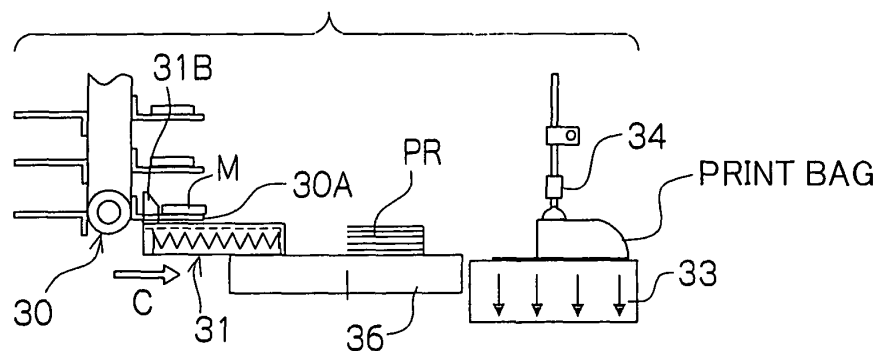


FIG.9B

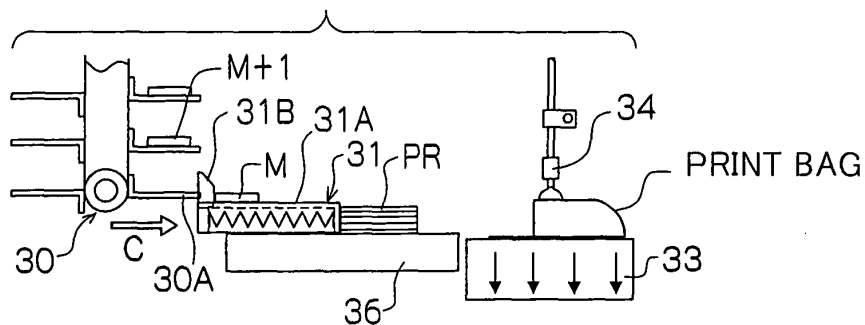


FIG.9C

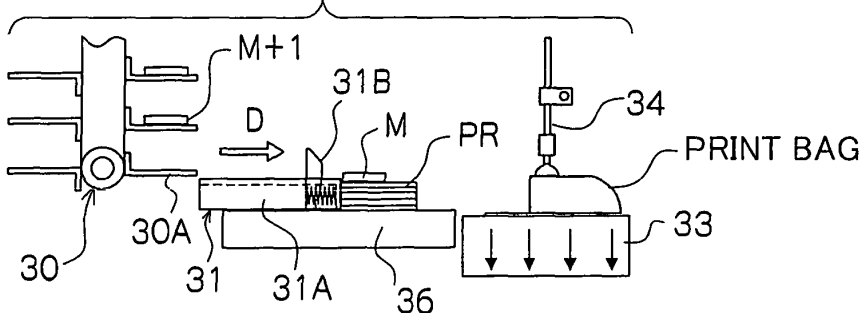


FIG.9D

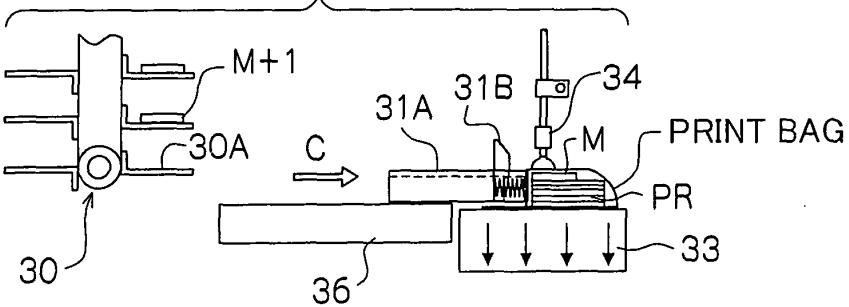


FIG.9E

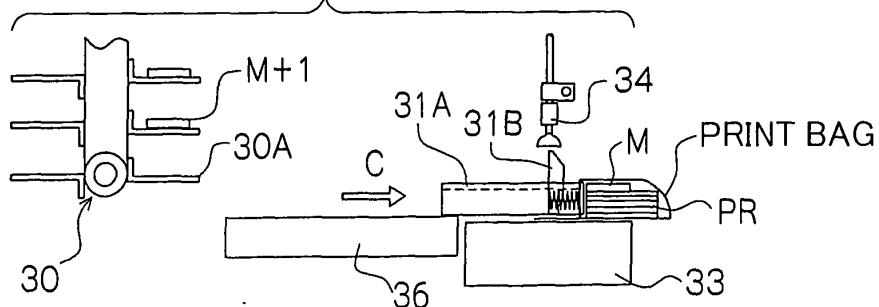


FIG.10A

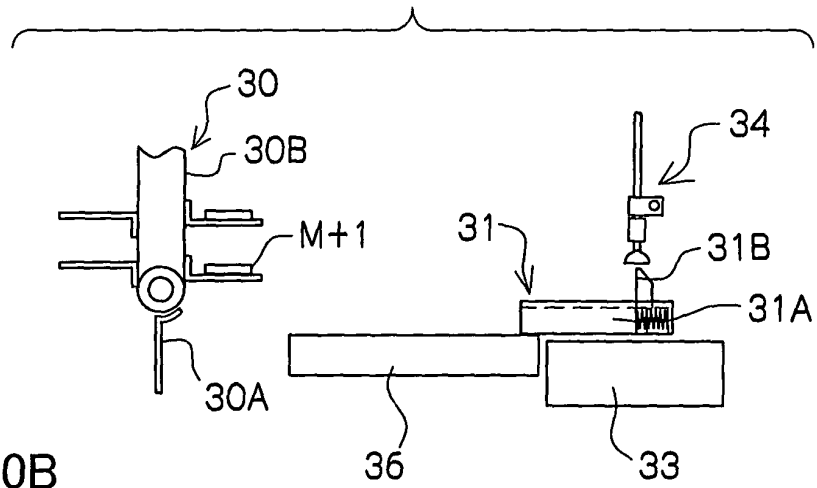


FIG.10B

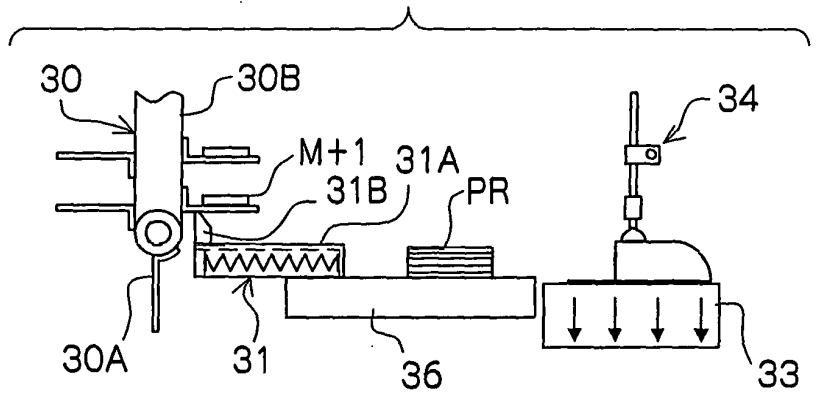


FIG.10C

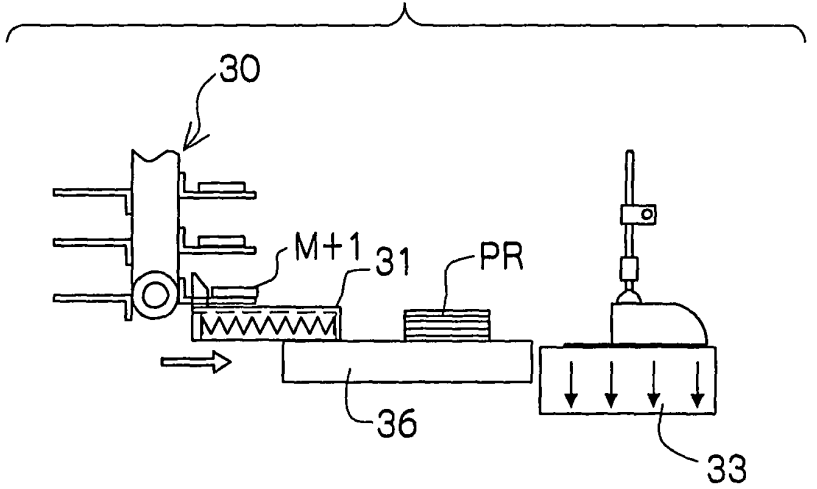


FIG. 11

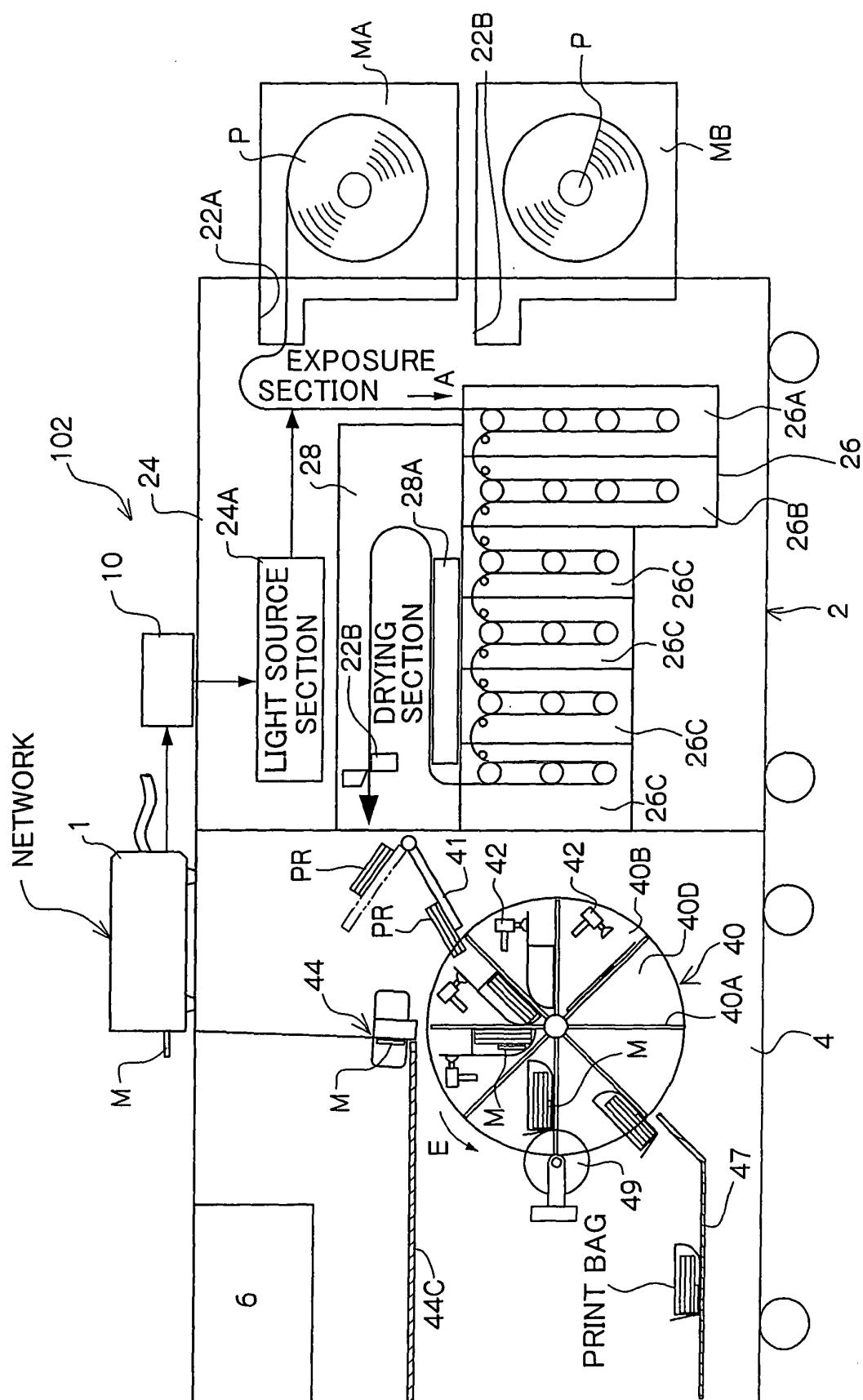


FIG.12

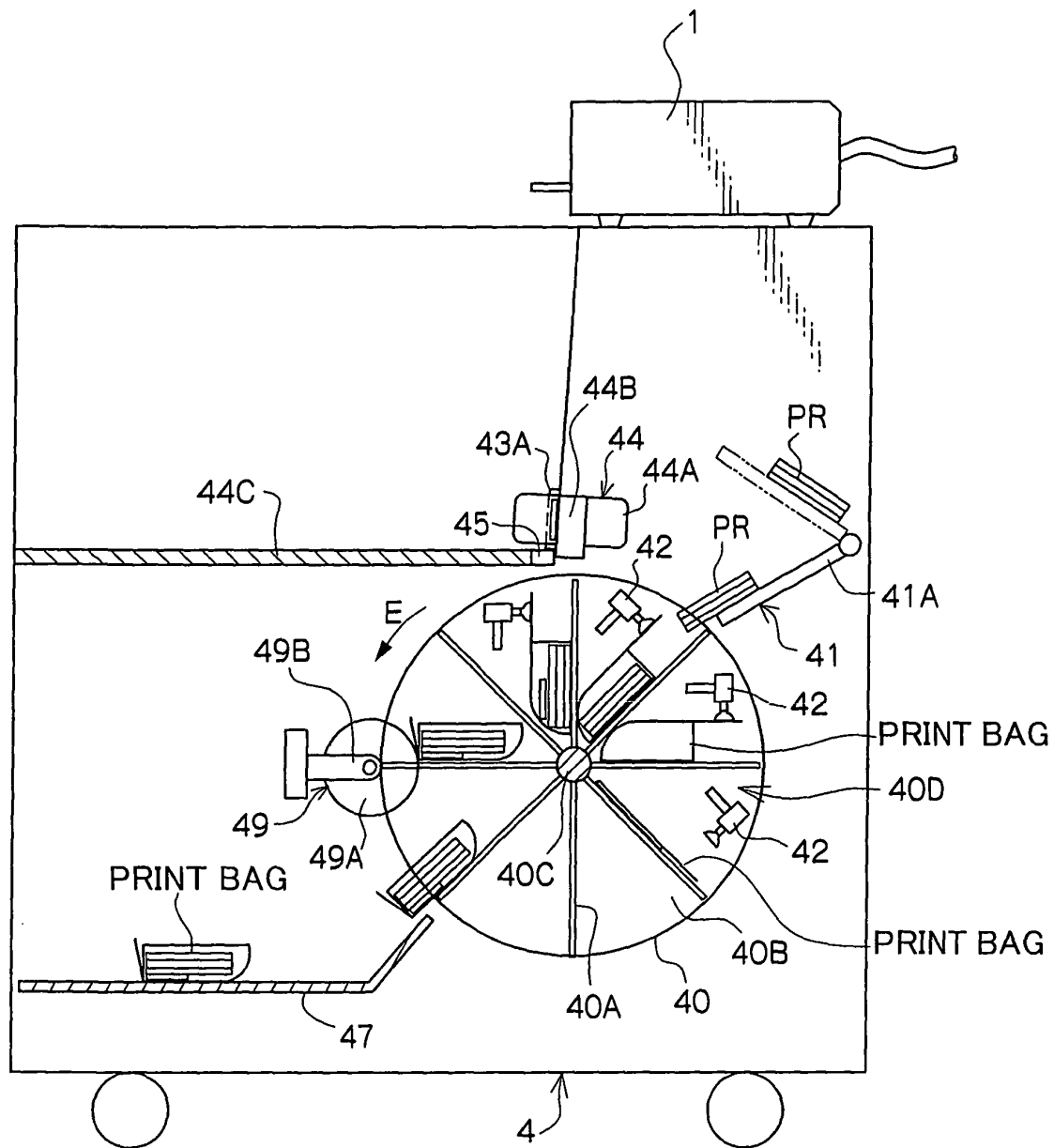


FIG.13

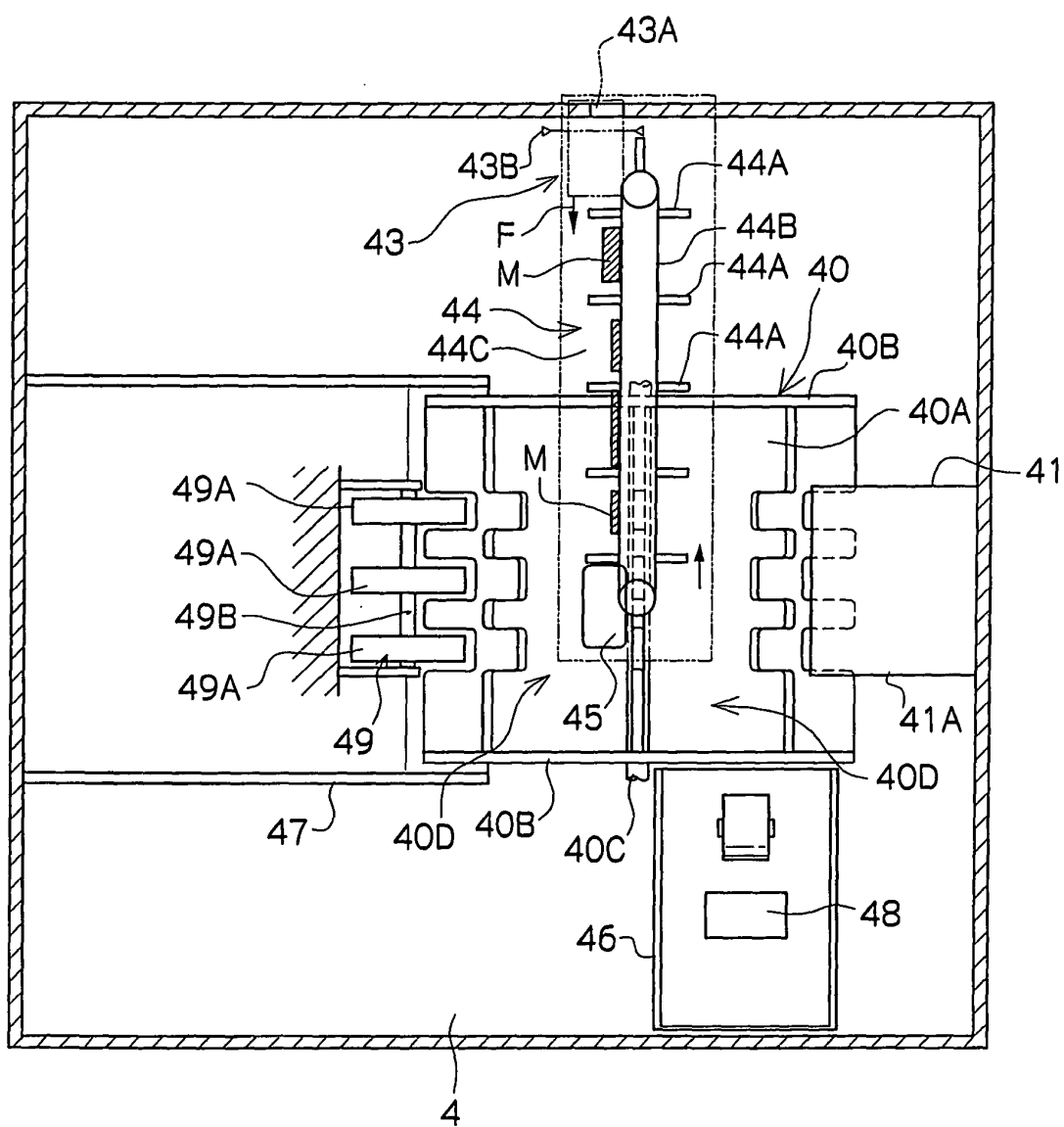
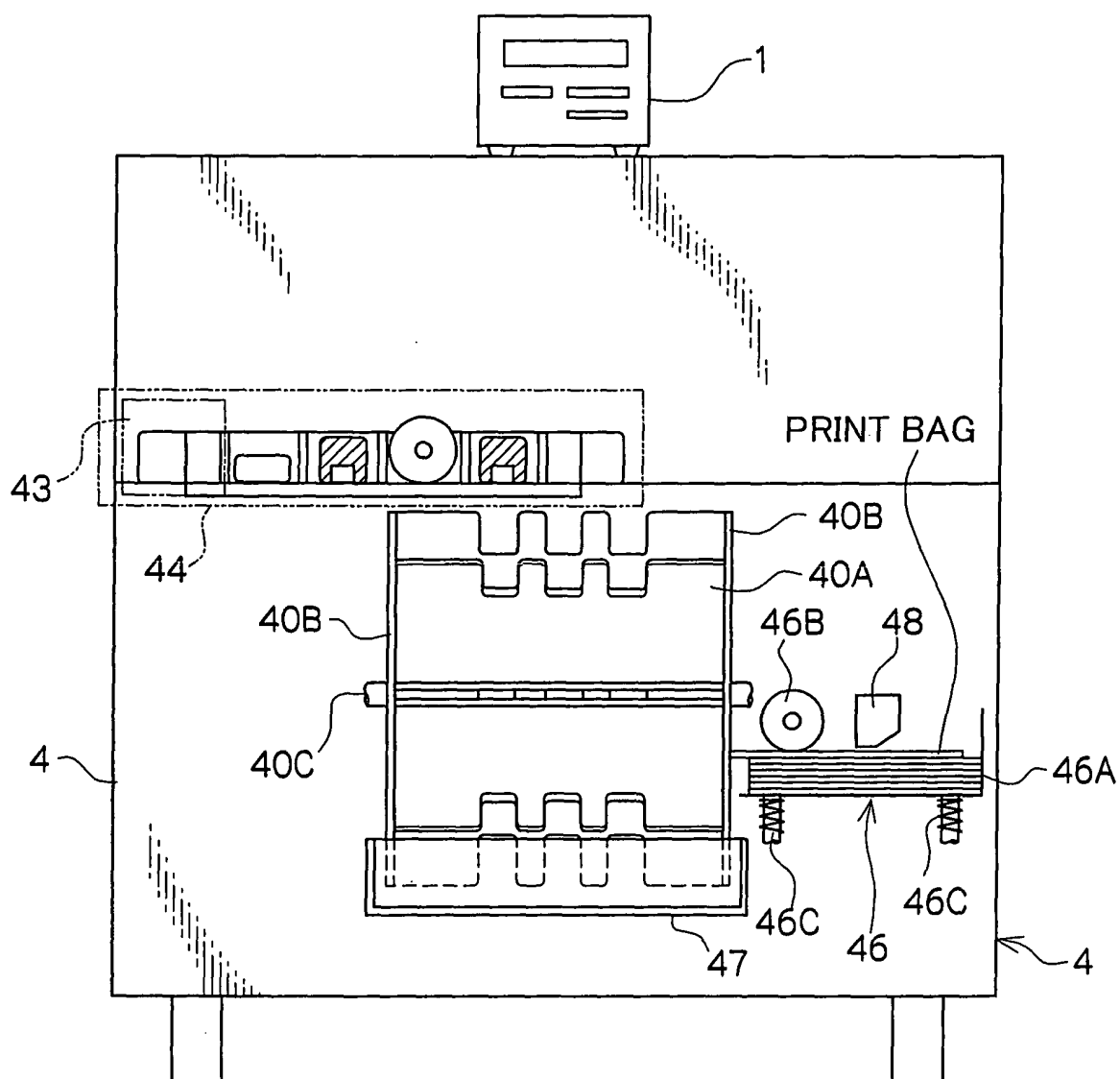
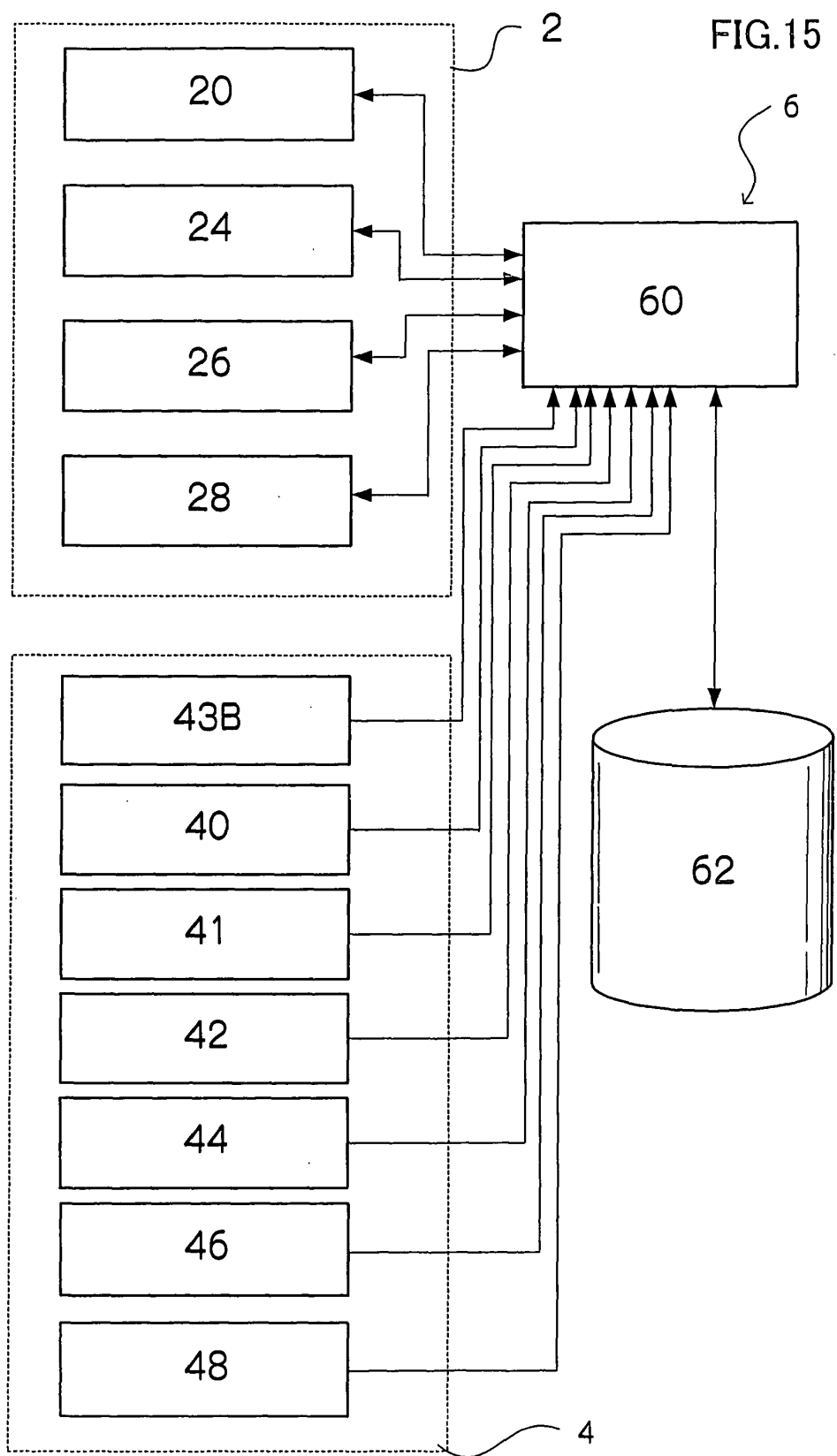


FIG.14







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 04 01 1067

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			G03D G06F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		7 September 2004	Boeykens, J
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