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(54) **DEVICE AND METHOD FOR CONNECTION/DISCONNECTION OF A DRYING-AIR CIRCUIT FOR A PRINTING PRESS**

(57) The printing machine comprises a printing group that applies an ink printout on a substrate resting on a central impression drum (18) supported between two framing walls (7), and a drying air circuit with a diffusing screen (1) that diffuses drying air over the newly printed ink and an apparatus supplying drying air to said diffusing screen (1) by means of delivery and suction ducts (31,

51) through an opening (14) formed in one of said framing walls (7). The device comprises a connection element (22) for connecting/disconnecting the delivery and suction ducts (31, 51) to/from respective inlet and outlet ports (9, 11) in said diffusing screen (1). This connection element (22) is accessible from an inside area of the printing machine located between the two framing walls (7).

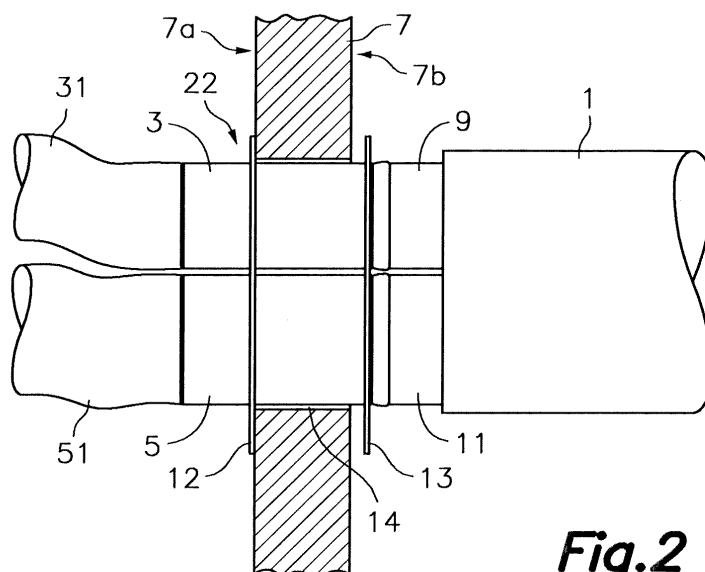


Fig.2

Description

Field of the art

[0001] The present invention relates generally to a drying air circuit connection/disconnection device and method for a printing machine, and more in particular to a device and a method for the connection or disconnection between ducts of the drying air circuit and drying air-diffusing screens of a printing machine from an inside area between framing walls of the printing machine.

Background of the invention

[0002] Printing machines, such as, for instance, flexographic printing machines, provided with drying air-diffusing screens for drying newly printed ink, are well known. For their proper operation, these diffusing screens require periodic cleaning and check-up, which are carried out by moving, generally in a swinging manner from its working position, a moving part of each diffusing screen in order to obtain access to its interior and to be able to check up and clean its components.

[0003] Said drying air-diffusing screens are located between two parallel framing walls that form a printing body of the printing machine and which support the ends of several rollers and other components necessary for printing, and delivery and suction ducts connecting the diffusing screens with a drying air supply apparatus are located on the outer side of one of the framing walls. The connection of these delivery and suction ducts with each diffusing screen is carried out by means of connecting elements through the framing wall.

[0004] In order to move the movable part of each diffusing screen, it is necessary to have previously disconnected said connecting elements. Access to the diffusing screens is carried out from the inside of the printing body, in an area located between the two framing walls, whereas access to said connecting elements is carried out from outside the corresponding framing wall.

[0005] The maintenance operation is typically as follows. An operator moves outside the printing body and disconnects the connecting elements from the diffusing screen. Then, he or she moves inside the printing body, between the two framing walls, where he or she carries out the movement of the movable part of the diffusing screen once it has been released from the connecting elements that were attaching it to the framing, and he or she carries out the maintenance tasks of the diffusing screen. In order to move the movable part of the diffusing screen, it is generally necessary to have previously released certain fastening elements. Then, once the diffusing screen has been cleaned, checked up and maintained, the operator places and fastens the moving part again in its working position and moves once again outside the framing walls so as to connect the connecting elements. This results in repeated movements of the operator that imply wasting time and the risk of possible

connection errors between components.

[0006] This waste of time and the risk of possible errors are maximised when the delivery and suction ducts are not both on the same side of the printing machine, but rather the delivery duct is on an outer side and the suction duct is on the opposite outer side, wherewith the operator must firstly access an outer side of the printing machine in order to disconnect the suction duct, then access the other outer side in order to disconnect the delivery duct; then, he or she will have to carry out the maintenance of the diffusing screen in the inner area between the two framing walls, and will finally have to proceed inversely in order to reconnect the delivery and suction ducts on the opposite outer sides of the printing machine.

[0007] Application PCT/ES2011/000174 describes an ink-drying device for a printing machine wherein each air-diffusing screen has an outer casing fastened to one of the framing walls and an inner casing sized to pass through a framing opening, so that it can be inserted into and removed from the outer casing by means of a movement in a direction substantially parallel to the axis of the impression drum. Valid as it is, this solution imposes the restraint of requiring enough room on the outer side of the framing for the movement of the inner casing of the diffusing screen substantially equal to the length of the diffusor, which in machines of large size may represent some difficulty.

Disclosure of the invention

[0008] The present invention contributes to lessening the above and other inconveniences by providing a drying air circuit connection/disconnection device and method for a printing machine, wherein said device, comprises an arrangement of pieces designed and assembled so that, without tools and with the operator always situated in a working area inside the printing body, between two framing walls of the printing machine, he or she is capable of connecting and disconnecting the diffusing screen of the ducts and carry out the maintenance tasks without the need of moving from the inside to the outside, and vice versa, of the printing body of the printing machine.

[0009] The device and method of the present invention are applicable to a printing machine of a known type, such as a flexographic printer, which comprises two framing walls between which one or more printing groups are arranged that apply an ink printout on a substrate supported on an impression drum. The printing machine further comprises a drying air circuit including one or more diffusing screens that diffuse drying air over the newly printed ink, and a drying air supplying apparatus that supplies drying air to said one or more diffusing screens by means of delivery and suction ducts through one or more openings formed in one of the framing walls or in both framing walls.

[0010] The connection/disconnection device of the present invention is characterized by comprising means for connecting/disconnecting said delivery and suction

ducts to/from respective inlet and outlet ports located on a side end of the diffusing screen, said connecting/disconnecting means being accessible from an inside area of the printing machine located between the two framing walls.

[0011] In some printing machines the inlet and outlet ports of each diffusing screen are located on the same side end of the diffusing screen, whereas in other printing machines the inlet port is located on one side end of the diffusing screen and the outlet port is located on the opposite side end. Therefore, in one embodiment said means for connecting/disconnecting said delivery and suction ducts comprise a single connection element when the delivery/suction ducts are on the same side of the machine, and in another embodiment the means for connecting/disconnecting the delivery and suction ducts comprise two independent connection elements located on opposite sides of the printing machine when the delivery and suction ducts are on opposite sides of the printing machine.

[0012] In one embodiment, said means for connecting/disconnecting the drying air circuit comprise a delivery coupling sleeve and a suction coupling sleeve respectively connected to the delivery and suction ducts. These delivery and suction coupling sleeves are inserted in said one or more openings of one or both of the framing walls, so that they are axially movable between a connected position, in which said delivery and suction coupling sleeves are respectively coupled with said diffusing screen inlet and outlet ports, and a disconnected position, in which the delivery and suction coupling sleeves are spaced apart from the diffusing screen inlet and outlet ports. Preferably, the delivery and suction ducts comprise flexible tube portions connected to said delivery and suction coupling sleeves so as to allow their movements.

[0013] In one embodiment, the delivery and suction coupling sleeves, together or individually, are attached to outer and inner plates parallel and adjacent to respective opposite outer and inner surfaces of the corresponding framing Wall. Said outer and inner plates are separated from each other by a distance greater than the framing wall thickness. The difference between said separation distance between the plates and the framing wall thickness is sufficient to allow for a shift of said outer and inner plates in the direction of the diffusing screen inlet and outlet ports until said connected position of the delivery and suction coupling sleeves is obtained, and a shift of said outer and inner plates in an opposite direction until the disconnected position of the delivery and suction coupling sleeves is obtained. In the connected position, the connection between the delivery and suction coupling sleeves and the inlet/output ports is completely airtight by virtue of the spatial configuration and arrangement thereof.

[0014] Advantageously, the outer plate abuts on said outer surface of the framing wall as a shift boundary towards the connected position of the delivery and suction coupling sleeves, whereas the inner plate abuts on said

inner surface of the framing wall as a shift boundary towards the disconnected position of the delivery and suction coupling sleeves. In one embodiment, the outer and inner plates are connected to each other by means of spacers inserted through one or more openings of the framing wall, and said spacers are preferably covered by friction bearings in contact with said openings, so that the spacers serve as a guide for the movement of the plates between the connected and disconnected positions of the delivery and suction coupling sleeves.

[0015] In one embodiment, the inner plate, which is located adjacent to said inner surface of the framing wall, is associated with a knob that can be operated by an operator for moving or facilitating the shift of the outer and inner plates and the delivery and suction coupling sleeves towards the connected position or the disconnected position, and a locking device of a conventional type is arranged to block the outer and inner plates and the delivery and suction coupling sleeves in the connected position relative to the diffusing screen. This way, an operator can unblock said locking device, actuate the knob for disconnecting the drying air circuit and open the movable part of the diffusing screen without moving from an area located between the two framing walls of the printing machine. Once the maintenance tasks have been carried out, the operator can close the movable part of the diffusing screen, actuate the knob for reconnecting the drying air circuit, and block the locking device, again without moving from the area located between the two framing walls of the printing machine.

[0016] The connection/disconnection method of the present invention comprises connecting/disconnecting the delivery and suction ducts to/from respective inlet and outlet ports located on a side end of the diffusing screen operating from an inside area of the printing machine located between the two framing walls.

[0017] In one particular embodiment, the method comprises arrange a delivery coupling sleeve and a suction coupling sleeve inserted in said framing wall opening and respectively connected to the delivery and suction ducts, and axially moving said delivery and suction coupling sleeves between a connected position, in which said delivery and suction coupling sleeves are respectively coupled with said inlet and outlet ports of the diffusing screen, and a disconnected position, in which the delivery and suction coupling sleeves are spaced apart from the inlet and outlet ports of the diffusing screen, operating on the delivery and suction coupling sleeves from inside the printing machine, between the two framing walls.

[0018] It is, therefore, a time saver and a measure of certainty that the equipment has been properly connected, since the check-up and maintenance tasks are carried out from a single working area wherein the diffusing screens are located.

Brief description of the drawings

[0019] The above and other features and advantages

will be more fully understood from the following detailed description of an exemplary embodiment with reference to the accompanying drawings, wherein:

Fig. 1 is a diagrammatic top plan view of a printing machine including a device for connecting/disconnecting a drying air circuit according to a first embodiment of the present invention;

Fig. 2 is a partial cutspaced apart view of the connection/disconnection device of Fig. 1 in a connected position;

Fig. 3 is a partial cutspaced apart view of the connection/disconnection device of Fig. 1 in a disconnected position;

Fig. 4 is a perspective view of elements forming the connection/disconnection device according to one variant of the first embodiment of the present invention;

Fig. 5 is a perspective view of elements forming the connection/disconnection device of Fig. 4 located relative to a diffusing screen of the printing machine;

Fig. 6 is a diagrammatic top plan view of a printing machine including a device for connecting/disconnecting a drying air circuit according to a second embodiment of the present invention;

Fig. 7 is a partial cutspaced apart view of a part of the connection/disconnection device of Fig. 6 corresponding to the delivery duct in a connected position; and

Fig. 8 is a partial cutspaced apart view of a part of the connection/disconnection device of Fig. 6 corresponding to the suction duct in a connected position.

Detailed description of an exemplary embodiment

[0020] Referring first to Fig. 1, there is shown a printing machine to which a device for connecting/disconnecting a drying air circuit has been applied according to a first embodiment of the present invention. Said printing machine comprises a framing formed by two framing walls 7 between which a central impression drum 18 rotatable about a shaft supported by its ends on said framing walls 7 is arranged. Around said central impression drum 18 several printing groups are arranged, although, for the sake of greater clarity of the drawing, only one printing group applies an ink printout on a substrate (not shown) supported on the central impression drum 18.

[0021] The printing machine further includes a drying air circuit comprising a plurality of diffusing screens 1, each of which is positioned downstream of the printing group and configured so that it diffuses drying air over the ink the unit has newly printed, although, for the sake of greater clarity of the drawing, only one diffusing screen 1 associated with the printing roller 20 is shown in Fig. 1. The drying circuit further includes a drying air supplying apparatus (not shown) that supplies drying air to said diffusing screens 1 by means of delivery and suction

ducts 31, 51 through one or more openings 14 (see Figs. 2 and 3) formed in one of said framing walls 7.

[0022] As shown in Figs. 2 and 3, the diffusing screen 1 has inlet and outlet ports 9, 11 located on the same side end thereof. The diffusing screen 1 has a fixed part and a moving part that must be removed for check-up and maintenance tasks, and said inlet and outlet ports 9, 11 are located on said moving part. The connection/disconnection device of the present invention comprises a delivery coupling sleeve 3 and a suction coupling sleeve 5 movably inserted in said opening 14 of the framing wall 7 of the printing machine. Said delivery coupling sleeve 3 is connected at the outer side of the framing wall 7 to a flexible portion of the delivery duct 31 and said suction coupling sleeve 5 is connected at the outer side of the framing wall 7 to a flexible portion of the suction duct 51.

[0023] The delivery and suction coupling sleeves 3, 5 are configured at the inner side of the framing wall 7 to engage the respective inlet and outlet ports 9, 11 of the diffusing screen 1 by contact so as to establish an airtight connection and facilitate the circulation of drying air along the circuit. The delivery and suction coupling sleeves 3, 5 are axially movable in said opening 14 of the framing wall 7 between a connected position, in which said delivery and suction coupling sleeves 3, 5 are respectively coupled with said inlet and outlet ports 9, 11 of the diffusing screen 1, and a disconnected position, in which the delivery and suction coupling sleeves 3, 5 are spaced apart from the inlet and outlet ports 9, 11 of the diffusing screen 1.

[0024] It is to be noted that means for connecting/disconnecting the delivery and suction coupling sleeves 3, 5 to/from the inlet and outlet ports 9, 11 are accessible from an inside area of the printing machine located between the two framing walls 7, so that an operator can disconnect the delivery and suction coupling sleeves 3, 5, carry out the maintenance tasks of the diffusing screen 1, and reconnect the delivery and suction coupling sleeves 3, 5 from a working area located between the two framing walls 7 of the printing machine.

[0025] For greater mobility of the elements, the delivery and suction coupling sleeves 3, 5 are attached to an outer plate 12 adjacent to an outer surface 7a of the framing wall 7 and to an inner plate 13 adjacent to an opposite inner surface 7b of the framing wall 7. The outer and inner plates 12, 13, together with the delivery and suction coupling sleeves 3, 5 make up a connection element 22 movable as a single piece. These outer and inner plates 12, 13 are larger than the opening 14 of the framing wall 7 and are separated from each other by a distance greater than the thickness of the framing wall 7. The difference between said separation distance between the plates 12, 13 and the thickness of the framing wall 7 is sufficient to allow for the shift of the assembly formed by said outer and inner plates 12, 13 and the delivery and suction coupling sleeves 3, 5 between the disconnected (Fig. 3) and connected (Fig. 4) positions, and vice versa.

[0026] This way, the outer plate 12 abuts on said outer surface 7a of the framing wall 7 as a shift boundary towards the connected position of the delivery and suction coupling sleeves 3, 5, whereas the inner plate 13 abuts on said inner surface 7b of the framing wall 7 as a shift boundary towards the disconnected position of the delivery and suction coupling sleeves 3, 5.

[0027] In one variant of the first embodiment shown in Figs. 4 and 5, the outer and inner plates 12, 13 of the connection element 22 are connected to each other by means of spacers 15 inserted through corresponding openings (not shown) formed in the framing wall 7, although they might optionally be passed through the same opening 14 wherein the delivery and suction coupling sleeves 3, 5 are inserted. These spacers 15 are covered by friction bearings 16 that, in use, are in contact with said openings, so that the spacers 15 serve as a guide for the movements of the connection element 22 between the connected and disconnected positions of the delivery and suction coupling sleeves 3, 5.

[0028] The inner plate 13, i.e., the plate located adjacent to said inner surface 7b of the framing wall 7, has a knob 17 attached thereto that can be pressed on from the working area located between the two framing walls 7 to effect the shift of the connection element 22 towards the disconnected position, or it can be pulled from so as to again shift the connection element 22 towards the connected position.

[0029] With reference now to Fig. 5, the diffusing screen 1 has a locking device 19, installed on its end adjacent to the inlet and outlet ports 9, 11, arranged to block the connection element 22 in the connected position relative to the diffusing screen 1. The locking device 19 may be a pressure lever lock or any other lock of a conventional type, so that the check-up and maintenance tasks can be carried out without the need for tools or disassembling any auxiliary pieces.

[0030] The diffusing screen 1 may further include an access hatch and handles 23 that may be grabbed for moving the movable part of the diffusing screen.

[0031] Figs. 6, 7 and 8 show a second embodiment of the connection/disconnection device for a drying air circuit for a printing machine according to the present invention. The main difference relative to the first embodiment described above in relationship with Figs. 1 to 5 is that here the inlet port 9 of the diffusing screen 1 is located on one side end thereof and the outlet port 11 on the other, opposite side and, accordingly, the drying air circuit includes a delivery duct 31 on the outer side of one of the framing walls 7 and a suction duct 51 on the outer side of the other of the framing walls 7.

[0032] As a result, the connection/disconnection device includes a first connection element 22a formed by the delivery coupling sleeve 3 inserted through an opening formed in one of the framing walls 7 and attached to corresponding outer and inner plates 12, 13, and a second connection element 22b formed by the suction coupling sleeve 5 inserted through an opening formed in the

other of the framing walls 7 and attached to corresponding outer and inner plates 12, 13. The operation of these first and second connection elements 22a, 22b is similar to that described above in relationship with the connection element 22 of the first embodiment.

[0033] A person skilled in the art will be able to introduce changes and modifications in the shown and described exemplary embodiments without departing from the scope of the present invention as defined in the enclosed claims.

Claims

1. A drying air circuit connection/disconnection device for a printing machine, said printing machine comprising two framing walls (7) between which at least one printing group is arranged applying an ink print-out on a substrate supported on an impression drum, as well as a drying air circuit including at least one diffusing screen (1) that diffuses drying air over said newly printed ink, a drying air supplying apparatus that supplies drying air to said diffusing screen (1) by means of delivery and suction ducts (31, 51) through at least one opening (14) formed in at least one of said framing walls (7), said connection/disconnection device being **characterized by** comprising connecting/disconnecting means for connecting/disconnecting said delivery and suction ducts (31, 51) to/from respective inlet and outlet ports (9, 11) of the diffusing screen (1), said connecting/disconnecting means being accessible from an inside area of the printing machine located between the two framing walls (7).
2. The drying air circuit connection/disconnection device according to claim 1, **characterized in that** said connecting/disconnecting means comprise a delivery coupling sleeve (3) and a suction coupling sleeve (5) respectively connected to the delivery and suction ducts (31, 51), said delivery and suction coupling sleeves (3, 5) being inserted in said at least one opening (14) of at least one of the framing walls (7) and being axially movable between a connected position, in which said delivery and suction coupling sleeves (3, 5) are respectively coupled with said inlet and outlet ports (9, 11) of the diffusing screen (1), and a disconnected position, in which the delivery and suction coupling sleeves (3, 5) are spaced apart from the inlet and outlet ports (9, 11) of the diffusing screen (1).
3. The drying air circuit connection/disconnection device according to claim 2, **characterized in that** the inlet and outlet ports (9, 11) of the diffusing screen (1) are located on one and the same side end of the diffusing screen (1) and said delivery and suction coupling sleeves (3, 5) are attached to outer and

- inner plates (12, 13) parallel and adjacent to respective opposite outer and inner surfaces (7a, 7b) of the corresponding framing wall (7), said outer and inner plates (12, 13) being separated from each other by a distance greater than the framing wall (7) thickness, said distance being sufficient so that, by shifting said outer and inner plates (12, 13) and the delivery and suction coupling sleeves (3, 5) in a first axial direction, said connected position of the delivery and suction coupling sleeves (3, 5) is obtained, whereas by shifting said outer and inner plates (12, 13) and the delivery and suction coupling sleeves (3, 5) in a second opposite axial direction, the disconnected position of the delivery and suction coupling sleeves (3, 5) is obtained.
4. The drying air circuit connection/disconnection device according to claim 2, **characterized in that** the inlet and outlet ports (9, 11) of the diffusing screen (1) are located on opposite side ends of the diffusing screen (1) and each of said delivery and suction coupling sleeves (3, 5) is attached to respective outer and inner plates (12, 13) parallel and adjacent to respective opposite outer and inner surfaces (7a, 7b) of each of the framing walls (7), said outer and inner plates (12, 13) being separated from each other by a distance greater than the corresponding framing wall (7) thickness, said distance being sufficient so that, by shifting said outer and inner plates (12, 13) and the corresponding delivery or suction coupling sleeve (3, 5) in a first axial direction, said connected position of the delivery or suction coupling sleeve (3, 5) is obtained, whereas by shifting said outer and inner plates (12, 13) and the corresponding delivery or suction coupling sleeve (3, 5) in a second opposite axial direction, the disconnected position of the delivery or suction coupling sleeve (3, 5) is obtained.
 5. The drying air circuit connection/disconnection device according to claims 3 or 4, **characterized in that** the outer plate (12) abuts on said outer surface (7a) of the framing wall (7) as a shift boundary towards the connected position of the delivery and suction coupling sleeves (3, 5), whereas the inner plate (13) abuts on said inner surface (7b) of the framing wall (7) as a shift boundary towards the disconnected position of the delivery and suction coupling sleeves (3, 5).
 6. The drying air circuit connection/disconnection device according to claims 3, 4 or 5, **characterized in that** said outer and inner plates (12, 13) are connected to each other by means of spacers (15) inserted through one or more openings of the framing wall (7).
 7. The drying air circuit connection/disconnection device according to claim 6, **characterized in that** said spacers (15) are covered by friction bearings (16) in contact with said openings, and they serve as a guide for the movement of the plates (12, 13) between the connected and disconnected positions of the delivery and suction coupling sleeves (3, 5).
 8. The drying air circuit connection/disconnection device according to any one of the claims 3 to 7, **characterized in that** the inner plate (13), which is located adjacent to said inner surface (7b) of the framing wall (7), is associated with a knob (17) operable for facilitating the shift of the outer and inner plates (12, 13) and the delivery and suction coupling sleeves (3, 5) towards the connected position or the disconnected position.
 9. The drying air circuit connection/disconnection device according to any one of the claims 3 to 8, **characterized in that** a locking device (19) is arranged to block the outer and inner plates (12, 13) and the delivery and suction coupling sleeves (3, 5) in the connected position relative to the diffusing screen (1).
 10. The drying air circuit connection/disconnection device according to claim 2, **characterized in that** said delivery and suction ducts (31, 51) comprise flexible tube portions connected to said delivery and suction coupling sleeves (3, 5).
 11. A drying air circuit connection/disconnection method for a printing machine, said printing machine comprising two framing walls (7) between which at least one printing group is arranged applying an ink print-out on a substrate supported on an impression drum, as well as a drying air circuit including at least one diffusing screen (1) that diffuses drying air over said newly printed ink, and a drying air supplying apparatus that supplies drying air to said diffusing screen (1) by means of delivery and suction ducts (31, 51) through at least one opening (14) formed in at least one of said framing walls (7), said connection/disconnection method being **characterized by** comprising connecting/disconnecting said delivery and suction ducts (31, 51) to/from respective inlet and outlet ports (9, 11) of the diffusing screen (1) operating from an inside area of the printing machine located between the two framing walls (7).
 12. The drying air circuit connection/disconnection method according to claim 11, **characterized by** comprising connecting/disconnecting said delivery and suction ducts (31, 51) to/from respective inlet and outlet ports (9, 11) located on one and the same side end of the diffusing screen (1) operating from an inside area of the printing machine located between the two framing walls (7).
 13. The drying air circuit connection/disconnection

method according to claim 11, **characterized by** comprising connecting/disconnecting said delivery and suction ducts (31, 51) to/from respective inlet and outlet ports (9, 11) located on opposite side ends of the diffusing screen (1) operating from an inside area of the printing machine located between the two framing walls (7).

14. The drying air circuit connection/disconnection method according to claim 11, 12 or 13, **characterized by** further comprising arranging a delivery coupling sleeve (3) and a suction coupling sleeve (5) inserted in said at least one opening (14) of at least one of the framing walls (7) and respectively connected to the delivery and suction ducts (31, 51), and axially moving said delivery and suction coupling sleeves (3, 5) between a connected position, in which said delivery and suction coupling sleeves (3, 5) are respectively coupled with said inlet and outlet ports (9, 11) of the diffusing screen (1), and a disconnected position, in which the delivery and suction coupling sleeves (3, 5) are spaced apart from the inlet and outlet ports (9, 11) of the diffusing screen (1).

Amended claims under Art. 19.1 PCT

1. A connection/disconnection device for a drying air circuit for a printing machine, said printing machine comprising two framing walls (7) between which at least one printing group is arranged applying an ink printout on a substrate resting on a print drum, as well as a drying air circuit including at least one diffusing screen (1) that diffuses drying air across said newly printed ink, a drying air supplying apparatus that supplies drying air to said diffusing screen (1) by means of delivery and suction ducts (31, 51) through at least one opening (14) formed in at least one of said framing walls (7), and means for connecting/disconnecting said delivery and suction ducts (31, 51) to/from respective inlet and outlet ports (9, 11) of the diffusing screen (1), said connecting/disconnecting means being accessible from an inside area of the printing machine located between the two framing walls (7), **characterized in that** said connecting/disconnecting means comprise a delivery coupling sleeve (3) and a suction coupling sleeve (5) respectively connected to the delivery and suction ducts (31, 51), said delivery and suction coupling sleeves (3, 5) being inserted in said at least one opening (14) of at least one of the framing walls (7) and being axially movable between a connected position, in which said delivery and suction coupling sleeves (3, 5) are respectively coupled with said inlet and outlet ports (9, 11) of the diffusing screen (1), and a disconnected position, in which the delivery and suction coupling sleeves (3, 5) are spaced apart

from the inlet and outlet ports (9, 11) of the diffusing screen (1).

2. The connection/disconnection device according to claim 1, **characterized in that** the inlet and outlet ports (9, 11) of the diffusing screen (1) are located on the same side end of the diffusing screen (1) and said delivery and suction coupling sleeves (3, 5) are attached to outer and inner plates (12, 13) parallel and adjacent to respective opposite outer and inner surfaces (7a, 7b) of the corresponding framing wall (7), said outer and inner plates (12, 13) being separated from each other by a distance greater than the framing wall (7) thickness, said distance being sufficient so that, by shifting said outer and inner plates (12, 13) and the delivery and suction coupling sleeves (3, 5) in a first axial direction, said connected position of the delivery and suction coupling sleeves (3, 5) is obtained, whereas by shifting said outer and inner plates (12, 13) and the delivery and suction coupling sleeves (3, 5) in a second opposite axial direction, the disconnected position of the delivery and suction coupling sleeves (3, 5) is obtained.
3. The connection/disconnection device according to claim 2, **characterized in that** the inlet and outlet ports (9, 11) of the diffusing screen (1) are located on opposite side ends of the diffusing screen (1) and each of said delivery and suction coupling sleeves (3, 5) is attached to respective outer and inner plates (12, 13) parallel and adjacent to respective opposite outer and inner surfaces (7a, 7b) of each of the framing walls (7), said outer and inner plates (12, 13) being separated from each other by a distance greater than the corresponding framing wall (7) thickness, said distance being sufficient so that, by shifting said outer and inner plates (12, 13) and the corresponding delivery or suction coupling sleeve (3, 5) in a first axial direction, said connected position of the delivery or suction coupling sleeve (3, 5) is obtained, whereas by shifting said outer and inner plates (12, 13) and the corresponding delivery or suction coupling sleeve (3, 5) in a second opposite axial direction, the disconnected position of the delivery or suction coupling sleeve (3, 5) is obtained.
4. The connection/disconnection device according to claims 2 or 3, **characterized in that** the outer plate (12) abuts on said outer surface (7a) of the framing wall (7) as a shift boundary towards the connected position of the delivery and suction coupling sleeves (3, 5), whereas the inner plate (13) abuts on said inner surface (7b) of the framing wall (7) as a shift boundary towards the disconnected position of the delivery and suction coupling sleeves (3, 5).
5. The connection/disconnection device according to claims 2, 3 or 4, **characterized in that** said outer

and inner plates (12, 13) are connected to each other by means of spacers (15) inserted through one or more openings of the framing wall (7).

6. The connection/disconnection device according to claim 5, **characterized in that** said spacers (15) are covered by friction bearings (16) in contact with said openings, and they serve as a guide for the movement of the plates (12, 13) between the connected and disconnected positions of the delivery and suction coupling sleeves (3, 5). 5
7. The connection/disconnection device according to any one of the claims 2 to 6, **characterized in that** the inner plate (13), which is located adjacent to said inner surface (7b) of the framing wall (7), is associated with a knob (17) operable for facilitating the shift of the outer and inner plates (12; 13) and the delivery and suction coupling sleeves (3, 5) towards the connected position or the disconnected position. 10
8. The connection/disconnection device according to any one of the claims 2 to 7, **characterized in that** a locking device (19) is arranged to block the outer and inner plates (12, 13) and the delivery and suction coupling sleeves (3, 5) in the connected position relative to the diffusing screen (1). 15
9. The connection/disconnection device according to claim 1, **characterized in that** said delivery and suction ducts (31, 51) comprise flexible tube portions connected to said delivery and suction coupling sleeves (3, 5). 20
10. A connection/disconnection method for a drying air circuit for a printing machine, said printing machine comprising two framing walls (7) between which at least one printing group is arranged applying an ink printout on a substrate resting on a print drum, as well as a drying air circuit including at least one diffusing screen (1) that diffuses drying air across said newly printed ink, and a drying air supplying apparatus that supplies drying air to said diffusing screen (1) by means of delivery and suction ducts (31, 51) through at least one opening (14) formed in at least one of said framing walls (7), said connection/disconnection method comprising connecting/disconnecting said delivery and suction ducts (31, 51) to/from respective inlet and outlet ports (9, 11) of the diffusing screen (1) operating from an inside area of the printing machine located between the two framing walls (7), **characterized by** further comprising having a delivery coupling sleeve (3) and a suction coupling sleeve (5) inserted in said at least one opening (14) of at least one of the framing walls (7) and respectively connected to the delivery and suction ducts (31, 51), and axially moving said delivery and suction coupling sleeves (3, 5) between a connected 25 30 35 40 45 50 55

position, in which said delivery and suction coupling sleeves (3, 5) are respectively coupled with said inlet and outlet ports (9, 11) of the diffusing screen (1), and a disconnected position, in which the delivery and suction coupling sleeves (3, 5) are spaced apart from the inlet and outlet ports (9, 11) of the diffusing screen (1).

11. The connection/disconnection method according to claim 10, **characterized by** comprising connecting/disconnecting said delivery and suction ducts (31, 51) to/from respective inlet and outlet ports (9, 11) located on the same side end of the diffusing screen (1) operating from an inside area of the printing machine located between the two framing walls (7).
12. The connection/disconnection method according to claim 10, **characterized by** comprising connecting/disconnecting said delivery and suction ducts (31, 51) to/from respective inlet and outlet ports (9, 11) located on opposite side ends of the diffusing screen (1) operating from an inside area of the printing machine located between the two framing walls (7).

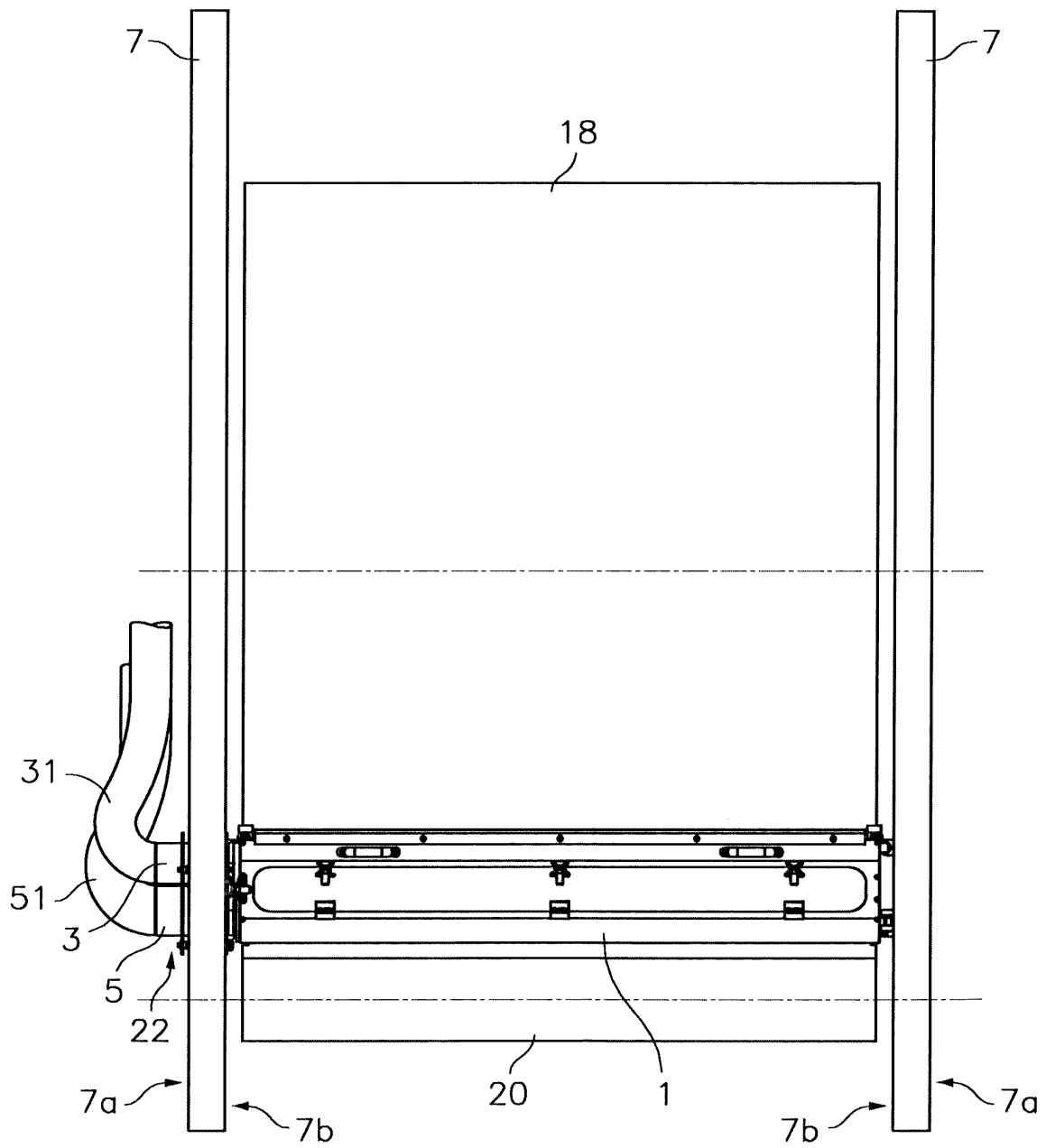
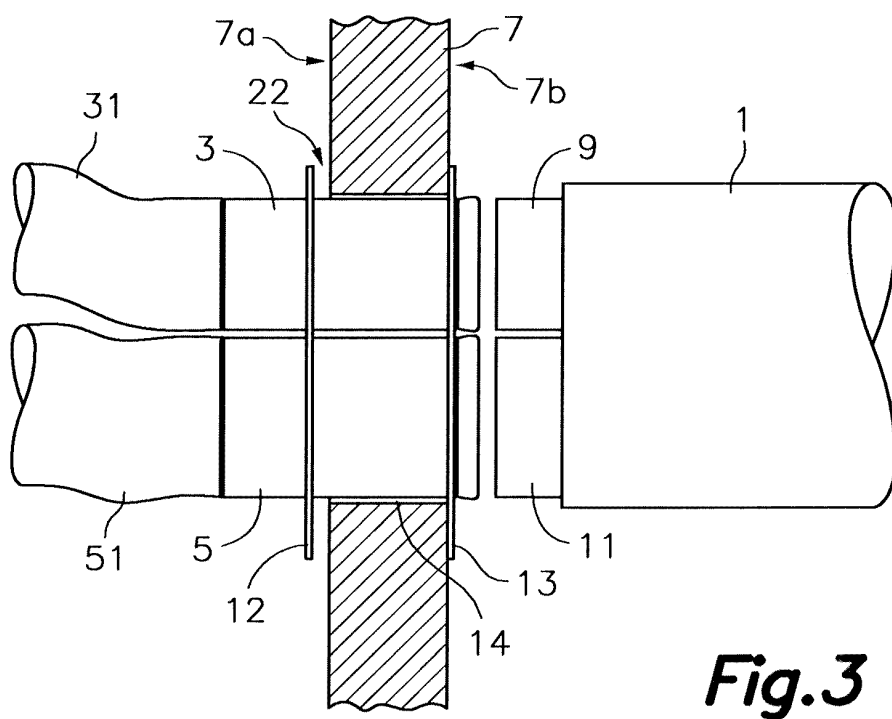
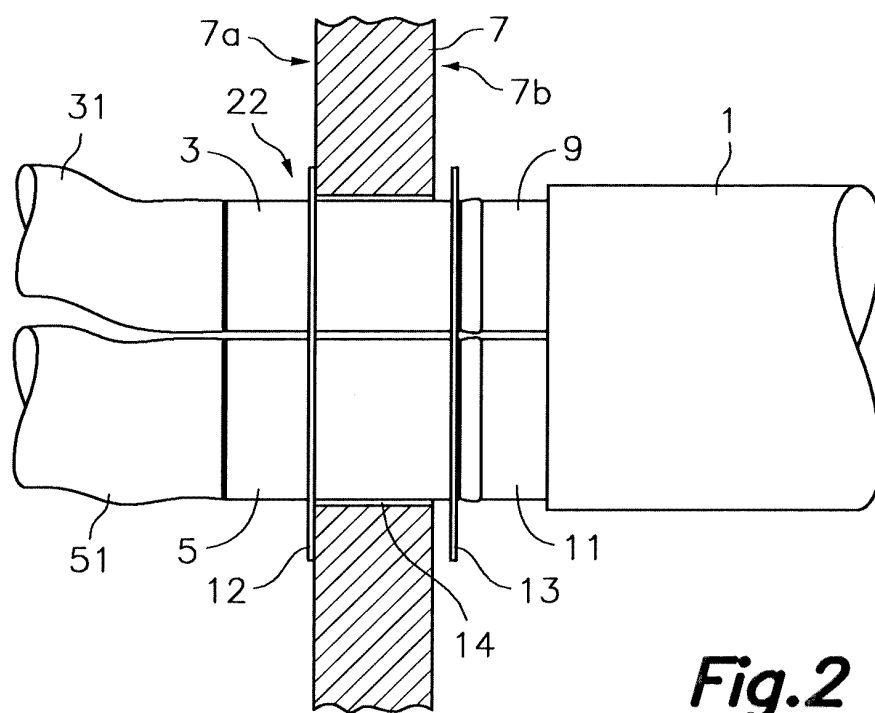


Fig. 1



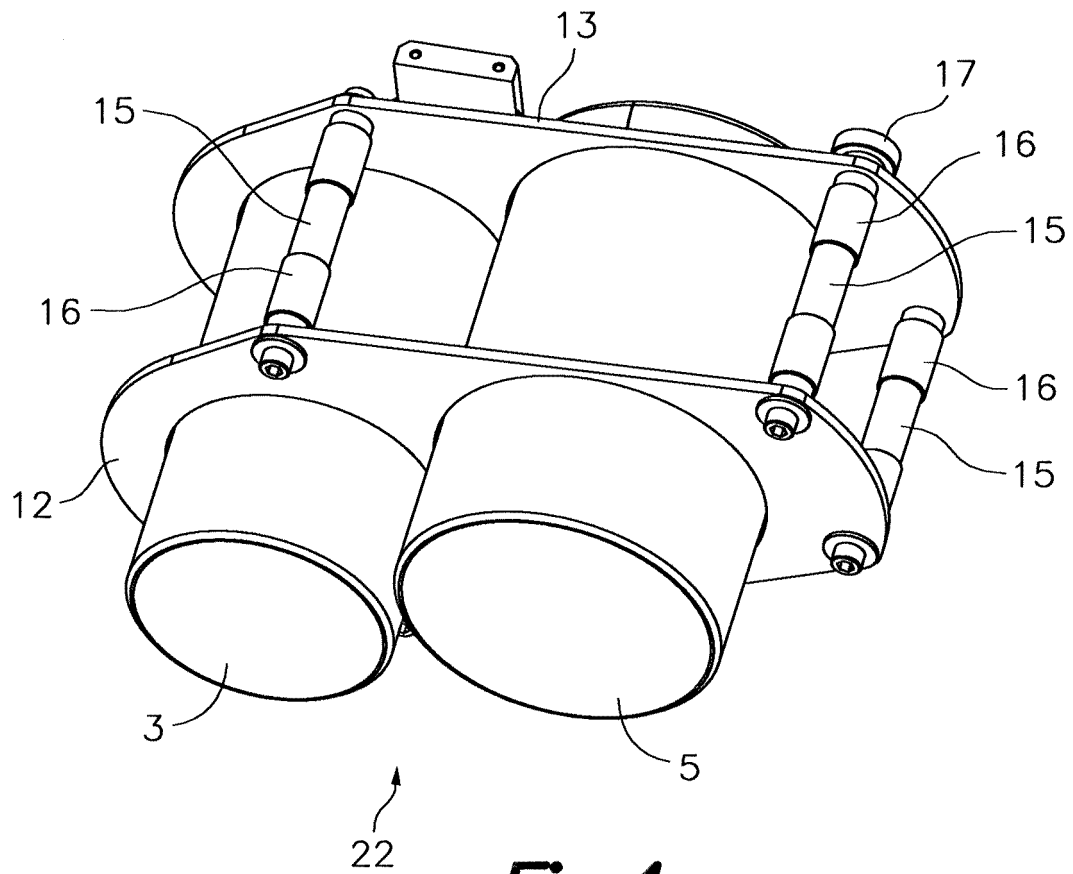


Fig. 4

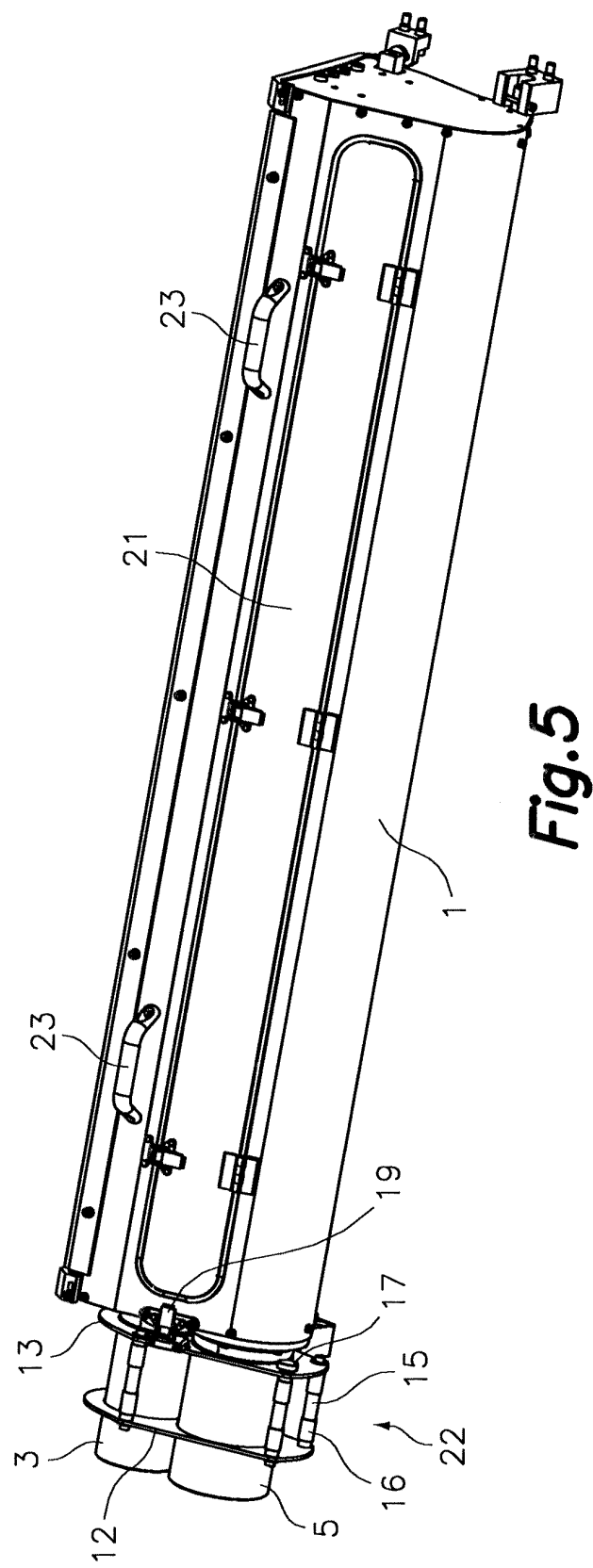


Fig. 5

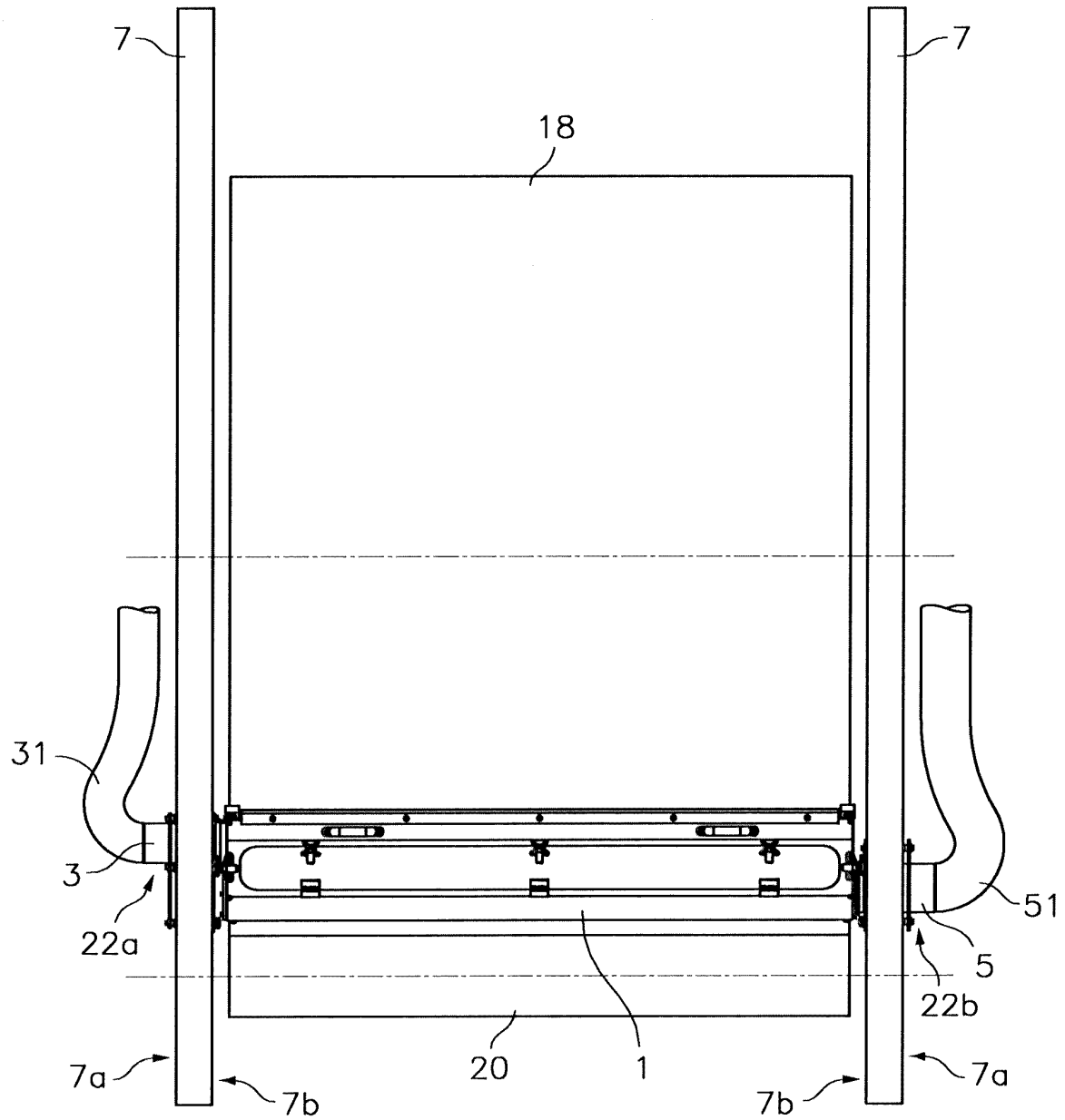
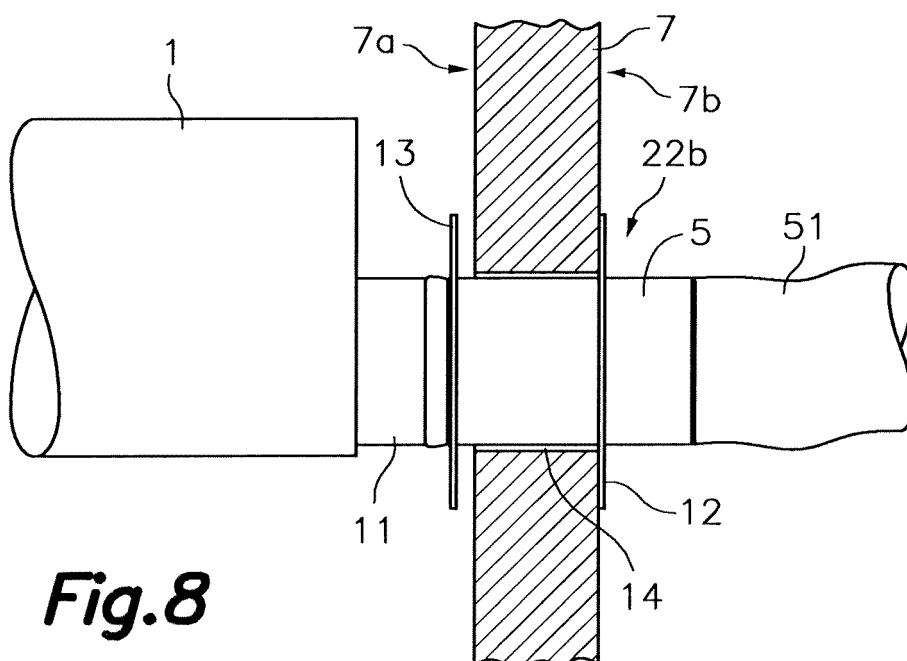
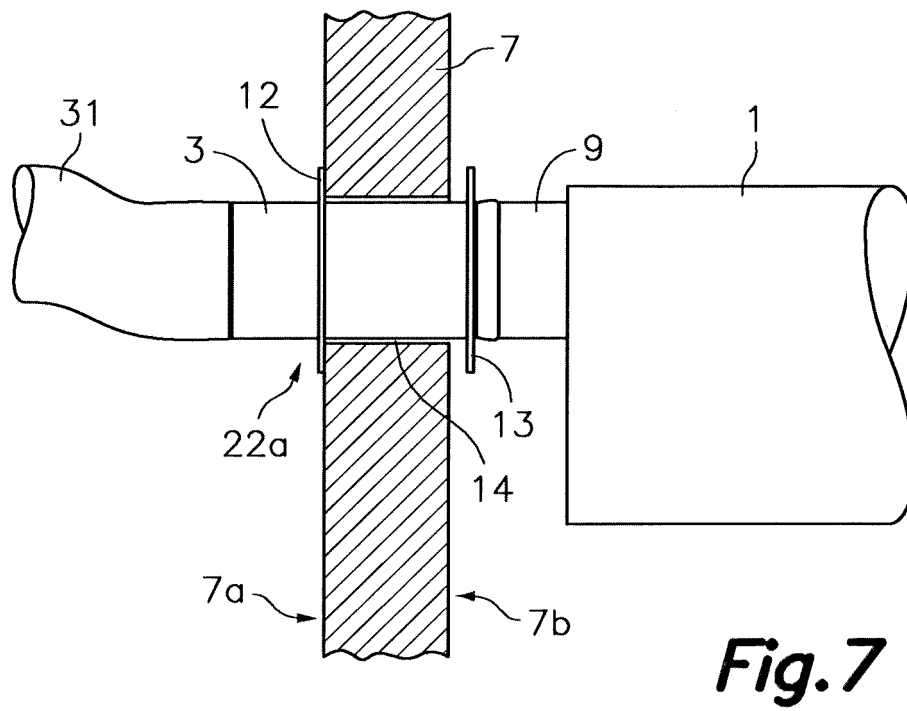


Fig. 6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2012/000221

A. CLASSIFICATION OF SUBJECT MATTER

B41F23/04 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B41F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1597077 A1 (WINDMOELLER & HOELSCHER) 23/11/2005, paragraphs[0019 - 0023]; figures.	1-14
A	DE 4308712 A1 (WINDMOELLER & HOELSCHER) 22/09/1994, the whole document.	1-14
A	DE 19903607 A1 (WINDMOELLER & HOELSCHER) 03/08/2000, column 2, line 24 - column 3, line 41; figures.	1-14
A	EP 1044813 A2 (PAPER CONVERTING MACHINE CO) 18/10/2000, Abstract from DataBase EPODOC. Retrieved from EPOQUE; figures.	1-14

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search
03/12/2012Date of mailing of the international search report
(05/12/2012)

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2012/000221

Information on patent family members

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
EP1597077 AB	23.11.2005	WO2004071769 A EP20040701000 US2006137552 A AT427832 T ES2322355 T	26.08.2004 09.01.2004 29.06.2006 15.04.2009 19.06.2009
DE4308712 AB	22.09.1994	ITBZ940015 A IT1278306 B GB2276123 AB US5507229 A ES2112111 AB	19.09.1994 17.11.1997 21.09.1994 16.04.1996 16.03.1998
DE19903607 A	03.08.2000	CA2297383 A FR2789011 A KR20000053436 A GB2349848 A ITMI20000048 A IT1316274 B TW480219 B ES2177378 AB	29.07.2000 04.08.2000 25.08.2000 15.11.2000 18.07.2001 10.04.2003 21.03.2002 01.12.2002
EP1044813 AB	18.10.2000	CA2299745 AC EP20000104658 JP2000318123 A US6176184 B MXPA00003429 A DE1044813 T DE60010170 T ES2219217 T BR0015852 A	16.10.2000 03.03.2000 21.11.2000 23.01.2001 08.03.2002 10.04.2003 26.08.2004 01.12.2004 06.06.2006

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- ES 2011000174 W [0007]