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Entry-level office mailing machine

(57)

An office mailing machine for printing mail items M of the type comprising:
 -a frame (10) with an opening (10a) for manually inserting and removing the mail item;
 -an print head (20) supported by a carriage (22) sliding in a longitudinal direction for printing the mail item;
 -an item transverse moving mechanism (70) for moving the mail item in a direction transverse to the longitudinal direction;
 -an item registration arrangement (80) for positioning the mail item and maintaining it in a perpendicular direction at a constant gap from the print head; and
 -an electronic control module (90) for starting and per-

forming a print cycle;

 characterized in that it further comprises a single drive mechanism (60) connected to the print head supporting carriage (22) for simultaneously:
 (a) moving the carriage back-and-forth along the longitudinal direction;
 (b) indexing the mail item by controlling the item transverse moving mechanism (70) according to information data to be printed on the mail item; and;
 (c) registering the mail item during printing by controlling the item registration arrangement (80).

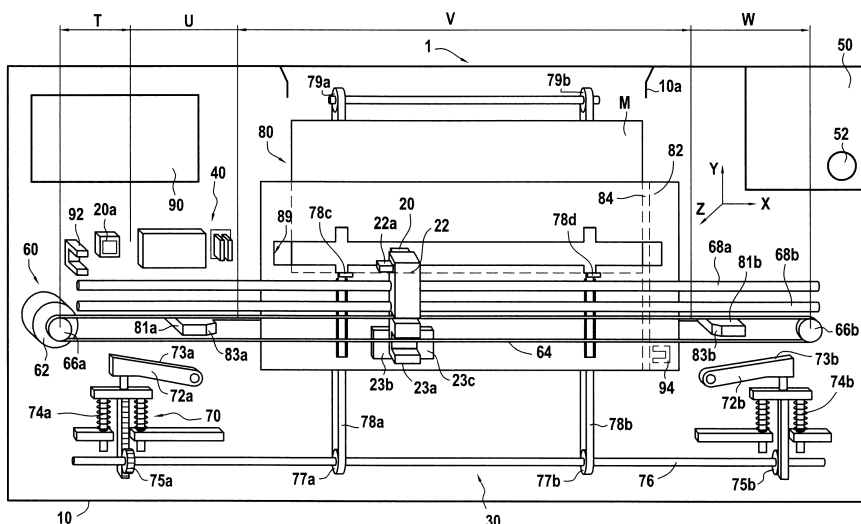


FIG.1

Description

TECHNICAL FIELD

[0001] The present invention relates to the mailing field and in particular to an entry-level office machine of the office type.

BACKGROUND

[0002] Prior art comprises several references on compact franking machines with a manual insertion of mail items.

[0003] EP 0 405 356 relates to an office machine which comprises two ink jet printing heads, each with a row of nozzles in limited number on a base of the head, a source of data for matrix definition of areas to be printed by the heads, means for movement in X and Y of the two heads over the article, the means being controlled over the duration of a cycle, for simultaneous scanning of two areas assigned to the heads respectively, along successive lines and with printing of the lines in these areas, and for return without printing of the heads over the areas, and means triggering off the start of the cycle when the article is present under the heads and controlling the end of the cycle. The machine mainly performs franking of articles, but also their addressing and the issuing of account slips; it is additionally usable for the ordered production of fixed data defining areas to be printed.

[0004] The use of two motors associated with two print heads movable in two directions complicates the architecture and the control of this office machine while raising its overall cost.

[0005] EP 0 980 761 discloses a print head transport mechanism of a postage meter for printing postal indicia which are of greater height than a printing height of a print head comprises a carriage to traverse the print head in a first direction over a band of a print receiving area and a guide to displace the print head from a home position to an index position during a second traverse of the print head in a reverse direction whereby the print head traverses over a second band, adjacent the first band, of the print receiving area during the second traverse.

In this case, a single motor is used to drive the print head in two perpendicular directions X and Y, but the displacement in the second direction is limited to one additional print swath. Therefore this machine is not capable of printing over the entire surface of the envelope.

[0006] EP 0 650 845 describes a shuttle-type printer including a media feed assembly to controllably transfer a recording media through a printing station and a carriage operably mounted at the printing station to move bidirectionally across the media. The printer further includes means mechanically connected to the carriage and media feed assembly for simultaneously (a) moving the carriage and (b) indexing the media through the printing station, whereby the means includes a single motor.

Accordingly, a single drive motor can accomplish both carriage motion and media advancement.

[0007] This shuttle-type printer does not address the specific franking of mixed mail items of variable thickness.

[0008] Though all the above-mentioned systems likely prove satisfactory, they would all remain rather complex or inappropriate when confronted with the design of a specific entry-level office machine of low cost for printing true mail items of variable kind and thickness.

OBJECT AND DEFINITION OF THE INVENTION

[0009] The object of the invention is to obviate the above-mentioned drawbacks in simplifying even better the typical office printing or franking machine and reducing even more its manufacturing cost. Not only a unique mechanism has to be found for integrating mail item feed and carriage motion, but also registration of mail items of variable kind and thickness.

[0010] According to one aspect of the invention, the office mailing machine for printing mail items M of the type comprising:

- a frame with an opening for manually inserting and removing the mail item;
- an print head supported by a carriage sliding in a longitudinal direction for printing the mail item;
- an item transverse moving mechanism for moving the mail item in a direction transverse to the longitudinal direction;
- an item registration arrangement for positioning the mail item and maintaining it in a perpendicular direction at a constant gap from the print head; and
- an electronic control module for starting and performing a print cycle; characterized in that it further comprises a single drive mechanism connected to the print head supporting carriage for simultaneously:

(a) moving the carriage back-and-forth along the longitudinal direction;

(b) indexing the mail item by controlling the item transverse moving mechanism according to information data to be printed on the mail item; and;

(c) registering the mail item during printing by controlling the item registration arrangement.

[0011] In a preferred embodiment, the single drive mechanism comprises a stepping motor which drives the print head supporting carriage through a set of endless belt, pulleys and guiding shafts.

[0012] According to another aspect of the invention, the item transverse moving mechanism comprises a twin train of pivoting rise and descent lever arms each acting on a one-way cogwheel which drives in rotation an axle shaft and hence lowers item bearing stops by moving around fixed and free pulleys item indexing belts bearing

said item bearing stops.

[0013] According to still another aspect of the invention, the item registration arrangement comprises a registration plate with a right angle corner and a spring-loaded pressing mechanism pivoting around a rod and having a pressing plate and two pressing end parts, the pressing plate pushing the mail item against the registration plate in opposition to springs. Advantageously, the registration plate comprises a longitudinal slot through which passing print head ejects ink droplets for multiple-pass printing in a stepwise manner over the entire mail item under control of the electronic control module.

[0014] Preferably, the print head supporting carriage comprises three cam surfaces that respectively cooperate with cam surfaces of said rise and descent lever arms and cam surfaces of said pressing end parts.

[0015] According to yet another aspect of the invention, the office mailing machine comprises a first sensor cooperating with a finger of the print head supporting carriage for detecting the presence of said print head supporting carriage at a rest position for starting the print cycle and a second sensor for detecting the presence of the mail item introduced manually by the operator through the frame opening.

[0016] Advantageously, the office mailing machine further comprises a service station for scraping and spitting the print head before said print head returns to said rest position.

BRIEF DESCRIPTION OF DRAWINGS

[0017] Exemplary preferred embodiments of the invention will be explained in the following description with reference to the attached drawings in which:

FIG. 1 is a front view diagrammatically showing the architecture of an office franking machine according to the invention;

FIG. 2A is a perspective view in a rest position of a transverse item moving mechanism located within the machine illustrated on FIG. 1;

FIG. 2B is a side view showing partially in a rest position an item registration arrangement used in the machine illustrated on FIG. 1;

FIG. 3A is a perspective view in an printing position of a transverse item moving mechanism located within the machine illustrated on FIG. 1; and

FIG. 3B is a side view showing partially in an printing position an item registration arrangement used in the machine illustrated on FIG. 1.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0018] With reference to FIG.1, the entry-level office machine 1 comprises inside a compact frame 10 with an opening 10a for manually inserting and removing the mail item M, an ink jet print head 20 supported by a carriage 22, a printing station 30, a servicing station 40, a control display 50 and a single drive mechanism 60. It also includes an item transverse moving mechanism 70 for moving the mail item in a direction Y transverse to the longitudinal direction X, and an item registration arrangement 80 for properly positioning the mail item in a perpendicular direction Z and maintaining its front face at a constant gap from the ink ejection nozzles during printing. An electronic control module 90, responsive to the at least one sensor 92, 94, allows to control the machine and in particular to start and perform a print cycle. More particularly, an optical sensor 92 permits to detect the presence of the print head supporting carriage at a rest position and another sensor 94 the mail item introduced in the item registration arrangement through the frame opening 10a.

[0019] The single drive mechanism 60 comprises a stepping motor 62 that drives the print head supporting carriage 22 through a set of endless belt 64, pulleys 66a, 66b and guiding shafts 68a, 68b. The item transverse moving mechanism 70 comprises a twin train of respective pivoting rise and descent lever arms 72a, 72b with a cam surface 73a, 73b, spring-loaded transmission racks 74a, 74b, one-way cogwheels 75a, 75b, axle shaft 76, fixed 77a, 77b and free pulleys 79a, 79b, and item indexing belts 78a, 78b with respective item bearing stops 78c, 78d. The item registration arrangement 80 comprises a registration plate 82 with a right angle corner 84 and a spring-loaded pressing mechanism 86 pivoting around a rod 85 and having a pressing plate 88 and two end parts 81a, 81b with a cam surface 83a, 83b, the pressing plate pushing the mail item against the registration plate in opposition to springs 87a, 87b. Three cam surfaces 23a, 23b, 23c of the print head supporting carriage 22 respectively cooperate with cam surfaces 73a, 73b, 83a, 83b of pivoting rise and descent lever arms 72a, 72b and of pressing end parts 81a, 81b. A further finger 22a located on a side of the carriage 22 cooperates with sensor 92.

[0020] This office franking machine operates as follows.

[0021] The instantaneous position of the print head supporting carriage 22 which is driven by the stepping motor 62 is known. This precise position within different areas of the printing cycle, i.e. rest capping zone T, item rise zone U, registration or printing zone V, and item descent zone W, is tied to relevant operating functions. Advantageously, a service zone (comprising the service station 40) which corresponds without limiting to the item rise zone is also present.

[0022] At rest in the capping position (zone T where

the print head 2 is covered by a cap 20a), sensor 92 detects with finger 22a the presence of carriage 22 while spring-loaded pressing mechanism 86 is deactivated in the back position (figures 2A and 2B). The item transverse moving mechanism 70 is in a low position, the carriage pushing down the rise lever arm 72a and the item bearing stops 78c, 78d are in the high position. It must be noted that resetting the steps of stepping motor can be done at each cycle start.

[0023] Then the operator inserts manually a mail item into the machine through the frame opening 10a against the right angle corner 84, the item resting on the item bearing stops 78c, 78d. Upon detection by sensor 94, or if the operator presses start button 52, stepping motor 62 is activated and drives carriage 22 to the right from its rest position.

[0024] The rise lever arm 72a is released but due to the one-way cogwheel 75a, the axle shaft 76 does not move. At the same time, the cam surface 83a is released too involving the activation of the spring-loaded pressing mechanism 86. The carriage crosses zone U where spitting and scraping operations are typically carried out and then zone V where printing can be performed through slot 89 while the mail item is registered via the item registration arrangement 80 (figures 3A and 3B). At the end of this zone V the cam surface 83b is activated by the carriage involving a deactivation of the spring-loaded pressing mechanism 86. Then in adjacent zone W, the carriage lowers descent lever arm 72b and hence item M also to the right level position via the one-way cogwheel 75b which drive in rotation the axle shaft 76 and hence lowers the item bearing stops 78c, 78d by moving the indexing belts 78a, 78b around the pulleys 77a, 77b, 79a, 79b. The spring-loaded transmission rack 74b is present to permit a continuous descent of the stops when the carriage 22 moving back-and-forth in zone W successively presses and releases the descent lever arm 72b. Cogwheels 75a and 75b of course rotate in opposite directions when activated.

[0025] When returning to the left, the carriage 22 releases the descent lever arm 72b and by releasing the cam surface 83b activates the spring-loaded pressing mechanism 86 before printing through slot 89. However, as previously with rise lever arm 72a, due to the one-way cogwheel 75b, the axle shaft 76 does not move. At least a next move to the right is necessary for multiple-pass printing in a stepwise manner over the entire front face of the mail item under control of electronic control module 90. The more the pivoting rise and descent lever arms 72a, 72b are displaced, the more the spring-loaded transmission rack causes a significant rise or descent of the mail item.

[0026] When the multiple-pass printing is over, the carriage 22 moves to the rest position on the end left after scraping and spitting are properly performed. Several two-way moves in zone U could be necessary on the lever rise arm 72a for lifting completely the mail item. Once there, the carriage has to move further to the end

left for reaching the capping position detected by optical sensor 92.

[0027] The invention is claimed in any of its forms or variants within the proper scope of the appended claims appropriately interpreted in accordance with the doctrine of equivalents. For example, the mail item stands either flat or on edge.

10 Claims

1. An office mailing machine for printing mail items M of the type comprising:

- a frame 10 with an opening 10a for manually inserting and removing the mail item;
- an print head 20 supported by a carriage 22 sliding in a longitudinal direction for printing the mail item;
- an item transverse moving mechanism 70 for moving the mail item in a direction transverse to the longitudinal direction;
- an item registration arrangement 80 for positioning the mail item and maintaining it in a perpendicular direction at a constant gap from the print head; and
- an electronic control module 90 for starting and performing a print cycle; **characterized in that** it further comprises a single drive mechanism 60 connected to the print head supporting carriage 22 for simultaneously:

- (a) moving the carriage back-and-forth along the longitudinal direction;
- (b) indexing the mail item by controlling the item transverse moving mechanism according to information data to be printed on the mail item; and
- (c) registering the mail item during printing by controlling the item registration arrangement.

2. An office mailing machine of claim 1, **characterized in that** the single drive mechanism comprises a stepping motor (62) that drives the print head supporting carriage through a set of endless belt (64), pulleys (66a, 66b) and guiding shafts (68a, 68b).

3. An office mailing machine of claim 1 or claim 2, **characterized in that** the item transverse moving mechanism comprises a twin train of pivoting rise and descent lever arms (72a, 72b) each acting on a one-way cogwheel (75a, 75b) which drives in rotation an axle shaft (76) and hence lowers item bearing stops (78c, 78d) by moving around fixed (77a, 77b) and free pulleys (79a, 79b) item indexing belts (78a, 78b) bearing said item bearing stops.

4. An office mailing machine of claims 1, 2 or 3, **characterized in that** the item registration arrangement comprises a registration plate (82) with a right angle corner (84) and a spring-loaded pressing mechanism (86) pivoting around a rod (85) and having a pressing plate (88) and two pressing end parts (81a, 81b), the pressing plate pushing the mail item against the registration plate in opposition to springs (87a, 87b). 5
5. An office mailing machine of claim 4, **characterized in that** the registration plate comprises a longitudinal slot (89) through which passing print head ejects ink droplets for multiple-pass printing in a stepwise manner over the mail item under control of the electronic control module. 10
6. An office mailing machine of claims 3 and 4, **characterized in that** the print head supporting carriage comprises three cam surfaces (23a, 23b, 23c) that respectively cooperate with cam surfaces (73a, 73b) of said rise and descent lever arms and cam surfaces (83a, 83b) of said pressing end parts. 15
7. An office mailing machine of claim 1, **characterized in that** it further comprises a first sensor (92) cooperating with a finger (22a) of the print head supporting carriage for detecting the presence of said print head supporting carriage at a rest position for starting the print cycle. 20
8. An office mailing machine of claim 7, **characterized in that** it further comprises a service station (40) for scraping and spitting the print head before said print head returns to said rest position. 25
9. An office mailing machine of claim 1, **characterized in that** it further comprises a second sensor (94) for detecting the presence of the mail item introduced manually by the operator through the frame opening. 30
10. An office mailing machine of any one of claims 1 to 9, **characterized in that** the mail item stands on edge or flat. 35

Amended claims in accordance with Rule 137(2) EPC.

1. An office mailing machine for printing mail items M of the type comprising: 40
 - a frame 10 with an opening 10a for manually inserting and removing the mail item;
 - an print head 20 supported by a carriage 22 sliding in a longitudinal direction for printing the mail item, the print head supporting carriage comprising three cam surfaces (23a, 23b, 23c) 45

that respectively cooperate with cam surfaces (73a, 73b) of said rise and descent lever arms and cam surfaces (83a, 83b) of said pressing end parts;

- an item transverse moving mechanism 70 for moving the mail item in a direction transverse to the longitudinal direction, the item transverse moving mechanism comprising a twin train of pivoting rise and descent lever arms (72a, 72b) each acting on a one-way cogwheel (75a, 75b) which drives in rotation an axle shaft (76) and hence lowers item bearing stops (78c, 78d) by moving around fixed (77a, 77b) and free pulleys (79a, 79b) item indexing belts (78a, 78b) bearing said item bearing stops;
- an item registration arrangement 80 for positioning the mail item and maintaining it in a perpendicular direction at a constant gap from the print head, the item registration arrangement comprising a registration plate (82) with a right angle corner (84) and a spring-loaded pressing mechanism (86) pivoting around a rod (85) and having a pressing plate (88) and two pressing end parts (81a, 81b), the pressing plate pushing the mail item against the registration plate in opposition to springs (87a, 87b);
- an electronic control module 90 for starting and performing a print cycle; and
- a single drive mechanism 60 connected to the print head supporting carriage 22 for simultaneously:

- (a) moving the carriage back-and-forth along the longitudinal direction;
- (b) indexing the mail item by controlling the item transverse moving mechanism according to information data to be printed on the mail item; and
- (c) registering the mail item during printing by controlling the item registration arrangement.

2. An office mailing machine of claim 1, **characterized in that** the single drive mechanism comprises a stepping motor (62) that drives the print head supporting carriage through a set of endless belt (64), pulleys (66a, 66b) and guiding shafts (68a, 68b). 50
3. An office mailing machine of claim 1, **characterized in that** the registration plate comprises a longitudinal slot (89) through which passing print head ejects ink droplets for multiple-pass printing in a stepwise manner over the mail item under control of the electronic control module. 55
4. An office mailing machine of claim 1, **characterized in that** it further comprises a first sensor (92) cooperating with a finger (22a) of the print head supporting

carriage for detecting the presence of said print head supporting carriage at a rest position for starting the print cycle.

5. An office mailing machine of claim 4, **characterized in that** it further comprises a service station (40) for scraping and spitting the print head before said print head returns to said rest position. 5
6. An office mailing machine of claim 1, **characterized in that** it further comprises a second sensor (94) for detecting the presence of the mail item introduced manually by the operator through the frame opening. 10
7. An office mailing machine of any one of claims 1 to 6, **characterized in that** the mail item stands on edge or flat. 15

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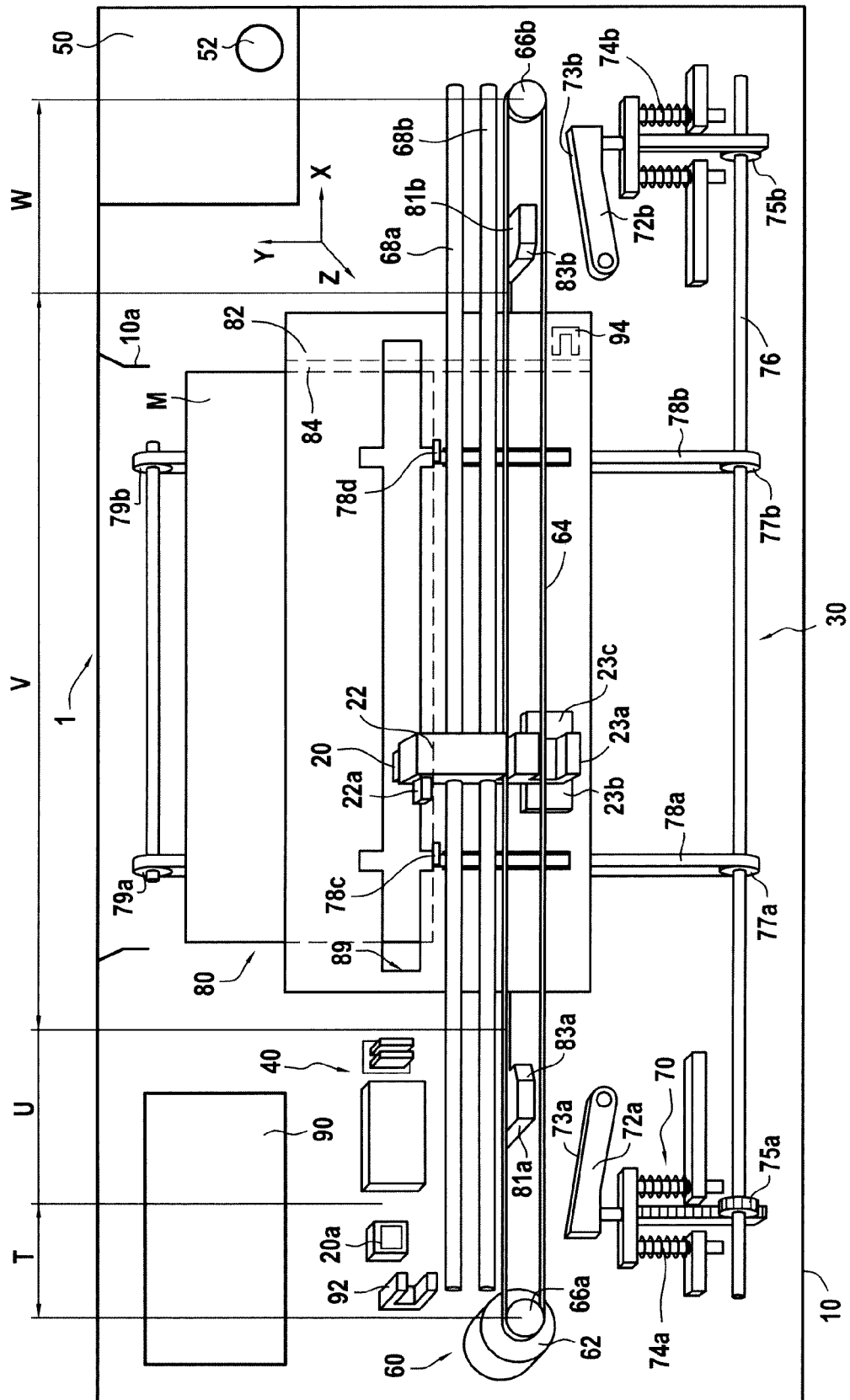
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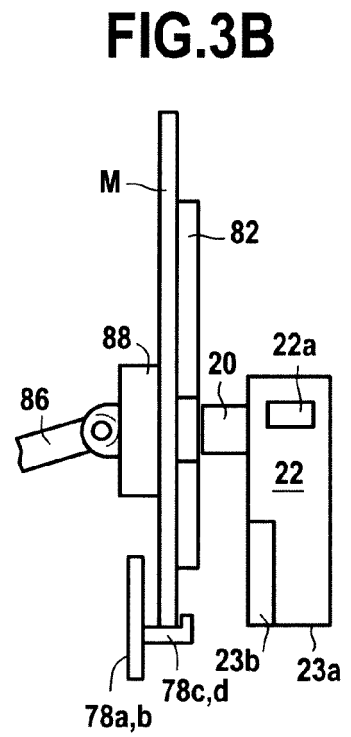
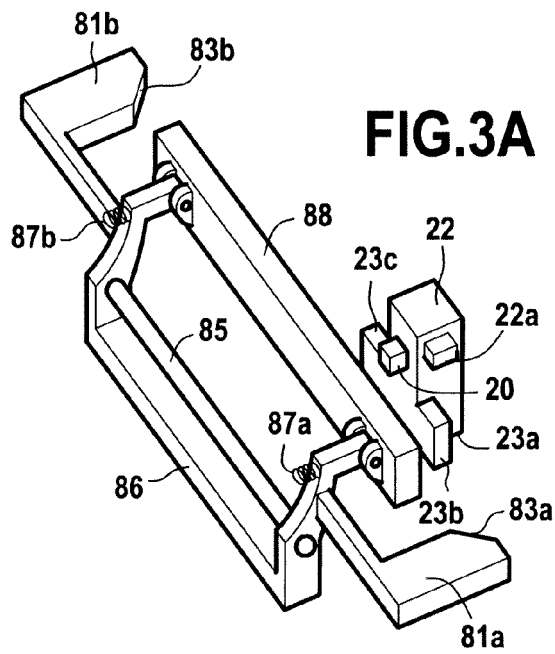
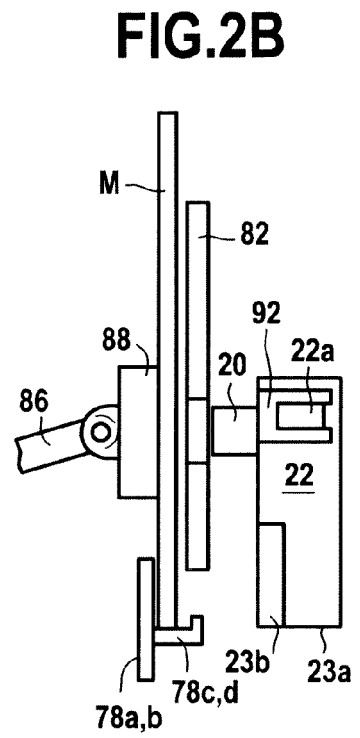
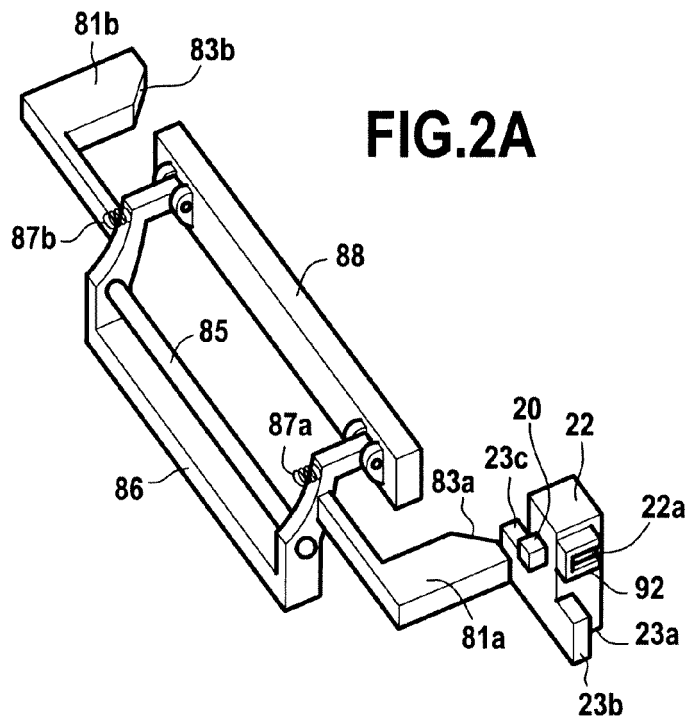
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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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