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AUSTRALIA

PATENTS ACT 1990

PATENT REQUEST: STANDARD PATENT

I/We, the Applicant(s)/Nominated Person(s) specified below, request I/We be granted a patent for the invention disclosed in the accompanying standard complete specification.

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Ferag AG, of 8340, Hinwil, SWITZERLAND

[54] Invention Title:

Apparatus for Feeding Products, Such as Cards and Product Samples, to a Further Processing Point

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Ferag AG

By:



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NOTICE OF ENTITLEMENT

✕ We, Gerd Rau and Jacques Meier both care
of Ferag AG, 8340, Hinwil, Switzerland

being authorised by the Applicant(s)/Nominated Person(s) in respect of an application entitled:

Apparatus for Feeding Products, Such as Cards and Product Samples,
to a Further Processing Point
state the following:-

1. The Applicant(s)/Nominated Person(s) has/have, for the following reasons, gained entitlement from the actual inventor(s):-

The Applicant/Nominated Person, by virtue of a Contract between the actual inventor as employee and the Applicant/Nominated Person as employer, is a person which would be entitled to have the patent assigned to it if a patent were granted on an application made by the actual inventor.

- 2a.* The Applicant(s)/Nominated Person(s) is/are the applicant(s) of the of the basic application(s) listed* on the Patent Request/ ~~*in the Declaration under Article 8 of the PCT.~~

- 2b.* ~~The Applicant(s)/Nominated Person(s) is/are entitled to rely on the basic application(s) listed* on the Patent Request/ *in the Declaration under Article 8 of the PCT as follows:-~~

- 3.* The basic application(s) listed *on the Patent Request/ ~~*in the Declaration under Article 8 of the PCT~~ is/are the application(s) first made in a Convention Country in respect of the invention.

- 4a.* ~~The Applicant(s)/Nominated Person(s) is/are the depositor(s) of the deposit(s) listed in the Schedule hereto.~~

- 4b.* ~~The Applicant(s)/Nominated Person(s) has/have the consent of _____, of~~

~~the depositor(s) of the deposit(s) listed in the Schedule hereto, to rely on that/those deposit(s).~~

DATED this

14.

day of

February

19 99

F E R A G A G

(Signature) Gerd Rau

Jacques Meier

Director

Director

(Name & Title)

* Delete if not applicable.

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(56) Prior Art Documents
US 5137269
US 4504053
US 2589428

(57) Claim

1. An apparatus for feeding products from a stack to a processing point comprising:

a magazine device having at least two magazine compartments, each for receiving a stack of products, and

a conveying device extending serially across each of said at least two magazine compartments and to a further processing point, wherein said conveying device includes a plurality of grippers which are arranged one behind the other on a drawing member which is driven in a conveying direction between said magazine device and said further processing point, and wherein each of said grippers has a gripper mouth which is movable between open and closed positions, and means for effecting individual movement of said grippers between said open and closed positions, and

a transporting member assigned to each of said at least two magazine compartments wherein each of said transporting members is movable from a receiving position located adjacent its assigned magazine compartment to a transfer position located proximate the path of movement of said grippers and back to said receiving position and wherein each of said transporting members is capable of removing a product from said stack of products placed in its assigned magazine compartment and transporting said product from said receiving position to said transfer position and then releasing said product to one of said plurality of grippers, and

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pushing means assigned to each of said at least two magazine compartment for pushing stacks of products placed in said magazine compartments in a direction towards said conveying device, and

control means for selectively operating said transporting member of each of said at least two magazine compartments so as to selectively

(1) serially remove products from one of said at least two magazine compartments and deliver the removed products to successive grippers of said conveying device, and

(2) serially remove products from another one of said at least two magazine compartments and deliver the removed products to successive grippers of said convey device,

whereby an interruption of the delivery of the products to the grippers of said conveying device may be avoided during periodic filling of the magazine compartments.

Apparatus for Feeding Products, such as Cards and Product Samples, to a Further Processing Point

The present invention relates to an apparatus for feeding products, such as cards and product samples which are intended to be inserted or stuck into printing products, to a further processing point.

An apparatus of this type is disclosed in DE-A-2135303. A stack of products, such as paper bags, plastic bags, tin-foil pockets or postcards, is arranged in a vertical magazine compartment. The products are removed individually from the magazine compartment. For this purpose, the apparatus has a conveying device with a drawing member which is driven in a circulating manner and on which there are arranged one behind the other two applying heads, which each have a gripping mechanism. The gripping mechanisms serve for removal of the products from the magazine compartment and their secure holding until the applying heads are set onto a printing product onto which the product is to be stuck. This known apparatus is likely to be suitable only for low operating speeds. The products are removed by means of the gripping mechanisms from the bottom of the upright stack. On the one hand, this results in correspondingly great accelerations and on the other hand the forces acting on the products are further increased by the entire weight of the stack resting on the product to be removed. This results in extremely great stressing of the products, in particular if they are product samples filled with liquid.

It is the object of the present invention to overcome or substantially ameliorate the above disadvantages.

There is disclosed herein an apparatus for feeding products from a stack to a processing point comprising:

a magazine device having at least two magazine compartments, each for receiving a stack of products, and

a conveying device extending serially across each of said at least two magazine compartments and to a further processing point, wherein said conveying device includes a plurality of grippers which are arranged one behind the other on a drawing member which is driven in a conveying direction between said magazine device and said further processing point, and wherein each of said grippers has a gripper mouth which is movable between open and closed positions, and means for effecting individual movement of said grippers between said open and closed positions, and

a transporting member assigned to each of said at least two magazine compartments wherein each of said transporting members is movable from a receiving position located adjacent its assigned magazine compartment to a transfer position located proximate the path of movement of said grippers and back to said receiving position and wherein each of said transporting members is capable of removing a product from said stack of products placed in its assigned magazine compartment and



transporting said product from said receiving position to said transfer position and then releasing said product to one of said plurality of grippers, and

pushing means assigned to each of said at least two magazine compartment for pushing stacks of products placed in said magazine compartments in a direction towards
5 said conveying device, and

control means for selectively operating said transporting member of each of said at least two magazine compartments so as to selectively

(1) serially remove products from one of said at least two magazine compartments and deliver the removed products to successive grippers of said
10 conveying device, and

(2) serially remove products from another one of said at least two magazine compartments and deliver the removed products to successive grippers of said convey device,

whereby an interruption of the delivery of the products to the grippers of said
15 conveying device may be avoided during periodic filling of the magazine compartments.

The apparatus according to the invention is suitable in particular for feeding the products to a further processing station, such as is described in Australian Patent No. 660242. There, the products are taken over from the grippers of the conveying
20 device by take-over grippers arranged on a wheel-like carrying member and, by means of these, are stuck onto printing products or inserted into the latter, the printing products being located in pocket-shaped receiving parts or on saddle-shaped supports of a processing drum. It would also be conceivable by means of the conveying device according to the present invention for the products to be inserted directly into printing
25 products or for bound-in inserts to be deposited in the opened state onto collecting lines.

In a particularly space-saving embodiment of the apparatus according to the invention, which requires small accelerations at high processing speed, the mouths of the grippers, when moving passed the magazine device, are aligned pointing rearward
30 and preferably obliquely downward with respect to the conveying direction and the transporting members are moved from the receiving position into the transfer position in a direction which has a component in conveying direction and a component from the magazine device towards the conveying device.

In a further preferred embodiment the pushing means each have a pushing
35 element intended for engaging into the respective magazine compartment and able to move along the latter, which pushing element is intended to engage behind the product of the stack furthest away from the delivery point and align the stack with the delivery point by the end of the stack facing toward the delivery point.



This preferred embodiment allows complete exposure of the respectively outermost product of a stack at the delivery point. As a result, only minimal forces act on this product during drawing off from the stack. Moreover, it is prevented that, during drawing off of the outermost product, further products of the stack are drawn
 5 along at the same time and that the stack is thus destroyed. Moreover, a large area of the product is available for the transporting member to act against.

A particularly simple and quick filling of the magazine compartments is ensured by the fact that they can be brought into a filling position in which they are freely accessible.

10 A further preferred embodiment of the apparatus according to the invention has a large magazine capacity and at the same time ensures free access to magazine compartments in order to fill them.

A particularly high processing speed with extremely gentle treatment of the products is achieved in the case of upright or inclined magazine compartments, the
 15 stacks being reduced by removal from above. In inclined magazine compartments, the stacks are held particularly securely.

Particularly preferred is an embodiment in which the transporting members each have a suction head, in order to seize the respectively outermost product of a stack and feed it to a gripper. The product can be seized in a gentle way on its flat side.

20 Particularly simple handling of the product stacks and, in particular, simple filling of the magazine compartments is achieved by the products being delivered in a product supply unit placed in at least one of said magazine compartments, wherein said product supply unit comprises a box-like container containing a stack of products.

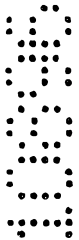
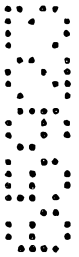


Figure 13 shows in perspective representation a stack of products which is inserted into a box-like container to form a product supply unit;

5 Figure 14 likewise shows in perspective representation a product supply unit; and

Figure 15 shows in perspective representation a supply stack of product supply units.

10 The apparatus according to the invention shown in Figures 1 and 2 has a magazine device 10 with four magazine compartments 12, 14, 16, 18 extending in the vertical direction. These are supported on a cabinet-like rack 20 in each case by means of two shanks 22

15 which run in the horizontal direction and are spaced apart in the vertical direction. As is evident in particular from Figure 2, the magazine compartments 12, 14, 16, 18 are displaceable individually from a working position 24, in which the magazine compartments 14, 16 and 18 are located, into a filling position 24', in which the magazine compartment 12 is located. The displacing drive acting on the shanks 22 is located in the rack 20 and is not shown.

20 A conveying device 26, which has a multiplicity of grippers 30 fastened at intervals one behind the other on a conveying chain 28, leads away over all the magazine compartments 12, 14, 16, 18, which are retracted into the working position 24. The conveying chain 28 is guided in a known way in a cross-sectionally C-shaped channel 32, which runs in a horizontal and rectilinear direction above the magazine device 10. The conveying device 26 is intended for taking over products 36 removed by means of transporting members 34 from the magazine compartments 12,

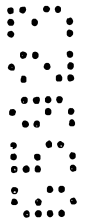
30 14, 16, 18 and feeding them to a further processing point which is arranged downstream of the magazine device 10, seen in conveying direction F, and is indicated in Figure 1 by an arrow 38. There, the products 36, which are cards or product samples, are

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inserted or stuck into printing products, such as for example periodicals, brochures or the like.

5 The grippers 30 have two clamping jaws 42, 42', which form a gripper mouth 40, can be swiveled about a joint axis and are each connected via levers to actuating rollers 44, 44'; see in particular also Figure 3. With the actuating rollers 44 there interacts a fixed link 46, which runs above the magazine device 10, parallel to the channel 32, and determines the position of the one clamping jaw 42; in the present case, the upper clamping jaw 42, which trails the other clamping jaw, seen in conveying direction F.

15 Each of the magazine compartments 12, 14, 16, 18 is assigned an independently controllable link arrangement 48, which respectively interact with the actuating rollers 44' in order to transfer the leading, lower clamping jaws 42' into the closing position and to close the gripper mouth 40 when the link arrangement 48 is activated. Each of the link arrangements 48 has a lower jointed link rail 50 and, above the latter, a swiveling link wedge 52. If the grippers 30 are not to close, the link rail 50 is located in its lower rectangular end position and the link wedge 52 is in a swivel-resting position, as is shown in Figure 1 with reference to the link arrangements 48 assigned to the magazine compartments 12, 16 and 18. The actuating rollers 44' are not actuated in this case. If, on the other hand, the grippers 30 are to close, the link rail 50 is brought into its upper end position and the link wedge 52 is swiveled counterclockwise out of the swivel-resting position into a swivel-working position, as is shown in Figure 1 in the case of the link arrangements 48 assigned to the magazine compartment 14 and in Figure 3. The link rail 50 is in this case bent at both ends in a direction obliquely downward, in order to form in the initial region, seen in conveying direction F, a run-up ramp for the actuating rollers 44' and to open the grippers 30 fully and, in the end region, to guide the actuating rollers 44' on both



sides together with the link wedge 52, swiveled into the swivel-working position. When the actuating rollers 44' run onto the link wedge 52, the leading clamping jaws 42', seen in conveying direction F, are swiveled clockwise, in order to close the gripper mouth 40. The clamping jaws 42, 42' are held in the closing position by means of a latching device, which is released at the further processing point 38, so that the grippers 30 release the products 36. Grippers of this type are disclosed, for example, in European Patent Application No. 93 100 004.6 and the corresponding US Patent Application No. 08/018749 and in Swiss Patent Application No. 03694/92-7.

The link rails 50 and link wedges 52 are actuated, for example, by means of cylinder-piston arrangements (not shown), which are driven by a control device 54, which is arranged in the rack 20 and is indicated by an arrow.

The upwardly open magazine compartments 12, 14, 16, 18 have at this end of them a delivery point 56 (Figure 3). Located at this point in each case is the uppermost outermost product 36 of a stack 58 arranged in the respective magazine compartment 12, 14, 16, 18. The transporting member 34 has a suction head 60, which is intended for seizing in a receiving position 62 at the delivery point 56 the relevant product 36 on its exposed upper side and introducing it into the gripper mouth 40 of an opened gripper 30. For this purpose, the suction head 60 is connected to a drive mechanism, as is disclosed, for example, in Swiss Patent Nos. 598 106 and 626 589 and the corresponding US Patent Nos. 4,127,262 and 4,279,142. The suction head 60 is moved by means of the drive mechanism along a closed circulating path 64, the form of which is similar to a hypocycloid. The drive mechanism of this type has a planetary gearing, which is connected to a drive motor and on the planetary gear of which there is eccentrically applied an angle lever, which is guided at one end in a longitudinal guide and on which at the

other end the suction head 60 is fastened. In order to achieve the circulating direction indicated in Figure 3 by arrow 64', only the drive motor is to be driven counter to the direction shown in the above-cited documents.

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Between the receiving position 62 and transfer position 62' in the path of movement of the gripper 30, in which the relevant product 36 is introduced in the gripper mouth 40, the suction head 60 is connected to a vacuum source (not shown). A valve arrangement suitable for this purpose is disclosed, for example, in Swiss Patent No. 626 589 and the corresponding US Patent No. 4,279,412. The direction of movement of the suction head 60 from the receiving position 62 into the transfer position 62' has a component pointing in conveying direction F and a component pointing upward in the vertical direction from the delivery point 56. As a result, the products 36 are introduced with their leading edge 66, seen in conveying direction F, ahead into the gripper mouths 40, which are directed counter to the conveying direction F and obliquely downward.

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The drawing off of a product 36 from the relevant stack 58 and introduction into the corresponding gripper 30 is now explained in more detail with reference to Figures 4 - 9. The reference symbols used in these figures correspond to those used further above. In Figure 4, the suction head 60 is located in receiving position 62 and is connected to the vacuum source. In this case, it rests on the exposed flat side of the outermost product 36 of the stack 58 and sucks said product to it. In this case, it should be noted that between the leading edge 66 and the suction head 60 there is a distance A which is at least as great as the depth of penetration with which the product 36 then enters into the gripper mouth 40 (see Figure 6). As Figure 5 shows, the suction head 60 lifts the uppermost product 36 off the stack 58 and accelerates it simultaneously in conveying direction F. Since the suction head 60 is driven synchronously with

the conveying device 26, the product 36 is then introduced with the leading edge 66 ahead into the relevant opened gripper mouth 40, which is then closed by means of the link 46 and the link arrangement 48 (Figure 6). This happens when the suction head 60 has reached the transfer position 62'. At the same time, said suction head is disconnected from the vacuum source, so that it releases the product 36 (Figure 7). The product 36 is then transported away by means of the gripper 30, and the suction head 60 moves along the circulating path 64 back in the direction of the receiving position 62, in order to receive the next product 36 (Figure 8). After closing of the gripper 30, the latter is swiveled by the link 46 counterclockwise, as can be seen in particular from Figure 9. This contributes to the product 36 being accelerated with respect to the circulating speed of the conveying device 26 and thus to the next product 36 being exposed at an early time for the suction head 60 (Figure 4).

The length of the products 36, measured in conveying direction F or in the direction of movement of the suction head 60, corresponds approximately to the center-to-center distance between two successive grippers 30. If, seen in conveying direction F, larger products 36 are to be processed, additional means are to be provided in order to remove the product 36 respectively seized by a gripper 30 from the region of the stack 58.

Each magazine compartment 12, 14, 16, 18 is assigned pushing means 68, which are designed for supporting the respective stack 58 and for pushing upward in the longitudinal direction of the magazine compartment when the stack 58 is being reduced, so that the upper end of the stack is respectively located at the delivery point 56. On extension arms 70, fastened on the rack 20, there is rotatably mounted in each case a pair of spindles 72, which extend in the vertical direction and are connected to a drive motor 74. The two spindles of a pair of spindles 72 interact with a

running nut 76, on which a tongue-like pushing element 78 is fastened. If the latter is located in the lowermost end position (see Figure 1, the pushing element 78 assigned to the magazine compartment 12), it is arranged underneath the relevant magazine compartment 12, 14, 16, 18 so that the latter can be brought from the working position 24 into the filling position 24' and back again. If the pushing element 78 is raised out of this position by driving the pair of spindles 72, it runs into the magazine compartment 12, 14, 16, 18, comes to bear against the lowermost product 36 of the stack 58 and raises the entire stack 58. Arranged at the upper end of each magazine compartment 12, 14, 16, 18 is a light barrier 80 (Figure 3), which is connected to the control device 54. The control device 54 in each case sets the drive motor 74 into operation until the light barrier 80 is interrupted by the uppermost product 36 of the stack 58. Then, the drive motor 74 is stopped until the light barrier 80 is cleared again, when the relevant product 36 has been drawn off from the stack 58 by means of the transporting member 34. The position of the stack 58 is consequently automatically leveled in such a way that the uppermost product 36 is located at the delivery point 56. Once the stack 58 of a magazine compartment 12, 14, 16, 18 has been reduced, the pushing element 78 is brought into its lower end position and the relevant magazine compartment 12, 14, 16, 18 is extended into the filling position 24', where it is freely accessible in order to be provided again with a new stack 58.

As is evident in particular from Figure 2, the magazine compartments 12, 14, 16, 18 have compartment walls 82, arranged in a U-shaped manner, and are open on the side facing the respective pair of spindles 72. The pair of spindles 72 is in each case arranged after the relevant magazine compartment 12, 14, 16, 18 in conveying direction F. In working position 24 of the magazine compartments 12, 14, 16, 18, the products 36 are prevented from falling out by retaining rails 84,

which are arranged fixedly between the pair of spindles 72 and the magazine compartment 12, 14, 16, 18 and which are passed through by the pushing element 78.

5 In order in the filling position 24' to support the stack 58 introduced into a magazine compartment 12, 14, 16, 18, the mutually opposite compartment walls 82 have at their lower end bottom plates 86, which protrude in the direction of the compartment interior and are spaced apart. It goes without saying that they
10 are spaced sufficiently far apart that in working position 24 the pushing element 78 can move between them.

Figure 10 shows a further embodiment of the apparatus according to the invention similar to the
15 embodiments described above. The major difference is that the magazine compartments 12, 14, 16, 18 and the pairs of spindles 72 assigned to the latter are arranged in a rearwardly inclined manner on the rack 20, so that in each case the delivery point 56 is offset counter to the conveying direction F with respect to a vertical line through the lower end of the magazine compartment 12, 14, 16, 18. The flat side of the products 36 in this case runs approximately in the direction of movement of the suction head 60 from the receiving position 62 into the transfer position 62'.
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A further embodiment of the apparatus according to the invention is represented in Figures 11 and 12. The magazine device 10 has in this case two magazine units 88, which are arranged one behind the other along the conveying device 26 and to each of which a transporting member 34 and a pushing means 68 are assigned. These are of the same design as in the
30 embodiments described further above. Four magazine compartments 90 are in each case fastened in a stellar manner on a pivot mounting 94, which is rotatable about its longitudinal axis 92 running in the vertical direction. Said mounting is mounted in a base 96 and is connected to a rotary drive, which can be driven by the control device 54 and is symbolized by the arrows 98.
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Also fastened on the base 96 are the retaining rails 84 and the drive motor 74. The pair of spindles 72 is mounted at the upper end on an extension arm 70, fastened on the retaining rails 84, and at the lower end on an extension arm 70, supported on the base 96.

The magazine compartment 90 respectively facing the pushing means 68 is located in working position 24 and is ready for reduction of the relevant stack 58. Reduction is performed in precisely the same way as described further above. Once a stack 58 has been reduced, the pushing element 78 is brought into the lower end position and the magazine compartments 90 of the relevant magazine unit 88 are turned clockwise through 90° by means of the rotary drive 98 about the axis of rotation 92, as is represented with reference to the magazine unit 88, shown on the left in Figure 12. The empty magazine compartment 90 shown there is located in freely accessible filling position 24'. During the time in which the magazine compartment 90 located in working position 24 is being emptied, the magazine compartment 90 located in filling position 24' is provided with a new stack 58, as was the case with reference to the magazine unit 88 shown on the right in Figure 12.

A stack 58 with products 36 is placed into a box-like container 100, as Figure 13 shows. The container 100 is designed as a lidless cardboard box 102. It has a bottom 104 and two side walls 106, running in the longitudinal direction of the stack 58. The end walls 108, running transversely to the longitudinal direction of the box, are designed as webs which are at a distance from the bottom 104 and interconnect the two side walls 106. Provided at the connection points between the side walls 106 and the end walls 108 are perforations 110 to allow the end walls 108 to be separated from the remaining part of the cardboard box 102.

Figure 14 shows a product supply unit 112, which comprises a cardboard box 102 and the stack 58

received in it. The magazine compartments 12, 14, 16, 18, 90 are preferably designed for each to be able to receive such a product unit 112. As soon as the product unit 112 has been inserted into the magazine compartment 12, 14, 16, 18, 90, located in filling position 24', the end walls 108 are removed, so that on the one hand the uppermost product 36 of the stack 58 is freely accessible and on the other hand the pushing element 78 can engage underneath the lowermost product 36. By means of such product supply units 112, unproblematical and extremely quick filling of the magazine compartments 12, 14, 16, 18, 90 is ensured. Moreover, the product supply units 112 can be stacked into stable stacks both for delivery and for storage, Figure 15.

In the product supply units 112 shown in Figures 13 - 15, the products 36 extend beyond the side and end walls 106, 108. It goes without saying that it would also be conceivable to take these walls up to the upper edge of the horizontal stacks 58. Furthermore, the containers 100 could be made, for example, from plastic or sheet metal, the end walls then being arranged such that they can be taken away, swiveled away or pushed away.

The mode of operation of the apparatuses described above is as follows:

First of all, with pushing elements 78 located in the lower end position, the magazine compartments 12, 14, 16, 18, 90 are each filled with a stack 58 of products 36. In the case of the embodiments according to Figures 1 to 10 this takes place by the magazine compartments 12, 14, 16, 18 successively extended into the filling position 24' one after the other and, after filling, withdrawn again into the working position 24. In the case of the embodiment shown in Figures 11 and 12, the magazine compartments 90 are brought one after the other into the filling position 24' by turning about the axis of rotation 92 and, after filling, are turned further through 90° until all the magazine compartments 90 have been filled. Located after filling

in working position 24, the magazine compartments 12, 14, 16, 18, 90 are entered from below by the pushing element 78, by driving of the pairs of spindles 72, and the stack 58 is raised until the respectively uppermost product 36 is located at the delivery point 56. The magazine device 10 is then ready for delivering products 36.

After setting the conveying device 26 into operation, the removal of products 36 from one of the magazine compartments 12, 14, 16, 18, 90, located in working position 24, then begins. The link arrangement 48 assigned to the relevant magazine compartment is activated and the corresponding transporting member 34 is set in motion; compare Figure 1: magazine compartment 14, Figure 10: magazine compartment 12, Figure 11: the magazine compartment 90 located in working position, of the magazine unit 88 shown on the left. During a certain time period, products 36 are then removed one after the other from the relevant magazine compartment 12, 14, 16, 18, 90 by means of the transporting member 34 and are introduced into the successive grippers 30 of the conveying device 26. After this time period, which may last, for example, until the relevant magazine compartment 12, 14, 16, 18, 90 is empty, the control device 54 switches the previously activated link arrangement 48 over into the resting position and switches off the relevant transporting member 34. To avoid interruptions, again during a time period the products 36 are then removed from another magazine compartment 12, 14, 16, 18, 90, located in working position 24. The activation of the relevant link arrangement 48 and of the transporting member 34 is performed appropriately in-phase by the control device 54, so that the first gripper 30 which follows a gripper 30 which has previously been fed a product 36 is now fed a product 36. If the magazine compartment 12, 14, 16, 90 is located upstream, counter to the conveying direction F, with respect to that magazine compartment 14, 16, 18, 90 from which the

products 36 have previously been removed, the control device 54 activates the relevant link arrangement 48 and the relevant transporting member 34 before the link arrangement 48, assigned to the downstream-assigned magazine compartment 14, 16, 18, 90, and the relevant transporting member 34 are switched over into the resting position. This is quite possible for the control device 54, provided that it detects the number of products 36 respectively located in the magazine compartments 12, 14, 16, 18, 90 and the number of grippers 30 between the transfer points 62' of the transporting members 34 assigned to the various magazine compartments 12, 14, 16, 18, 90. In this way, the stacks 58 are reduced alternately.

Once a magazine compartment 12, 14, 16, 18, 90 has been emptied, it is transferred for filling into the filling position 24'.

To be able to operate uninterruptedly, consequently at least two magazine compartments are necessary, each with a transporting member 34. If, as shown in Figures 1, 2 and 10, the apparatus has four magazine compartments 12, 14, 16, 18, for example two magazine compartments can be filled with a stack 58 of a first type of products 36 and the other two magazine compartments can each be filled with a stack 58 of a second type 36. Uninterrupted operation is ensured then as well, even if it is intended to process at the further processing point 38 for a lengthy processing phase the same type of products 36 or in each case, after a certain number of one particular type, to process products 36 of the other type. If, on the other hand, all four stack compartments 14, 16, 18, 20 are provided with the same products, the supply is increased, so that in each case two or three of the magazine compartments can be filled shortly one after the other and then a lengthy time is available until two to three magazine compartments have again been emptied. The same advantages are accomplished by the embodiment according to Figures 11 and 12. Thus, it is

quite possible for all the magazine compartments 90 of the one magazine unit 88 to be emptied before they have to be filled again.

5 It should be mentioned for the sake of completeness that, seen in conveying direction F, the suction heads 60 may be arranged laterally of the path of movement of the grippers 30. The suction heads may in this case also take hold of the products 36 at their leading edge 66. It is also conceivable to provide on
10 each of both sides of this path of movement a suction head 60 in order to seize the products 36 with two suction heads 60. Moreover, it is possible to assign to each transporting member 34 a plurality of suction heads 60, which each grip a product 36 alternately one
15 after the other and feed it to a gripper 30. Finally, it should be mentioned that the transporting members 34 or suction heads 60 may be driven in a different way from that described.

20 It is also conceivable to provide instead of the pair of spindles 72 only one spindle and a guide for preventing turning of the running nut. It goes without saying that the light barrier 80 may be replaced by other types of switching means.

25 It should be mentioned that a plurality of magazine compartments may be arranged on an endless drawing member, for example a chain, and that said chain is in each case driven to bring a magazine compartment into the working position.

The claims defining the invention are as follows:

1. An apparatus for feeding products from a stack to a processing point comprising:

a magazine device having at least two magazine compartments, each for receiving a stack of products, and

a conveying device extending serially across each of said at least two magazine compartments and to a further processing point, wherein said conveying device includes a plurality of grippers which are arranged one behind the other on a drawing member which is driven in a conveying direction between said magazine device and said further processing point, and wherein each of said grippers has a gripper mouth which is movable between open and closed positions, and means for effecting individual movement of said grippers between said open and closed positions, and

a transporting member assigned to each of said at least two magazine compartments wherein each of said transporting members is movable from a receiving position located adjacent its assigned magazine compartment to a transfer position located proximate the path of movement of said grippers and back to said receiving position and wherein each of said transporting members is capable of removing a product from said stack of products placed in its assigned magazine compartment and transporting said product from said receiving position to said transfer position and then releasing said product to one of said plurality of grippers, and

pushing means assigned to each of said at least two magazine compartment for pushing stacks of products placed in said magazine compartments in a direction towards said conveying device, and

control means for selectively operating said transporting member of each of said at least two magazine compartments so as to selectively

(1) serially remove products from one of said at least two magazine compartments and deliver the removed products to successive grippers of said conveying device, and

(2) serially remove products from another one of said at least two magazine compartments and deliver the removed products to successive grippers of said convey device,

whereby an interruption of the delivery of the products to the grippers of said conveying device may be avoided during periodic filling of the magazine compartments.

2. The apparatus as claimed in claim 1, wherein, when moving past the magazine device, the mouths of the grippers are aligned pointing rearward and preferably obliquely downward with respect to the conveying direction and the transporting members are moved from the receiving position into the transfer position



in a direction which has a component in conveying direction and a component from the magazine device towards the conveying device.

3. The apparatus as claimed in claim 1 or 2, wherein the pushing means each have a pushing element intended for engaging into the respective magazine compartment and able to move along the latter, which pushing element is intended to engage behind the product of the stack furthest away from the delivery point and align the stack with the delivery point by the end of the stack facing toward the delivery point.

4. The apparatus as claimed in claim 3, wherein each pushing element is connected to a running nut, which is seated on a spindle running approximately parallel to the longitudinal direction of the respective magazine compartment and connected to a drive motor.

5. The apparatus as claimed in any one of claims 1 to 4, wherein, for filling with a new stack, the magazine compartments can be brought from a working position, in which their delivery point is located at the receiving position, into a filling position, in which the magazine compartment is freely accessible.

6. The apparatus as claimed in claim 5, wherein the magazine device has at least two magazine units with a plurality of magazine compartments which can be turned about axes of rotation, the magazine compartments of each magazine unit being such that they can be brought one after the other into the working position.

7. The apparatus as claimed in any one of claims 1 to 6, wherein the longitudinal direction of the magazine compartments runs transversely to a horizontal plane, preferably in the vertical direction or in a rearwardly inclined direction, in which the delivery point of the magazine compartment is offset counter to the conveying direction F with respect to a vertical line through the end of the magazine compartment remote from the delivery point.

8. The apparatus as claimed in any one of claims 1 to 7, wherein the conveying device runs rectilinearly and substantially in the horizontal direction away over the magazine device.

9. The apparatus as claimed in any one of claims 1 to 8, wherein the transporting members each have a suction head, which is connected at times to a vacuum source and is intended for seizing in the receiving position the relevant product on the flat side facing away from the stack and for securely holding said product until in the transfer position the corresponding gripper is transferred into its closing position.

10. The apparatus as claimed in any one of claims 1 to 9, wherein the dimensioning of the products, measured in the direction of movement of the transporting member, is less than or equal to the center-to-center distance between two successive grippers.



11. The apparatus as claimed in any one of claims 1 to 10, further comprising a product supply unit placed in at least one of said magazine compartments, wherein said product supply unit comprises a box-like container containing a stack of products.

5 12. The apparatus as claimed in claim 11, wherein said box-like container has two longitudinal side walls and first and second end walls connecting said two longitudinal walls, wherein said first and second end walls are removable.

13. An apparatus for feeding products from a stack to a processing point substantially as hereinbefore described with reference to the accompanying drawings.

Dated 31 July, 1996

Ferag AG

Patent Attorneys for the Applicant/Nominated Person

SPRUSON & FERGUSON

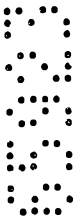


Apparatus for Feeding Products, Such as Cards and
Product Samples, to a Further Processing Point

Abstract of the Disclosure

The magazine device (10) has at least two magazine compartments (12, 14, 16, 18). Over these there leads away a conveying device (26), with grippers (30) arranged one behind the other. During a certain time period, a transporting member (34) removes products (36) one after the other from in each case one of the magazine compartments (12, 14, 16, 18) and feeds each of them to a gripper (30) running past. After a certain time period, the products (36) are removed from another magazine compartment (12, 14, 16, 18) by means of a transporting member (34) assigned to the latter. The products (36) are cards or product samples which are inserted or stuck into printing products at the further processing point (38). With this apparatus uninterrupted operation is possible with a high processing capacity.

(Figure 1)



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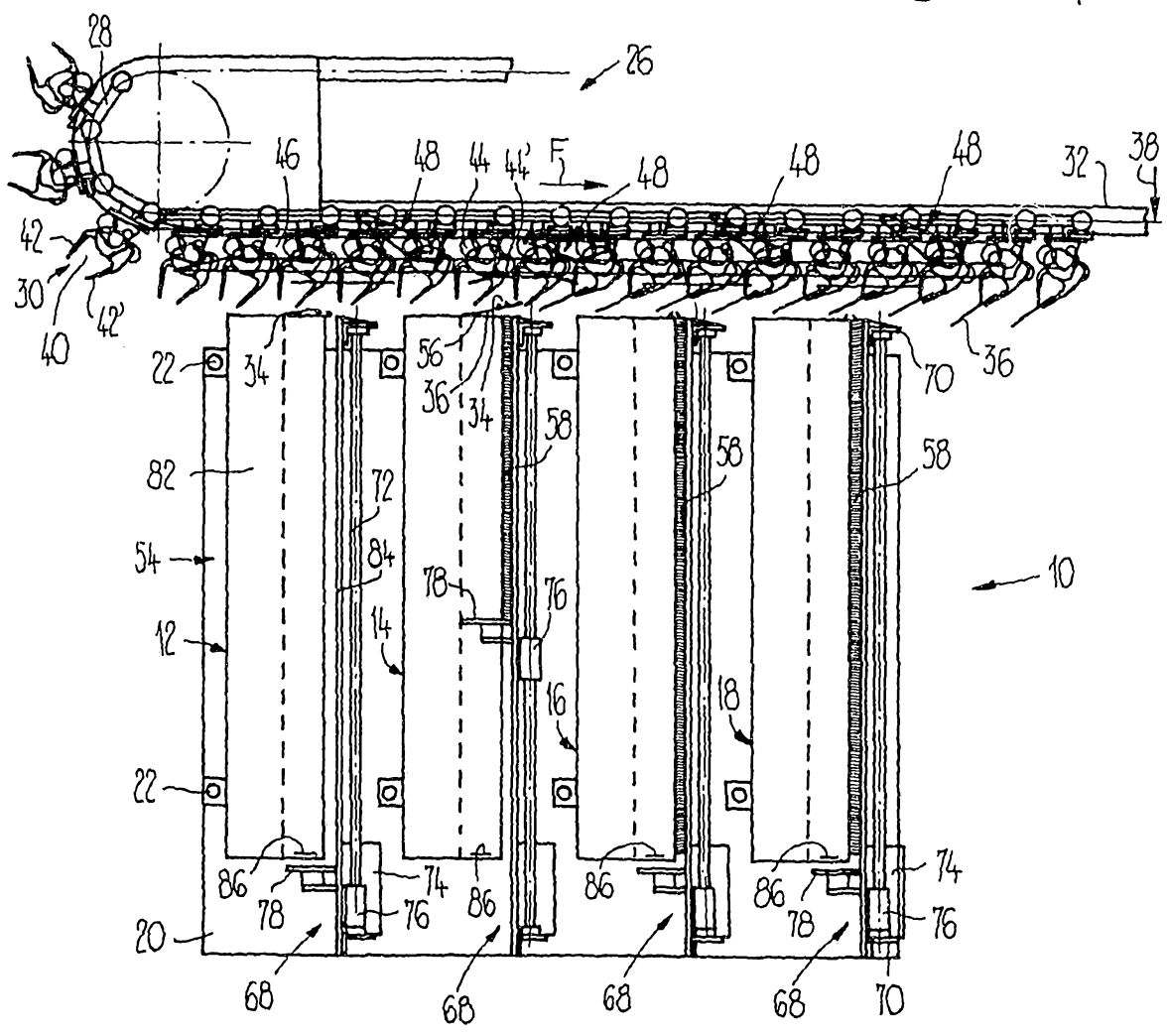


Fig. 1

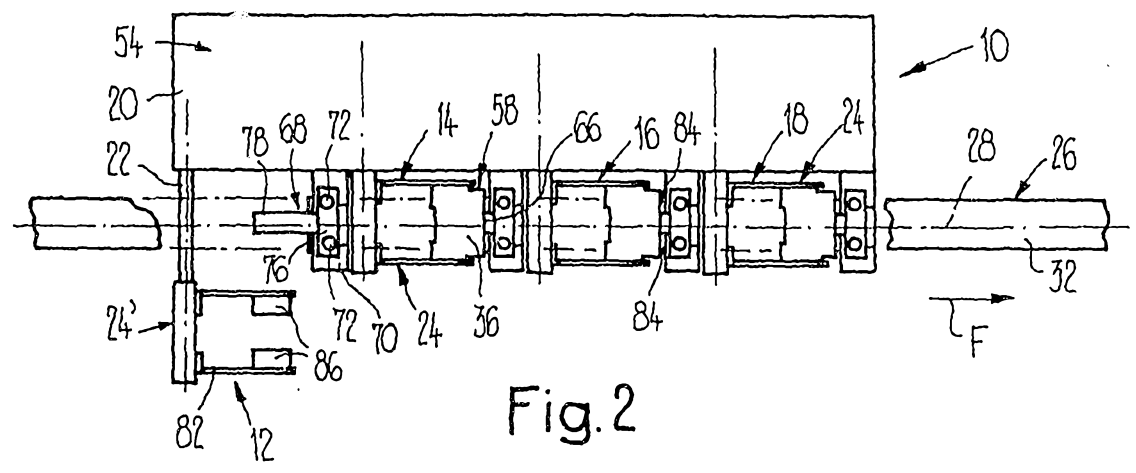


Fig. 2

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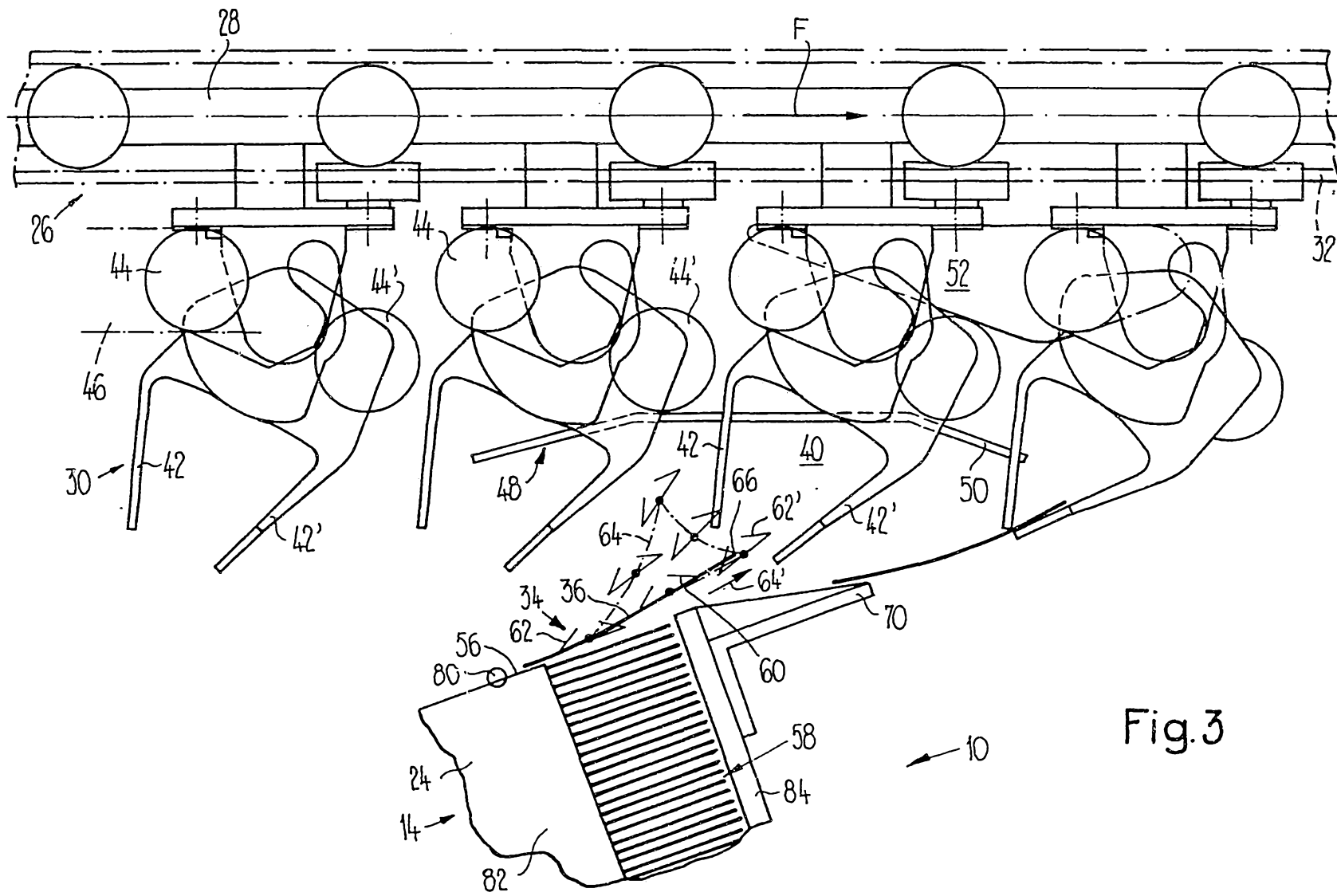


Fig.3

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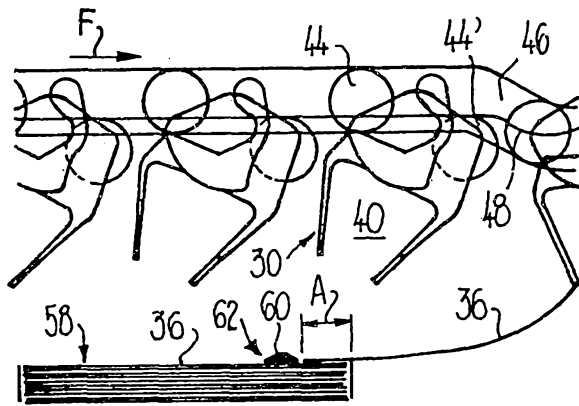


Fig. 4

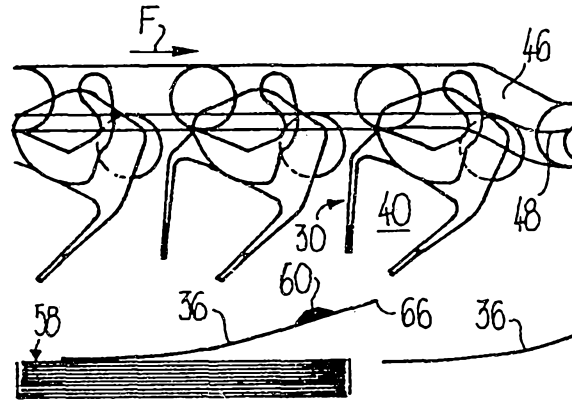


Fig. 5

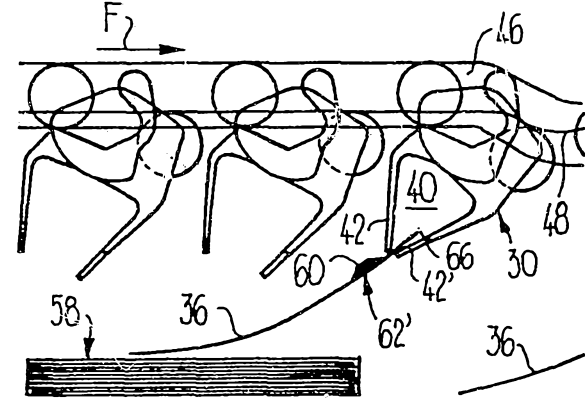


Fig. 6

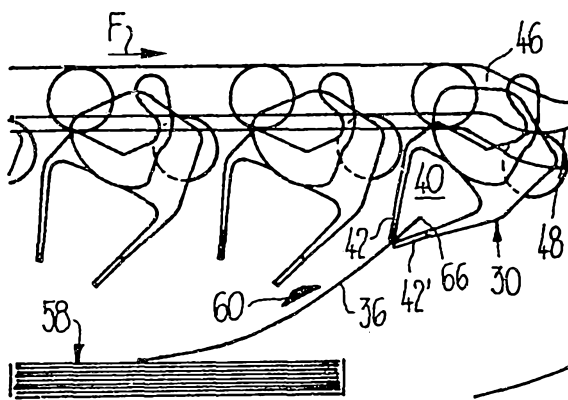


Fig. 7

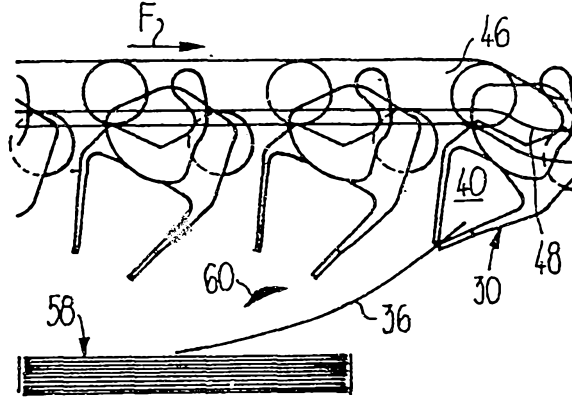


Fig. 8

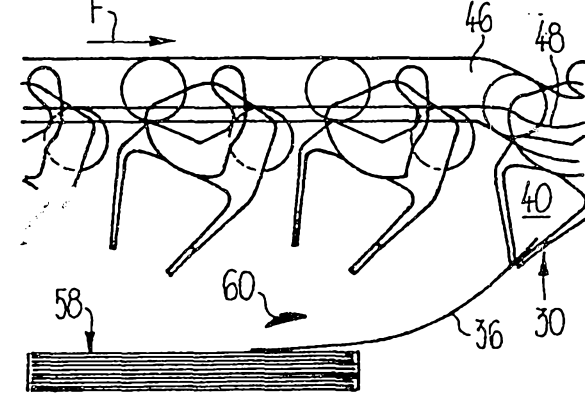


Fig. 9

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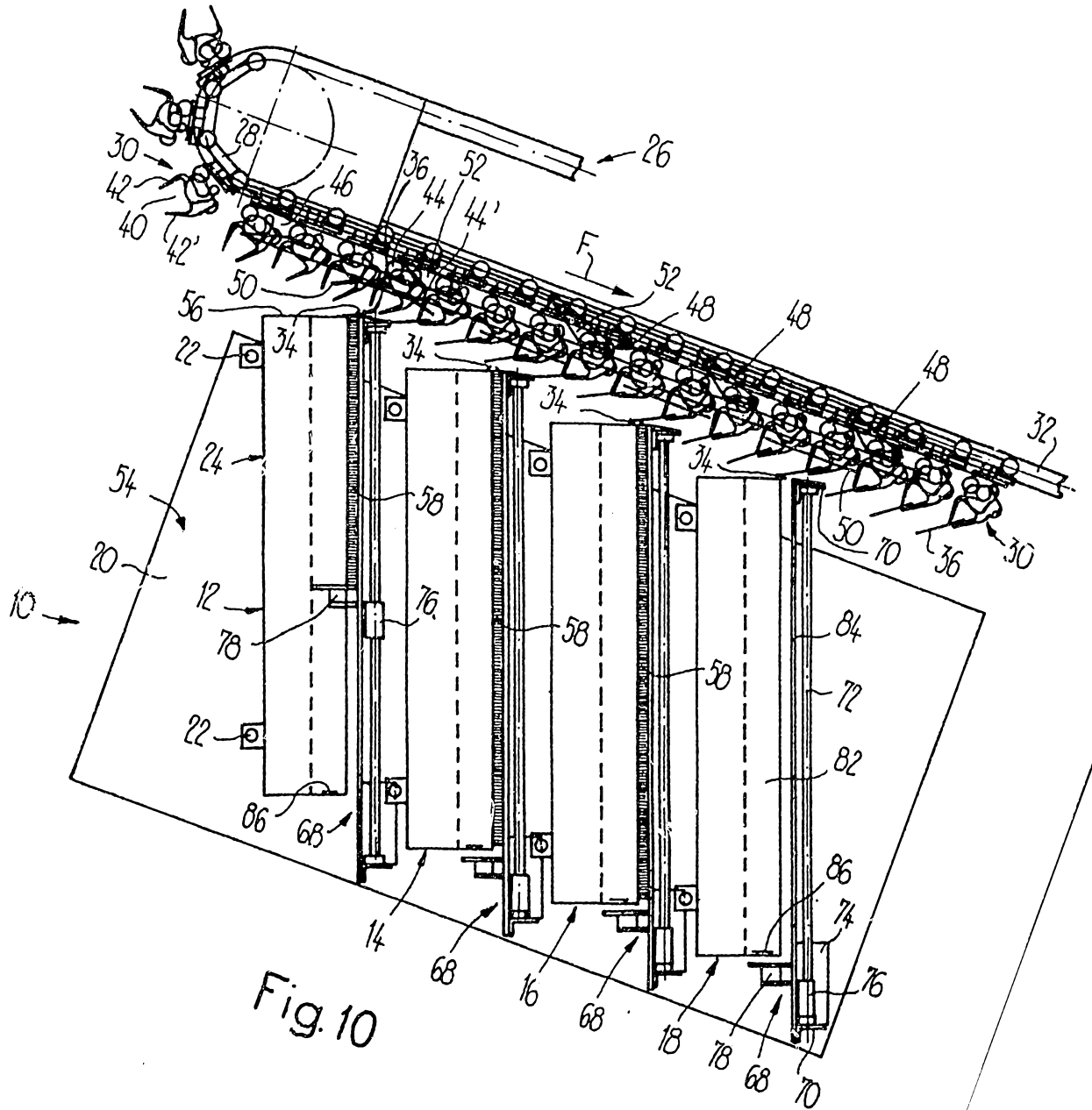


Fig. 10

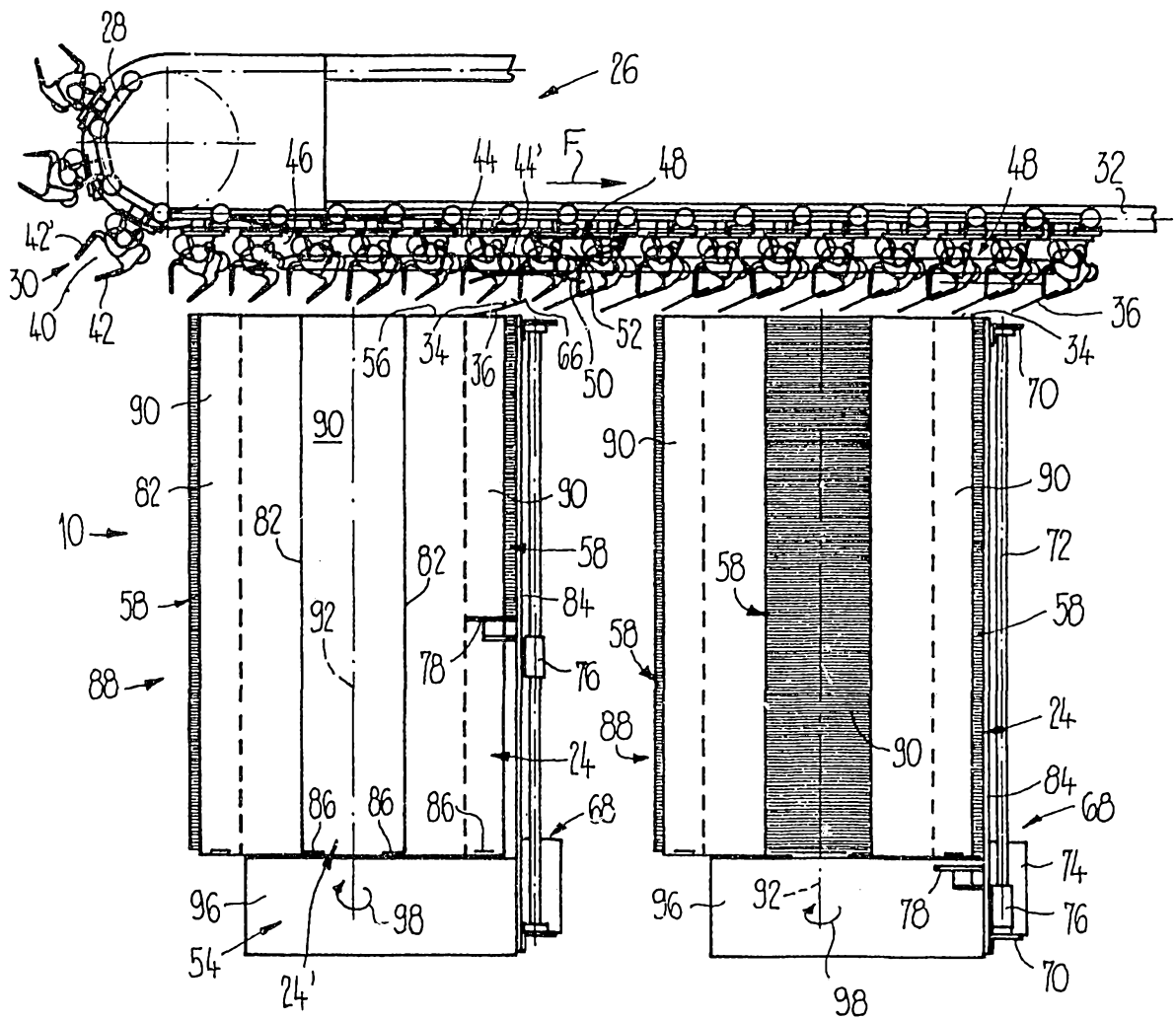


Fig. 11

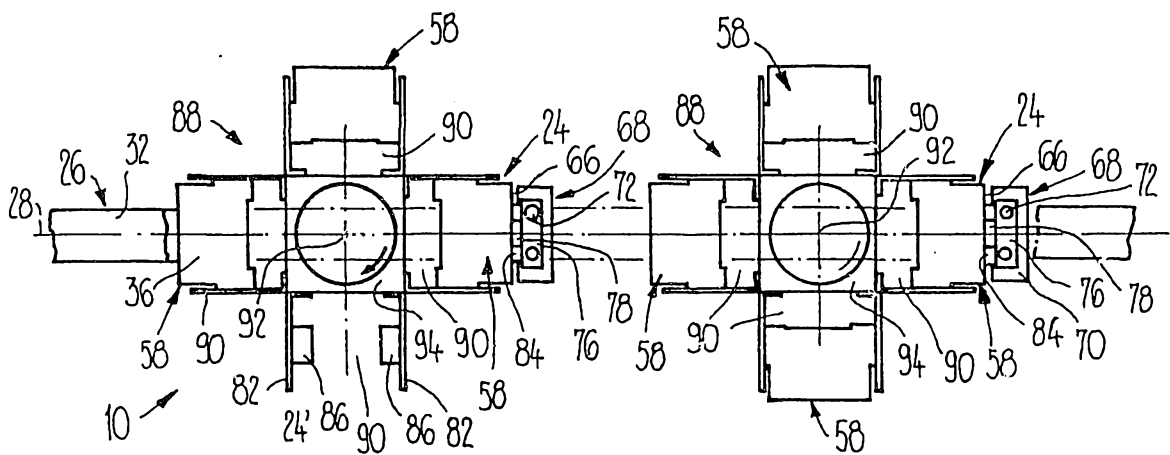


Fig. 12

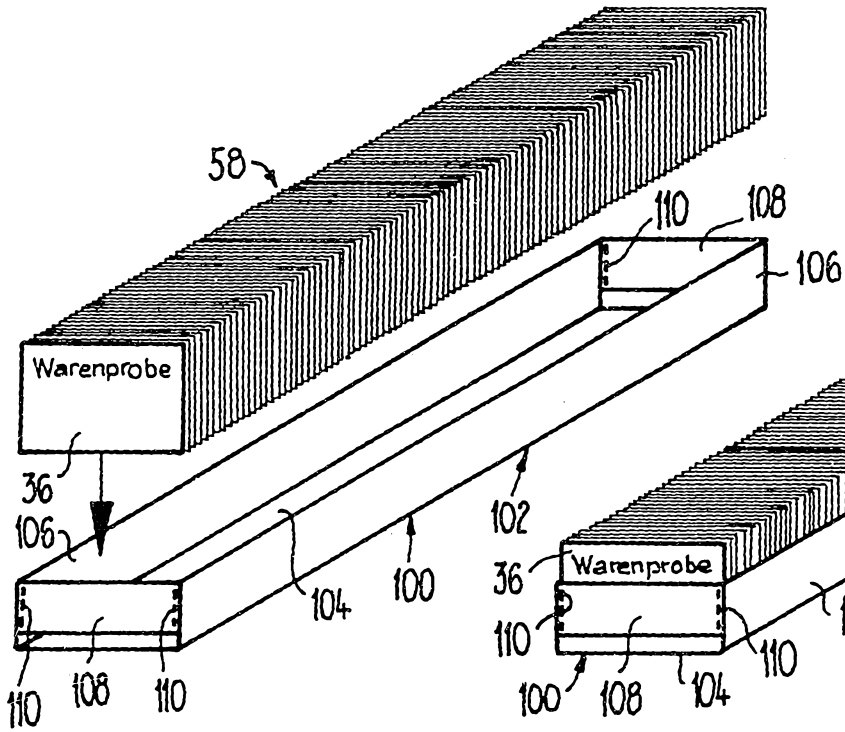


Fig.13

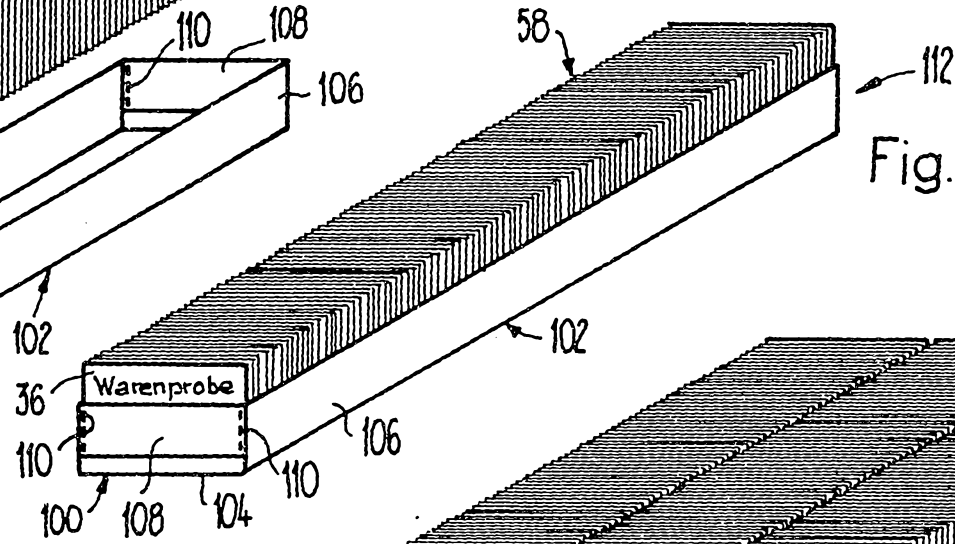


Fig.14

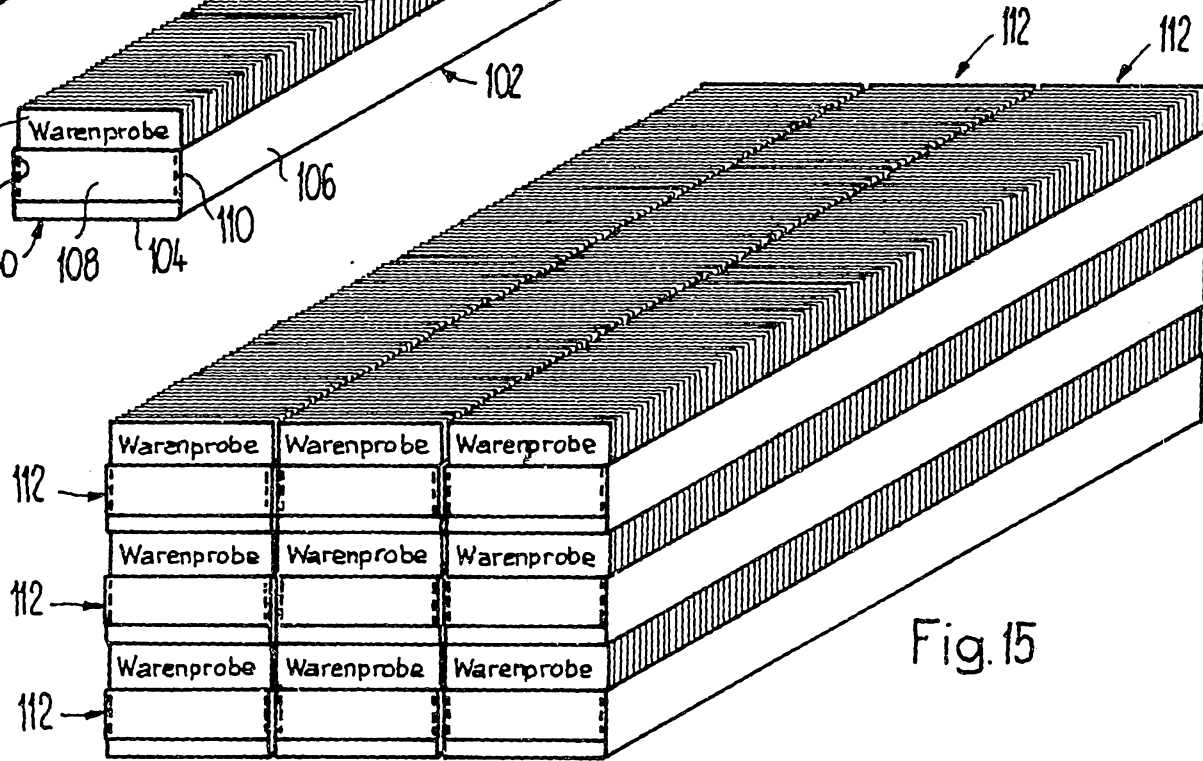


Fig.15

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