

## Description

The present invention relates generally to image reproduction machinery, and more particularly relates to envelope feed apparatus for printers, copiers and the like.

Modern image reproduction machines, such as printers and copiers, are typically provided with one or more paper supply trays, each of which is removably insertable into an associated opening formed in the outer housing of the machine. Such a machine is disclosed e.g. in EP-A-0 400 673. Each tray is adapted to hold a stack of cut paper sheets typically of  $8\frac{1}{2}$ " x 11" or  $8\frac{1}{2}$ " x 14" size - for infeed to the internal printing portion of the machine and subsequent discharge from the machine housing into an external paper receiving structure.

The handling of envelopes is conventionally accomplished utilizing a separate feed structure externally built onto the housing, normally on a side thereof opposite from the paper supply tray or trays. These envelope feed structures are adapted to hold a single stack of envelopes and successively deliver the envelopes into the interior of the housing for feed therethrough via a path different than that of the paper entering the housing from the opposite side.

Compared to a single sheet of paper, an envelope is quite thick, having four or five stacked layers of paper at the point where its flap overlaps the central back side of the envelope. Accordingly, far fewer envelopes than cut paper sheets can be placed in a stack of a given height. This large stack height associated with envelopes has heretofore limited the number of envelopes that could be held at one time in their dedicated single stack exterior storage structure. Accordingly, when large numbers of envelopes are to be imprinted in a given run, it is necessary to frequently re-load the exterior envelope storage structure with a new single stack of envelopes to be fed into the machine.

It can be readily seen from the foregoing that it would be desirable to provide image reproduction machinery, such as printers and copiers, with improved apparatus for storing and infeeding envelopes. It is accordingly an object of the present invention to provide such improved apparatus.

In carrying out principles of the present invention, in accordance with a preferred embodiment thereof, an image reproduction machine, representatively a laser printer, is provided with a dual bin envelope feed tray adapted to support two side-by-side stacks of envelopes for longitudinal infeed into the machine through its normal paper supply feed path. According to an important feature of the invention, the loaded envelope feed tray is configured to be removably insertable into the machine housing paper tray opening in place of the paper

supply tray normally received therein.

This unique interchangeability between the envelope feed tray and a paper supply tray of the machine advantageously eliminates the conventional necessity of building a separate, external envelope storage and supply structure onto the housing. Additionally, since the envelopes are supported in two side-by-side stacks, a considerably greater quantity of envelopes of the same size may be supplied to the machine in a given batch, or two different envelope sizes (one size in each stack) may be simultaneously made available for machine infeed without envelope size changeout.

The dual bin envelope feed tray of the present invention is provided with a drive structure operable to selectively feed the envelopes of either stack thereof into the machine for delivery (along the same feed path traversed by the paper sheets) to its existing printing means and subsequent discharge into its existing paper receiving means. In a preferred embodiment thereof, the drive structure includes a reversible electric motor operable to selectively rotate a main drive shaft in opposite directions. The shaft has externally toothed, one-way roller bearing clutches secured to opposite ends thereof, the single operative rotational drive direction of one clutch being opposite to that of the other clutch.

The teeth on the spaced apart clutches drivably mesh with gear trains on opposite sides of the tray, with each gear train being drivable to rotate picker, drive and retard rollers on its side of the tray. With the main drive shaft being rotated in one direction, the picker rollers on one side of the tray operate to frictionally engage and forwardly move the bottom envelope in one stack thereof into its associated drive rollers for feed thereby into the machine's printing section. At the same time, the associated retard roller frictionally engages the upper envelopes in the stack in a manner preventing them from being fed to the drive rollers until they reach the bottom of their stack. Upon reversal of the drive motor, rotation of the first gear train ceases and the opposite gear train is rotationally driven to successively feed envelopes in the other stack, bottom envelope first, to their associated drive rollers.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG 1 is A somewhat schematic perspective view of a representative laser printer provided with a unique dual bin envelope feed tray which embodies principles of the present invention and is interchangeable with the printer's conventional paper supply tray;

FIG. 2 is a highly schematic cross-sectional view through the printer, taken along line 2-2 of FIG.

1, illustrating drive, printing and transfer means therein, and the general paper path therethrough;

FIG 3 is an enlarged scale, partially exploded perspective view of the envelope tray, and an associated drive structure, with selected portions thereof being cut away and phantomed for illustrative purposes; and

FIG. 4 is an enlarged scale partial cross-sectional view through the envelope tray, and its drive structure, taken along Line 4-4 of FIG 3.

Referring initially to FIG. 1 and 2, the present invention provides an improved image reproduction machine which is representatively illustrated as being a laser printer 10, although it could alternatively be another type of image reproduction machine such as a copier or non-laser type printer. Laser printer 10 includes a housing 12 having a front opening 14 therein which removably receives a conventional paper supply tray 16 adapted to hold a stack 18 of individual paper sheets 18<sub>a</sub>.

During operation of the printer 10, with the paper tray 16 operably received in the housing opening 14, the paper sheets 18<sub>a</sub> are sequentially fed to printing means 20 by paper feed means 22. In a conventional manner, the printing means 20 are operative to imprint paper stock, such as paper sheets 18<sub>a</sub>, fed thereto. The printed sheets 18<sub>a</sub> exiting the printing means 20 are delivered to and stacked within an external paper receiving well area 24, recessed into the top side of the housing 12, by transfer means 26.

In conventional image reproduction machines, such as printers and copiers, the infeed of envelopes into the machine for imprintation therein (if provided for in the machine) is typically accomplished by building onto the housing 12 a permanent structure (normally on the back end of the housing) dedicated to envelope feeding. If provided, this dedicated envelope feed structure is operative to deliver envelopes to the internal printing means 20 via a feed path separate from the paper sheet feed path, and is designed to support a single stack of envelopes. Because of the multi-layer thickness of each envelope (typically four or five paper layers at its thickest point), the envelope storage capacity of conventional built-in envelope feed structures is quite limited.

As can be seen in FIGS. 1 and 2, the improved printer 10 is not provided with the usual limited capacity built-in envelope feed structure projecting outwardly from the back end of its housing. Instead, according to an important aspect of the present invention, the printer 10 is provided with a unique dual bin envelope tray structure 30 which is configured to be removably insertable into the housing opening 14, in place of the conventional paper supply tray 16, as indicated in FIGS. 1 and

2.

In a manner subsequently described, the envelope tray structure 30 is operative to support, in a side-by-side relationship, two stacks 32 and 34 of differently sized envelopes 32<sub>a</sub>, 34<sub>a</sub> (for example, legal and personal sized envelopes). If desired, the envelopes in the two side-by-side stacks thereof could be of the same size. The envelope feed tray structure 30 includes a suitably dimensioned tray 36 having an open front end 38, a bottom wall 40, upstanding opposite side walls 42 and 44, and an upstanding rear end wall 46.

Schematically depicted driven means 48 are supported on tray 36 adjacent its open front end 38 and, in a manner subsequently described, cooperate with driving means 50 disposed within housing 12 to sequentially feed envelopes, in an end-wise direction from a selectively variable one of the envelope stacks 32 and 34, to the printing means 20 along essentially the same feed path traversed by the paper sheets 18<sub>a</sub> when the paper tray 16 is inserted into the housing opening 14 in place of the envelope tray 36. The operation of the cooperative driven and driving means 48, 50 is regulated by suitable control means 52 which are also operative to govern the operation of the conventional printing means 20, paper feed means 22, and transfer means 26 disposed within the housing 12. The various printing and feeding tasks of the printer 10 effected and regulated by control means 52 may be selected by using suitable control buttons 54 on a control panel 56 conveniently positioned on the front end of the housing 12.

The dual bin envelope tray structure 30 of the present invention provides the laser printer 10, as well as other types of image reproduction machines into which the tray structure 30 can be incorporated, with a variety of envelope handling advantages compared to the conventional scheme of building a dedicated envelope feed structure onto the exterior of the machine housing remote from the paper sheet feeding apparatus. For example, due to the ability of the tray 36 to support two side-by-side stacks of differently sized envelopes, envelope size may be rapidly changed without the previous necessity of removing a stack of envelopes and replacing it with a stack of differently sized envelopes. Additionally, when the envelopes in the two supported stacks are of the same size, a substantially greater supply quantity of a particular size envelope may be loaded for machine infeed, thereby desirably reducing the frequency with which the envelope tray must be manually reloaded. This correspondingly reduces machine downtime when large numbers of envelopes are to be imprinted in a single run.

Another advantage provided by the dual bin envelope tray structure of the present invention, as

previously mentioned, is its desirable ability to utilize essentially the same feed route as that traversed by the paper sheets 18. Compared to image reproduction machines provided with conventional envelope handling apparatus, this simplifies the overall structure of the printer 10, thereby providing the potential for desirably reducing its total fabrication cost.

The unique structure and operation of the envelope handling apparatus of the present invention, in its illustrated preferred embodiment, will now be described in conjunction with FIGS. 3 and 4. As best illustrated in FIG. 3, two pairs of vertical support rods 58, 60 project upwardly from the bottom tray wall 40 rearwardly adjacent the open front tray end 38, while two additional pairs of vertical support rods 58<sub>a</sub>, 60<sub>a</sub> also project upwardly from the bottom tray wall and are spaced rearwardly apart from their associated front support rod pairs 58, 60. The envelope stack 32 is supported on the bottom tray wall 40 between the rod pairs 58, 58<sub>a</sub> which engage opposite sides of the individual envelopes 32<sub>a</sub> to hold them in lateral alignment with one another.

The rear or right ends of the envelopes 32<sub>a</sub> are engaged by an upstanding tab member 62 which projects upwardly through an elongated slot 64 formed through the bottom tray wall 40. Tab member 62 is secured at its lower end to an adjustment member 66 carried on the bottom side of tray wall 40 for sliding movement relative thereto along the length of slot 64. The tab member 62 serves to longitudinally align the individual envelopes 32<sub>a</sub> initially placed in the "bin" defined by the rod pairs 58, 58<sub>a</sub>.

In a similar fashion, the shorter envelopes 34<sub>a</sub> in the envelope stack 34 are positioned between the rod pairs 60 and 60<sub>a</sub> with the front rods 60 engaging the opposite sides of the envelopes 34<sub>a</sub> and holding them in lateral alignment with one another. When operatively loaded into tray 36 in this manner, the envelope stacks 32, 34 are in a side edge-by-side edge, longitudinally parallel orientation.

An upstanding tab member 62<sub>a</sub>, projecting upwardly through a bottom wall slot 64<sub>a</sub> and secured to a slidable adjustment member 66<sub>a</sub>, engages the rear or right ends of the envelopes 34<sub>a</sub> to provide for an initial longitudinal alignment thereof when they are placed in the "bin" defined by the front and rear support rod pairs 60, 60<sub>a</sub>. As illustrated, the stack 32 of envelopes 32<sub>a</sub> has a bottom envelope 32<sub>a</sub>' which rests upon the bottom tray wall 40, while the stack 34 of envelopes 34<sub>a</sub> similarly has a bottom envelope 34<sub>a</sub>'.

For purposes subsequently described, the front end 68 of the bottom tray wall 40 is spaced rearwardly apart from the open front end 38 of the tray

36, front end portions 70 and 72 of tray side walls 42, 44 project downwardly beyond the bottom tray wall 40, and a support block member 74 is secured to a laterally central portion of the front end of bottom tray wall 40 and projects forwardly therefrom. The driven means 48 carried on the tray 36 adjacent its open front end 38 include a pair of envelope feed assemblies 76, 76<sub>a</sub> which are respectively positioned to the right and left of the support block 74 as viewed in FIG. 3.

In a manner subsequently described, the right and left feed assemblies 76, 76<sub>a</sub> are independently operable to respectively feed envelopes from the bottom of envelope stack 32 to the aforementioned printing means 20, or to feed envelopes from the bottom of envelope stack 34 to such printing means. The components in the envelope feed assembly 76<sub>a</sub>, and its operation, are identical to the components in and the operation of the envelope feed assembly 76. Accordingly, only the components in and the operation of feed assembly 76 will be described. For ease in comparison, the components in feed assembly 76<sub>a</sub> have been given reference numerals identical to their counterparts in feed assembly 76, but with the subscripts "a".

The right envelope feed assembly 76 includes a pair of frictional drive rollers 78 coaxially secured to a shaft 80 in a spaced apart relation thereon for rotation therewith. The left or inner end of shaft 80 is journaled in the support block 74, and the right or outer end of shaft 80 extends outwardly through and is rotatably supported within an opening formed through the side wall front end portion 70. An input gear 82 is coaxially anchored to the outer end of shaft 80 and meshes with a transfer gear 84 coaxially anchored to a stub shaft 86 journaled in the side wall front end portion 70. The transfer gear 84, in turn, meshes with a drive gear 88 coaxially anchored to the outer end of a shaft 90 which rotatably extends inwardly through an opening in the side wall front end portion 70 and is journaled at its inner end in the support block 74. Coaxially anchored to the shaft 90, in a longitudinally spaced relationship thereon, are a pair of frictional picker rollers 92, upper side portions of which project upwardly through slots 94 in the bottom tray wall 40.

Positioned above and parallel to the shaft 80 is a pivot shaft 96 which is journaled at its opposite ends in vertically elongated slots 98 formed in the support block 74 and the side wall front end portion 70. A axially spaced apart pair of frictional drive rollers 100 are coaxially secured to shaft 96, overlie the drive rollers 78, and are positioned on opposite sides of a frictional transfer roller 102 which is also coaxially secured to shaft 96. Small coil spring member 104 (FIG. 4) are interconnected between the opposite ends of the shaft 96 and the tray

portions 70 and 74, and resiliently bias the opposite ends of shaft 96 toward the bottom ends of their associated vertically elongated slots 98 for a purpose subsequently described herein.

Opposite end portions of the pivot shaft 96 rotatably support the left ends of a pair of elongated connecting members 106, and the right ends of the connecting members 106 rotatably receive the opposite ends of a support shaft 108. A frictional retard roller 110 is coaxially secured to a central portion of the shaft 108 and is frictionally engaged by the transfer roller 102. A pair of cylindrical metal weight members 112 are coaxially mounted on the shaft 108 on opposite sides of the retard roller 110, and a rectangular weight member 114 is slidably carried on the front support rods 58 for vertical movement along their lengths. During loading of the envelope stack 32 into the tray 36 as subsequently described, the shaft 108 may be pivoted in a counterclockwise direction about the shaft 96, and then pivoted in a clockwise direction to its position shown in FIG. 3, after the envelopes are loaded, to operatively position the retard roller 110 as subsequently described.

The drive means 50, disposed within the machine housing 12, include a support structure having a horizontally extending base plate 120 secured at its opposite ends to transverse end plates 122 and 124. A reversible electric motor 126 is suitably secured to the underside of plate 120 and has a rotatable output shaft 128 that extends upwardly through a circular opening 130 formed through the base plate 120. A worm gear 132 is coaxially anchored to an upper end of the shaft 128 and operatively meshes with an externally toothed worm wheel 134 coaxially anchored to a longitudinally intermediate portion of a horizontal drive shaft 136.

The right end of the shaft 136 is journaled in the end plate 124, and just inwardly of the end plate 124 a cylindrical, externally toothed one-way clutch 138 is coaxially secured to the shaft 136. The clutch 138 is a conventional one-way roller bearing clutch which is rotationally drivable by the shaft 136 in a counterclockwise direction, but "idles" (i.e., is not rotationally drivable by shaft 136) when the shaft 136 is rotated in a clockwise direction. The external teeth on the clutch 138 mesh with a transfer gear 140 which is coaxially anchored to the left end of a shaft 142 a central portion of which is journaled in an appropriate opening formed in the end plate 124. The outer or right end of the shaft 142 is coaxially anchored to a drive gear 144.

The left end of the drive shaft 136 is rotatably supported in a suitable opening formed in the left end plate 122, and extends outwardly beyond such end plate. Coaxially secured to the outwardly pro-

jecting left end of shaft 136 is a cylindrical, externally toothed one-way clutch 146 which is identical to the previously described clutch 138. However, clutch 146 is rotationally drivable by shaft 136 only in a clockwise direction as viewed in FIG. 3. Accordingly, when the drive shaft 136 is rotated in the illustrated counterclockwise direction, the clutch 146 "idles" on the shaft 136 and is not rotationally driven thereby.

To ready the envelope tray structure 30 for insertion into the housing opening 14 in place of the paper supply tray 16 previously removed therefrom, the envelope stack 32 is loaded into the tray 36 by lifting the rectangular weight member 114 and the envelope stack 32 is placed within the tray 36 between the vertical support rod pairs 58, 58<sub>a</sub> as previously described with the envelope flap up, and the upstanding tab member 62 is forwardly brought into engagement with the rear ends of the individual envelopes 32<sub>a</sub>. The rectangular weight member 114 is lowered onto the front end of the now loaded envelope stack 32. The envelope stack 34 is then loaded into the opposite side of the tray 36 in a similar manner relative to its support rods 60, its upstanding tab member 62<sub>a</sub>, its rectangular weight member 114<sub>a</sub> and its associated envelope feed assembly 76<sub>a</sub>.

The loaded envelope tray 36 is then simply inserted, front end first, into the housing opening 14, thereby also longitudinally inserting front end portions of the envelope stacks 32, 34 inwardly through the housing opening 14. Operative insertion of the paper tray 36 into the housing opening 14 automatically causes the input gear 82 to mesh with the drive gear 144, and the input gear 82<sub>a</sub> to mesh with the external teeth on the one-by clutch 146, as best illustrated in FIG. 3. The envelopes in either of the two side-by-side stacks thereof may then be successively fed to the printing means 20 from the bottom of the selected envelope stack.

To illustrate the envelope infeed, it will be assumed that the envelope stack 32 is initially selected for successive delivery of its envelopes to the printing means 20. To effect this representative envelope delivery, the control means 52 are actuated to cause a counterclockwise rotation of the electric motor output shaft 128, and its attached worm gear 132, as viewed from the top in FIG. 3. The counterclockwise rotation of the worm gear 132 rotates the worm wheel 134 in the indicated counterclockwise direction, thereby rotationally driving the one-by clutch 138 in its operative counterclockwise drive direction.

This selected counterclockwise rotation of the drive shaft 136, however, does not rotationally drive the one-way clutch 146. Accordingly, during the infeed of the envelopes in stack 32 which will now be described, the entire left envelope feed assem-

bly 76<sub>a</sub> remains idle, and the envelopes in the stack 34 thereof are undisturbed by the operation of the driven and driving means 48, 50.

With continued reference to FIGS. 3 and 4, the counterclockwise driven rotation of the one-way clutch 138 causes the lower drive rollers 78 and the picker rollers 92 to be rotationally driven in counterclockwise directions as indicated in FIG. 4. The lower drive rollers 78 frictionally engage the undersides of the upper drive rollers 100 and frictionally drive them, together with the transfer roller 102, in the indicated clockwise direction. Via its frictional engagement with the retard roller 110, the transfer roller 102 drives the retard roller 110 in the indicated counterclockwise direction.

As can be seen in FIG. 4, the rectangular weight member 114 presses front end portions of the envelopes 32<sub>a</sub> in the envelope stack 32 downwardly against the upper side of the rotating picker rollers 92. Accordingly, the rotating picker rollers 92 frictionally engage a front underside portion of the bottom envelope 32<sub>a</sub>' and drive it forwardly (i.e., leftwardly) to beneath the underside of the rotating retard roller 110 which exerts a rearwardly directed frictional force on the bottom envelope 32<sub>a</sub>'. However, due to the downward force of the weight member 114, the forwardly directed frictional force of the picker rollers 92 is greater than the rearwardly directed frictional force on the bottom envelope exerted by the retard roller 110. Accordingly, the bottom envelope 32<sub>a</sub>' is driven forwardly between the rotating upper and lower feed rollers 100, 78 and driven forwardly thereby into the aforementioned printing means 20 for subsequent delivery into the external receiving well 24. The rotating retard roller 110 also exerts a rearwardly directed frictional force on the remaining envelopes 32<sub>a</sub> to prevent them from being forwardly fed to the printing means along with the bottom envelope 32<sub>a</sub>'. When the bottom envelope 32<sub>a</sub>' forwardly exits the retard roller 110, the next upwardly adjacent envelope 32<sub>a</sub> becomes the bottom envelope in the stack 32 and is fed to the printing means as just described in conjunction with the bottom envelope 32<sub>a</sub>'.

As previously mentioned, the shaft 96 is pivotally received as its opposite ends within the vertically elongated slots 98, the opposite ends of the shaft 96 being biased toward the bottom ends of such slots by the spring members 104. This permits the upper drive rollers 100 to be upwardly deflected, as indicated by the arrow 148 in FIG. 4, to automatically adjust the distance between the drive rollers 78, 100 to accommodate thickness variations in the envelopes being fed therethrough to the printing means 20.

To successively feed the envelopes 34<sub>a</sub> from the envelope stack 34 to the printing means 20, all

that is necessary is to reverse the drive direction of the electric motor 126 utilizing the control means 52. Such reversal of the electric motor causes the drive shaft 136 to be driven in a clockwise direction instead of the counterclockwise direction shown in FIGS. 3 and 4. This rotational reversal of the drive shaft 136 rotationally drives the one-way clutch 146 in its clockwise drive direction, thereby operating the left envelope feed assembly 76<sub>a</sub> to successively feed envelopes 34<sub>a</sub> to the printing means 20 from the bottom of the envelope stack 34. The clockwise rotation of the drive shaft 136 also renders the one-way clutch 138 inoperative, thereby terminating the driven operation of the right envelope feed assembly 76 and preventing infeed of the envelopes 32<sub>a</sub> from the envelope stack 32.

As will be readily appreciated by those skilled in this art, the envelope drive structure just described is representative of a variety of drive structures which could be used to feed envelopes to the printing means from a selectively variable one of the two illustrated envelope stacks 32, 34. For example, instead of the illustrated left and right gear trains used to accomplish this selective feeding task, a pulley and belt system, or other equivalent drive structures could be alternatively utilized if desired. Similarly, while the illustrated overall drive structure is conveniently split into the driven means 48 carried by the envelope tray 36, and the driving means 50 disposed within the housing 12, the overall drive structure could be differently separated, or could be essentially entirely incorporated within the machine housing or on the envelope tray structure.

The foregoing detailed description is to be clearly understood as being given by way of illustration and example only, the scope of the present invention being limited solely by the appended claims.

## Claims

1. A method of feeding envelopes to an image reproduction machine, such as a printer or copier, for imprintation thereby, said image reproduction machine having a housing with an opening therein, a paper supply tray removably insertable into said housing opening and adapted to support a stack of paper sheets, printing means disposed within said housing and operative to imprint paper stock fed thereto, and feed means for feeding paper sheets from the stack thereof supported on the inserted paper supply tray to said printing means, said method comprising the steps of:

removing said paper supply tray from said housing opening;

supporting first and second stacks of en-



bly 76<sub>a</sub> remains idle, and the envelopes in the stack 34 thereof are undisturbed by the operation of the driven and driving means 48, 50.

With continued reference to FIGS. 3 and 4, the counterclockwise driven rotation of the one-way clutch 138 causes the lower drive rollers 78 and the picker rollers 92 to be rotationally driven in counterclockwise directions as indicated in FIG. 4. The lower drive rollers 78 frictionally engage the undersides of the upper drive rollers 100 and frictionally drive them, together with the transfer roller 102, in the indicated clockwise direction. Via its frictional engagement with the retard roller 110, the transfer roller 102 drives the retard roller 110 in the indicated counterclockwise direction.

As can be seen in FIG. 4, the rectangular weight member 114 presses front end portions of the envelopes 32<sub>a</sub> in the envelope stack 32 downwardly against the upper side of the rotating picker rollers 92. Accordingly, the rotating picker rollers 92 frictionally engage a front underside portion of the bottom envelope 32<sub>a</sub>' and drive it forwardly (i.e., leftwardly) to beneath the underside of the rotating retard roller 110 which exerts a rearwardly directed frictional force on the bottom envelope 32<sub>a</sub>'. However, due to the downward force of the weight member 114, the forwardly directed frictional force of the picker rollers 92 is greater than the rearwardly directed frictional force on the bottom envelope exerted by the retard roller 110. Accordingly, the bottom envelope 32<sub>a</sub>' is driven forwardly between the rotating upper and lower feed rollers 100, 78 and driven forwardly thereby into the aforementioned printing means 20 for subsequent delivery into the external receiving well 24. The rotating retard roller 110 also exerts a rearwardly directed frictional force on the remaining envelopes 32<sub>a</sub> to prevent them from being forwardly fed to the printing means along with the bottom envelope 32<sub>a</sub>'. When the bottom envelope 32<sub>a</sub>' forwardly exits the retard roller 110, the next upwardly adjacent envelope 32<sub>a</sub> becomes the bottom envelope in the stack 32 and is fed to the printing means as just described in conjunction with the bottom envelope 32<sub>a</sub>'.

As previously mentioned, the shaft 96 is pivotally received as its opposite ends within the vertically elongated slots 98, the opposite ends of the shaft 96 being biased toward the bottom ends of such slots by the spring members 104. This permits the upper drive rollers 100 to be upwardly deflected, as indicated by the arrow 148 in FIG. 4, to automatically adjust the distance between the drive rollers 78, 100 to accommodate thickness variations in the envelopes being fed therethrough to the printing means 20.

To successively feed the envelopes 34<sub>a</sub> from the envelope stack 34 to the printing means 20, all

that is necessary is to reverse the drive direction of the electric motor 126 utilizing the control means 52. Such reversal of the electric motor causes the drive shaft 136 to be driven in a clockwise direction instead of the counterclockwise direction shown in FIGS. 3 and 4. This rotational reversal of the drive shaft 136 rotationally drives the one-way clutch 146 in its clockwise drive direction, thereby operating the left envelope feed assembly 76<sub>a</sub> to successively feed envelopes 34<sub>a</sub> to the printing means 20 from the bottom of the envelope stack 34. The clockwise rotation of the drive shaft 136 also renders the one-way clutch 138 inoperative, thereby terminating the driven operation of the right envelope feed assembly 76 and preventing infeed of the envelopes 32<sub>a</sub> from the envelope stack 32.

As will be readily appreciated by those skilled in this art, the envelope drive structure just described is representative of a variety of drive structures which could be used to feed envelopes to the printing means from a selectively variable one of the two illustrated envelope stacks 32, 34. For example, instead of the illustrated left and right gear trains used to accomplish this selective feeding task, a pulley and belt system, or other equivalent drive structures could be alternatively utilized if desired. Similarly, while the illustrated overall drive structure is conveniently split into the driven means 48 carried by the envelope tray 36, and the driving means 50 disposed within the housing 12, the overall drive structure could be differently separated, or could be essentially entirely incorporated within the machine housing or on the envelope tray structure.

The foregoing detailed description is to be clearly understood as being given by way of illustration and example only, the scope of the present invention being limited solely by the appended claims.

#### Claims

1. A method of feeding envelopes to an image reproduction machine, such as a printer or copier, for imprintation thereby, said image reproduction machine having a housing with an opening therein, a paper supply tray removably insertable into said housing opening and adapted to support a stack of paper sheets, printing means disposed within said housing and operative to imprint paper stock fed thereto, and feed means for feeding paper sheets from the stack thereof supported on the inserted paper supply tray to said printing means, said method comprising the steps of:  
removing said paper supply tray from said housing opening;  
supporting first and second stacks of en-



velopes in a side edge-by-side edge, longitudinally parallel orientation;

inserting end portions of the supported first and second envelope stacks inwardly through said housing opening after removal of said paper supply tray therefrom; and

longitudinally feeding envelopes, from a selectively variable one of the first and second inserted stacks thereof, to said printing means.

2. The method of Claim 1 wherein:

said supporting step is performed by supporting first and second stacks of differently sized envelopes in a side edge-by-side edge, longitudinally parallel orientation.

3. The method of Claim 1 wherein:

said supporting step includes the steps of providing an envelope tray structure configured to be selectively and removably insertable into said housing opening in place of said paper supply tray, and operatively loading said first and second stacks of envelopes, in said side edge-by-side edge, longitudinally parallel orientation thereof, into said envelope tray structure, and

said inserting step is performed by inserting the operatively loaded envelope tray structure into said housing opening in place of said paper supply tray.

4. For use in conjunction with an image reproduction device, such as a copying machine, printer or the like, having a housing, a paper supply tray removably insertable into an opening in the housing, means for sequentially feeding sheets of paper into said housing from a stack of paper sheets supported on said tray, printing means for printing selected indicia on the sheets fed from the stack, and means for transferring the printed sheets to the exterior of the housing, envelope handling apparatus comprising:

envelope tray means for supporting, in a side-by-side relationship, first and second stacks of envelopes, said envelope tray means being configured to be selectively and removably insertable into said housing opening in place of said paper supply tray; and

means, associated with said envelope tray means and operable when said envelope tray means are inserted into said housing opening in place of said paper supply tray, for sequentially feeding envelopes, in an endwise direction from a selectively variable one of the supported first and second envelope stacks, to said printing means.

5. The envelope handling apparatus of Claim 4 wherein:

said envelope tray means are operative to selectively support first and second stacks of identically sized envelopes or first and second stacks of differently sized envelopes.

6. The envelope handling apparatus of Claim 4 wherein:

said means for sequentially feeding envelopes are operative to sequentially feed envelopes to said printing means from the bottom of the selected envelope stack.

7. The envelope handling apparatus of Claim 6 wherein said means for sequentially feeding envelopes include first and second independently operable feed assemblies respectively associated with the first and second envelope stacks, each of said first and second feed assemblies including:

rotationally drivable picker roller means for frictionally engaging a front underside portion of the bottom envelope in their associated envelope stack and forwardly driving the bottom envelope relative to the rest of the envelopes in its stack,

weight means for pressing a front end portion of the associated envelope stack downwardly against said picker roller means,

rotationally drivable retard roller means for frictionally engaging front end portions of the envelopes in the associated stack in a manner preventing forward feeding of any envelope therein until it reaches the bottom of its stack, and

drive roller means rotationally drivable to sequentially feed each successive forwardly driven bottom envelope in the associated stack to said printing means.

8. The envelope handling apparatus of Claim 7 further comprising:

drive means for rotationally driving the picker, retard and drive roller means in a selectively variable one of said first and second feed assemblies.

9. The envelope handling apparatus of Claim 8 wherein:

each of said first and second feed assemblies includes a gear train, and

said drive means include a drive shaft having cylindrical, externally toothed first and second one-way clutch means coaxially secured to opposite end portions thereof and drivingly meshable with said gear trains, said first and second one-way clutch means having



opposite rotational drive directions, and means for rotating said drive shaft in selectively opposite directions.

10. The envelope handling apparatus of Claim 9 wherein said means for rotating said drive shaft include:
- a reversible electric motor having a rotatable output shaft, and
  - worm gear means for drivingly coupling said output shaft to said drive shaft.
11. For use in conjunction with an image reproduction device, such as a copying machine, printer or the like, having a housing, a paper supply tray removably insertable into an opening in the housing, means for sequentially feeding sheets of paper into said housing from a stack of paper sheets supported on said tray, printing means for printing selected indicia on the sheets fed from the stack, and means for transferring the printed sheets to the exterior of said housing, envelope handling apparatus comprising:
- envelope tray means for supporting, in a side-by-side relationship, first and second stacks of envelopes, said envelope tray means being configured to be selectively and removably insertable into said housing opening in place of said paper supply tray;
  - driven means carried by said envelope tray means and operatively drivable, when said envelope tray means are inserted into said housing opening in place of said paper supply tray, to sequentially feed envelopes, in an end-wise direction from a selectively variable one of said first and second envelope stacks, to said printing means; and
  - driving means, supportable within said housing, for engaging and operatively driving said driven means when said envelope tray means are inserted into said housing opening in place of said paper supply tray.
12. The envelope handling apparatus of Claim 11 wherein:
- said envelope tray means are operative to selectively support first and second stacks of identically sized envelopes or first and second stacks of differently sized envelopes.
13. The envelope handling apparatus of Claim 11 wherein said driven means comprise first and second independently operable feed assemblies respectively associated with the first and second envelope stacks and positioned adjacent forward ends thereof, each of said first and second feed assemblies including:

rotationally drivable first roller means for frictionally engaging a front underside portion of the bottom envelope in their associated envelope stack and forwardly driving the bottom envelope relative to the rest of the envelopes in its stack,

weight means for pressing a front end portion of the associated envelope stack downwardly against said first roller means,

rotationally drivable second roller means for frictionally engaging front end portions of the envelopes in the associated stack in a manner preventing forward feeding of any envelope therein until it reaches the bottom of the stack, and

rotationally drivable third roller means for sequentially feeding each successive forwardly driven bottom envelope in the associated stack to said printing means.

14. The envelope handling apparatus of Claim 13 wherein:

said apparatus further comprises first and second support structures carried by said envelope tray means forwardly adjacent the first and second envelope stacks, respectively, for pivotal movement relative to said envelope tray means toward and away from front end portions of the envelope stacks about axes generally transverse to the lengths of the envelopes, and

said second roller means are carried by said first and second support structures for pivotal movement therewith.

15. The envelope handling apparatus of Claim 14 wherein each of said support structures includes:

a shaft extending along one of said axes and journaled at its opposite ends to said envelope tray means, and

a generally U-shaped support assembly having outer ends rotatably secured to said shaft, and a central portion to which one of said second roller means is coaxially and rotatably mounted.

16. The envelope handling apparatus of Claim 15 wherein:

the opposite ends of each of said shafts are received in slots formed in said envelope tray means and permitting generally vertical movement of the shaft ends relative to said envelope tray means.

17. The envelope handling apparatus of Claim 13 wherein:

each of said first and second feed assem-



blies further includes a gear train drivable to operatively rotate said first, second and third roller means of the feed assembly, and

said drive means include a drive shaft having cylindrical, externally toothed first and second one-way clutch means coaxially secured to opposite end portions thereof and drivably meshable with said gear trains, said first and second one-way clutch means having opposite rotational drive directions, and means for rotating said drive shaft in selectively opposite directions.

18. The envelope handling apparatus of Claim 17 wherein said means for rotating said drive shaft include:

a reversible electric motor having a rotatable output shaft, and

worm gear means for drivingly coupling said output shaft to said drive shaft.

19. An image reproduction machine comprising:

a housing having an opening therein;

a paper supply tray removably insertable into said housing opening and adapted to support a stack of paper sheets;

means for sequentially feeding sheets of paper into said housing from a stack of paper sheets supported on said paper supply tray when said paper supply tray is inserted into said housing opening;

printing means for printing selected indicia on the sheets fed from the stack thereof;

means for transferring the printed sheets to the exterior of said housing;

envelope tray means for supporting, in a side-by-side relationship, first and second stacks of envelopes, said envelope tray means being configured to be selectively and removably insertable into said housing opening in place of said paper supply tray; and

means, associated with said envelope tray means and operable, when said envelope tray means are inserted into said housing opening in place of said paper supply tray, to sequentially feed envelopes, in an endwise direction from a selectively variable one of said first and second one of said first and second envelope stacks, to said printing means.

20. The image reproduction machine of Claim 19 wherein said image reproduction machine is a printer.

21. The image reproduction machine of Claim 19 wherein said image reproduction machine is a laser printer.

22. The image reproduction machine of Claim 19 wherein said image reproduction machine is a copier.

23. The image reproduction machine of Claim 19 wherein:

said envelope tray means are operative to selectively support first and second side-by-side stacks of identically sized envelopes or first and second side-by-side stacks of differently sized envelopes.

#### Patentansprüche

1. Verfahren zur Zuführung von Umschlägen zu einer Abbildungsreproduktionsmaschine, wie beispielsweise ein Drucker oder Kopierer, zum Bedrucken, wobei die Abbildungsreproduktionsmaschine ein Gehäuse mit einer Öffnung darin, einen Papiervorratsschacht, der entnehmbar in die Gehäuseöffnung einsetzbar ist und dazu geeignet ist, einen Stapel Papierblätter zu halten, Druckeinrichtungen, die innerhalb des Gehäuses angeordnet sind und so betreibbar sind, um den Papierstapel, der dorthin zugeführt wird, zu bedrucken, und Zuführeinrichtungen zur Zuführung von Papierblättern von dem Stapel davon, der auf dem eingesetzten Papiervorratsschacht gehalten ist, zu den Druckeinrichtungen besitzt, wobei das Verfahren die Verfahrensschritte aufweist:  
Entfernen des Papiervorratsschachts aus der Gehäuseöffnung;  
Halten erster und zweiter Stapel aus Umschlägen in einer Seitenkante an Seitenkante, längsparallelen Orientierung;  
Einsetzen von Endbereichen der gehaltenen ersten und zweiten Umschlagstapel nach innen durch die Gehäuseöffnung nach dem Entfernen des Papiervorratsschachts; und  
Längszuführung von Umschlägen von einem selektiv variablen des ersten und zweiten eingesetzten Stapels zu den Druckeinrichtungen.
2. Verfahren nach Anspruch 1, wobei:  
der haltende Verfahrensschritt durch Halten erster und zweiter Stapel aus Umschlägen unterschiedlicher Größen in einer Seitenkante zu Seitenkante, längsparallelen Orientierung ausgeführt wird.
3. Verfahren nach Anspruch 1, wobei:  
der haltende Verfahrensschritt die Verfahrensschritte der Bildung einer Umschlagschachtstruktur, die so konfiguriert ist, um selektiv und entnehmbar in die Gehäuseöffnung anstelle des Papiervorratsschachts einsetzbar zu sein, und betriebsmäßiges Beladen erster und



- zweiter Stapel aus Umschlägen in einer Seitenkante an Seitenkante, längsparallelen Orientierung in die Umschlagschachtstruktur umfaßt, und  
der Einsetzverfahrensschritt durch Einsetzen der betriebsmäßig beladenen Umschlagschachtstruktur in die Gehäuseöffnung anstelle des Papiervorratsschachts durchgeführt wird.
4. Zur Verwendung in Verbindung mit einer Abbildungsreproduktionsvorrichtung, wie beispielsweise eine Kopiermaschine, ein Drucker oder dergleichen, die ein Gehäuse, einen Papiervorratsschacht, der entnehmbar in eine Öffnung in dem Gehäuse einsetzbar ist, Einrichtungen zur aufeinanderfolgenden Zuführung von Blättern aus Papier in das Gehäuse von einem Stapel Papierblätter, die auf dem Schacht gehalten sind, Druckeinrichtungen zum Drucken ausgewählter Zeichen auf den Blättern, die von dem Stapel zugeführt werden, und Einrichtungen zum Übertragen der gedruckten Blättern zu der Außenseite des Gehäuses besitzt, wobei das Umschlaghandhabungsgerät aufweist:  
eine Umschlagschachteinrichtung zum Halten in einer Seiten an Seiten Beziehung erster und zweiter Stapel aus Umschlägen, wobei die Umschlagschachteinrichtung so konfiguriert ist, daß sie selektiv und entnehmbar in die Gehäuseöffnung anstelle des Papiervorratsschachts einsetzbar ist; und  
Einrichtungen, die der Umschlagschachteinrichtung zugeordnet sind und betätigbar sind, wenn die Umschlagschachteinrichtungen in die Gehäuseöffnung anstelle des Papiervorratsschachts eingesetzt werden, und zwar zur aufeinanderfolgenden Zuführung von Umschlägen in einer Ende zu Ende Richtung von einer selektiv Variablen der gehaltenen ersten und zweiten Umschlagstapel zu der Druckeinrichtung.
5. Umschlaghandhabungsgerät nach Anspruch 4, wobei:  
die Umschlagschachteinrichtungen so betreibbar sind, um selektiv erste und zweite Stapel aus Umschlägen identischer Größe oder erste und zweite Stapel aus Umschlägen unterschiedlicher Größen zu halten.
6. Umschlaghandhabungsgerät nach Anspruch 4, wobei:  
die Einrichtungen zur aufeinanderfolgenden Zuführung von Umschlägen so betreibbar sind, um aufeinanderfolgende Umschläge zu den Druckeinrichtungen von dem Boden aus des ausgewählten Umschlagstapels zuzuführen.
7. Umschlaghandhabungsgerät nach Anspruch 6, wobei die Einrichtungen zur aufeinanderfolgenden Zuführung von Umschlägen erste und zweite, unabhängig voneinander betreibbare Zuführanordnungen umfaßt, die jeweils dem ersten und dem zweiten Umschlagstapel zugeordnet sind, wobei jede der ersten und zweiten Zuführanordnungen umfaßt:  
drehbar antreibbare Aufnahmewalzeneinrichtungen zum reibungsmäßigen Eingreifen eines vorderen Unterseitenbereichs des Boden-Umschlags in dessen zugeordnetem Umschlagstapel und zum nach vorne gerichteten Antreiben des Boden-Umschlags relativ zu dem Rest der Umschläge in seinem Stapel,  
Gewichtseinrichtungen zum Drücken eines vorderen Endbereichs des zugeordneten Umschlagstapels nach unten gegen die Aufnahmewalzeneinrichtungen,  
drehbar antreibbare Verzögerungswalzeneinrichtungen zum reibungsmäßigen Eingreifen in vordere Endbereiche der Umschläge in dem zugeordneten Stapel in einer Art und Weise, um eine nach vorne gerichtete Zuführung irgendeines Umschlags darin zu verhindern, bis er den Boden seines Stapels erreicht, und  
Antriebswalzeneinrichtungen, die drehbar antreibbar sind, um aufeinanderfolgend jeden aufeinanderfolgenden nach vorne angetriebenen Boden-Umschlag in dem zugeordneten Stapel zu den Druckeinrichtungen zuzuführen.
8. Umschlaghandhabungsgerät nach Anspruch 7, das weiterhin aufweist:  
Antriebseinrichtungen zum drehbaren Antreiben der Aufnahme-, Verzögerungs- und Antriebswalzeneinrichtungen in einer selektiv Variablen der ersten und zweiten Zuführanordnung.
9. Umschlaghandhabungsgerät nach Anspruch 8, wobei:  
jede der ersten und zweiten Zuführanordnungen einen Zahnradantriebszug umfaßt, und  
die Antriebseinrichtungen eine Antriebswelle umfassen, die zylindrische, außengezahnte erste und zweite Einwegkupplungseinrichtungen besitzen, die koaxial an entgegengesetzten Endbereichen davon gesichert sind und antriebsmäßig mit den Zahnradantriebszügen in Eingriff bringbar sind, wobei die erste und zweite Einwegkupplungseinrichtung entgegengesetzt drehbare Antriebsrichtungen und Einrichtungen zum Drehen der Antriebswelle in auswählbar entgegengesetzten Richtungen besitzt.



10. Umschlaghandhabungsgerät nach Anspruch 9, wobei die Einrichtungen zum Drehen der Antriebswelle umfassen:

einen umkehrbaren, elektrischen Motor, der eine drehbare Abtriebswelle besitzt, und Schneckenzahnradanordnungen zum antriebsmäßigen Verbinden der Abtriebswelle mit der Antriebswelle.

11. Zur Verwendung in Verbindung mit einer Abbildungsreproduktionsvorrichtung, wie beispielsweise eine Kopiermaschine, ein Drucker oder dergleichen, die ein Gehäuse, einen Papiervorratsschacht, der entnehmbar in eine Öffnung in dem Gehäuse einsetzbar ist, Einrichtungen zur aufeinanderfolgenden Zuführung von Blättern aus Papier in das Gehäuse von einem Stapel Papierblätter, die auf dem Schacht gehalten werden, Druckeinrichtungen zum Drucken ausgewählter Zeichen auf die Blätter, die von dem Stapel zugeführt werden, und Einrichtungen zum Überführen der bedruckten Blätter zu der Außenseite des Gehäuses, wobei das Umschlaghandhabungsgerät aufweist:

Umschlagschachteinrichtungen zum Halten, in einer Seiten an Seiten Beziehung, erster und zweiter Stapel aus Umschlägen, wobei die Umschlagschachteinrichtungen so konfiguriert sind, daß sie auswählbar und entfernbar in die Gehäuseöffnung anstelle des Papiervorratsschachts einsetzbar sind;

angetriebene Einrichtungen, die durch die Umschlagschachteinrichtungen getragen sind und betriebsmäßig antreibbar sind, wenn die Umschlagschachteinrichtungen in die Gehäuseöffnung anstelle des Papiervorratsschachts eingesetzt werden, um aufeinanderfolgende Umschläge in einer Längsrichtung von einem selektiv Variablen des ersten und zweiten Umschlagstapels zu der Druckeinrichtung zuzuführen; und

Antriebseinrichtungen, die innerhalb des Gehäuses zum Ineingriffbringen und betriebsmäßigen Antreiben der angetriebenen Einrichtungen haltbar sind, wenn die Umschlagschachteinrichtungen in die Gehäuseöffnung anstelle des Papiervorratsschachts eingesetzt werden.

12. Umschlaghandhabungsgerät nach Anspruch 11, wobei:

die Umschlagschachteinrichtungen so betreibbar sind, um selektiv erste und zweite Stapel aus Umschlägen identischer Größe oder erste und zweite Stapel aus Umschlägen unterschiedlicher Größe zu halten.

13. Umschlaghandhabungsgerät nach Anspruch 11, wobei die angetriebenen Einrichtungen er-

ste und zweite unabhängig betreibbare Zuführanordnungen aufweisen, die jeweils ersten und zweiten Umschlagstapeln zugeordnet sind und angrenzend an vordere Enden davon positioniert sind, wobei die ersten und zweiten Zuführanordnungen umfassen:

drehbar antreibbare erste Walzeneinrichtungen zum reibungsmäßigen Eingreifen in einen vorderen Unterseitenbereich des Boden-Umschlags in deren zugeordnetem Umschlagstapel und zum nach vorne gerichteten Antreiben des Boden-Umschlags relativ zu dem Rest der Umschläge in dessen Stapel, Gewichtseinrichtungen zum Drücken eines vorderen Endbereichs des zugeordneten Umschlagstapels nach unten gegen erste Walzeneinrichtungen, drehbar antreibbare zweite Walzeneinrichtungen zum reibungsmäßigen Eingreifen in vordere Endbereiche der Umschläge in dem zugeordneten Stapel in einer Art und Weise, um eine nach vorne gerichtete Zuführung irgendeines Umschlags zu verhindern, bis er den Boden des Stapels erreicht, und drehbar antreibbare dritte Walzeneinrichtungen zum sequentiellen Zuführen jedes aufeinanderfolgenden nach vorne angetriebenen Boden-Umschlags in dem zugeordneten Stapel zu den Druckeinrichtungen.

14. Umschlaghandhabungsgerät nach Anspruch 13, wobei:

das Gerät weiterhin erste und zweite Haltestrukturen, die durch die Umschlagschachteinrichtungen, nach vorne angrenzend an erste und zweite Umschlagstapel jeweils für eine schwenkbare Bewegung relativ zu den Umschlagschachteinrichtungen zu den vorderen Endbereichen der Umschlagstapel um Achsen im wesentlichen quer zu den Längen der Umschläge hin und weg getragen werden, aufweist, und die zweiten Walzeneinrichtungen werden durch die ersten und zweiten Haltestrukturen für eine schwenkbare Bewegung zusammen damit getragen.

15. Umschlaghandhabungsgerät nach Anspruch 14, wobei die Tragestrukturen umfassen:

eine Welle, die sich entlang einer der Achsen erstreckt und drehbar an ihren entgegengesetzten Enden an den Umschlagschachteinrichtungen gelagert ist und eine im wesentlichen U-förmige Halteanordnung, die äußere Enden besitzt, die drehbar an der Welle gesichert sind, und einen zentralen Bereich, an dem eine der zweiten Walzeneinrichtungen koaxial und drehbar befestigt ist, besitzt.



16. Umschlaghandhabungsgerät nach Anspruch 15, wobei:

die entgegengesetzten Enden jeder der Wellen in Schlitten aufgenommen sind, die in den Umschlagschachteinrichtungen gebildet sind und eine im allgemeinen vertikale Bewegung der Wellenenden relativ zu den Umschlagschachteinrichtungen erlauben.

17. Umschlaghandhabungsgerät nach Anspruch 13, wobei:

jede der ersten und zweiten Zuführanordnung weiterhin einen Zahnradantriebszug umfaßt, der antriebsbar ist, um betriebsmäßig die ersten, zweiten und dritten Walzeneinrichtungen der Zuführanordnung zu drehen, und die Antriebseinrichtungen einer Antriebswelle, die zylindrische, außengezahnte erste und zweite Einwegkupplungseinrichtungen besitzt, die koaxial an entgegengesetzten Endbereichen davon gesichert sind und antriebsbar mit den Getriebezahnradzügen in Eingriff bringbar sind, wobei die ersten und zweiten Einwegkupplungseinrichtungen entgegengesetzt drehbare Antriebsrichtungen besitzen, und Einrichtungen zum Drehen der Antriebswelle in selektiv entgegengesetzten Richtungen, umfaßt.

18. Umschlaghandhabungsgerät nach Anspruch 17, wobei die Einrichtungen zum Drehen der Antriebswelle umfassen:

einen umkehrbaren, elektrischen Motor, der eine drehbare Abtriebswelle besitzt, und Schneckengetriebezahnradantriebsrichtungen zur antriebsmäßigen Verbindung der Abtriebswelle mit der Antriebswelle.

19. Abbildungsreproduktionsmaschine, die aufweist:

ein Gehäuse, das eine Öffnung darin besitzt; einen Papiervorratsschacht, der entfernbar in die Gehäuseöffnung einsetzbar ist und dazu geeignet ist, einen Stapel Papierblätter zu halten;

Einrichtungen zur sequentiellen Zuführung von Blättern aus Papier in das Gehäuse von einem Stapel Papierblätter, die auf dem Papiervorratsschacht gehalten sind, wenn der Papiervorratsschacht in die Gehäuseöffnung eingesetzt wird;

Druckeinrichtungen zum Drucken ausgewählter Zeichen auf die Blätter, die von dem Stapel zugeführt werden;

Einrichtungen zum Überführen der bedruckten Blätter zu der Außenseite des Gehäuses;

Umschlagschachteinrichtungen zum Halten in einer Seite an Seiten Beziehung, erster und

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zweiter Stapel aus Umschlägen, wobei die Umschlagschachteinrichtungen so konfiguriert sind, um selektiv und entnehmbar in die Gehäuseöffnung anstelle des Papiervorratsschachts einsetzbar zu sein;

Einrichtungen, die den Umschlagschachteinrichtungen zugeordnet sind und betätigbar sind, wenn die Umschlagschachteinrichtungen in die Gehäuseöffnung anstelle des Papiervorratsschachts eingesetzt werden, um sequentiell Umschläge in einer Längsrichtung von einem selektiv variablen des ersten und zweiten der ersten und zweiten Umschlagstapel zu den Druckeinrichtungen zuzuführen.

20. Abbildungsreproduktionsmaschine nach Anspruch 19, wobei die Abbildungsreproduktionsmaschine ein Drucker ist.

21. Abbildungsreproduktionsmaschine nach Anspruch 19, wobei die Abbildungsreproduktionsmaschine ein Laserdrucker.

22. Abbildungsreproduktionsmaschine nach Anspruch 19, wobei die Abbildungsreproduktionsmaschine ein Kopierer ist.

23. Abbildungsreproduktionsmaschine nach Anspruch 19, wobei:

die Umschlagschachteinrichtungen so betreibbar sind, um selektiv erste und zweite Stapel aus Umschlägen identischer Größe Seite an Seite oder erste und zweite Stapel aus Umschlägen unterschiedlicher Größe Seite an Seite zu halten.

## Revendications

1. Procédé pour acheminer des enveloppes jusqu'à une machine de reproduction d'images, telle qu'une imprimante ou une photocopieuse, pour qu'elles soient imprimées par celle-ci, ladite machine de reproduction d'images ayant un logement muni d'une ouverture, un plateau d'alimentation en papier pouvant être inséré d'une manière amovible dans ladite ouverture du logement et étant conçu pour supporter une pile de feuilles de papier, un moyen d'impression disposé dans ledit logement et servant à imprimer le papier acheminé jusqu'à lui, et un moyen d'acheminement pour acheminer jusqu'audit moyen d'impression des feuilles de papier provenant de la pile de papier supportée par le plateau d'alimentation en papier inséré, ledit procédé comprenant les étapes consistant à:

enlever de ladite ouverture du logement ledit plateau d'alimentation en papier;



supporter une première et une seconde piles d'enveloppes disposées bord latéral à bord latéral, selon une orientation parallèle dans la direction longitudinale;

insérer des parties formant extrémités des première et seconde piles d'enveloppes supportées, vers l'intérieur à travers ladite ouverture du logement, après que ledit plateau d'alimentation en papier a été enlevé de celle-ci; et acheminer longitudinalement jusqu'audit moyen d'impression des enveloppes provenant au choix de la première ou de la seconde pile d'enveloppes insérées.

2. Procédé selon la revendication 1, dans lequel: ladite étape de support est effectuée en supportant une première et une seconde piles d'enveloppes de formats différents, disposées bord latéral à bord latéral, selon une orientation parallèle dans la direction longitudinale.

3. Procédé selon la revendication 1, dans lequel: ladite étape de support comporte les étapes consistant à fournir une structure de plateau pour enveloppes agencée de façon à pouvoir être insérée d'une manière sélective et amovible dans ladite ouverture du logement à la place dudit plateau d'alimentation en papier, et à charger, en fonctionnement, lesdites première et seconde piles d'enveloppes, bord latéral à bord latéral, selon ladite orientation parallèle dans la direction longitudinale de celles-ci, dans ladite structure de plateau pour enveloppes, et

ladite étape d'insertion est effectuée en insérant la structure formant plateau pour enveloppes chargée, en fonctionnement, dans ladite ouverture du logement à la place dudit plateau d'alimentation en papier.

4. Dans le but d'être utilisé conjointement avec un dispositif de reproduction d'images tel qu'une photocopieuse, une imprimante ou autre, ayant un logement, un plateau d'alimentation en papier pouvant être inséré d'une manière amovible dans une ouverture du logement, un moyen pour acheminer successivement des feuilles de papier jusque dans ledit logement à partir d'une pile de feuilles de papier supportée par ledit plateau, un moyen d'impression pour imprimer des motifs choisis sur les feuilles acheminées à partir de la pile, et un moyen pour transporter les feuilles imprimées jusqu'à l'extérieur du logement, dispositif de manipulation d'enveloppes comprenant:

un moyen formant plateau pour enveloppes afin de supporter, côte à côte, une première et une seconde piles d'enveloppes, ledit

moyen formant plateau pour enveloppes étant agencé pour pouvoir être inséré d'une manière sélective et amovible dans ladite ouverture du logement à la place dudit plateau d'alimentation en papier; et

un moyen, coopérant avec ledit moyen formant plateau pour enveloppes et utilisable lorsque ledit moyen formant plateau pour enveloppes est inséré dans ladite ouverture du logement à la place dudit plateau d'alimentation en papier, pour acheminer successivement jusqu'audit moyen d'impression des enveloppes, orientées dans le sens longitudinal depuis l'une ou l'autre, au choix, des première et seconde piles d'enveloppes supportées.

5. Dispositif de manipulation d'enveloppes selon la revendication 4, dans lequel:

ledit moyen formant plateau pour enveloppes sert à supporter d'une manière sélective une première et une seconde piles d'enveloppes de format identique ou une première et une seconde piles d'enveloppes de formats différents.

6. Dispositif de manipulation d'enveloppes selon la revendication 4, dans lequel:

ledit moyen pour acheminer successivement des enveloppes sert à acheminer successivement des enveloppes jusqu'audit moyen d'impression depuis le bas de la pile d'enveloppes choisie.

7. Dispositif de manipulation d'enveloppes selon la revendication 6, dans lequel ledit moyen pour acheminer successivement des enveloppes comprend un premier et un second systèmes d'acheminement pouvant fonctionner indépendamment, associés respectivement à la première et la seconde piles d'enveloppes, chacun desdits premier et second systèmes d'acheminement comprenant:

des moyens formant galets de préhension pouvant être entraînés en rotation, destinés à venir frotter contre une partie antérieure du dessous de l'enveloppe du bas de leur pile d'enveloppes correspondante et à entraîner vers l'avant l'enveloppe du bas par rapport au reste des enveloppes de sa pile,

des moyens formant poids pour pousser vers le bas, contre lesdits moyens formant galets de préhension, une partie d'extrémité antérieure de la pile d'enveloppes correspondante,

des moyens formant galets de retardement pouvant être entraînés en rotation, conçus pour venir frotter contre des parties d'extrémité avant des enveloppes de la pile



correspondante d'une manière empêchant l'une quelconque des enveloppes de ladite pile d'avancer tant qu'elle n'a pas atteint le bas de sa pile, et

des moyens formant galets d'entraînement pouvant être entraînés en rotation pour acheminer successivement jusqu'audit moyen d'impression chaque enveloppe successive, entraînée vers l'avant, du bas de la pile correspondante.

8. Dispositif de manipulation d'enveloppes selon la revendication 7, comprenant en outre:

un moyen d'entraînement pour entraîner en rotation les moyens formant galets de préhension, de retardement et d'entraînement, au choix parmi l'un ou l'autre desdits premier et second systèmes d'acheminement.

9. Dispositif de manipulation d'enveloppes selon la revendication 8, dans lequel:

chacun desdits premier et second systèmes d'acheminement porte un train d'engrenages, et

ledit moyen d'entraînement comporte un arbre d'entraînement ayant un premier et un second moyens formant embrayages unidirectionnels cylindriques, à denture extérieure, fixés coaxialement à des parties d'extrémité opposées de celui-ci et pouvant engrener de façon à réaliser un entraînement avec lesdits trains d'engrenages, lesdits premier et second moyens formant embrayages unidirectionnels tournant dans des directions d'entraînement opposées, et un moyen pour faire tourner ledit arbre d'entraînement dans des directions sélectivement opposées.

10. Dispositif de manipulation d'enveloppes selon la revendication 9, dans lequel ledit moyen pour faire tourner ledit arbre d'entraînement comporte:

un moteur électrique réversible ayant un arbre rotatif de sortie, et

un moyen formant engrenage à vis sans fin pour coupler de manière motrice ledit arbre de sortie audit arbre d'entraînement.

11. Pour coopérer avec un dispositif de reproduction d'images tel qu'une photocopieuse, une imprimante ou autre, ayant un logement, un plateau d'alimentation en papier pouvant être inséré d'une manière amovible dans une ouverture du logement, un moyen pour acheminer successivement des feuilles de papier dans ledit logement à partir d'une pile de feuilles de papier supportée par ledit plateau, un moyen d'impression pour imprimer des mo-

tifs choisis sur les feuilles acheminées depuis la pile, et un moyen pour transférer les feuilles imprimées à l'extérieur dudit logement, dispositif de manipulation d'enveloppes comprenant:

un moyen formant plateau pour enveloppes servant à supporter, côte à côte, une première et une seconde piles d'enveloppes, ledit moyen formant plateau pour enveloppes étant agencé pour pouvoir être inséré d'une manière sélective et amovible dans ladite ouverture du logement à la place dudit plateau d'alimentation en papier;

un moyen mené porté par ledit moyen formant plateau pour enveloppes et pouvant être entraîné, en fonctionnement, lorsque ledit moyen formant plateau pour enveloppes est inséré dans ladite ouverture du logement à la place dudit plateau d'alimentation en papier, pour acheminer successivement des enveloppes jusqu'audit moyen d'impression, dans une direction longitudinale à partir de l'une ou l'autre, au choix, desdites première et seconde piles d'enveloppes; et

un moyen d'entraînement, pouvant être supporté dans ledit logement, destiné à venir entraîner, en fonctionnement, ledit moyen mené lorsque ledit moyen formant plateau pour enveloppes est inséré dans ladite ouverture du logement à la place dudit plateau d'alimentation en papier.

12. Dispositif de manipulation d'enveloppes selon la revendication 11, dans lequel:

ledit moyen formant plateau pour enveloppes sert à supporter sélectivement une première et une seconde piles d'enveloppes de format identique ou une première et une seconde piles d'enveloppes de formats différents.

13. Dispositif de manipulation d'enveloppes selon la revendication 11, dans lequel ledit moyen mené comprend un premier et un second systèmes d'alimentation pouvant fonctionner indépendamment, correspondant respectivement à la première et à la seconde piles d'enveloppes et placés au voisinage immédiat des extrémités antérieures de celles-ci, chacun desdits premier et second systèmes d'acheminement comprenant:

des premiers moyens formant galets pouvant être entraînés en rotation pour venir frotter contre une partie antérieure formant la face inférieure de l'enveloppe du bas dans leur pile d'enveloppes correspondante et pour entraîner vers l'avant l'enveloppe du bas par rapport au reste des enveloppes de sa pile,

des moyens formant poids pour pousser



- vers le bas, contre lesdits premiers moyens formant galets, une partie formant extrémité antérieure de la pile d'enveloppes correspondante,
- des seconds moyens formant galets pouvant être entraînés en rotation, conçus pour venir frotter contre des parties d'extrémité antérieures des enveloppes de la pile correspondante d'une manière empêchant n'importe quelle enveloppe de celle-ci d'avancer tant qu'elle n'a pas atteint le bas de sa pile, et
- des troisièmes moyens formant galets pouvant être entraînés en rotation pour acheminer successivement jusqu'audit moyen d'impression chaque enveloppe du bas de la pile correspondante, entraînée successivement vers l'avant.
14. Dispositif de manipulation d'enveloppes selon la revendication 13, dans lequel:
- ledit dispositif comprend en outre une première et une seconde structures de support portées
- par ledit moyen formant plateau pour enveloppes immédiatement à l'avant respectivement de la première et de la seconde piles d'enveloppes pour pivoter par rapport audit moyen formant plateau pour enveloppes afin de se rapprocher et de s'éloigner des parties d'extrémité antérieures des piles d'enveloppes autour d'axes globalement transversaux par rapport à la longueur des enveloppes, et
- lesdits seconds moyens formant galets sont portés par lesdites première et seconde structures de support pour pivoter avec celles-ci.
15. Dispositif de manipulation d'enveloppes selon la revendication 14, dans lequel chacune desdites structures de support comprend:
- un arbre s'étendant le long d'un desdits axes et pivotant à ses extrémités opposées par rapport audit moyen formant plateau pour enveloppes, et
- un système de support globalement en forme de U ayant des extrémités extérieures fixées d'une manière rotative audit arbre, et une partie centrale à laquelle un desdits seconds moyens formant galets est monté d'une manière coaxiale et rotative.
16. Dispositif de manipulation d'enveloppes selon la revendication 15, dans lequel:
- les extrémités opposées de chacun desdits arbres sont reçues dans des fentes ménagées dans lesdits moyens formant plateaux pour enveloppes et permettant un mouvement globalement vertical des extrémités des arbres
- par rapport auxdits moyens formant plateaux pour enveloppes.
17. Dispositif de manipulation d'enveloppes selon la revendication 13, dans lequel:
- chacun desdits premier et second systèmes d'acheminement comporte en outre un train d'engrenages pouvant être entraîné pour faire tourner, en fonctionnement, lesdits premiers, seconds et troisièmes moyens formant galets du système d'acheminement, et
- lesdits moyens d'entraînement comprennent un arbre d'entraînement ayant un premier et un second moyens formant embrayages unidirectionnels cylindriques, à denture extérieure, fixés coaxialement à des parties d'extrémité opposées de celui-ci et pouvant engrener d'une manière motrice avec lesdits trains d'engrenages, lesdits premier et second moyens formant engrenages unidirectionnels ayant des directions opposées d'entraînement en rotation, et un moyen pour faire tourner ledit arbre d'entraînement dans des directions sélectivement opposées.
18. Dispositif de manipulation d'enveloppes selon la revendication 17, dans lequel lesdits moyens pour faire tourner ledit arbre d'entraînement comprennent:
- un moteur électrique réversible ayant un arbre de sortie rotatif, et
- un moyen formant engrenage à vis sans fin pour coupler d'une manière motrice ledit arbre de sortie audit arbre d'entraînement.
19. Machine de reproduction d'images, comprenant:
- un logement dans lequel est ménagée une ouverture;
- un plateau d'alimentation en papier pouvant être inséré d'une manière amovible dans ladite ouverture du logement et conçu pour supporter une pile de feuilles de papier;
- un moyen pour acheminer successivement des feuilles de papier jusque dans ledit logement à partir d'une pile de feuilles de papier supportée par ledit plateau d'alimentation en papier lorsque ledit plateau d'alimentation en papier est inséré dans ladite ouverture du logement;
- un moyen d'impression pour imprimer des motifs choisis sur les feuilles acheminées à partir de la pile de feuilles;
- un moyen pour transférer les feuilles imprimées à l'extérieur dudit logement;
- des moyens formant plateaux pour enveloppes afin de supporter, côte à côte, une première et une seconde piles d'enveloppes,



- lesdits moyens formant plateaux pour enveloppes étant agencés pour pouvoir être insérés d'une manière sélective et amovible dans ladite ouverture du logement à la place dudit plateau d'alimentation en papier; et 5
- des moyens, associés auxdits moyens formant plateaux pour enveloppes et servant, lorsque lesdits moyens formant plateaux pour enveloppes sont insérés dans ladite ouverture du logement à la place dudit plateau d'alimentation en papier, à acheminer successivement des enveloppes, jusqu'audit moyen d'impression, dans une direction longitudinale depuis l'une ou l'autre, au choix, desdites première et seconde piles d'enveloppes. 10 15
20. Machine de reproduction d'images selon la revendication 19, ladite machine de reproduction d'images étant une imprimante. 20
21. Machine de reproduction d'images selon la revendication 19, ladite machine de reproduction d'images étant une imprimante laser.
22. Machine de reproduction d'images selon la revendication 19, ladite machine de reproduction d'images étant une photocopieuse. 25
23. Machine de reproduction d'images selon la revendication 19, dans laquelle: 30
- lesdits moyens formant plateaux pour enveloppes servent à supporter sélectivement côte à côte une première et une seconde piles d'enveloppes de format identique ou une première et une seconde piles d'enveloppes de formats différents. 35

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