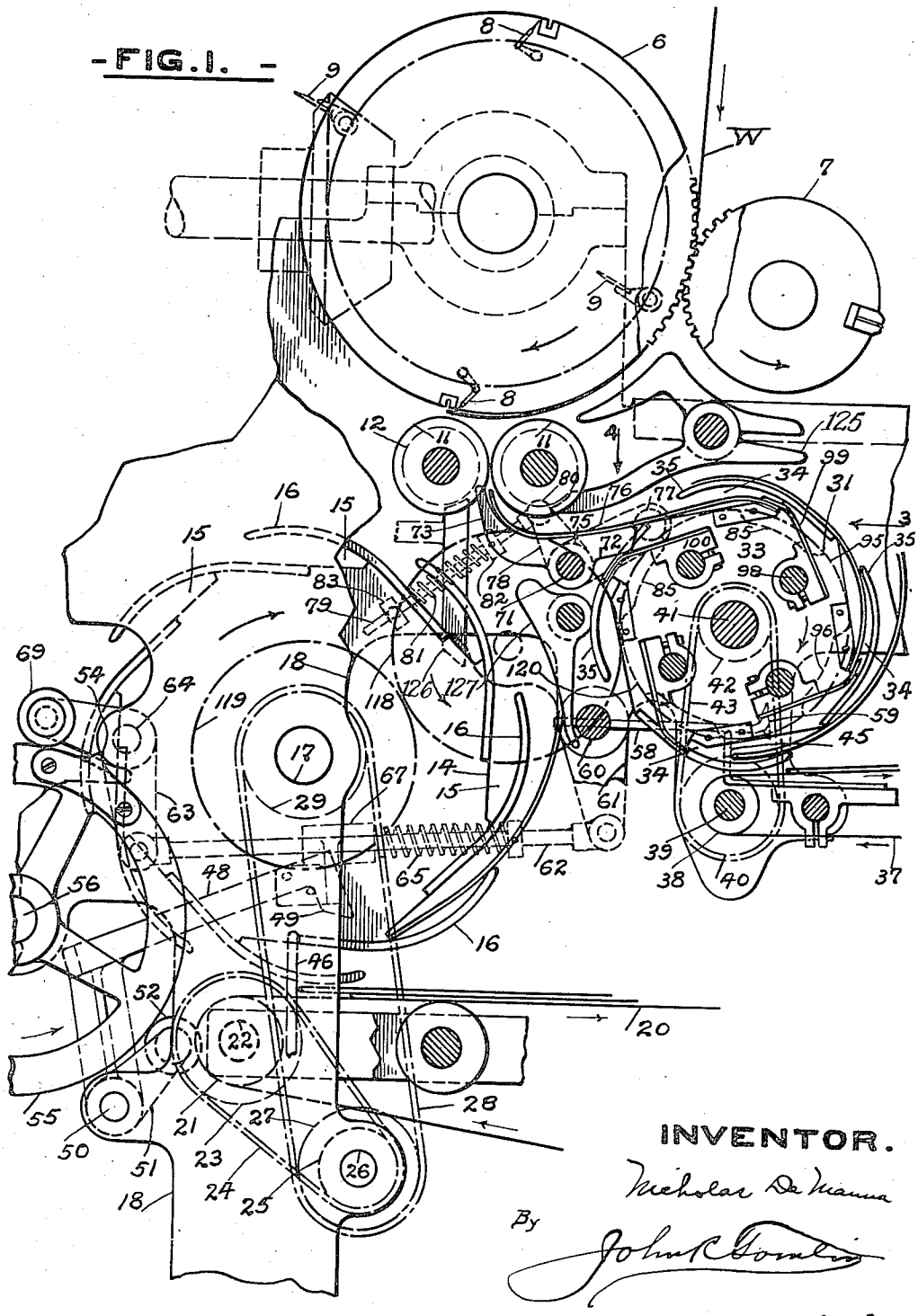
Jan. 12, 1937. N. DE MANNA 2,067,565

DELIVERY MECHANISM FOR PRINTING MACHINE FOLDERS

Filed Dec. 27, 1933 4 Sheets-Sheet 1

-FIG. 1.-



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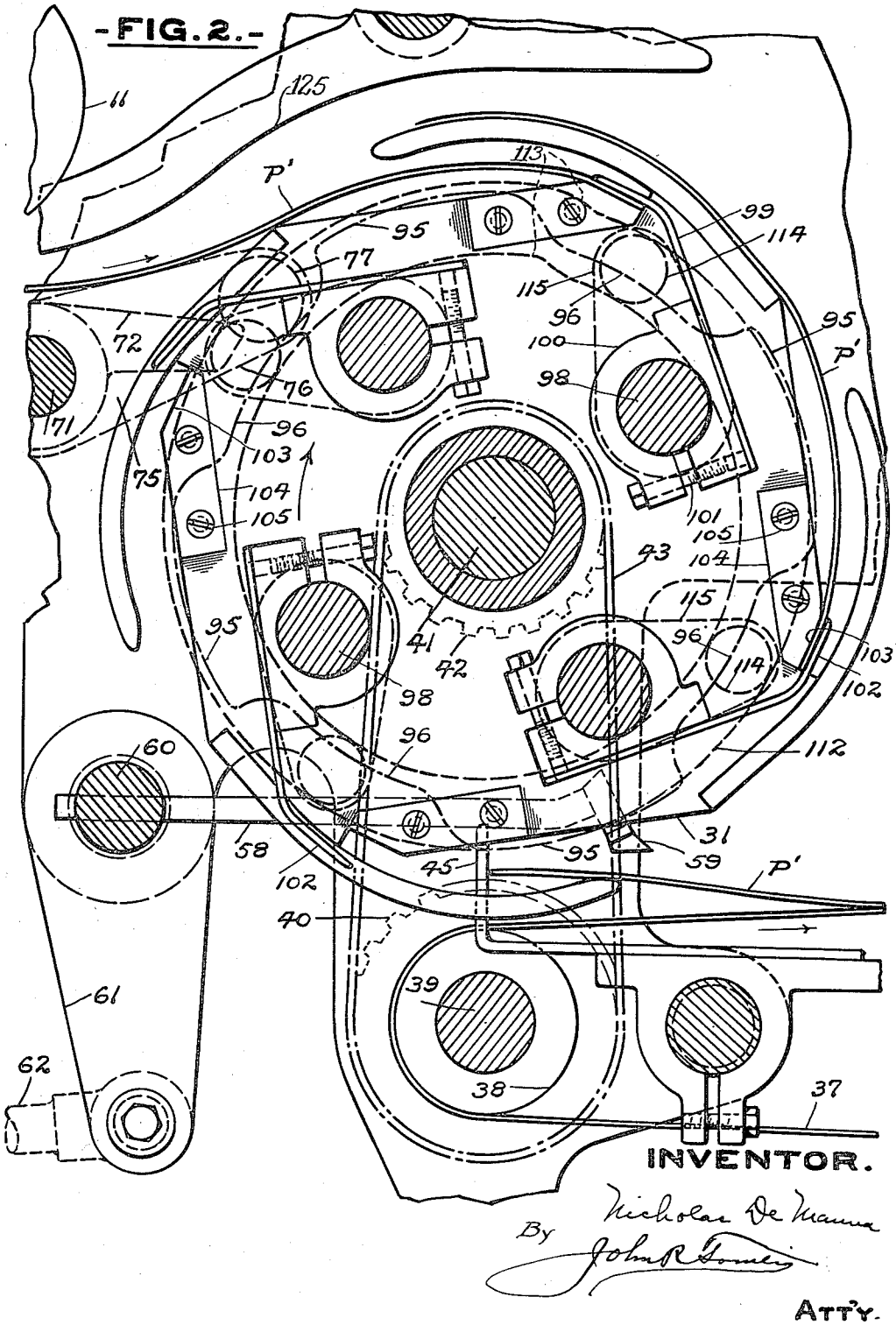
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Jan. 12, 1937. N. DE MANNA 2,067,565

DELIVERY MECHANISM FOR PRINTING MACHINE FOLDERS

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-FIG. 2.-



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DELIVERY MECHANISM FOR PRINTING MACHINE FOLDERS

Filed Dec. 27, 1933 4 Sheets-Sheet 3

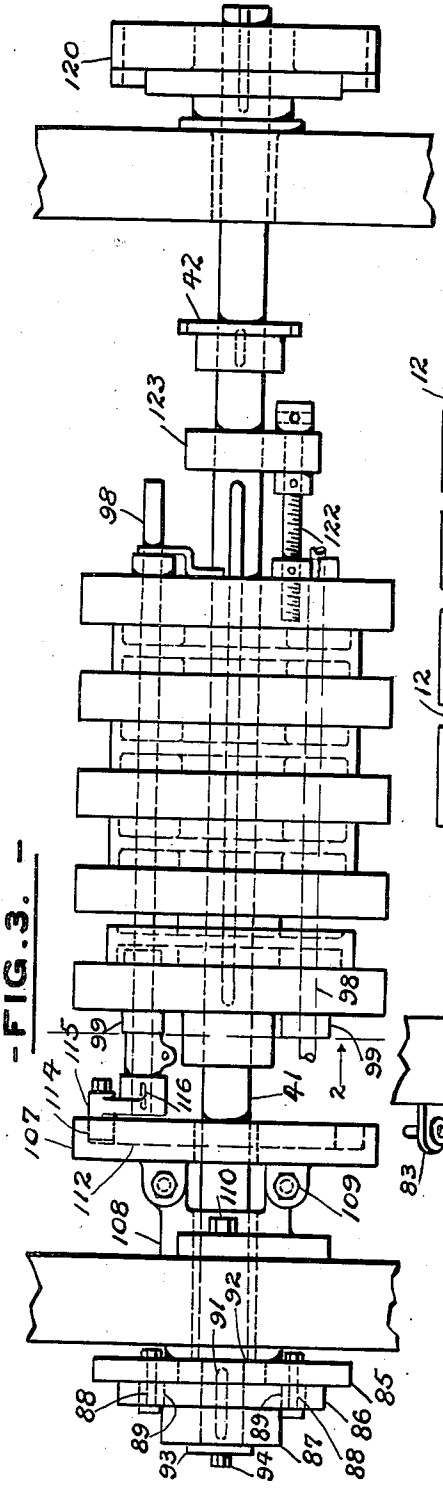


FIG. 3.

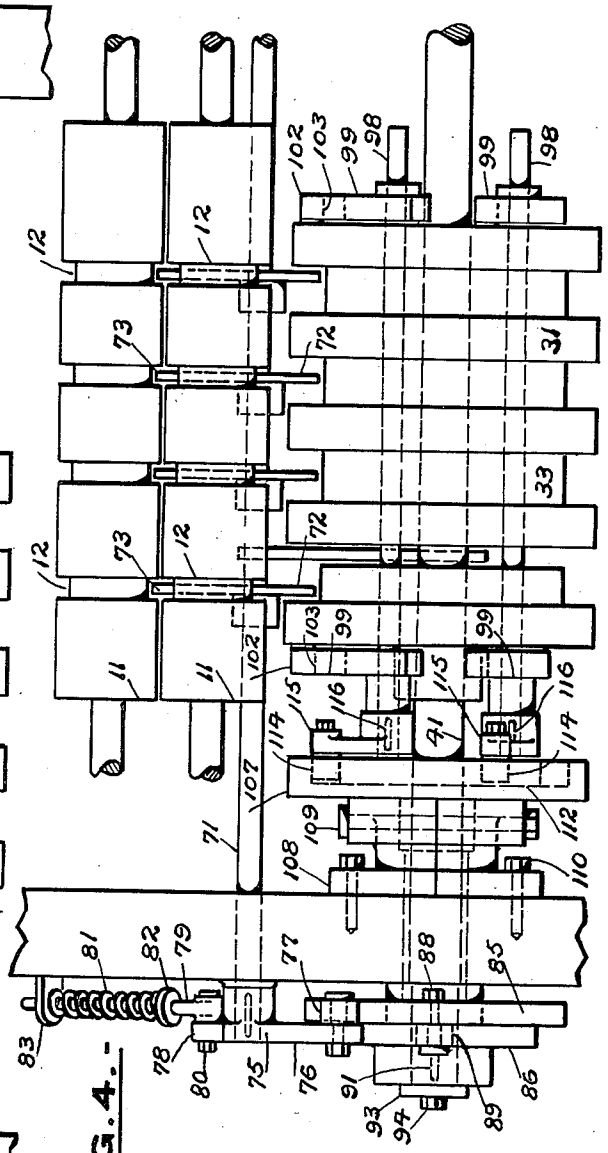


FIG. 4.

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Jan. 12, 1937. N. DE MANNA 2,067,565

DELIVERY MECHANISM FOR PRINTING MACHINE FOLDERS

Filed Dec. 27, 1933 4 Sheets-Sheet 4

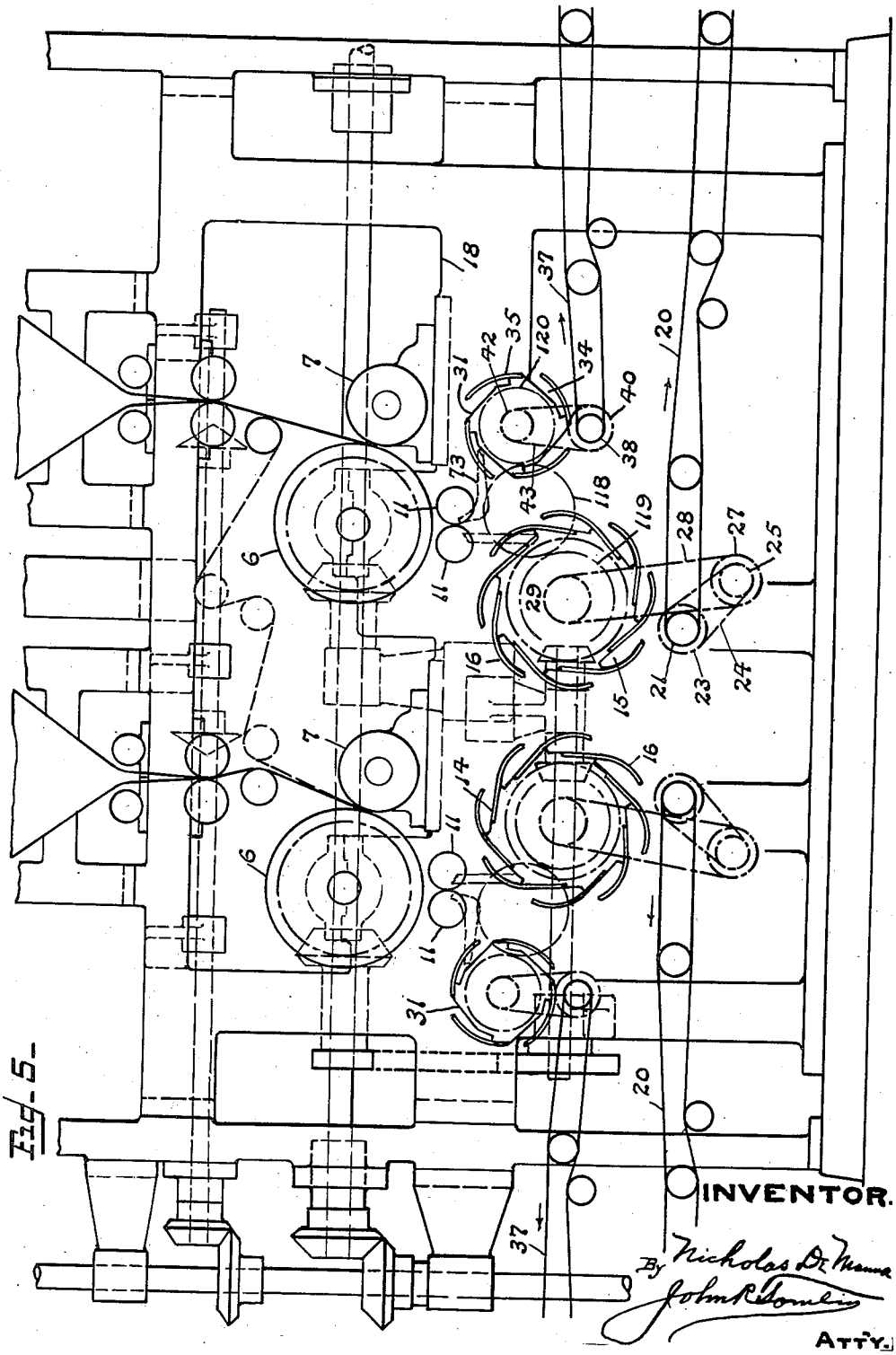


Fig. 5.

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Patented Jan. 12, 1937 2,067,565

UNITED STATES PATENT OFFICE

2,067,565

DELIVERY MECHANISM FOR PRINTING MACHINE FOLDERS

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Application December 27, 1933, Serial No. 704,165

15 Claims. (Cl. 271—64)

This invention relates to delivery mechanisms to be employed in printing machine folders and particularly folders of the type employed in rotogravure presses, and which are adapted for folding multiple products and delivering each product separately.

Heretofore printing machines have employed folders capable of delivering separate products folded by a common folding mechanism in different directions away from the folder. Usually such folders are constructed and arranged to fold multiple products and each alternate product is delivered in different directions away from the folder.

An object of this invention is to provide a delivery mechanism for use in printing machine folders capable of separating multiple products folded by a common folding mechanism, and then delivering alternate products in the same direction away from the folder.

Another object of this invention is to provide a folder delivery mechanism constructed and arranged to separate the products folded by a common folder, and mechanically gripping certain of these products to insure positive delivery of all the products.

A further object of this invention is to provide a folder delivery mechanism including a rotary delivery fan and a separate delivery fan provided with positive sheet-taking means.

A more specific object of the invention is to provide a folder delivery mechanism having separate delivery fans, one of which being constructed and positioned to operably receive folded products from the folding rollers through a gravity path, and the products for the other fan diverted from a normal gravitational path of travel by a positively actuated means, and the products then propelled during the initial phase of their travel by the folding rollers and then gripped by mechanism operably supported by the second fan and positively conveyed around the fan to the final conveying means.

It is also an aim and object of this invention to provide in a printing machine folder a delivery mechanism of generally improved construction, whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical and efficient and serviceable in its use.

With these and other objects not specifically referred to in view, the invention consists in certain novel parts, arrangements and combinations, which will be described in connection with the accompanying drawings and the novel features pointed out in the claims hereunto appended.

The invention has been illustrated in its preferred embodiments in the accompanying drawings, wherein:—

Figure 1 is a fragmentary side elevation of a printing machine folder, showing the invention applied thereto, parts appearing in section;

Figure 2 is a vertical sectional view taken approximately on the line 2—2 of Figure 3;

Figure 3 is a fragmentary elevation of the folder, depicting the improved delivery fan and its cooperating driving mechanism, the view being taken in the direction of the arrow 3 of Figure 1;

Figure 4 is a fragmental plan view, showing the cooperative relationship between the folding rollers, improved delivery fan, and switching means, the view looking in the direction of arrow 4, Figure 1; and

Figure 5 is a diagrammatic elevation depicting a double folder arrangement.

Referring to the drawings in which corresponding parts are indicated by similar reference characters, there is shown for each unit of a double folder a conventional folding cylinder 6, and a cooperating cutting cylinder 7, employed in the usual printing machine folder construction, and the folding cylinder 6 is provided with the usual web or sheet taking pins 8, and conventional folding blades 9. Inasmuch as the function and operation of these components are thoroughly understood by those skilled in the art, it is thought that a detailed disclosure thereof is not here necessary. Opposed folding rollers 11 of usual construction are provided and are positioned adjacent to and below the folding cylinders 6, to permit the folding blades 9 to tuck the sheets or webs therebetween to cause the product to be folded off the folding cylinder in the usual manner.

A rotary delivery fan 14, of usual construction, is positioned below the folding rollers 11. This fan has product receiving pockets 15 defined on its periphery by fan blades 16, and these pockets are arranged for tangential disposition relative to the folding off rollers 11 during the rotation of the fan about its supporting shaft 17 which is journalled in machine frame 18. This fan is provided with eight pockets 15 for the reception of the products from the folder, and a conveyor member 20 is provided to cooperate with the delivery fan to receive and convey products therefrom.

This conveyor 20 may conform to the conventional structure, and is driven by a pulley or sprocket 21 secured to a shaft 22 which, in turn,

is driven by a sprocket 23 to which power is imparted through a chain 24, driven from a sprocket 25, carried by shaft 26, journaled in machine frame 18. The shaft 26 is driven by a sprocket 27, to which power is imparted by a chain 28, driven by a sprocket 29, carried by the delivery fan operating and supporting shaft 17.

A second delivery fan 31 is provided, and this fan is smaller than the fan 14 and is positioned to one side of the folding rollers 11. It includes a composite cylinder or body member 33 having separate series of product receiving pockets 34 formed on the periphery thereof, and the outer portion of these pockets are defined by separate series of fan blades 35, which are secured to the body member 33. In the structure illustrated there are five series of fan blades 35 positioned axially of the cylinder or body member 33, and there are preferably four blades to each series, these blades being spaced equidistant around the cylinder, thus defining equidistant product receiving pockets 34.

A conveyor 37 is provided to cooperate with the small delivery fan 31, and this conveyor is driven by a pulley or sprocket 38, carried by a shaft 39, driven by sprocket 40, and the sprocket 40 is driven from the operating and supporting shaft 41 of the delivery fan 31 through the instrumentality of a sprocket 42 and chain 43. The usual stop or abutment 45 is provided for the small delivery fan, and a similar stop 46 is provided for the large fan 14, both stops functioning to interrupt the movement of the product around the periphery of the delivery fans and to cause the products to be deposited onto the delivery conveyors 20 and 37 in the usual manner.

As known to those skilled in the art, such mechanisms are usually provided with "kickers" or "counters", and in this device, the large delivery fan 14 is provided with a cooperating counter member which includes an arm 48, having an enlarged head 49, and the arm 48 is pivotally supported by a shaft 50, journalled in the frame 18 of the machine, and a crank arm 51 is secured to and extends from the shaft 50, and has a terminal roller 52 journalled thereto, and this roller is operably engaged by a cam projection 54 carried on the rotary cam 55, which is operably supported by a shaft 56, journalled in the frame 18 and driven by any suitable instrumentality.

A kicker or counting device is also provided for the small delivery fan 31, and it includes an arm 58 having an enlarged head or product interrupter 59, and the arm 58 is secured to and supported by a shaft 60, journalled in the machine frame. A crank arm 61 is secured to and extends from the shaft 60, and its outer terminal is pivotally secured to a rod 62 which has its opposed terminal pivotally secured to bell crank 63, fulcrummed at 64 to the machine frame 18. The rod 62 is normally urged in a direction away from the cam 55 by a helical spring 65 carried by the rod, and its opposed terminal engaging a bracket 67 supported by the machine frame 18, and through which the rod extends. The bell crank 63 is provided with a terminal roller 69 which is positioned in the path of travel of the cam projection 54, and when this projection engages the roller 69 it moves the bell crank 63, rod 62, crank 61 and kicker arm 58 and head 59 so that this head interrupts the path of the product around the fan 31, thereby positioning the engaged product on the delivery fan at an angle to the other products. The cam projection 54 also engages the roller 52 which is stressed towards the cam by any suitable means, not shown, and rocks the arm 48 about its pivot 50, thereby disposing its enlarged head 49 in the path of travel of the products traveling around the large fan 14 and thereby interrupting the engaged product. As is well understood by those skilled in the art, these kicker members are constructed and arranged to operate only after a predetermined number of papers have been discharged on the conveyor belt and the interrupted sheet indicates that such predetermined number have been deposited.

Normally the product or sheet after being folded from the folding cylinder 6 by the folding rollers 11 are propelled by these rollers and gravity into the pockets 15 of the delivery fan 14, and then deposited on the conveyor belt 20. In order that alternate products may be diverted from their normal path of travel and directed towards the smaller delivery fan 31, an improved switching or guiding member is provided which includes a shaft 71, journalled in machine frame 18 for oscillatory movement, and this shaft has a plurality of spaced guide members 72 secured thereto, and the outer terminal 73 of each guide member is curved upwardly and terminates and is received within grooves 12 formed in the folding rollers 11. One terminal of the shaft 71 is provided with a bell crank 75, having a relatively long arm 76 to the terminal of which a roller 77 is rotatively secured. A relatively short arm 78 extends from the bell crank 75, and a rod 79 is pivotally secured to its outer terminal, as indicated at 80. The bell crank 75 is normally stressed so that its long arm 76 is urged towards the small fan 31 by means of a helical spring 81 which surrounds the rod 79, and one terminal of this spring abuts a collar 82 carried by the rod, and its opposed terminal engages a lug 83 extending from the frame 18 and through which the rod 79 is slidably mounted.

A cam 85 is secured to the flange 86 of a collar 87 by means of bolts or other suitable securing means 88, which extend through the cam and through elongated slots 89 provided in the flange 86 to permit the cam to be adjusted relative to the flange. The collar 87 is secured to the shaft 41 against relative rotary motion by a suitable key 91, and the collar is clamped against relative longitudinal motion between a shoulder 92 formed on the shaft 41, and an enlarged washer or retainer 93 which is secured to the shaft 41, by means of a screw or other securing device 94. The cam 85 is provided with four equally spaced cam projections 95, and four intervening equally spaced cam recesses 96. Inasmuch as the roller 77 is normally stressed towards cam 85 by the tension spring 81, the roller 77 drops into a cam recess 96 and causes the curved terminals 73 of the guide members 72 to move toward the right, as viewed in Figure 1, and clear the path of travel for the products to pass from the folding rollers 11 to the fan 14, and when the roller 77 engages the cam projections 95, the guide terminal 73 is moved back to the position depicted in Figure 1, and guides the products from their normal path of travel along the upper face of the guide members 72 into the pockets 34 of the small fan 31. Inasmuch as this fan is positioned laterally relatively to the folding-off rollers 11, there is a tendency for the products to slow down as they pass through the curved path of travel to this fan, and, in order to insure that the product is delivered to the delivery conveyor 37, suitable gripper mechanism is provided.

Shafts 98 are journalled in and are operably

supported by the cylinder 33 of the small fan member 31, there being a shaft 98 for each product receiving pocket 34 formed circumferentially around the fan. Gripper arms 99 are secured to the opposed terminals of the shafts 98 by means of split clamping heads 100 carried by the arms and secured to the shafts 98 by suitable screws or tightening members 101. The outer or gripping terminal 102 of each gripper 99 is disposed at an angle to the main portion of the gripper and is arranged to operably engage the angular disposed faces 103 of gripper pads 104 secured to the fan cylinder 33, as indicated at 105. These pads are positioned adjacent the base or inner terminals of the product receiving slots 34 in order that the gripping terminals 102 of the grippers 99 may engage the inner terminals of the products P' and positively convey them around the fan 31 to its cooperating conveyor 37.

Inasmuch as the grippers 99 operably engage the products P' at a predetermined point or angular position in the path of travel of the products around the periphery of the fan, they are actuated by a fixed actuator in the form of a cam 107 which is secured to a split bracket 108, as indicated at 109, and the bracket 108, in turn, is fastened to the machine frame 18, as depicted at 110. This cam is of the closed type, and has formed therein a closed cam groove 112, for the operable reception of roller 114, rotatably supported at the outer terminals of cranks 115, and each crank or arm 115 is secured to a terminal of each shaft 98, as indicated at 116.

Any preferred means may be employed to drive the folder, and since such devices are well known to those skilled in the art and is not an element of this invention no detailed disclosure will be made herein. The large fan 14 is driven in the usual manner, and the small fan 31 is driven from the large fan by an interposed idler gear 118, which meshes with gears 119 and 120 secured to the terminals of the shafts 17 and 41 respectively of the fans 14 and 31. These gears are preferably proportioned to drive the separate fans at one to one ratio, so that the small four pocket fan 31 makes a revolution for each revolution of the large eight pocket fan, for reasons to be hereinafter disclosed.

In order to insure that the small fan 31 may be positioned to accurately cooperate with the folder or have the proper "side lay", the body 33 of the fan may be adjusted longitudinally on the shaft 41 by means of an adjusting screw or member 122, threaded in the body 33 and which is swivelled to a collar or head 123, secured to the shaft 41. By merely rotating the screw 122 the fan 31 may be adjusted to any desired position relative to the other components of the folding and delivering device.

Suitable guide members are provided to aid in directing the folded sheets or products to the separate fans, and to this end guides 125 extend from the folding rollers 11 and over the small fan 31, thereby cooperating with the guides 72 to direct or guide the folded sheets P' into the pockets 34 of the small fan. Other guides 126 extend downwardly from the folding roller 11 to the large fan 14 to aid in directing products P from the folding rollers 11 thereto, and a tail guide 127 is supported between the large fan 14 and small fan 31 to prevent the "sheet tails" of the folded product P from striking the fan as the folded sheet P passes around the fan 14 to delivery conveyor 20.

In operation, the web W is carried around the folding cylinder 6 by the pins 8, in the usual manner, and it is then tucked between the folding rollers 11 by the conventional folding blades 9. The folding rollers 11 fold the web from the cylinder 6, thus producing the finished folded product, and if the guide member 72 is so operated by its actuating cam 85 that its curved terminal 73 is positioned below the folding rollers, as shown in Figure 1, the product P' engages the upper edge of the curved terminal 73 and the guide member 72 which directs it into a pocket 34 of the smaller fan 31. As each product P' engages the inner terminal or stop of the pockets the gripper-actuating roller 114 rides down the offset portion 113 of the cam groove 112 of the fixed cam 107, thereby causing the gripping terminal 102 of the gripper 99 to grip the forward folded edge of the product and positively convey it around the fan 31. As the product approaches the stop member or abutment 45, the cam 107 is shaped to open the gripper 99 and release the product so that when it impinges the stop member 45 it will be deposited on the conveyor 37, and conveyed to the right, as viewed in Figure 1, away from the folder. After a product P' has passed between the folding rollers 11, the roller 77 which actuates the guide member 72 drops into a cam recess 96 of the driven cam 85, thereby causing the curved guiding terminal 73 of the member 72 to move to the right, as viewed in Figure 1, and clear the path of travel for the product P from the folding rollers 11 to the large fan 14. The product P is propelled by the folding rollers 11 and by gravity into a pocket 15 of the large fan 14, and is conveyed around this fan into engagement with the stop member 46, and finally deposited on the conveyor 20, and conveyed to the right as, viewed in Figure 1, away from the folder. Thus it is seen that the products P' are conveyed into the small gripper-equipped delivery fan 31, and the alternate products P are delivered into the large fan 14, and each product is conveyed from its respective delivery fan in the same direction away from the folder. In the operation just described, a product P' is received in each pocket of the small fan 31, and a product P is received in each alternate pocket of the large fan.

When a double folder is employed, as shown in Figure 5, four separate products may be printed and then folded by a unit of the double folder and delivered separately, two of the products being delivered separately in the same direction away from one unit of the double folder, and two products delivered away from the other folder unit in another direction. If it is desired to deliver only one product through each folder unit, then the small delivery fan in each unit is silenced, with the roller 77 resting in a cam recess 96, thus causing all of the products to be delivered into the large delivery fan, and, in this event, a product is received in each pocket thereof and delivered to the conveyor 20.

Having thus described my invention, what I claim as new and useful in the art is:—

1. In a delivery mechanism for a printing machine folder, separate delivery fans rotatable in the same direction, means for directing alternate products from the folder to the same operative side of each fan, and means for conveying the products from the separate fans away from the folder in the same direction.

2. In a delivery mechanism for a printing machine having double folders, two delivery fans for

each folder and the fans for each folder being rotatable in the same direction, means for directing alternate products from each folder to the same operative side of the separate fans, and means for conveying the products from the two fans of each folder in the same direction away from the folder.

3. In a delivery mechanism for a printing machine having double folders, two delivery fans for each folder and the fans for each folder being rotatable in the same direction, means for directing alternate products from each folder to the same operative side of the separate fans, means for conveying the products from the two fans of one folder in one direction away from the folder, and for conveying the products from the two fans of the other folder in a different direction away from the folder.

4. A delivery fan for use in printing machine folders, including a body member having a plurality of substantially concentric product receiving pockets, each pocket constructed and arranged to receive a substantial portion of a product and positively actuated grippers operably supported by the delivery fan for gripping the products received in the pockets to convey them around the fan.

5. A delivery fan for use in a printing machine folder, including a body member, a plurality of fan blades carried thereby and defining peripheral product receiving pockets, each pocket being constructed and arranged to receive a substantial portion of a product, gripper pads positioned adjacent the inner terminals of these pockets, and grippers pivotally supported by the body and constructed and arranged to cooperate with the said pads to grip the products which are received in the pockets and positively convey them around the fan.

6. In a delivery mechanism for a printing machine folder, a fan capacitated to receive all the products from the folder, guides forming a gravity path of travel leading from the folder to the fan, a second fan capacitated to receive only a portion of the products of the folder and having pockets, each pocket receiving and supporting a substantial portion of a product, laterally extending rigid stationary guides forming a second path of travel leading from the folder to the second fan, means whereby the gravity path of travel to the first fan is interrupted to divert certain products from the folder into the second path of travel and into the pockets of the second fan when the second fan is operating, positively actuated product taking means operably supported by the second delivery fan to positively convey the products received by this fan around the fan, and means for conveying the products from the fans.

7. In a delivery mechanism for a printing machine folder having folding rollers, a fan positioned below the folding rollers and capacitated to receive all the products from the folder, guides forming a gravity path of travel leading from the folder to the fan, a second fan capacitated to receive only a portion of the products of the folder and having pockets, each pocket receiving and supporting a substantial portion of a product, rigid stationary guides forming a second path of travel leading laterally from a point below the folding rollers to the second fan, means power driven in timed relation to the printing machine folder whereby the gravity path of travel from the folding rollers to the first fan is intermittently interrupted to thereby divert certain products laterally into the second path of travel and into the pockets of the second fan when the second fan is operating, and means for conveying the products away from the fans.

8. In a delivery mechanism for a printing machine folder having folding rollers, a fan positioned below the folding rollers and capacitated to receive all the products from the folder, guides forming a gravity path of travel leading from the folder to the fan, a second fan capacitated to receive only a portion of the products of the folder and having pockets, each pocket receiving a substantial portion of a product, rigid stationary guides forming a second path of travel leading laterally from a point below the folding rollers to the second fan, means whereby the gravity path of travel from the folding rollers to the first fan is interrupted to thereby divert certain products laterally into the second path of travel and into the pockets of the second fan when the second fan is operating, grippers operably supported by the second fan to engage and convey products received therein around this fan, and means for conveying the products away from the fans.

9. In a delivery mechanism for a printing machine folder having folding rollers, a fan positioned below the folding rollers and capacitated to receive all the products from the folder, guides forming a gravity path of travel leading from the folder to the fan, a second fan capacitated to receive only a portion of the products of the folder and having pockets, each pocket receiving and supporting a substantial portion of a product, rigid stationary guide members leading laterally from a point below the folding rollers to the second fan, a switch member positioned outside of the gravity path of travel when the second fan is inoperative and movable into the said gravity path of travel when the second fan is in operation to thereby divert certain products laterally into the guides and into the pockets of the second fan, grippers operably supported by the second fan to engage and convey products received therein around this fan, and means for conveying the products away from the fans.

10. In a delivery mechanism for a printing machine folder, two delivery fans, guide members forming a gravity path of travel leading from the folder to one fan, rigid stationary guide members forming a laterally disposed path of travel leading from the folder to the second fan, a power driven switching member driven in timed relation to the printing machine folder and constructed and arranged to interrupt the gravity path of travel of the products from the folder to the first fan to initially divert alternate products into the laterally disposed path of travel toward the second fan and to open the gravity path to permit the remaining products to gravitate to the first fan, and means for conveying the products away from both fans.

11. In a delivery mechanism for a printing machine folder, a delivery fan constructed and positioned to operably receive products from the folder along a gravity path, a second delivery fan having pockets for receiving a substantial portion of a product, stationary rigid guides leading from the folder to the second fan, means driven by an operating component of a folder for positively diverting other products of the folder from the gravity path along the guides toward the second fan, and positive product taking means carried by the second fan to convey the products around this fan.

12. In a delivery mechanism for a printing

machine folder, a rotary delivery fan constructed and positioned to operably receive products from the folder along a gravity path, a second delivery fan rotatable in the same direction as the first fan and having separate pockets, each pocket receiving and supporting a substantial portion of a product, means driven in predetermined sequence by an operating component of the folder for positively diverting other products of the folder from the gravity path toward the second fan, both fans receiving the products at their same operative sides, and grippers operably supported by the second fan to positively grip and convey the products received by this fan around the fan.

13. In a delivery mechanism for a printing machine folder, a rotary delivery fan positioned and constructed to operably receive products from the folder through a gravity path of travel, rigid stationary guides forming a second path of travel, a conveyor cooperating with the fan to receive products therefrom and convey them in a given direction away from the folder, a second delivery fan rotatable in the same direction as the first fan, driven means for diverting other products from the folder into the second path of travel where they are propelled by momentum to the second delivery fan, a second conveyor cooperating with the second delivery fan to receive products therefrom and convey them away from the folder in the same direction as the first conveyor.

14. In a delivery mechanism for a printing machine folder, a delivery fan rotatable in a given direction and constructed and positioned to operably receive products from the folder through a gravity path of travel, laterally-extending guides forming a second path of travel, a conveyor cooperating with the fan to receive products therefrom and convey them from the folder, a second delivery fan rotatable in the same direction as the first delivery fan and having separate pockets, each pocket receiving and supporting a substantial portion of a product, means for diverting other products from the gravity path into the second path of travel to the second delivery fan, both fans receiving the products at their same operative sides, positively actuated product taking means operably supported by the second delivery fan to engage and positively convey these products around the fan with a substantial portion of each product in a pocket, and a second conveyor cooperating with the second delivery fan to receive products therefrom and convey them away from the folder.

15. In a delivery mechanism for a printing machine folder, a delivery fan rotatable in a given direction and constructed and positioned to operably receive products from the folder through a gravity path of travel, a conveyor cooperating with the fan to receive products therefrom and convey them from the folder, a second delivery fan having pockets and rotatable in the same direction as the first delivery fan, each pocket receiving and supporting a substantial portion of a product, guides extending laterally from the folder to form a second path of travel to the second fan, means for diverting other products of the folder from the gravity path of travel into the second path along the laterally disposed guides and into the pockets of the second delivery fan, both fans receiving their products at their same operative sides, positively actuated grippers operably carried by the second fan to grip and convey these products around the fan to discharge position, and a second conveyor cooperating with the second delivery fan to receive products therefrom and convey them away from the folder.

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