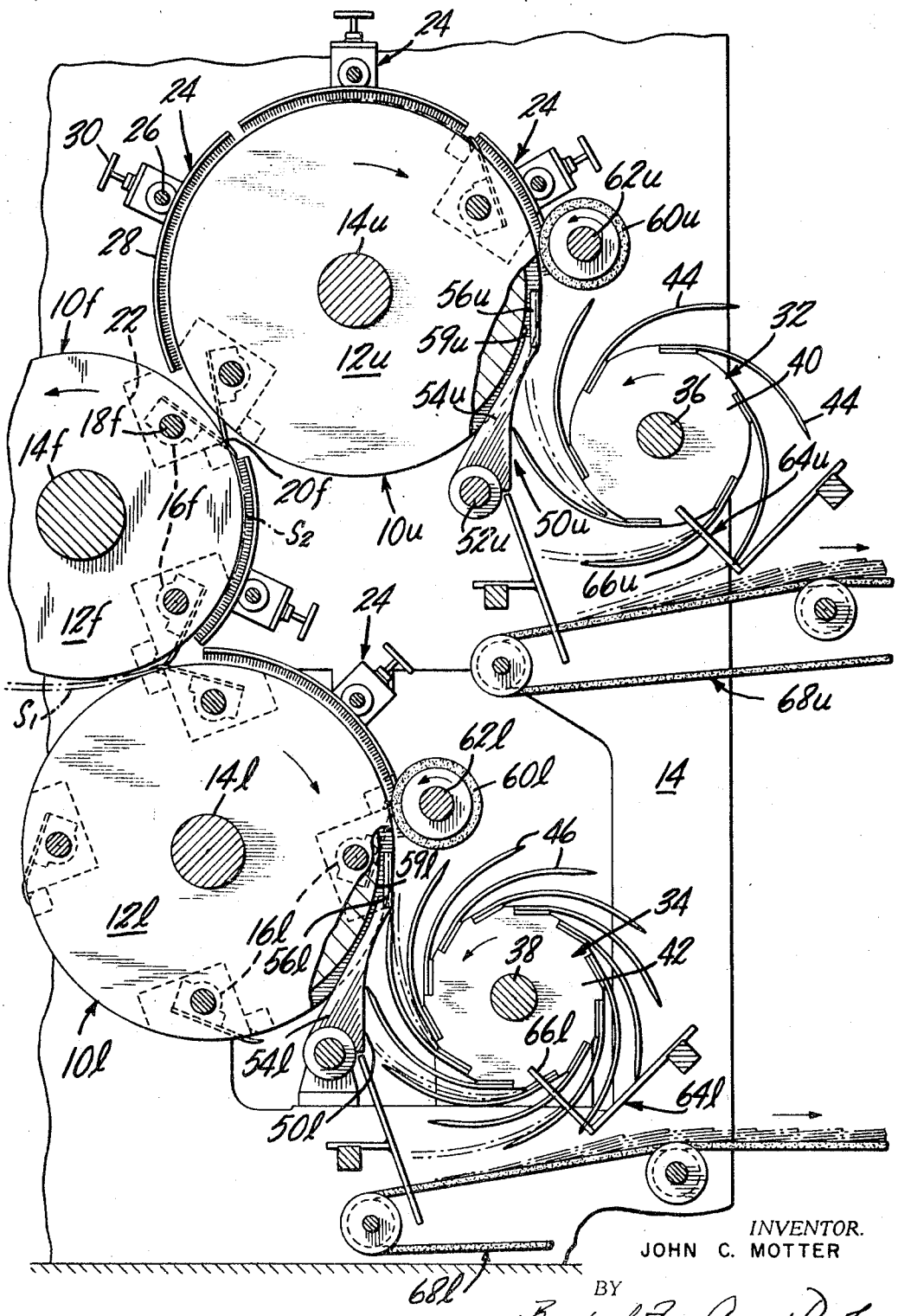
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FOLDER DELIVERY APPARATUS

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INVENTOR.
JOHN C. MOTTER

BY
Brumbaugh, Free, Graves & Donohue

his ATTORNEYS

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FOLDER DELIVERY APPARATUS

John C. Motter, York, Pa., assignor to John C. Motter Printing Press Co., York, Pa., a corporation of Delaware

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ABSTRACT OF THE DISCLOSURE

Folder delivery apparatus for use in printing equipment to deliver folded signatures from a folder mechanism onto a creeping belt or the like comprising a first rotatable gripper and slowdown cylinder and at least one and preferably two second rotatable gripper and slowdown cylinders, each having grippers for receiving and gripping the backbones of each of a stream of folded signatures coming in succession from the folder mechanism and each carrying the folded signature at a speed less than the speed at which it is received along an arcuate path, the second cylinders receiving the signatures from the first. The signatures are transferred from each of the second gripper and slowdown cylinders to a fan wheel which has a plurality of spaces for capturing and carrying the signatures for deposition on the creeping belt. Guides located in the path of movement of the signatures carried by the second gripper and slowdown cylinders guide the signatures into the receiving spaces of the fan wheels and rotatable propeller discs engage the signatures against the second gripper and slowdown cylinder and propel them into the receiving spaces of the fan wheels without diminution of their speed until after they are released to the fan wheel. The signatures are kept flat on the gripper and slowdown cylinders by means of a series of longitudinally spaced, arcuate brushes fixed concentric to each gripper cylinder and encompassing a substantial part of the segment along with the signatures pass as they are carried by the cylinder.

BACKGROUND OF THE INVENTION

This invention relates to folder equipment used in printing presses and, more particularly, to a novel and improved folder delivery apparatus for transferring the folded signatures from the sheet folding mechanism to a creeping belt or other receiving medium and, in the course of so doing, slowing the speed of the signature sufficiently to permit them to be brought to a stop without risk of mutilation.

Many types of modern printing machines are capable of operating at very high speeds, this capability being a result of numerous improvements made over the years. Each system of the machine must be capable of operating efficiently and with a minimum possibility of faulty operation at the highest operating speed for the machine. Otherwise, the system would not function properly in the machine and would constitute a restriction on the speed at which the machine can be operated.

One important system in a printing machine is the folder, and folders have been devised that are capable of accommodating to the higher operating speeds of the printing sections of the machines. An important part of the folder is the delivery part which transfers the folded signatures from the folding mechanism to creeping output belts or other suitable output media. Because of the high operating speed of the press, and consequently the high speed of the signatures as they are delivered to and pass through the folder, the folder delivery apparatus must slow the speed of the signatures, as well as appropriately transfer them from the sheet folding mechanism to the output belt.

One form of previously known folder delivery apparatus embodies two or more rotatable gripper and slowdown cylinders arranged in series, each cylinder rotating at a peripheral speed such that the signatures are slowed down in steps upon being transferred from one to another. Various specific forms of gripper and slowdown cylinders have been proposed. Upon leaving the last of the series of gripper and slowdown cylinders, the signatures have been handled in various ways to transfer them onto the output belt. One form of folder delivery apparatus embodies one or more sets of pinch rolls, each set being composed of a pair of coengaging rolls forming a nip through which the signatures are fed and by which the signatures are flattened and the air removed from them. Inasmuch as the pinch rolls engage the opposite surfaces of the folded signature, the folded signature usually being in the form of a book containing a number of folded sheets, the pinch rolls have not provided positive feed to the output belt, inasmuch as opportunity is afforded for slippage between the interior sheets and the outer sheet which is engaged and driven by the pinch rolls. Accordingly, this form of output has not proved to be entirely satisfactory in operation.

Another desirable attribute of a press delivery apparatus is to provide multiple output streams to permit two or more products to be printed and to be separately delivered. Although there have been various proposals for delivery apparatus providing separate outputs, many of them have proved to be quite susceptible to paper jams resulting from interference between the signatures. For example, one form of known multiple or separated output system is composed of two rotatable fan wheels positioned adjacent each other in the path of delivery from a gripper cylinder or the like. The fan wheels are rotated in opposite directions, and their phases and rates of rotation are established so that the signature-receiving spaces of each traverse the path of the output of the signature and the fan wheels alternately receive the signatures. Often, the signatures are fed by gravity from pinch rolls and feed rolls, usually along suitable guides, or they may be driven by feed belts into the fan wheels. In any event, interference between the operation of the two fan wheels frequently occurs, and this system has not provided to be capable of the high speed printing operations that are possible with modern equipment.

SUMMARY OF THE INVENTION

An important objective of the present invention is to provide a folder delivery apparatus that is capable of operating at high speed and can provide either single delivery of one product onto a single creeping output belt or other appropriate delivery medium or to provide separate delivery of two, three or four products on separate output belts. The delivery apparatus according to the invention embodies a number of features that provide full control over the signatures at all stages of their movement from the sheet folding mechanism to the belt, thus providing the maximum assurance against the risk of jamming, and improvements that provide for delivery of a uniformly creased product in which the sheets or pages on opposite sides of the fold lie relatively flat and from which air has been removed.

More particularly, the folder delivery apparatus according to the invention comprises a first rotatable gripper and slowdown cylinder and at least one, and preferably two second rotatable gripper and slowdown cylinders, each cylinder having grippers for receiving and engaging the backbones of each of the succession of folded sheets coming from the sheet folding mechanism and carrying them along an arcuate path to a transfer point. Preferably, the folder handles two side-by-side streams of signatures, one

stream on each longitudinal half of the cylinders. All of the signatures coming from the folder mechanism are received by the first gripper and slowdown cylinder and are transferred by it to one or both of the second cylinders. The first cylinder is rotated at a rate such that the speed of the signatures as they are carried by it is substantially less than the speed of the incoming signatures to it, and similarly the second cylinders are rotated at yet a slower rate so that the speed of the signatures is further reduced. The delivery apparatus can be operated to either deliver all of the signatures coming from the folder along one path through one of the second cylinders to the exclusion of the other or along two paths to and through the two second gripper and slowdown cylinders. Because the machine handles two side-by-side streams, the delivery can provide two, three, or four separate and different outputs, each output belt receiving two side-by-side streams for a total of four for the two belts. Depending upon the particular printing format of the signatures in the printing section of the machine, the delivery apparatus can separately deliver one, two, three or four different printed products.

The signatures are transferred from each of the second gripper and slowdown cylinders to a fan wheel positioned adjacent the second cylinder and provided with a plurality of spaces for receiving and capturing the signatures. Transfer from the second cylinders to the fan wheel is effected by guides disposed at the transfer point and in the path of movement of the signatures as they are carried by the second cylinder which deflect the signatures from the arcuate path into the receiving spaces of the fan wheel. In a preferred embodiment, the guides are in the form of elongated elements made of a suitable low friction material and having a substantially straight guiding surface which is disposed substantially tangent to the arcuate path of movement of the signatures at the transfer point. The downstream terminus of the guide element is located closely adjacent to the trajectory of the outermost parts of the fan wheel so that the signatures are accurately and positively guided through the transfer stage in a controlled manner. The transfer of the signatures from each second gripper and slowdown cylinder to the fan wheel associated with it is accomplished by means of one or more longitudinally spaced, rotatable propeller discs located adjacent the transfer point and engaging the signatures in nips between them and the cylinder to propel the signatures in a controlled and positive manner into the receiving spaces of the fan wheel without diminution of their speed until after they are released from the propellers. Further control over the signatures as they pass through the delivery apparatus and, more importantly, removal of air from and more complete flattening of the signatures is accomplished by arcuate brushes positioned concentric with and spaced longitudinally along each gripper and slowdown cylinder so as to engage and flatten each signature against the surface of the cylinder as it is carried from the receiving point to the transfer point. The brushes preferably encompass substantially all of the circumferential segments of the cylinders along which the signatures are carried. In this way, the signatures are maintained in flattened condition against the several gripper and slowdown cylinders throughout the entire delivery and slowdown operation.

Where the folder delivery apparatus includes two second gripper and slowdown cylinders, as it usually does, separate delivery is provided by a fan wheel and an output conveyor for each second gripper and slowdown cylinder.

Further, to provide versatility by permitting all of the signatures to be delivered to one output, one of the fan wheels has a sufficient number of signature-receiving spaces to accommodate all of the signatures coming from the press, and the gripper and slowdown cylinder serving it has twice as many grippers so that it can receive and transfer all signatures from the first cylinder to the fan wheel. On the other hand, the other fan wheel has one half the number of signature-receiving spaces as the first and is adapted, therefore, to receive every second pair of side-by-side signatures. Similarly, the cylinder feeding it has one-half as many grippers.

BRIEF DESCRIPTION OF THE DRAWING

For a better understanding of the invention, reference may be made to the following description of an exemplary embodiment taken in conjunction with the figure of the accompanying drawing, which is an end view in cross-section of the embodiment taken along a plane perpendicular to the axes of rotation of the cylinders and just inside the near end frame.

DESCRIPTION OF EXEMPLARY EMBODIMENT

Although the figure of the drawing illustrates only the folder delivery apparatus constructed according to the invention, those skilled in the art will understand that the delivery apparatus forms a part of a folding unit that includes a suitable mechanism for cutting and folding the printed signatures. Various types of cutting and folding mechanisms can be used with the delivery. Briefly, an exemplary one is composed of a pair of coacting pin-cutting and knife cylinders, cutting blades on the knife cylinder transversely cutting printed ribbons into sheets and movable pins on the pin-cutting cylinder picking up the sheets and delivering them to a collect cylinder. The collect cylinder includes pins which pick up the sheets from the pin-cutting cylinder and carry them to a jaw cylinder for formation of the folds. The collect cylinder includes one or more tucking blades spaced around its circumference, while the jaw cylinders have movable clamping jaws which open to receive the sheet (which is forced or tucked into the jaws by the tucking blade on the collect cylinder) and then close on the sheets to form the fold.

Referring now to the drawing, the signatures are received in two side-by-side streams from the jaw cylinder by a first gripper and slowdown cylinder, which is designated generally by the reference numeral **10***f*, and are transferred by it to one or the other of two second gripper and slowdown cylinders. Inasmuch as the first gripper and slowdown cylinder and the second gripper and slowdown cylinders are basically the same, the corresponding parts of the three gripper and slowdown cylinders are designated by the same reference numerals, and the following description of one is applicable to each of them. To distinguish a particular gripper and slowdown cylinder or any part thereof, letter suffixes are added to the reference numerals, the letter *f* (for "first") designating the first gripper and slowdown cylinder **10***f*, the letter *u* (for "upper") designating the upper second cylinder, and the letter *l* (for "lower") designating the lower second cylinder.

Each gripper and slowdown cylinder is composed of a cylindrical body **12** which extends substantially the entire transverse distance between opposite end frame members **14** (only one shown) of the folder and is journaled in the end members by a shaft **14** at each end. The cylinder body carries sets of grippers **16** spaced about the circumference of the cylinder body **12**, the first cylinder and lower second cylinder having four gripper sets at 90° spacing and the upper second cylinder having two sets at 180°. Each set of grippers **16** comprises a shaft **18** extending the length of the cylinder and carrying a multiplicity of longitudinally-spaced gripping elements **20** mounted on the shaft **18**. The gripping elements are generally in the form of fingers that protrude out from the surface of the cylinder; the outer portions of the fingers overlie and define a gripping space with the surface of the cylinder. The gripping elements **20** are received in cut-outs **22** formed in the cylinder body **12**.

In a manner well-known to those skilled in the art, the grippers **16** carry cam levers (not shown) driven by cams (not shown) at the ends of the cylinder that open and close the grippers at prescribed points along their

path of movement as the cylinders are rotated. In particular, each gripper opens to receive a signature as it passes a transfer point from the preceding cylinder. For example, each gripper **16***f* of the first gripper and slowdown cylinder **10***f* opens to receive a signature from the jaw cylinder at the transfer point between the jaw cylinder and the first gripper and slowdown cylinder **10***f*. The first cylinder **10***f* is rotated so that its peripheral speed is less than the speed of the signatures carried by the jaw cylinder when they approach the transfer point, and consequently the signatures are driven into the open gripping space. Thereupon, the grippers close to grip the signature along the backbone and carry the signatures to the next transfer point. Because the peripheral speed of the first cylinder is somewhat less than the speed of the jaw cylinder, the speed of the signatures is of course slowed.

The upper and lower second gripper and slowdown cylinders **12***u* and **12***l* are positioned adjacent the first cylinder **12***f* at spaced-apart transfer points and, as described below, receive the signatures from the first cylinder **12***f*. For example, the grippers **16***l* of the lower cylinder **10***l* open to receive a pair of side-by-side signatures (for example S_1) from a gripper **16***f* of the first cylinder **12***f*, the gripper **16***f* opening at the transfer point to release the signatures. The lower cylinder **10***l* is rotated so that its peripheral speed is less than the speed of approach of a signature (S_1) carried by the first cylinder **12***f*, thus accomplishing transfer from the first cylinder **12***f* to the lower second cylinder **10***l* in a manner similar to the transfer from the jaw cylinder to the first gripper and slowdown cylinder. The transfer of signatures from the first cylinder **10***f* to the upper second cylinder **10***u* is accomplished in an identical fashion, as illustrated in the drawing by the signature S_2 at the upper transfer point. However, as is described below, the upper second cylinder **10***u* may or may not be in operation for a given press run, the lower second cylinder **10***l* taking all signatures. When both cylinders are operating for a press run, the lower cylinder receives alternate side-by-side pairs of signatures in the stream coming through the machine, while the upper cylinder receives the remaining signatures.

One important feature of the invention is the provision of a series of arcuate brushes **24** which serve to hold the signatures flattened against the surface of the cylinder body and to remove air from between the pages and to flatten the pages against each other. Each brush assembly **24** is composed of a transverse shaft **26** which carries a series of longitudinally spaced arcuate brush elements **28**, the brush elements having a width of say 2 inches or so and being curved to conform to the surface of the cylinder. The shaft **26** is carried at either end of the machine by adjustable bracket elements **30** mounted on the press frames, e.g., **14**, thus providing a way of adjusting the spacing between the brushes **28** and the cylinder surface. The adjustment of the brushes toward and away from the cylinder surface provides for adjustment of the pressure exerted by the brushes on the cylinders to obtain optimum flattening and removal of air without tending to exert an excessive force of the signatures that might impair the proper operation of the delivery apparatus. The adjustment of the spacing may be made, for example, upon changing the operation of a press from signatures having one number of pages or weight of paper to signatures having another number of pages or weight. As shown in the drawing, the brush assemblies **24** cover substantially all of the paths of movement of signatures carried by the cylinders. Accordingly, the signatures are kept in uniformly flattened condition against the surface of the cylinders, thus providing uniform handling and control of the signatures in the gripping and slowdown cylinders.

Associated with each of the second gripper and slowdown cylinders **10***u* and **10***l* is a fan wheel, the upper fan wheel being designated by the reference numeral **32** and the lower fan wheel by the reference numeral **34**. Each of the fan wheels is composed of a transverse shaft **36** or **38** journaled in the frame members, e.g., **14**, a plurality of discs or bodies **40** or **42** spaced longitudinally along the shafts **36** or **40**, respectively, and a plurality of fingers **44** or **46** carried by each disc and defining with each disc a plurality of aligned signature-receiving spaces across the length of the fan wheels and uniformly spaced circumferentially.

To enable alternate modes of operation of the delivery apparatus to deliver all signatures to one output or alternate pairs of signatures to each output, the lower fan wheel **34** has twice as many fingers **46**, and consequently twice as many signature receiving spaces, as the upper fan wheel **32**. Accordingly, the lower fan wheel can handle all of the signatures coming from the folder, while the upper fan wheel **32** can handle only one-half of the total number of signatures, i.e., alternate side-by-side signatures in the stream.

Assuming that both second cylinders and fan wheels are operated to provide separated delivery of two, three or four products coming from the folder, the side-by-side pairs of signatures are released in sequence by the respective gripper and slowdown cylinders **10***u* or **10***l* as they approach a transfer point from the cylinder to the fan wheel. At the transfer point from each cylinder **10***u* or **10***l* is a guide structure **50***u* or **50***l* composed of a transverse shaft **52** and a number of guide mounting arms **54** affixed to the shaft at longtudinal spaced locations. The upper end of each arm **54** carries a guide element **56** which is in the form of an elongated member, such as a tube, of a suitable anti-friction material such as tetrafluoroethylene ("Teflon"). The cylinder body **12** is formed with grooves **59** aligned with the arms **54** and guide elements **56** so that these parts may be located radially inward (relative to the cylinder **10**) of the paths followed by the signatures. Each elongated guide element **56** is substantially straight and is oriented so as to be tangent to the arcuate path of movement of the signatures carried by the gripper and slowdown cylinder **10** at the point of transfer of the signatures from the cylinder **10** to the fan wheel. Accordingly, a smooth guiding action is provided to deflect the signatures away from the arcuate path along which they are carried by the cylinder into the signature-receiving spaces defined by the fingers of the fan wheel.

To ensure uniform, controlled transfer of the signatures from the respective second gripper and slowdown cylinders **10***u* or **10***l* into the fan wheels **32** or **34**, a series of longitudinally-spaced propeller discs **60** carried by a shaft **62** journaled in the end frames of the machine engages each signature against the surface of the gripper and slowdown cylinder body **12***u* or **12***l*, the propeller discs being driven in the direction indicated by the arrows to propel each signature into the fan wheel after it is released from the gripper. The propeller discs **62** are rotated with a peripheral speed not substantially less than the speed of the signatures as they come to the discs, so that the speed of the signatures is not diminished until after they leave the propellers.

Each fan wheel **32** and **34** is driven at a speed such that the signature spaces and the signatures received and carried by them is reduced; accordingly, there is a further slowdown of the signatures before they are brought against a stop or stripper assembly **64** composed of a series of stop bars **66** appropriately bracketed and disposed between the several fan wheel discs **40** or **42**. The stops **64** remove the signatures from each of the signature receiving spaces, and they are permitted to drop onto a creeping belt output **68** or other suitable receiving medium. The strippers **64** can be adjusted back and forth relative to the belt or the belt speed changed to accommodate the output function to variations in the sizes of the products.

As mentioned above, the delivery apparatus of the in-

vention can be operated to either deliver two streams of side-by-side products separately to each of the outputs **68***u* or **68***l* or to deliver two side-by-side streams to one of the output belts. In the particular embodiment illustrated all signatures handled by the apparatus will ordinarily be delivered to the lower output belt **68***l* when the press is putting out a single product. Alternatively, the delivery apparatus can be operated to deliver every other side-by-side pair of signatures to the lower belt **68***l* while the remaining signatures are delivered to the upper belt **68***u*. To permit such separate delivery, the first cylinder has gripper-operating cams at both ends, the cam at each end operating two diametrically opposite sets of grippers so that the two transfer points are independently served by the separate cams for separate delivery to both outputs. To change over to delivery of all signatures to the lower belt, the cam follower levers on the first cylinder grippers delivering to the upper second cylinder are removed and installed on the other end so that all of the first cylinder grippers are operated by one cam to release all signatures to the lower second cylinder. In an analogous manner, the levers of the grippers on the upper second cylinder are removed and installed on the previously inactive pair of extra (diametrically opposite) grippers on the lower second cylinder so that all of the grippers of the lower second cylinder are activated to receive signatures from the first cylinder. (It is clear that one diametrically opposite pair of grippers on the lower second cylinder are inactivated for separated delivery to both outputs.) For single delivery to the lower output, it is desirable to fully inactivate the upper second cylinder by uncoupling it from the press drive.

Where all products are to be delivered to the lower belt **68***l*, the gripper elements of the first gripper and slowdown cylinder **10***f* and the lower second gripper and slowdown cylinder **10***l* are operated in such a manner that every gripper of the first cylinder **10***f* opens to release its signatures to the grippers of the lower cylinder **10***l*, each gripper of the lower second cylinder **10***l* opens to receive and then closes to grip the signatures received from the first cylinder. Meanwhile, the upper gripper and slowdown cylinder can be appropriately inactivated, as mentioned above. Thus, all signatures are transferred from the first cylinder **10***f* to the lower second cylinder **10***l*, and all signatures are transferred in succession from the lower second cylinder **10***l* to the lower fan **34** and deposited on the lower output belt **68***l*.

Alternatively, the respective gripper and slowdown cylinders **10***f*, **10***u* and **10***l* can be operated so that alternate side-by-side pairs of signatures, namely those pairs carried by diametrically opposite grippers of the cylinder **10***f*, are released and transferred to the lower cylinder **10***l* and are in turn transferred to the lower fan wheel for deposit on the lower output belt **68***l*. In this instance every other gripper of the upper and lower second cylinders is appropriately silenced. Meanwhile, the other pair of diametrically opposite grippers of the first cylinder **10***f*, carry their signatures to the upper gripper and slowdown cylinder **10***u* which receives and carries them to the upper fan wheel **32**.

Thus there is provided, in accordance with the invention, a novel and improved folder delivery apparatus embodying the distinct advantage of versatility, by virtue of being capable of being operated to either deliver all products to one output belt or two, three or four different products separately to two output belts. Moreover, the apparatus embodies features that afford positive and uniform control over the signatures and provide for more uniform and flat signature delivery onto the output. These and other advantages and features go to make up an apparatus that provides more efficient, more versatile, higher speed and more trouble-free operation than has been generally possible heretofore employing apparatus previously known in the art.

The above-described embodiment of the invention is intended to be merely exemplary, and those skilled in the art will be able to make numerous variations and modification of it without departing from the spirit and scope of the invention. All such variations and modifications are intended to be included within the scope of the invention as defined in the appended claims.

I claim:

1. Delivery apparatus for use in printing equipment to deliver folded signatures from a folder mechanism onto a creeping belt or other output medium comprising first and second rotatable gripper and slowdown cylinders, each having gripping means including movable gripping fingers at spaced locations thereon for receiving and engaging the backbones of each signature of at least one stream of folded signature transferred to it in succession, the first gripper and slowdown cylinder positioned to receive the folded signatures from the folder mechanism and operable to carry them along an arcuate path traversed by the gripping fingers thereon at a speed substantially less than the speed at which they are received and the second rotatable gripper and slowdown cylinder positioned adjacent the first gripper and slowdown cylinder to receive the signatures from the first gripper and slowdown cylinder and operable to carry them along the arcuate path traversed by the gripping fingers thereon at a speed substantially less than the speed at which they were received, a rotatable fan wheel positioned closely adjacent the second gripper and slowdown cylinder and having means defining a plurality of spaces for receiving and capturing the folded signatures delivered from the second gripper and slowdown cylinder, guide means associated with the second gripper and slowdown cylinder and disposed in the path of movement of the signatures carried thereby at the point of transfer of the signatures to the fan wheel for guiding the signatures out of the gripping means of the second gripper and slowdown cylinder and into the receiving spaces of the fan wheel, and means including at least one rotatable propeller disc positioned adjacent the second gripper and slowdown cylinder and coacting with it to engage and propel the signatures into the receiving spaces of the fan wheel without diminution of their speed until they leave the propeller means.

2. Folder delivery apparatus according to claim **1** further comprising a plurality of longitudinally spaced-apart arcuate brushes positioned concentric with each gripper and slowdown cylinder and encompassing a substantial part of the path of movement of the signatures carried thereby and engaging and flattening each signature against the surface of the respective gripper and slowdown cylinders.

3. Folder delivery apparatus according to claim **1** wherein the guide means includes an elongated member of low friction material disposed to present a longitudinal guide surface thereof substantially tangent to the surface of the gripper cylinder at the point of transfer of signatures from the second gripper and slowdown cylinder to the fan wheel.

4. Folder delivery apparatus according to claim **1** wherein the fan wheel includes a generally annular body portion and a plurality of curved fingers defining with the body the signature receiving spaces, the fan wheel being positioned and the outer ends of the fingers being oriented so as to be generally aligned with a tangent to the gripper cylinder at the transfer point from the second gripper and slowdown cylinder to the fan wheel as each finger passes the transfer point.

5. Folder delivery apparatus according to claim **4** wherein the guide means includes at least one elongated member of low friction material disposed with a longitudinal surface thereof substantially tangent to the arcuate path of movement of the signatures at the transfer point from the second gripper and slowdown cylinder to the fan wheel, and wherein the outer ends of the fingers are oriented so as to be generally aligned with the longitu-

dinal guide surface of the guide member as each finger traverses the transfer point.

6. Folder delivery apparatus according to claim 1 wherein there are two second gripper and slowdown cylinders located at spaced positions adjacent the first gripper and slowdown cylinder, and wherein there is associated with each second rotatable gripper and slowdown cylinder a rotatable fan wheel, guide means for guiding the signatures from each second gripper and slowdown cylinder to the respective fan wheel, and propeller disc means for propelling the signatures into the receiving spaces of the respective fan wheels, the two second gripper and slowdown cylinders being adapted to receive alternate signatures from the first gripper and slowdown cylinder for separate delivery to two outputs.

7. Folder delivery apparatus according to claim 6 further comprising a plurality of longitudinally spaced-apart arcuate brushes positioned concentric with each gripper and slowdown cylinder and encompassing a substantial part of the path of movement of the signatures carried thereby and engaging and flattening each signature against the surface of the respective gripper cylinder.

8. Folder delivery apparatus according to claim 6 wherein the rotatable fan wheel associated with one of the second gripper and slowdown cylinders has twice as many signature receiving spaces as the other fan wheel, whereby the first mentioned fan wheel is adapted to either receive all signatures in the stream coming from the folder mechanism while the last mentioned fan wheel is adapted to receive only alternate signatures in the stream.

9. Delivery apparatus for use in printing equipment to deliver folded signatures from a folder mechanism onto a creeping belt or other receiving medium comprising a first rotatable gripper and slowdown cylinder having gripping means for receiving and engaging the backbone of each of a succession of folded signatures coming from the folder mechanism and carrying them along the arcuate path traversed thereby at a speed substantially less than the speed at which they are received, two second rotatable gripper and slowdown cylinders, each having gripping means for receiving and engaging the backbones of signatures coming from the first gripper and slowdown cylinder and carrying them along the arcuate path traversed thereby at a speed substantially less than the speed at which they are received, the first and second gripper and slowdown cylinders being operable to deliver and carry, respectively, all of the signatures in the succession to and along one of the second gripper and slowdown cylinders to the exclusion of the other or alternatively to deliver and carry, respectively, the signatures to and along both gripper and slowdown cylinders in alternation, a rotatable fan wheel positioned closely adjacent each second gripper and slowdown cylinder and having means defining a plurality of spaces for receiving and capturing folded signatures coming from each second gripper and slowdown cylinder, guide means associated with each second gripper and slowdown cylinder and disposed in the path of movement of the signatures thereon at the point of transfer of the folded signatures therefrom to the respective fan wheel for guiding the sheets out of the gripping means and into the receiving spaces of the fan wheel, means including rotatable propeller discs adjacent each gripper and slowdown cylinder and coacting therewith to engage and propel the signatures into the receiving spaces of the respective fan wheel without diminution of their speed until after they are released from the propeller means to the fan wheel, and a plurality of longitudinally spaced arcuate brushes positioned concentrically with each gripper and slowdown cylinder and encompassing a substantial part of the paths of movement of the signatures carried thereby and engaging and flattening each signature against the surface of the respective gripper and slowdown cylinder at it is carried along thereon.

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