

[54] FOLDER DELIVERY OF WEB-FED ROTARY PRINTING PRESSES

[75] Inventor: Hans-Bernhard Bolza-Schünemann, Würzburg, Germany
[73] Assignee: Schnellpressenfabrik Roenig & Bauer Aktiengesellschaft, Würzburg, Germany
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[51] Int. Cl..... B41f 13/58
[58] Field of Search 270/72, 70, 71, 63, 270/65, 76, 38, 47-50, 42, 64, 77, 6, 7, 10, 11

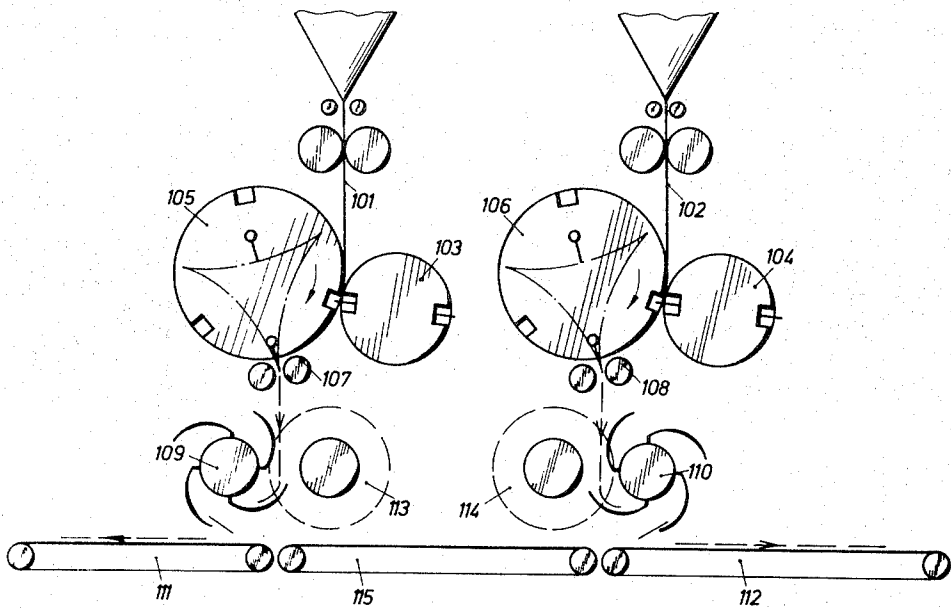
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Primary Examiner—Robert W. Michell
Assistant Examiner—L. R. Oremland
Attorney—Beale and Jones

[57] ABSTRACT

A delivery mechanism for a single or double folder in which underneath each individual folder a pair of fan shafts are mounted to which fan paddles may be removably secured so that, if both folders of a double folder are in operation, one fan shaft of each pair is left without paddles and only the paddles on the other fan shafts receive the folded products from the associated folders and deposit them on separate conveyer belts, while when one folder of a double folder including the associated fan shafts is stopped and all webs are passed from the press to the other folder or when only one folder is provided, one half of the usual number of paddles of one fan is secured to each of the other pair of fan shafts but in a staggered relation to each other so that these fans will then alternately deposit the products upon one conveyer belt and then upon another adjacent conveyer belt.

2 Claims, 10 Drawing Figures



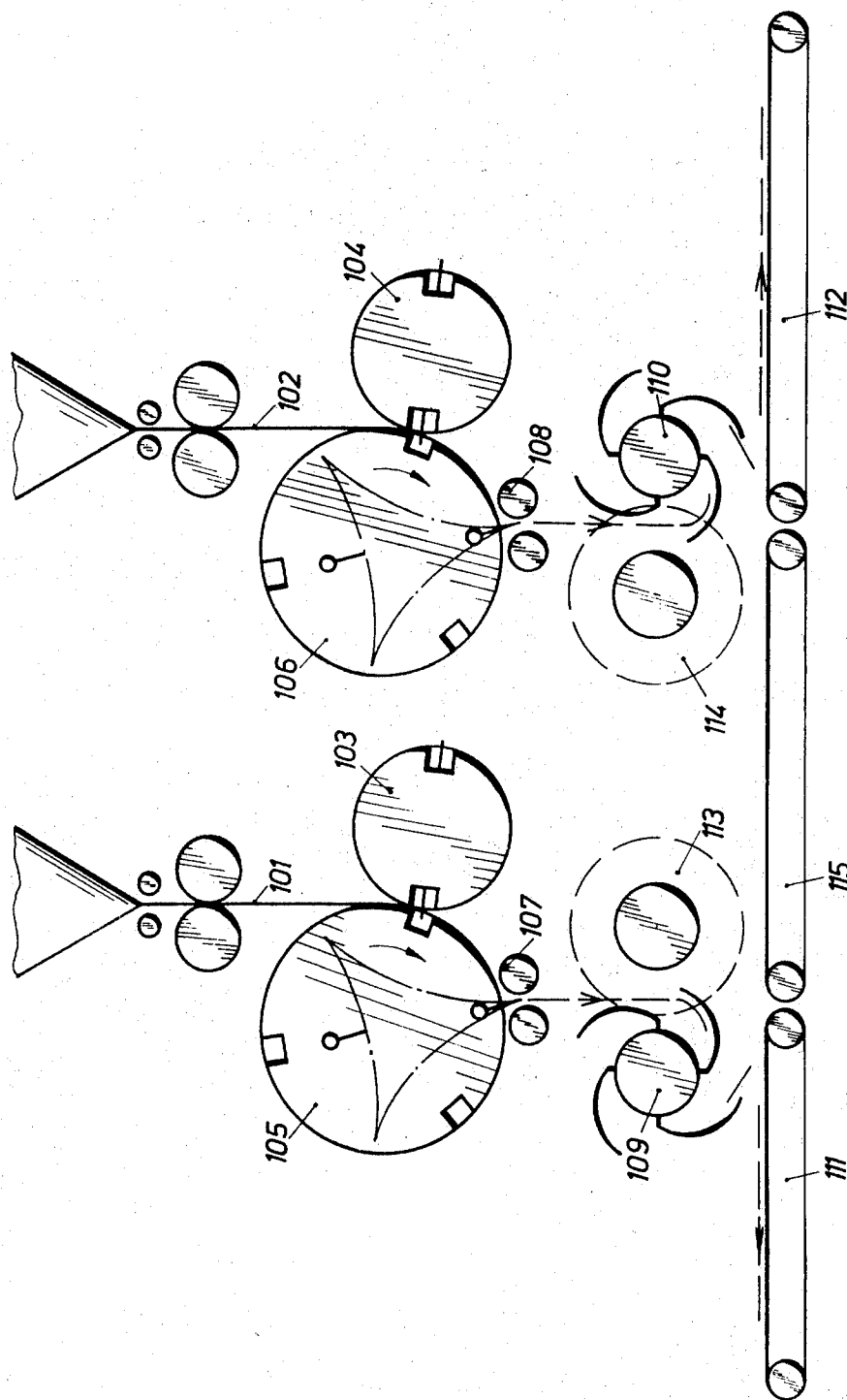
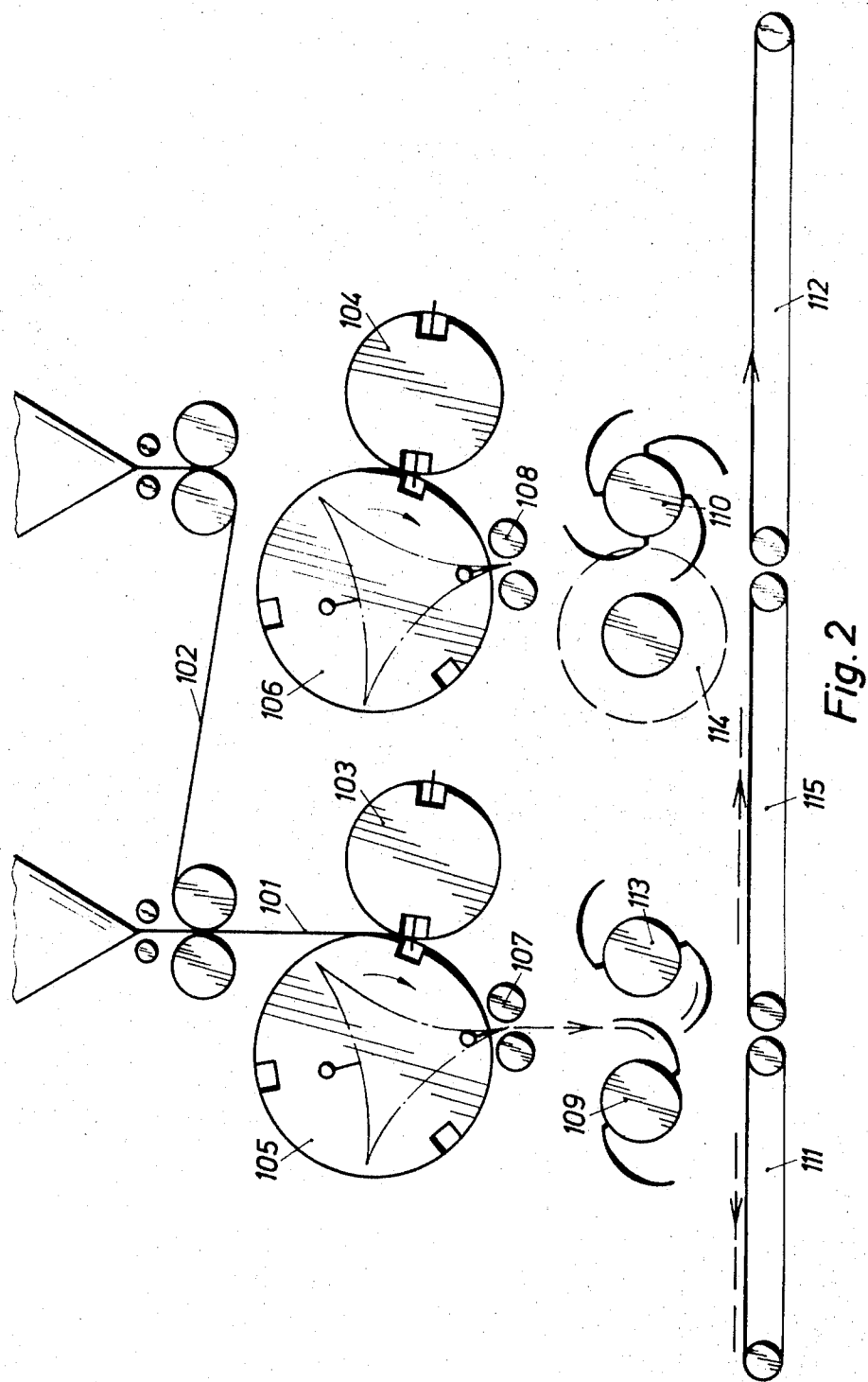


Fig. 1



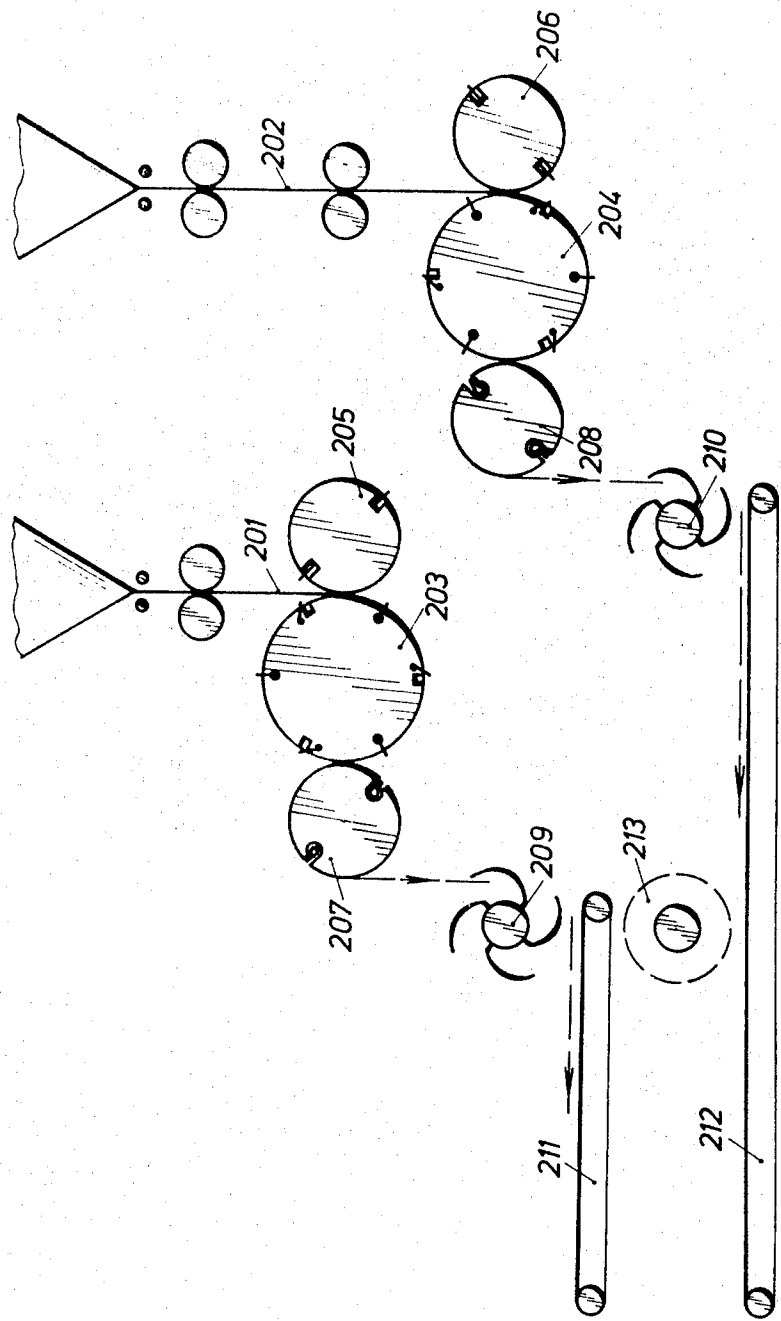


Fig. 3

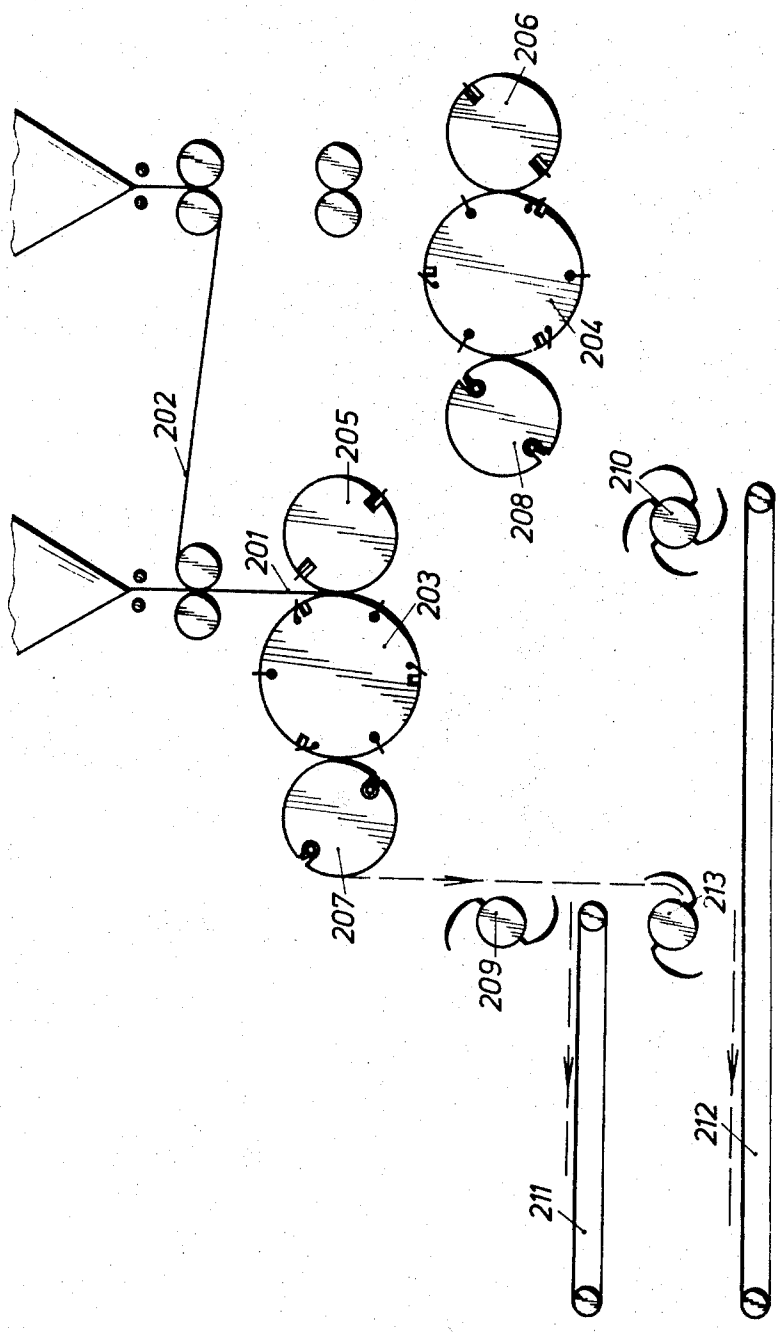


Fig. 4

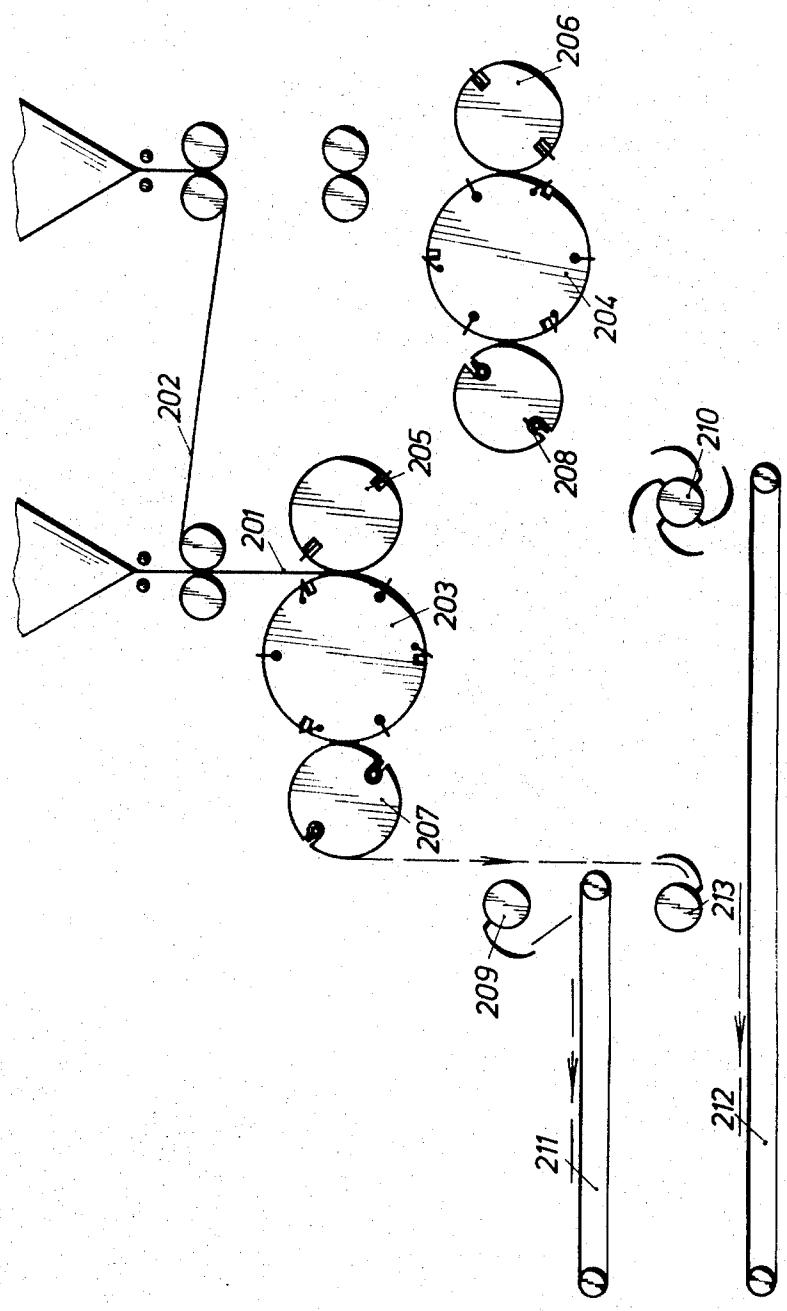


Fig. 5

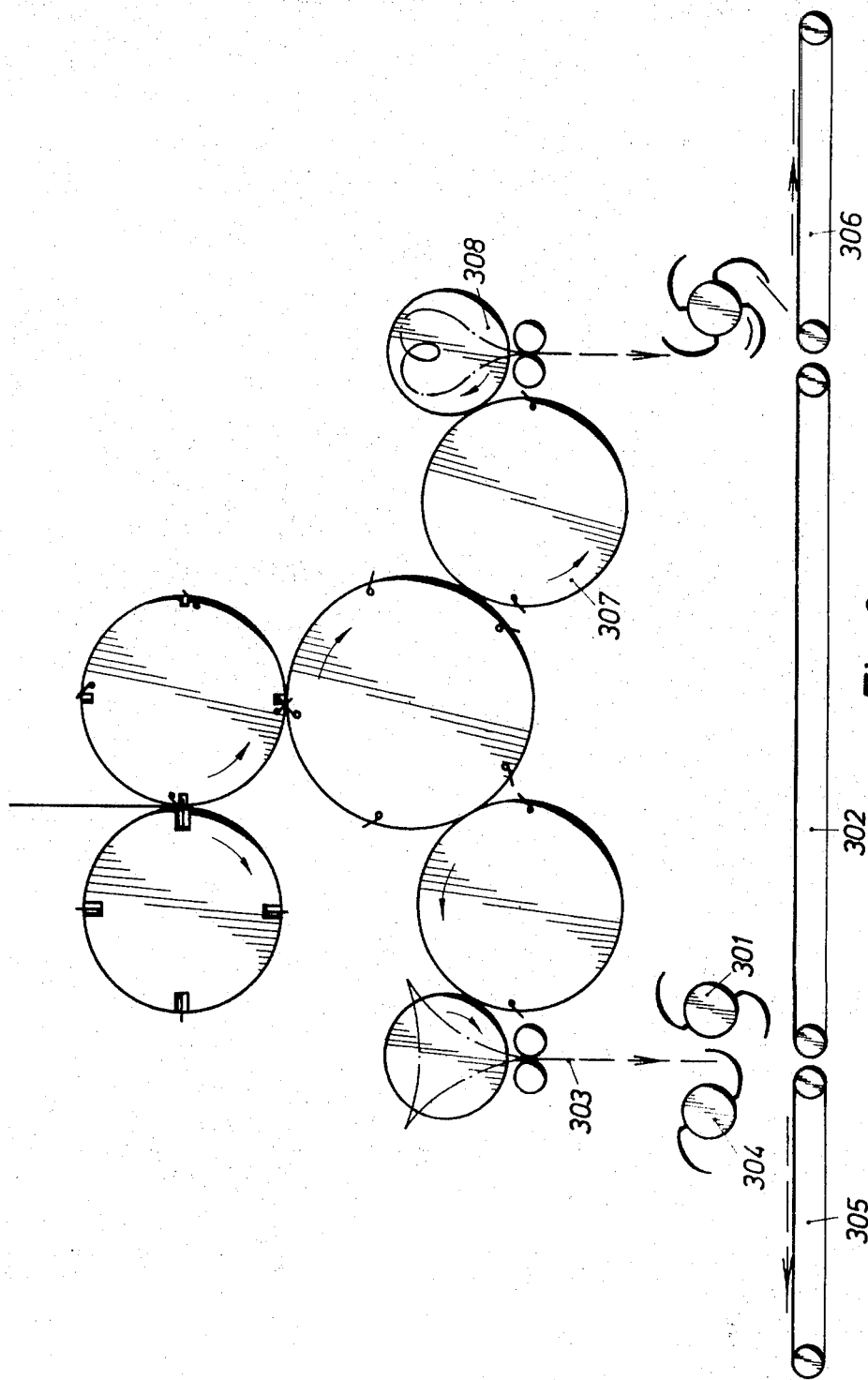


Fig. 6

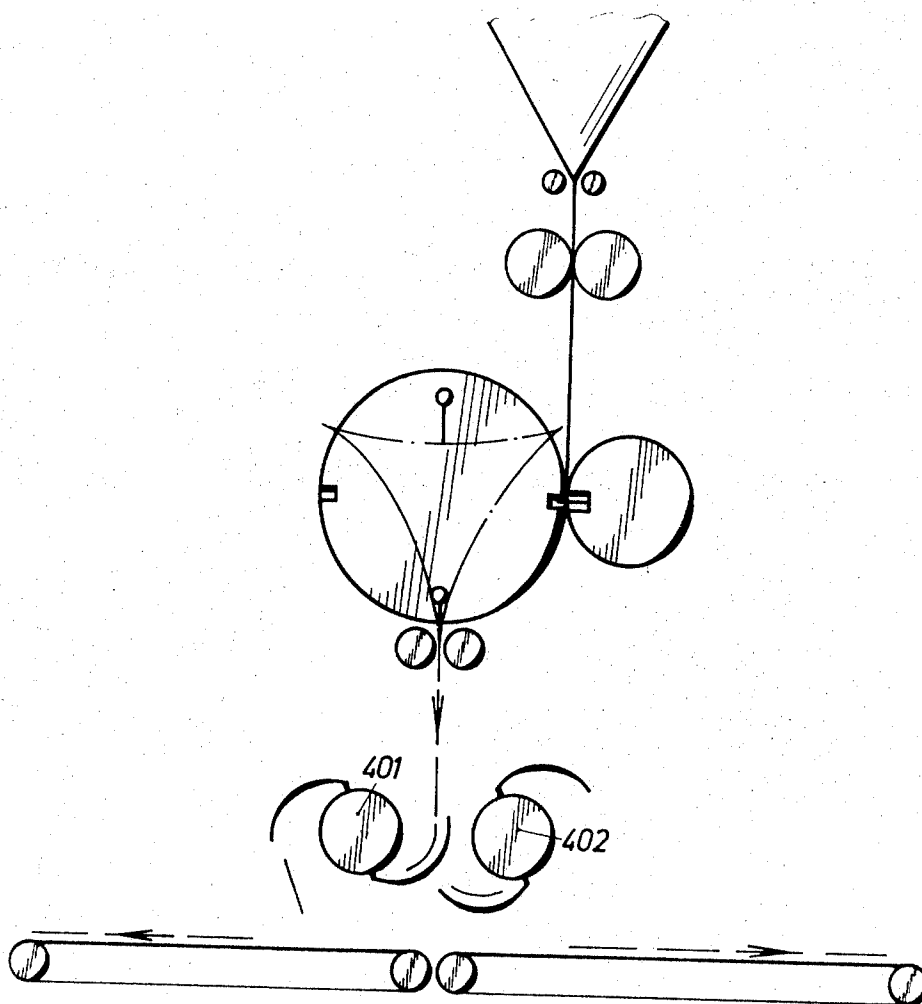


Fig. 7

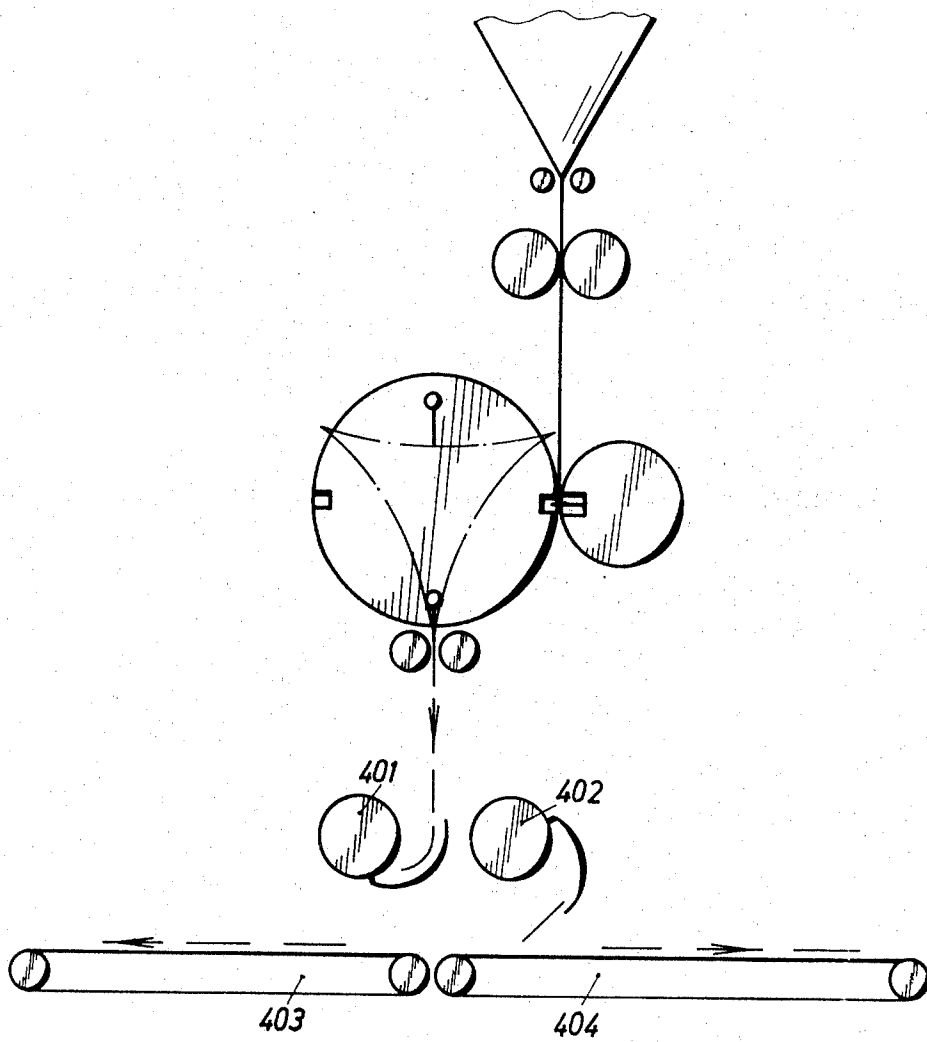


Fig. 8

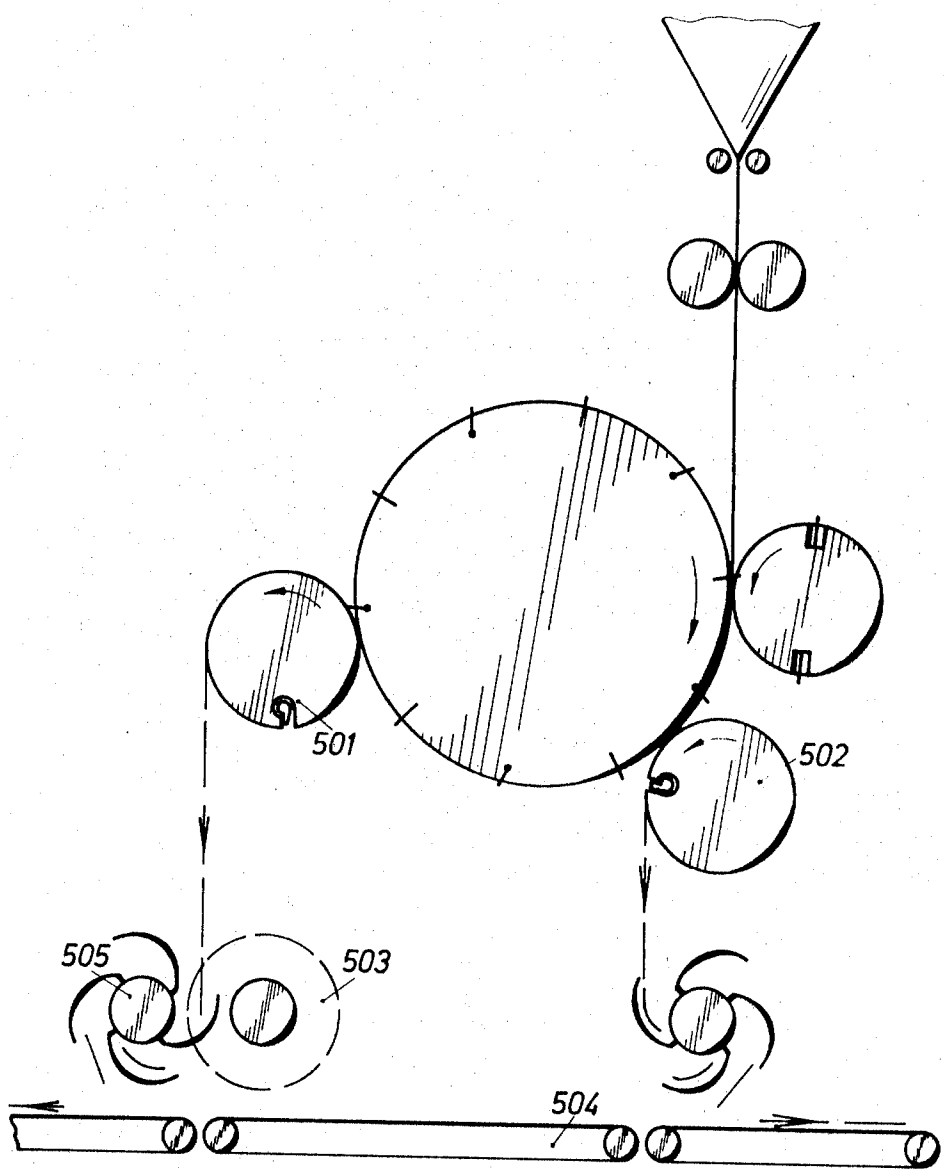


Fig. 9

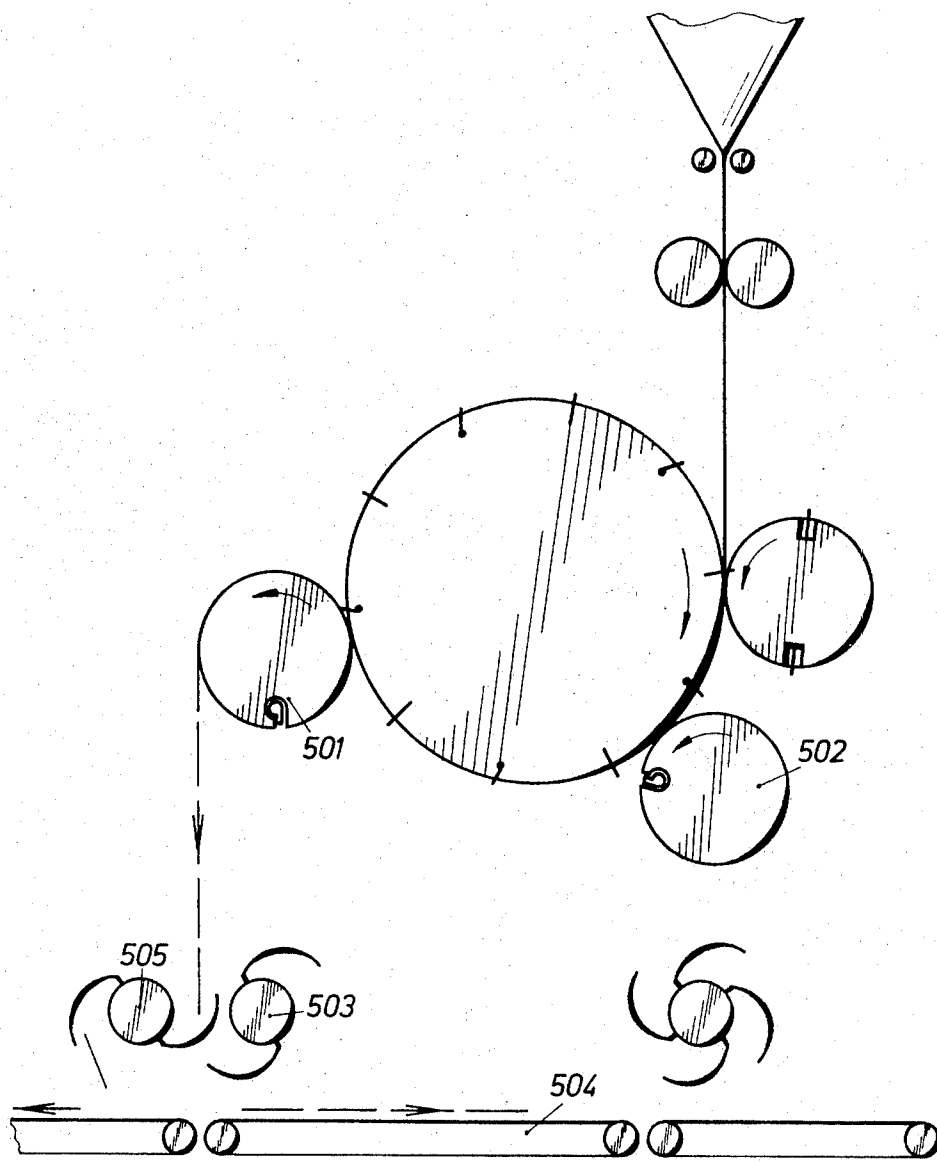


Fig. 10

FOLDER DELIVERY OF WEB-FED ROTARY PRINTING PRESSES

The present invention relates to a folder delivery mechanism for a web-fed rotary printing press.

It is conventional especially insofar as double folders of printing presses are concerned to provide such folding cylinder group with a separate delivery conveyer from which the newspapers are either removed by hand or are further transported to the shipping room by means or other conveying means.

Although such an arrangement has proved very efficient in actual practice, it has the advantage especially when employing expensive conveyers or automatic packing lines that if for any reason one of the two cylinder groups of the double folder is not in operation, one of these conveyers also becomes useless and is stopped. This occurs rather frequently, for example, when all paper webs are directed to one folding group by means of angle bars in order to obtain double-size products of several sections. In other kinds of folders, one folding cylinder group is stopped as soon as the folder is changed over from a straight run to a collect run. Great difficulties also arise nowadays quite frequently when extremely thick newspapers have to be produced in a collect run. It may then occur that the tying machines in the shipping rooms cannot keep up in speed since it requires only a few newspapers to fill one normal-size package. It then becomes necessary to reduce the speed of the rotary press in order to synchronize it with the operation of the tying machine.

It is an object of the present invention to provide a mechanism which eliminates the disadvantages of the known folder delivery mechanisms so that it will no longer be necessary to reduce the output of the associated web-fed rotary press.

For attaining this object, it is one important feature of the present invention to provide an intermediate transfer conveyer which is located between and adapted to connect the two separate delivery conveyers of the two cylinder groups of a double folder and to be controlled so as to run in one or the other direction toward the particular delivery conveyer underneath the folding cylinder group which has been stopped.

While usually two operatively associated delivery fans which together form a double fan are located underneath each folding roller of a gear folder or underneath each jaw cylinder of a jaw folder and both individual fans of such a double fan are always running together when the associated folding roller as well as the associated delivery conveyer are in operation, it is another feature of the invention to design the two fans of each double fan so that their paddles are removably secured to their shafts so as either to permit all paddles to be removed from one shaft, while the other fan may be provided with the normal number of paddles for depositing all copies upon the associated delivery conveyer, or to permit the normal number of paddles of one fan to be equally divided and connected to the shafts of both fans so that both fans alternately receive the copies and deposit them upon two conveyers which run in opposite directions to each other and of which may be the intermediate transfer conveyer as previously mentioned.

Since in folders when running in collect production gaps will occur periodically in the stream of products so that, even if the paddles are distributed upon two

fans in accordance with the invention, one of these fans may not receive any products, it is another feature of the invention to account for these gaps by either reducing the speed of the two fans, for example, to one half of their normal speed by the provision of a speed reduction gearing or by removing additional paddles from the shafts of the two fans and by then running both fans at the normal speed.

These and additional features and advantages of the present invention will become further apparent from the following detailed description thereof which is to be read with reference to the accompanying diagrammatic drawings, in which

FIG. 1 shows a double gear folder of the conventional 3:2 ratio in double production per cycle group;

FIG. 2 shows a double gear folder in double production or collect run with one cylinder group;

FIG. 3 shows a double jaw folder of a conventional design in double production;

FIG. 4 shows the double jaw folder according to FIG. 3, but in double production or collect run with one folder and with an additional delivery fan;

FIG. 5 shows the double jaw folder according to FIG. 4 in double production or collect run with one folder and with the shaft of the normal fan and the additional fan each carrying only one paddle;

FIG. 6 shows a gear folder which may also be employed for a double-collect run;

FIG. 7 shows a single 2:1 gear folder in double production;

FIG. 8 shows a single 2:1 gear folder in collect run;

FIG. 9 shows a single jaw folder with two jaw cylinders for a straight run; while

FIG. 10 shows the single jaw folder according to FIG. 9 with two jaw cylinders for a collect run.

In the drawings, FIG. 1 illustrates two gear folders running straight in quadruple production. The paper webs 101 and 102 are cut to copy length by the cutting cylinders 103 and 104, and then transferred to the folding blade cylinders 105 and 106 and folded in the two pairs of folding rollers 107 and 108. Thereafter, by means of the fans 109 and 110, the folded products are delivered to the conveyer belts 111 and 112 which transport them in the usual manner to the conveyer chains.

If a collect or double production is to be carried out by means of a single folder as illustrated in FIG. 2, the paper webs 102 are transferred, for example, to the left folder, while the right folder is stopped. In accordance with the invention, the apparatus is provided in addition to the fans 109 and 110 with further fans 113 and 114 which are adapted to deliver the copies upon a transfer belt 115 which may be driven so as to convey the copies either to the right or to the left. Thus, for example, if the right folder is stopped as shown in FIG. 2, the transfer belt 115 is driven so as to convey the copies either to the right or to the left. Thus, for example, if the right folder is stopped as shown in FIG. 2, the transfer belt 115 is driven so as to convey the copies toward the right toward the moving delivery belt underneath the stopped folder. The fans of the apparatus are for this purpose designed so that their paddles are removably secured to their shafts. In the present case, for example, two of the paddles are removed from the fan 109 and connected to the formerly bare shaft of fan 113 in a position so as to be peripherally offset at an angle of 90° to the paddles of fan 109. The stream of

products which is produced in a straight run by the left folder is now divided by the fans 109 and 113 so that one half of the stream will be conveyed toward the left by the conveyor belt 111 and the other half toward the right by the transfer belt 115 from which this right stream will then be taken over and further conveyed toward the right by the right conveyor belt 112.

For a collect run, the speed of fans 109 and 113 is reduced to one half of their normal speed and the successive folded products will be delivered alternately toward the right and toward the left. It is, however, also possible to run both fans 109 and 113 at the normal speed if the number of paddles on each fan is further reduced.

If the operation of the apparatus as previously described is reversed and the paper webs 102 are transferred to the right folder while the left folder is stopped, the direction of travel of the transfer belt 115 is likewise reversed so that the latter will convey toward the left, and, for example, two of the paddles of fan 110 are removed from its shaft and connected to the shaft of fan 114. The stream of folded products coming from the right folder will then be divided into two separate streams in the same manner as previously described with reference to the operation of the left folder.

FIG. 3 illustrates the operation of two jaw folders while folding the paper webs coming from the rotary press. For a quadruple production, the paper webs 201 and 202 are cut into sheets by the cutting cylinders 205 and 206 which cooperate with the grooved folding cylinders 203 and 204. The sheets are then taken up by these folding cylinders and transferred to the folding jaw cylinders 207 and 208. The folded products are then fed by these cylinders to the fans 209 and 210 and are successively deposited by the latter upon the conveyor belts 211 and 212. According to the invention, this apparatus is improved by the provision of an additional shaft for a fan 213 in a position underneath the fan 209. If the production is then to be carried out only by means of one folder and the right folder is stopped and the webs 202 are also fed to the left folder, as illustrated in FIG. 4, two of the four paddles are removed from fan 209 and connected to the shaft of fan 213 in a position so as to be offset peripherally at an angle of 90° to the paddles of fan 209. Thus, if the paddles of the upper fan 209 extend, for example, in a vertical direction, the paddles of the lower fan 213 will extend in a horizontal direction. The stream of folded products which is delivered from the jaw cylinder 207 will then be divided and one half of the products will be deposited by fan 209 upon the conveyor belt 211 and the other half by fan 213 upon the conveyor belt 212.

For a collect production by means of a single folder, both fans 209 and 213 are driven at one half of the normal speed of fan 209 so that the folded products will be alternately deposited upon the two delivery belts 211 and 212. It is, however, also possible to drive both fans 209 and 213 at the normal speed if they are provided with a still smaller number of paddles. Thus, for example, as illustrated in FIG. 5, each fan 209 and 213 is only provided with a single paddle which is mounted on its shaft in such a position that when the paddle of fan 213 just receives one folded product, the paddle of the other fan 209 is peripherally offset at an angle of about 180° to its receiving position.

FIG. 6 illustrates a gear folder which is designed so as to permit a straight, collect or double-collect pro-

duction as disclosed in my copending application, Ser. No. 765,189, filed on Oct. 4, 1968 now U.S. Pat. No. 3,521,878, patented July 28, 1970. This folder may be changed over from a straight run to a collect run by stopping one gear folding cylinder group, for example, the cylinders 307 and 308 together with the associated fan, while the right conveyor belt 306 continues to run. The present invention as already described with reference to FIGS. 1 to 5 may also be applied to this apparatus by providing an additional fan 301 and a transfer belt 302 so that the stream of products will be equally divided by the two fans 301 and 304 which will alternately deposit one folded product of the stream upon the conveyor belt 305 running in one direction and the next product upon the transfer belt 302 which runs in the opposite direction and then passes these products to the conveyor belt 306.

When such a gear folder is running in double-collect production, the stream of products 303 will be interrupted periodically by gaps. If this stream is to be divided into two halves which are to be delivered in opposite directions, it is therefore necessary to compensate for these gaps by reducing the speed of fans 301 and 304, for example, by means of a reduction gearing with a gear ratio of 1:2 so that each paddle of both fans 301 and 304 will then alternately receive one product and deposit it upon the associated belt 302 and 305. It is, however, also possible as previously described with reference to FIGS. 1 to 5 to drive both fans 301 and 304 at an unreduced speed by removing from them further paddles so that, for example, each fan 301 and 304 carries only one paddle.

The present invention is, however, not limited to th particular embodiments as previously described. Thus, for example, in gear folders such as shown in FIGS. 1 and 2, both conveyor belts 111 and 115 may also be driven in the same direction so as to deliver the folded products toward the same side, while in jaw folders such as shown in FIGS. 3, 4 and 5, the two conveyor belts 211 and 212 may also be movable in opposite directions to each other so as to deliver the products to different sides.

FIG. 7 illustrates a single 2:1 gear folder with a conventional split delivery by means of two fans 401 and 402. However, also in this case it is possible by changing the gear ratio of the two fans 401 and 402 or by changing the number of paddles of these fans to attain the result that when operating in a collect run as shown in FIG. 8 the stream of folded products may be divided so that one half of the stream will be delivered by the belt 403 in one direction and the other half by the belt 404 in the opposite direction, whereas in a collect run it was usual prior to this invention to stop the delivery by one conveyor belt and only in a straight run to deliver the folded products in both directions.

FIG. 9 illustrates a single jaw folder with two jaw cylinders 501 and 502 in a straight-run production, whereas in a collect-run production as shown in FIG. 10, only one of the two jaw cylinders, for example, the cylinder 501, will be operative and transmit the folded products to the delivery means. In the latter case, the invention therefore again provides a second fan 503 in addition to and laterally adjacent to the fan 505, and a transfer conveyor belt 504 for receiving the products from this second fan 503 and passing them to the other delivery belt. One half of the number of paddles of fan 505 is then again removed from its shaft and connected

to the formerly bare shaft of fan 503 so that the two fans 503 and 505 will then alternately deposit the folded products upon the two belts underneath.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments but is capable of numerous modifications within the scope of the appended claims.

Having thus disclosed my invention, what I claim is:

1. A delivery apparatus for printed products for use with folding apparatus of web-fed rotary printing machines wherein there are double folding apparatus, there being delivery apparatus for each folding apparatus, one of the folder's delivery apparatus being spaced apart from the other folder's delivery apparatus and transfer means between said spaced apart delivery apparatus, said delivery apparatus for each folder comprising a pair of spaced apart fan shafts underneath said folder, paddles adapted to be secured to and removed from said fan shaft to be exchanged for each other whereby there are provided a pair of delivery fans having their paddles in the line of the printed products delivered from said folder, a substantially horizontal moveable conveyor underneath one of said delivery fans positioned to receive and move along printed

products deposited thereon by said delivery fan, the other of said delivery fans having therebelow said transfer means between said spaced apart delivery apparatus, said transfer means being a substantially horizontal conveyor in line with said above referred to conveyor, said transfer conveyor serving also as the delivery conveyor for one of said other folder's pair of spaced apart delivery fans, the other delivery fan of said other folder having its delivery conveyor in substantial alignment with said transfer conveyor.

2. A folder delivery mechanism according to claim 1 wherein there is only one press feeding to said two folders, one of said folders having its two spaced apart delivery fans delivering the printed product from said one folder alternately to said conveyor under one of said fans while the other cooperating delivery fan delivers to said conveyor therebelow serving as said transfer conveyor, and

the other of said folders running and delivering its products to its first fan shaft equipped with its paddles which deliver said products to the conveyor therebeneath,

said last conveyor also receiving the products conveyed by said transfer conveyor.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,762,697 Dated October 2, 1973

Inventor(s) HANS-BERNHARD BOLZA-SCHUNEMANN

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover page of the patent after "[73] Assignee: Schnellpressenfabrik", delete "Roenig" and insert --Koenig--.

Column 5, line 21, after "from" insert --each--.

Column 6, line 24 after "last" insert --named--.

Signed and sealed this 25th day of December 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents