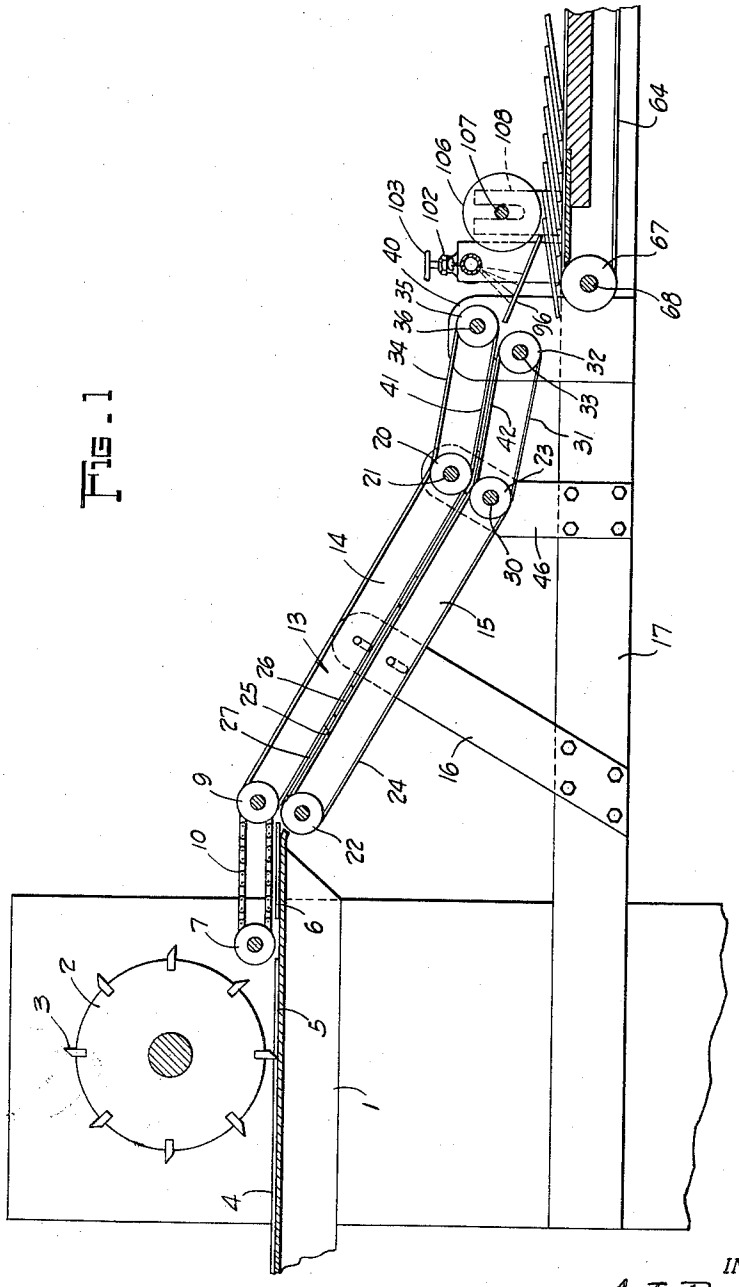
Dec. 9, 1958 A. J. RICHARDS 2,863,663

DELIVERY END MECHANISM

Filed Dec. 1, 1955 3 Sheets-Sheet 1

Fig. 1



INVENTOR.
A. J. RICHARDS
BY
Robba & Robb
attorneys

Dec. 9, 1958 A. J. RICHARDS 2,863,663

DELIVERY END MECHANISM

Filed Dec. 1, 1955 3 Sheets-Sheet 2

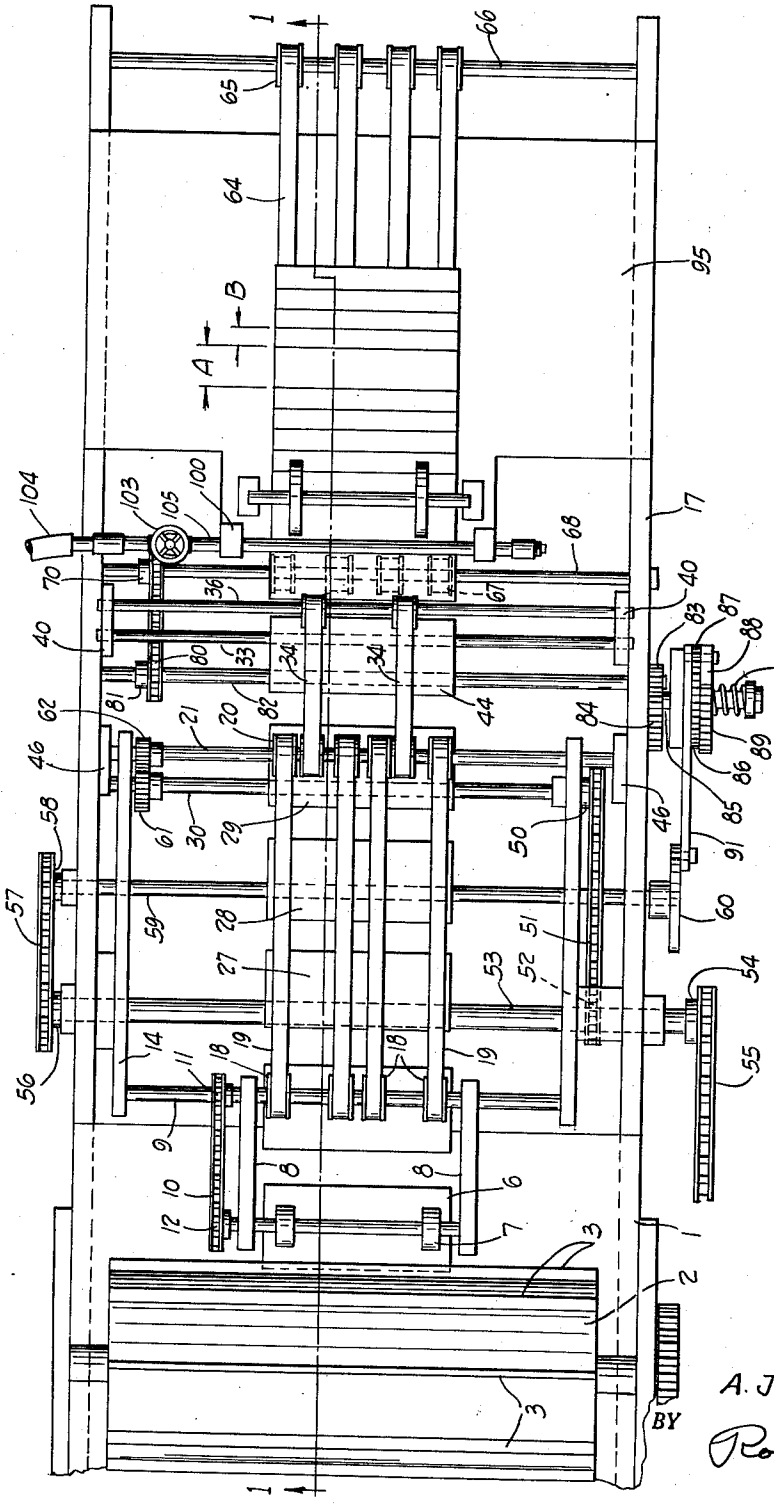


FIG. 2

INVENTOR.
A. J. RICHARDS
Robb & Robb
attorneys

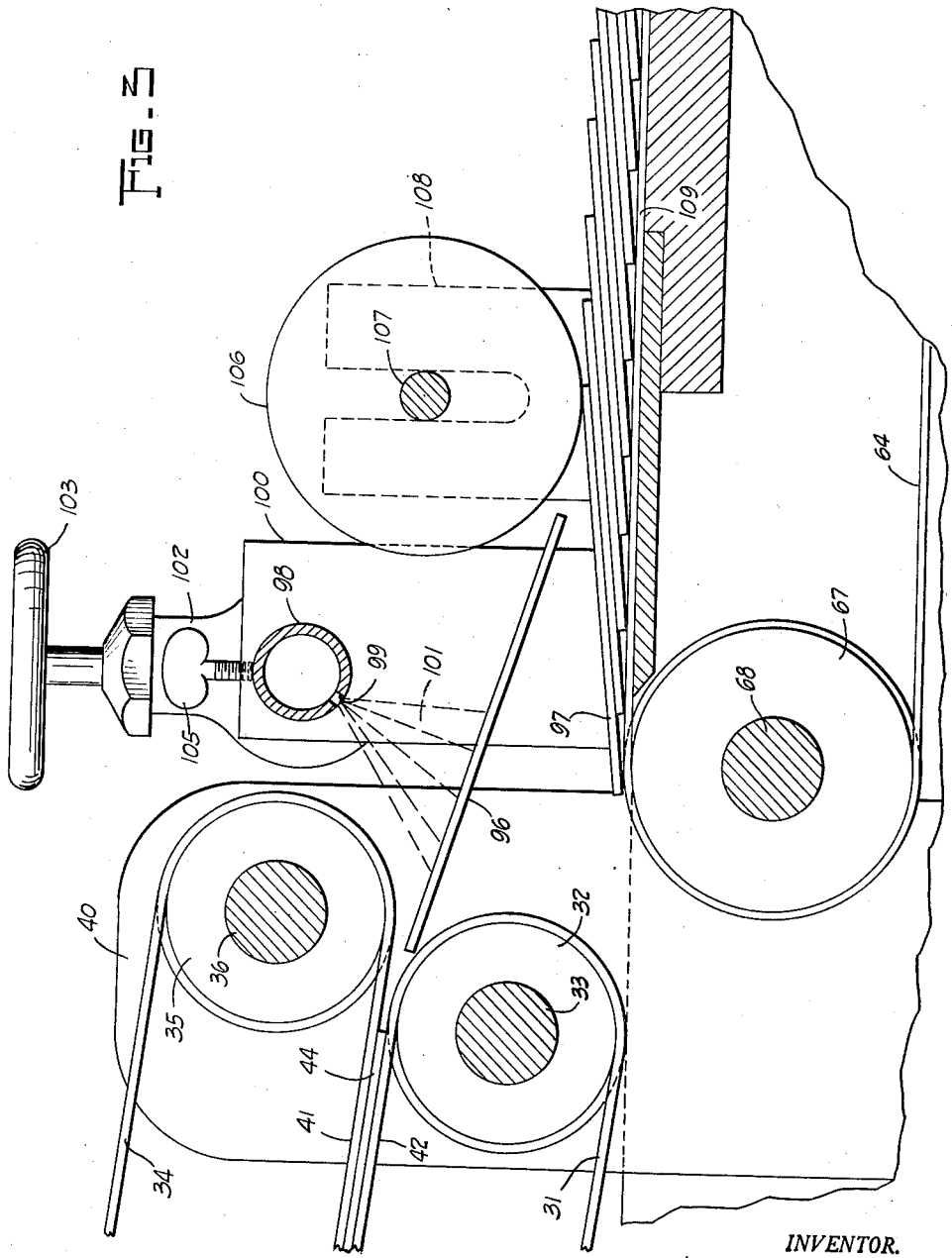
Dec. 9, 1958 A. J. RICHARDS 2,863,663

DELIVERY END MECHANISM

Filed Dec. 1, 1955

3 Sheets-Sheet 3

FIG. 5



INVENTOR.
A. J. RICHARDS
BY
Robb & Robb
attorneys

United States Patent Office

2,863,663

Patented Dec. 9, 1958

2,863,663

DELIVERY END MECHANISM

Augustus J. Richards, Cleveland, Ohio, assignor to Bonnar-Vawter, Incorporated, Cleveland, Ohio, a corporation of Ohio

Application December 1, 1955, Serial No. 550,343

4 Claims. (Cl. 271—69)

This invention relates to delivery end mechanism for manifold form producing machines, whether the forms be of the strip or fanfold type and is primarily concerned with the handling of short form packs when severed from a collated web.

The problem in delivery of such short form packs is largely the result of endeavoring to do so as speedily as possible, and at the same time maintain the packs in alignment and in groups for easy counting and packing.

The necessity for gathering and counting the form packs in many cases, and doing so most simply by machinery, requires that a constant rate of delivery by a delivery unit of the delivery end mechanism be co-ordinated with a carry-off unit which has a variable rate of operation, transfer from one to the other of the units being necessary. This in turn involves guiding the form packs during transfer or in some manner controlling or directing the same.

It is therefore a principal object of this invention to provide a delivery end mechanism wherein short form packs may be severed from a web, picked up by feeding devices at a constant rate, and transferred to group separating and carry-off instrumentalities which gather the packs into groups, and operate at a different rate, while assuring that the packs will be guided so as to effect orderly transfer.

A further object of the invention is to provide novel means for guiding the form packs during the transfer described, irrespective of the difference in rates of movement of the packs prior to and after such transfer.

A still further object of the invention is to provide novel means as above set forth, which comprise a stream or streams of air properly directed toward the form packs during the transfer set forth, whereby to assure that the packs remain intact and move into proper position in the respective groups.

Other and similar objects of the invention will be understood from a consideration of the specification appended hereto and shown in the drawings, wherein:

Figure 1 is a view in elevation showing the delivery end portion of the collating machine, the same being somewhat diagrammatic in nature and illustrating the general relationship of the various parts hereof.

Figure 2 is a top plan view, somewhat fragmentary in nature showing further the various mechanisms availed of herein.

Figure 3 is an enlarged sectional view, somewhat fragmentary in nature showing the transfer and guiding mechanism of the invention.

Referring now to the drawings and particularly initially Figures 1 and 2, the machine hereof is shown as comprising a main frame 1 above which is mounted a drum 2 having the knives or blades 3 extending radially therefrom, the drum 2 being supported in any preferred manner and being driven rotatably so as to in this instance move in a counter-clockwise direction whereby to sever the web of collated forms indicated at 4 into the short section denoted at 5 which short section 5 for example

is picked up at 6 by means of a pair of rollers 7 in the form pack feeding devices now to be described.

The form pack feeding devices as shown in the figure, and now referring to Figure 2 also, include the rollers 7 which grip the form pack 6 for example, the rollers 7 being supported at the out board end of arms 8 which arms 8 in turn are supported on a transversely extending shaft 9, the rollers 7 being driven by chain 10 reeved over sprockets indicated at 11 and 12.

As seen in Figure 1 particularly a downwardly extending conveyor unit indicated at 13 includes out board frame members such as 14 and 15, there being one each of the same at opposite sides of the conveyor unit 13 which frame members 14 and 15 are in each case supported on an arm such as 16 extending upwardly from the bed frame 17 of the machine.

This conveyor unit 13 includes the transversely extending shaft 9 at the upper portion for example upon which is supported a series of roller members such as 18, the roller members 18 engaging suitable belts such as 19 of an endless construction the lower ends of the belts 19 engaging similar rollers 20 to the rollers 18 previously mentioned, the rollers 20 being supported on the transversely extending shaft 21.

Beneath and closely spaced with regard to the above parts just referred to including the rollers 18 and 20 and the belts 19 is a corresponding series of rollers and belts, referring now to Figure 1 indicated at 22 for the upper series of rollers and 23 for the lower series of rollers a series of belts 24 being mounted thereon.

Obviously the lower lap indicated at 25 of the upper series of rollers and belts is closely spaced with regard to the upper lap of the lower series of rollers and belts, the said upper lap being indicated at 26. The close spacing of the respective laps enables the gripping of form packs such as 6 shown in the position 27, the form pack 27 being preceded by a form pack 28 and the form pack 28 having been preceded by a form pack 29 such as seen in Figure 1 and is near the lower end of the spaced roller and belt unit described above in detail.

The transverse shaft 30 upon which the lower rollers 23 are supported, likewise carries additional rollers for engagement by other belts such as 31, these belts 31 engaging at their other ends with suitable rollers such as 32 which rollers 32 are supported on additional transverse shaft 33.

It will be understood that the transverse shafts 21 and 30 are supported at their outer ends in suitable structural members such as 46 which members 46 are likewise mounted on and connected to the frame part 17.

Above the belts 31 and rollers 32 just described is a corresponding series of belts 34, in this instance there being two of these as seen in Figure 2, which belts are supported at their ends on the rollers 35 which rollers 35 are mounted on transverse shaft 36. The transverse shafts 33 and 36 are supported at their outer ends in suitable upwardly extending plate members such as 40 at opposite sides of the frame and mounted on the frame members 17. The upper belts 34 include lower laps 41 closely spaced with regard to the upper laps 42 of the lower belts 31 whereby to grip the form packs, in this instance the form pack 44 being illustrated in one position.

In order to effect driving motion of the shaft 30, to drive the lower series of belts 24 previously mentioned, a suitable drive sprocket 50 is mounted at one end as seen in Figure 2 engaging a chain 51 in turn connected with a sprocket indicated in dotted lines at 52, the sprocket 52 being mounted on a transverse shaft 53. At the outer end of the shaft 53 as seen in Figure 2 a further sprocket 54 is provided engaging a chain 55 the chain 55 in turn being driven by any suitable source of power not

here illustrated, which source however may obviously be the same source of power as is used to rotate the cylinder or drum 2 previously described.

At the other end of the shaft 53 from the sprocket 54 is a further sprocket 56, which in turn engages a chain 57, the chain 57 further being mounted on and drivably connected to a sprocket 58 at the outer extremity of a cross-shaft 59. The cross-shaft 59 again referring to Figure 2 is provided with a crank wheel 60 which crank wheel is availed of to drive other instrumentalities which will be described subsequently.

The transverse shaft 30 previously mentioned as having been driven by the chain 51 and sprocket 50 mounted on the shaft is provided at 61 with a suitable gear engaging a further gear 62 on the shaft 21 whereby to drive the said shafts in unison and in opposite directions to thereby cause the belts driven thereby to move simultaneously and carry the form packs such as 27, 28, etc., to the right as seen in Figures 1 and 2.

The mechanism thus far described may be said to largely comprise the form pack feeding devices which are availed of to deliver the form packs carried thereby through a gathering, group separating and carry-off set of instrumentalities which are now to be described, and as seen in Figures 1 and 2 as well as Figure 3 include a series of longitudinally extending belts such as 64 which belts 64 at their ends as seen in Figure 2 are provided with suitable pulleys 65 over which the said belts may be reeved, the pulleys 65 being carried on a transverse shaft 66 which shaft 66 is rotatably supported in the frame 17.

At the other end of the belts 64 are additional pulleys 67 which are supported on transverse shaft 68 which shaft 68 is rotatably driven by a sprocket 70 mounted thereon the sprocket 70 in turn engaging chain 80 which is further connected to an additional sprocket 81 mounted on a transverse shaft 82. The shaft 82 is provided at its outer end as seen in Figure 2 at 83 with a relatively small gear which small gear engages somewhat larger gear 84 carried on the frame member 17 being drivably connected to a shaft 85, which shaft 85 includes a gear 86 thereon, which gear 86 is arranged to be driven by a dog 87. Dog 87 is controlled as to its contact with the gear 86 by means of a dog 88 for driving a further gear 89 frictionally drivably connected to the shaft 85 by means of the spring pressed arrangement indicated at 90. The gear 89 is provided with a deep notch in its periphery whereby upon contact of the dog with the notch, the dog being 88, will permit the other dog 87 connected to the said dog 88 to engage the gear 86 and move the same a relatively greater distance than is normally the case. This movement is effected by means of a pitman arm 91 connected to the part 60 previously mentioned and likewise to the dogs 87 and 88. The normal motion of the pitman arm 91 is such as to impart a uniform rotation to the shaft 82. When the shaft 82 has caused the belts 64 to move a given distance, the action of the dog 88 will cause the dog 87 to impart a greater increment of movement to the belts 64 whereby to space groups of form packs a distance indicated at A in Figure 2 the usual distance of movement of the said form packs being indicated at B for purposes which will be understood as this description proceeds.

It should be made plain that the extreme rightward end of the machine as seen in Figure 2 includes a table 95 at which the person who is packing the severed forms in their various groups stands and thus has acccess to the forms as gathered in the respective groups, in this instance, the forms being shown as having been gathered in groups of five. This gathering of the form packs in groups, as explained, enables the packer to easily count the same and with very little effort to place the same in the shipping cartons as will be understood.

As the form pack such as 96, most clearly shown in Figures 1 and 3 reaches the position shown in those figures, it is discharged from the laps 41 and 42 and is thus, in effect, in the air until it assumes the position adjacent a form pack such as 97 shown in Figure 3 most clearly.

Considering now the Figure 3 disclosure, it will be seen that extending transversely above the form pack 96 is a hollow pipe 98 having a series of orifices 99 at any preferred location in its periphery which orifices are in a straight line axially of the pipe 98. The pipe 98 is supported in any suitable support member 100 and is intended to provide a source of air indicated at 101 controllable by a suitable valve 102 having a handle 103 therefor, the air being furnished from any source as by means of the connecting pipe 104 as shown in Figure 2.

Assuming that the pipe 98 has been adjusted so that the orifices deliver air in the pattern shown in Figure 3, which adjustment may be made by means of the thumb screw 105 as will be understood, air may be admitted to the interior of the pipe 98 and thus delivered from the orifices 99 so as to impinge upon the upper surface of the form pack 96 and since it is moving to the rightward as viewed in Figure 3 at the same time cause the form pack to move downwardly and be maintained in collected or gathered condition while at the same time moving rightwardly until the said form pack reaches a position beneath a hold-down roller 106, there being two of these, supported on transverse shaft 107. The shaft 107 is guidingly mounted in the slotted members such as 108 indicated in dotted lines in Figure 3, the form packs now resting upon the upper laps of the belts 64 which belts 64 are moving, with respect to their upper laps indicated at 109, toward the right in Figure 3 and thus gather the form packs in the condition shown in the said Figure 3 disclosure for subsequent collection and deposit in the packing boxes by the person who is packing the forms or form packs as the case may be.

It should be explained that if it were not for the air blast indicated at 101, the form packs under many conditions have a tendency to separate and thus pile up or be improperly gathered beneath the hold-down rollers 106, and it is necessary to have the separate carry-off mechanism including the belts 64 because of the variation in speed at which the said belts 64 are intended to operate by the means previously explained including the gears 85 and 86 as well as the gears 83 and 84. It has been found that the air blast is most effective in maintaining the forms in their collated condition as a form pack and thus the delivery end mechanism of the invention is particularly suitable for use in short form manipulation. The fact that the forms such as 96 are so short, prevents them from being gripped by the hold-down rollers 106 before they leave the position between the laps 41 and 42 and thus are in effect freely floating or moving, making the air blast more effective. Obviously the reason for having the separate carry-off mechanism is the different rate of movement of the respective belts since it is desired to gather the forms in the condition shown in Figure 3 for their subsequent manipulation by the operator.

I claim:

1. In delivery end mechanism of the class described, in combination, form pack feeding devices comprising a pair of superposed endless belts adapted to grip and transport form packs therebetween, group separating and carry-off instrumentalities to receive form packs after they are out of contact with the devices, said feeding devices and said instrumentalities being operable at differing speeds, said instrumentalities being spaced from the end of the devices, and pneumatic means directed from above the instrumentalities for guiding form packs downwardly from the devices to the instrumentalities irrespective of the differing speeds thereof.

2. In delivery end mechanism of the class described, in combination, form pack feeding devices operable to deliver form packs, form pack group separating and carry-

off instrumentalities to receive form packs from the devices, said instrumentalities being spaced a sufficient distance from the devices to enable the form packs to be entirely out of contact with the devices, and air blast means directed from above the packs for guiding form packs from said devices downwardly to said instrumentalities.

3. In delivery end mechanism of the class described, in combination, form pack feeding devices operable to deliver form packs at a constant rate, form pack group separating and carry-off instrumentalities to receive form packs from the feeding devices, the instrumentalities being spaced from the devices to thereby completely release the packs therefrom, said instrumentalities being operable at varying speeds, and air blast means acting independently of the devices and instrumentalities from a position above such packs as released for guiding form packs from said devices to said instrumentalities.

4. In delivery end mechanism of the class described, in combination, form pack feeding devices comprising

endless belt members operable to deliver form packs at a given rate, form pack group separating and carry-off instrumentalities including an endless belt member to receive form packs from the feeding devices, said instrumentalities being operable at different and variable rates, and air blast means intermediate the devices and directed downwardly toward the instrumentalities for directing form packs from the former downwardly to the latter irrespective of the rate of operation of the latter, said air blast means acting independently of the devices and instrumentalities during movement of the packs from one to the other.

References Cited in the file of this patent

UNITED STATES PATENTS

1,232,422	Halvorsen	July 3, 1917
1,758,535	Post	May 13, 1930
2,261,971	Matthews	Nov. 11, 1941