May 24, 1949. E. S. HOPE 2,471,214

GATHERING MACHINE DISTRIBUTOR

Filed Jan. 24, 1948 2 Sheets-Sheet 1

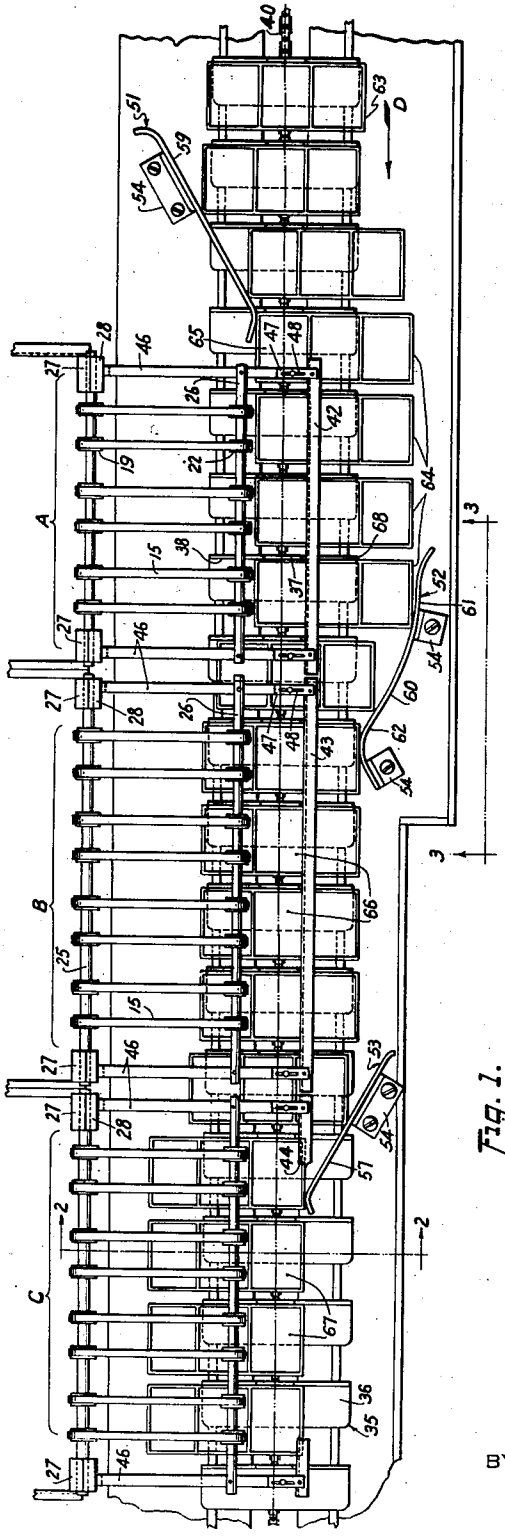


Fig. 1.

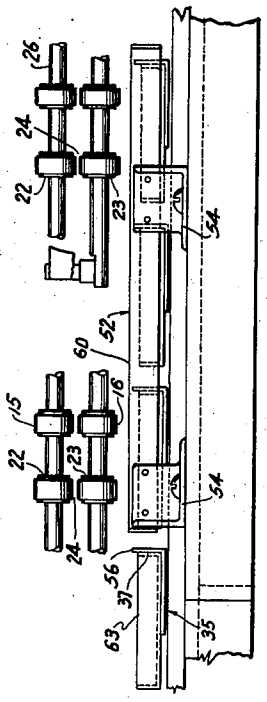


Fig. 3.

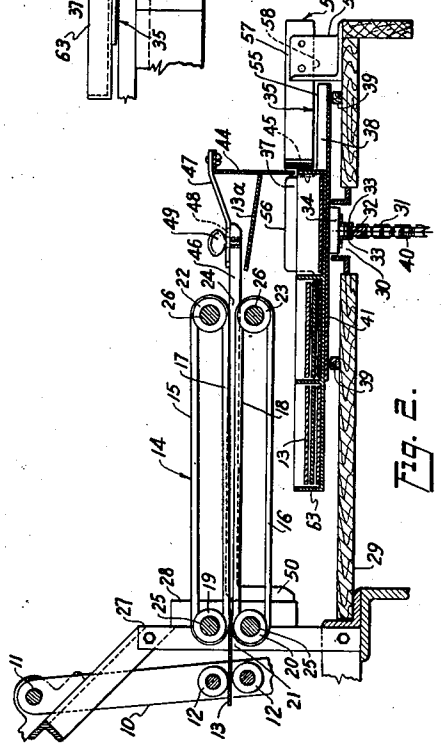


Fig. 2.

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2 Sheets-Sheet 2

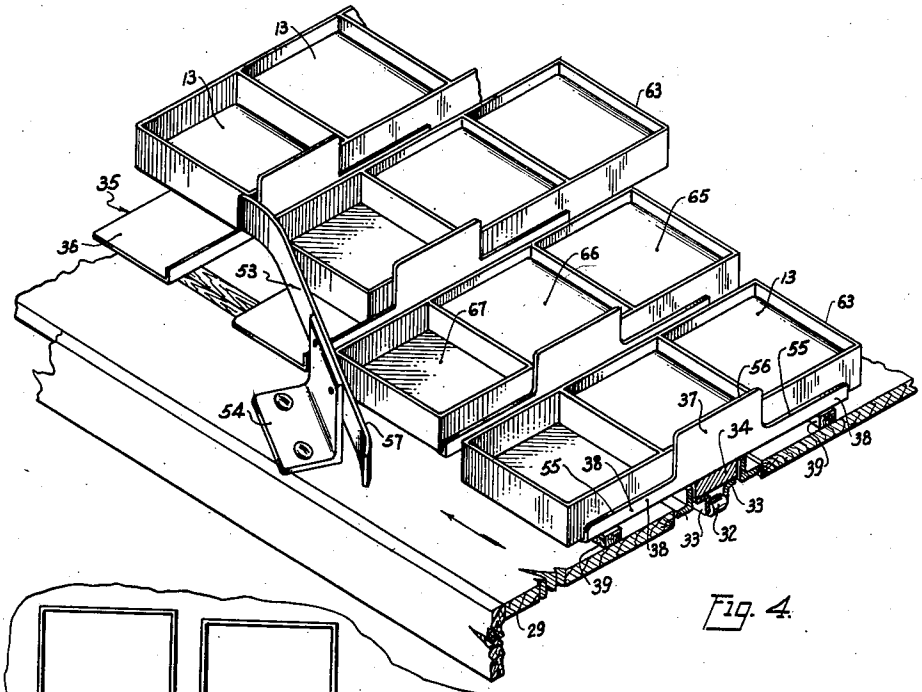


Fig. 4.

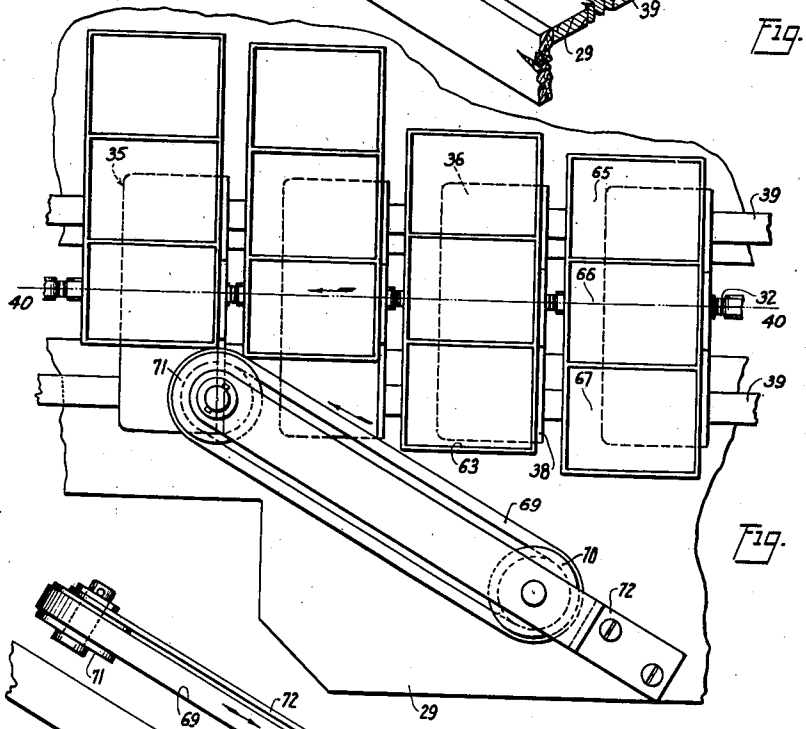


Fig. 5.

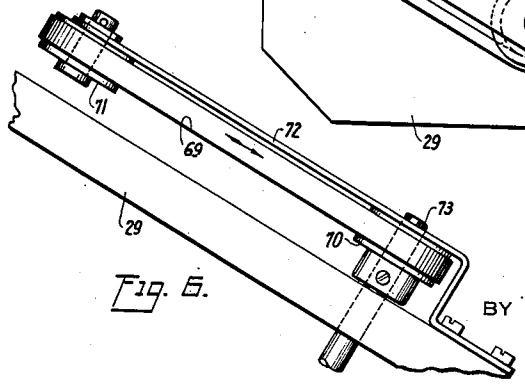


Fig. 6.

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2,471,214

UNITED STATES PATENT OFFICE

2,471,214

GATHERING MACHINE DISTRIBUTOR

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Application January 24, 1948, Serial No. 4,100

20 Claims. (Cl. 226—14)

1

This invention relates to gathering machine distributors, more particularly to apparatus for receiving cards or sheets from a gathering machine and distributing them, in a number of stacks, to boxes moving on a conveyor belt.

My previous application for a gathering machine, filed April 4, 1947, Serial No. 742,891, discloses an arrangement for assembling and collecting a variety of cards or sheets in stacks. It is within the contemplation of the present invention to enable such variegated stacks to be deposited into boxes and at the same time to divide them into a number of groups, so that each group could be positioned in a different section or compartment of a box.

And it is an important object of this invention to effect a delivery of such grouped stacks, in a continuous operation, into boxes carried by a conveyor system.

Another object is to enable the aforesaid distribution to be accomplished in conjunction with the gathering machine described in my said previous application.

Still another object of my invention is to provide adjusting means in connection with the apparatus, for varying the contents and size of each stack, the number of stacks, and for accommodating it to cards, sheets and boxes of different sizes and proportions.

It is a further object to provide a machine capable of attaining the aforesaid objectives in a simple and economical manner, that is completely automatic, and that will obviate the danger of the boxes and their contents.

Other objects, features and advantages will appear from the drawings and the description hereinafter given.

Referring to the drawings,

Figure 1 is a plan view of the distributor apparatus according to my invention, showing a plurality of boxes on the conveyor forming part of the invention;

Figure 2 is a somewhat enlarged transverse section of Figure 1 taken along line 2—2;

Figure 3 is a somewhat enlarged front elevation of a portion of Figure 1, looking from 3—3;

Figure 4 is a fragmentary perspective of the last stage of the apparatus of Figure 1;

Figure 5 is an enlarged plan view showing a modified form of deflector guide used in my invention, the view showing the last stage; and

Figure 6 is a projected front elevation of the belt-type of deflector guide of Figure 5.

In Figures 1–4 of the drawings, which illustrate a preferred embodiment of my invention,

2

there is shown an arrangement of three banks of sheet or card delivery units, the banks being identified as A, B and C, there being positioned in front of delivery hoppers or roller feeding means, and so disposed as to receive cards or sheets and carry them forward to boxes moving on a conveyor belt, as will more specifically be hereinafter described. In the embodiment shown, the apparatus is adapted for coactive use with the gathering machine of the aforesaid patent application, Serial No. 742,891, where each of the oscillating transfer arms 10 (Figure 2) is pivotally carried by shaft 11, each arm having preferably rubber-faced transfer rollers 12 which receive a card 13 from a hopper (not shown), and feed it to a discharge roller or belt. No description need here be given of the hopper construction and associated members, inasmuch as these are no part of the present invention, other than the illustrated relation between the said transfer rollers 12 and the elements of my invention which will now be described.

Cooperating with the said transfer rollers 12 of a suitable gathering machine are the delivery members 14 which, as aforesaid, receive cards 13 and deliver them to conveyed boxes. In the preferred form, the said delivery members 14 consist of pairs of elongated extension belts 15 and 16, each consisting of loops mounted over oppositely disposed rollers so that lengths 17 and 18 are in parallel adjacent relation and adapted to hold therebetween a sheet such as 13. The said rollers comprise the coacting rollers 19 and 20 at the receiving end 21, and the coacting rollers 22 and 23 at the discharge end 24 of the said delivery members 14. The belt lengths 17 and 18 move from the receiving end 21 to the discharge end 24, at uniform speeds, the belts being actuated by means of shaft 25 or 26 suitably driven by any known means. The said shafts 25 are shown supported by vertical bars 27 and 28, but they can obviously be supported in any other known manner within the scope of this invention.

Disposed below the extension delivery belts 14 is the table 29 which contains a longitudinal split portion 30 within which extends the conveyor chain 31. In the form illustrated, this chain comprises a plurality of articulated elements each having a roller 32 at each end of which is a pair of angles 33 supporting a block 34. Resting upon and secured to each successive block is a tray 35 consisting of a base plate 36 and a medial upright wall 37 flanked by lower wall portions 38. The blocks 34 maintain the trays above the table 29, and the rails 39, flanking the

center-line of the conveyor and supported by the table, underlie the trays and prevent them from tilting laterally.

In the preferred arrangement, the longitudinal center-line **40** of the conveyor is disposed outwardly beyond the discharge ends **24** of the delivery members **14**, and the inner portion **41** of the base plate **36** underlies the forward part of the said extension delivery belt.

Operatively associated with each of the banks of delivery extension belts are the stop plates **42**, **43** and **44**, these being disposed longitudinally along the conveyor belt, and spaced from the discharge ends **24** of said delivery belts, the preferred position of these stop plates being outwardly beyond the longitudinal conveyor center line **40**, substantially in the region of the outer edges **45** of the upright walls **37** of the trays **35**. Each of said stop plates **44** are adjustably attached to a supporting bracket **46** by a connecting member **47** which has a longitudinal slot **48** through which extends the adjusting and fastening screw **49**. The bracket **46** contains at the inner end thereof a flange **50** which is attached to the said vertical bar **28**. The arrangement is hence such that the stop plates **42**, **43** and **44** can be adjusted transversely with respect to the conveyor center-line to a position best suited to receive an ejected card, and to cooperate with the wall **37**, all in a manner to be hereinafter set forth.

Attached to the table **29** are a plurality of deflector guides, corresponding in number to the number of banks of extension delivery belts. In the preferred construction illustrated, these deflector guides are in the form of stationary cam members **51**, **52** and **53**, attached to the table by suitable fastening means such as the angle bars **54**. Deflector cam **51** is positioned before the bank A, deflector cam **52** is positioned in the region between banks A and B, and deflector cam **53** is positioned in the region between banks B and C. Deflector cam **51**, in the preferred form illustrated, is located at the inner side of the table, whereas the other two deflector cams are located along the outer side of the table. Each of the deflector cams contains a bar spaced above the base plates **36** of the trays, the bottom edge of the said bars being above the upper edges **55** of the lateral rear walls **38** of the trays, and below the upper edges **56** of the medial upright wall **37** of the trays. Thus, as indicated in Figures 2 and 4, the cam bar **57** has its lower edge **58** above said edge **55** and below said edge **56**. Each of the said cam bars are also disposed at an inclination to the center-line of the conveyor, the bars **57** and **59** being shown having substantially the same inclinations, whereas the bar **60** being shown as curved with the rear contacting portion **61** making a relatively slight angle with the conveyor center-line and the forward portion **62** approaching the conveyor at a gradually increasing inclination to provide a gradual pick up, as will more clearly hereinafter appear. The cam bars **59**, **60** and **57**, respectively, are so positioned as to engage and slidably move boxes on the trays **36** to various predetermined positions, as will also be hereinafter more fully explained.

In the operation of this apparatus, boxes **63** are placed upon trays at stations before the cam **51**, the boxes being of a sufficient length to accommodate, in the particular form illustrated, three stacks of cards **13**, the particular form of boxes illustrated containing three partitions. As the conveyor and associated trays **35** move in the direction of arrow D, they will be first engaged by the bar **59** of cam **51**, slidably moving said boxes outwardly to the position illustrated before the delivery belt bank A. The position of boxes **64** at this stage is such that the innermost compartment **65** of each of the boxes is substantially centrally located with respect to the longitudinal center-line **40** of the conveyor (Figure 1). At this position cards are delivered to each of the compartments **65**, in a manner to be more fully hereinafter described. As the boxes **64** before bank A move to the left, they engage the deflecting bar **60** of the cam **52**, to be slidably moved inwardly to the second position where the intermediate compartments **66** are now positioned over the center-line **40**, cards being delivered into this compartment by the extension delivery belts. Thereafter, the boxes engage the deflecting bar **57** of cam **53**, to be slidably moved inwardly until the outer compartments **67** are over center-line **40**, in which position cards are operatively delivered by the extension delivery belts to these outer compartments.

It will be noted that in the outermost position of the boxes, that is, before bank A, the overhang of each of the boxes is such that there may be danger of the boxes being caused to strike corner **68** of the rear wall of each tray, with a resulting turning of the boxes about edge **68** as an axis. To prevent this condition, the rearmost portion **61** of cam **52** is at a very slight inclination to the moving belt, the inclination increasing gradually, as aforesaid. The arrangement is hence such that when the boxes are engaged by cam **52**, there will at the beginning be a very slight turning force, the effective force being transverse with respect to the conveyor; and thereafter, when the boxes have already been moved inwardly by the bar **60**, there is less danger of a turning effect, and accordingly the inclination is increased.

It is further to be noted, that in each of the positions, the bars **59**, **60** and **57**, respectively, of the deflecting cams are so positioned that although they clear the rear walls **38** of each of the trays, they nevertheless engage the walls of the boxes which extend thereabove.

By referring to Figure 2, it will be seen that cards **13** are fed by rollers **12** towards the delivery member **14**, each card being engaged by the coacting belt portions **17** and **18** and ejected outwardly. Thus, card **13***a* is ejected until it strikes stop member **44**, thereby being deflected and caused to drop downwardly. And inasmuch as stop member **44** is positioned at the outer end of rear upright wall **37**, stop **44** and wall **37** cooperate to direct an intercepted card downwardly into the proper compartment.

It will be further noted that the shifting of each of the boxes by the cams occurs only at positions where no card deliveries are made. Thus, cam **51** is positioned before bank A, cam **52** is positioned substantially between banks A and B at which region there are no extension delivery belts, and similarly cam **53** is positioned between banks B and C, where there are no delivery belts. Accordingly, the shifting of the boxes does not in any way interfere with the delivery of cards in their proper positions.

According to the operation above described, it will thus be apparent that any predetermined number of variously arranged cards can be continuously and progressively deposited in a plurality of stacks in boxes that are being conveyed.

This entire operation is performed automatically, and in a manner which enables adjustments to be made with respect to the size of the card and the size of the boxes.

By referring to Figures 5 and 6, a modified form of box deflector will be observed instead of a stationary cam, a constantly rotating belt 69 serves in its place, the belt being mounted over pulleys 70 and 71, the latter being operatively supported by terminal of bracket 72 affixed to table 29, and the former being connected to drive shaft 73, the belt 69 being spaced above the table the same distance as aforesaid bars of the stationary cams. Shaft 73 can be driven in any known manner, preferably, though not necessarily, by the driving means operatively associated with the conveyor. It is preferred, for best operative results, that the speed of belt 69 with respect to the speed of the conveyor be such, that the velocity component of the speed of belt 69 in the direction of the conveyor be equal to the speed of the conveyor. This arrangement will reduce the tendency of the engaged boxes 63 from being jammed against the back wall 38 of the tray, the only effective force acting upon the tray being one transverse with the direction of conveyor travel. Hence, the inclination of the contacting belt 69, while serving as a means to shift the boxes along the trays, nevertheless, because of the aforesaid velocity relationship, exerts no appreciable turning or other rearward force upon the boxes.

In the above description, the invention has been disclosed merely by way of example and in preferred manner; but obviously many variations and modifications may be made therein which will still be comprised within its spirit. It is to be understood, therefore, that the invention is not limited to any specific form or manner of practicing same, except in so far as such limitations are specified in the appended claims.

I claim:

1. In a distributing apparatus for receiving and delivering sheets from the feed rollers of a gathering machine of the class described, a plurality of successive pairs of coacting delivery members positioned to receive therebetween sheets from said feed rollers, each of said pairs of members having a receiving end and a discharge end and containing cooperative sheet-engaging elements continuously moving from said receiving end towards said discharge end, a continuous conveyor disposed below and movable transversely with respect to the said moving elements of the said delivery members, said conveyor having thereon a plurality of open trays each containing a flat base plate adapted to receive thereupon boxes for receiving the sheets, and a plurality of deflector guides disposed along the path of said conveyor in different predetermined positions relative to the longitudinal center-line of the conveyor and disposed above said base plates, whereby the guides may engage and operatively move the boxes on the said base plates to predetermined positions relative to said discharge ends of the delivery members.

2. In a distributing apparatus of the class described, the combination according to claim 1, further provided with a stop member extending longitudinally along the conveyor and above the base plates and being in spaced relation to the discharge ends of the said delivery members, whereby sheets operatively ejected from said discharge ends will be engaged by said stop member and caused to drop downwardly.

3. In a distributing apparatus of the class described, the combination according to claim 1, the said pairs of delivery members each comprising a pair of coacting rollers at the said receiving end, a second pair of coacting rollers at the said discharge end, and two belt loops each operatively connecting a roller at the receiving end and one at the discharge end, two belt lengths of said loops being in adjacent parallel relation, movable towards the said discharge end and adapted to engage therebetween a predetermined sheet.

4. In a distributing apparatus of the class described, the combination according to claim 1, the said pairs of delivery members each comprising a pair of coacting rollers at the said receiving end, a second pair of coacting rollers at the said discharge end, and two belt loops each operatively connecting a roller at the receiving end and one at the discharge end, two belt lengths of said loops being in adjacent parallel relation, movable towards the said discharge end and adapted to engage therebetween a predetermined sheet, a portion of each of the said base plates underlying the said belt loops, the longitudinal center-line of the conveyor being disposed a predetermined distance outwardly beyond said discharge ends.

5. In a gathering machine distributor of the class described, a plurality of successive pairs of coacting delivery extension belts each having a receiving end and a discharge end, each pair containing two belt lengths in adjacent parallel relation constantly moving coactively towards the discharge end, a continuous conveyor disposed below and movable transversely with respect to said adjacent belt lengths, said conveyor having thereon a plurality of trays each containing a flat base plate adapted to slidably receive thereupon a suitable sheet-containing box, and a plurality of deflector guides disposed along the path of said conveyor in different predetermined positions relative to the longitudinal center-line of the conveyor and disposed above said base plates, whereby the guides may engage and operatively move the boxes on the said base plates to predetermined positions relative to said discharge ends of the said extension belts.

6. In a gathering machine distributor of the class described, a plurality of successive pairs of coacting delivery extension members each having a receiving end and a discharge end and containing cooperative sheet-engaging elements continuously moving from said receiving end towards said discharge end, a continuous conveyor disposed below and movable transversely with respect to the said moving elements of the said delivery members, said conveyor having thereon a plurality of trays each containing a flat base plate adapted to slidably receive thereupon a suitable sheet-containing box, and a plurality of deflector guides disposed along the path of said conveyor in different predetermined positions relative to the longitudinal center-line of the conveyor and disposed above said base plates, whereby the guides may engage and operatively move the boxes on the said base plates to predetermined positions relative to said discharge ends of the delivery members, the longitudinal center-line of the conveyor being disposed a predetermined distance outwardly beyond said discharge ends.

7. In a gathering machine distributor of the class described, the combination according to claim 6, further provided with a stop member extending longitudinally along the conveyor and above the base plates and a predetermined dis-

tance outwardly beyond the said longitudinal center-line of the conveyor.

8. In a gathering machine distributor of the class described, the combination according to claim 7, the stop member being adjustable transversely with respect to the longitudinal path of the conveyor.

9. In a gathering machine distributor of the class described, the combination according to claim 6, further provided with a stop member extending longitudinally along the conveyor and above the base plates and a predetermined distance outwardly beyond the said longitudinal center-line of the conveyor, a horizontal bracket, a support therefor, and a connecting member adjustably attached to the bracket and in supporting engagement with said stop member.

10. In a gathering machine distributor of the class described, the combination according to claim 6, the base plates of the trays each having a portion thereof underlying the said extension members.

11. In a gathering machine distributor of the class described, the combination according to claim 6, the base plate of each tray containing a rear upstanding wall along a predetermined medial portion thereof.

12. In a gathering machine distributor of the class described, the combination according to claim 6, the base plate of each tray containing a rear upstanding wall along a predetermined medial portion thereof, further provided with a stop member extending longitudinally along the conveyor and above the base plates and substantially at the outer edge of said wall, whereby the stop member and the wall may cooperate to direct an operatively ejected sheet downwardly.

13. In a gathering machine distributor of the class described, the combination according to claim 6, the deflector guides being spaced a predetermined distance above the said base plates.

14. In a gathering machine distributor of the class described, the combination according to claim 6, the base plate of each tray containing a rear upstanding wall along a predetermined medial portion thereof, the deflector guides being spaced a predetermined distance above the said base plates and a predetermined distance below the top edges of the said upstanding walls.

15. In a gathering machine distributor of the class described, the combination according to claim 6, the deflector guides containing fixed bars disposed obliquely at predetermined inclinations to the longitudinal axis of the conveyor and above the level of the base plates, whereby the bars may intercept and engage boxes disposed upon the base plates and cause them to slidably move transversely along said base plates.

16. In a gathering machine distributor of the class described, the combination according to claim 6, the deflector guides containing fixed bars disposed obliquely at predetermined inclinations to the longitudinal axis of the conveyor and above the level of the base plates, whereby the bars may intercept and engage boxes disposed upon the base plates and cause them to slidably move transversely along said base plates, at least one of said bars being of curved configuration with the rear contacting portion thereof making a relatively slight angle with the longitudinal center-line of the conveyor, the forward part of the bar approaching the conveyor at a gradually increasing inclination.

17. In a gathering machine distributor of the class described, the combination according to claim 6, at least one of the deflector guides comprising a constantly moving belt angularly disposed with respect to the longitudinal center-line of the conveyor, the belt portion facing the conveyor moving in the same general direction as the conveyor.

18. In a gathering machine distributor of the class described, the combination according to claim 6, at least one of the deflector guides comprising a constantly moving belt angularly disposed with respect to the longitudinal center-line of the conveyor, the belt portion facing the conveyor moving in the same general direction as the conveyor, the relative speeds of the deflector belt and the conveyor being such that the conveyor belt speed is substantially the same as the velocity component of the deflector belt parallel to the conveyor direction.

19. In a gathering machine distributor of the class described, the combination according to claim 6, the said successive pairs of delivery members being arranged in banks each containing a predetermined number of such pairs, each bank being in spaced relation to the next adjacent bank, certain of the said deflector guides being disposed substantially in the region of the spaces between said banks.

20. In a gathering machine distributor of the class described, the combination according to claim 6, further provided with a table having a longitudinally split portion, the conveyor extending along said split portion, said conveyor comprising a link chain carrying a plurality of blocks each supporting one of said trays a predetermined distance above the table, and a pair of longitudinal rails flanking the said split portion and disposed below said trays.

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No references cited.