May 17, 1949. J. G. HERRMANN 2,470,557

GATHERING MACHINE

Filed March 24, 1948 2 Sheets-Sheet 1

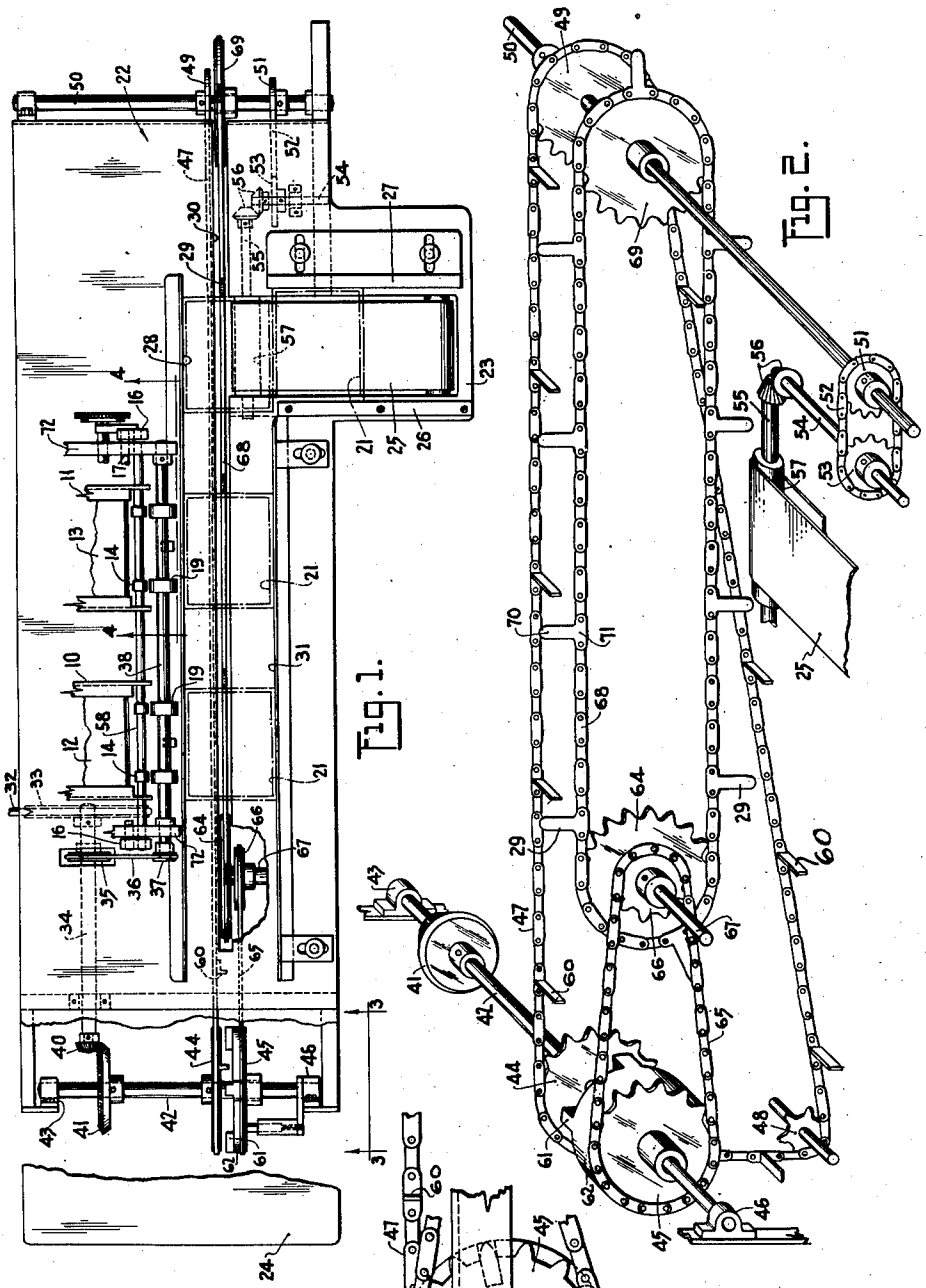


Fig. 1.

Fig. 2.

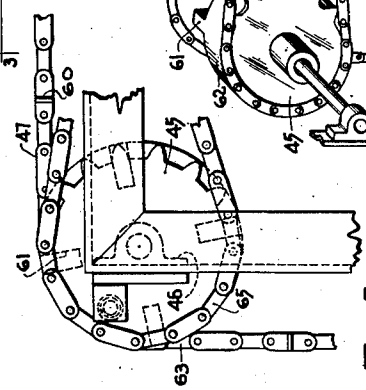


Fig. 3.

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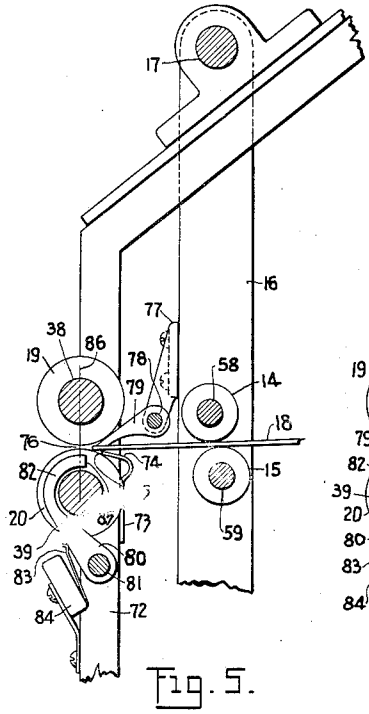


Fig. 5.

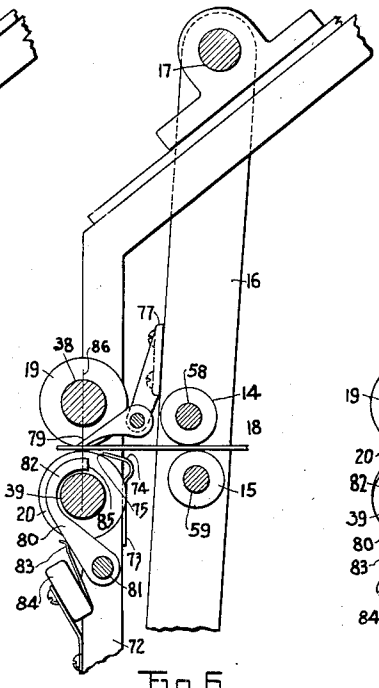


Fig. 6.

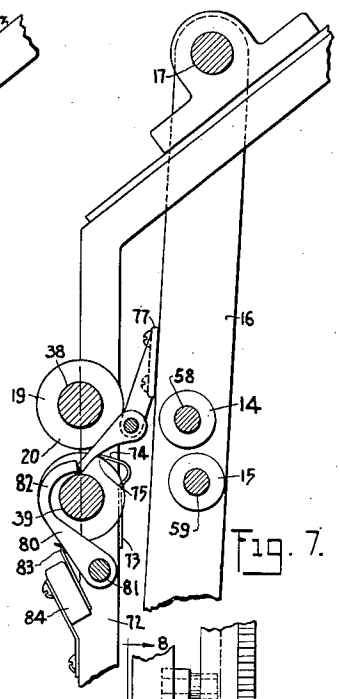


Fig. 7.

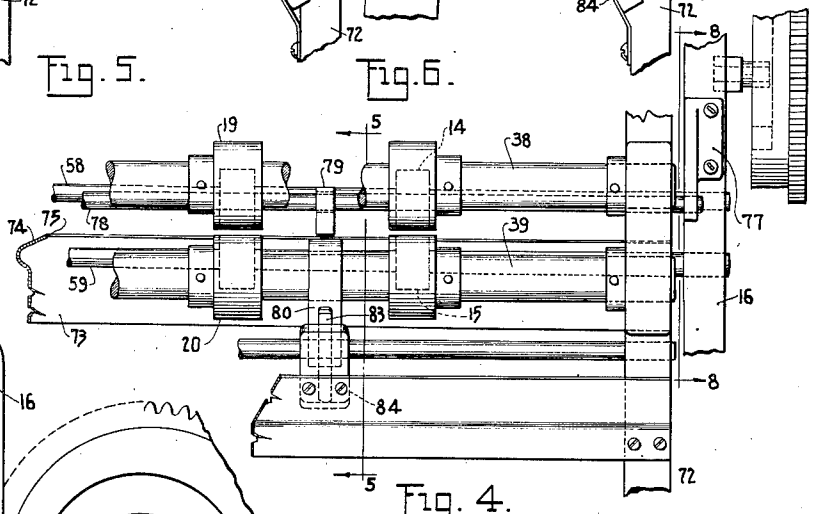


Fig. 4.

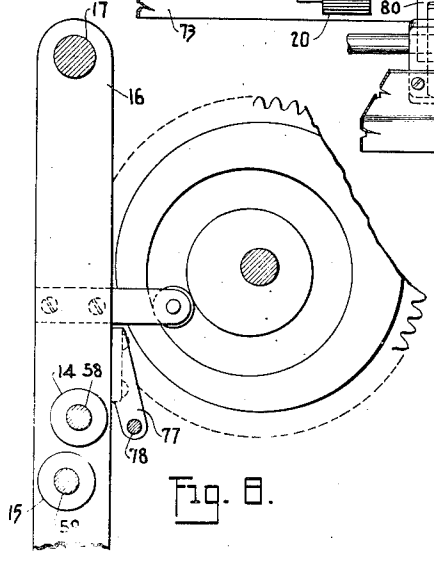


Fig. 8.

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Patented May 17, 1949

2,470,557

UNITED STATES PATENT OFFICE

2,470,557

GATHERING MACHINE

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Application March 24, 1948, Serial No. 16,731

18 Claims. (Cl. 271—57)

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This invention relates to gathering machines for collecting cards or sheets and distributing them in groups or stacks upon a conveyor collector.

It is primarily within the contemplation of my invention to provide an apparatus, in a machine of the above-mentioned category, that will assure the correct predetermined number of cards in each group or stack operatively assembled by the machine. More particularly, it is an object of my invention to provide the said apparatus in combination with gathering machines such as those disclosed in the patent applications Serial No. 742,891 and No. 4,100, filed April 4, 1947 and January 24, 1948, respectively.

In the above-mentioned aspect of my invention, it is an important object to attain the said objective by means of a positive and continuously operating stop-motion and/or signalling device which will be automatically set into operation upon the failure of the machine to deliver a card in accordance with a predetermined timing sequence—which is economical of space, and which will not interfere with the normal operation of the machine.

It is also an object of my invention to provide a self-contained gathering, distributing, and stop-motion and signalling unit, of simple and compact design, that will be capable of effectively accomplishing the aforesaid objectives.

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 a preferred form of self-contained unit including my invention, fragments of the delivery hoppers and of the table being broken away for clarity, the boxes for receiving the stacks of cards being shown by dot-dash lines.

Figure 2 is a semi-schematic perspective of the drive means for the conveyor portions of the device of Fig. 1.

Figure 3 is a somewhat enlarged front view of the left end of the unit of Fig. 1, looking from line 3—3.

Figure 4 is a somewhat enlarged front view of one of the stop-motion sections of the unit of Fig. 1, the view being taken looking substantially from line 4—4.

Figure 5 is a vertical section of the machine taken substantially along line 5—5 of Fig. 4, the oscillating transfer arm being shown in its retracted position operatively feeding a card to the discharge rollers.

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Figure 6 is a section like Fig. 5, the oscillating transfer arm being shown in its forward delivery position and the discharge rollers in the process of discharging a card.

Figure 7 is a section like Fig. 6, but with no card being delivered, and with the detecting finger of the stop-motion apparatus in its circuit-opening position, and

Figure 8 is a fragmentary section of Fig. 4 taken substantially along line 8—8, showing a cam-type of actuator for oscillating the transfer arm.

Figure 1 shows an arrangement of two delivery hoppers 10 and 11 containing banks of cards 12 and 13, respectively, the lowermost card in each bank being adapted for removal by the adjacent pair of constantly rotating rubber-faced transfer rollers 14 and 15 (see also Figs. 4–7) mounted on the oscillating transfer arms 16 pivotally carried by shaft 17—each removed card 18 being delivered to a discharge member including two coacting discharge rollers 19 and 20 for discharge into intermittently moving boxes 21 (to be hereinafter again referred to)—the operation of the transfer and discharge rollers being substantially in accordance with the machine described in the aforesaid patent application, Serial No. 742,891. The said transfer arms 16 oscillate between two limiting positions—the retracted position shown in Fig. 5 where the transfer rollers 14 and 15 receive the cards from the hopper, and the forward or discharge position shown in Figure 6 where the discharge rollers 19 and 20 receive the cards from the transfer rollers 14 and 15.

In the particular embodiment illustrated, the members above-referred to are part of a self-contained unitary structure including a table with receiving and discharge ends, box conveyors and pushers, drives for the conveyor and other moving mechanism, and structure supports therefor, all as will more clearly hereinafter appear. Disposed below the said hoppers 10 and 11 and extending also forwardly therefrom is the table 22 containing the loading platform 23 and the discharge portion 24. The said loading platform is disposed at right angles with respect to the body of the table, and has a continuous conveyor loading belt 25 moving at right angles to the longitudinal extent of the table. Flanking said loading conveyor 25 are the two parallel guides 26 and 27 secured to loading table 23 for guiding boxes 21 that are operatively placed upon said conveyor 25. When boxes 21 (which are subsequently to receive stacks of cards) move rearwardly towards the table, they are intercepted by

the longitudinal rear guide wall 28, thereby positioning the boxes to be engaged by the box pusher bars 29 moving longitudinally within slot 30 of the table 22, said slot being disposed substantially midway between the said rear longitudinal guide wall 28 and the front longitudinal guide wall 31. There are a plurality of said bars 29 in predetermined spaced relation—the spacing being determined in accordance with a predetermined relative timing between the loading belt 25, the speed of said bars 29, and the movement of the oscillating transfer levers 16— all as will more clearly hereinafter appear. The boxes 21 are carried along the table, in spaced relation, by the pusher bars 29, which move intermittently— the arrangement being such that there is always a box operatively in front and below each of the hoppers 10 and 11 to receive a predetermined succession of cards of stacks 12 and 13, respectively. As the boxes continue their travel along table 22, they finally land on discharge table 24, from which they are manually or otherwise removed. It is thus apparent that by successively loading boxes on belt 25, the boxes are brought to the main or body portion of table 22, intermittently carried therealong to predetermined card receiving stations, are held at such stations until a predetermined number of cards are delivered, and then are moved towards the discharge end of the table. During this entire operation, the transfer rollers 14 and 15 and discharge rollers 19 and 20 are continuously rotating, and the transfer arms 16 are operatively oscillating to receive the discharge cards from the hoppers, all in a manner described in said prior application Serial No. 742,891.

Figures 1, 2 and 3 indicate the drive mechanism for the apparatus above-described. A source of power, not shown, connected to belt 32 drives pulley 33 which is keyed on to shaft 34. The latter is connected through pulley 35 and belt 36 to belt 37 which drives the discharge roller shaft 38, the coacting discharge roller shaft 39 being similarly driven by a drive not shown. The shaft 34 is also connected through gears 40 and 41 to shaft 42, supported by bearing 43—the said shaft 42 having keyed thereon the fixed sprocket wheel 44, the intermittent sprocket wheel and drum 45 being loosely mounted over said shaft 42, the forward portion of which is supported by bearing 46. The continuously moving chain 47 is also in operative engagement with sprocket wheels 48 and 49, the latter being keyed to shaft 50 the forward end of which contains the fixed sprocket wheel 51 connected by chain 52 to the sprocket wheel 53 driving shafts 54 and 55 through gears 56—said shaft 55 carrying the roller 57 on which the said loading conveyor belt 25 is operatively mounted. It is thus apparent that chain 47 is continuously moving, causing the said loading belt 25 also to be in continuous motion. The said discharge roller shafts 38 and 39 are also continuously moving, through their connection with suitable drive mechanisms. The drive mechanism for the reciprocating transfer arms 16 and the transfer roller shafts 58 and 59 is similar to that described in the aforesaid patent application Serial No. 742, 891, and could be driven by any driving mechanism known in the art.

Attached to and extending forwardly from said link chain 47 are the spaced bears 60, these coming successively into engagement with the four lugs 61 extending rearwardly from the drum portion 62 of the sprocket wheel 45. The said bars 60 thus cause the entire sprocket wheel 45 to rotate intermittently, that is, only during the period of such engagement—the engagement terminating when the bars 60 tangentially slip off the lugs upon reaching the vertical portion of their path of travel, as indicated at 63 in Fig. 3. This rotation of sprocket wheel 45 caused by the above described action of bars 60 causes the sprocket wheel 64 to rotate through interconnecting chain 65 and sprocket wheel 66—wheels 64 and 66 being affixed to shaft 67. Mounted over sprocket wheel 64 is the intermittently actuated box moving chain 68 in engagement with the oppositely disposed sprocket wheel 69 loosely mounted over said shaft 50. The said chain 68 carries thereon the above-mentioned pusher bars 29, these preferably each consisting of a vertical arm 70 and a base portion 71 constituting a link in the said chain 68. It is thus apparent that although the said pusher bars 29 are adapted to actuate boxes with which they come into engagement, in the manner above described, they nevertheless are not rigidly mounted, being slightly movable due to the general flexibility to the chain 68. This construction enables each pusher bar to yield slightly when contacting a box, thereby eliminating the danger of marring or mutilating the box in the event of a sudden engagement therewith.

The arrangement above described accordingly enables the continuously moving sprocket chain 47 to impart an intermittent movement to the chain 68 and the pusher bars carried thereby. The pitch of the pressure bars 29 as well as that of the bars 60 on chain 47 is predetermined so as to permit the boxes to be pushed a predetermined distance along the table 22 so that each box will be successively brought into operative registry with the hoppers 10 and 11—the pitch of the said bars 60 determining the intervals between movements. Obviously, the greater the distance between bars 60; the longer the period each box will remain in position to receive cards from the hoppers, and the more cards will be fed into each box.

Attached to the frame 72 of the machine is the stationary shoe 73 constituting a part of the discharge member including the said rollers 19 and 20—said shoe having an upper substantially horizontal deflecting wall 74 behind the said discharge rollers 19 and 20. In the preferred arrangement, the said wall 74 is slightly upwardly and forwardly inclined, the foremost terminal portion 75 being preferably slightly below and behind the uppermost central discharge point 76 of the lower roller 20. Affixed to the said transfer arms 16 are the brackets 77, these carrying the shaft 78 upon which are rotatively mounted the detector fingers 79. Rotatively mounted on each said frame 72 is the switch-actuator lever 80 mounted at 81 and having an upper arcuate portion 82 disposed partially around shaft 39. The said lever rests upon the spring switch arm 83 operatively attached to the micro-switch 84. In the normal condition of the micro-switch 84, the said spring arm 83 thereof is inclined away from the switch as shown in Figs. 5 and 6, and yieldably holds the said lever 80 in its normally retracted position shown in said Figs. 5 and 6. When the said lever 80 is operatively moved into its projected or forward position (in a manner to be hereinafter described) shown in Figure 7, the lever will engage arm 83 and move it towards the micro-switch 84, to operatively actuate the switch. The micro-switch 84 is in series with

a circuit containing an electric motor which in turn operates the belt 32 and drives the conveyor mechanism above described. The drawings do not illustrate the wiring diagram nor the switch's connection with the motor since such a circuit is old in the art and need not be described other than to state that the micro-switch 84 is connected to a motor-controlling circuit. Similarly, the said micro-switch can be connected to an electric light signalling device.

It is preferred that the terminal 85 of the switch actuator lever 80 be disposed rearwardly of the center line 86 joining the two centers of shafts 38 and 39. The length of the detector finger 79 is such that when the transfer arm 16 is in its retracted position as shown in Fig. 5, the terminal of finger 79 will be directly above and engageable with the wall 74. However, when the transfer arm 16 is in its forward position, as shown in Fig. 7, the terminal of the finger 79 will drop within the space between the terminal 76 of the wall 74 and the terminal 85 of the lever 80, and will engage said terminal 85 of the lever to bring it into the projected position shown in Fig. 7 where it actuates the micro-switch 84.

When a card or other sheet of paper is, during its path of travel, operably supported between the transfer rollers 14 and 15 and the wall 74 of the shoe 73 or the lower discharge roller 20, the said finger 79 will rest upon said card 18, the card constituting a barrier between the finger 79 and lever 80. And in this position, the lever 80 is in its retracted position shown in Figs. 5 and 6, and yieldably held in such position by the arm 83. However, in the event the transfer rollers 14 and 15 fail to take up a sheet from the coacting hoppers 10 or 11, there will be nothing to support said finger 79 when the transfer arm 16 is in its forward position, and accordingly the finger will enter the space between the terminals of wall 74 and the lever 80, and actuate the lever and the micro-switch 84, to stop the machine, or flash on a signal. However, under normal operating conditions, when cards are continuously being transferred in their intended sequence, there will be no such actuation of the switch and consequently no interruption to the operation of the machine.

Obviously, when the machine stops, the chain 47 will cease its operative movement, and matters will remain at a stand-still until the trouble has veen located and remedied. In other words, there is no possibility whatsoever that any of the boxes 21 will contain less than the predetermined amount of cards in each stack, since a single skip will stop the machine. Nor can the boxes contain more than the predetermined amount of cards in view of the fact that the spacing of bars 60 determines the period during which cards can be fed at a known rate of feeding.

It is necessary that the said terminal 85 of the switch actuator lever 80 be below the discharge point between rollers 19 and 20—that is, below the uppermost point 76 on said roller 20. With this arrangement, a card 18 being transferred from rollers 14 and 15 to discharge rollers 19 and 20 will have an unobstructed path except for the detector finger 79, and each of these is sufficiently light in weight to enable the forwardly moving card 18 to lift it in the manner above indicated. The card 18 thus can not possibly contact the lever 80, and it is only the detector finger 79 which can actuate said lever 80 when there is no card present to lift said finger above the terminal 85 of the lever.

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 insofar as such limitations are specified in the appended claims.

I claim:

1. In combination with a gathering machine of the type having a movable card-transfer member for moving a card to a predetermined discharge position, a discharge member disposed forwardly of said card-transfer member and spaced therefrom for receiving and supporting a card being operatively moved by said transfer member toward said discharge position, an electric switch, a lever operatively engageable with said switch and movable between a predetermined switch-actuating position and a non-switch-actuating position, a movably mounted detector finger adjacent said lever and adapted to engage the lever for operatively moving it into its said switch-actuating position, said lever being normally yieldably held in its said non-switch-actuating position, the path of said card in moving towards said discharge position being between the said lever and said finger, whereby the card will constitute a separating barrier between the lever and finger.

2. The combination according to claim 1, the discharge member including two coacting rotating rollers for operatively receiving therebetween the said card, the peripherally coacting portions of said rollers being disposed at said discharge position, the said lever being spaced from said coacting portions of the rollers, whereby the lever will be out of the path of said card.

3. The combination according to claim 2, said rollers being positioned one above the other, said lever being spaced below the level of said discharge position, said finger being pivotally mounted behind said discharge member, the pivotal mounting for the detector finger being above the level of said discharge position.

4. The combination according to claim 3, said finger being of a length sufficient to extend below the level of said discharge position for operative engagement with said lever.

5. The combination according to claim 4, said finger being attached to said movable card-transfer member.

6. The combination according to claim 1, the discharge member including a stationary wall spaced rearwardly from said lever for slidably supporting said card, the said finger and its mounting being movable between predetermined forward and retracted positions, the finger being engageable with said wall when in its said retracted position and with said lever when the finger is in its said forward position, whereby in the absence of a card the finger will concomitantly acuate said lever and switch.

7. The combination according to claim 6, the discharge member further including two coacting rotating rollers for operatively receiving therebetween the said card, the peripherally coacting portions of said rollers being disposed at said discharge position, said rollers being positioned one above the other, said lever being spaced below the level of said discharge position, said detector finger being pivotally mounted the pivotal mounting for the detector finger being above the level of said discharge position, said finger being of a

length sufficient to extend below the level of said discharge position for operative engagement with said lever.

8. The combination according to claim 1, the discharge member including two substantially vertically aligned coacting rotating rollers for operatively receiving therebetween the said card, the peripherally coacting portions of said rollers being disposed at said discharge position, said rollers being mounted on horizontal shafts, said lever being pivotally mounted and having a hooked upper portion partially surrounding the lower of said shafts, the said detector finger being engageable with the terminal of said hooked portion.

9. The combination according to claim 8, said terminal portion being below the level of said discharge position and adjacent the common vertical center line of the two rollers.

10. The combination according to claim 9, the discharge member further including a stationary wall spaced rearwardly from the lever and having a forward upper terminal edge spaced a predetermined distance rearwardly from the said terminal of the lever.

11. The combination according to claim 10, the said finger and its mounting being movable between predetermined forward and retracted positions, the finger being of a sufficient length to enter the said space between the said lever and wall terminals to operatively engage the lever terminal when the finger is in its said forward position, the finger being engageable with the said wall when it is in said retracted position.

12. The combination according to claim 11, the said wall being slightly upwardly and forwardly inclined, the forward terminal of the wall being above the said terminal of the lever.

13. In a gathering machine of the type having a hopper for feeding cards to a card-transfer member, the combination of a movable transfer arm movable between predetermined forward discharging and retracted receiving positions, a pair of transfer rollers rotatably mounted thereon for operatively receiving a card from said hopper and moving it forwardly, a discharge member disposed forwardly of said transfer arm at a predetermined discharge position and spaced from said arm for receiving and supporting a card being operatively moved by said transfer rollers toward said discharge position, an electric switch, a lever operatively engageable with said switch and movable between a predetermined switch-actuating position and a non-switch-actuating position, a detector finger pivotally mounted on said transfer arm, said finger being adapted to engage the lever for operatively moving it into its said switch-actuating position when the transfer arm is in its said forward position and being out of engagement therewith when the transfer arm is in its said retracted position, said lever being normally yieldably held in its said non-switch-actuating position, the path of said card in moving towards said discharge position being between the said lever and said finger, whereby the card will constitute a separating barrier between the lever and finger.

14. The combination according to claim 13, the said transfer arm being pivotally mounted, the said discharge member including two coacting rotating rollers for operatively receiving therebetween the said card, the peripherally coacting portions of said rollers being disposed at said discharge position, a stationary frame spaced forwardly from said transfer arm, said lever being pivotally mounted on the frame.

15. The combination according to claim 14, said switch being attached to the frame, the switch having a spring arm normally yieldably holding the lever in its said non-switch-actuating position.

16. The combination according to claim 15, said discharge member further including a stationary wall affixed to said frame behind said discharge rollers, said wall being adapted to slidably support a card operatively moving between the transfer and discharge rollers, said finger being adapted to engage said wall when the transfer arm is in its said retracted position.

17. The combination according to claim 16, each pair of said rollers being in substantial vertical alignment, whereby the path of travel of the card will be substantially horizontal, the pivotal mounting of the finger being above the said path of travel, whereby the detecting finger will gravitationally rest upon the card moving along said path of travel.

18. The combination according to claim 13, further provided with a table extending below and forwardly of said hopper, a longitudinally slotted portion therealong, an intermittently moving conveyor chain below the table and containing spaced pusher bars extending vertically through said slotted portion, said pusher bars being yieldably mounted on said chain and being adapted to engage boxes disposed on said table, and driving means connected to the conveyor chain and the said transfer rollers.

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