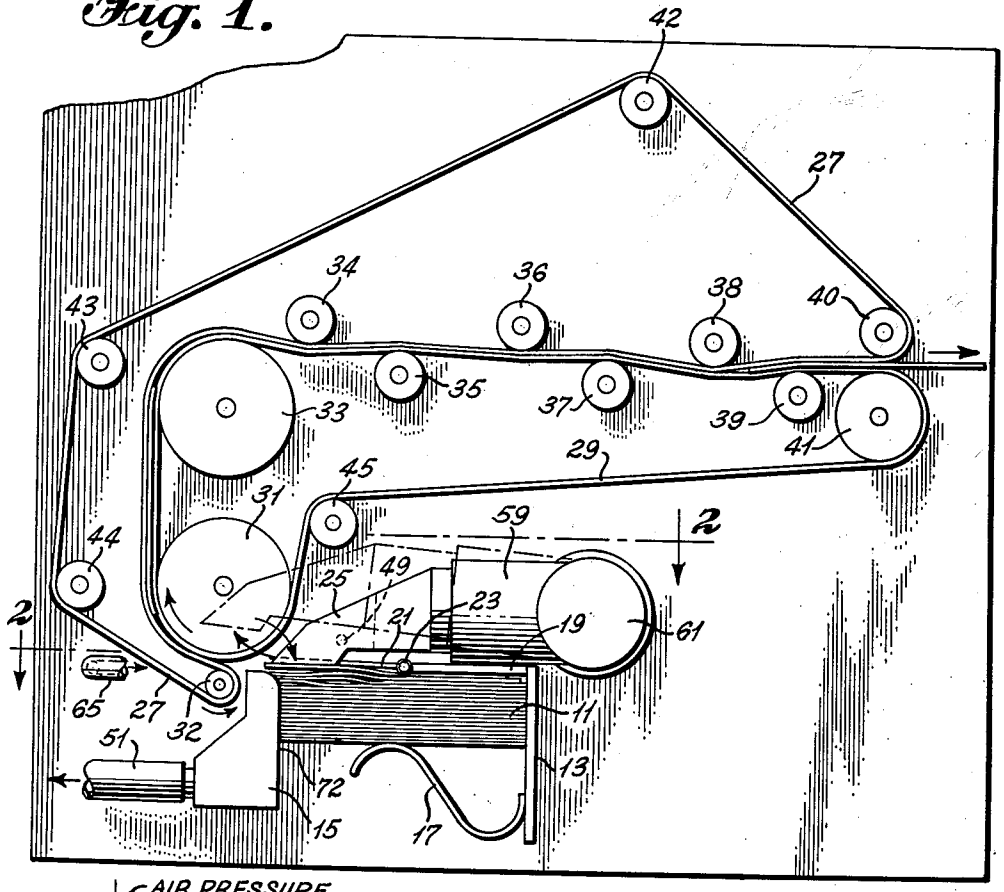
Feb. 26, 1963 G. W. CHILDS 3,079,149

SHEET FEEDING

Filed May 19, 1961 2 Sheets-Sheet 1

Fig. 1.



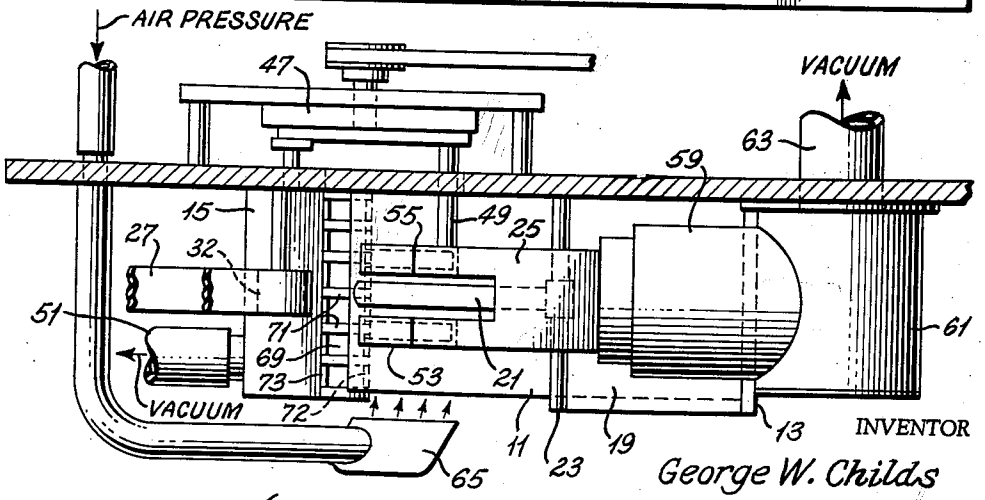


Fig. 2.

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Fig. 3.

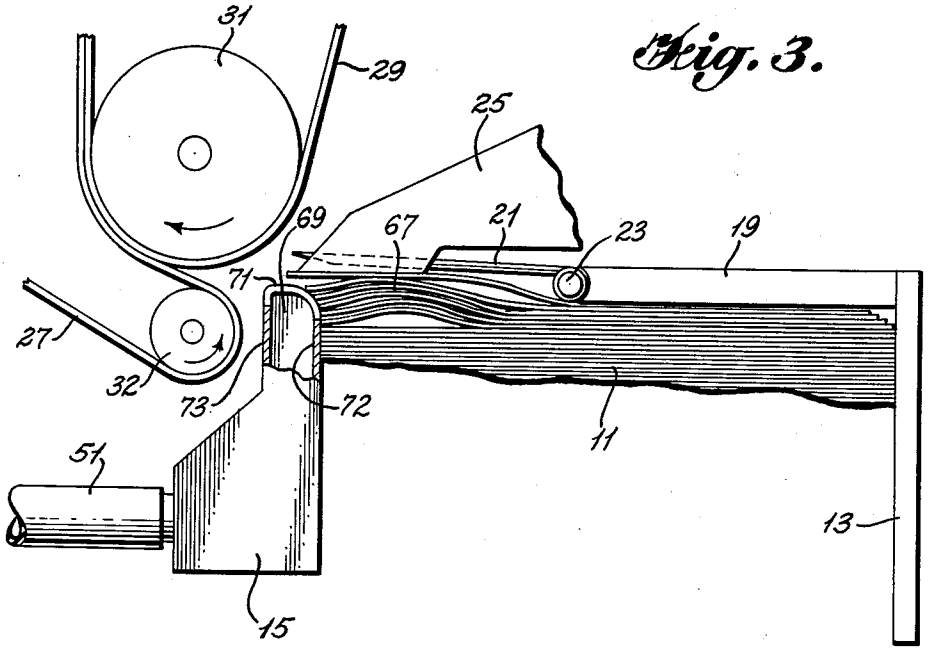
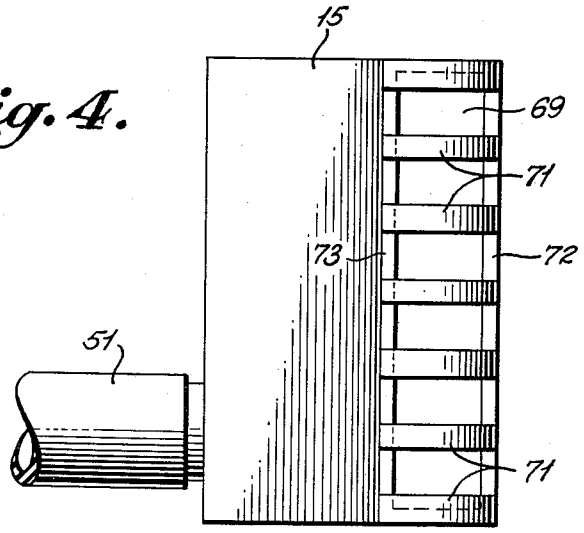


Fig. 4.



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3,079,149

SHEET FEEDING

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15 Claims. (Cl. 271—27)

This invention relates to material handling and more particularly to an apparatus for picking up sheets of thin material such as paper one at a time from a stack and feeding the sheets to a remote location.

In the design of apparatus for performing the function of picking up and feeding thin sheets one a time to a remote location there have arisen several problems, particularly when it is desired to feed the sheets at a high rate. One problem is a tendency of the apparatus to pick up and feed more than one sheet at a time from the stack. This particular malfunctioning is referred to as "feeding doubles." Another problem is the synchronization of the feeding operation so that it is carried out without any damage to the thin sheets.

In a copending application Serial No. 53,742 invented by George W. Childs, filed September 2, 1960, there is disclosed a sheet feeding apparatus which is directed at overcoming these two problems. The present invention is an improvement upon the apparatus in the aforesaid application to make the apparatus even more reliable and effective in the prevention of feeding doubles.

In the apparatus of the aforesaid copending application the sheets to be fed one at a time are held in a stack between two guides. A vacuum pickup arm cyclically picks up one sheet from the stack and delivers the sheet to a remote position where it is accepted between a pair of moving belts. The apparatus is reasonably effective in the prevention of feeding doubles because it directs a stream of air against the side of the stack to riffle and separate the sheets in the stack and because there is provided a sheet separating vacuum duct having an opening positioned adjacent the stack very close to the path that the vacuum arm carries the sheets in moving away from the stack. Air is sucked in through the vacuum duct opening and this action causes all the sheets but one carried by the vacuum pickup arm to be removed and left in a position to be picked up on the next cycle of the arm. The vacuum duct cooperates with the means directing the stream against the stack in that it tends to hold the edges of the sheets of the stack together while the stream of air separates the sheets in the area adjacent the pickup position of the vacuum arm.

In the apparatus of the aforesaid copending application there has arisen a problem. When the extra sheets carried by the arms 25 are removed from the arm by the action of the sheet separating vacuum duct, it is possible that the sheets removed will close off the opening of the vacuum duct and thus make it ineffective to perform its function. In the improved apparatus of the present invention this problem is overcome in that it is made impossible for the sheets removed from the vacuum pickup arm to close off the vacuum duct. Also in the improved apparatus it is less likely that two sheets will be picked up by the vacuum arm in the first place.

In the improved apparatus of the invention the vacuum duct itself forms one of the guides between which the stack of sheets is held. The contour of the face of the vacuum duct opening has been modified to be outwardly curved on the side adjacent to the stack of sheets. Because of this structure the edges of the sheets in the stack are drawn together and into contact with the face of the duct opening. Because of the sucking action through the vacuum duct opening and the curved face of the duct

opening, each sheet in the top of the stack projects out from the stack over the vacuum duct opening slightly more than the adjacent sheet beneath it. Thus the sheets in the stack are slightly fanned in the region near the top of the stack with a small margin of each sheet near the top of the stack exposed to the sucking action of the vacuum duct opening. Because the sheets are slightly fanned in this manner with their edges drawn together into contact with the face of the vacuum duct opening, the vacuum pickup arm is less likely to pick up more than one sheet, particularly since the sheets are separated in the area adjacent the pickup position of the vacuum pickup arm by the action of the stream of air directed against the side of the stack. The vacuum duct opening extends all the way across the top of the duct. Ribs are provided across the top of the duct projecting away from the edge of the side wall of the duct defining the side of the opening remote from the stack. These ribs prevent sheets from being sucked down into the vacuum duct and also prevent the sheets from closing off the duct opening because they project away from the edge of the duct side wall. Thus the apparatus of the present invention provides more reliable operation in the prevention of feeding doubles by the sheet feeding apparatus.

Accordingly, it is one object of the present invention to provide an improved sheet feeding apparatus.

It is a further object of the present invention to provide more effective prevention of the feeding of doubles in sheet feeding apparatus.

It is a still further object of the present invention to provide an improved apparatus for feeding thin sheets from a stack one at a time at a high rate of speed.

Further objects and advantages of the present invention will become readily apparent as the following detailed description of a preferred embodiment of the invention unfolds and when taken in conjunction with the drawings, wherein:

FIG. 1 illustrates a top view of the improved apparatus of the present invention;

FIG. 2 is a cross-sectional view of the apparatus taken along the lines 2—2 in FIG. 1;

FIG. 3 illustrates the details of the sheet separating vacuum duct positioned adjacent the stack of thin sheets and how it operates to effectively prevent the feeding of doubles; and

FIG. 4 shows the sheet separating vacuum duct in detail.

In the apparatus of the invention as shown in FIGS. 1 and 2, a stack of thin sheets 11 is held between a guide 13 and one wall 72 of a sheet separating vacuum duct 15. A bar 19 fixed to the guide 13 extends out over one face of the stack 11 and an arm 21 mounted on the end of the bar 19 extends further out across the stack 11. This face shall be referred to as the top of the stack because the sheets are picked up from the stack at this face. Correspondingly the opposite face of the stack shall be referred to as the bottom of the stack and the faces of the stack defined by the sheet edges shall be defined as the sides of the stack. The stack 11 is held between the guide 13 and the vacuum duct 15 by means of a spring 17 mounted on the guide 13. The spring 17 bears against the bottom of the stack 11 and urges the top of the stack 11 against the bar 19 and the arm 21. The arm 21 is mounted on the bar 19 by means of a pivot 23, which does not permit the arm 21 to rotate freely, but holds it firmly in position. Adjustment of the position of the arm 21 about the pivot 23 determines the precise position of the part of the top sheet of the stack 11 under the arm 21. A vacuum pickup arm 25 lifts the top sheet from the stack 11 and feeds it between two belts 27 and 29 which are driven and guided by a system of pulleys 31

through 45. The system of belts 27 and 29 and pulleys 31 through 45 is substantially identical to the system of belts and pulleys in the aforesaid copending application. The belt 29 after passing over pulley 45 passes over the pulley 31, where it comes together with the belt 27. The belt 27 after passing over the pulley 32 comes together with the belt 29 and also passes over the pulley 31. The two belts 27 and 29 lying together then pass over the pulley 33 and then over a series of pulleys 34 through 39 which maintain the belts 27 and 29 together. The belts 27 and 29 then pass through the pair of pulleys 40 and 41. The belt 29 continues around the pulley 41 and back to the pulley 45 and the belt 27 passes in the opposite direction around the pulley 40 and then is guided back to the pulley 32 by means of pulleys 42, 43 and 44.

The arm 25 feeds the sheets from the stack 11 one at a time to the point where the belts 27 and 29 come together, whereupon the sheets are gripped by the belts 27 and 29 and are transported by the belts 27 and 29 up between the pulleys 40 and 41 where the sheets are fed out of the mechanism. The peripheral speed of the pulley 31 and hence the speed of the belts 27 and 29 is controlled to be faster than the speed of the laterally moving arm 25 as it brings a sheet up to the point where the belts 27 and 29 come together. This feature causes the belts to pull the sheets positively from the arm 25 without any bending or crumpling of the sheets by the mechanism. After delivering a sheet from the stack 11 to the point where the belts 27 and 29 come together, the arm 25 returns to the stack 11 where it picks up another sheet.

The arm 25 moves in a straight line motion from adjacent the top of the stack to the point where the belts 27 and 29 come together while it is carrying a sheet and then returns from this point to the pickup position adjacent the top of the stack in a path which curves away from the stack so that the arm will not tend to make a pickup before it is again in the pickup position. The arm 25 comes to a substantially complete stop each time it comes to the pickup position adjacent the top of the stack 11. The arm 25 is driven in this motion by means of a linkage mechanism 47 which connects to the arm 25 by means of a pin 49. This linkage mechanism is fully disclosed in the aforesaid copending application and will not be described in detail here.

An opening 69 is provided in the sheet separating vacuum duct 15. This opening is positioned alongside of the top of the stack 11 and faces the path taken by the pickup arm en route to the belts 27 and 29 from the pickup position. The air is evacuated from the interior of the duct 15 by means of a vacuum pump withdrawing air from the duct 15 through a tube 51. As a result air is sucked in through the opening 69 in the vacuum duct 15. The sheets that are carried by the vacuum pickup arm 25, due to the motion of this arm in delivering the sheets to the belts 27 and 29, pass close to the opening 69. The air being sucked in through the opening 69 will cause all the sheets but one carried by the arm 25 to be removed from the arm 25. Thus if it should happen that the arm 25 picks up more than one sheet, the extra sheets will be caused to be removed by the vacuum duct 15. These extra sheets will be left in a position to be picked up on the next succeeding cycle of the arm 25.

The arm 25 is identical to the one described in the aforesaid copending application and accordingly it will only be briefly described here. As best seen in FIG. 2, the arm 25 is formed with two feet 53 and 55. An opening facing the top of the stack 11 is provided in each of the feet 53 and 55. The arm 25 is hollow and telescopes in and out of a tubular extension 59 on a hollow cylinder 61, which is pivotable about its axis. By means of this pivotal motion and the telescoping action of the arm 25 in the tubular extension 59, the arm 25 is made free to move in its cyclical path as it is driven by the mechanism 47. A vacuum is created within the cylinder 61 by means of a vacuum pump connected to the cylinder 61 through a tube 63, about which the cylinder 61 pivots. The hollow interior of the arm 25 communicates with the interior of the cylinder 61 so that air is sucked in through the openings in the feet 53 and 55. Because of the sucking action generated at these openings the arm 25 will pick up the top sheet from the stack 11 each time it comes into its pickup position adjacent the top of the stack. The two feet of the pickup arm straddle the arm 21 when the pickup arm is in its pickup position and when the pickup arm delivers a sheet between the belts 27 and 29 and starts on its return path to the pickup position adjacent the top of the stack 11, the two feet will straddle the belt 29 and the pulley 31, as illustrated in phantom in FIG. 1. The communication between the interior of the arm 25 and the interior of the cylinder 61 is automatically closed off when the arm 25 gets to the point where it delivers a sheet between the belts 27 and 29, as is fully disclosed in the aforesaid copending application.

Air under pressure is supplied to a separator nozzle 65 which is positioned to direct a stream of air against the side of the stack 11 in the area adjacent the pickup position of the arm 25. This stream of air riffles or separates the sheets in this area and reduces the tendency of the arm 25 to pick up more than one sheet.

Although the sheets in the stack 11 are separated in the area adjacent the pickup position of the pickup arm 25, the edges of the sheets adjacent the sheet separating vacuum duct 15 are held together by the sucking action of the opening 69. This action of the opening 69 is best illustrated in FIG. 3. As shown in FIG. 3, the sheets in the stack 11 are separated in the area by the reference number 67, which is adjacent the pickup position of the arm 25, by the action of the stream of air directed by the nozzle 65 against the side of the stack 11. At the same time the sucking action through the opening 69 holds the edges of the sheets in the stack 11 together. Although this action occurs to some extent in the apparatus of the aforesaid copending application, it is much more effectively carried out by the apparatus of the present invention because of the structure and location of the sheet separating vacuum duct opening in reference to the stack 11.

As shown in FIG. 3, the wall 72 of the duct 15, which is adjacent the stack 11, is in direct contact with the edge of the stack of sheets 11 and forms one of the guides between which the stack of sheets is held. The wall 73 of the duct 15, which is remote from the stack 11, extends farther than the wall 72. The two edges of these walls define the sides of the duct opening 69. The ribs 71 and therefore the face of the opening 69 are outwardly curved near the stack 11. The curved portion of the face of the opening 69 is positioned adjacent the top of the stack 11 between the top and bottom of the stack 11. The edges of the sheets of the stack 11 are held in direct contact with the curved portion of the face of the opening 69, or in other words in direct contact with the curved portion of the ribs 71. Thus the sucking action through the opening 69 is applied directly to the edges of the top sheets in the stack 11 because the edges of the sheets in the stack 11 are held directly against the face of the opening 69. Because the face of the opening 69 is curved, each sheet near the top of the stack 11 projects out from the stack 11 over the opening 69 slightly more than the adjacent sheet below it, as is illustrated in FIG. 3. Thus the sheets near the top of the stack are slightly fanned with a small margin of each sheet near the top of the stack exposed to the sucking action of the opening 69. Because the sheets are slightly fanned in this manner with their edges drawn together in contact with the opening 69, the vacuum arm 25 is less likely to pick up more than one sheet. The action of the duct 15 coacts with the action of the separator nozzle 65 in that it maintains the edges of the sheets 11 together although the sheets are separated in the area 67. This combined effect provides a much more reliable operation in preventing the arm 25

from picking up more than one sheet from the stack 11 on each cycle.

The fanning of the top sheets in the stack 11 could also be achieved if the opening 69 had a straight face. To achieve the fanning effect it is only necessary that the portion of the face of the opening which is in direct contact with the edge of the stack 11 form an acute angle with a plane parallel to the sheets in the stack 11.

As illustrated in FIGS. 3 and 4, the ribs 71 project away from the edge of the wall 73 as an extension of the wall 73. Because part of the ribs 71 are in the plane of the wall 73 projecting away from the edge of the wall 73, the opening 69 can never be completely closed off by a sheet from the stack 11 even if the sheet should extend all the way across the opening 69 as it quite possibly might do. For example, if the arm 25 should possibly pick up more than one sheet, all of the sheets but one will be caused to be removed by the sucking action of the opening 69 as the arm 25 passes by the opening 69 en route to the point where the belts 27 and 29 come together. The sheet or sheets removed by this action could very well lie all the way across the opening 69. However, the opening 69 will not be closed off because the structure of the ribs 71 projects. Because the opening 69 can not be closed off by overlying sheets from the stack 11, the sucking action through the opening 69 will never even be temporarily interrupted.

The position of the arm 21 is adjusted about the pivot 23 so that the openings in the feet 53 and 55 of the arm 25 will be less than one-eighth of an inch away from the top of the stack 11 when the arm 25 is in its pickup position. If the arm 21 is rotated counter-clockwise about the pivot 23 to depress the top of the stack 11 so that the top of the stack is more than one-quarter of an inch away from the feet 53 and 55 when the arm 25 is in the pickup position, a pickup will not occur. Thus the operation of the mechanism can be controlled simply by adjusting the position of the arm 21. A small rotation of the arm 21 in a clockwise direction will start the feeding of sheets from the stack 11 and a small rotation of the arm 21 in a counter-clockwise direction until the arm 21 is brought into contact with the duct 15 will stop the feeding operation. The arm 21 may be controlled by a solenoid for remote or automatic control of the starting and stopping of the feeding operation.

The above described apparatus is a preferred specific embodiment of the invention, and many modifications may be made thereto without departing from the spirit and scope of the invention.

What is claimed is:

1. A material handling apparatus comprising means to hold a stack of thin sheets, a vacuum operated pickup means, means to drive said vacuum operated pickup means to cyclically move said vacuum operated pickup means from a position over said stack to a position remote from said stack in a predetermined path going away from said stack along a line initially parallel to the top of said stack, said vacuum operated pickup means coming to a substantial stop over said stack once each cycle and causing the top sheet to be picked up from said stack by said vacuum operated pickup means and carried to said remote position, means to remove from said vacuum operated pickup means the sheet carried by the last said means at said remote position, means defining a duct having an opening fixedly positioned adjacent said stack and close but spaced from said path, at least a portion of the face of the opening being curved and said curved portion being in direct contact with a side of said stack, means to suck air in through said duct to cause all the sheets but the one carried by said vacuum operated pickup means to be dropped from the last said means in a position substantially on the top of said stack to be picked up by said arm on the succeeding cycles of said arm.

2. A material handling apparatus as recited in claim 1 further comprising means to direct a stream of air against a side of said stack.

3. A material handling apparatus comprising means to hold a stack of thin sheets, a pickup arm having a first duct defined in the end thereof, means to suck air in through said duct, means to drive said arm to cyclically move said duct from a position over said stack to a position remote from said stack in a predetermined path going away from said stack along a line initially parallel to the top of said stack, said duct coming to a substantial stop over said stack once each cycle, the sucking action of said duct causing the top sheet to be picked up from said stack by said arm and carried to said remote position, means to remove from said arm the sheet carried by said arm at said remote position, means defining a second duct fixedly positioned adjacent said stack and close to but spaced from said path, said duct defining an opening adjacent said stack, curved rib-like members extending across said opening at least a portion of said members being in direct contact with a side of said stack, and means to suck air in through said second duct to cause all the sheets but one carried by said arm to be dropped from said arm substantially on top of said stack in a position to be picked up by said arm on the succeeding cycles of said arm.

4. A material handling apparatus comprising means to hold a stack of thin sheets, pickup arm having a first duct defined in the end thereof, means to suck air in through said first duct, means to drive said pickup arm to cyclically move said first duct from a position over said stack to a position remote from said stack through a predetermined path going away from said stack above a line initially parallel to the top of said stack and causing said first duct to come to a substantial stop over said stack once each cycle, the sucking action through said first duct causing the top sheet from said stack to be picked up by said arm and carried by said arm to said remote position, means to remove from said arm the sheet carried by said arm at said remote position, means defining a second duct fixedly positioned adjacent said stack and adjacent said predetermined path, said duct having an opening and rib-like members extending across said opening, at least a part of said rib-like members projecting away from the edge of one wall of said duct defining a side of said opening in the plane of said wall, and means to suck air in through said second duct, said second duct causing all the sheets but one carried by said pickup arm to drop off said pickup arm into a position substantially on top of said stack to be picked up by said pickup arm on the succeeding cycles thereof.

5. A material handling apparatus comprising means to hold a stack of thin sheets, a pickup arm having a first duct defined in the end thereof, means to suck air in through said first duct, means to drive said arm to cyclically move said first duct from a position over said stack to a remote position through a path which goes in a straight line from said position over said stack to said remote position and which curves away from the top of said stack on the return from said remote position to a substantial stop position over said stack once each cycle, the sucking action through said first duct causing the top sheet from said stack to be picked up by said arm and carried to said remote position, and means to remove the sheet carried by said arm from said arm at said remote position, means defining a second duct having an opening adjacent said stack, means to suck air in through said opening, and ribs extending across said opening, part of said ribs projecting away from the edge of the wall of said duct defining the side of said opening remote from said stack in the plane of said wall.

6. A material handling apparatus comprising means to hold a stack of thin sheets, a pickup arm having a first duct defined in the end thereof, means to such air in through said first duct, means to drive said arm to cyclically move to said duct from a position over said

stack to a remote position in a motion that brings said duct to a substantially complete stop over said stack and in a path which goes in a straight line from a position over said stack to said remote position and which curves away from the top of said stack in return from said remote position to said position over said stack, the sucking action through said duct causing the top sheet from said stack to be picked up by said arm and carried to said remote position, and means to remove from said arm the sheet carried by said arm at said remote position, and means defining a second duct adjacent said stack, and close but spaced from said path, ribs extending across said opening, part of said ribs projecting away from the edge of the wall of said duct defining a side of said opening in the plane of said wall, said ribs being positioned in direct contact with the side of said stack, and means to suck air through said second duct to cause all sheets but the one carried by said arm to be dropped from said arm substantially on top of said stack in a position to be picked up on the next succeeding cycles of said arm.

7. A material handling apparatus comprising means to hold a stack of thin sheets, vacuum operated means to pick up one sheet at a time, means to drive said vacuum operated pick up means to carry such sheet to a remote position in a predetermined path going away from said stack along a line initially parallel to the top of said stack and cause said vacuum operated pickup means to come to a substantial stop over said stack once each cycle, means defining a duct fixedly positioned alongside of said stack and close to but spaced from said predetermined path, said duct having an opening adjacent said stack, means to suck air in through said opening, a portion of the face of said opening making an acute angle with a plane parallel to the sheets in said stack, said portion of said face being in direct contact with the side of said stack, and means to suck air in through said duct to cause all of the sheets but one carried by said pickup means to be dropped from said pickup means in a position substantially on top of said stack to be picked up on the succeeding cycles of said pickup means.

8. A material handling apparatus as recited in claim 5 further comprising means to direct a stream of air against a side of said stack.

9. A material handling apparatus as recited in claim 4 wherein said vacuum operated means comprises a pickup arm having two feet on the end thereof separated by a slot with ducts defined in said feet, means to suck air in through said ducts, a pulley at a remote position, a pair of belts coming together over said pulley, means to drive said pickup arm to cyclically move said feet from a position over said stack to the point where said belts together with said feet straddling said pulley.

10. A material handling apparatus comprising a means to hold a stack of thin sheets, a vacuum operated pickup means adapted to pick up one sheet at a time from said stack and carry such sheet to a remote position, duct means defining an opening adjacent said stack, the face of said opening having a curved portion, said curved portion of the face of said opening being in direct contact with the side of said stack, means to drive said vacuum operated pickup means from a position above said stack in a predetermined path going away from the stack along a line initially parallel to the top of said stack, means for removing the sheet carried to the remote position, a portion of said opening being positioned close but spaced from said path, means to suck air in through the duct means to cause all the sheets but the one carried by said vacuum operated pickup means to be dropped from the last said means in a position substantially on top of said stack to be picked up by the vacuum operated pickup means on succeeding cycles.

11. A material handling apparatus comprising a duct having an opening defined therein, a portion of the face of said opening being curved, means to hold a stack of thin sheets with the edges of the main body of said sheets against the side wall of said duct and the edges of the sheets in the top of said stack against the curved portion of the face of said opening, and means to pick up one sheet at a time from the top of said stack and carry such sheet to a remote position, means to drive said means to pick up from a position above said stack in a predetermined path going away from the stack along a line initially parallel to the top of said stack, means for removing the sheet carried to the remote position, a portion of said opening being positioned close but spaced from said path, means to suck air in through the duct to cause all the sheet but the one carried by said means to pick up to be dropped from the last said means in a position substantially on top of a position substantially on top of said stack to be picked up by the means to pick up on succeeding cycles.

12. A material handling apparatus comprising a duct having an opening defined therein, a portion of the face of said opening being curved, means to hold a stack of thin sheets with the edges of the sheets in the top of said stack against the curved portion of the face of said opening, means to suck air in through said opening, and a vacuum pickup arm adapted to pick up one sheet at a time from the top of said stack and carry such sheet to a remote position, means to drive said vacuum operated pickup arm from a position above said stack in a predetermined path going away from the stack along a line initially parallel to the top of said stack, means for removing the sheet carried to the remote position, a portion of said opening being positioned close but spaced from said path, means to suck air in through the duct to cause all the sheets but the one carried by said vacuum operated pickup means to be dropped from the last said means in a position substantially on top of said stack to be picked up by the vacuum pickup arm on succeeding cycles.

13. A material handling apparatus comprising a means to hold a stack of thin sheets, a vacuum operated pickup means adapted to pick up one sheet at a time from said stack and carry such sheet to a remote position, duct means defining an opening adjacent said stack, the face of said opening having a curved portion, said curved portion of the face of said opening being in direct contact with the side of said stack, means to drive said vacuum operated pickup means from a position above said stack in a predetermined nontortuous path going away from the stack, means for removing the sheet carried to the remote position, a portion of said opening being positioned close but spaced from said path, means to suck air in through the duct means to cause all the sheets but the one carried by said vacuum operated pickup means to be dropped from the last said means in said stack to be picked up by the vacuum operated pickup means on succeeding cycles.

14. A material handling apparatus comprising a duct having an opening defined therein, a portion of the face of said opening being curved, means to hold a stack of thin sheets with the edges of the main body of said sheets against the side wall of said duct and the edges of the sheets in the top of said stack against the curved portion of the face of said opening, and means to pick up one sheet at a time from the top of said stack and carry such sheet to a remote position, means to drive said means to pick up from a position above said stack in a predetermined nontortuous path going away from the stack, means for removing the sheet carried to the remote position, a portion of said opening being positioned close but spaced from said path, means to suck air in through the duct to cause all the sheets but the one carried by said means to pick up to be dropped from the last said means in a position substantially on top of said stack to be picked up by the means to pick up on succeeding cycles.

15. A material handling apparatus comprising a duct

having an opening defined therein, a portion of the face of said opening being curved, means to hold a stack of thin sheets with the edges of the sheet in the top of said stack against the curved portion of the face of said opening, means to suck air in through said opening, and a vacuum pickup arm adapted to pick up one sheet at a time from the top of said stack and carry such sheet to a remote position, means to drive said vacuum operated pickup arm from a position above said stack in a predetermined nontortuous path going away from the stack, means for removing the sheet carried to the remote position, a portion of said opening being positioned close

but spaced from said path, means to suck air in through the duct to cause all the sheets but the one carried by said vacuum operated pickup means to be dropped from the last said means in a position substantially on top of said stack to be picked up by the vacuum pickup arm on succeeding cycles.

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