June 23, 1931. A. W. BELL 1,810,898

SHEET FEEDING MECHANISM

Filed May 26, 1928 4 Sheets-Sheet 1

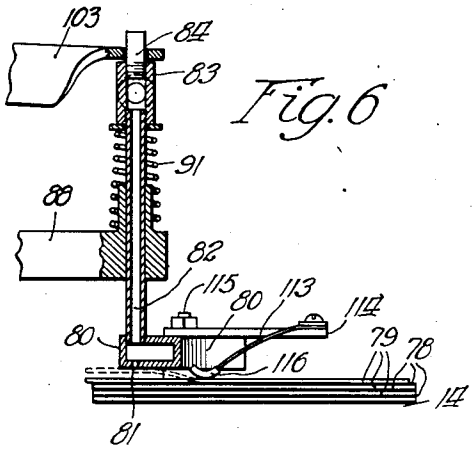


Fig. 6

Fig. 1

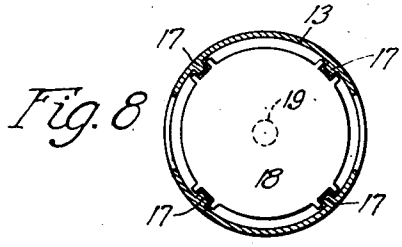


Fig. 8

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SHEET FEEDING MECHANISM

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Fig. 2

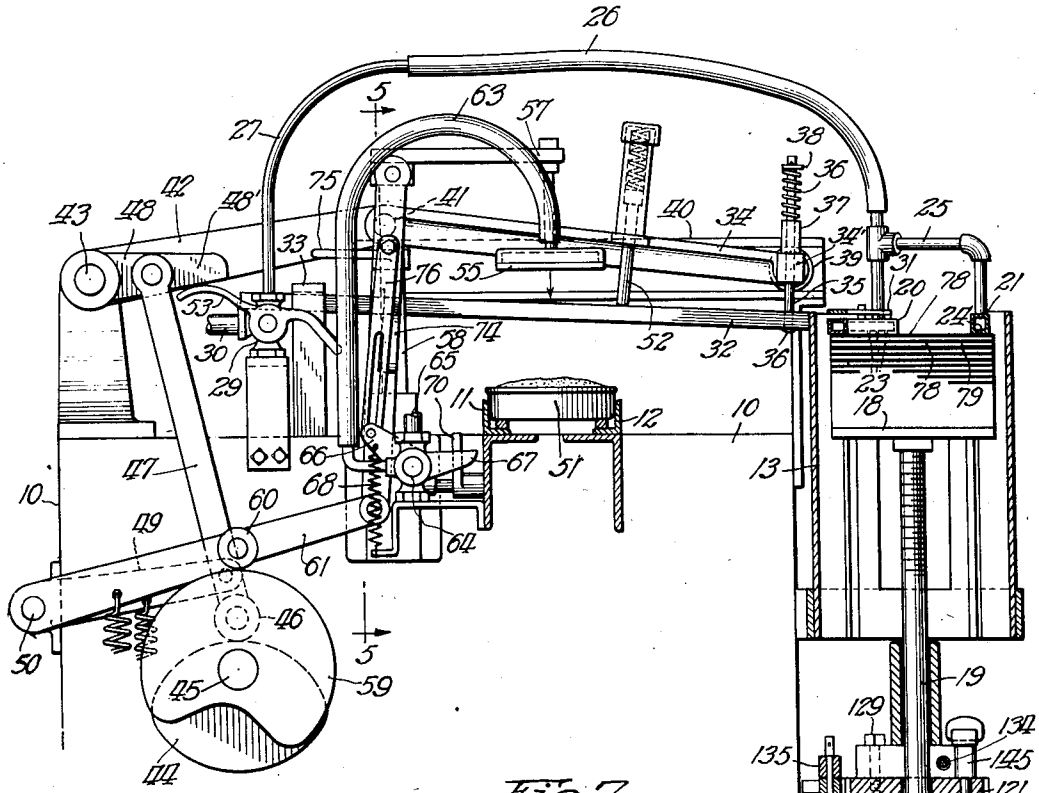
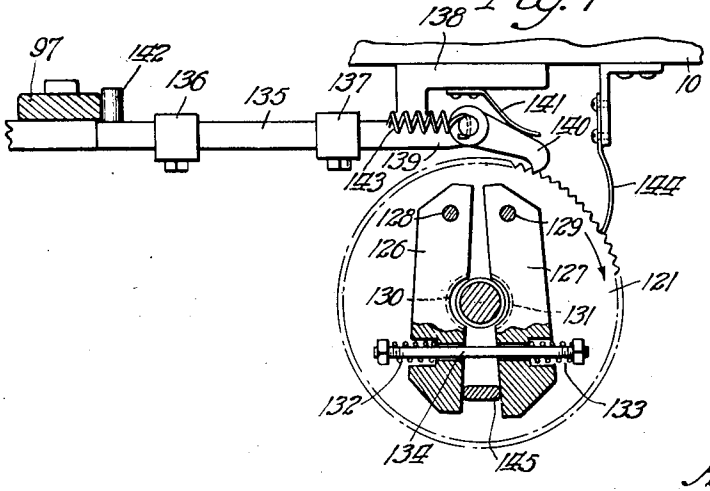


Fig. 7



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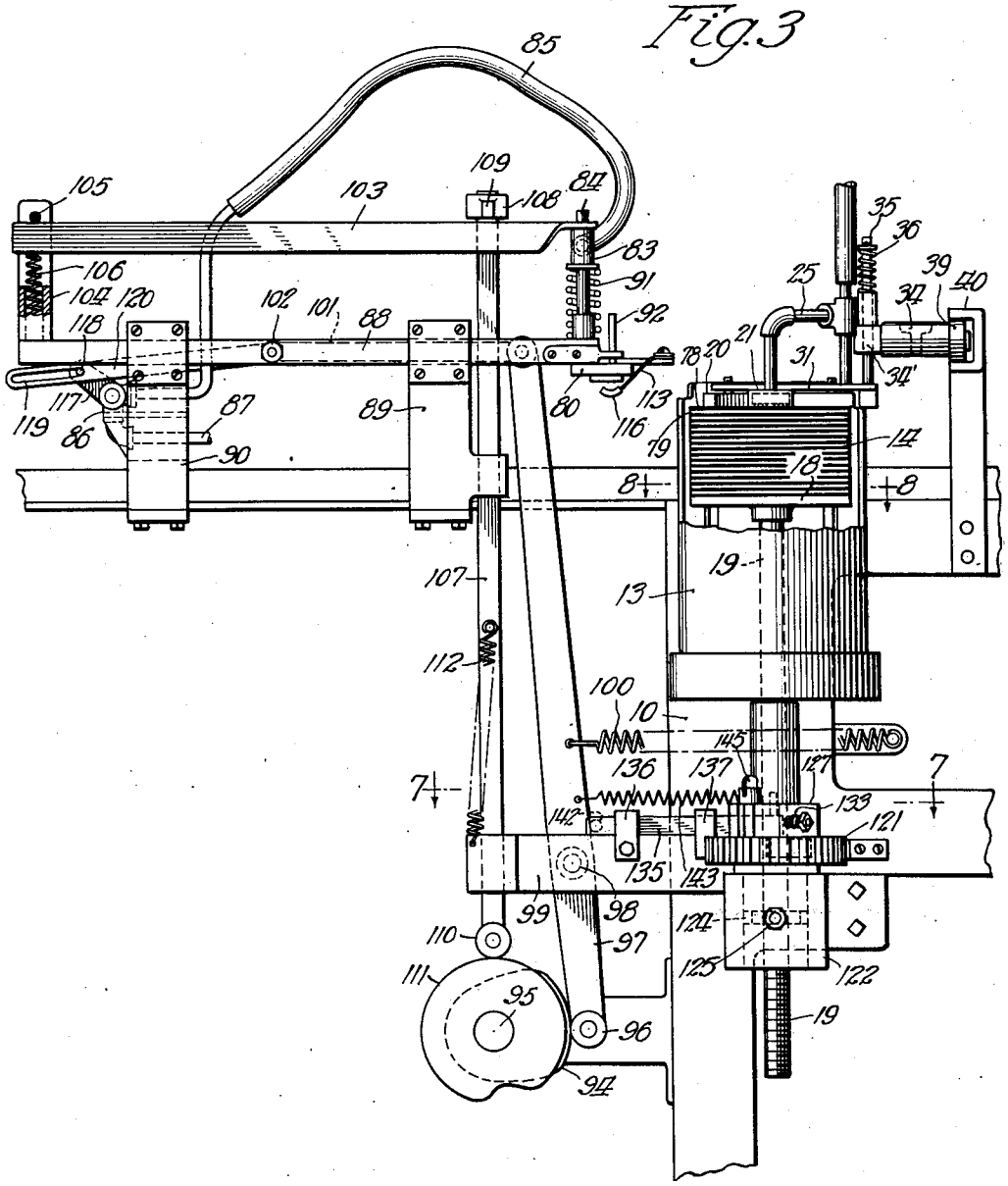
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SHEET FEEDING MECHANISM

Filed May 26, 1928 4 Sheets-Sheet 3

Fig. 3



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SHEET FEEDING MECHANISM

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Fig. 4

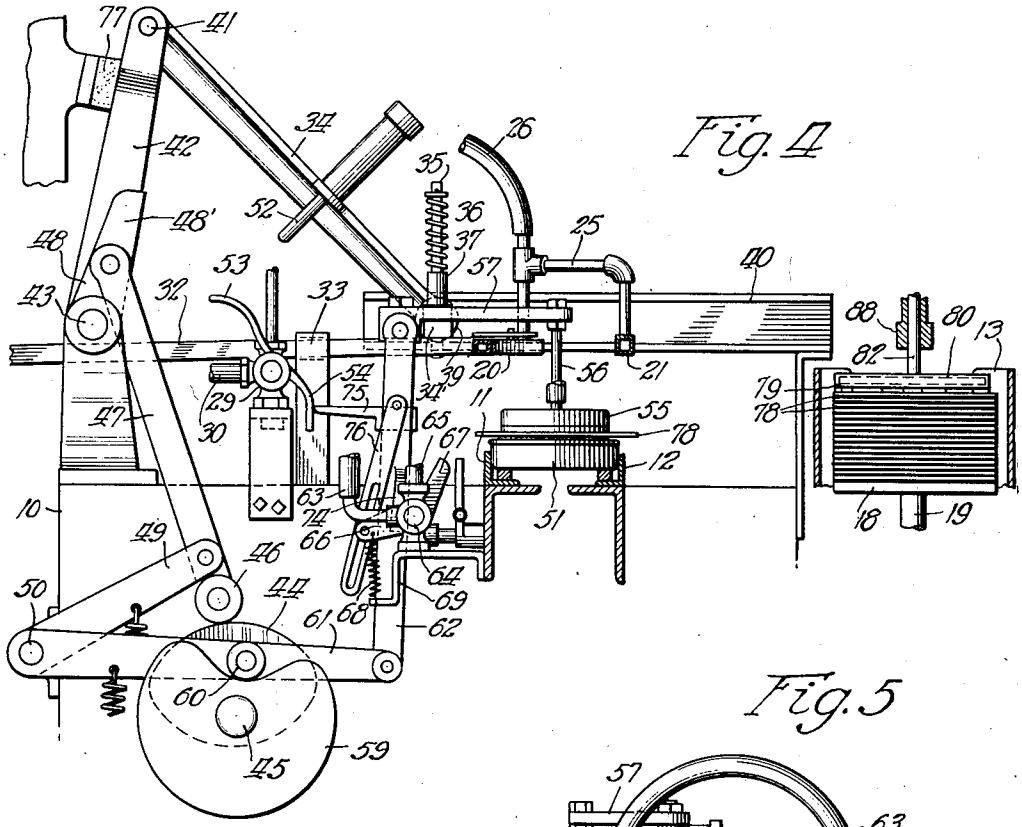
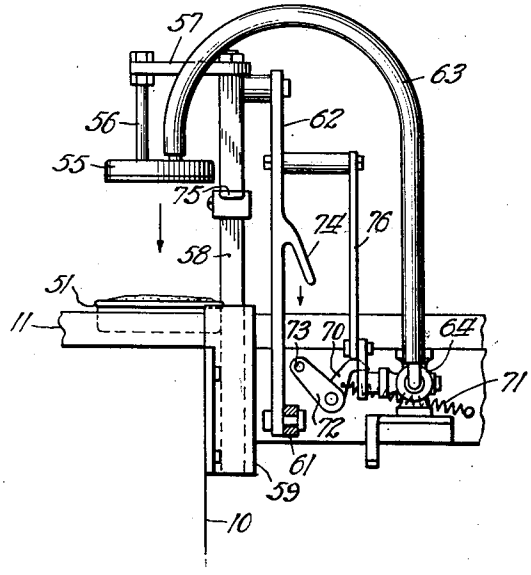


Fig. 5



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Patented June 23, 1931 1,810,898

UNITED STATES PATENT OFFICE

ARTHUR W. BELL, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO KRAFT-PHENIX CHEESE CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE

SHEET FEEDING MECHANISM

Application filed May 26, 1928. Serial No. 280,701.

This invention relates to sheet feeding mechanisms, and more particularly to mechanism for feeding sheets of tinfoil or the like from a stack of such sheets in which the sheets are separated by tissue paper or similar separating sheets.

It has been found desirable, when stacking sheets of material such as tinfoil or the like, to separate each of the sheets by means of a tissue paper or similar separating sheet so as to prevent the tinfoil sheets from sticking together and to facilitate removal thereof, one by one, from the stack. Hence, in feeding tinfoil or like lining sheets, it is necessary to remove the separator sheets from the stack before the lining sheets can be picked up and carried to the position in which they are deposited on an article for lining or wrapping such article.

The present invention has for its principal object, to provide efficient means for removing the separator sheets from a stack of tinfoil lining sheets and to provide means for successively feeding the lining sheets from the stack to a predetermined position in which the sheets are deposited on an article to be lined or wrapped, or in which the sheets are otherwise treated.

Other objects of the invention are: to provide a pair of alternately operative means for picking up the top sheet of the stack of sheets, one of the means being operative to pick up the separator sheets and the other to pick up the lining sheets; to provide improved means for picking up the separator sheets; and to provide means for initially moving the top separator sheet relative to the lining sheet thereunder so as to reduce the adhesion between the separator sheet and lining sheet.

Still other objects are: to provide improved vacuum means for successively picking up and conveying the separator sheets from the top of the stack to a position spaced horizontally from the stack and there depositing such separator sheets in a suitable receptacle; to provide improved vacuum means for successively picking up and conveying the lining sheets from the top of the stack to a position spaced horizontally from the stack of sheets; to provide means for removing the lining sheet from said vacuum pick-up means and to deposit such sheet in a predetermined place; to provide means whereby said depositing means will be effective, incidentally to its depositing operation, to cut off or relieve the vacuum of said pick-up means so as to release the sheet therefrom; to provide means for maintaining the top of the stack of sheets at a substantially constant height, and, in general, the object of the present invention is to provide improved sheet-feeding mechanism of the type above referred to.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings in which I have illustrated sheet-feeding mechanism embodying one form of my invention as applied to a machine for packaging cheese.

In the drawings:

Fig. 1 is a plan.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is an elevation of the front end of Fig. 1.

Fig. 4 is a section similar to Fig. 2, but showing the parts in a changed position.

Fig. 5 is a section on the line 5—5 of Fig. 2.

Fig. 6 is a section on the line 6—6 of Fig. 1.

Figs. 7 and 8 are sections on the lines 7—7 and 8—8, respectively, of Fig. 3.

Referring now to the drawings, and particularly Fig. 1, I have shown a part of a cheese packaging machine including a main frame supporting table 10 which serves to support various parts of the sheet-feeding mechanism and also a pair of tracks 11 and 12 which extend lengthwise of the machine for guiding cartons through the machine, which cartons are filled with cheese by mechanism not herein shown. The embodiment of my invention herein disclosed is adapted to deposit tinfoil or other suitable linings on top of the cheese in the cartons.

A receptacle is indicated at 13 for holding a stack 14 of lining sheets, in the present in-

stance, circular in form. The stack 14 comprises alternately arranged tinfoil or lining sheets and tissue paper or other similar separating sheets. According to the present invention, I provide mechanism, indicated generally at 15, for picking up and removing the separating sheets from the top of the stack and mechanism indicated generally at 16 for picking up the lining sheets from the top of the stack and conveying them to a position over the tracks 11 and 12, in which position the lining sheets are deposited on the top of a carton filled with cheese.

I will first describe the mechanism indicated at 16 for conveying the lining sheets from the stack, to a position spaced horizontally from the stack, and in which they are deposited on a carton filled with cheese.

The receptacle 13 is cylindrical in form to receive the cylindrical sheets of material, it being understood that in the present instance cylindrical cartons of cheese are packaged. The receptacle 13 is provided with inwardly projecting ribs 17—17 which extend the length of the receptacle and serve to position the circular lining sheets substantially concentric with the receptacle, the relatively narrow width of the ribs providing the only contact between the receptacle wall and stack of sheets. Hence, the sheets are not unduly held in the receptacle by an excessive amount of peripheral contact with the wall of the receptacle. A bottom plate 18 which is rotatably supported on the upper end of a screw member 19 serves to support the stack of sheets in the receptacle. Means which will hereinafter be described is provided for adjusting the supporting plate 18 upwardly as the sheets are removed from the top of the stack so as to maintain the top of the stack at a substantially constant height.

The lining sheet pick-up device is preferably of the vacuum type and in the present instance includes an arc-shaped hollow member 20 and another relatively small hollow member 21, each of which are rigidly connected together and connected to a suitable vacuum pump for exhausting the air therefrom. The member 20 is preferably provided with spaced sets of apertures 22 and 23 adjacent its ends and the member 21 is provided with a plurality of apertures indicated at 24. The apertures in the members 20 and 21 are in the bottom walls thereof, which bottom walls are brought into engagement with the lining sheet on the top of the stack so that when the air is exhausted from the members 20 and 21, the lining sheet will adhere thereto and be picked up and carried away from the stack when the members 20 and 21 are raised and moved horizontally by mechanism which I will presently describe. The members 20 and 21 are rigidly connected together by means of piping 25 and connected to a vacuum pump through the agency of a length of flexible tubing 26, which is connected through a pipe 27 to a control valve 29. A pipe 30 extends from the valve 29 to a suitable exhaust pump. The valve 29 is actuated to control the exhausting of air from the members 20 and 21 and to thereby cause the members to pick up and carry a lining sheet or to release the same.

The member 20 is secured by means of a fastening plate 31 to a rod or bar 32 which is slidably mounted in a suitable bearing 33 supported by the main frame 10 of the machine. The bearing 33 is preferably disposed adjacent the rear end of the bar 32 when the latter is in its forward position, as shown in Figs. 1 and 2. The forward end portion of the bar, i. e., the end adjacent the member 20, is yieldingly connected to the front end of an arm 34 by means of a rod 35 extending through the bar 32 and having a head 36 underlying and supporting the bar. The rod 35 extends upwardly, is slidably mounted in a block 34′ which is pivotally mounted in the front end of the arm 34, and the rod is provided with a compression spring 36 which is compressed between a collar 37 engaging the top of the block 34′ and a washer 38, which is locked on the rod 35. The spring 36 serves to yieldingly hold the bar 32 in engagement with the lower face of the block 34′ as shown in Fig. 4.

The front end of the arm 34 is provided with a roller 39 which is adapted to roll back and forth in a track 40 supported by suitable brackets extending from the main frame 10. In the present instance, the track 40 consists of a length of channel iron and the roller 39 fits between the opposite flanges thereof as shown in Figs. 2 and 4. The rearward end of the arm 34 is pivotally connected as shown at 41 to the outer end of an arm 42 which is secured to a rock shaft 43, the latter being mounted in suitable bearings shown in Figs. 1, 2 and 4 on the main frame 10.

The rock shaft 43 is rocked by means of a rotating cam 44 which is carried by a drive shaft 45, the latter being driven in any suitable manner such as an independent motor drive or by being geared to other rotating parts of the machine. The cam 44 acts on a roller 46 which is carried by the lower end of a link 47 which is pivoted between an arm 48 secured to the rock shaft 43 and an arm 49 which is pivotally mounted as indicated at 50 on the main frame 10.

By an inspection of Figs. 2 and 4, it will be understood that starting with the parts in the position shown in Fig. 2, the shaft 43 when rocked, will be effective, through the agency of the arms 42 and 34, to slide the bar 32 rearwardly in the bearing 33, the spring 36 being effective to raise the front end of the bar 32 and vacuum members 20 and 21 so that the same will clear the top of

the receptacle 13 and be effective to carry the lining sheet held thereby to a position over a carton of cheese 51, which is supported on the tracks 11 and 12. This position of the parts is shown in Fig. 4. Rocking of the shaft 43 in the reverse direction will of course, be effective to return the vacuum members 20 and 21 to their pick-up position over the stack of sheets, and a spring pressed plunger 52 carried by the arm 34 serves to yieldingly urge the bar 32 to force the same downwardly against the pressure of the spring 36 so that the vacuum members 20 and 21 will be forced into engagement with the top of the stack of sheets. Obviously, when the arm 34 begins its movement from the position shown in Fig. 2 to the position shown in Fig. 4, the spring pressed plunger 52 is raised from the bar 32 so that the spring 36 is effective to lift the bar and vacuum members upwardly over the top of the receptacle 13.

The valve 29 which controls the vacuum in the pick-up members 20 and 21 is provided with levers 53 and 54 which are engaged by suitable means for turning the valve off and on as desired. The lever 53 is engaged by an extension 48′ of the arm 48 when the latter is rocked from the position shown in Fig. 4 to the position shown in Fig. 2, so as to open or turn the valve on so that the exhaust pump is operatively connected to the vacuum pick-up members 20 and 21, and thereby enabled to produce a vacuum in the members 20 and 21 sufficient to enable the same to pick up the lining sheet on the top of the stack. Means will presently be described for turning the valve off so as to release the lining sheet from the pick-up members 20 and 21 when the latter are moved to the position shown in Fig. 4.

In the cheese packaging machine embodying the present form of my invention, the cartons of cheese are positioned on the tracks 11 and 12 considerably below the horizontal plane of movement of the pick-up members 20 and 21. For conveying the lining sheets from the pick-up members 20 and 21 and depositing the same on the tops of the cheese filled cartons, I provide plunger mechanism which I will now describe. A hollow or vacuum plunger head 55 is secured by means of a bolt 56 to a cross-head 57 which is carried by the upper end of a vertically slidably mounted plunger rod 58, the latter being slidably mounted in a suitable bearing such as 59 carried by a part of the main frame 10. The plunger rod 58 is vertically reciprocated by means of a rotating cam 59 mounted on the shaft 45 and which cam acts on a roller 60, carried by an arm 61, which is pivotally mounted on the shaft 50. A link 62 pivotally connected between the outer end of the arm 61 and the upper end of the plunger rod 58, as best shown in Figs. 4 and 5, serves to transmit cam effected vertical movement of the outer end of the arm 61 to the plunger rod.

The vacuum plunger head 55 is connected by means of a length of flexible tubing 63 to a valve 64 which communicates with the exhaust fan through tubing 65. The valve 64 is provided with controlling arms 66 and 67 and a spring 68 stretched between the arm 66 and a bracket 69 normally tends to close the valve. The valve is held in open position by means of a dog 70 which is urged by a spring 71 into the position shown best in Figs. 2 and 5, wherein it overlies the arm 67 so as to prevent the spring 68 from turning the valve to closed position. The dog 70 is pivotally mounted in suitable bearings and is rigidly connected to an arm 72 having a pin 73 which is adapted to be engaged by a cam member 74 carried by the link 62. By an inspection of Fig. 5, it will be seen that when the plunger rod 58 is moved downwardly through the agency of the link 62, the cam 74 will be effective to engage the pin 73 and to thereby rock the arm 72 and dog 70 against the tension of the spring 71 so that the valve control arm 67 will be released and the spring 68 permitted to turn the valve to off position. Obviously, the valve control arm 67 will be released when the plunger rod 58 approaches its lowermost position.

It will be understood that when the pick-up and conveying members 20 and 21 carry a sheet of lining material to the position overlying the cheese filled carton 51, the vacuum plunger head 55 will be in the position shown in Fig. 2. When the sheet is delivered to the said overlying position, the same will be disposed beneath the plunger 55, which will then be moved downwardly by the mechanism above described. The vacuum being on in the plunger 55, the latter will be effective to take hold of the lining sheet, up to this point held by the members 20 and 21, and to carry the lining sheet downwardly into engagement with the top of the cheese filled carton as shown in Fig. 4. A finger 75 carried by the plunger rod 58 serves to engage the lever 54 of the valve 29 in proper time to cut off the vacuum in the heads 20 and 21 so as to release the lining sheet therefrom. The valve 64, which controls the vacuum in the head 55 is turned off by engagement of the cam 74 and pin 73 as above described, to release the lining sheet from the plunger 55 when the latter is in its lowermost or delivery position, as shown in Fig. 4. The valve 64 is again turned to on position when the plunger reaches its up position by means of a link 76 which is pivoted at its upper end to the link 62 and provided with a pin and slot connection with the arm 66. When the plunger 55 approaches its up posi-

tion, the lower end of the slot in the link 76 engages the pin carried by the valve arm 66 so as to turn the valve to on position, and the cam 74 releases the pin 73 so that the spring 71 may pull the pawl 70 into locking position over the valve arm 67. Suitable spring means indicated in Figs. 1, 2 and 4 may be provided for urging the arms 49 and 61 downwardly so as to maintain the rollers 46 and 60 in engagement with their respective operating cams. A stop 77 in the form of an abutment on a part of the machine frame may be provided for limiting rearward rocking of the arm 42 and consequently rearward horizontal movement of the vacuum pick-up members 20 and 21.

In the drawings, I have indicated the tinfoil lining sheets by means of relatively heavy lines 78, and the intervening spaces 79 represent separator sheets of tissue paper or the like. It will be understood that when the pick-up and conveying mechanism 16 have been actuated to pick up and carry the top lining sheet 78 to position for depositing the same on the cheese filled carton 51, a separator sheet remains on the top of the stack. It then becomes necessary to remove such separator sheet before the next lining sheet can be picked up from the stack. The mechanism indicated at 15 is provided for this purpose and I will now proceed to describe the same.

The separator sheet pick-up mechanism includes a hollow arcuate vacuum member 80 which is provided with a plurality of apertures one of which is indicated at 81 in Fig. 6, for the purpose of picking up the separator sheet when the member 80 is brought into close proximity to the surface thereof. The vacuum member 80 is provided with an upwardly extending tubular post or pipe 82, which is provided at its upper end with a T connection 83, the upper end of which is closed by means of a plug 84 which projects therefrom a substantial distance, as shown in Figs. 3 and 6. A flexible tube 85 is connected at one end to the side opening of the T connection, and at its other end to a control valve 86 which in turn is connected by means of a pipe 87 to an exhaust pump for exhausting the air from the pick-up member 80. The valve 86 is operated in a manner which will hereinafter be described to close and open the valve at predetermined times so as to cause the member 80 to be effective to pick up and release the separator sheets as desired.

The vacuum member 80 is carried by a bar 88 which is slidably mounted in suitable bearing brackets 89 and 90 carried by any convenient part of the machine, the pipe member 82 being vertically slidably mounted in a suitable aperture provided in the front end of the bar 88 and a spring 91 compressed between the bar 88 and lower end of the T connection 83 serving to normally maintain the member 80 in contact with the bottom face of the bar as shown in Fig. 3. A pin 92 projecting upwardly from the member 80 and through an aperture in a bracket 93 secured to the bar 88 serves to prevent the member 80 from turning or swiveling about the center of the pipe 82 as an axis.

The bar 88 and member 80 carried thereby are reciprocated in a horizontal direction by means of a rotating cam 94 which is carried by a shaft 95, the latter being rotatably mounted in suitable bearings supported by the frame of the machine and rotation being imparted to the shaft in any suitable manner. The cam 94 acts on a roller 96 which is carried by a lever 97 pivotally mounted intermediate its ends as at 98 in a bracket 99, which is secured to and supported by the main frame 10. A spring 10 connected between the lever and a stationary part of the frame serves to normally maintain the roller 96 in engagement with the cam 94. The upper end of the lever 97 is connected by means of a link 101 to the bar 88 as indicated at 102 at a point intermediate the bearings 89 and 90 which slidably support the said bar.

It will be seen that when the cam 94 rotates and causes the lever 97 to rock, the bar 88 will correspondingly be reciprocated through the link connection 101. As shown in Fig. 3, the vacuum member 80 is in its retracted position, i. e., at the limit of its rearward movement and it will be understood that the vacuum member when in its advanced position overlies the marginal portion of the top sheet of the stack.

In order to enable the vacuum member 80 to pick up the top sheet from the stack, the member is lowered into close proximity to the surface of the top sheet as shown in Fig. 6. The mechanism for so lowering the vacuum member 80 includes a crosshead 103 which is provided with an apertured end fitting loosely over the projecting portion of the closure plug 84 and the other end of which crosshead fits between the arms of a forked bracket 104 secured to the rearward end of the bar 88. A pin 105 extending through the upper ends of the arms of the forked bracket 104 prevents upward displacement of the crosshead 103 from its position between the arms and a spring 106 compressed between the lower edge of the crosshead, and a seat provided in the bracket 104 serves to yieldingly maintain the crosshead in up position with its upper edge engaging the pin 105.

A vertically disposed bar 107, slidably mounted in suitable bearings formed integral with the brackets 89 and 99 is provided with a head member 108 which has a finger or lug portion 109 projecting therefrom and overlying the crosshead 103. The lower end

of the bar 107 is provided with a roller 110 which is seated on a rotating cam 111 carried by the shaft 95 and a spring 112 connected between the bar 107 and any convenient stationary part such as the bracket 99, serves to normally pull the bar downwardly and to maintain the roller 110 in engagement with the cam 111.

It will be seen that the cam 111 is effective to normally maintain the bar 107 in an elevated position of adjustment as shown in Fig. 3 and intermittently to permit the spring 112 to lower the same. When the bar is thus lowered, the lug or finger 109 of the head member 108 engages the crosshead 103 which in turn presses downwardly on the upper end of the T connection 83 so that the pipe 82 is slid downwardly through the aperture in the bar 88 against the pressure of the spring 91. It will be understood that the cams 111 and 94 are so timed that the vacuum head 80 will be depressed when the vacuum head is in position overlying the stack of sheets. Hence the vacuum head will be lowered into position closely adjacent the surface of the top sheet of the stack, as shown in Fig. 6.

For assisting the vacuum head 80 to pick up the separate sheet on top of the stack, I provide a device for preliminarily moving the top sheet relative to the next lower sheet of the stack, which movement effectively reduces the adhesion between the top sheet and next lower sheet so that the said top sheet may be more readily picked up from the stack without also carrying with it the next lower sheet. This device consists, in the present instance, of a yielding finger or spring 113, which is secured at one end to a bracket 114 which in turn is secured to and carried by the vaccum head 80, as shown at 115. The spring 113 is curved downwardly as clearly shown in Figs. 3 and 6, and the free end thereof is provided with a friction tip 116 of rubber or other suitable material. As shown in Fig. 3, the friction tip is normally spaced below the bottom of the vacuum pick-up member 80 so that when the latter is lowered to the position shown in Fig. 6, the end of the yielding finger will be caused to engage the top sheet of the stack before the pick-up member reaches its lowermost position. Continued lowering of the pick-up member 80, after the end of the yielding finger 113 has engaged the top sheet will cause the finger to yield, bending upwardly and describing an arc about a center located approximately in the head of the screw which fastens the yielding finger to the bracket 114. Such movement of the free end of the finger obviously results in an outward movement of the end of the finger relative to the stack of sheets and effects a horizontal slipping movement of the top sheet 79 relative to the next lower lining sheet 78 (see Fig. 6). When the top sheet is so slipped or moved, it is loosened from the next lower sheet sufficiently to enable the vacuum of the pick-up member 80 to lift the adjacent marginal portion of the sheet from the stack, as indicated in dotted lines in Fig. 6. The cam 111 then raises the bar 107 and consequently the vacuum pick-up member 80 so that the top sheet 79 is picked up from the top of the stack and subsequently carried in a horizontal movement to a position spaced horizontally from the stack substantially as shown in Fig. 3. At this point the vacuum in the pick-up member 80 is cut off or relieved so that the sheet adhering thereto is released and permitted to drop into a suitable receptacle not herein shown.

The valve 86 which controls the vacuum in the pick-up member 80 is normally closed. For turning the valve on and off, the same is provided with an arm 117 having a pin 118 projecting therefrom and which pin is disposed in a slot 119 provided in the adjacent end of a link 120. The link 120 is pivotally connected to the link 101 as shown in Fig. 1 so that when the arm 88 is moved forwardly, the link 120 also moves forwardly. When the vacuum head 80 approaches its advanced position over the stack of sheets, the end of the slot 119 in the link 120 engages the pin 118 in the valve arm 117 and serves to turn the valve to on position. On reverse movement of the bar 88 and link 120, the other end of the slot in the link 120 turns the valve to off position so as to release the sheet from the vacuum member 80.

It will of course be understood that the separate sheet pick-up mechanism 15 and lining sheet pick-up mechanism 16 are synchronized or actuated in timed relation so as to operate alternately to pick up the top sheet of the stack of sheets, the mechanism 15 serving to remove the separate sheets and the mechanism 16 serving to pick up and deposit the lining sheets. By inspection of Fig. 1 it will be noted that the two mechanisms are disposed at substantially right angles to each other whereby the same may be very compactly arranged in a machine of which they form a part.

The mechanism above referred to for maintaining the top of the stack of sheets at a substantially constant height includes a tooth or ratchet wheel 121 which is rotatably mounted in a bearing 122 secured to or forming a part of the main frame 10. The toothed wheel 121 is provided with a hub 123 which fits within the bearing member 122, and the said hub is provided with an annular groove 124 which receives the inner end of a screw 125 extending through the bearing 122 to lock the wheel in the bearing against removal therefrom. A pair of half nut members 126 and 127 are pivotally mounted at 128 and 129 respective-

ly on the top face of the wheel 121 and are provided with threaded portions 130 and 131 which are adapted to engage threading on the screw 19. Springs 132 and 133 on the opposite end of a rod 134 which extends through and loosely fits in apertures in the nut halves 126 and 127 serve to normally maintain the halves together and in threaded engagement with the threads on the screw 19. Obviously, by rotating the wheel 121 in the proper direction, the screw 19 will be caused to move upwardly and thereby elevate the stack of sheets. For so rotating the wheel 121, I provide a member 135 which is horizontally slidably mounted on the bracket 99, suitable bearings 136 and 137 being provided to guide the same. The inner end of the horizontally slidable member 135 is provided with an offset portion 138 and a lug 139, the latter of which pivotally supports a pawl 140 which is adapted to engage the teeth of the wheel 121. A flat spring 141 is secured to the offset portion 138 and yieldingly urges the pawl 140 into the said engagement. The outer end of the member 135 is provided with a pin 142 which bears against the adjacent edge of the lever 97 so that when the cam 94 rocks the lever, the slide 135 will be moved accordingly. A spring 143 connected between the pawl pivot pin and the lever 97 serves to maintain the pin 142 in engagement with the edge of the lever and thereby to effect sliding of the member 135 in an outward direction. A stop spring 144, which is mounted on an adjacent part of the main frame as shown in Fig. 7 serves to prevent rearward rotation of the wheel 121. By an inspection of Fig. 7 it will be seen that when the slide 135 is moved to the right, the pawl 140 will be effective to turn the wheel 121 a certain amount, the spring 144 yielding sufficiently to permit the teeth of the wheel to pass thereunder. On sliding movement of the member 135 to the left, the spring 141 will yield and permit the pawl 140 to ride over the tops of the teeth of the wheel. A flat cam member 145 is pivotally mounted in the wheel 121 intermediate the nut halves and serves to facilitate spreading thereof as shown in Fig. 7 thereby to disengage the threaded portions 130 and 131 of the nut members from the screw 19. The stack supporting plate 18 may thus be quickly lowered to starting position.

While I have described my improved sheet feeding mechanism in connection with a cheese packaging machine, it is to be understood that the invention is applicable to other machines, and I therefore do not intend to limit myself to the embodiment herein shown and described.

I am aware that changes may be made in the form, construction and proportion of parts without departing from the spirit of the invention, the scope of which should be determined by reference to the following claims, the same being construed as broadly as possible, consistent with the state of the art.

I claim as my invention:

1. In a sheet feeding device of the class described, the combination of a support for a stack of sheets to be fed, a movable device having means for picking up the top sheet of a stack of sheets on said support, operative to carry said sheet to one side of said stack and to there deposit said sheet, and means carried by said movable device for preliminarily moving said top sheet relative to the next lower sheet so as to reduce the adhesion between said top and next lower sheet, thereby to assist said device to pick up said top sheet.

2. In a sheet feeding device of the class described, the combination of a support for a stack of sheets, movable means for picking up the top sheet of a stack of sheets on said support, operative to carry the same to one side of the stack and to there deposit said top sheet, said means being adapted to be lowered into operative engagement with said top sheet, and means for preliminarily moving said top sheet relative to the next lower sheet as an incident to the lowering of said movable means, thereby to reduce the adhesion between said top sheet and next lower sheet to assist said movable means to pick up said top sheet.

3. In a sheet feeding device of the class described, the combination of a support for a stack of sheets, movable means for picking up the top sheet of a stack of sheets on said support, operative to carry the same to one side of the stack and to there deposit said top sheet, said means being adapted to be lowered in a substantially vertical direction into operative engagement with said top sheet, and means for preliminarily moving said top sheet relative to the next lower sheet as an incident to the lowering of said movable means, thereby to reduce the adhesion between said top sheet and next lower sheet to assist said movable means to pick up said top sheet.

4. In a sheet feeding device of the class described, the combination of a support for a stack of sheets, movable means for picking up the top sheet of a stack of sheets on said support, operative to carry the same to one side of the stack and to there deposit said top sheet, said means being adapted to be lowered in a substantially vertical direction, into operative engagement with said top sheet, and means carried by said movable means for preliminarily moving said top sheet relative to the next lower sheet as an incident to the lowering of said movable means, thereby to reduce the adhesion be-

tween said top sheet and next lower sheet to assist said movable means to pick up said top sheet.

5. In a sheet feeding device of the class described, the combination of a support for a stack of sheets, movable means for picking up the top sheet of a stack of sheets on said support, operative to carry said top sheet to one side of the stack and there deposit the same, said means being adapted to be lowered in a substantially vertical direction into operative engagement with said top sheet, and a yielding finger carried by said movable means for engaging said top sheet as an incident to the lowering of said movable means, said yielding finger being operative to move the top sheet relative to the next lower sheet so as to reduce the adhesion therebetween, before said movable means engages said top sheet, thereby to assist said movable means to pick up said top sheet.

6. In a sheet feeding device of the class described, the combination of a support for a stack of sheets, movable means for picking up the top sheet of a stack of sheets on said support, operative to carry said top sheet to one side of the stack and there deposit the same, said means being adapted to be lowered in a substantially vertical direction into operative engagement with said top sheet, and a yielding finger carried by said movable means for engaging said top sheet as an incident to the lowering of said movable means, said yielding finger having a friction tip adapted to frictionally engage said top sheet and thereby to move the top sheet relative to the next lower sheet as an incident to the yielding of the finger, thereby reducing the adhesion between said top sheet and lower sheet before said movable means engages said top sheet, whereby said movable means is assisted in picking up said top sheet.

7. In a sheet-feeding device of the class described, the combination of a support for a stack of alternately arranged lining sheets and separator sheets, and a pair of horizontally reciprocating sheet pick-up and conveying devices, disposed at substantialy right angles to each other and alternately operative to pick up the top sheet of such a stack of sheets disposed on said support and to carry such top sheet to a position spaced horizontally from the stack, one of said devices being operative to remove the separator sheets from the stack and the other to pick up and convey the lining sheets.

8. In a sheet-feeding device of the class described, the combination of a support for a stack of alternately arranged lining sheets and separator sheets, a pair of horizontally reciprocating sheet pick-up and conveying devices, disposed at substantially right angles to each other, alternately operative to pick up the top sheet of such a stack of sheets disposed on said support and to carry such top sheet to a position spaced horizontally from the stack, one of said devices being operative to remove the separator sheets from the stack and the other to pick up and convey the lining sheets, and means synchronized with said lining-sheet conveying device to remove the lining sheet therefrom and to convey the same vertically in said horizontally spaced position.

9. In a sheet-feeding device of the class described, the combination of a support for a stack of alternately arranged lining sheets and separator sheets, a pair of horizontally reciprocating sheet pick-up and conveying devices, disposed at substantially right angles to each other, alternately operative to pick up the top sheet of such a stack of sheets disposed on said supports and to carry such top sheet to a position spaced horizontally from the stack, one of said devices being operative to remove the separator sheets from the stack and the other to pick up and convey the lining sheets, means synchronized with said lining-sheet conveying device to remove the lining sheet therefrom and to convey the same vertically in said horizontally spaced position, and means for causing the sheet to be freed from said vertical conveying means in a position spaced downwardly from the plane of the horizontal movement of said lining-sheet conveying device.

10. In sheet feeding mechanism of the class described, a support for a stack of alternately arranged lining sheets and separator sheets, a pair of horizontally reciprocating vacuum sheet pick-up and conveying devices, disposed at substantially right angles to each other and alternately operative to pick up the top sheet of such a stack of sheets disposed on said support and to carry such top sheet to a position spaced horizontally from the stack, one of said devices being operative to remove the separator sheets from the stack, and the other to pick up and convey the lining sheets.

11. In a sheet feeding device of the class described, the combination of a support for a stack of alternately arranged lining sheets and separator sheets, a pair of horizontally reciprocating sheet pick-up and conveying devices, disposed at substantially right angles to each other, alternately operative to pick up the top sheet of such a stack of sheets disposed on said support and to carry such top sheet to a position spaced horizontally from the stack, one of said devices being operative to remove the separator sheets from the stack and the other to pick up and convey the lining sheets, and means synchronized with said lining sheet conveying device to remove the lining sheets therefrom and to convey the same to a position spaced downwardly from the plane of movement of

said horizontally reciprocating conveying device and there to deposit said lining sheet.

12. In sheet feeding mechanism of the class described, the combination of a support for a stack of alternately arranged lining sheets and separator sheets, a pair of horizontally reciprocating sheet pick-up and carrying devices disposed at an angle to each other so as to be respectively operative to convey sheets to horizontally spaced positions relative to each other and to said support, said pair of devices being operative in paths of movement extending transversely to each other and being alternately operative to pick up the top sheet of a stack of sheets on said support and to convey such top sheet to said horizontally spaced positions, one of said devices being operative to remove the separator sheets from the stack and the other to pick up and convey the lining sheets.

13. In a sheet feeding device of the class described, the combination of a support for a stack of alternately arranged lining sheets and separating sheets, means for successively removing the separating sheets from the top of such a stack disposed on said support, said means being operative to deposit such sheets in a pile spaced horizontally from said stack, means for successively picking up the lining sheets from the top of such a stack and conveying the same to a position spaced horizontally from the stack in a direction extending transversely of the direction in which said separating sheets are removed, and means for alternately actuating said separator sheet and lining sheet removing means.

14. In a sheet feeding device of the class described, the combination of a support for a stack of alternately arranged lining sheets and separating sheets, means for successively picking up and conveying away the separating sheets from the top of such a stack of sheets disposed on said support, and reciprocating means operative alternately with said separating sheet removing means, to successively pick up the lining sheets from the top of such a stack and to convey the same to a position spaced horizontally from the stack in a direction extending transversely of the direction in which said separating sheets are removed.

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