

March 17, 1942.

W. T. BAILEY

2,276,683

APPARATUS FOR FEEDING SHEETS

Filed May 9, 1940

8 Sheets-Sheet 1

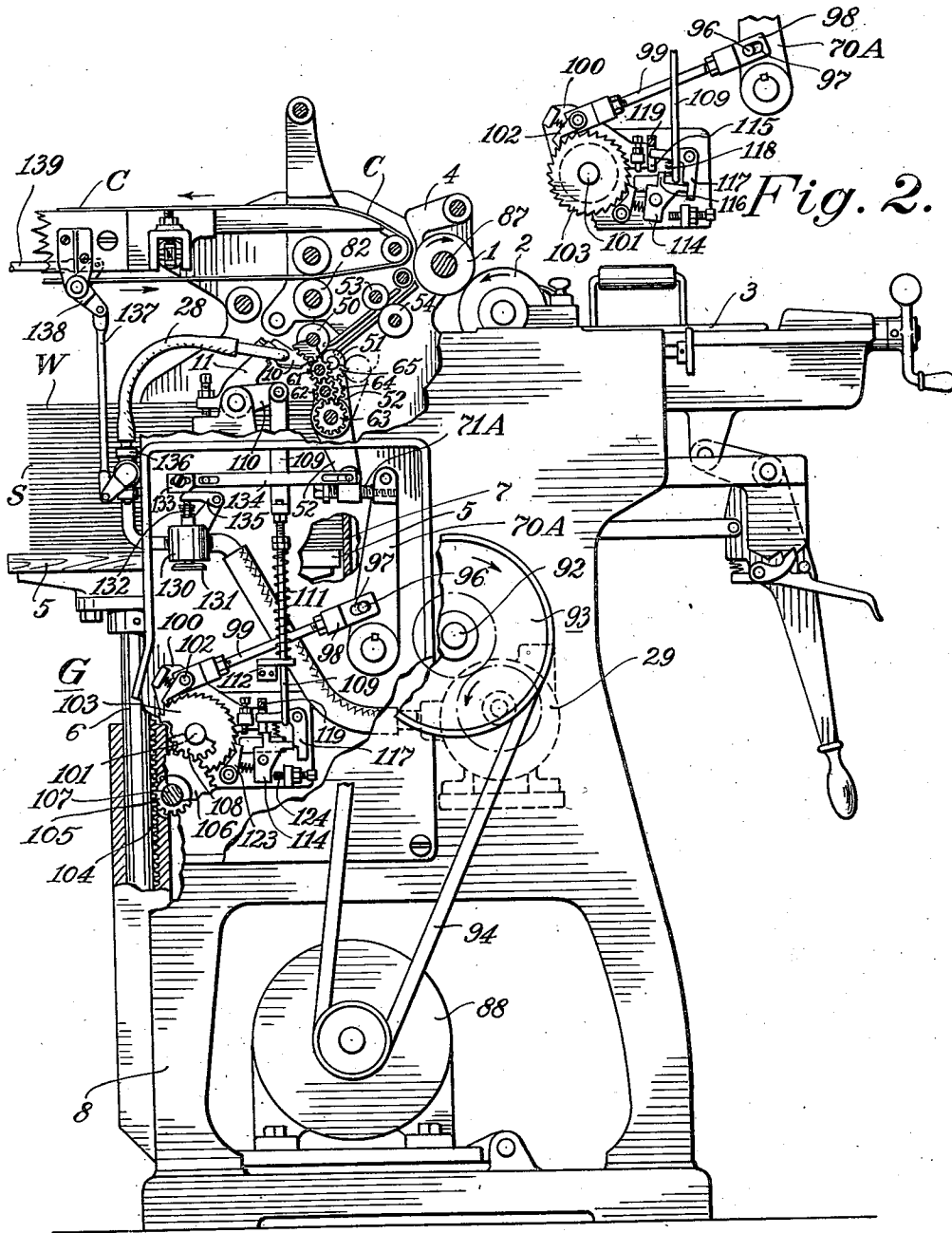


Fig. 1.

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8 Sheets-Sheet 2

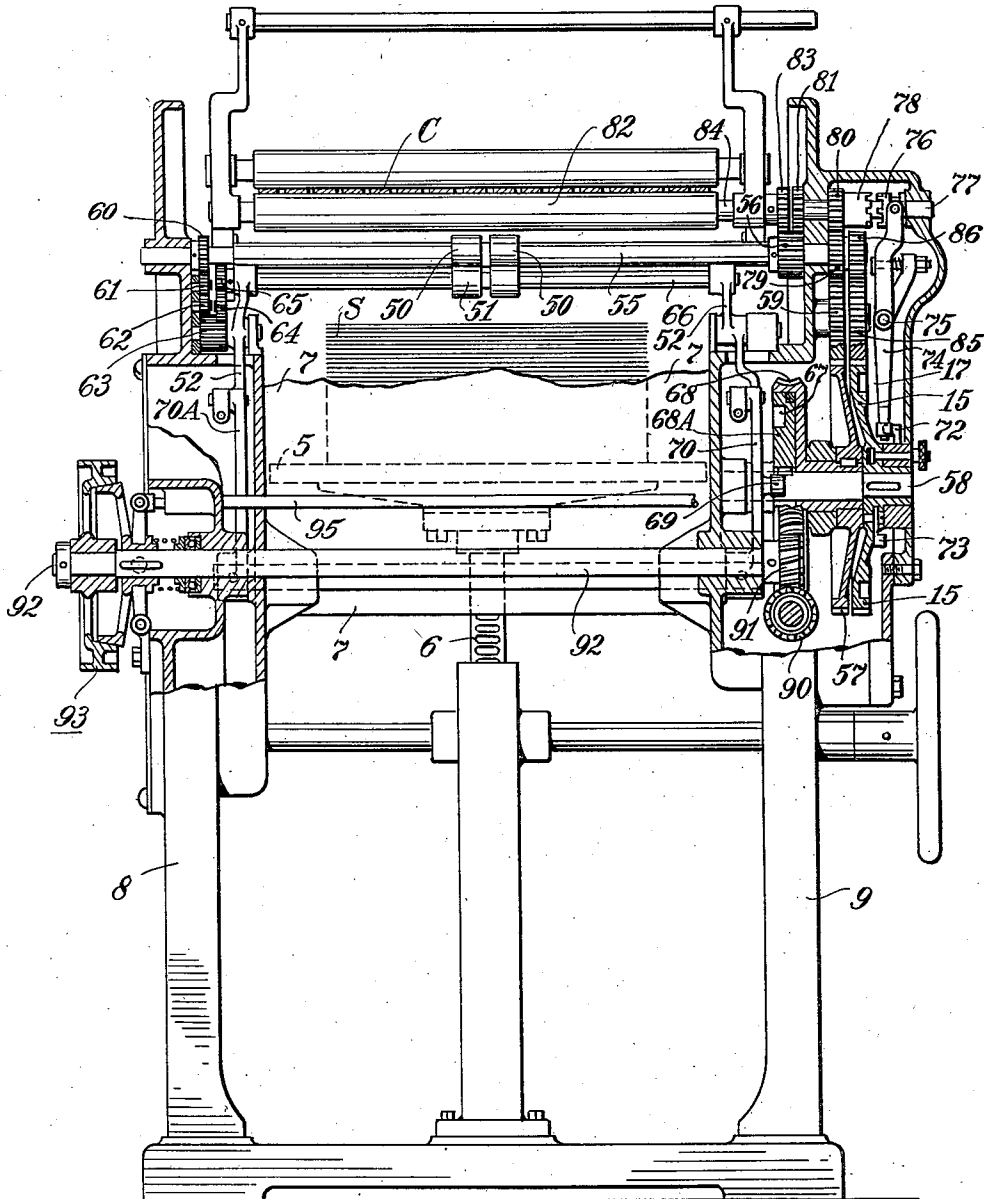


Fig. 3.

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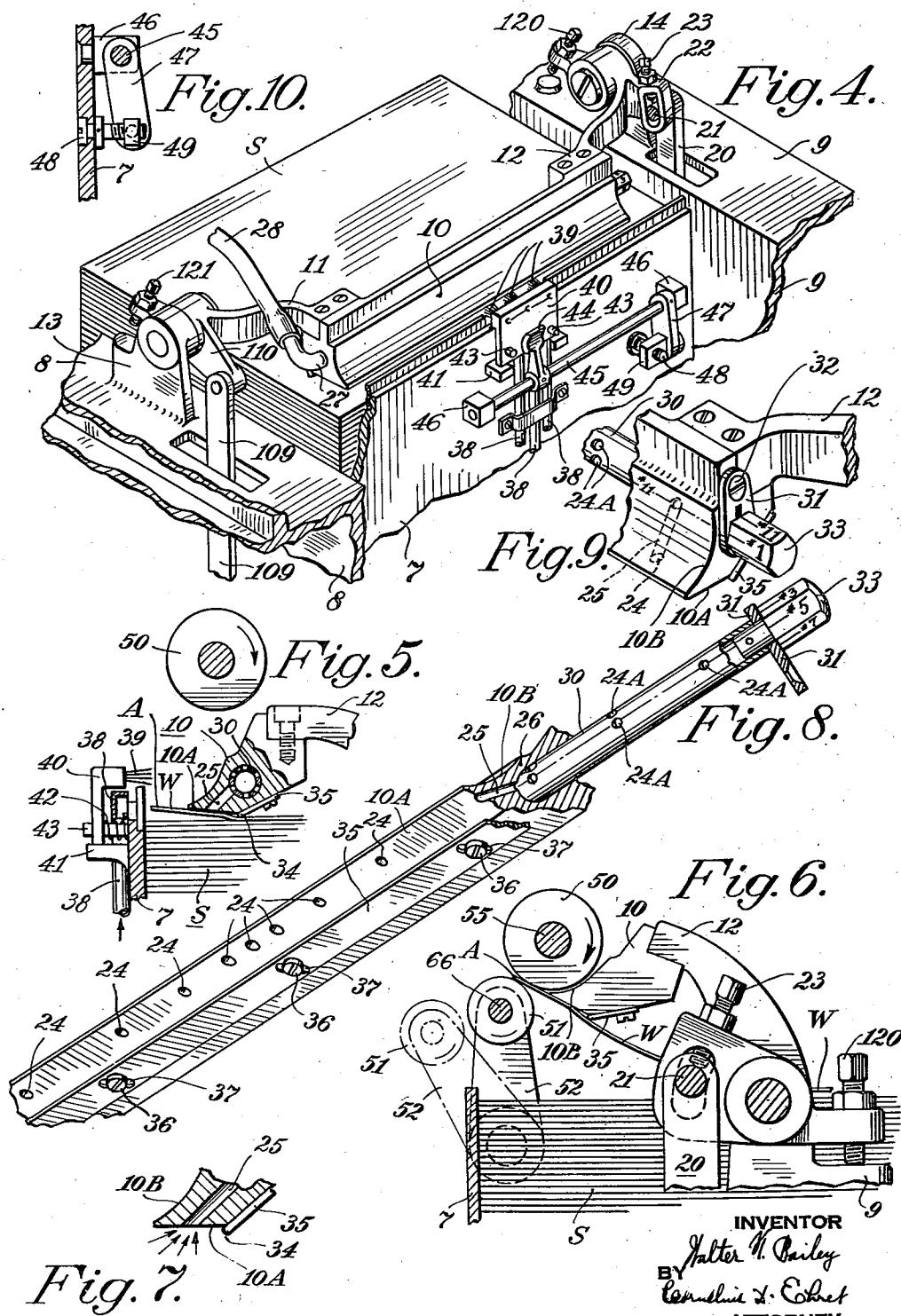
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8 Sheets-Sheet 4

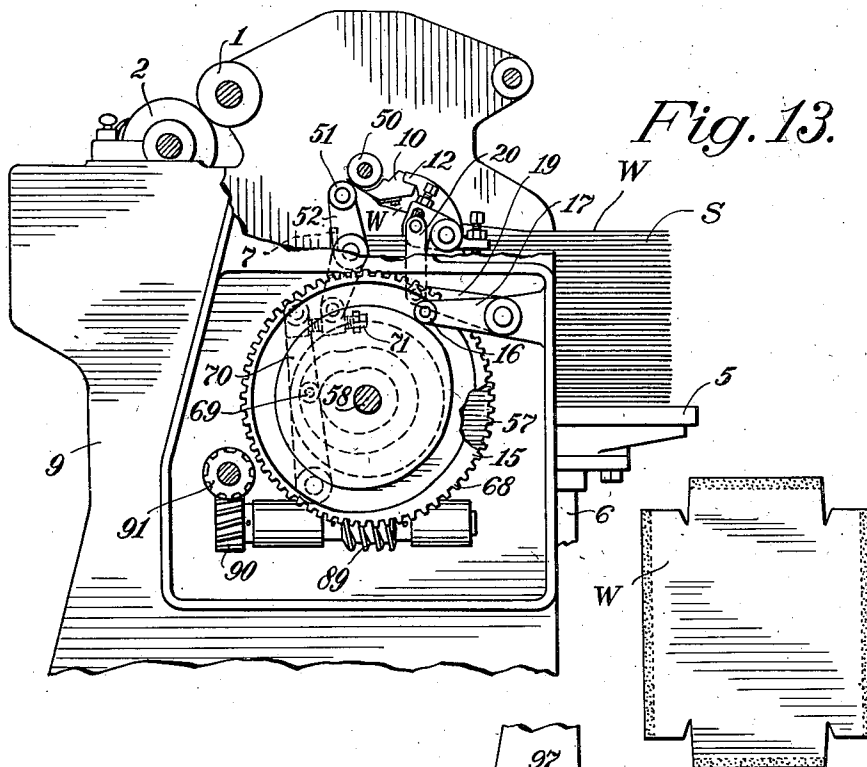


Fig. 13.

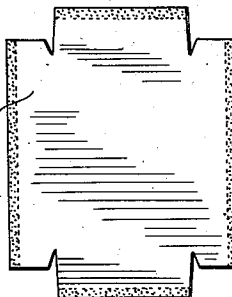
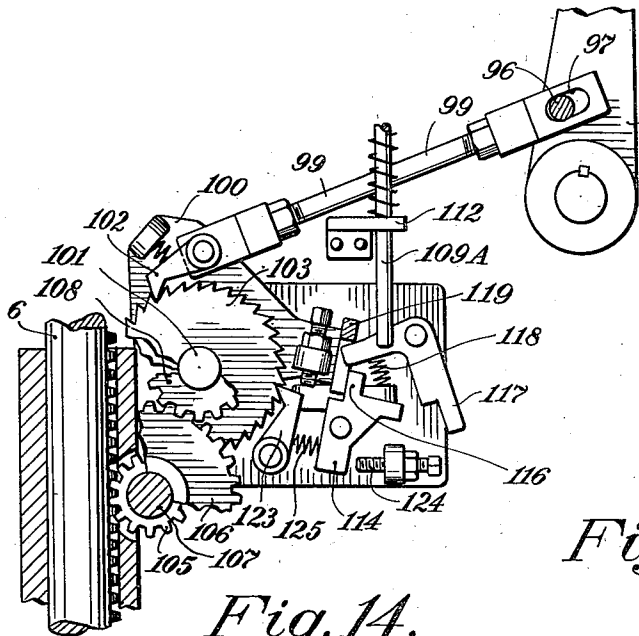


Fig. 11.



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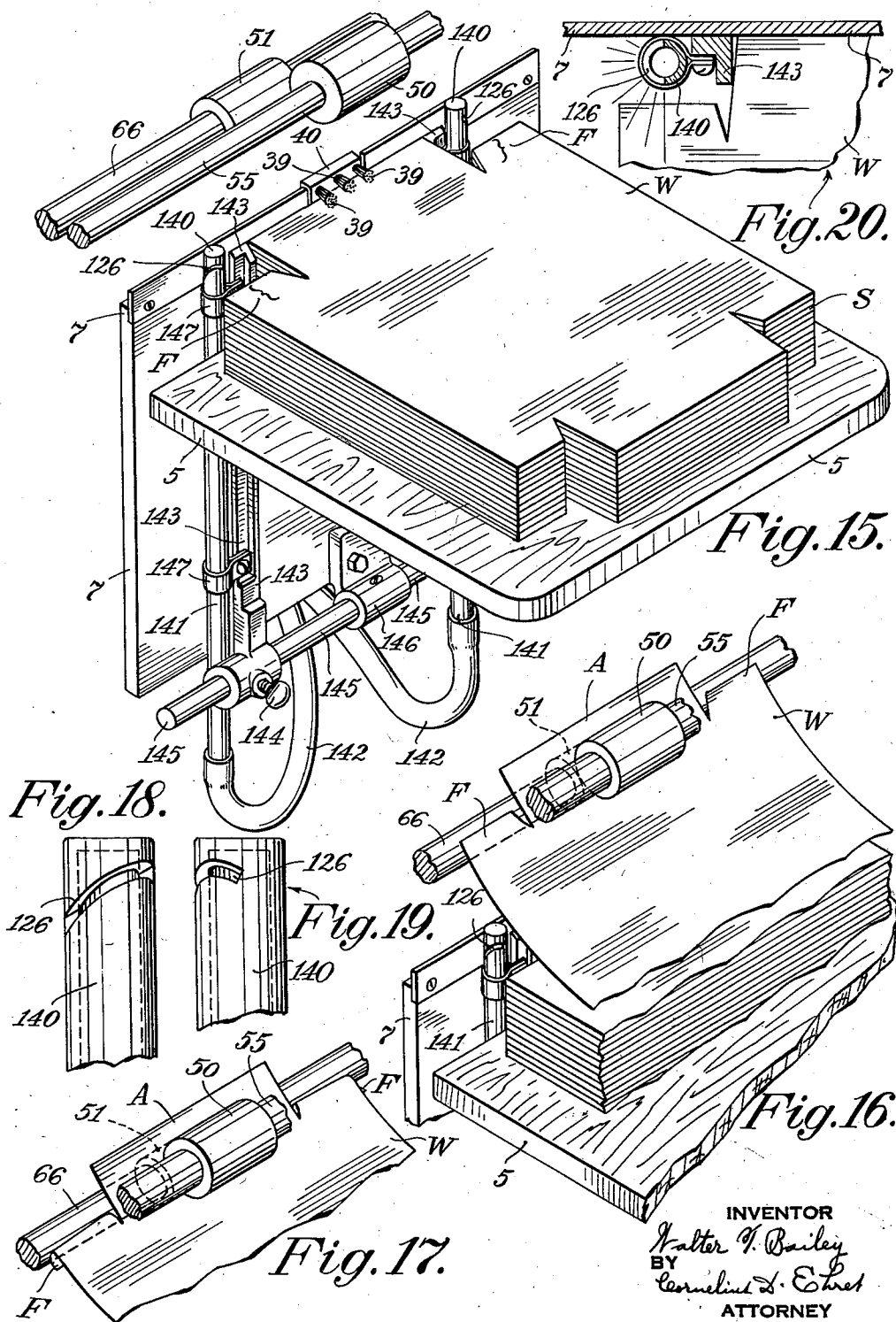
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Fig. 22.

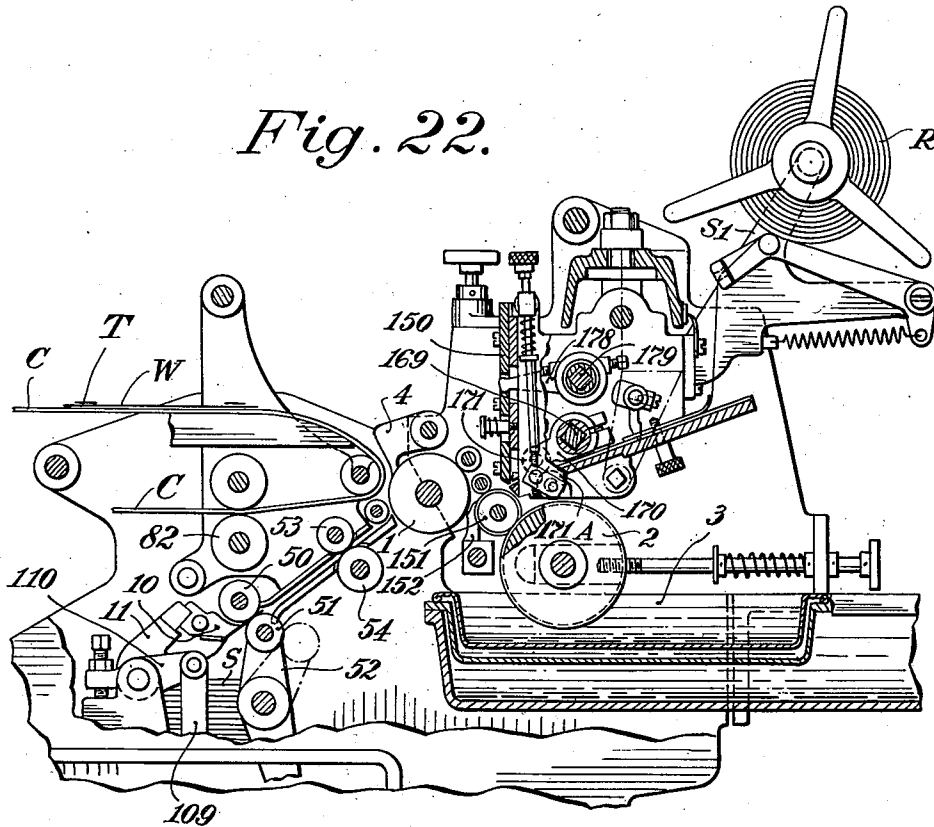


Fig. 21.

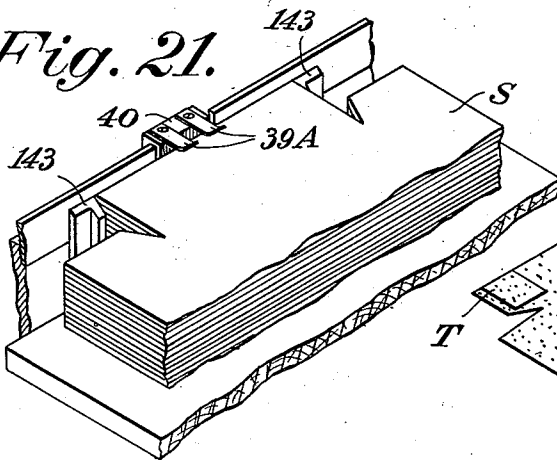
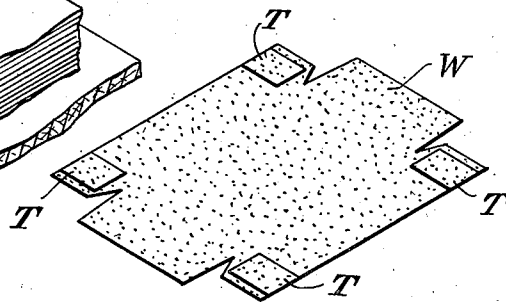


Fig. 25.



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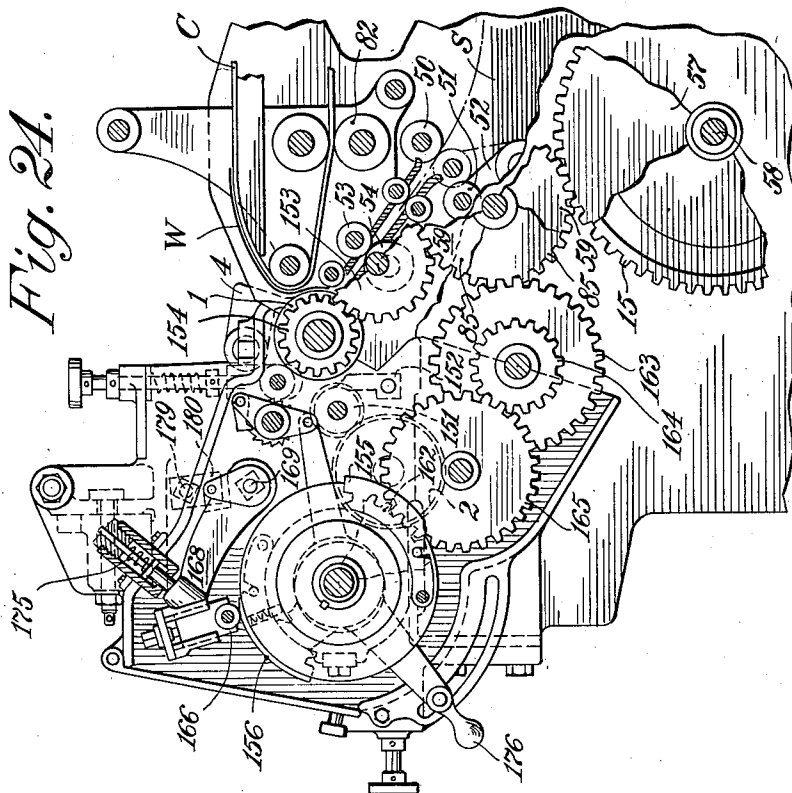
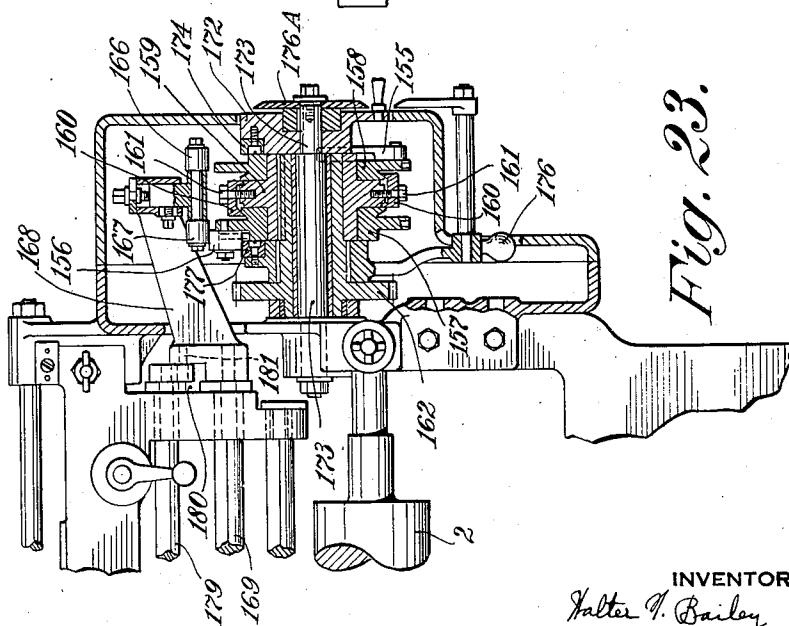
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8 Sheets-Sheet 7



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Fig. 26.

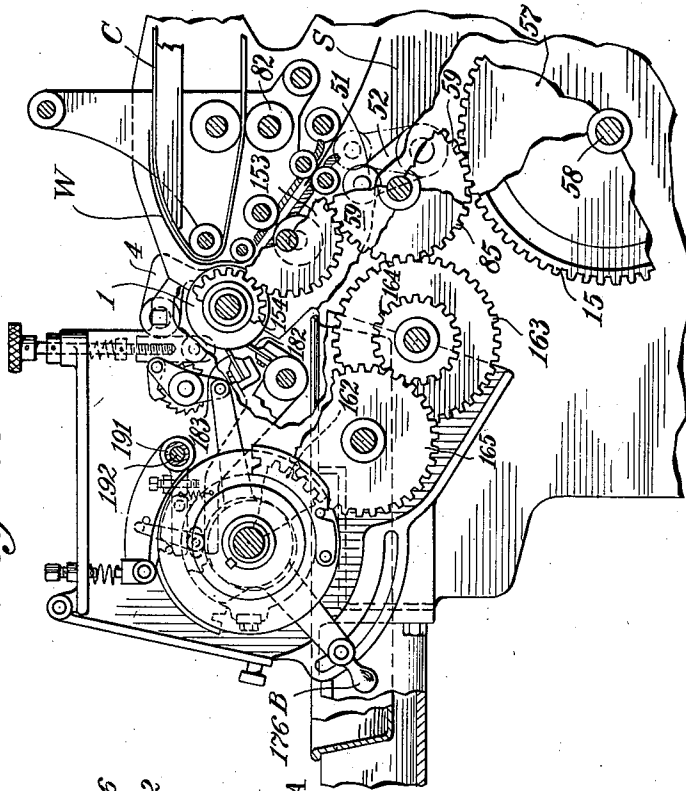
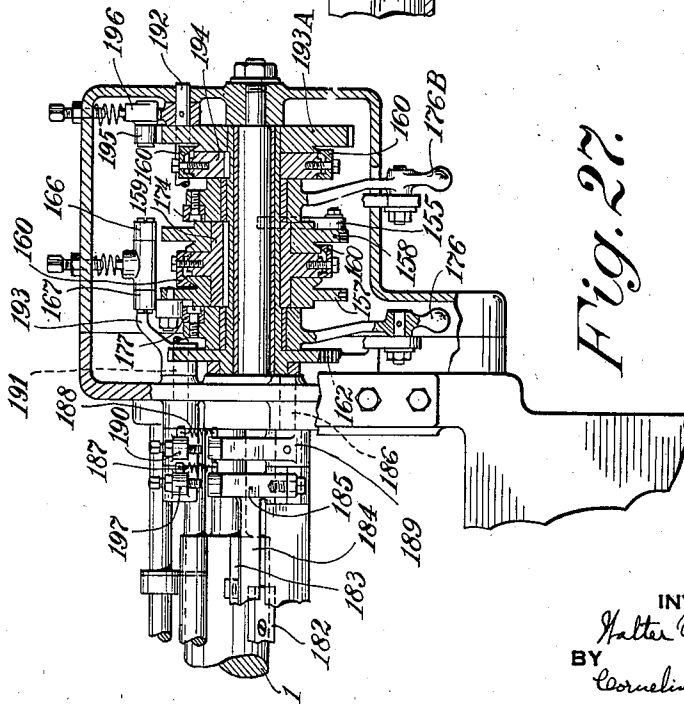


Fig. 27.



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UNITED STATES PATENT OFFICE

2,276,683

APPARATUS FOR FEEDING SHEETS

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Application May 9, 1940, Serial No. 334,149

18 Claims. (Cl. 271—31)

My invention relates to apparatus for separating sheets, particularly wrappers, labels, and the like, and feeding them in succession from a stack.

In accordance with one aspect of my invention, the separation of the sheets is effected by a suction head which oscillates between an end of the stack and a feeding element, for example a feed roll, and which for each oscillation separates or lifts an end of a sheet from the stack and holds it adjacent the feed roll until pressed by the feed roll against a second feed roll; more particularly, the second feed roll or element moves away from the first roll during movement of the suction head toward it to avoid obstruction to separation of the sheet from the stack, and moves toward the first feed roll to clamp the sheet between them before return movement of the suction head toward the stack; preferably, movement of the suction head beyond the normal or desired position of the end of the stack is utilized to control, as by tripping of a latch, operation of mechanism which feeds the stack during its depletion to maintain said end thereof at a predetermined level or position.

Further in accordance with my invention, to insure proper feed of corner-notched wrappers, there are disposed within recesses of the front edge of the stack of corner-notched sheets, means providing for blasts of air directed outwardly and away from the sides and aforesaid end of the stack so to preclude, during aforesaid movement of the wrapper by the suction head toward the feed rolls, curling or folding of those wrapper panels which because of the corner-notching are too short to be engaged by the suction head.

In accordance with another aspect of my invention, a suction head for separation of sheets from a stack, comprises a member having in its sheet-engaging surface a plurality of ports, various combinations of one or more of which may selectively be placed in communication with a source of suction by a perforated sleeve, or equivalent, rotatable within said member and serving as a valve between the ports and the source of suction; more particularly, each of the suction passages to the ports is at acute angle to said sheet-engaging surface, which is arrested before contact with the stack by a projection along the rear edge of said surface, to effect withdrawal of the end of the sheet from a guide-plate, or equivalent, at the corresponding edge of the stack.

My invention further resides in the features of construction, combination, and arrangement hereinafter described and claimed.

For an understanding of my invention, and for illustration of preferred constructions embodying it, reference is made to the accompanying drawings in which:

Fig. 1 is a side elevational view, partly in section, with parts broken away, of a wrapper feeding mechanism;

Fig. 2 is a detail view showing the parts of stack-feeding mechanism shown in Fig. 1 in another operating position;

Fig. 3 is a front elevational view, partly in section and partly broken away, of the machine shown in Fig. 1;

Fig. 4, in perspective and on an enlarged scale, shows sheet-separating mechanism appearing in Fig. 1;

Figs. 5, 6 and 7 are fragmentary views referred to in description of the sheet-separating mechanism of Fig. 4;

Fig. 8 is a perspective view, partly in section and with parts broken away, of a suction head shown in Fig. 4;

Fig. 9 is a fragmentary view of the suction head;

Fig. 10 is an end elevational view of parts shown in Fig. 4;

Figs. 11 and 12 are plan views of different types of wrappers discussed in the following specification;

Fig. 13 is a side elevation of part of the machine shown in Fig. 1, as viewed from the opposite side thereof;

Fig. 14, on an enlarged scale, illustrates the stack-feeding mechanism of Fig. 2 with the parts in different operating position;

Fig. 15, in perspective, shows a modification of elements shown in Fig. 1;

Figs. 16 and 17 are perspective views discussed in explanation of the operation of Fig. 15;

Fig. 18 is a side elevational view on enlarged scale of one of the air blast members of Fig. 15;

Fig. 19 is a front elevational view of Fig. 18;

Fig. 20 is a plan view of parts shown in Fig. 15;

Fig. 21 is a perspective view illustrating a modification of parts shown in Fig. 4;

Fig. 22 is a side elevational view, partly in section and with parts omitted, illustrating tabbing mechanism;

Fig. 23 is an end elevational view, partly in section, of control devices for the tabbing mechanism of Fig. 22;

Fig. 24 is a side elevational view, partly broken away, of mechanism shown in Figs. 22 and 23;

Fig. 25 shows a tabbed wrapper in perspective;

Fig. 26 is a side elevational view, partly in section and with parts broken away, of selective gluer mechanism;

Fig. 27 is an end elevational view, partly in section, of parts appearing in Fig. 25.

Referring particularly to Figs. 1 and 2, the machine G, generally of the type shown in Nitsch Patent 1,684,741, comprises mechanism for feeding wrappers W in succession from a stack S thereof into engagement with a roller 1 coated with adhesive transferred thereto from roller 2 whose periphery dips below the surface of a body of adhesive within the pan 3. The wrappers having one face in part, or wholly, coated with adhesive are deflected by the stripper blades 4 onto a conveyor C, preferably of the suction type disclosed in Stokes Patent 1,701,317 or Davis Patent 1,818,198, which may, for example, transport them to an assembly station at which boxes or box blanks are disposed thereon, either automatically or manually, in the intervals between successive feeding movements of the conveyor.

It is important in such case that the successive wrappers occupy the same position at the assembly station, or in other words, each of the wrappers at the end of a step of the conveyor should be in a predetermined position. Heretofore, re-registering devices have been required to effect such alignment because in the previous machines the wrappers were not rigidly controlled throughout their movement from the stack to the assembly station.

Rigid control of the position of the wrappers is also of paramount importance when tabs are to be applied thereto, as by mechanism of the type shown in Rider Patent 1,857,260; otherwise, the tabs are not applied to the wrappers in the proper or desired locations.

Rigidity of control is also of importance when the adhesive is to be applied to the wrappers in predetermined patterns, for example in narrow stripes along the edges, Fig. 11, as by mechanism shown in Rider Patent 1,932,989.

With previous types of sheet-separating and feeding mechanisms, the wrappers were momentarily out of positive control during their transfer from the member which lifted them, or a portion thereof, from the stack, to the feed rolls, or equivalent feeding devices, which moved the sheet bodily from the stack. As will hereinafter more fully appear, it is a feature of my construction that each sheet, from the time it is engaged by a separating member and until it has been bodily removed from the stack, is under positive control so dispensing with need for re-registering mechanisms when the conveyor C transports them to an assembly station, and so insuring proper register of wrappers for operation thereon of a selective gluing mechanism, or a tabbing mechanism, such as shown in the aforesaid Rider patents.

Referring to Figs. 1 and 2, the stack of sheets S is disposed upon a table 5 supported by the vertically movable column 6 associated with mechanism hereinafter described for maintaining the top of the stack at a predetermined level. The forward end of the stack, Fig. 4, abuts against a vertical guide plate 7 extending between the side frame members 8 and 9 which may serve as guides for sides of the stack. The suction head 10 for engaging the top sheet of the stack adjacent its forward or right hand edge, Fig. 4, is supported by the arms 11, 12 pivotally mounted upon the brackets 13 and 14

extending upwardly from the side frames 8 and 9 respectively.

Movement of the suction head 10 toward and from the stack is controlled by cam 15, Figs. 3 and 13, having a cam groove for receiving the cam follower 16 carried by arm 17 secured to shaft 18 to which is also secured arm 19 pivotally connected to the lower end of link 20, Figs. 4 and 13. From the upper end of link 20 extends pin 21 having lost motion connection with arm 12 afforded by the slotted extension 22. During upward movement of link 20, the pin 21 engages adjustable stop 23 and for its further upward movement raises the head 10 away from stack S, Fig. 6. When link 20 moves downwardly, the suction head 10 follows, under the influence of gravity or other bias, until it meets and is arrested by the top of the stack whereupon for further movement of link 20 the pin 21 moves downwardly away from stop 23.

The sheet-engaging face 10A of the suction head 10, as most clearly shown in Fig. 8, is provided with a plurality of ports 24 each connected by an individual passage 25 to the cylindrical suction chamber 26 extending from one end to the other of member 10, and at the left hand end, Fig. 4, connected, as by coupling 27 and hose 28, to a source of suction, for example pump 29, Fig. 1.

To permit use of the same suction head for wrappers of various widths, with sufficient number of openings to insure separation of large sheets and yet without loss of suction when the same head is used for narrow sheets, there is provided a valve member 30 in the form of a sleeve snugly fitting the bore of chamber 26 and having therethrough angularly spaced rows of holes 24A; the holes of each row are spaced axially of the valve member 30 each to register with one of the passages 25 through the suction head. The number of holes in the different rows suitably vary so that by rotation of the sleeve 30 suction may be applied to any desired group of ports 24. The sleeve 30 is held in proper axial position with respect to suction head 10 by the bearing plate 31 suitably attached as by screw 32 to the suction head. The member 33 serves as a plug for the end of the valve member 30, and by its cooperation with plate 31, as a bearing therefor. It also serves as a manually adjustable knob for setting the valve member 30 to any desired position and to facilitate such setting, the member 33 may be provided with, or serve as, a scale.

With the particular construction shown, when the member 33 is in the #1 position, suction is applied only to the central port and the head 10 is thus adapted to feed wrappers of the type shown in Fig. 12 suited for narrow deep boxes; when in the #3 position, suction is applied to the three central ports, and for each of the succeeding positions, an additional pair of ports, one on either side of center is added to those in communication with the suction chamber, thus for the progressively higher settings of the valve 30, the suction head 10 is adapted to operate upon wider and wider sheets. The particular machine shown is suited to feed sheets or strips as narrow as three-fourths of an inch or as wide as twenty-five inches.

Preferably, as shown in Fig. 5, actual engagement of the face 10A of the suction head does not occur while the sheet is still flat in the stack; such engagement is prevented by the shoulder 34 integral with member 10 or, as in the preferred

construction shown, afforded by the plate 35, adjustably secured to the suction head 10 by the screws 36 which pass through slots 37 in plate 35, Fig. 8.

With this construction, the area A of the top sheet, between its edge and the line of engagement with the shoulder 34, concurrently with its swinging movement toward the face 10A of the suction head, is drawn back from the front edge of the stack so insuring separation of the front edge of the top sheet from the corresponding edge of the next lower sheet or sheets.

This drawing back of the edge of the top sheet is enhanced or contributed to by drilling or otherwise forming the passages 25 so that instead of being normal to the face 10A they are inclined toward the front edge of the stack, Figs. 5 and 7. For optimum results with substantially different types and grades of paper, it may be necessary to adjust the plate 35 in effect to increase or decrease the extent to which the shoulder 34 projects beyond the face 10A. The construction shown is suited to feed sheets of thickness ranging from about .001"—paper, Cellophane, or the like—to that of fairly heavy cardboard.

To insure separation of only a single sheet at a time from a stack, there are preferably provided air blasts directed across the top of the stack toward its rear edge of the stack; in the particular arrangement shown in Figs. 1-14, these air blasts issue from the pipes 38 connected, for example, to the high pressure side of pump 29. As additional or supplemental means for insuring separation of only a single sheet, there are provided the brushes 39 supported by plate 40 which rests upon ledge 41 extending rearwardly from plate 7 and is biased away from the stack by the springs 42 encircling the pins 43 which pass through plate 40. The rear of the plate 40 is engaged by arm 44 attached to shaft 45 supported in brackets 46 extending rearwardly from plate 7 and to which is secured arm 47, Figs. 4 and 10. The position of the brushes 39 with respect to the front edge of the stack can be adjusted from the front of the machine by turning the threaded member 48, which extends through, and is supported by, plate 7, and which, to the rear of plate 7 threadably engages the block 49 pivotally mounted on the aforesaid arm 47.

As more clearly shown in Figs. 5 and 6, the suction head 10 engages an area of the top sheet of the stack, which is somewhat removed from the forward edge, so leaving a projecting area A which, when the suction head is lifted from the stack by cam 15, is positioned, Fig. 6, in contact with or closely adjacent the feed roll 50.

As shown in Figs. 5 and 6, the sheet-engaging face 10A of head 10 and its face 10B presented to the upper feed roll 50 extend at a sharp angle away from the area A of the sheet, so to insure, when the suction head is in its upper position, contact between the feed roll 50 and the sheet W as close as possible to the face 10A; preferably, the face 10B is so shaped that when the head is in the upper position, Fig. 6, the periphery of the roll 50 and the face 10B are substantially concentric.

The spacing between the periphery of roll 50 and face 10B for the upper limit of movement of the head 10 is preferably very small, for example less than .01". Close adjustment of this spacing can be effected by varying the setting of the adjustable stops 23, 120 and 121. Stops 120 and 121, or equivalent, are necessary because otherwise, there being no rigid connection between arms 12 and 20, the suction head would,

due to its inertia, at end of the upstroke of arm 20, strike roll 50 and perhaps bound back and forth between limits determined by roll 50 and the stop 23.

Before release of the sheet W from the suction head 10, a second feed roll 51 carried by arm 52 is swung to its full line position shown in Fig. 6, so to clamp the forward end A of the sheet between the two feed rolls. Before the trailing end of the sheet has passed between the feed rolls 50 and 51, its leading edge passes between the second pair of feed rolls 53, 54, Fig. 1, and before the trailing end of the sheet has passed the second pair of feed rolls, its forward portion has been deflected from the adhesive-applying roll 1 onto the receiving end of the suction conveyor C. It is thus insured the wrapper W has a definite position at every instant in the cycle of the sheet-separating and feeding mechanism, and so has a definite position with respect to any other synchronized mechanism, such as the aforesaid selective gluer or tabbing mechanism, intended to operate upon it at a definite time in its cycle.

The feed roll 50 is supported by shaft 55 extending between the side frames 8 and 9 of the machine and to the right hand end of which, Fig. 3, is secured gear 86 driven from gear 15 on the one-cycle shaft 58 through gear 85. To the left-hand end of shaft 55 is attached gear 60 for driving the lower, or oscillating, feed roll 51 through the train of gearing including gears 61-65. Gear 63 is mounted concentrically, Figs. 1 and 3, with the pivotal axis of the arms 52 which support the shaft 66 of roll 51 so to maintain driving engagement between the shafts 55 and 66 as the lower feed roll 51 is moved toward and away from the upper feed roll 50.

The rocking movement of the supporting arms 52 of feed roll 51 is controlled by a cam groove 67 of driven clutch member 68A attached to the one-cycle shaft 58. The cam follower 69, received by groove 67, is supported by arm 70, Figs. 3 and 13, pivoted at its lower end to side frame 9 of the machine, and connected at its upper end to one arm of one of the bell crank levers 52. The connection between arm 70 and lever 52 is preferably an extensible one, such as afforded, for example, by the threaded member 71, so to permit adjustment of feed roll 51 to suit papers of different thicknesses or finishes.

The other bell crank lever 52, for supporting the left-hand end of shaft 66, Figs. 1 and 3, is similarly connected by another adjustable link 71 to arm 70A pivotally secured at its lower end to the side frame.

The timing of the movement of conveyor C is controlled by the abutments 72, 73, Fig. 3, which, during each cycle of the mechanism G, alternately engage the lower end of lever 74 pivoted intermediate its ends at 75 to the frame member of the machine, and at its upper end provided with a yoke received by the groove in driven clutch member 76 slidably keyed to the stud shaft 77. When the lever 74 is swung in counterclockwise direction by abutment 73, the driven clutch member 76 is moved into engagement with the driving clutch member 78 loosely mounted on shaft 77 and continuously driven from gear 68 through gears 57, 59, 79 and 80. Upon such engagement, shaft 77 is rotated to effect rotation of shaft 84 of conveyor drive roll 82 through gear 81 on shaft 77, gear 56 loose on shaft 55 and gear 83 attached to shaft 84 of roll 82.

When the clutch control lever 74 is swung in clockwise direction by its engagement with abut-

ment 72, the clutch members 76 and 78 are disengaged, so to interrupt movement of the conveyor belt C at a predetermined time in the cycle of the machine. Because of aforesaid continuous control of the sheets W, each of them, at the end of a stepping movement of conveyor C, occupies the same position as that occupied by the previously transported sheet or wrapper.

The abutments 72 and 73 are angularly adjustable with respect to each other and with respect to the shaft 58 so to adapt the machine to different lengths of wrappers or sheets or to vary the extent of their feed per cycle of the machine.

The adhesive-applying roll 1 is continuously rotated by the train of gearing including gears 57 and 59.

The motor 88 for driving the conveyor C, the sheet-separating and feeding mechanism, and the adhesive-applying roll 1, is connected to shaft 58 through driven clutch member 68A, gear 68, Figs. 3 and 13, worm 89, spiral gears 90 and 91, shaft 92, clutch 93, and belt 94. The rod 95 for effecting engagement and disengagement of the elements of clutch 93 may be controlled manually. The clutch comprising gear or driving clutch member 68 and driven clutch member 68A includes a dog or latch, not shown, which may be released manually, or automatically as by a box-wrapping machine, to initiate the cycle of the sheet-feeding machine G, and which is reset at the end of the cycle by stop, not shown, retractable, as aforesaid, to initiate the next cycle.

The suction head 10, in addition to separating sheets from the stack S, is utilized, as now described, to control upward feed of plunger 6, Fig. 1, to maintain the top of the stack at a predetermined level. The arm 70A, Figs. 1 and 14, is provided with a pin 96 received by slot 97 in block 98 secured to one end of link 99 whose other end is pivotally secured to a frame 100 oscillatable about the axis of shaft 101. The pawl 102 pivotally mounted upon member 100 is adapted to engage the teeth of ratchet 103 on shaft 101. The rack 104 cut in the supporting column 6 for stack S is in driving engagement with shaft 101 through the train of gearing including gears 105 and 106 on shaft 107 and gear 108 on shaft 101.

With member 100 locked in the position shown in Fig. 1, the pin 96, during its angular reciprocation with arm 70A, merely rides back and forth in slot 97; when, however, the member 100 is released, as hereinafter described, for movement in clockwise direction by spring, or other, bias, the arm 70A through its pin 96 effects reciprocation of the link 99 and so causes rotation of shaft 101 in counter-clockwise direction, Fig. 1, with consequent upward movement of the stack supporting plunger 6. The pawl 123 prevents reverse rotation of shaft 101.

The release of member 100 to initiate the stack-feeding movement is controlled by the suction head 10. Referring to Figs. 1 and 4, the tripping member 109 is pivotally connected at its upper end to an extension 110 of the supporting arm 11 for the suction head. The spring 111 compressed between the bracket 112 extending outwardly from the side frame 8 of the machine and the adjustable stop 113 is insufficient fully to overcome the weight of the suction head 10. Consequently, the lowermost position of the member 109 in each cycle of the machine depends upon the plane of the top sheet of the stack. So long as the level is correct or not too low, the suction head 10 is arrested by the stack with the lower end of tripping member 109

out of engagement with the latch member 114 which is biased to its latched position against adjustable stop 124 by spring 125.

When, however, the stack has been sufficiently depleted, the suction head 10, before its downward movement is interrupted by the stack, effects, through the tripping member 109, movement of latch 114 from the position shown in Fig. 1 to the position shown in Fig. 2. With the abutment 115 of member 100 no longer engaged by the abutment 116 of latch 114, member 100 is free to move, as above discussed, in clockwise direction, to shift link 99 to the right whereupon, arm 70A, during one or more of its subsequent oscillations, effects counter-clockwise movement of member 100 intermittently to raise the stack S.

Latch 114 when tripped is prevented from immediately returning to its original locking position of Fig. 1, when suction member 10 is raised from the stack, by the second latching member 117 biased to the position shown in Fig. 2 by spring 118. During each reciprocation of member 100, its abutment 119 moves secondary latch 117 out of restraining engagement with latch 114, Fig. 14. Thus, after the latching mechanism has once been tripped, it is re-set and re-tripped in every subsequent cycle until the level of the stack has been restored to such height that, when suction head 10 descends, the tripping member 109 does not engage and release the main latch 114.

Preferably, the suction to head 10 is cut off in each cycle of the machine after the projecting area A of the separated sheet has been clamped between the feed rolls 50 and 51. To that end, there is interposed between the suction head and the pump 29, a bleeder valve 130, Fig. 1, whose movable element 131 is biased to closed position, as by spring 132, and is moved to open position by a cam member 133 attached to, or a part of, the rectilinearly reciprocable bar 134, which is slidably connected to the actuating arm 52 of the lower feed roll 51. The cam 133 is so shaped or positioned on bar 134 that substantially at the end of a movement of feed roll 51 toward feed roll 50, the cam 133, through the interposed pivoted arm 135, depresses the stem of the valve member 131 and breaks the suction exerted upon the sheet W now gripped between the feed rolls 50 and 51, so to avoid hindrance by the suction to bodily movement of the sheet from the stack by rolls 50 and 51.

When the mechanism G is controlled, or automatically tripped by a box-wrapping machine, for example, with which it is associated, it is often desirable that the feed of sheets from stack S be discontinued without interruption of the operation of conveyor C. Such interruption of feed of sheets from the stack may be conveniently effected, as shown in Fig. 1, by a valve 136 in the suction line from pump 29 to suction head 10. The movable element of the valve is connected by link 137 and levers 138 to a rod or other control member 139 extending to a position convenient to the operator of the wrapping machine.

When the sheets to be separated from the stack are corner-notched wrappers, Fig. 15, the suction head 10 engages only the central portion of the leading end of the wrapper and there is tendency for the leading wings or flaps F to curl back, Fig. 17, with the result the feed rolls 53 and 54 sharply fold the flaps against the wrapper and so create difficulties arising dur-

ing application of adhesive to the wrapper and in application of the wrapper to a box.

This difficulty is overcome in the modification shown in Figs. 15, 16 and 20 by providing air blasts so directed outwardly and above the top of the stack that the wings F of each sheet, after its separation from the stack, are prevented from curling. These air blasts are provided by the slotted nozzles 140, 140 at the upper ends of the tubes or pipes 141 suitably connected, as by tubing 142, to the exhaust side of the suction pump 29. The slot 126, through which the air issues from each of the heads 140, is, as shown most clearly in Figs. 18 and 19, preferably cut at an angle with respect both to horizontal and vertical planes through the head. As shown in Figs. 15 and 16, the lower end of each slot is adjacent the guide plate 7 for the front of the stack and each slot is directed substantially at right angles to the plate 7 and away from the central portion of the stack. With the slots so cut and directed, there is within and adjacent each of the recesses defined by the front notches of the stacked sheets a turbulent body of air, vapor, or gas, generically termed "air" which assists in the separation of the sheets as they in turn become the top sheet of the stack, and an upwardly directed jet of air moving at higher velocity which resists any tendency of the wings or flaps F, F' of the separated wrappers to curl.

To permit adjustment of the nozzles 140, 140 to accommodate different widths of wrappers, their supporting tubes 141, are suitably attached, as by clamps 147, Fig. 9, to the standards 143 adjustably held, as by set screws 144, to the bar 145 extending substantially parallel to plate 7 to which it is supported by bracket 146. The standards 143 are also preferably used, Fig. 15, as guides to hold the wrappers or stack in properly aligned position.

Instead of the brushes 39 shown in Figs. 4, 5 and 15, there may be, and preferably is used a plurality of resilient fingers 39A, Fig. 21, suitably attached to the adjustable block 40. These fingers may be of rubber or preferably they are of clock-spring steel.

The manner in which my improved sheet-feeding arrangement may be combined with tabbing mechanism such as disclosed and claimed in aforesaid Rider Patent 1,857,260 is shown in Figs. 22, 23 and 24.

The roll 1, Figs. 23-24, applies adhesive to the wrappers removed from stack S and transfers to the wrapper tabs T, Fig. 25, cut from strips S1 of tabbing material. The strips S1 are intermittently fed from rolls R thereof by mechanism herein briefly expalined and fully described in aforesaid Rider patent. Each strip is cut by a knife 150 operating in timed relation to the suction-head 10 and the oscillatable feed roll 51. The tab-transfer roll 151, coated with adhesive, engages the leading ends of strips S1 before the knives 150 descend so that immediately a pair of tabs are cut from the strips S1, the roll 151 moves them toward roll 1 onto which they are deflected by strippers 152.

The tabs are transferred by roll 1 to the wrappers concurrently with application of a coating of adhesive to the wrappers. Because of aforesaid positive or rigid control of the wrappers by my wrapper feeding mechanism, whereby the wrappers or sheets are under positive control from the time they leave the stack until after the tabs are thereto applied, the tabs are applied

exactly at the locations desired and at the same locations on successive wrappers.

The train of gearing for effecting continuous rotation of roll 1 comprises the continuously rotating gear 57, rotatable with gear 68, gear 59, gear 153 and gear 154 attached to the shaft of roll 1.

The lengths of the tabs and their positions upon the wrappers are controlled by the cams 155, 156 pivotally mounted, respectively, upon disks 157, 158 angularly adjustable on hub member 159. The clamping lugs 160 and their bolts 161 are provided to clamp the disks in their adjusted positions on hub 159 which is suitably attached to and rotates with gear 162 intermittently rotated through the train of gearing comprising gears 15, 85, 153, 164 and 165.

The rollers 166, 167 adapted to engage the cams 155 and 156, respectively, are carried by arm 168 attached to shaft 169 to which is secured, in each of the tabbing heads, an arm 170 for supporting a feed-roll 171. Upon counter-clockwise movement of arm 170, Fig. 22, feed-roll 171 descends to press the tab strip S1 against a lower feed-roll 171A. The period of engagement between roller 166 and its actuating cam 155 may be varied by angular adjustment of member 172 about the axis of stud shaft 173. The lower surface of cam 155 rides upon the adjustable stop 174 suitably secured to the inner face of member 172. Movement of arm 168 to separate the tab-feeding rolls, as roll 166 or 167 passes off its respective cam, is effected by spring 175. The index plate 176A clamped to the end of shaft 173 indicates the position of stop 174. Similarly, the period of engagement between roller 167 and cam 156 may be varied by movement of actuating handle 176 connected to the stop-supporting member 177 freely rotatable on the hub portion of gear 162.

The interval between actuations of arm 168 in a cycle of the machine and, therefore, the spacing of tabs along a wrapper is varied by changing the relative angular positions of cams 155, 156 upon hub member 159. The length of the tabs is varied as above described.

Each of the knives 150 descends concurrently with lifting of the associated upper feed-roll 171 from one of the strips S1. The operating arm 178 for a knife is attached to shaft 179 to an end of which is secured a U-shaped member 180 which straddles pin 181 extending from rocker arm 168 controlled by cams 155, 156.

For more detailed explanation of the operation of the tab-cutting and feeding mechanism, reference is made to aforesaid Rider Patent 1,857,260.

The manner in which my sheet-feeding mechanism is combined with the selective gluer mechanism of aforesaid Rider Patent 1,932,989 is shown in Figs. 26 and 27, in which scraper blades 182, 183, operated as herein briefly described, remove adhesive from roll 1 to leave thereon a desired pattern of adhesive to be transferred to a wrapper fed from stack S by the mechanism shown in Figs. 1-20. The rigid control by the feeding mechanism of each wrapper from the inception of its separation from the stack until and during its engagement with roll 1 insures proper location of the desired pattern of adhesive upon each wrapper; see for example, Fig. 11.

The upper scraper member 183 is attached to a bar 184 extending substantially parallel to the periphery of roll 1 and having at its ends supporting arms 185 loosely received by shaft 186.

The scraper 183 is biased toward engagement with roll 1 by spring 187. The lower scraper member 182 is attached to shaft 186 and is biased toward engagement with roll 1 by spring 188 connected between arm 189 attached to shaft 186 and arm 190 attached to sleeve 191 on shaft 192. The arm 193 attached to sleeve 191 supports roller 166, 167 coacting with cam 155, 156 pivotally mounted upon disks 157, 158 clamped in desired angular relation to hub member 159 rotatable with gear 162.

The period of engagement between roller 167 and cam 156 for each cycle of the machine may be varied by angular adjustment of stop 177 operable by handle 176. Similarly, the period of engagement between roller 166 and cam 155 may be varied by angular adjustment of stop 174 operable by handle 176B. The setting of the cams with respect to each other and to the hub 159 determines when and for how long the scraper blade 182 engages the adhesive-coated roll 1 during each cycle of machine G.

The movement of the upper scraper blade 183 is controlled by cam 193A, of suitable configuration, clamped in desired angular relation to hub member 194 rotatable with gear 162. Cam 193A engages roller 195 on arm 196 attached to one end of shaft 192 to which is also secured the arm 197 between which and arm 185 of the scraper bar 183 the spring 187 is connected.

For the operation and construction of the scraper-actuating mechanism and of the provision for procuring various patterns of adhesive, reference is made to aforesaid Rider Patent 1,932,989.

What I claim is:

1. Apparatus for feeding sheets from a stack comprising a sheet-separating member including shoulder structure for engaging and extending across an end sheet of the stack at a distance from an edge of the sheet and means for bending along said shoulder structure that portion of the sheet between its said edge and said shoulder structure and holding said bent portion of the sheet to said member, means for moving said member away from said stack to separate therefrom at least said portion of said sheet, and sheet-feeding means for clamping upon said bent portion of the sheet while it is held to said member.

2. Apparatus for feeding sheets from a stack comprising a suction member, shoulder structure projecting beyond said suction member for engaging and extending across an end sheet of the stack at a distance from an edge of the sheet, means for moving said member away from said stack to separate therefrom at least that portion of said sheet, between its said edge and said shoulder structure, bent along the shoulder structure by the suction, and sheet-feeding means for clamping upon said bent portion of the sheet while it is held by the suction to said member.

3. Apparatus for feeding sheets from a stack comprising a member for engaging and extending across an end sheet of the stack at a distance from an edge of the sheet and having a plurality of spaced ports, means for applying suction through said ports, means for moving said member away from said stack to separate therefrom at least that portion of said sheet, between its said edge and the member, held by the suction to said member and feed rolls for clamping upon said portion of the sheet while it is held by said member.

4. Apparatus for transferring and feeding sheets comprising a feed roll, a transfer member for engaging and holding a sheet, and means for moving said member to effect engagement between said roll and said sheet, the sheet-engaging face of said member and the face thereof presented to said roll extending from an edge of said member at an angle which is sharp to provide for engagement between said roll and sheet close to said edge.

5. Apparatus for transferring and feeding sheets comprising a feed roll, a movable transfer member having a flat face for engaging a sheet and an adjacent concave face, and means for moving said member to position its concave face substantially concentric with said roll and its flat face substantially tangent to said roll.

6. Apparatus for feeding sheets from a stack comprising a movable member having an elongated sheet-engaging face having one or more ports, means for moving said member to bring said face thereof to an inclined position short of contact with the end sheet of said stack, means supplying suction through said ports to an area of said sheet to swing it against said inclined face, and structure forming an elongated projection from said surface for engaging said sheet adjacent said area thereof and co-operating with the applied suction to effect rectilinear displacement of said entire area as it is swung toward said face.

7. Apparatus for feeding sheets from a stack comprising a member having a sheet-engaging face movable to a position short of contact with the end sheet of said stack adjacent an edge of the sheet, said member having one or more passages inclined toward said edge of said stack, means for supplying suction connected to said passages to draw an area of said sheet against said face, and structure engaging said sheet adjacent said area and co-operating with the suction applied through said inclined passages to effect rectilinear displacement of said area from said edge of the stack as the sheet is drawn toward said face of the member.

8. Apparatus for feeding and transferring sheets comprising a feed roll, a second feed roll movable toward said first feed roll, a transfer member having a flat sheet-engaging surface, means for moving said member, while holding a sheet, to position said face substantially tangent with said first feed roll, means including a lost-motion connection for moving said second feed roll to position substantially tangent to said first feed roll and to said face there to press said sheet against said first feed roll, and stop structure preventing overthrow of said transfer member into engagement with said first feed roll.

9. Apparatus for feeding sheets from a stack comprising a member for engaging an end sheet of the stack, means for moving said member away from the stack while holding said sheet, and means to prevent curling of a leading portion of the sheet during its movement by said member comprising nozzles directing blasts, between said end of the stack and toward said sheet after at least partial separation therefrom, along said sheet toward the leading edge thereof.

10. Apparatus for feeding sheets from a stack comprising a member for engaging an end sheet of the stack, means for moving said member away from the stack while holding said sheet, and means to prevent curling of the corners of the sheet during its movement by said member comprising nozzles directing blasts, between said

end of the stack and said sheet after at least partial separation therefrom, along the sheet toward said corners.

11. Apparatus for feeding corner-notched sheets from a stack comprising a member for engaging an end sheet of the stack between its flaps formed by the corner-notching, means for moving said member away from the stack while holding said sheet, and means to prevent curling of said flaps during movement of the sheet by said member comprising nozzles directing blasts outwardly of the stack between said end of the stack and said sheet, and along the sheet toward said flaps.

12. In an apparatus for feeding sheets comprising a conveyor operated step-by-step, means for feeding a sheet from a stack to said conveyor for each step thereof and insuring the sheets at the end of each step of the conveyor shall in turn occupy identical positions thereon comprising a member movable toward and from the stack in timed relation to said conveyor in succession to lift each sheet as it becomes an end sheet of the stack, and feeding elements movable toward and away from each other in timed relation to said member and to said conveyor clamping a sheet while held by said member and feeding it to said conveyor.

13. In an apparatus for feeding and coating sheets comprising a roll for transferring a predetermined pattern of adhesive to sheets in succession, means for feeding the sheets in succession from a stack into engagement with said roll and insuring transfer of identical patterns in identical locations upon the successive wrappers comprising a sheet-separating member movable toward and from the stack in definite relation to occurrences of successive patterns on said roll, and feeding elements movable toward and from each other in timed relation to said member for clamping a sheet held by said member and for feeding the sheet to said roll.

14. In an apparatus for feeding and tabbing wrappers comprising mechanism operating intermittently to apply tabs to wrappers, means for feeding the wrappers in succession from a stack to said tabbing mechanism and insuring application of tabs to identical positions upon the successive wrappers comprising a wrapper-separating member movable toward and from the stack in timed relation to said tab-applying mechanism, and feeding elements movable toward and away from each other in timed relation to said member and said tab-applying mechanism clamping a wrapper while held by said member and feeding it to said tab-applying mechanism.

15. In a system comprising a member coated with adhesive and means for applying tabs thereto, means for feeding wrappers from a stack to

said member for transfer therefrom to the wrappers of adhesive and tabs including devices successively effecting movement of each wrapper and jointly effecting continuous rigid control of each wrapper from inception of its movement from the stack at least until completion of transfer thereto of tabs from said member to insure the tabs transferred to successive wrappers shall occupy identically corresponding positions thereon.

16. In a system comprising a conveyor and a tabbing mechanism, means for feeding wrappers from a stack for application thereto of tabs by said mechanism, while enroute from the stack to said conveyor, including devices successively effecting movement of each wrapper and jointly effective with each other and said conveyor to retain rigid control of each wrapper from inception of its movement from the stack, throughout application of tabs thereto by said tabbing mechanism, and until under control of said conveyor, to insure the tabs applied to successive wrappers shall occupy identically corresponding positions thereon.

17. Apparatus for feeding sheets from a stack comprising a sheet-feeding roll, an oscillating member for effecting movement of said roll toward and from a sheet-feeding position, a sheet-separating member movable toward and from engagement with the stack to move each sheet in turn to said sheet-feeding position, means for feeding the stack including said oscillating member and a second member having a lost-motion connection thereto, latching means releasably restraining movement of said second member by said oscillating member to preclude feed of the stack, and a third member movable with said sheet-separating member to trip said latching means when depletion of the stack requires abnormal movement of said sheet-separating member for engagement therewith.

18. Apparatus for feeding sheets from a stack comprising sheet-feeding rolls, a sheet-separating member cyclically movable toward and away from the stack in turn to move each sheet, as it becomes the end sheet of the stack, into position to be fed by said rolls, means for feeding the stack comprising a member adapted to oscillate during any cycle of said sheet-separating member, latching means for restraining said feeding member from oscillation, and a control member directly mechanically connected to said sheet-separating member and movable in a path extended, when said member in any of its cycles moves to abnormal extent to remove a sheet from the stack, to engage and trip said latching means to allow oscillation of said feeding member for that cycle.

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