Sept. 4, 1945. T. A. FEDERWITZ ET AL 2,384,021

ADHESIVE APPLYING SYSTEM

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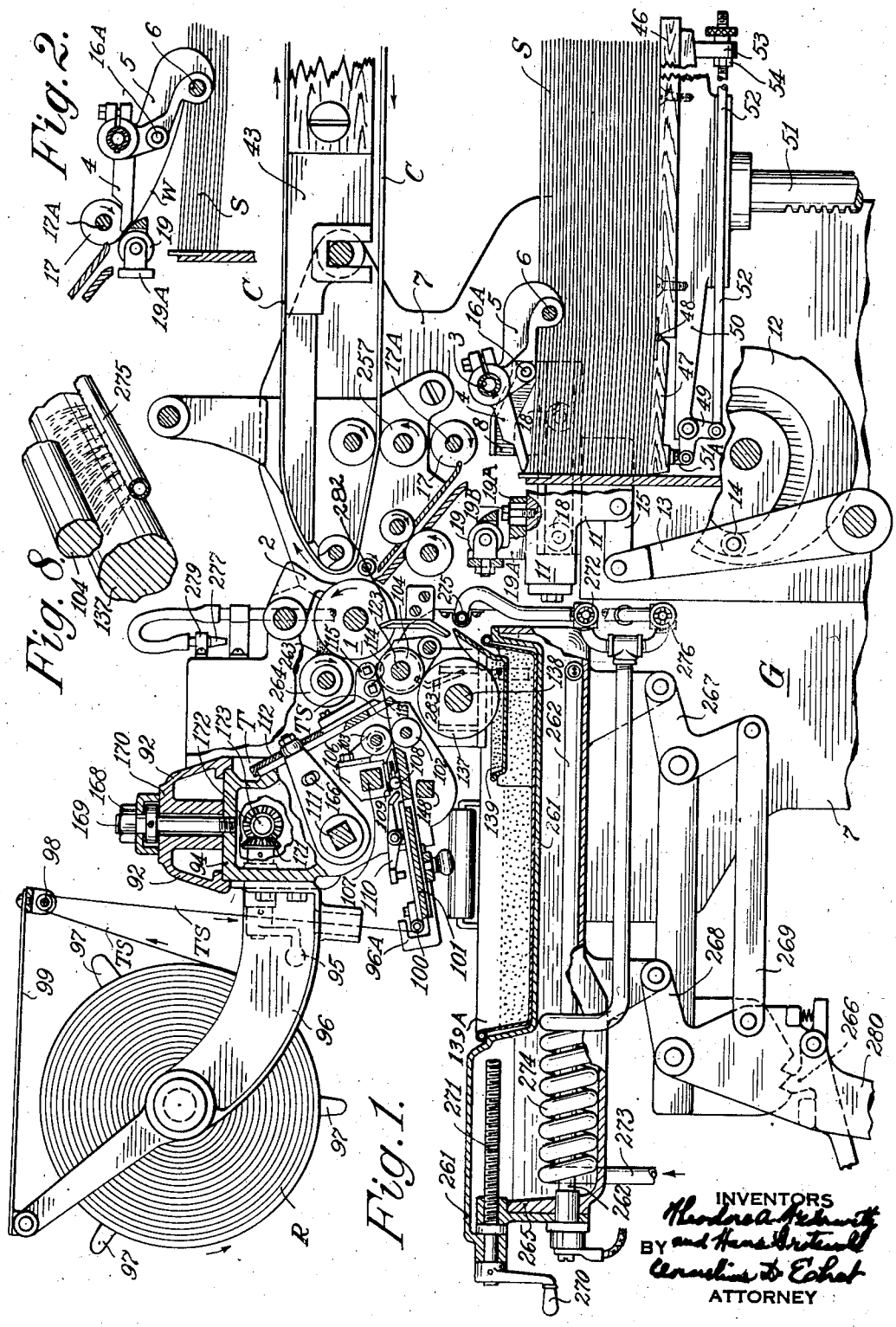


Fig. 1.

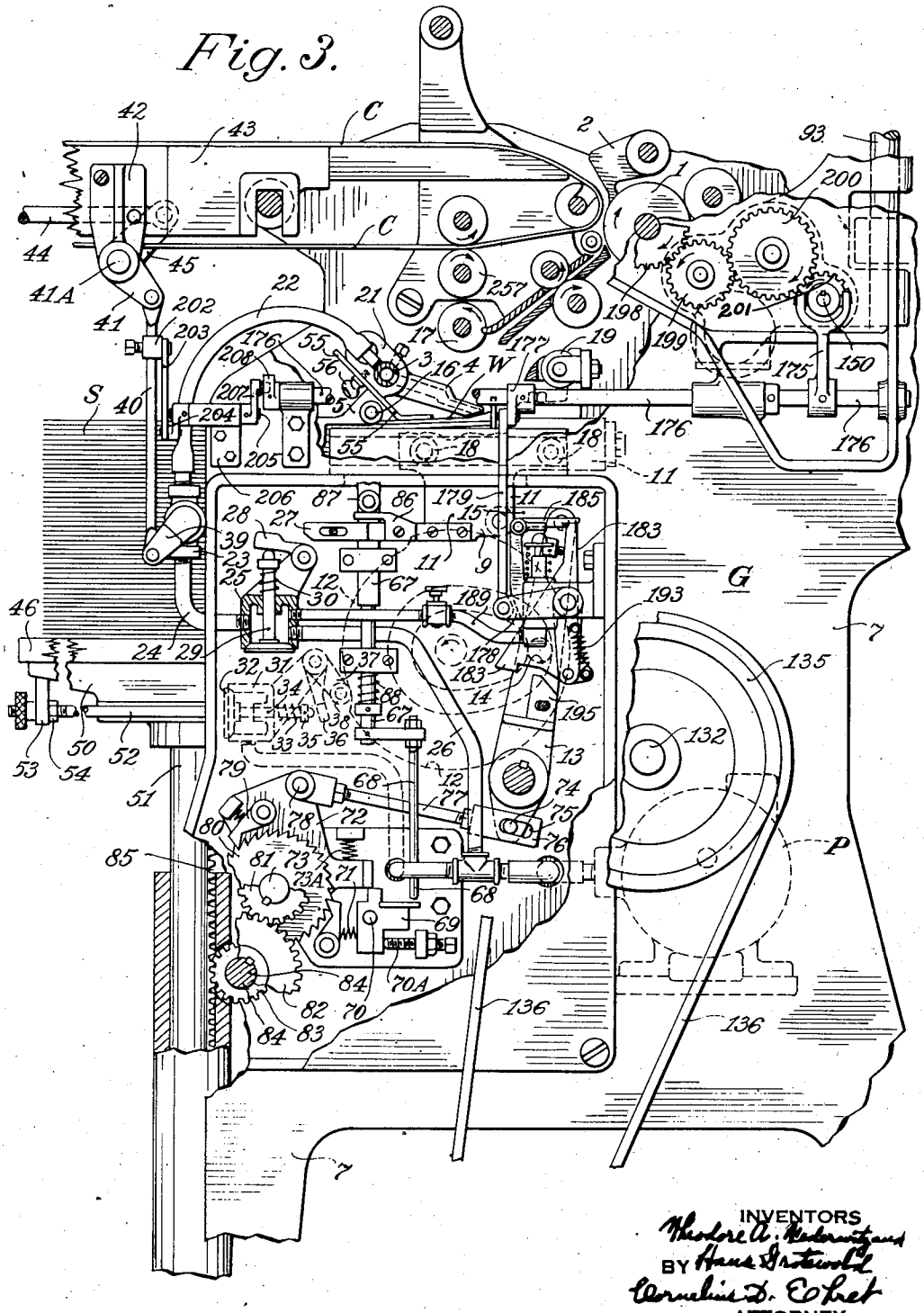
INVENTORS
Theodore A. Federwitz
BY and Hans Arsteuff
Cornelius D. Eshat
ATTORNEY

Sept. 4, 1945. T. A. FEDERWITZ ET AL 2,384,021

ADHESIVE APPLYING SYSTEM

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Fig. 3.



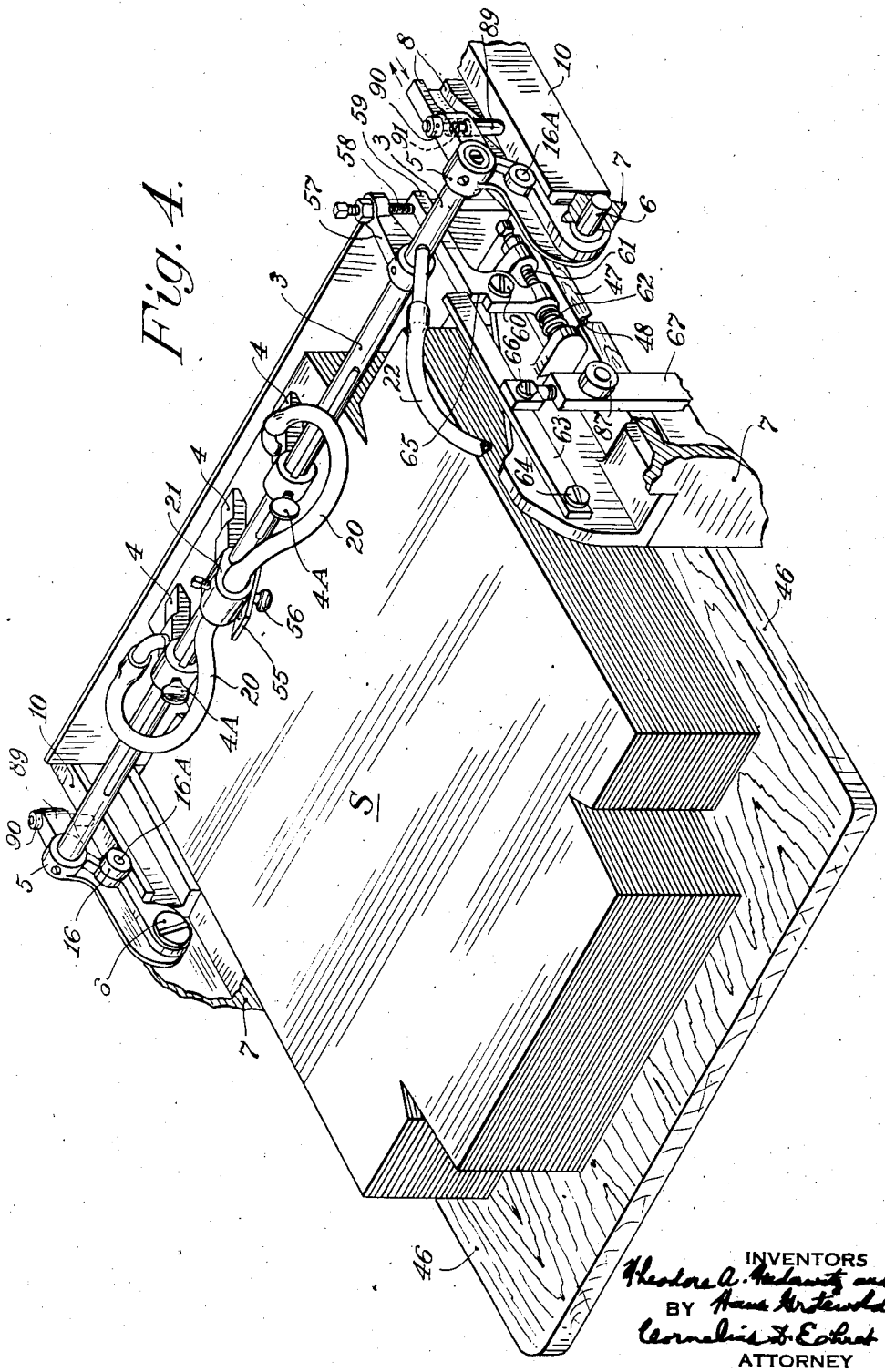
INVENTORS
Theodore A. Federwitz and
BY Hans Grotewold
Cornelius D. Echert
ATTORNEY

Sept. 4, 1945. T. A. FEDERWITZ ET AL 2,384,021

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Fig. 4.



INVENTORS
Theodore A. Federwitz and
BY Hans Hirtenfeld
Cornelius F. Eckhart
ATTORNEY

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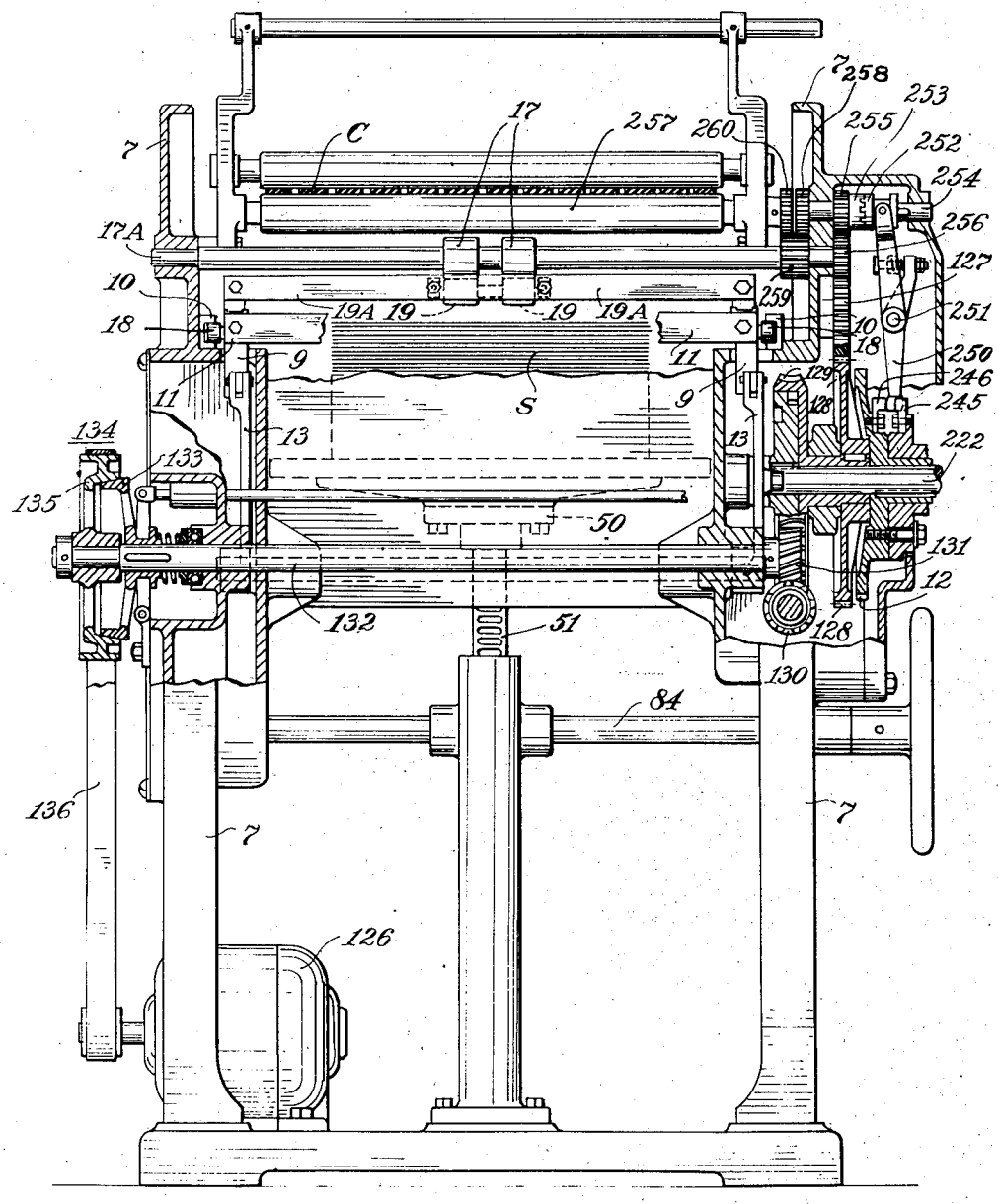


Fig. 5.

INVENTORS
Theodore A. Federwitz
and Hans Grotenhuis
BY
Cornelius D. Echert
ATTORNEY

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Fig. 6.

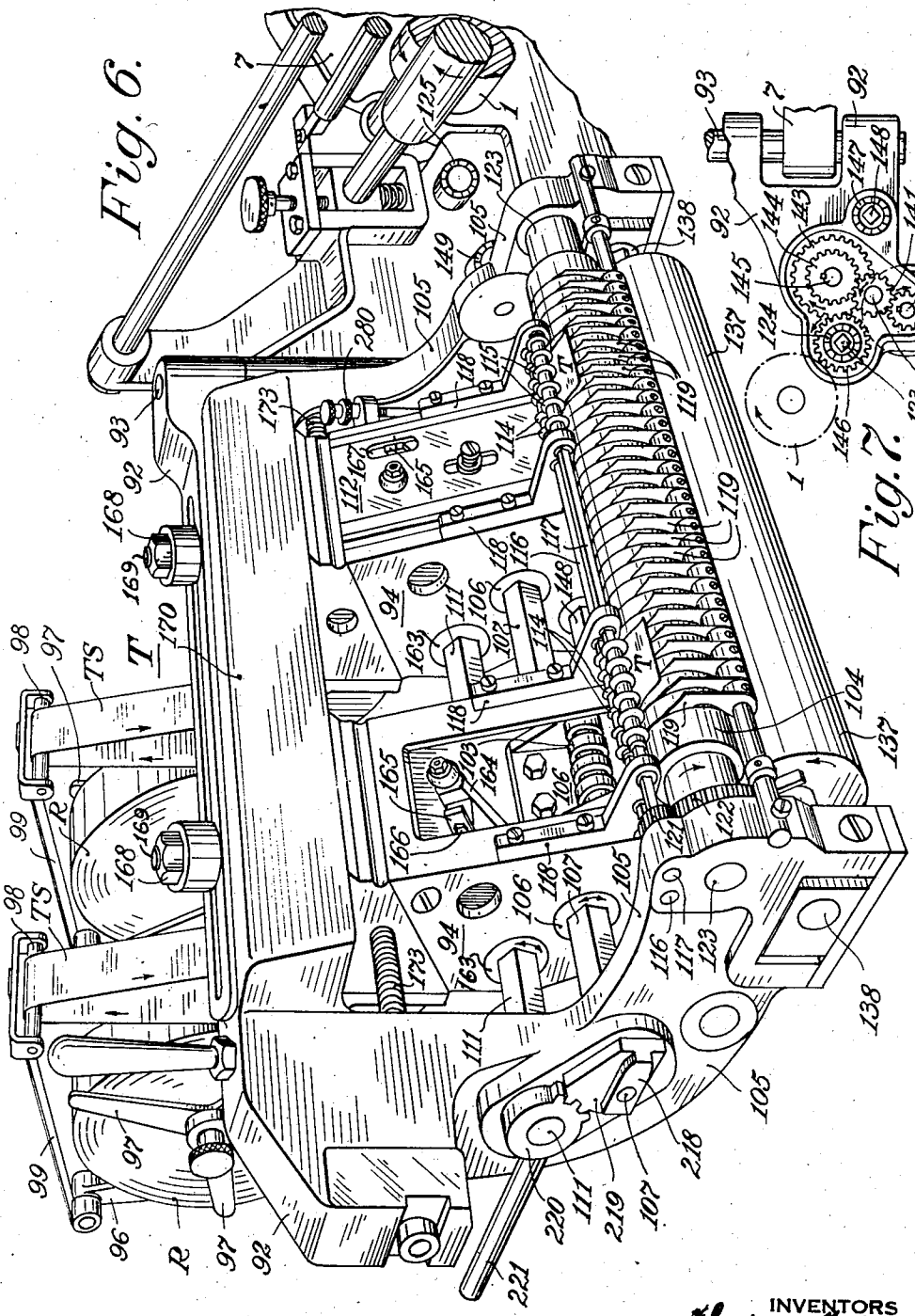


Fig. 7.

INVENTORS
Theodore A. Federwitz and
BY Hans Gritzwald
Cornelius S. Eckert
ATTORNEY

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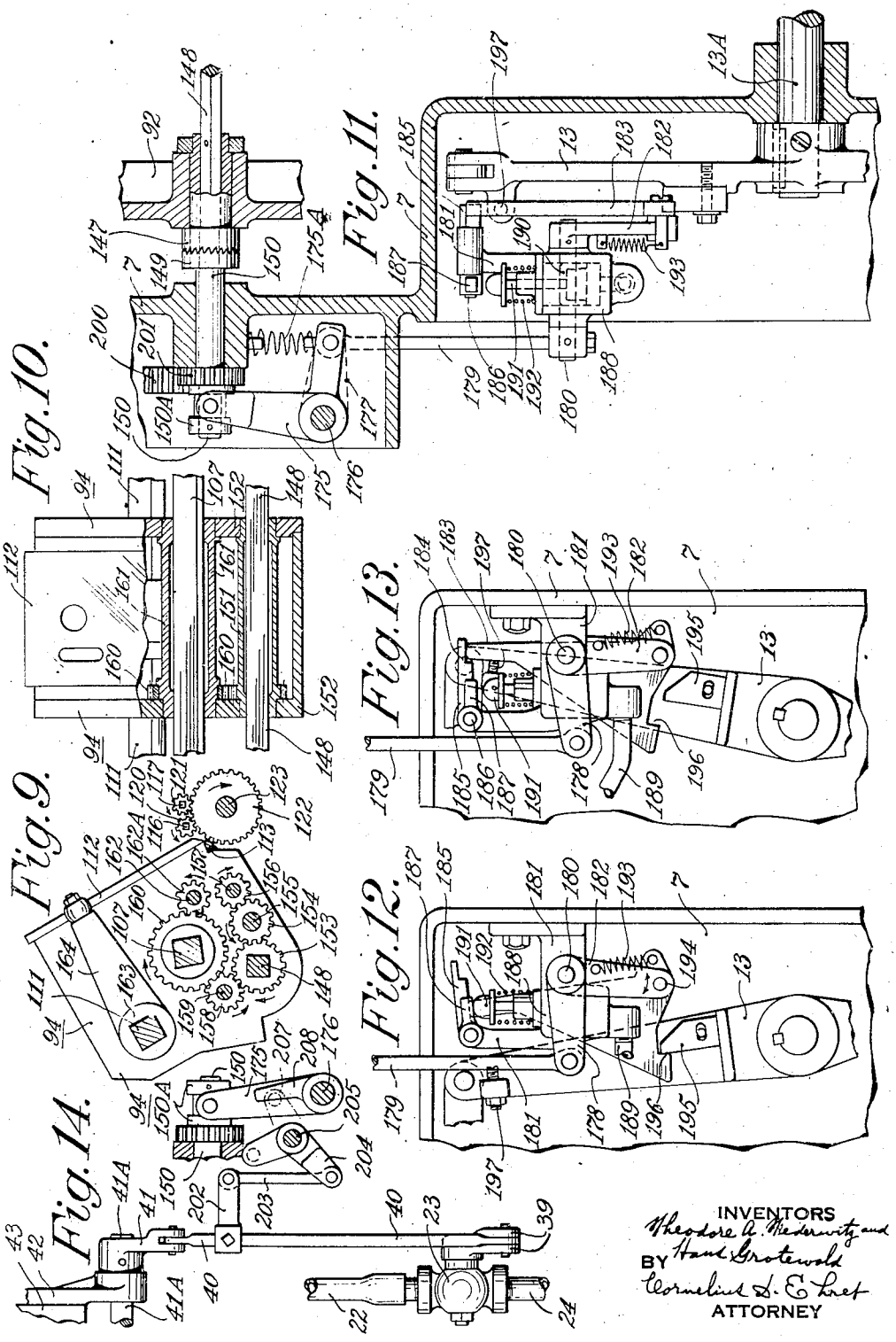


Fig. 10.

Fig. 11.

Fig. 13.

Fig. 9.

Fig. 12.

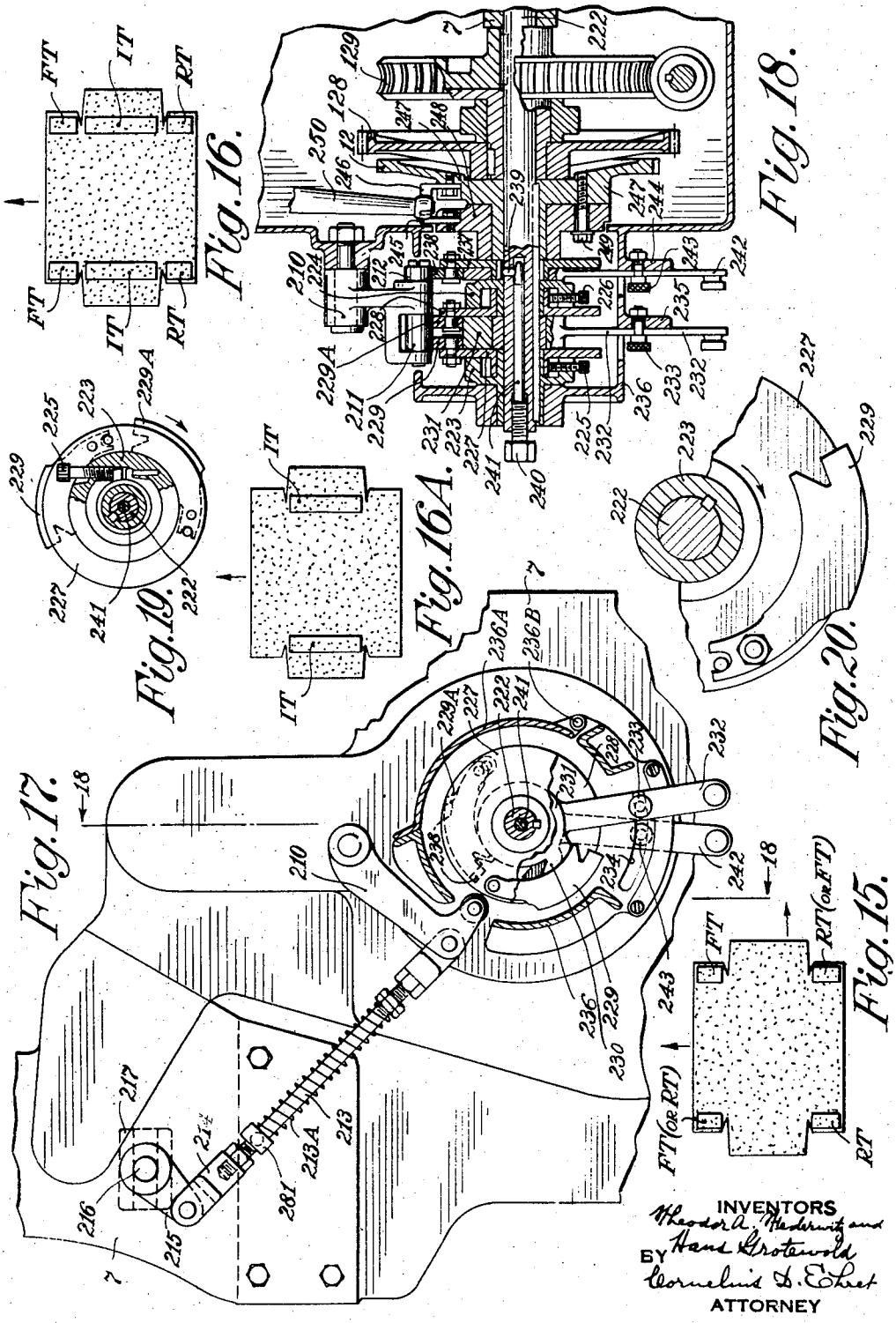
Fig. 14.

INVENTORS
Theodore A. Federwitz and
Hans Grotewold
BY Cornelius L. E. Loret
ATTORNEY

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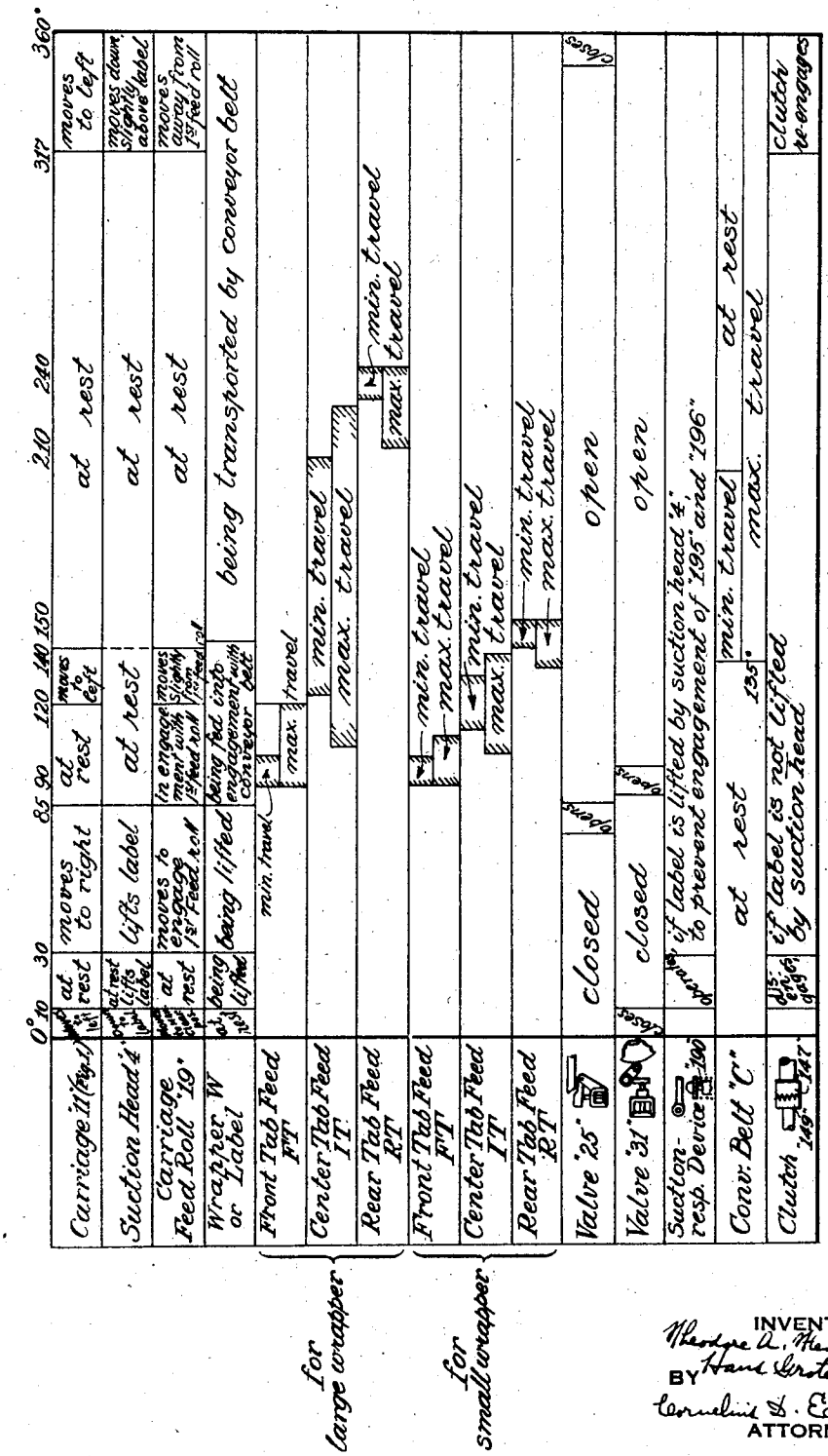


Fig. 21.

INVENTORS
Theodore A. Federwitz and
BY Hans Grotenhold
Cornelius A. Colnet
ATTORNEY

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UNITED STATES PATENT OFFICE

2,384,021

ADHESIVE APPLYING SYSTEM

Theodore A. Federwitz and Hans Grotewold, Philadelphia, Pa., assignors to Stokes & Smith Company, Philadelphia, Pa., a corporation of Pennsylvania

Application June 13, 1941, Serial No. 397,894

26 Claims. (Cl. 93—56)

Our invention relates to apparatus for applying adhesive to sheet material such as wrappers, labels, or the like, generically termed "sheets" or "wrappers," and reinforcing elements or strips, generically termed "tabs," and more particularly relates to apparatus for applying tabs and adhesive to wrappers for application to boxes, box blanks, or the like.

In accordance with one aspect of our invention, there is provided means, responsive to failure of wrapper-feeding mechanism to engage or grip a wrapper for transport to a tabbing station, for disabling mechanism which otherwise provides for delivery of tabs to the tabbing station for attachment there to a wrapper; more particularly the wrapper-feeding mechanism includes a suction-gripper head to whose suction supply line is connected a bleeder valve operative to release a clutch between tab-feeding rolls, or equivalent, and their source of power upon failure of the suction head to engage a wrapper at usual time in the cycle of the machine.

Further in accordance with our invention, the movement of the suction head is so controlled that, at the end of each cycle of the apparatus, it is close to the wrapper next to be fed by it but is then ineffective to engage that wrapper because suction is supplied to the head only for a period terminating before the end of the cycle; more particularly there are connected to the suction supply line for the feeder head two bleeder valves, one of which is closed for a period continuous through the latter part of each cycle and the earlier part of the next cycle, and the other of which valves is open at the end of each cycle to effect inoperativeness of the suction head notwithstanding the first valve is then closed, and which second named valve is closed early in each cycle to maintain engagement of the suction head with a wrapper while both valves are closed.

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

For an understanding of our invention and for illustration of a preferred embodiment thereof, reference is made to the accompanying drawings in which:

Fig. 1 is a side view, with parts in section, and parts broken away, of apparatus suited to apply adhesive to tabs and attach them to wrappers concurrently with coating of the wrappers with adhesive.

Fig. 2 is a detail view showing parts appearing in Fig. 1 in a different operating position.

Fig. 3 is a side elevational view, with parts in section, and parts omitted and broken away, showing, from opposite side of the machine, features of construction not appearing in Fig. 1.

Fig. 4 in perspective, shows further details of construction of wrapper-feeding mechanism shown in Figs. 1–3.

Fig. 5, with parts in section and parts broken away, is a front elevational view of the machine shown in Figs. 1–3.

Fig. 6, in perspective, shows further features of construction of tabbing mechanism appearing in Fig. 1.

Fig. 7 is a detail view showing driving means for parts appearing in Fig. 6.

Fig. 8, in perspective, is a fragmentary view showing adhesive-coated rolls and a spray-head for cleaning them.

Fig. 9 is a side elevational view, with parts omitted, showing internal features of construction of a tabbing head appearing in Figs. 1 and 6.

Fig. 10 is a rear view, partly in section and with parts omitted, of the tabbing head, Fig. 9.

Fig. 11, a fragmentary elevational view in section, shows an arrangement for controlling a clutch to tab-feeding rolls of the tabbing heads of Figs. 1 and 6.

Figs. 12 and 13 are detail views showing parts appearing in Fig. 11 in different operating positions.

Fig. 14 is a fragmentary view illustrating an additional control arrangement for the clutch mechanism appearing in Fig. 11.

Figs. 15, 16 and 16A are plan views of tabbed wrappers.

Fig. 17 is a detail view, in side elevation and partly in section, of mechanism effecting timed operation of rockshafts appearing in Figs. 1, 6, 9 and 10.

Fig. 18 is a sectional view taken on line 18—18 of Fig. 17.

Figs. 19 and 20 are detail views showing timing cams of Figs. 17 and 18.

Fig. 21 is a chart or diagram illustrative of the timing relations between significant elements of the apparatus shown in Figs. 1–20.

Once for each cycle of the mechanism G, generally similar to that disclosed in Letters Patent Nos. 1,806,181 and 1,857,260 to Ernest G. Rider, a wrapper W is separated from the stack S thereof, Fig. 1, and fed into engagement with the adhesive-coated roll 1 from which it is deflected as by the stripping knives 2 onto an endless conveyor C, preferably of the suction type disclosed in Letters Patent No. 1,818,198 to S. H. Davis.

Boxes or box blanks registered upon the coated

wrappers before setting of the adhesive form assemblies which by further application of the coated wrappers are converted into wrapped boxes.

For reinforcement of corners of the boxes, tabs or stays T (Figs. 15, 16, 16A) are applied to the wrappers as they pass from the stack S to conveyor C; by mechanism hereinafter described, the tabs are cut from strips TS (Figs. 1 and 6) of suitable tabbing material, for example paper, and transferred to the periphery of the adhesive-coated roll 1 which during its rotation applies them to a wrapper W concurrently with transfer of adhesive thereto.

Referring particularly to Figs. 1, 3 and 4 which illustrate a preferred construction of the mechanism which separates the wrappers from the stack, the bar or tube 3 upon which are mounted a suitable number of gripper heads 4, is supported at its opposite ends by the levers 5, 5 pivotally mounted at 6, 6 to the side frames 7, 7 of the machine. The pivoted frame comprising the arms 5, 5, tube 3, and suction heads 4 is biased, as by its own weight or by any other suitable means including a spring, to position effecting engagement between the suction heads 4 and the top wrapper or sheet of the stack S. Movement of suction heads 4 away from the stack is effected by a pair of cams 8 having cam slots each receiving a cam roller 16 mounted at 16A to one of the pair of arms 5. Each of the cam members 8 is attached to one of a pair of reciprocable members 9 each having wheels or rolls 18 guided by a track or channel member 10 supported from a respective side frame 7 of the machine. The pair of members 9 comprise a carriage 11 whose movements are controlled by the cam 12 through linkage including links 15 and the arms 13, one of which carries cam follower 14.

To avoid unnecessary and undesirable load upon the suction pump P, Fig. 3, and yet provide a suction-controlled monitor system hereinafter described, the cycle of the mechanism ends with the suction heads 4 out of engagement with the end wrapper of the stack. When the one-cycle clutch of the machine G is tripped, as by an operator or by some other mechanism included in the same system, the carriage 11 is first moved a short distance to the left, Fig. 1, so that relieved or wider sections of cam tracks 8 come adjacent the cam rollers 16 on arms 5 so permitting the arms 5 to swing about their fixed pivots 6 until arrested by engagement of the suction heads 4 with the top of the stack S. Shortly thereafter upon continued rotation of cam 12, the carriage 11 is reversed, moving cams 8, 8 to the right, Fig. 1, and so effecting thereby clockwise movement of the suction heads 4 about the pivot 6. Because of suction exerted through the heads 4 during this movement thereof, the upper face of the leading edge of the separated wrapper is brought into engagement, Fig. 2, with the feed rolls 17 suitably attached to the shaft 17A supported, as most clearly shown in Fig. 5, by the side frames of the machine.

When the suction heads 4 are moving toward or from the upper feed rolls 17 within a short distance therefrom, the roll 19, or equivalent pressure-applying member, is widely separated from the feed rolls 17 to avoid interference with the suction heads or the wrapper held thereto. While the suction heads remain substantially in the position shown in Fig. 2, because of the illustrated dwells in the cams 8, for continued movement of carriage 11 to the right, the lower feed roll 19 mounted thereon is moved to press against the under surface of the leading edge of the wrapper W, whereupon the feed rolls 17, 19 are effective to advance the wrapper toward the adhesive-coated roll 1.

Conveniently to suit the apparatus to feed wrappers of different thickness and surface characteristics, the roller 19 is supported from carriage 11 by the adjustable bracket 19A which is clamped, as by the bolts 19B, in position affording the desired feeding pressure between the upper and lower feed rolls when carriage 11 is at the limit of its travel to the right, Fig. 1.

At least some of the suction heads 4 are adjustable to accommodate the sheet separating device to wrappers of different dimensions; in the arrangement shown in Fig. 4, the outer pair of suction heads are slidable along tube 3 to increase or decrease their spacing from the central suction head. Thumbscrews 4A, or equivalent are provided to clamp the heads in desired position. To afford suction connections to the adjustable suction heads 4, there are provided sections 20, 20 of flexible tubing or hose extending from the manifold 21 of the central suction head 4 provided with an internal passage continuously in communication with the hollow bore of the supporting member 3.

The connections from the suction pump P, Fig. 3, to the suction heads 4 include the flexible tubing 22 extending from the tubular member 3 to valve 23, pipe 24 extending from valve 23 to a second valve 25, and pipe 26 extending from valve 25 to the intake of pump P.

The bleeder valve 25, for cutting off suction to heads 4 when carriage 11 has moved the lower feed roll 19 to the position shown in Fig. 2, is actuated by the bar 27, Fig. 3, extending from one of the side members 9 of carriage 11. Near the end of the sheet-separating stroke of the carriage, the left-hand end of bar 27, Fig. 3, engages and depresses the pivoted arm 28 resting upon the stem of the movable valve member 29. The resultant opening movement of the valve, in opposition to its biasing spring 30, interrupts the application of suction to the sheet then held by the suction heads against the upper feed rolls. Upon return movement of the carriage 11, the bar 27 is retracted whereupon the bleeder valve 29 closes and remains closed until the carriage 11, in the next cycle of the machine, again approaches the limit of its wrapper-separating stroke.

Notwithstanding the valve 25 is closed somewhat before the end of the cycle and remains closed for a substantial part of the succeeding cycle, suction is not exerted through the suction heads 4 at the end of the cycle because of the second bleeder valve 31 controlled by cam 12. The movable member 32 of valve 31 is biased to its closed position by the spring 33 encircling the stem 34 between the collar 35 and the valve housing. The arms 36, 37, the latter supporting a cam roller 38 engaged by the periphery of cam 12, are interposed between the valve member 32 and the cam to open the valve 31 shortly after the valve 25 opens and to maintain it open throughout the remainder of the cycle. Therefore although at the end of the cycle the suction heads 4 are immediately above the top of the stack and cut-off valve 25 is closed, a sheet is not drawn to the heads until after the next cycle of the machine has been initiated by the operator or by some other machine in the system. Consequently when for any reason, there is a long interval be-

tween successive cycles of the machine, there is not imposed upon the suction pump P the heavy load existant when a wrapper is held by suction against the heads 4.

The valve 23, normally open to afford communication between pipes 24 and 22, is provided to disable the suction-heads of the wrapper-separating mechanism so to preclude feed of further wrappers from the stack to the conveyor C when it is desired by continued step-by-step operation of the conveyor to clear it of the wrappers thereon. The movable element 39 of the valve 23, shown in normal position in Fig. 3, is connected by link 40 to arm 41 attached to shaft 41A supported by brackets 42 extending downwardly from opposite sides of the housing 43 of the suction conveyor C. The bar 44, connected by arm 45 to shaft 41A, extends to position convenient for control of valve 23 by the operator of the machine. This same linkage, as hereinafter appears, is part of an arrangement providing for manual interruption of the feeding of tabs to the adhesive-coated roll 1 of mechanism G.

Referring to Figs. 1, 3 and 4, the stack of sheets is supported by a platform 46 the forward portion 47 of which is pivoted or hinged at 48 to provide for an adjustment to greater or less extent bowing the wrappers by elevating the front end of the stack S with respect to the remainder thereof. In the particular arrangement shown, the angular adjustment of the hinged portion 47 is effected by linkage including the bell crank lever 49 pivotally mounted upon the head 50 of plunger 51, brackets 51A depending from the hinged member 47, threaded bar 52 extending from bell crank lever 49 through bracket 53 attached to head 50, and the threaded stop member 54 which is manually adjustable, during operation of the machine if that be necessary, to obtain desired inclination of platform member 47. This feature of applicants' invention is of importance in adapting the machine to feed sheets or wrappers varying widely in dimensions, weight, composition, surface finish, etc.; for example, large or small sheets of Cellophane, or like film material, glazed papers, and in general, sheets of paper or other material having decided tendency to curl.

Further to insure separation of only a single sheet or wrapper, there is provided, Figs. 3 and 4, the stop member 55 adjustably secured, as by thumb screw 56, to manifold 21 or to some other member attached to and movable with the supporting tube or bar 3 for the suction heads 4. The stop 55 is so adjusted that when it is in engagement with the top of the stack the suction heads 4 are in position suitably short of contact with the top wrapper. The suction exerted through the heads therefore draws only the top wrapper toward them; the forward portion of the wrapper bends more or less sharply about the forward edge of the stop 55 as a fulcrum and separates from the corresponding portion of the next lower wrapper. The stop member 55 is adjustable to obtain optimum results with wrappers of different dimensions and characteristics.

As the stack S is depleted, the platform 46 is elevated by mechanism now described to maintain the top of the stack in proper position for separation of wrappers therefrom by the suction heads. Referring to Fig. 4, there is attached to the supporting member 3 of the suction heads an arm 57 to which is adjustably secured the latch-operating member 58. So long as the top of the stack is at the desired level, the member 58 during the oscillations of the suction head frame about its pivots 6, 6 is ineffective to release the latch 59 pivoted at 60 to the side frame 7 of the machine. When however the stack S has been to sufficient extent depleted, the stop 55 does not engage the top of the stack until after, if at all, the member 58 has engaged latch 59 and moved it away from its stop 61 in opposition to the biasing spring 62. When latch 59 is so moved from its normal position, the lever 63 pivoted at 64 to the side frame of the machine moves downwardly into the notch 65 of latch 59 and is there held until lever 63 is returned to its original position by mechanism, including cam 86 (Fig. 3), hereinafter described.

The extent to which the suction heads may descend beyond the position effecting tripping of latch 59 is suitably limited by a pair of buffer stops, each comprising a spring pressed plunger 89 extending from one of the pair of arms 5. Collars 90 prevent the springs 91 from expelling the plungers from the arms 5.

As shown, Figs. 3 and 4, the lever 63 is pivotally connected at 66 to an adjustable extension of the vertically disposed bar 67 to the lower end of which is secured the tripping rod 68 adapted, when the bar 67 is released as above described, to engage and trip the latch 69 pivotally mounted at 70 to the side frame of the machine. When latch 69 is rocked in clockwise direction away from stop 70A in opposition to its biasing spring 71, it permits the frame 72, loosely mounted on shaft 73, to swing in clockwise direction under the influence of its biasing spring 73A.

When frame 72 is in its normal position, Fig. 3, the pin 74 at the lower end of the oscillating arm 13 moves freely in the slot 75 in block 76 attached to the link 77 extending from, and pivotally mounted at 78 to, frame 72. When however, the frame 72 is released by the aforesaid actuation of latch 69, it is moved by spring 73A to such position that during the subsequent oscillation of arm 13 the pin 74 engages an end of the slot 75 and returns the frame 72 to the position shown in Fig. 3. During such return movement, the pawl 79 mounted upon the frame 72 is effective to rotate the ratchet 80 attached to shaft 73 and so move the stack-supporting plunger 51 upwardly through the gearing including gear 81 attached to shaft 73, gears 82 and 83 attached to shaft 84, and the rack member 85 attached to or integral with the plunger 51. At or before the end of the return movement of frame 72, the latch 69, because permitted by retraction of its tripping member 68 as hereinafter described, returns to the latching position shown in Fig. 3 and there remains until in the next or subsequent cycle of the machine it is again tripped by descent of bar 67.

Assuming latch 59, Fig. 4, has been tripped in response to low level of the stack by abnormal movement of the suction heads, as above described, it is re-set subsequently in the same cycle of the machine by engagement of the rise of cam member 86 (Fig. 3), attached to the reciprocating carriage 11, with the roller 87, or equivalent abutment, extending from the bar 67; more particularly, upon return movement of the carriage 11 toward the position shown in Fig. 3, the cam 86 lifts the bar 67, in opposition to biasing spring 88, to swing lever 63, Fig. 4, in counter clockwise direction out of the notch 65 of latch 59. The biasing spring 62 is thereupon effective to return the latch 59 to its normal position, shown in Fig. 4, in which it is effective to hold

lever 63 and bar 67 in their upper or non-tripping positions.

The various components of the tabbing mechanism T are carried by the bridge 92 pivotally mounted at 93 to one of the side frames 7 of the adhesive applying mechanism G. The pivotal mounting of the tabbing mechanism or unit permits it to be swung out of its operating position, Fig. 1, to the position shown in Fig. 6 for access to its various parts for replacement, adjustment, cleaning, inspection, or repair. To each of the two tabbing heads 94 adjustable toward and away from each other transversely of the bridge 92 by cranks 95 or equivalent (Fig. 1), is attached a bracket 96 (Figs. 1 and 3) for supporting a roll R of tabbing material and a clamping spider 97 therefor; inasmuch as the tabbing heads are essentially duplicates, the following description of one of them applies to both. The strip TS from the roll R is threaded over the idler roll or bar 98 supported by flexible arm 99 suitably attached to bracket 96. After passing over idler roll 98, the tab strip passes between the adjustable forked guide 96A downwardly and underneath the idler roll or bar 100, Fig. 1, supported at or adjacent the rear end of the guide plate 101 of the corresponding tabbing head, thence along the plate 101, and between the feed rolls 102, 103.

The upper feed roll 103 of each tabbing head 94 is carried by a sleeve or block 106 which slidably receives the rockshaft 107 which passes through both heads 94. By mechanism hereinafter described, shaft 107 is intermittently rocked in clockwise direction to the position shown in Fig. 1, to press the leading end of each of the tab strips TS against the lower feed roll 102 of the corresponding tabbing head and remains in that position for an interval predetermined by adjustments hereinafter described to feed the desired length of tab strip into engagement with the adhesive-coated roll 104 which, Fig. 6, extends between the side frames 105, 105 of the bridge 92. When the shaft 107 is rocked to separate the feed rolls 102, 103, a brake comprising the spring-pressed roll 108 and the stationary wedge shaped member 109 prevents reverse movement of the tab strip. This brake may be released manually, for threading of a tab strip through head 94, by depressing the exposed arm of lever 110, Fig. 1. The member 109, or other convenient stop, prevents lever 110 from being swung far enough to allow roll 108 to pass beneath its inner or right hand end.

In the interval between successive movements of the block 106, the shaft 111 is rocked in clockwise direction, Fig. 1, to move the blade 112 of each tabbing head downwardly for severance of that portion of the corresponding tab strip extending beyond the stationary blade 113 attached to and extending across the front of the tabbing head.

Before operation of blade 112 to detach a tab therefrom, the leading end of the tab strip TS is fed by rolls 102, 103 into engagement with the coated roll 104, preferably grooved to receive stripper blades 119, and is pressed against roll 104, shaped or curved in conformity therewith to assure distribution of the adhesive throughout the tab surface, by at least two sets of pressure-applying rolls or discs 114, 115 mounted upon and continuously rotated by the shafts 116, 117 which pass through the brackets or extensions 118 of the tabbing heads. These pressure applying rolls maintain control of the detached tabs and so insure definite positions of the tabs for deflection by the stripper blades 119 onto the adhesive-coated roll 1 which, as above stated, applies the adhesive-coated tabs to the wrappers.

As shown in Figs. 6 and 9, the drive shafts 116, 117 of the pressure-applying rolls 114, 115 are provided respectively with gears 120, 121 in mesh with and driven by gear 122 secured to the shaft 123 to which the adhesive-coated roll 104 of the tabbing unit is attached. To the other end of shaft 123, Fig. 7, is attached the clutch member 124 which, when the bridge 92 is in the operating position, Fig. 1, is in engagement with driving clutch member 125 continuously driven by motor 126, Fig. 5, through a gear train comprising gears 127, 128, 129, 130 and 131. The gear 131 is attached to shaft 132 to which is slidably attached the driven cone 133 of clutch 134 whose driving cone 135 is continuously driven from motor 126 by the belt 136 or equivalent. So long as the clutch members 124, 125 are in engagement and the bridge 92 is in position, the roll 104 for applying adhesive to the tabs and the rolls 114, 115 for applying pressure to them while being coated are in continuous rotation.

Adhesive is supplied to the distributor roll 104 by the agitating roll or drum 137, Figs. 1, 6 and 7, whose shaft 138 extends between and is supported by the side frames 105 of the bridge 92. When the tabbing unit is in operation, the drum 137 having its periphery dipping below the surface of adhesive in pan 139, Fig. 1, is continuously rotated by the train of gears including the gear 140 attached to shaft 138 of the drum, Fig. 7, gear 141 on shaft 142, gears 143 and 144 on shaft 145, and gear 146 on shaft 123 to which is secured, as above stated, the driven member of clutch 124, 125.

The drive shaft 148 of tab feed rolls 102, 103 is also normally continuously driven through the gear train including aforesaid gears 127—131, Fig. 5, and gears 198—201, Figs. 3 and 11. When the bridge 92 is in operating position the driven clutch member 147, attached to shaft 148, is in engagement, except under circumstances herein described, with the driving clutch member 149, Fig. 11, attached to shaft 150 supported from one of the side frames 7 and driven from the aforesaid gear train 127—131, 198—201.

Within each tabbing head 94, Fig. 10, the shaft 148 passes through a sleeve 151 whose ends serve as bearings received by the sides 152 of the head. The bore of the sleeve is at least in part square or of non-circular configuration fitting the corresponding shape of the shaft so to provide both for rotation of the sleeve with the shaft and axial adjustment of the head along the shaft. The gear 153 (Fig. 9), attached to or an integral part of sleeve 151, meshes with the idler gear 154 supported within the head on a stud shaft 155; the gear 154 is in mesh with and drives the gear 156 attached to the shaft 157 of the lower feed roll 102. Gear 153 on sleeve 151 is also in continuous engagement with gear 158 rotatable on stud shaft 159 supported within the head and in mesh with the gear 160 freely rotatable upon the sleeve 151 to which the block 106, supporting the upper feed roll 103 and its rocker arm, is attached. The gear 162A attached to shaft 162, supported by the rocker arm and to which is attached the upper feed roll 103, is in continuous engagement with the gear 160.

Consequently, during normal operation of the machine the feed rolls 102, 103, as previously herein stated, are in continuous rotation and are

effective immediately to advance the tab strip TS when the shaft 107 is rocked to bring the upper feed roll into engagement with the tab strip and force it against the lower feed roll. To ensure the tabs fed from one head 94 shall equal in length the tabs fed from the other head, at least one head is provided (Fig. 6) with an adjustable member 280 (corresponding with knob 152 of aforesaid Rider Patent 1,857,260) to change the pressure between its tab-feeding rolls 102, 103.

The sleeve 163, rotatably supported by the sides 152 of the head 94, slidably receives the rockshaft 111 and is suitably internally shaped to insure its angular movement with the shaft. The arm 164 for actuating the blade 112 fits the sleeve 163 loosely but is adjustably clamped to the arm 165 rigidly attached to sleeve 163 for angular movement therewith; the clamping bolt 166 passes through a slot provided in arm 164 to permit the arm to be adjusted angularly with respect to shaft 111 accurately to set or reset the knife 112 and so to compensate, when necessary, for its wear. The outer end of arm 165 may, as shown in Fig. 6, extend through a slot 167 in blade 112, the relative positions of suitable indicia on the blade and on the visible end of arm 165 indicating the relative angular positions of the arms 164 and 165.

To adjust each of the heads 94 and with it all of its components including the knife-actuating mechanism, the tab feeding mechanism, the pressure applying discs 114, 115, the brake, and the supporting bracket 96, the head is first unclamped by loosening the nut 168 at the upper end of the stud 169 (Figs. 1 and 6) which extends upwardly from the top of the head through the cross-rail 170 of the bridge. The crank 95 is then rotated in proper direction and to proper extent to slide the head transversely of the bridge to the desired position through the intermediary of bevel gears 171, 172 and the rod 173 attached to the latter and threadably engaging the head 94. When the heads are in the desired position suited to the wrappers to be tabbed, they are clamped in place by re-tightening the nuts 168.

In event the suction heads 4 do not, because of depletion of the stack or for any other reason, deliver a wrapper to the feed rolls 17, 19, it is desirable the tab feeding mechanism be disabled; otherwise coated tabs will be delivered to the conveyor C, and because the under faces of the tabs are coated with adhesive they will stick to and foul the surface of the conveyor.

Referring particularly to Figs. 3, 11, and 12 to 14, the shaft 150 of the clutch 147, 149, in the driving train of the tab feed shaft 148, is provided with collars 150A for receiving the abutments or anti-friction rollers carried by the yoke arm 175 attached to shaft 176. The arm 177 attached to shaft 176 is connected to an arm 178 by link 179. The shaft 180 to which arm 178 is attached is supported by bracket 181 from the side frame 7 of the machine. To shaft 180 is attached another arm 182 upon which is pivotally mounted the latch member 183.

Movement of the upper end of the latch member is normally restrained by notched arm 185 secured to shaft 186 also supported by bracket 181 and to which is attached the operating member 187. Within the suction chamber 188 connected, as by pipe 189, to the suction chamber of valve 25, Fig. 3, is disposed a plunger 190 whose stem 191 externally of the suction chamber is movable, under circumstances hereinafter mentioned, to engage the operating arm 187 and effect disengagement of clutch members 147, 149.

At that portion of the machine cycle during which a wrapper is held by suction against suction heads 4, the valves 25 and 31 are closed and the suction within the chamber 188 is effective to hold the plunger 190 in its lowermost position against the bias of spring 192. Consequently so long as the suction heads 4 lift a wrapper in each cycle, the latch 183 and associated parts remain in their inoperative position shown in Fig. 13 and there is no interruption of rotation of the tab feed shaft 148. If however, the suction heads 4 fail in any cycle to lift a sheet, because for example, of the depletion of the stack, failure of the suction pump, or any other cause, the spring 192 causes the stem of piston 190 to rise and engage the operating member 187 whereupon the arm 185 is moved counter-clockwise from the position shown in Fig. 13 to the position shown in Fig. 12 so releasing the latch member 183 from the notch 184 and allowing biasing spring 193 to move latch 183 about pivot 194. Upon movement of arm 13 in counter-clockwise direction from the position shown in Fig. 13, the adjustable abutment or stop member 195 movable therewith engages the shoulder 196 of the released latch member 183 and, through the linkage comprising arms 182, 178, link 179, arm 177 and shaft 176, causes the clutch operating member 175 to move in counterclockwise direction, Fig. 11, and so withdraw the driving clutch member 149 from the driven clutch member 147 on the end of shaft 148.

Consequently when, during that cycle of the machine, the shaft 107 is subsequently rocked to effect engagement of the upper feed roll with the tab strip, there is no feeding of the tabs because the fed rolls are not in rotation. Because the tab strip has not been advanced, the operation of the knives 112 in that cycle of the machine does not detach tabs from the tab strip and none are delivered to the transfer roll 1.

Subsequently in the same cycle of the machine during return stroke of arm 13, the adjustable stop 197 attached to arm 13 engages the latch member 183 and resets it to the restrained position, Fig. 13, to provide for feed of tabs when the heads 4 again lift a wrapper. Therefore so long as the suction heads are ineffective to lift a wrapper, the clutch members 147, 149 are disengaged in each cycle before the rockshaft 107 lowers the upper feed roll 103 and are re-engaged in each cycle after shaft 107 has been reversely rocked to lift the upper feed roll away from the lower feed roll.

With the apparatus as thus far described, if the operator should disable the suction heads 4 by closing the valve 23, the suction-responsive device including the piston 190 would not respond to the intended resultant failure of the suction heads to lift a wrapper, and consequently tabs alone would, except for the control arrangement now described, be fed to the adhesive-coated roll 1 and transferred to the conveyor C. To insure disengagement of the clutch members 147, 149 in the drive to the tab feed roll shaft 148 when the suction heads 4 are thus intentionally disabled by the operator, there is provided, Figs. 3 and 14, between the shaft 176 and the operating link 40 of valve 23, the arm 202 adjustably secured to link 40 and connected by link 203 to arm 204 attached to one end of shaft 205 supported by bracket 206 from the side frame 7 of the machine. To the other end of shaft 205 is attached arm 207 normally out of engagement with arm 208 (full line

position, Fig. 14) attached to shaft 176. When the operator, by operation of bar 44 and link 40, closes the valve 23 to discontinue supply of suction to the heads 4, the arm 207 is concurrently moved, in clockwise direction from the full line to dotted line position Fig. 14, to engage arm 208 and rotate shaft 176 in clockwise direction, Fig. 14, so to effect disengagement of the clutch members 147, 149 and to maintain them disengaged so long as valve 23 is closed. When arm 207 is returned to the full line position, Fig. 14, concurrently with manual reopening of valve 23, the spring 175A, Fig. 11, effects re-engagement of clutch members 147, 149 in the feed-roll drive.

The mechanism for actuating the knives 112 and the rockable supports 106 for the upper feed rolls 103 includes, Figs. 17 and 18, the arm 210 which supports the cam followers or rolls 211, 212 for engagement with rotatable cams 229, 229A and 238 hereinafter described. From arm 210 there extends the rod 213, the upper end thereof slidably passing through pivoted post 281 and attached to the link member 214 pivotally connected to arm 215 attached to one end of a shaft 216 rotatably supported by side frame 7 of the machine and to the other end of which is secured the grooved driving member 217. When the tabbing unit or bridge 92 is swung from the position shown in Fig. 6 into operating position, the tongue or driven member 218 extending from the gear segment 219 attached to shaft 107 is received by the groove of member 217, Fig. 17, so that angular movements of arm 210, effected by its actuating cams and its biasing spring 213A, are transmitted to shaft 107 to move the upper feed roll 103 toward and from the lower feed roll as above described.

The gear segment 219, Fig. 6, is in mesh with gear segment 220 attached to knife-actuating shaft 111 so that movement of arm 210, Fig. 17, concurrently effects movement of the blades 112 and of the supports 106 of the upper feed rolls 103. The handle 221 extending from the gear segment 220 permits the tongue 218 to be manually moved into alignment with the groove in member 217 as or before the bridge is swung into its operating position.

The mechanism for effecting operation of arm 210 to determine the size and position of tabs is shown in Figs. 17, 18 and 19. To the shaft 222 which makes one revolution for each cycle of the machine, are attached the collars 223, 224 threadably receiving the clamping screws 225, 226 of the timing disks 227, 228 of substantially identical construction; for example cam 227 is provided with a hub portion adapted to be engaged and clamped by screw 225 and a disc portion upon which is pivotally mounted cam member 229 for engaging roller 211 of arm 210. Cam 229, rotating with timing disk 227, determines the position and length of the rear tabs RT, Figs. 15 and 16, and cam 229A, attached to the timing disk 228, determines the location and lengths of the forward tabs FT applied to a wrapper. The times in the cycle of the machine at which these cams are effective to displace arm 210 are dependent upon the angular relations between the timing disks 227, 228 and the shaft 222; the length of the tabs cut from strips TS is determined by the setting of abutment 230 carried by the stationary sleeve 231 which encircles shaft 222 and whose position may be varied by adjustment of arm 232 which may be clamped in desired position as by the clamping bolt 233 which passes through the arm 232 and the slot 234 in the bracket 235 extending downwardly from housing 236. Access to clamping screws 225 and 226 for adjustment of the spacing of tabs FT and RT in the direction of feed of the wrapper is afforded by the cover 236A of housing 236 which may be swung outwardly about pivot 236B.

The knives and feed rolls of the tabbing heads may also be controlled to provide intermediate or long tabs IT, Figs. 16 and 16A, by provision of another timing disk assembly 237, similar in construction to assemblies 227, 228, including the pivotally mounted cam 238 for engagement with roll 212 carried by arm 210. The timing disk assembly 237 is releasably locked to shaft 222 in desired angular relation with respect thereto and to timing cam assemblies 227, 228 by pin 239 which forced radially of shaft 222 into engagement with the collar of cam assembly 237 when screw 240 is tightened to effect movement of the tapered pin 241 inwardly from the end of shaft 222. The length of the tabs IT is variable by adjustment of arm 242 releasably secured as by bolt 243 to the flange 244 of housing 236 and having at its upper end a stationary sleeve portion which encircles the shaft 222 and from which projects an abutment or operating member, similar to abutment 230, engaged by cam member 238 during rotation thereof. For each revolution of shaft 222, cam 238 displaces arm 210 from the position shown in Fig. 17 for a fraction of the revolution determined by the setting or position of the lever 242.

The settings of arms 232, 242 and the angular settings with respect to shaft 222 of the timing assemblies 227, 228 and 237 determine the lengths of and the spacings between the tabs in the direction of feed of the wrappers, and the settings of tabbing heads 94 transversely of the bridge 92 determines the tab spacing transversely of the wrappers.

The cams 245, 246, Figs. 5 and 18, which control the starting and stopping of the conveyor C during each cycle of the machine are mounted upon the sleeved members 247, 248, the former keyed or otherwise suitably attached to shaft 222 and the latter secured to the former in desired angular relation, as by clamping bolt 249 which passes through an elongated arcuate slot in member 248 into a tapped hole in member 247. When during a revolution of shaft 222, cam 246 engages lever 250 the latter is swung in counterclockwise direction about its fixed pivot 251, Fig. 5, to effect engagement of clutch member 252, slidable along and keyed to shaft 254, with clutch member 253 attached to gear 255 loose upon shaft 254 and continuously driven from gear 129 through a train including gears 128, 127 and 256. Engagement of the clutch members 252, 253 effects movement of the conveyor drive roll 257 through shaft 254, gear 258 attached thereto, gear 259 which is loose on shaft 17A, and gear 260 attached to the shaft of the drive roll 257. When subsequently in the cycle of the machine, cam 245 engages lever 250, it is rocked in clockwise direction to effect disengagement of clutch members 252, 253 and so interrupt rotation of drive roll 257 of conveyor C. The extent to which the wrappers are advanced by conveyor C for each cycle of the machine is adjustable by change in the aforesaid angular relation between the cams 245, 246.

As exemplary of a preferred cycle of operation, reference is made to Fig. 21, a self-explanatory diagram which shows the timing of conveyor C

and other significant elements of the wrapper-coating and tab-applying mechanism herein described. Because the cams which control the starting and stopping of conveyor C, the feeding of tabs, and the feeding of wrappers are all on the common one-cycle shaft 222, there is no possibility their timing relations will vary because of lost motion or backlash and so undesirably alter the dimensions or locations of the tabs on the wrappers.

When the bridge 92 is in operating position, Fig. 1, the coated distributing roll 104 of the tabbing unit is immediately adjacent the coated distributing roll 1. The adhesive on roll 104 for application to the tabs is preferably tackier than the adhesive on roll 1 for application to the wrappers; this result is obtained with the arrangement shown in Fig. 1 by heating the tabbing adhesive in pan 139 from or by the wrapper-adhesive in pan 139A. The latter pan is in turn supported by plate 261 with its bottom immersed in water heated to suitable temperature by electric heater 262 which extends through the water-pan 265.

During normal operation of the machine, hot glue from pan 139A is pumped therefrom at suitable rate, as by the valveless pump disclosed in aforesaid Rider Patent 1,857,260, to maintain the fountain of adhesive 263 between roll 1 and the doctor roll 264 which is adjustable to predetermine the thickness of the coating of adhesive transferred by roll 1 onto the wrappers. The excess adhesive removed from the ends of roll 1 by scrapers 282 is directed by them into pan or reservoir 139 to serve as the cooler tabbing adhesive fed to distributor roll 104 by agitator roll 137. Scrapers 283 at the ends of rolls 104, 137 return excess tabbing adhesive to reservoir 139.

When it is desired, as at the end of a day's run, to clean the adhesive-coated rolls and the stripping knives 2, 119, the pans 139, 139A and 265 are lowered by releasing latch 266, Fig. 1, which normally holds them in raised position by locking the parallel-motion linkage comprising levers 267, 268 and link 269 in the position shown in Fig. 1; the two glue pans 139, 139A are then retracted from beneath the glue rolls by operation of crank 270 whose shaft 271 threadably engages the rear wall of the water pan 265. Valve 272 is then opened to allow flow of cleansing fluid, water, through inlet pipe 273 and heat-exchange coil 274 to the spray-pipe 275 extending between the side frames 7, 7 of the machine and having orifices for directing a multitude of jets, Fig. 8, into the bight of rolls 104, 137 which continue to rotate during their cleaning. The used wash water falls into the pan 265 having a drain spigot or plug, not shown. To clean the rolls 1 and 264, the valve 276 is opened to supply heated water to nozzle 277 at the end of flexible hose 278 manipulated by the operator after removal from clip 279. The excess or used wash water from these rolls also falls into pan 265.

When operation of the machine is to be resumed, handle 270 is turned to restore glue pans 139 and 139A to position beneath the glue rolls and then handle 280 is depressed to raise the whole assembly comprising pans 265, 139 and 139A to the position shown in Fig. 1.

What we claim is:

1. Apparatus for applying tabs to wrappers comprising means for feeding wrappers to a tabbing station, means for feeding tabs to said station for application to the wrappers comprising feed rolls, means for intermittently moving said rolls relatively toward each other concurrently to engage opposite faces of a tab, and driving means for effecting rotation of said rolls, and means responsive to failure of said first-named means to feed a wrapper temporarily to disable said driving means to preclude feed of a tab when said intermittent means moves said rolls into engagement therewith.

2. Apparatus for applying tabs to wrappers comprising suction means for engaging wrappers to be tabbed, means for feeding tabs for application to the wrappers, and pressure-responsive means effective upon non-engagement of a wrapper by said suction means or upon failure of the source of suction to prevent feed of tabs by said feeding means.

3. Apparatus for applying tabs to wrappers comprising tab-feeding means including feed rolls, driving means therefor, a clutch between said driving means and said feed rolls comprising disengageable clutch members normally continuously engaged to effect continuous rotation of said feed rolls, wrapper-feeding mechanism, and means for effecting disengagement of said clutch members responsive to failure of said mechanism to feed a wrapper.

4. Apparatus for applying adhesive-coated tabs to wrappers comprising a conveyor, an adhesive-coated member, means including said member for feeding tabs and wrappers to said conveyor, and means responsive to failure of feed of a wrapper to said member for precluding delivery of coated tabs alone to said member in avoidance of fouling of the conveyor by the coated tabs.

5. Apparatus for applying adhesive-coated tabs to wrappers comprising a conveyor, an adhesive-coated roll, mechanism for feeding wrappers to said roll, mechanism for feeding tabs to said roll, means for diverting coated tabs and wrappers from said roll onto said conveyor, and means for preventing delivery of coated tabs, without wrappers, to said conveyor comprising means for precluding operation of said second-named mechanism in response to failure of said first-named mechanism to feed a wrapper.

6. Apparatus for applying tabs comprising a tabbing head having at least one rockshaft, stationary structure, means for operating said rockshaft including an oscillatable clutch member supported by said stationary structure, structure carrying said tabbing head movable with respect to said stationary structure, and a clutch member movable with said movable structure which by movement in one direction effects engagement of said clutch members for operation of said rockshaft by said operating means and which by movement in another direction effects disengagement of said clutch members and affords access to said tabbing head.

7. Apparatus for applying tabs comprising separable feed rolls intermittently engaging a strip of tab material to advance it in one direction, and means preventing movement of said strip in reverse direction when said rolls are separated comprising a movable member biased to move in said reverse direction, and stationary structure defining a convergent aperture limiting movement of said member in said reverse direction and forcing it against said strip.

8. Tabbing apparatus comprising an adhesive-coated roll, structure for supporting said roll, a transfer roll for transporting tabs to said adhesive-coated roll, and a support for said transfer roll mounted for movement with respect to said structure to afford access to said rolls.

9. Tabbing apparatus comprising an adhesive-coated roll, structure for supporting said roll, a transfer roll for receiving tabs, stripper members for deflecting the tabs from said transfer roll onto said adhesive-coated roll, and a support for said transfer roll and said stripper members mounted for movement with respect to said structure to afford access to said stripper members.

10. Tabbing apparatus comprising an adhesive-coated roll, structure for supporting said roll, a transfer roll for transporting tabs to said adhesive-coated roll, a roll for supplying said transfer roll with adhesive, and a common support for said transfer and supply rolls mounted for movement with respect to said structure to afford access to all of said rolls.

11. Tabbing apparatus comprising an adhesive-coated roll, structure for supporting said roll, mechanism for forming tabs from strip material, a transfer roll for receiving tabs from said mechanism, stripper members for deflecting the tabs from said transfer roll onto said coated roll, and a common support for said mechanism, said stripper members and said transfer roll mounted for movement with respect to said structure to afford access to said rolls, said stripper members and said mechanism.

12. Apparatus for tabbing wrappers comprising means intermittently operable to feed wrappers, means intermittently operable to feed tabs for engagement with the wrappers, a member controlling the timing of the operations of said wrapper-feeding means, a member controlling the timing of the operations of said tab-feeding means, and movable structure supporting said timing members for movement in unison in avoidance of mistiming between said wrapper-feeding means and said tab-feeding means.

13. Apparatus for tabbing wrappers comprising means intermittently operable to feed wrappers, means intermittently operable to detach tabs from strip material for delivery into engagement with said wrappers, a member controlling the timing of the operations of said wrapper-feeding means, a member controlling the timing of the operations of said tab-detaching means, and movable structure supporting said timing members for movement in unison in avoidance of mistiming between said wrapper-feeding means and said tab-detaching means.

14. Apparatus for tabbing wrappers comprising means intermittently operable to feed wrappers, means intermittently operable to feed a strip of tabbing material, means intermittently operable to sever said strip to detach tabs therefrom for delivery into engagement with said wrappers, members for timing the operations of said wrapper-feeding means, said strip-feeding means and said strip-severing means, and movable structure supporting said timing members for movement in unison in avoidance of mistiming.

15. Tabbing apparatus comprising a conveyor, means operable to feed a strip of tabbing material, means operable to sever said strip to detach therefrom tabs received by said conveyor, a one-cycle shaft, and means for controlling the timing of the operation of said conveyor, of said strip-feeding means and of said strip-severing means comprising members mounted upon said shaft for movement in unison.

16. Wrapper tabbing mechanism comprising means for feeding a strip of tab material, means for severing said strip of tab material, means for feeding a wrapper, means for operating said strip-feeding means and said strip-severing means to provide tabs applied to the leading and trailing portions of said wrapper during feed thereof, and means for operating said strip-feeding means and said strip-severing means to provide a tab applied to the wrapper during its feed intermediate said leading and trailing portions thereof.

17. Tabbing apparatus comprising means operable to feed a strip of tabbing material, structure movable to and from a position effecting operation of said feeding means, rotatable members, arcuate cam members respectively pivoted to said rotatable members sequentially to engage said structure, and an abutment supporting said cam members for part of each revolution of said rotatable members to determine the extents of the periods during which said cam members maintain said structure in said position.

18. Tabbing apparatus comprising means operable to feed a strip of tabbing material, structure operable to sever the strip to detach tabs from the strip, structure movable to control actuation of said strip-feeding means and of said severing structure, rotatable members, arcuate cam members respectively pivoted to said rotatable members sequentially to engage said control structure, and an abutment for supporting said cam members for part of each revolution of said rotatable members and adjustable concurrently to vary the lengths of tabs successively formed from said strip.

19. Tabbing apparatus comprising means operable to feed a strip of tab material and detach tabs therefrom, structure movable to control the operation of said means, members rotatable about a common axis, arcuate cam members respectively pivoted to said rotatable members sequentially to engage said control structure, and an abutment for supporting said cam members for part of each revolution of said rotatable members and adjustable angularly about said axis concurrently to vary the lengths of tabs successively detached from said strip.

20. Tabbing apparatus comprising a pair of feed rolls on opposite sides of a strip of tabbing material, means intermittently operable to effect relative movement of said rolls toward and from clamping engagement with said strip, and a plurality of means respectively individual to said rolls continuously to drive them independently of each other in avoidance of differences between extents of strip fed for successive operations of said intermittently operable means.

21. Tabbing apparatus comprising an adhesive-coated roll, stationary structure for supporting said roll, a transfer roll for transporting tabs to said adhesive-coated roll, a third roll for supplying adhesives to said transfer roll, a common support for said transfer and supply rolls mounted for movement with respect to said structure movable away from operative position to another position for access to said rolls, and a spray header supported by said stationary structure disposed to direct jets of cleaning liquid into the bight of said transfer and third rolls when their said common support is in said operative position.

22. A machine for applying tabs to wrappers comprising a member operable in each cycle of the machine to engage and hold the end wrapper of a stack thereof, means for feeding tabs for application to the wrappers, and means responsive to failure of said member in any cycle of said machine to engage or hold a wrapper ef-

fective to disable said tab-feeding means at least until said member again engages and holds a wrapper.

23. A machine for applying tabs to wrappers comprising tab-feeding means, driving means therefor, a clutch between said driving means and said tab-feeding means including disengageable members, wrapper feeding means including structure movable from and toward engagement with the end wrapper of a stack and a member movable in unison therewith, and means for effecting relative movement of said disengageable members comprising a second member movable into the path of said first member upon failure of said structure to engage a wrapper.

24. A machine for applying tabs to wrappers comprising tab-feeding means, mechanism including disengageable clutch members for effecting operation of said tab-feeding means, wrapper-feeding means including structure movable cyclically toward and from engagement with the end wrapper of a stack, mechanism operative in each cycle of said structure to effect disengagement of said clutch members in event of failure of said structure to engage a wrapper, and mechanism operative in each cycle of said structure to effect re-engagement of said clutch members in anticipiation of engagement by said structure with a wrapper in its next cycle.

25. Wrapper tabbing and coating comprising a roll for applying heated liquid-adhesive to wrappers and to the box-engaging faces of tabs on the wrappers, a second roll for applying adhesive to the wrapper-engaging faces of the tabs, and means for supplying to said second roll liquid-adhesive which is cooler than the adhesive supplied to the first-named roll comprising means for collecting excess adhesive at the end of said first-named roll, and means for distributing aforesaid collected adhesive on the surface of said second roll.

26. Apparatus for applying adhesive to sheets comprising, in combination with a sheet-coating mechanism including a sheet-engaging roll and a roll for transferring adhesive to said sheet-engaging roll, a system for supplying adhesive to said transfer roll comprising a container for the adhesive supplied to said transfer roll, a container for liquid in contact with first-named container transmitting heat to the adhesive in said first-named container, means for heating said liquid, a spray head adjacent and for delivering cleansing fluid to said sheet-engaging and adhesive transfer rolls, means for delivering cleansing fluid to said spray head, and means for heating said cleansing fluid associated with said liquid heating means.

THEODORE A. FEDERWITZ.
HANS GROTEWOLD.