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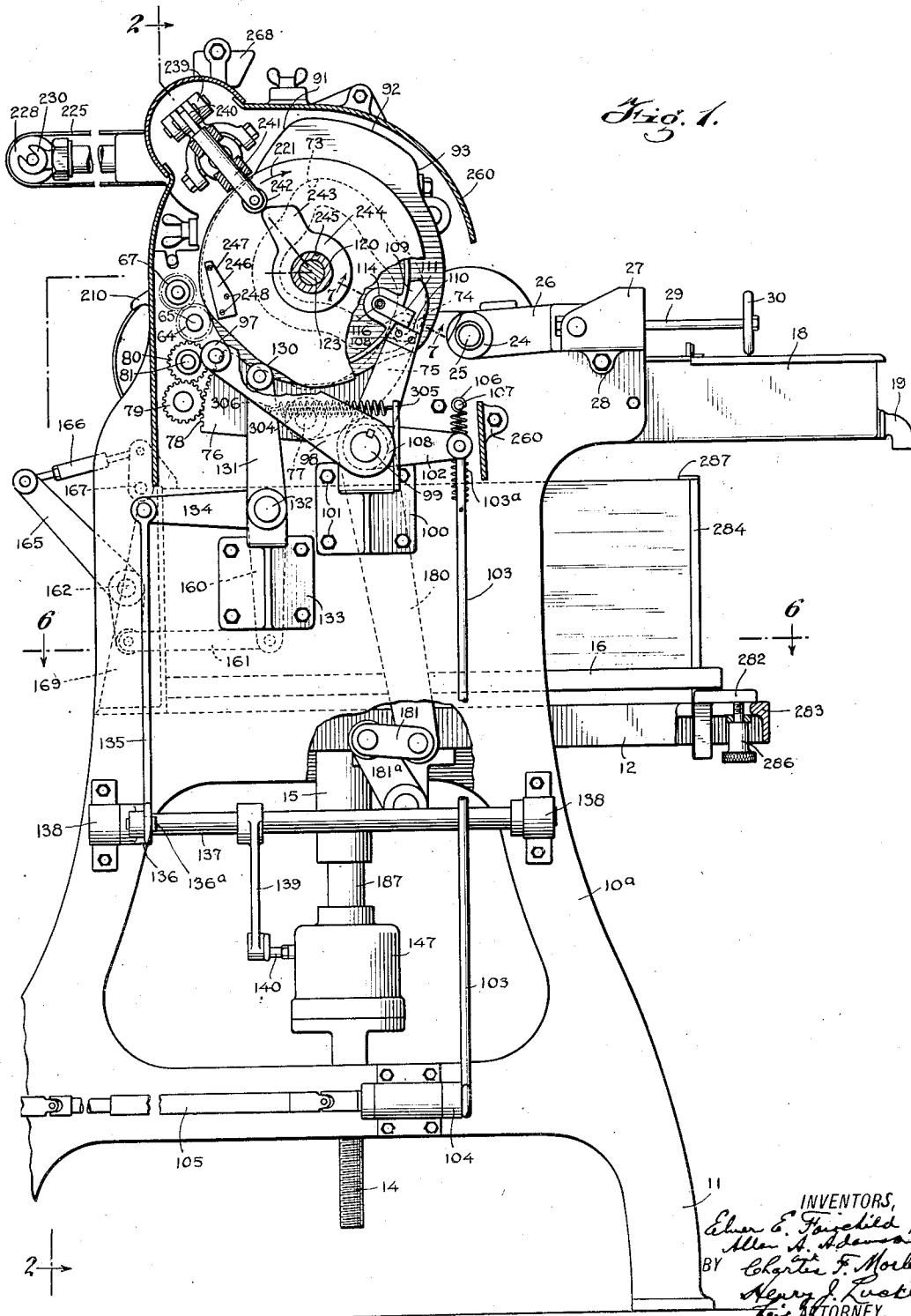
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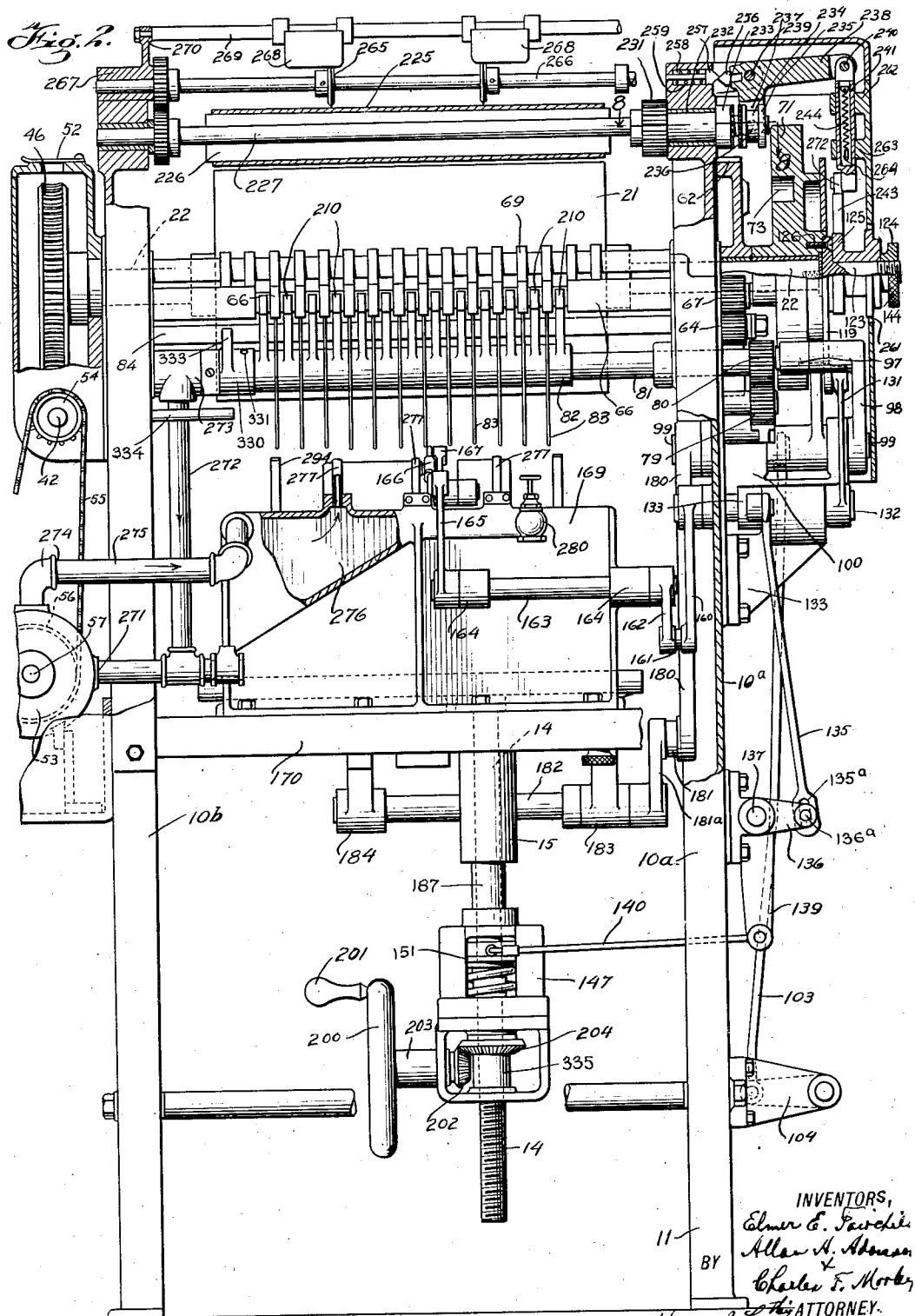
SHEET FEEDING MECHANISM

Filed Nov. 12, 1924

6 Sheets-Sheet 1



6 Sheets-Sheet 2



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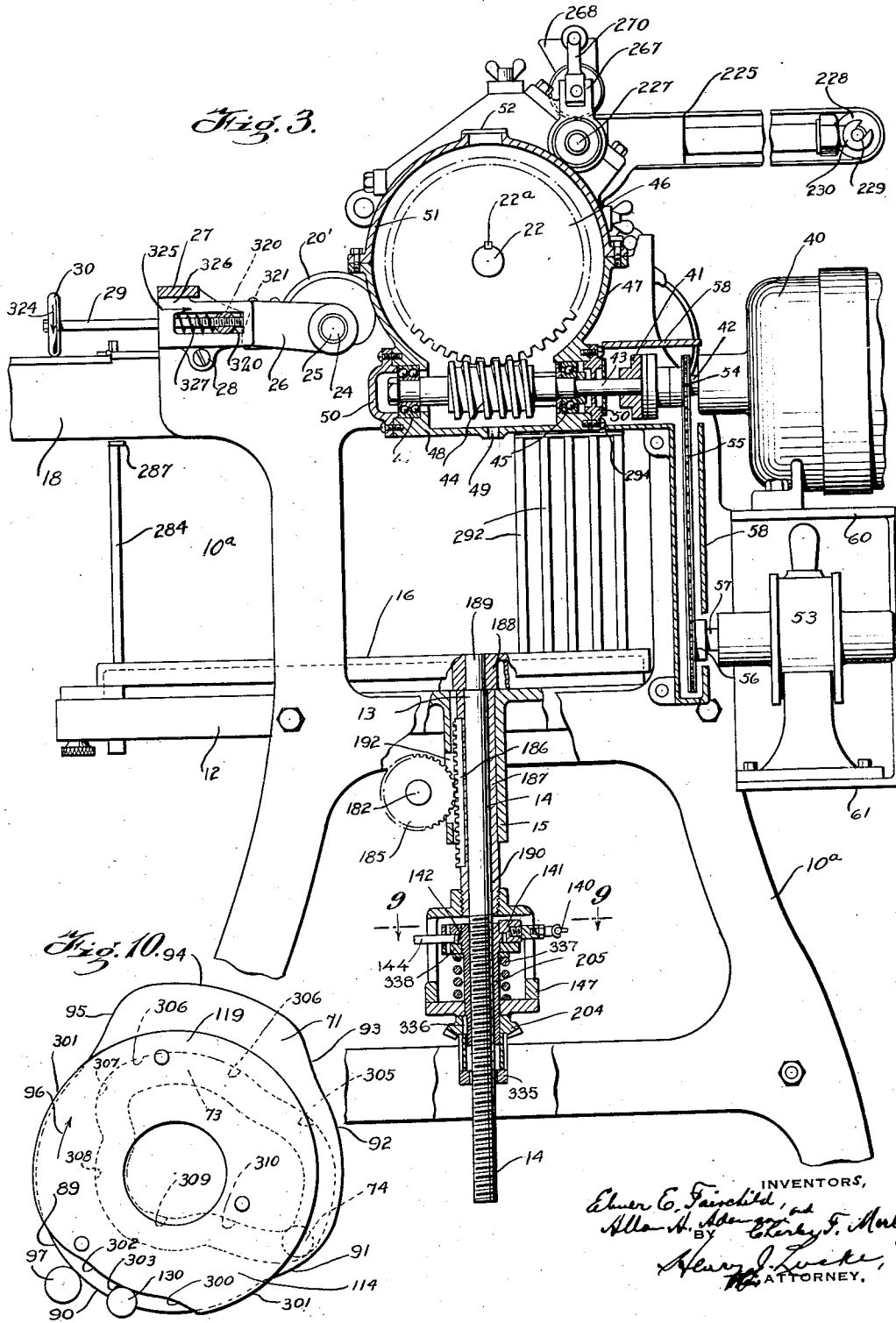
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SHEET FEEDING MECHANISM

Filed Nov. 12, 1924

6 Sheets-Sheet 3



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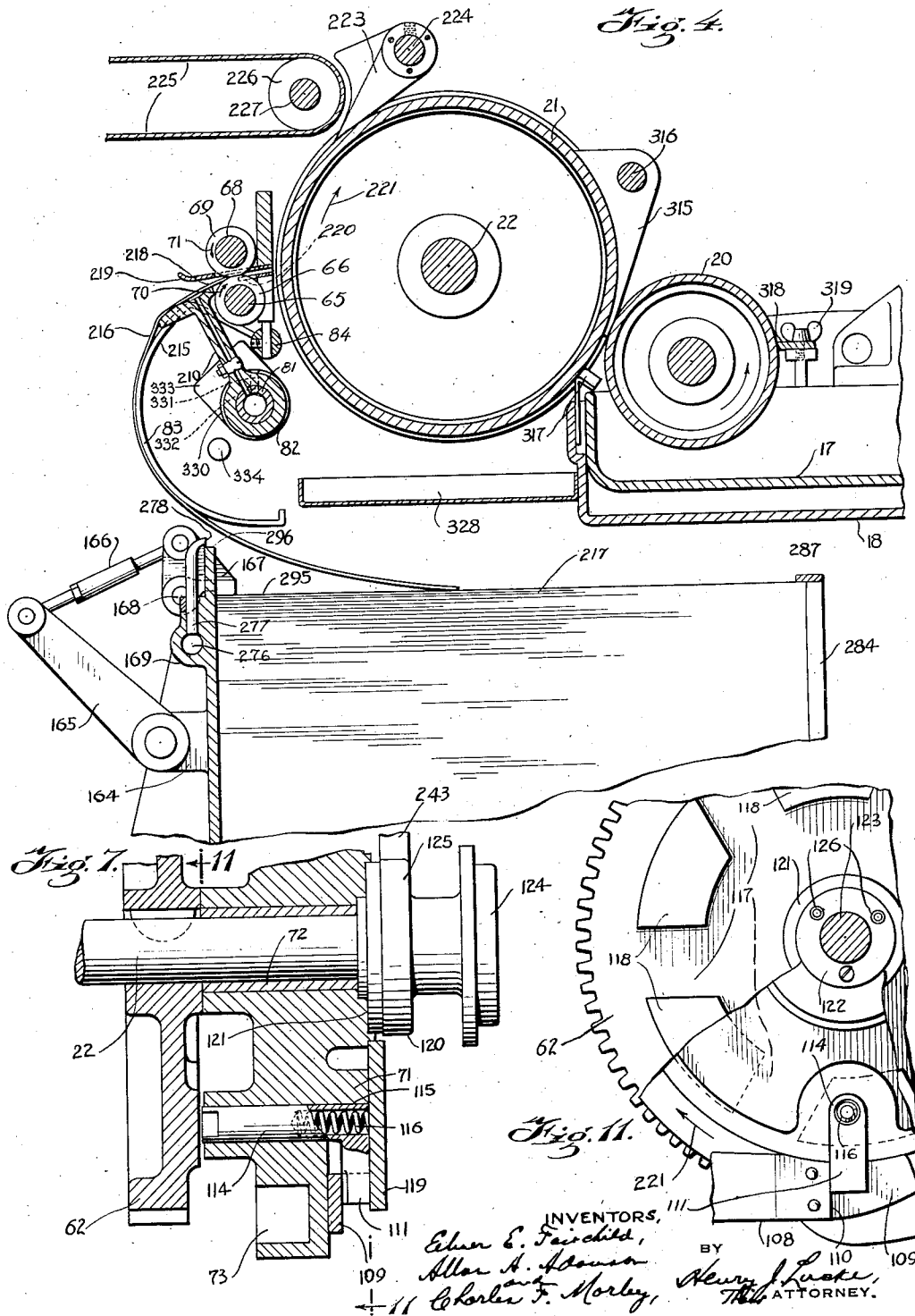
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SHEET FEEDING MECHANISM

Filed Nov. 12, 1924

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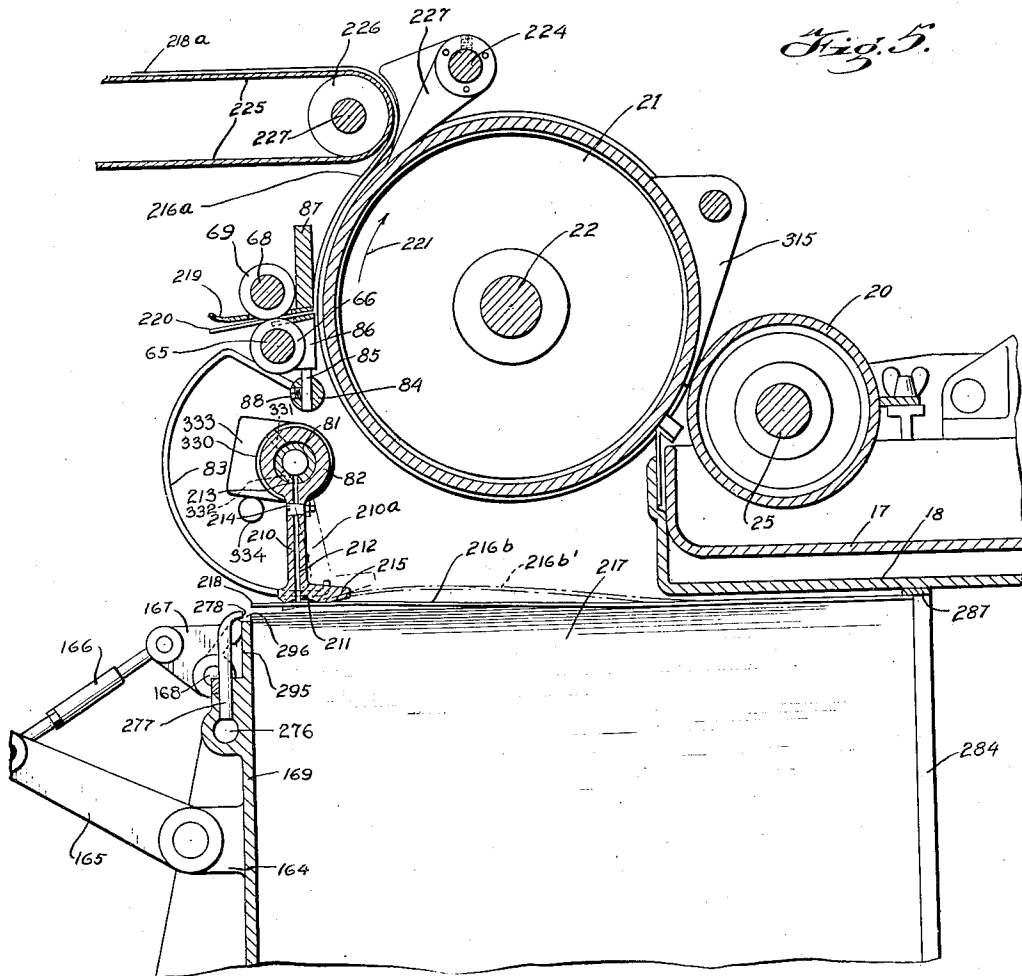
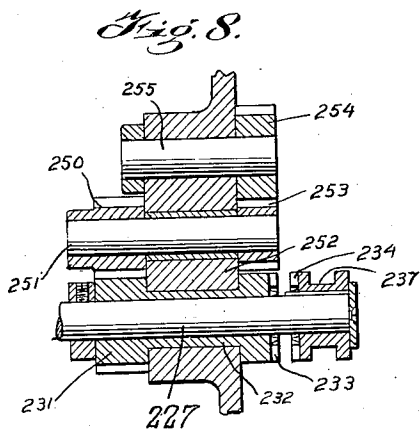
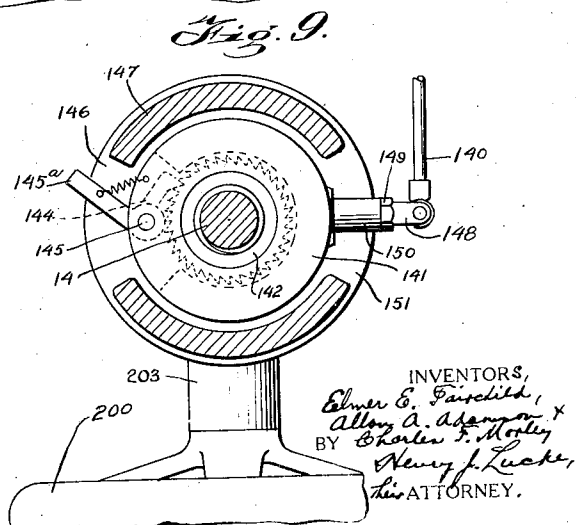
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SHEET FEEDING MECHANISM

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6 Sheets-Sheet 5



UNITED STATES PATENT OFFICE.

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SHEET-FEEDING MECHANISM.

Application filed November 12, 1924. Serial No. 749,403.

This invention relates to sheet feeding mechanism.

An object of the invention is to provide a feeding mechanism for feeding sheets of various character of paper stock applicable as wrappers, covers, labels and the like to gluing machines, printing machines and the like, whereby the sheets are fed definitely one at a time.

A further object of the invention is to provide a sheet feeding mechanism which is self-adjustable for sheets of various thickness and varying conditions of stacking.

A further object of the invention resides in improved means for stacking a superposed pile of wrappers or like sheets, combined with height determining means for definitely locating the position of the topmost sheet in predetermined relation to the suction finger means for removing the topmost sheet from the stack.

A further feature of the invention resides in the combination of means including a movable support for the stack of wrappers or the like, actuated by suitable raising and lowering means, preferably under control of the height determining means, whereby upon removal of the topmost sheet from the stack, the support and therewith the stack are depressed and displaced from the topmost sheet. In such preferred form of our invention the control by the height determining means of the stack is effective at a stage when the stack has reached a status of relative quiescence, and suitable means is provided to thereafter remove the height determining means out of the path of movement of the support and stack and the path of removal of the topmost sheet.

Coacting with the suction fingers, the preferred form of our invention embodies suitable auxiliary pneumatic blast means to facilitate the separation of the topmost sheet from the next and lowerly disposed sheets. Such auxiliary pneumatic separating means is preferably mounted in fixed relation to suitable aligning means for the lateral edges of the stack, thereby locating the aligning means substantially fixed within the region of the initial contact of the suction removing means with the topmost sheet.

Such pneumatic means further serves to riffle the topmost sheet upon attainment of the stack to its maximum height and thereby

effect contact with the suction removing means when the latter is at its lowermost position, and in furtherance of such object a predetermined spacing between the position of the suction removing means is selected, say, for the usual character of paper stock used for wrappers, a $\frac{1}{8}$ of an inch, thereby effecting with greater certainty the positive removal of the topmost sheet from the stack to the suction removing means notwithstanding high speeds of operation of the feeding mechanism.

The preferred form of our invention comprises a table for vertically supporting the stack of sheets, a cam for controlling the actuation of the table, suction means for removing the topmost sheet to the glue roll, said cam operating to move the topmost sheet of the stack approximately $\frac{1}{8}$ of an inch from the suction means when the suction means is in its lowermost position, an aligning plate supported fixedly relatively to the frame of the machine for maintaining in alignment the edges of the sheets on one side of the stack, a height determining finger pivotally mounted on the aligning plate, ratchet mechanism for modifying the control of the cam in the actuation of the table, a second cam controlled by the height determining finger and controlling the ratchet mechanism for regulating the position of the top sheet of the stack when the stack is moved to the suction removing means, said second-named cam operating also to move the height determining finger to its operating position when the top sheet and the stack are in substantial quiescence and for further moving the height determining finger to its non-operating position and out of range of the path of the movement of the stack to its position for the removal of the topmost sheet by the suction means, pneumatic blast means for riffing the topmost sheet into contact with the suction removal means, said blast means being fixedly positioned upon the top edge of the aligning plate, a cam for controlling the movement of the suction means in proper timed relation for the removal of the topmost sheet from the stack to the glue roll and for imparting to the suction means an additional movement simultaneously with the action of the pneumatic blast means for mechanically separating the topmost sheet from any lower

sheet, the aforesaid cam for controlling the actuation of the table imparting an abrupt lowering of the table at the stage of separation of the topmost sheet from the stack, a conveyor for transferring the glued sheet to the wrapping, printing or other machine, cam means for controlling the starting and stopping of the conveyor and adjustable for different lengths of sheets and tripping mechanism for setting the aforesaid cams into operation and automatically stopping the aforesaid cams upon each removal of the successive top sheets from the stack.

Further features and objects of the invention will be more fully understood from the following detail description and the accompanying drawings, in which—

Fig. 1 is a side elevation of a gluing machine provided with a sheet feeding mechanism embodying one form of our invention; the upper portion of the view is partially shown in vertical section;

Fig. 2 is a sectional elevation on line 2—2 of Fig. 1;

Fig. 3 is a side elevation taken on the opposite side of Fig. 2, and showing the driving parts of the main glue roll and the stack supporting table and its screw shaft and operating parts in central vertical section;

Fig. 4 is a detail vertical sectional view on an enlarged scale of the assembly of the main glue roll, the glue pan and feed glue roll; this figure shows the suction finger means removing a topmost sheet from the stack, and also the position of the height determining means in operative relation to the stack;

Fig. 5 is a detail vertical sectional view on an enlarged scale similar to Fig. 4, but showing the height determining means removed to its non-operative position, the suction finger means in its lowermost position and the blast means riffling the topmost sheet into contact with the suction finger means;

Fig. 6 is a sectional elevation on a somewhat enlarged scale taken on line 6—6 of Fig. 1;

Fig. 7 is a sectional elevation on an enlarged scale taken on line 7—7 of Fig. 2;

Fig. 8 is a sectional elevation on an enlarged scale taken on line 8—8 of Fig. 2;

Fig. 9 is a sectional elevation on an enlarged scale taken on line 9—9 of Fig. 3;

Fig. 10 is a detail face view of the multiple cam controlling the table and associated parts;

Fig. 11 is a sectional elevation on line 11—11 of Fig. 7; and

Fig. 12 is a detail top plan view of one side of the glue pan, the feeding glue roll and associated parts.

Referring particularly to Figs. 1, 2 and 3, the machine as a whole is mounted on suitable oppositely disposed open frame mem-

bers 10^a, 10^b, having suitable feet 11. The horizontal open bed 12, is bolted or otherwise secured to and between the frame members 10^a, 10^b, and is provided with a central opening 13 through which extends the helically threaded or screw shaft 14 and its enclosing collar 15 of the vertically movable table 16 on which is stacked the wrappers or like sheet material.

The glue pan is indicated at 17, see Figs. 1, 3, 4 and 5; and is disposed within the container 18 for enclosing steam, heated water or water to be heated by an electrical coil (not shown) for controlling the temperature of the glue in the glue pan 17. The feeding glue roll 20 is partly immersed in the glue pan 17, i. e., a suitable distance below the glue level; the shaft of the feed glue roll 20 is suitably mounted in adjustable opposite bearings as is described more fully hereinafter.

The main glue roll is indicated at 21, see Figs. 2, 4 and 5, and is grooved circumferentially; its shaft 22 is journaled at its opposite ends in the bearings 23, 23, carried in the opposite frame members 10^a, 10^b.

The opposite bearings 24, 24 of the shaft 25 of the feed glue roll 20 are respectively mounted, see Figs. 1, 3 and 12, in the oppositely disposed bearing bars 26, 26, respectively slidable in the pivot bearing blocks 27, 27, secured at 28, 28, respectively to the opposite frame members 10^a, 10^b, to permit adjustment by means of the screw shafts 29, 29, respectively having the hand wheels 30, 30, whereby to regulate the clearance between the periphery of the feed glue roll 20 and the periphery of the main glue roll 21, and thereby regulate the thickness of the coating of glue applied by the feed glue roll 20 to the main glue roll 21. Upon rotation of the hand wheel 30, see Figs. 3 and 12, namely, in the direction of the indicated arrow, the glue feed roll 20 is moved toward the main glue roll 21.

The main glue roll 20 is driven by the motor 40, see Fig. 3, through the coupling 41 secured to the motor shaft 42; the coupling 41 is directly attached to the shaft 43 of the worm 44, mounted in the opposite ball bearings 45, 45. The worm 44 meshes with the teeth of the main drive gear 46.

Preferably, the worm 44, its bearings 45 and the main drive gear 46 are enclosed within a casing 47 to preclude leakage of lubricant and to effect complete lubrication economically. The casing 47 is shown formed of the hollowed based portion 48, having a drain plug 49 and oppositely disposed caps 50, 50, secured by screws or the like for affording access to the ball bearings 45, 45; the casing 47 further comprises the sectional upper circular portion, the top of which is provided with a spring filling cap 52.

The motor 40 is employed also for driving the rotary air exhaust and blast pump 53 through the intermediation of the sprocket gear 54, see Figs. 2 and 3, keyed on the shaft 42 and the sprocket chain 55 passes about the sprocket gear 54 and the sprocket gear 56 on the shaft 57 of the rotary air pump 53. The guard 58 encloses the coupling 41 on the motor shaft 42 and also the sprocket chain 55 and sprocket gears 54 and 56.

The main gear 46 is removably secured on the shaft 22 of the main glue roll 21 as by means of the key 22^a, see Fig. 3.

The motor 40 and air pump 53 are suitably mounted on platforms 60, 61, bolted at the rear of and to the frame members 10^a, 10^b.

At the opposite end of the shaft 22 of the main glue roll 21 is keyed a large gear 62, the teeth of which mesh with an intermediate gear (not shown), in turn meshing with the gear 64 on the shaft 65 of the lower set of feed rolls 66, see also Fig. 2. The gear 64 (see Figs. 1 and 2) meshes with the gear 67 on the shaft 68 of the upper set of feed rolls 69. As will be noted from Figs. 4 and 5, the lower set of feed rolls 66 and the upper set of feed rolls 69 are rotated in opposing directions, indicated respectively by the arrow 70 and the arrow 71, and serve to receive the anterior edge portion of the topmost sheet from the suction finger means for delivery to the glued periphery of the main glue roll 21, as set forth more clearly hereinafter.

Referring now to Figs. 2 and 7, the cam 71 is floatingly mounted on the bushing 72 on the shaft 22 of the main glue roll 21, and outwardly of the gear 62. The cam 71 is grooved internally for the cam formation 73, shown in side elevation in Figs. 1 and 10, for controlling the drive of the suction fingers. Coacting with the grooved cam 73 is the roller 74 carried by the tail 75 of the segment 76, suitably pivoted intermediately at 77; the teeth 78 of the segment 76 mesh with the teeth of the gear 79, see also Fig. 2, in turn meshing with the gear 80 on the hollowed shaft 81, on which are mounted the hubs 82 of the suction fingers, which oscillate from their lowermost position shown in Fig. 5 to their uppermost position shown in Fig. 4 as is described more fully hereinafter.

Between the respective suction fingers are disposed the spaced, curved track members 83, supported by the horizontal bar 84, see Figs. 4 and 5, adjustably positioned on the pins 85 carried at the lowerly portion 86 of the tension bar 87. The adjustment of the bar 84 relative to the pins 85, is attained by means of set screws 88.

As will be noted from Fig. 10, the cam 71 is also machined at its periphery 89 to

have the cam formation for controlling the movement of the stack supporting table. The cam 89 comprises the substantially circular portion 90, the slowly rising portion 91, leading to the substantially circular portion 92, thence to the slowly rising portion 93, thence to the substantially circular portion 94, thence to the abruptly depressing portion 95 and leading to the aforesaid substantially circular portion 90. As is indicated in Fig. 10, the cam 71 is rotated in the direction of the arrow 96. On the cam face 89 rides the roller 97, see Figs. 1 and 10, of the angular lever 98 keyed to the stud 99, journaled in the bearing bracket 10^a, attached to the frame member 10^a as by the bolts 101. The joint control by the cam 71 of the movement of the stack supporting table 16 and the actuation of the suction fingers is described more fully hereinafter.

The preferred form of our invention provides for the tripping of the feeding mechanism for each sheet delivered by the feeding mechanism to the wrapping machine or other associated machine. On the stud 99, see Fig. 1, is loosely pivoted the bell crank lever 102, the horizontal arm of which is pivotally connected to the link 103 arranged to be tripped by a treadle or like control device from the wrapping or other machine to which the sheets are fed one at a time; the link 103 is shown connected to the arm 104 operated by the universal coupling 105. The trip link 103 is biased upwardly by the retractile spring 103^a, whose fixed end 106 is hung from the pin 107, projecting from the frame member 10^a, whereby upon release of the treadle or other control device the link 103, and bell crank 102 are returned to their upward positions as indicated in full outline in Figs. 1 and 11.

The upper arm 108 of the bell crank lever 102 carries a forward extension plate 109, secured at the side, as indicated in Figs. 1, 7 and 11; the end face 110 of the arm 108 serves as an abutment for the finger piece 111 of the barrelled pin 114, slidingly carried in the recess 115 of the cam 71 and normally biased by the expansive, coiled spring 116 toward the gear 62 to effect locking of the gear 62 with the cam 71. Upon engagement of the pin 114 with any of the recesses 117 between the spaced lugs 118 on the face of the gear 62, the cam 71 is rotated by the gear 62 for a full turn, namely until the pin 114 upon being carried within and by the cam 71 is retracted from engagement with such recess of the gear 62 by the extension plate 111 at the free end 109 of the lever 108, thereby providing for a single full turn of the cam 71 for each tripping of the trip lever 103, referred to more fully hereinafter.

Outwardly of the cam 71, see Figs. 2 and 7 is located the edge face cam 119 of the

height determining finger and controlling the ratchet mechanism for adjusting the table 16 relative to the table actuating mechanism, as is described more fully hereinafter. The cam 119 is provided with a circular opening 120 substantially at its center for mounting on the outwardly projecting hub portion 121 of the cam 71. The cam 119 is positioned relative to the cam 71 by means of screws or the like.

It will be noted from Fig. 7 that the cam 119 is utilized as an abutment for the spring 116 of the barrelled pin 114 and as a stop for the outward movement of the pin 114.

To the hub 121 of the cam 71 is secured the base 122 of the stud 123 threaded at its outer end to mesh with the inner threading of the knurled nut 124. On the stud 123 is loosely mounted the thimble 125, carrying a cam for disconnecting the drive of the conveyor belt, which serves to deliver the glue coated wrappers from the main glue roll 21 to the wrapping machine, as is set forth in detail hereinafter. The base 122 is secured by screws 126 to the hub 121.

The control by the cam 119 of the ratchet mechanism is attained by the roller 130 riding on the cam 119 and carried by the free end of the arm 131, see Figs. 1, 2 and 10, keyed to the stud 132, suitably journaled to the frame member 10^a, by means of the bracket 133; the arm 134 is keyed to the stud 132, see Fig. 1; the free lower end of arm 132 is pivotally connected by the link 135, through its slot 135^a and the pin 136^a to the arm 136, secured to the shaft 137, journaled in the opposite bearings 138, 138, carried by the frame member 10^a. To the shaft 137 is splined the arm 139 pivotally connected by the link 140 to the pawl block 141, see Fig. 9, coacting with the ratchet gear 142, keyed to the screw shaft 14 of the stack supporting table 16, see Figs. 2, and 3. The pawl 144, see also Fig. 9, is pivoted at 145 to the pawl block 141, and biased by the usual spring. The pawl 144 is provided with an extension 145^a projecting through the slotted opening 146 of the cage 147, to afford manual release of the pawl 144 from the teeth of the ratchet gear 142 when desired. It will be noted from Fig. 9 that the connection of the link 140 with the ratchet block 141 comprises a threaded stud 148 locked by the nut 149 in the internally threaded pin 150 which projects through the slotted opening 151 in the cage 147.

The connection of the cam 119 with the height determining means is attained by the arm 160 keyed to the stud 132 and connected through the link 161 to the lever arm 162, see Figs. 1 and 2, keyed to the shaft 163, journaled in the bearing brackets 164, 164; the shaft 163 is keyed to the lever arm 165 connected at its outer end through the turn-buckle 166 with the height determining fin-

ger 167. The height determining finger 167 is shown of the pivotal type, namely as pivoted on the pivot lug 168, see Figs. 4 and 5, carried by the plate 169. The plate 169 serves as an aligning plate for the forward or anterior edges of the stack of sheets, and serves also to support the pivot bearing brackets 164, 164. The plate 169 is supported, see Fig. 2, fixedly relatively to the opposite frame members 10^a, 10^b, as by means of the cross bar 170.

It will be observed that the lever arm 131 is thereby controlled by the height determining finger 167 for those periods of movement of the arm 131 afforded by the corresponding movement of its roller 130 on the depressed portions of the cam 119, see Fig. 10. Such movement of the arm 131, see Fig. 1, effects corresponding movement of the lever arm 134 and its linkage with the pawl block 141 within the ratchet cage 147. As will be shown more fully hereinafter, such depressed portions of the cam 119 are traversed by the roller 130 during the stage intermediate the removal of the topmost sheet and the subsequent removal of the next topmost sheet and the cam 119 includes a raised cam portion during the period of initial contact of the suction cups with a topmost sheet and the upward movement of the suction cups with such topmost sheet for moving and holding, see Fig. 5, the height determining finger 167 out of the path of removal of the topmost sheet from the stack by the suction fingers, as is explained more fully hereinafter.

The actuation of the table 16 by the cam face 89 of the cam 71 is afforded by the long lever arm 180, keyed to the stud 99, see Figs. 1 and 2 connected by the link 181 to the arm 181^a keyed to the shaft 182 mounted in the end brackets 183, 184; the spur gear 185, see also Fig. 3, is keyed to the shaft 182 and meshes with the teeth of the rack 186 for raising and lowering the screw shaft 14 of the table 16. The rack 186 formed in the collar 187 extending upwardly to engage the socket 188 to control the position of the table 16. The socket 188 receives fixedly the reduced end 189 of the screw shaft 14, of the table 16. The collar 187 extends downwardly and is threaded at its end 190 in fixed relation to the casing 147 of the pawl and ratchet mechanism.

The roller 97 is held continuously in contact with its cam face 89 by the weight of the stack 217 and its supporting table 16.

The collar 187 is preferably enclosed within the outer collar 15 carried by and depending from the fixed bed 12. When the table 16 is brought to its lowermost position, it rests upon the fixed bed 12. The collar 15 is slotted at 192 to afford meshing of the spur gear 185 with the rack 186.

When it is desired to manually lower the stack supporting table 16, the wheel 200 is grasped by its handhold 201 and rotated to thereby revolve the beveled gear 202 fixed to the shaft 203, see Fig. 2, thereby rotating the beveled gear 204, splined to the collar 205, see Fig. 3. The collar 205 is fixed to the ratchet gear 142 and thereby rotates the screw shaft 14 corresponding to the direction of rotation of the hand wheel 200.

Referring now to the sheet removing means, as indicated generally above, the same is preferably of the suction type, and comprises preferably a plurality of suction fingers 210, see Figs. 2, 4 and 5. Each suction finger 210 is shown of the cup shape including a pocket 211 communicating with the outer opening of the passage 212 extending through each arm of the suction finger 210; the inner opening of the passage 212 communicates with a perforation 213 in the hollow shaft 81. The adjustable valve plug 214 is provided for each suction finger 210 for regulating the effective suction through the passage 212. Preferably, the foot of each suction finger 210 is elongated at one side as indicated at 215, namely at the right as viewed in Fig. 5, whereby such extension 215 of each suction finger serves to raise the topmost sheet 216, see Fig. 4, outwardly of the guide bars 83 as the topmost sheet 216 is being carried by the suction fingers 210 from a position above the stack toward the main glue roll 21.

The particular mode of removal of the uppermost sheet of the stack by the suction fingers is described more particularly hereinafter, and subsequent to the removal of the topmost sheet marked 216^a in Fig. 5, from the stack 217, see Fig. 4, the anterior edge 218 of the sheet 216^b is brought by the suction fingers 210 within the flared upper guide 219 and the lower guide 220 and thence between the lower and upper feeding rolls 66, 69, for conveyance to the surface of the main glue roll 21. The rate of rotation of the surfaces of the feed rolls 66, 69 as is set forth more fully hereinafter, is slightly less than that of the surface of the main glue roll 21, thereby effecting tautness in the sheet during the stage of transfer from the feed rolls 66, 69 to the main glue roll 21 and also to cause a wiping action of the sheet on the glue roll 21. The bar 87 is positioned between the feed rolls 66, 69 and the main glue roll 21 to effect contact with the side of the sheet opposite that to which glue is to be applied and thereby straighten out the sheet. Upon rotation of the main glue roll 21, clockwise as is indicated by the arrow 221, see also Fig. 4, the sheet 216^a is carried upwardly on the periphery of the main glue roll 21 until its anterior edge 218 encounters the pick-off fingers 223, mounted fixedly on the supporting shaft 224

and transferred to the conveyor belt 225. The pick-off fingers 223 project within the grooves of the glue roll 21. The conveyor belt 225 is mounted on the positively driven elongated wooden roll 226 and the idly supported elongated roll 228 whose shaft 229 is carried by the oppositely disposed adjustable bearings 230.

As appears from Figs. 1, 2 and 3, the shaft 227 of the roll 226 loosely carries the gear 231 secured to its collar 232, also loosely mounted on the shaft 227, and at the opposite end of the collar 232 is attached the clutch member 233 coacting with the clutch member 234, which latter is keyed to the shaft 227 by a slotted key connection. The clutch member 234 is provided with an annular groove 235 receiving the roller 236 carried by the arm 237 of the bell crank lever 238 pivoted at 239; the opposite arm of the bell crank lever 238 is pivotally connected at 240 to the hollow link 241 carrying the roller 242. The roller 242 coacts with the cam 243 mounted on the thimble 125 and locked in adjusted position relative to the cam 71 by means of the knurled nut 124.

The cam 243 serves to determine the instant of disconnection of the belt conveyor 225 from operative actuation, and such cam may be in the form of a cam finger serving as the cam proper carried by its central ring portion 244, see Fig. 1, having an inner opening 245 tightly fitting the thimble 125 loosely carried on the stud 123. As indicated above, the cam 243 is locked in its desired adjusted position by tightening the knurled nut 124, to thereby clamp the thimble 125 to the stud 123.

Suitable means are provided for initiating the operation of the belt conveyor, as by means of the cam 246, Fig. 1, having the cam face 247 on which rides the roller 242 controlling the bell crank lever 236. The cam 246 may be fixedly secured in proper position to be brought into engagement with the roller 242 upon travel of the cams 71 and 119, as by securing the cam 246 by screws 248 on the outer face of the cam plate 119.

The gear 231, see Fig. 8, meshes with the gear 250 keyed to the stud 251 mounted in the bearing 252 and carrying at its opposite end a gear 253 keyed thereto. The gear 253 meshes with the gear 254 mounted on the shaft 255 and meshes with the main drive gear 46, driven by the motor 40 as hereinabove described, whereby the gear 231, its collar 232 and the clutch member 233 are continuously rotated by the main drive gear 46.

To insure full coupling and uncoupling of the clutch members 233 and 234 relative to one another, see Fig. 2, the bell crank lever 235 is provided with the conical pointed pin 256 coacting with a similarly pointed pin 257 disposed in the recess 258 and tensioned outwardly by its coiled spring 259.

The cam 71, cam 119 and cam 243, and their immediately associated parts are preferably enclosed in a guard casing 260, having a suitable opening 261, see Fig. 2, through which projects the thimble 125, to afford manual adjustment of the thimble 125 and thereby set the cam finger 243. The guard casing 260 serves also to carry apertured lugs 262, 263 for aligning the slotted link 241; the pin 264 carried by the lug 263 serves to hold the fixed end of the coiled spring 244.

It will be noted that the pick-off fingers 223 are shaped to reverse the position of the sheet 216^a, see Fig. 5, when being transferred from the main glue roll 21 to the conveyor belt 225, to thereby position the gummed face of the sheet 216^a upwardly and bring the non-gummed face of the sheet 216^a in contact with the belt 225.

As suitable means for insuring the straightening-out of the gummed sheet on the conveyor 225, we provide the spaced rollers 265, see Fig. 2, the shaft 266 of which is positively driven in a suitable bearing 267; associated with each straightening roller 265 is a box 268 for containing a moistened sponge or the like, having in its bottom a slotted opening, through which the peripheral edge of its roller 265 projects to contact with the moistened sponge or the like, whereby the glue or other adhesive adhering to the peripheral edge of the roller 265 is removed to free the peripheral edge of the roller 265 substantially from undue stickiness. The boxes 268 may be hung from a bar carried at its opposite ends in the brackets 270 projecting from the bearing 267.

The air pump 53, see Fig. 2, serves to provide the exhaust for the suction fingers 210 as well as to provide compressed air for the air blast nozzles. The suction port 271 of the air pump 53 communicates through the piping 272 with the chambered block 273, surrounding the open end of the hollow shaft 81, shown at the left in Fig. 2. The opposite end of the hollow shaft 81 is suitably closed in any desired manner.

If desired, suitable means are provided for closing the communication of the chambered block 273 with the hollow tube 81 during the period of travel of the suction fingers 210 from their upward position as shown in Fig. 4 to their lowermost position shown in full outline in Fig. 5, and for restoring suction at the stage of engagement of the topmost sheet 216^b, see Fig. 5, when initiating the stage of removal of the topmost sheet 216^b from the stack 217.

The compressed air discharge port 274, see Fig. 2, communicates through the piping 275 with the air chamber 276, with which the inlets of the air blast nozzles 277 communicate. The air chamber 276 is conveniently formed on the rearward face of the

aligning plate 169. The blast nozzles 277 are shown as three in number, see also Fig. 2, and the outlets 278 of the blast nozzles 277 are positioned closely adjacent the upper edge of the plate 269, see Fig. 5, to thereby direct corresponding number of blasts of air at the front edge of the anterior portion 218^b of the topmost sheet 216^b during the stage of effecting engagement of the topmost sheet 216^b with the suction fingers 210. The outlet valve 280 is provided for the air chamber 276 to relieve excess compression whenever desired.

The table for receiving a stack of sheets may be of the open frame type, as is indicated in Fig. 6, and preferably is provided with adjustable rear and side guides. The adjustable rear guide 281 is shown of the form having a base 282 slidable in the channelled bar 283, and the vertical guide standards 284 extend through the longitudinal, substantially central slot 285. The base 282, see Fig. 1, is clamped in any desired position by means of the knurled set nut 286. The guide standards 284 are preferably provided with a horizontally extending lip 287, at the top and projecting toward the aligning plate 169. The oppositely disposed side guides, 289, 289 are similarly provided with sliding bases 290, 291 respectively, and the opposite sets of vertical guide standards 292 thereof project through the transverse slots 293, at the forward sides of the open frame 16. An inwardly extending lip 294 is provided at the upper end of each set of guide standards 292.

Referring now to the operation of the most preferred form of our invention in respect to the removal of the outermost top sheet from the stack and solely a single sheet at a time, the cam 71 and the cam 119 are properly assembled relative to one another with respect to their effective cam portions and with respect to the pin 114 for coupling the cam 71 and the cam 119 to the main drive gear 62. The proper positions of the cam 71 and the cam 119 and the pin 114 at the instant of tripping the trip lever 102—108 is indicated in Fig. 1. Upon tripping by the operator at the wrapping machine proper or like machine with which our sheet feeding mechanism is associated, the extension 109, see Figs. 7 and 11, of the trip lever arm 108 is withdrawn from engagement with the extension plate 111, whereby the expansive spring 116 of the pin 114 effects coupling of the cam 71 and the cam 119 jointly with the main gear 62 in the direction of the arrow 221, see Fig. 1, and corresponding to the direction of the arrow 221 indicating the rotation of the main glue roll 21 in Figs. 4 and 5. Such coupling effects the actuation of the cams 71 and 119, thereby operating the roller 130 the height determining finger 167 to move the height determining finger 167 to a

position such as is shown in Fig. 4, to be out of the path of movement of the stack 217 and the suction fingers 210. When a stack of sheets is placed on the table 16 is raised manually by turning the hand wheel 200 until the topmost sheet of the stack is slightly below the position of the lowermost or effective face 295 of the height determining finger 167. The clearance between the topmost sheet below the effective face 295 of the height determining finger 167, upon oscillation of the pawl 144 of a tooth spacing of the ratchet gear 142 by the linkage controlling the ratchet mechanism 141-143, raises the collar 187 and therewith the screw shaft 14, table 16 and the stack 217 of sheets until contact is made between the uppermost sheet and the effective face 295 of the height determining finger 167.

It will be noted, see Figs. 1 and 10, that the rising cam portion 300 of the cam 119 controlling the roller 130 provides for the effective stroke of the pawl block 141, while the uppermost sheet is at a position below the upper edge of the aligning plate 164, so that the air blasts discharged through the blast nozzles 278 are wholly ineffective in disturbing the topmost or any lower sheets of the stack 217. The lip 287 of the rear guide standards 284 and similarly the lips 294 of the opposite side guide standards 292 assist in holding the topmost and lower sheets of the stack to preclude any possible displacement.

The cam portion 301 of the cam 119 is substantially circular and obtains for the greater part of the periphery of the cam edge 89 to provide non-operation of the pawl block 141 until the depressed portion 302 is brought in contact with its roller 130 to thereby move the pawl 144 in its stroke. The elevated cam portion 303 provides for effective stroke of a single tooth spacing of the ratchet gear 142.

The roller 130 is retained in contact with its cam 119 by the retractile spring 304 having its fixed end held in the pin 305 and free end secured in a suitable opening 306 in the arm 131.

As set forth hereinabove, the cam 119 serves also to move the height determining finger 167 to its operating position and to its non-operative position; the depressed cam portion 302 effects the movement of the finger 167 to its height determining position and rising cam portion 300 moves the finger 167 to its non-operating position.

It will be further observed that the cam portion 90 of the cam edge 89 cooperate with the roller 97 to hold the table 16, and the stack 217 at the position of cooperation with the height determining finger 167, see Fig. 4, and that the roller 130 encounters its abruptly rising cam portion 300 to move the height determining finger 167 to its non-operating position; see Fig. 5, before the roller

97 encounters its rising cam portion 91 to elevate the table 16 and the stack 217. This cam portion 91 raises the top of the stack to approximately the top edge of the aligning plate 169, the face of the aligning plate maintaining the anterior edges of the stack in alignment. The further rising cam portion 93 effects further elevation of the table 16 and the stack 217, the final elevating cam portion 93 raises the top sheets of the stack above the edge of the aligning plate 169. The circular cam portion 94 holds the stack 217 at its maximum position while the suction fingers 210 are in their lowermost position.

Upon such elevation of the stack 217 to its uppermost position, see Fig. 5, the upper sheets of the stack 217 are brought above the uppermost edge 296 of the aligning plate 169 to be subjected to the blasts of air discharged from the blast nozzles 278, to thereby cause riffling of the uppermost sheet 216^b. During such stage of gradual rising of the stack 217, the cam portions 305, 306 of the groove cam 73 will have rotated the suction fingers 210 downwards to the position shown in full outline in Fig. 5, and upon the riffling and consequent raising of the uppermost sheet is caught by the suction effect of the suction fingers 210 and held in contact with the foot 214 of the suction cups 210.

It will be further observed that the relatively steep but short cam portion 307 of the groove cam 73 rotates the suction fingers 210 still further in the same rotational direction as their downward movement, namely to the dot and dash position, indicated at 210^a in Fig. 5, whereby the topmost sheet 216^b is suddenly forced from its elevated position shown in full outline in Fig. 5 to its dot and dash position shown at 216^{b'}, namely to buckle the same, whereby in the event of the next or lower sheets of the stack 217 being possibly caught with the uppermost sheet 216^{b'} the buckling of the uppermost sheet 216^{b'} mechanically separates the uppermost sheet 216^{b'} from the next or lower sheets at the top of the stack 217. At this stage complete separation of the uppermost sheet at both of its positions 216^b and 216^{b'} is accelerated by the blasts of air discharged by the nozzles 278. It will be noted that the lip 287 of the rear standard 284 and the lips 294 of the side guides 292 serve as abutments for the uppermost sheet 216^b when elevated by riffling and when buckled in the position shown at 216^{b'} as well as to preclude undue displacement of the next and lower sheets of the upper portion of the stack 217.

The circular cam portion 308 holds the topmost sheet 216^{b'} in its buckled position; and the slowly rising cam portion 309 moves the suction fingers 210 back through the full

outline position 210 shown in Fig. 5 and upwardly to the position shown in Fig. 4 of feeding the anterior end portion 218 of the sheet 216 to the feeding rolls 66, 69. At the stage of upward movement of the suction fingers 210 from the full line positions shown in Fig. 5, namely while its cam roller 74 traverses the cam portion 309, the cam roller 97 controlling the stack encounters the abruptly depressed cam portion 95 to cause the table 16 and the stack 217 to drop suddenly and thereby further enhance the separation of the top sheet from the balance of the stack as an entirety. The table 16 remains at its lowered position shown in Fig. 5, while the cam roller 130 moves the height determining finger 167 to its height determining position shown in Fig. 5 and simultaneously actuates the pawl 144 through its effective stroke to further raise the table 16 to compensate for the effectual lowering of the stack by the removal of the previous top sheet.

It will be noted that the conveyor cam roller 242 encounters its starting cam 247 when the suction fingers 210 are about to raise the next topmost sheet, see Fig. 5, whereupon the shaft 227 is actuated and continues under drive by the motor while the clutch 233, 234 is in closed position, namely, until the stopping cam 243 encounters the conveyor cam roller 242.

The combined cams 71 and 119 are rotated in full turn and disconnected from the drive gear 62 near the completion of the full turn by the finger piece 111 being moved to its disengaging position when encountering the tapered end of the extension 109 of the arm 108, and moving along the body of the extension 109 until the finger piece 111 contacts with the end face and is brought to rest.

Upon the operator again tripping the lever arm 108, the cams 71 and 119 and 243, 246 are again rotated and the aforesaid operations of the respective co-operating parts are repeated and the next topmost sheet is removed from the top of the stack 217 and thus repeatedly for the remaining sheets as they are removed positively one by one from the table 16.

The fingers 315, see Figs. 4 and 5, extend into the grooves of the main glue roll 21 to prevent glue entering therein; the fingers 315 may be idly pivoted on a supporting bar 316. The drip apron 317 catches the removed glue to direct the same into the glue pan 17.

The bar 318 is adjusted by winged clamps 319 to gauge the thickness of the glue coating on the feed glue roll 20.

The adjustment of the feed glue roll 20 relative to the main glue roll 21 is attained in the embodiment illustrated in the drawings, by threading the hand screw shafts 29

through correspondingly threaded openings in the rods 320 fixedly projecting from the brackets 27, see Figs. 3 and 12, the forward end 321 of each of the hand screw shafts 29 contacting with the abutting face of its bearing plate 26. Each screw shaft 29 is journaled in a suitable bearing 323. The rods 320 pass through the slots 330 of the slide bearing plates 26, see Fig. 3.

Upon turning the hand wheels 30 in the direction of the indicated arrow 324, the forward ends 321 force the faces 322 of the respective bearing plates 26 away from the main glue roll 21. In such movement, the face 325 of the rearward portion of the slide bearing plate 26 slides on the under face of the plate 27 in the direction of the arrow 326. The retractile springs 327 serve to return the slide bearing plates 26 upon reversed rotation of the hand shafts 29.

When it is desired to clean the glue rolls, the hand screw shafts 29 are turned in direction reversely to that of the indicated arrows 324, the springs 327 forcing the bearing plates 26 in the direction reversely to the arrow 325 until the ends 321 are freed of the rods 320 whereupon the feed glue roll is swung bodily upwardly on its hinged brackets 28, see Fig. 1, to permit removal of the glue pan 17, and the feed glue roll 20 then lowered into the water in the water pan 18, and the hand screw shafts 29 again turned to move the feed roll 20 into contact with the main roll 21 to feed water thereto and thus dilute the glue thereon.

The pan 328 serves to catch any drip, see Fig. 4.

In practice, the suction of each suction finger 210 is reduced to a minimum at the stage of maximum height or delivery of the raised sheet 216 to the feed rolls 66, 69, by the provision, see Figs. 2 and 4, of the collar 330 fairly tightly frictionally fitted about the suction pipe or hollow shaft 81 on which the hubs 82 of the suction fingers 210 are secured. The collar 330 is provided with a bleed orifice 331 which is brought into register within the hollow shaft 81 when the suction fingers 210 are raised to their maximum position, as by means of the extension 333 of the collar 330 encountering the bar 84, to thereby rotate the collar 330 to effect communication of the orifice 332 of the hollow shaft through the orifice 331 to the atmosphere. The rod 334, see Figs. 2, 4 and 5, is located to encounter the extension 333 of the collar 330 and hold the same while the shaft 81 is continued in rotation in counter-clockwise direction, as viewed in Figs. 4 and 5, to thereby break the communication of the orifice 332 of the hollow shaft 81 with the bleed orifice 331, whereupon the full effective suction is attained through the passages 212 of the respective suction cups 210 at the stage of approach of the suction cups

210 towards the topmost sheet 216 of the stack 217. The full effective suction through the suction fingers 210 is continued until the suction fingers 210 are raised to again rotate the extension 333 of the collar 330 into its upper quiescent position in contact with the rod 84, as above described.

The bevel gear 204 meshing with the bevel gear 202 of the hand-wheel 200, for manually raising or lowering the screw shaft 14 and therewith the table 16, see Figs. 2 and 3, may be mounted on the sleeve 335, splined at 336 to the collar or elongated nut 205, threaded internally to mesh with the threading of the screw shaft 14. The collar or elongated nut 205 is fixed to or otherwise carries the ratchet gear 142. The slot 135^a and pin 136^a of the connection between the link 135 and the collar 136 affords a lost motion range in the actuation of the ratchet 141, 144 to provide for a movement of these parts over a range less than that of the tooth spacing of the ratchet gear 144. The spring 337 serves to support the disk member 338 of the ratchet block 141 in engagement with the body portion of the ratchet block 141.

It will be observed that the clearance between the suction fingers when at their lowermost position and the topmost sheet of the stack and the removal of the topmost sheet from the stack without any positive engagement by the suction fingers with the stack provides for the maintenance of the interposition of more or less air between the respective sheets; in other words, the removal of each topmost sheet severally upon the respective removal movement of the suction fingers is accomplished without any pressure exerted by the suction fingers on the top of the stack, and thus preventing the creation of a partial vacuum between any of the sheets and thereby causing the "sticking" of one sheet to the next sheet.

Whereas, we have described our invention by reference to specific forms thereof it will be understood that many changes and modifications may be made without departing from the spirit of the invention.

We claim:—

1. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet of the stack, means for determining the effective height of the support and therewith the stack of sheets thereon, means for supporting said effective height determining means independently of said stack support and means for moving said stack support to a certain position for effecting co-operation with said height determining means and for moving said stack support to a different position for effecting co-operation with said outermost sheet removing means.

2. A sheet feeding mechanism comprising the combination of a support for a stack of

sheets, means for removing the outermost sheet of the stack, means for determining the effective height of the support and therewith the stack of sheets thereon, means for supporting said effective height determining means independently of said stack support and means for moving said stack support to a certain range of its movement for effecting co-operation with said height determining means and for moving said stack support to a different position for effecting co-operation with said outermost sheet removing means.

3. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet of the stack, means for determining the effective height of the support and therewith the stack of sheets thereon, means for supporting said effective height determining means independently of said stack support and means for moving said stack support to a certain range of its movement for effecting co-operation with said height determining means and for moving said stack support to a different position for effecting co-operation with said outermost sheet removing means, said stack support moving means comprising a cam.

4. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, a cam controlling the period of actuation of said sheet removing means, means for determining the effective height of the support and therewith the stack of sheets thereon, means for supporting said effective height determining means independently of said stack support and means for moving said support through a certain range of its movement for effecting co-operation with said height determining means and for moving said support through a different range for effecting co-operation with said outermost sheet removing means, said support moving means comprising a cam controlling the movement of said support in the direction toward said sheet removing means.

5. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, a cam for controlling the period of actuation of said sheet removing means, means for determining the effective height of the support and therewith the stack of sheets thereon, means for supporting said effective height determining means independently of said stack support, means for moving said stack support to a certain range of its movement for effecting co-operation with said height determining means and for moving said stack support to different position for effecting co-operation with said outermost sheet removing means, said stack support moving means comprising

ing a cam for controlling the movement of said support in the direction toward said sheet removing means, and means for mounting said sheet removing means controlling cam and said first named cam in predetermined relation to one another.

6. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet of the stack, means for determining the effective height of the support and therewith the stack of sheets thereon and means for moving said support through a certain range of its movement for effecting co-operation with said height determining means and for moving said support to different position for effecting co-operation with said outermost sheet removing means, said support moving means comprising a member for controlling the movement of said support in the direction toward said sheet removing means, a tripping member and means operated by said tripping member to effect the movement of said support controlling member for a full cycle of its movement solely.

7. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet of the stack, means for determining the effective height of the support and therewith the stack of sheets thereon and means for moving said support to a certain range of its movement for effecting co-operation with said height determining means and for moving said support to a different position for effecting co-operation with said outermost sheet removing means, said support moving means comprising a member for controlling the movement of said support in the direction toward said sheet removing means, a tripping member and means operated by said tripping member to effect the movement of said support controlling member for a full cycle of its movement solely, said last named means comprising an element normally resiliently biased to engage said support controlling member.

8. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet, means for pivotally supporting said member independently of said stack support, and means for moving said stack support to a certain range for effecting contact by said height determining member with the outermost sheet and for moving said stack support to a different position for effecting co-operation with said outermost sheet removing means.

9. A sheet feeding mechanism comprising

the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet, means for pivotally supporting said member independently of said stack support, and means for moving said stack support to a certain range for effecting contact by said height determining member with the outermost sheet and moving said stack support to a different position for effecting co-operation with said outermost sheet removing means and a fixed aligning plate for guiding the movement of the stack.

10. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet and means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet and moving said support to a different position for effecting co-operation with said outermost sheet removing means, a fixed aligning plate for guiding the movement of the stack and means for pivotally mounting said height determining member on said fixed aligning plate.

11. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet and means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet, for moving said support to a different position for effecting co-operation with said outermost sheet removing means and fixed aligning plate for guiding the movement of the stack and means for pivotally mounting said height determining member on said fixed aligning plate.

12. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet and means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet and moving said support to a different position for

effecting co-operation with said outermost sheet removing means, a fixed aligning plate for guiding the movement of the stack, means for pivotally mounting said height determining member on said fixed aligning plate and means for moving said determining member out of the path of movement of the stack subsequent to the stage of contact of said height determining member with the outermost sheet.

13. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet and means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet and moving said support to a different position for effecting co-operation with said outermost sheet removing means, a fixed aligning plate for guiding the movement of the stack, means for mounting said height determining member on said fixed aligning plate and means for moving said determining member out of the path of movement of the stack subsequent to the stage of contact of said height determining member with the outermost sheet.

14. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet, means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet and moving said support to a different position for effecting co-operation with said outermost sheet removing means, a fixed aligning plate for guiding the movement of the stack, means for mounting said height determining member on said fixed aligning plate, means for moving said determining member out of the path of movement of the stack subsequent to the stage of contact of said height determining member with the outermost sheet and auxiliary sheet separating means effectively disposed at the top of said aligning plate.

15. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet, means for moving said support to a certain range for effecting

contact by said height determining member with the outermost sheet and for moving said support to a different position for effecting co-operation with said outermost sheet removing means and ratchet means controlled by said height determining means for controlling said support moving means.

16. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet, means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet and for moving said support to a different position for effecting co-operation with said outermost sheet removing means, ratchet means controlled by said height determining means and controlling said support moving means and cam means operative in common with said height determining means and said ratchet means.

17. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet, means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet and for moving said support to a different position for effecting co-operation with said outermost sheet removing means, means for modifying the actuation of said support moving means and means controlled by said height determining means for controlling said modifying means.

18. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet of the stack, means for determining the effective height from the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet, means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet and for moving said support to a different position for effecting co-operation with said outermost sheet removing means, means for modifying the actuation of said support moving means and means controlled by said height determining means for controlling said modifying means, said last-named controlling means including an effective cam portion for moving said height determining member out

from its operative position to non-operative position.

19. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet from the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet, means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet and for moving said support to a different position for effecting co-operation with said outermost sheet removing means, means for modifying the actuation of said support moving means and cam operated means controlled by said height determining means for moving said modifying means, said cam operated means including an effective cam portion for moving said height determining member out of its contact position to non-operative position, said cam operated means further including an effective cam portion for moving said height determining member from its non-operative position to its contact position.

20. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet of the stack, means for determining the effective height of the support, said height determining means comprising a member adapted to be brought in contact with the outermost sheet, means for moving said support to a certain range for effecting contact by said height determining member with the outermost sheet and for moving said support to a different position for effecting co-operation with said outermost sheet removing means and means controlled by said height determining means for modifying said support moving means, said modifying means including a cam controlled by said height determining means, said cam including an effective cam portion for moving said height determining member from its contact position to a non-operative position.

21. A sheet feeding mechanism comprising the combination of a support for a stack of sheets, means for removing the outermost sheet of the stack, mechanical means for determining the effective height of the support and therewith the stack of sheets thereon, mechanical means for moving said support to a certain range of its movement for effecting co-operation with said height determining means and for moving said support to a different position for effecting co-operation with said outermost sheet removing means, said support moving means comprising a cam for controlling the movement of said support in the direction toward said sheet removing means, a cam controlling the

period of actuation of said sheet removing means and means for mounting said second named cam and said first named cam in fixed relation to one another.

22. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the outermost sheet of the stack, means for actuating said stack supporting means to position the outermost sheet a predetermined separation from the position of the said sheet removing means at the period of minimum separation of the stack from said sheet removing means and pneumatic means for effecting engagement by said sheet removing means with the outermost sheet when the stack is positioned at minimum separation.

23. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the outermost sheet of the stack, means for actuating said stack supporting means to position the outermost sheet a predetermined separation from the position of the said sheet removing means at the period of minimum separation of the stack from said sheet removing means, means for determining the effective height of the stack and controlling said stack supporting actuating means and pneumatic means for effecting engagement by said sheet removing means with the outermost sheet when the stack is positioned at minimum separation.

24. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the outermost-sheet of the stack, means for actuating said stack supporting means to position the outermost sheet a predetermined separation from the position of the said sheet removing means at the period of minimum separation of the stack from said sheet removing means, means for determining the effective height of the stack and controlling said stack supporting means, means controlling the operation of said height determining means to effect operation of the same at a stage in advance of the positioning of the stack at minimum displacement from said sheet removing means and pneumatic means for effecting engagement by said sheet removing means with the outermost sheet when the stack is positioned at minimum separation.

25. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the outermost sheet of the stack, means for actuating said stack supporting means to position the outermost sheet a predetermined separation from the position of the said sheet removing means at the period of minimum separation of the stack from said sheet removing means, means for determining the

effective height of the stack and controlling said stack supporting means, means controlling the operation of said height determining means to effect operation of the same
 5 at a stage in advance of the positioning of the stack at minimum displacement from said sheet removing means and pneumatic means for effecting engagement by said sheet removing means with the outermost sheet
 10 when the stack is positioned at minimum separation, said stack support actuating means providing for movement of said stack support to displace the stack from said stack supporting means at the stage of engagement of the outermost sheet with said sheet removing means.

26. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the
 20 outermost sheet of the stack, means for actuating said stack supporting means to position the outermost sheet a predetermined separation from the position of the said sheet removing means at the period of minimum
 25 separation of the stack from said sheet removing means, means for determining the effective height of the stack and controlling said stack supporting means, means controlling the operation of said height determining means to effect operation of the same
 30 at a stage in advance of the positioning of the stack at minimum displacement from said sheet removing means and pneumatic means for effecting engagement by said sheet removing means with the outermost sheet
 35 when the stack is positioned at minimum separation, said stack support actuating means providing for movement of said stack support to abruptly displace the stack from said stack supporting means at the stage of
 40 engagement of the outermost sheet with said sheet removing means.

27. A sheet feeding mechanism comprising the combination of a support for a stack of
 45 sheets, means for removing the outermost sheet of the stack, means for determining the effective height of the support and there-with the stack of sheets thereon, means for positively moving said support to a certain
 50 position for effecting co-operation with said height determining means and for positively moving said support to a different position for effecting co-operation with said outermost sheet removing means and means controlled by said height determining means for
 55 modifying said support moving means.

28. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the
 60 outermost sheet of the stack, means for effecting engagement with an initial displacement of the outermost sheet with said sheet removing means and means independently of said stack supporting means effecting increased
 65 displacement between the stack and said

sheet removing means at the period of engagement of the outermost sheet with said sheet removing means.

29. A sheet feeding mechanism comprising the combination of means for supporting a
 70 stack of sheets, means for removing the outermost sheet of the stack, means for effecting engagement with an initial displacement of the outermost sheet with said sheet removing means, means independently of said
 75 stack supporting means effecting increased displacement between the stack and said sheet removing means at the period of engagement of the outermost sheet with said sheet removing means and means for effecting buckling of the outermost sheet at the
 80 stage of operation of said increased displacement effecting means.

30. A sheet feeding mechanism comprising the combination of means for supporting a
 85 stack of sheets, means for removing the outermost sheet of the stack, means for effecting engagement with an initial displacement of the outermost sheet with said sheet removing means, means independently of said
 90 stack supporting means effecting increased displacement between the stack and said sheet removing means at the period of engagement of the outermost sheet with said sheet removing means and means for effecting buckling of the outermost sheet at the
 95 stage of operation of said increased displacement effecting means, said buckling effecting means comprising a guide for a lateral edge of the stack.

31. A sheet feeding mechanism comprising the combination of means for supporting a
 100 stack of sheets, means for removing the outermost sheet of the stack, means for effecting engagement with an initial displacement of the outermost sheet with said sheet removing means, means independently of said stack supporting means effecting increased displacement between the stack and said sheet removing means at the period of
 110 engagement of the outermost sheet with said sheet removing means and means for effecting buckling of the outermost sheet at the stage of operation of said increased displacement effecting means, said buckling effecting means comprising a fixed guide for a lateral edge of the stack.

32. A sheet feeding mechanism comprising the combination of means for supporting
 120 a stack of sheets, means for removing the outermost sheet of the stack, means for effecting engagement with an initial displacement of the outermost sheet with said sheet removing means, means independently of said stack supporting means effecting increased displacement between the stack and said sheet removing means at the period
 125 of engagement of the outermost sheet with said sheet removing means and means for effecting buckling of the outermost sheet
 130

at the stage of operation of said increased displacement effecting means, said buckling effecting means comprising a fixed adjustable guide for a lateral edge of the stack.

5 33. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the outermost sheet of the stack, means for actuating said sheet supporting means to
10 position the outermost sheet a minimum separation from said sheet removing means, means for effecting engagement of the outermost sheet with said sheet removing means, means for actuating said sheet removing
15 means to provide movement of said sheet removing means in a certain direction to remove the outermost sheet and to provide movement of said sheet removing means in a transverse direction in advance of its move-
20 ment in said certain direction.

34. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the outermost sheet of the stack, means for
25 actuating said sheet supporting means to position the outermost sheet a minimum separation from said sheet removing means, means for effecting engagement of the outermost sheet with said sheet removing
30 means, means for actuating said sheet removing means to provide movement of said sheet removing means in a certain direction to remove the outermost sheet and to provide movement of said sheet removing means in a
35 transverse direction in advance of its movement in said certain direction and a guide for a lateral edge of the stack cooperating with said sheet removing means when moving in said transverse direction to buckle the
40 outermost sheet.

35. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the outermost sheet of the stack, means for
45 actuating said sheet supporting means, means for moving said sheet supporting means in the direction toward said sheet removing means, means providing a discharge of compressed air for effecting engagement
50 of the outermost sheet with said sheet removing means, said actuating means providing movement of said sheet removing means during the period of engagement of the outermost sheet with said sheet removing
55 means in the direction of discharge of the compressed air.

36. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the
60 outermost sheet of the stack, means for actuating said sheet supporting means, means for moving said sheet supporting

means in the direction toward said sheet removing means, means providing a discharge
of compressed air for effecting engagement 65 of the outermost sheet with said sheet removing means, said actuating means providing movement of said sheet removing means during the period of engagement of the outermost sheet with said sheet removing
70 means in the direction of discharge of the compressed air and a guide for a lateral edge of the stack and co-operating with said sheet removing means to buckle the outermost sheet. 75

37. A sheet feeding mechanism comprising the combination of means for supporting a stack of sheets, means for removing the outermost sheet of the stack, means for
actuating said sheet supporting means, 80 means for moving said sheet supporting means in the direction toward said sheet removing means, means providing a discharge of compressed air for effecting engagement of the outermost sheet with said sheet removing
85 means, said actuating means providing movement of said sheet removing means during the period of engagement of the outermost sheet with said sheet removing means in the direction of discharge of the compressed air and a fixed, adjustable guide
90 for a lateral edge of the stack and co-operating with said sheet removing means to buckle the outermost sheet.

38. A sheet feeding mechanism comprising the combination of movable means for supporting a stack of sheets, means for removing an outermost sheet from the stack,
sheet transferring means, means for controlling the movement of said stack supporting
100 means relative to said sheet removing means, means for controlling the actuation of said sheet transferring means and means for adjusting said sheet transferring controlling means relative to said sheet support
105 controlling means and relative to said sheet removing means.

39. A sheet feeding mechanism comprising the combination of movable means for supporting a stack of sheets, pivotal means
110 for removing an outermost sheet from the stack, sheet transferring means, means controlling the movement of said sheet removing means, means for controlling the movement of said sheet transferring means and
115 means for adjusting said sheet transferring controlling means relative to said sheet removing controlling means and relative to said movable stack supporting means.

In testimony whereof we have signed this 120 specification this 31st day of October 1924.

ELMER E. FAIRCHILD.
ALLAN A. ADAMSON.
CHARLES F. MORLEY.