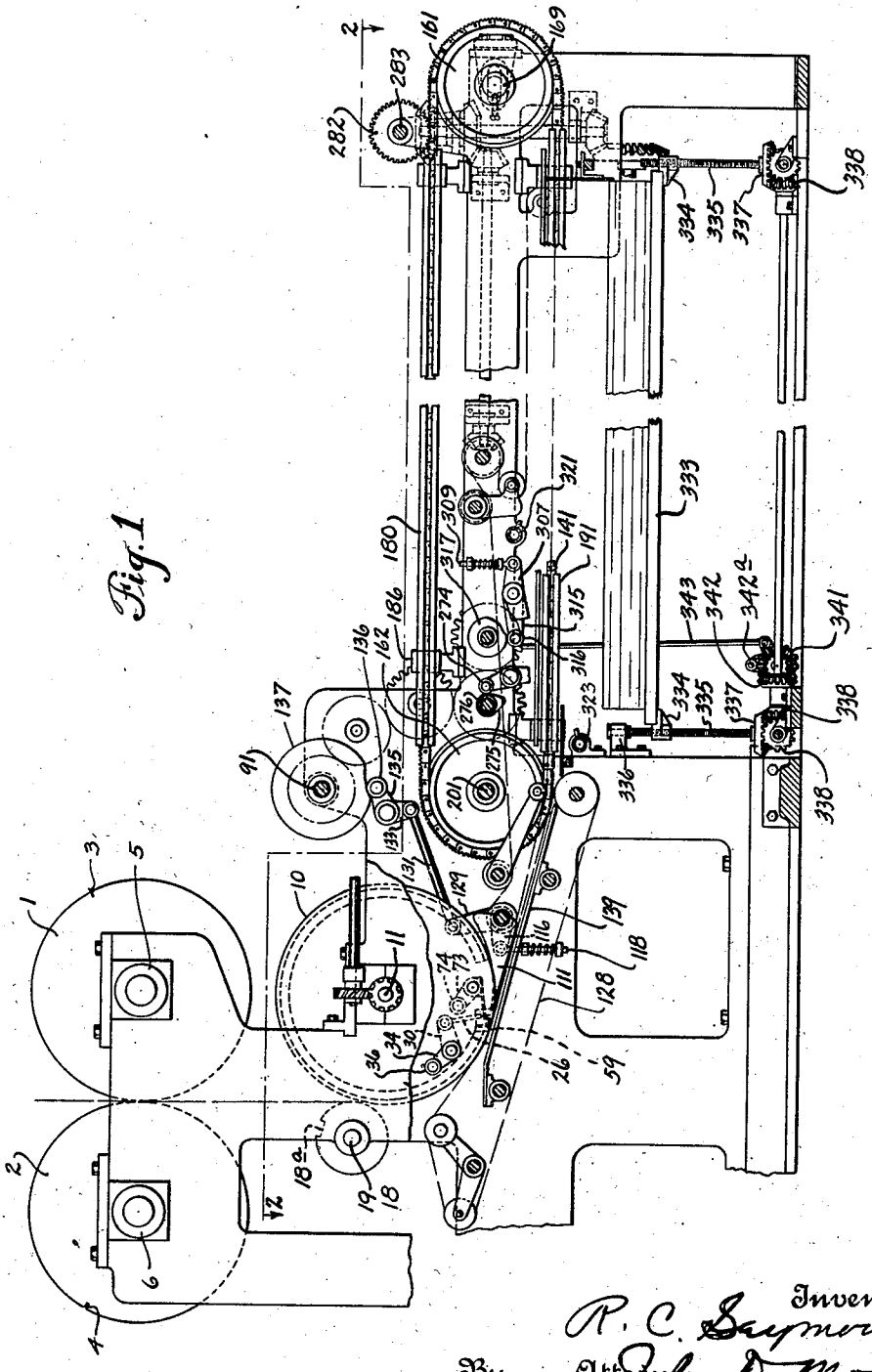
Feb. 5, 1929. 1,700,776

R. C. SEYMOUR

SHEET DELIVERY MECHANISM

Filed Nov. 19, 1925 7 Sheets-Sheet 1

Fig. 1



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SHEET DELIVERY MECHANISM

Filed Nov. 19, 1925 7 Sheets-Sheet 2

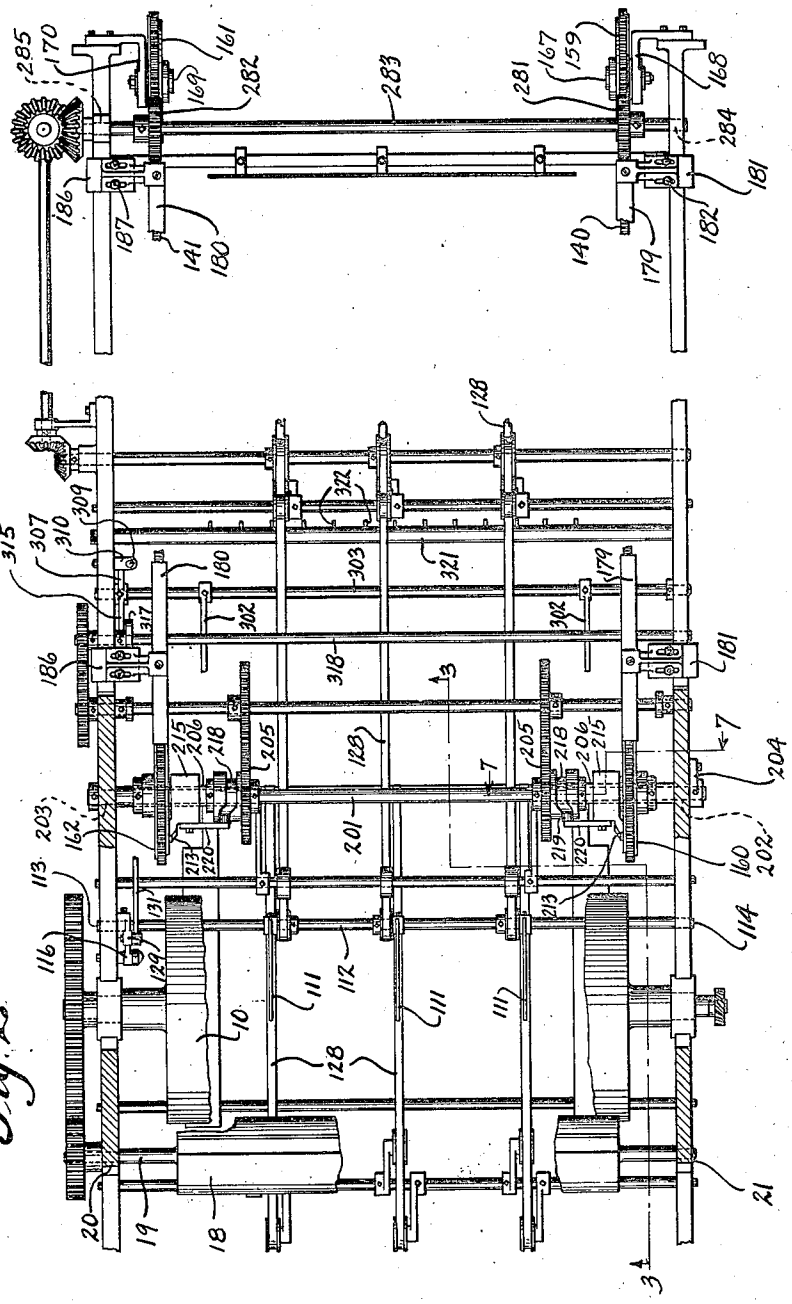


Fig. 2.

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SHEET DELIVERY MECHANISM

Filed Nov. 19, 1925 7 Sheets-Sheet 3

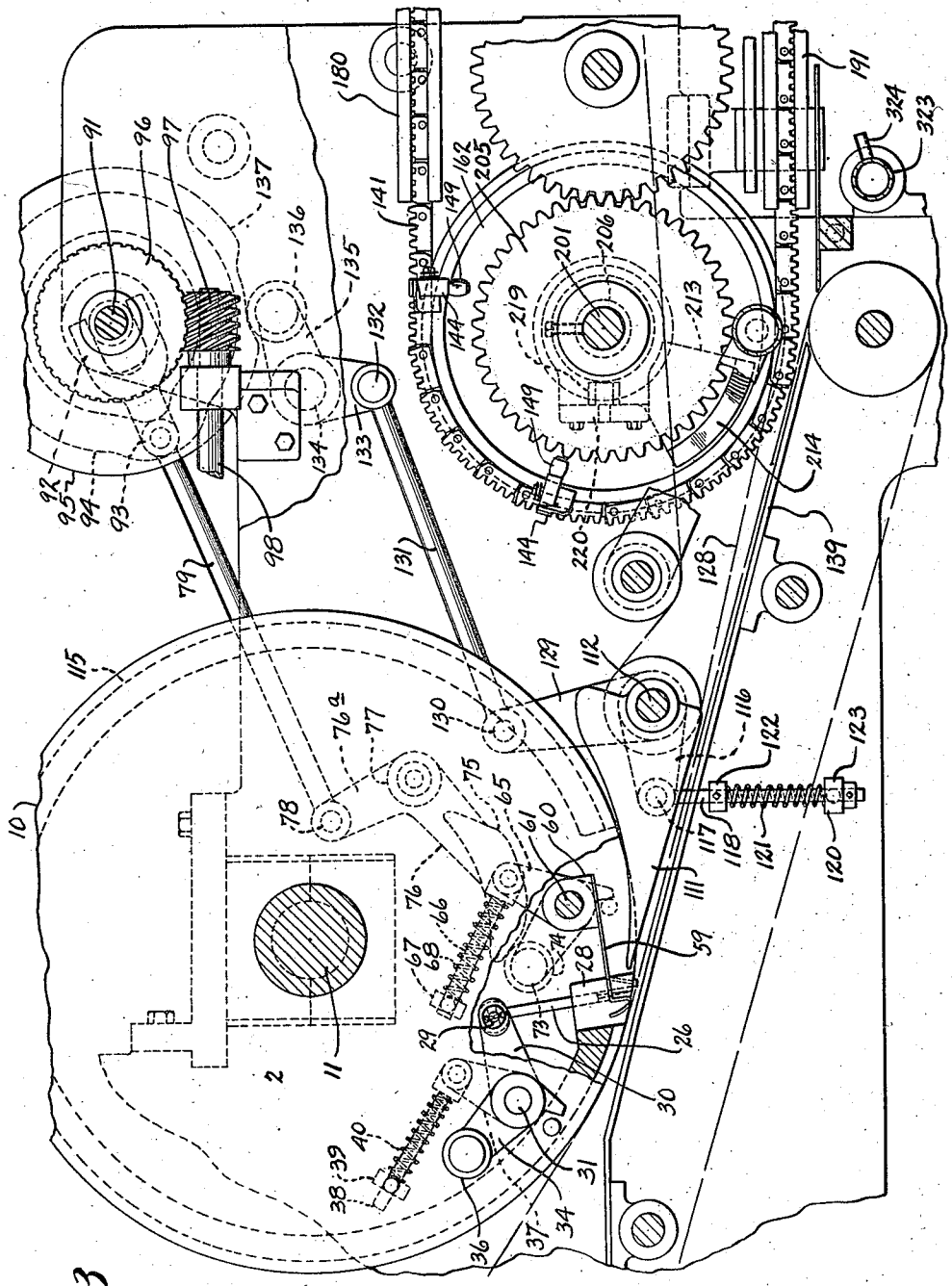


Fig. 3

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SHEET DELIVERY MECHANISM

Filed Nov. 19, 1925 7 Sheets-Sheet 4

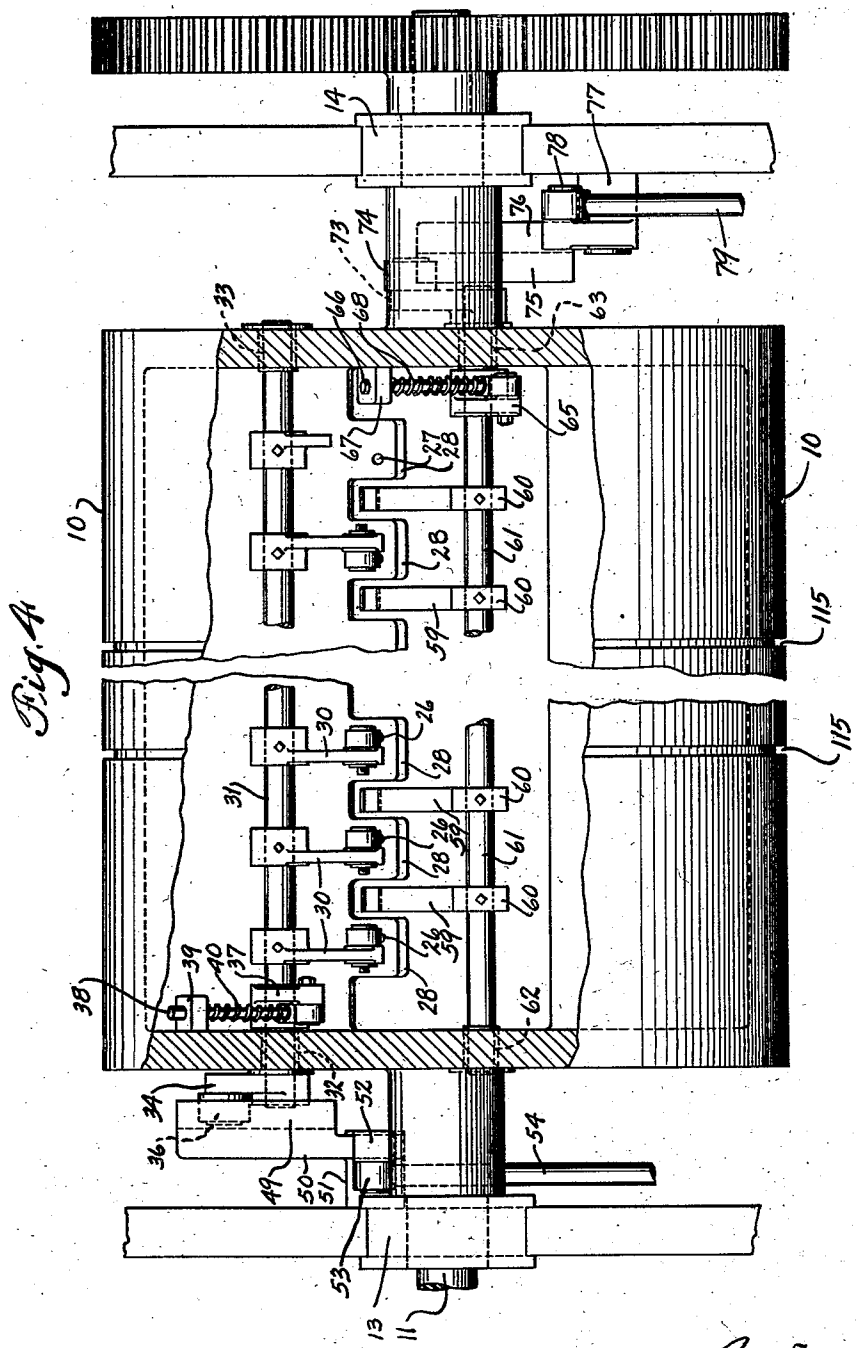


Fig. 4

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SHEET DELIVERY MECHANISM

Filed Nov. 19, 1925 7 Sheets-Sheet 5

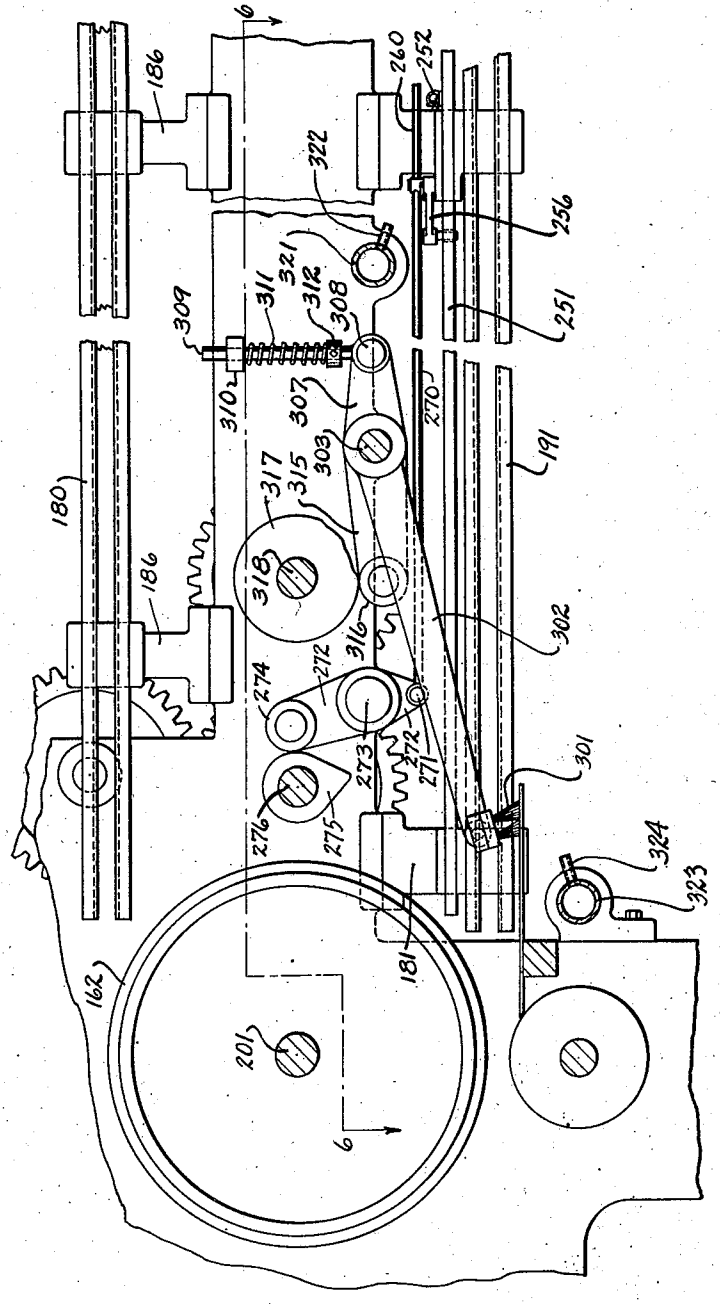


Fig. 5

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SHEET DELIVERY MECHANISM

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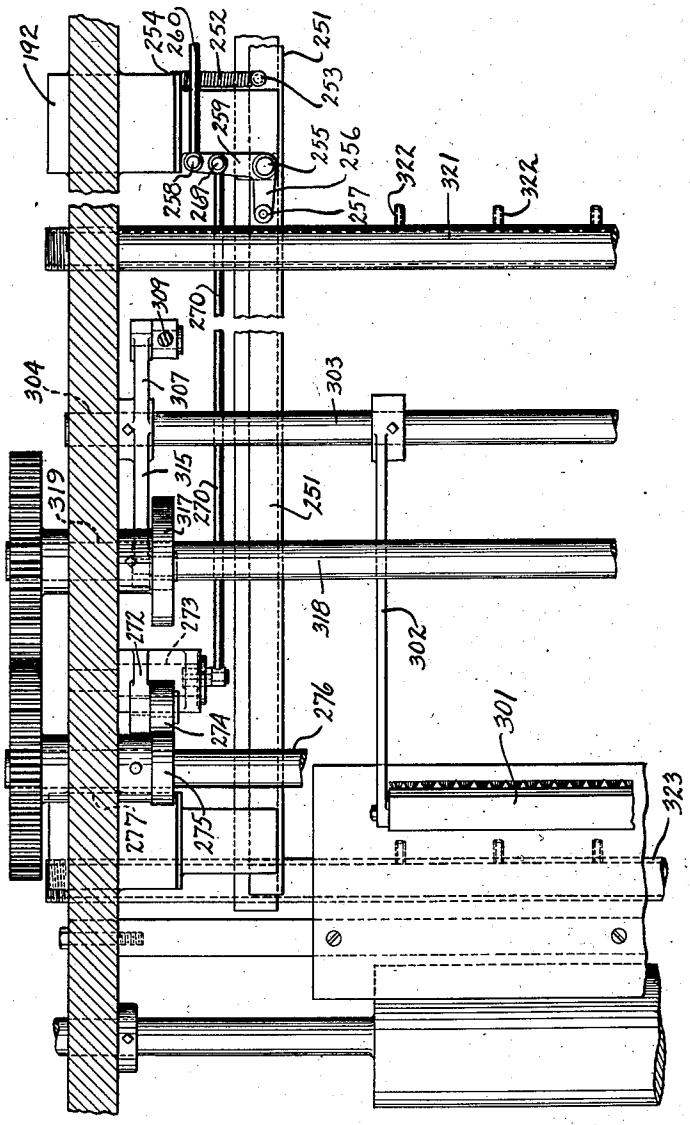


Fig. 6

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SHEET DELIVERY MECHANISM

Filed Nov. 19, 1925 7 Sheets-Sheet 7

Fig 7

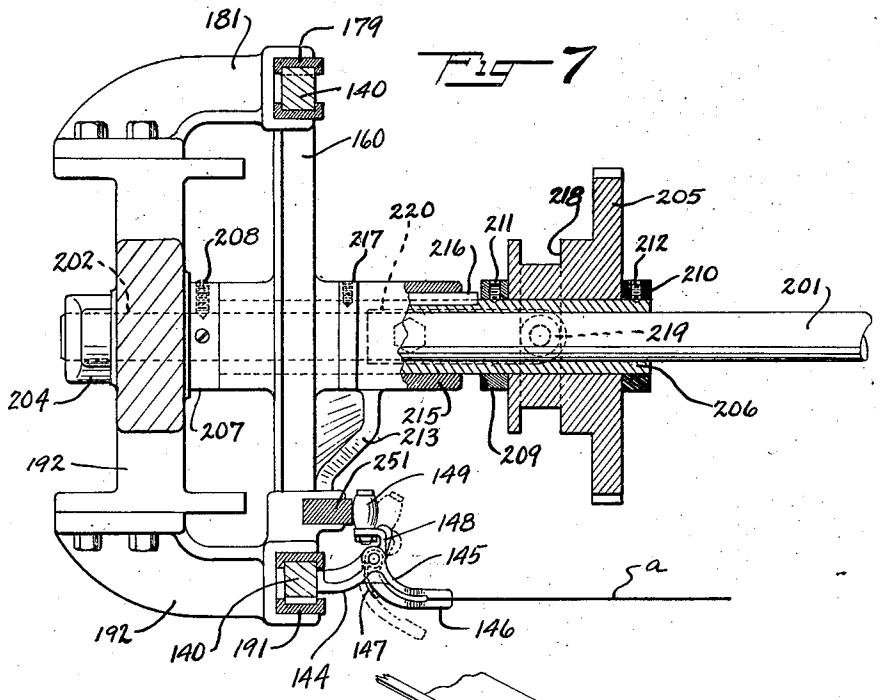


Fig 8

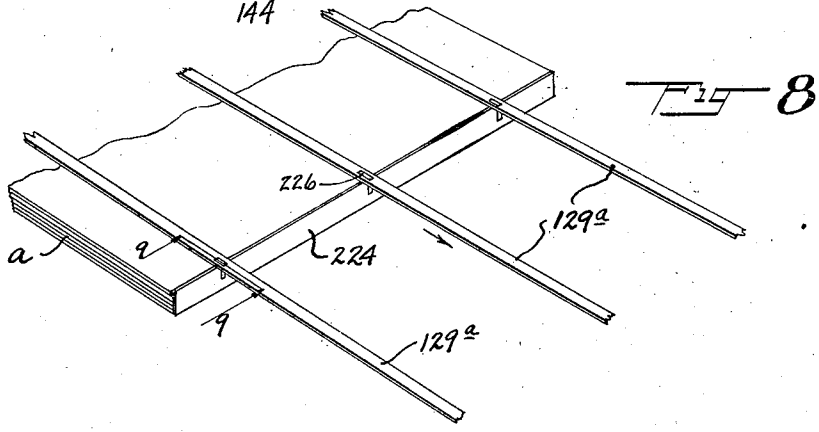
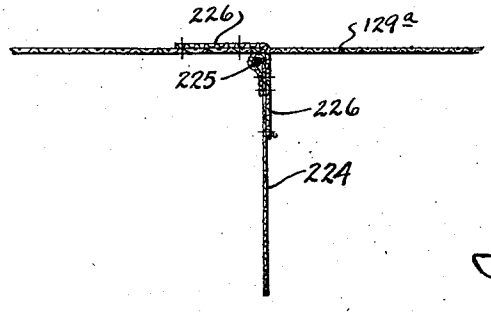


Fig 9



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Patented Feb. 5, 1929. 1,700,776

UNITED STATES PATENT OFFICE.

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SHEET-DELIVERY MECHANISM.

Application filed November 19, 1925. Serial No. 70,001.

The invention relates to a novel and useful delivery mechanism for printing presses and the like, and more particularly to such a mechanism adapted to deliver successive groups of sheets, especially large sheets of very thin paper.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is a side elevation, with the front frame cut away for clearness, of a mechanism embodying the invention;

Fig. 2 is a top plan, corresponding to Fig. 1, partly in section on the line 2—2 of Fig. 1, and with parts broken away;

Fig. 3 is a fragmentary elevation, greatly enlarged, of the central left-hand part of Fig. 1;

Fig. 4 is a top plan, with parts in section, and parts broken away, of the collecting cylinder shown at the left in Fig. 3;

Fig. 5 is a fragmentary, detail elevation, with the front frame removed, of the left central part of Fig. 1, and showing certain parts omitted from Fig. 1;

Fig. 6 is a fragmentary horizontal section taken on the line 6—6 of Fig. 5;

Fig. 7 is a greatly enlarged, vertical section on line 7—7 of Fig. 2;

Fig. 8 is a fragmentary perspective of the forwarding tapes in position at the head of a group of sheets; and

Fig. 9 is a fragmentary section, greatly enlarged, through the tape and wind break.

The invention is directed to providing a mechanism adapted to deliver printed or other sheets, especially sheets of large size and of relatively great thinness, from a rotating collecting or other cylinder, and to deliver the successive sheets or group of sheets flat upon a stack of delivered sheets. The invention provides likewise for smoothing and stretching the sheets during delivery, and for changing the level of the pile of delivered sheets, as the work of delivery progresses.

Other features and adaptations of the invention will be set forth in connection with the following detailed description of the present preferred embodiment of the invention, which embodiment it will be understood is illustrative and explanatory of the invention, but is not restrictive thereof.

Referring now in detail to the embodiment of the invention, illustrated by way of example in the accompanying drawings, the delivery mechanism is exemplified attached to and receiving a web from a fast rotary press (the press not being shown). The web is cut into successive sheets by a rotary cutting mechanism having cylinders 1 and 2, provided one with a cutting knife 3 and the other with a cooperating cutting groove 4, the cylinders having respective bearings 5 and 6, in the machine frame.

In the preferred embodiment of the invention, a plurality of successive sheets are received from the cutting cylinders and are collected one upon the other on a collecting cylinder 10, and are thence delivered in a group to the delivery mechanism. The collecting cylinder has its shaft 11 journaled in bearings 13 and 14 in the machine frame. A tucking roller 18, has its shaft 19 journaled in bearings 20 and 21 in the machine frame, the tucking roller cooperating with the series of impaling pins carried by the collecting cylinder, the tucking cylinder 18 having a recess 18a therein for this purpose, this mechanism operating in a well-known manner.

Referring in detail to the sheet handling mechanism of the collecting cylinder, a plurality of spaced-apart impaling pins 26 are reciprocably mounted in apertures 27 in a corresponding series of spaced-apart guide blocks 28 formed in the cylindrical wall of the cylinder. The respective impaling pins are pivoted at 29 to a corresponding series of arms 30, which arms are fixed on a shaft 31, this shaft being journaled at 32 and 33 in the cylinder head. At one end the shaft 31 projects from the cylinder, and has fixed thereto an actuating arm 34, upon which is rotatably mounted a cam roller 36.

The impaling pins are impelled to the protruding or impaling position by suitable spring means, which as embodied comprises an arm 37, fixed on shaft 31 within the col-

lecting cylinder. Pivotally connected to the arm 37 is a rod 38, reciprocable in an aperture in a lug 39, fixed to the inner face of the end wall of the cylinder. A helical spring 40 encircles the rod 48, and is in compression between the pivoted shouldered head of the rod 38 and the lug 39.

Means are provided for retracting the impaling pins, against the action of spring 40, from the group of sheets at the moment of the release of the group, and the embodied form thereof comprises a cam 49, movable in timed relation into and out of the path of and mounted on an arm 50, pivoted on a lug 51, fixed on the machine frame. Integral with an arm 50 is an arm 52 to which is pivotally connected at 53 a rod 54, which rod is actuated from a cam shaft, which will be later described in connection with the actuating means for the stripping arms.

Means are provided for stripping the head of the impaled group of sheets from the impaling pins at the moment of delivery, and as embodied, said means comprises a plurality of stripping fingers 59, fixed respectively to short arms 60, which arms are fixed on a shaft 61, journaled at 62 and 63 in the heads of the collecting cylinder. The stripping fingers 59 work in the recesses between the guide blocks 28 for the impaling pins, already described, and thus engage the sheets between the impaling pins, and substantially in alinement therewith, to disengage the heads of the sheets from the pins, and direct them into the delivery mechanism.

The stripping fingers 59 are normally resiliently held out of the stripping position, and for this purpose an arm 65 is fixed to shaft 61, and a rod 66 is pivotally connected to the end of the arm and is reciprocable in an aperture in a lug 67, projecting inwardly from the adjacent head of the collecting cylinder. A helical spring 68 encircles the rod 66, and is in tension between the shouldered pivoted head of the rod and the lug 67.

The embodied form of means for momentarily actuating the stripping fingers 59 to disengage the sheet heads from the impaling pins, comprises an arm 73, fixed exteriorly to the cylinder to an end of shaft 61, which projects from the head of the cylinder. The arm 73 has a cam roller 74 pivotally mounted on the end thereof. Cooperating with the cam roller 74 is a cam 75, movable in timed relation into and out of the path of cam roller 74. For this purpose it is fixed on an arm 76, which arm is pivotally mounted upon a bracket 77, fixed to the inner face of the machine frame.

In the embodied means for so moving cam 75, integral with the arm 76 is an arm 76^a, and pivotally connected at 78 to the end of the arm 76^a is an actuating rod 79. The rod 54 (which actuates the stripping fingers) and rod 79 are actuated from a common cam shaft, and the connection from the rods 79 to the shaft will be described as applying to the actuating means for either.

In the embodied form of said means, a cam shaft 91 is journaled in the side frames of, and extends there-across the machine. The ends of the respective rods 54 and 79 are each provided with yokes 92, respectively, which encircle the shaft 91 and act as guiding and supporting means for their rods. On each of these rods is pivotally mounted a cam roller 93 working in a box or groove cam 94, formed in a cam disk 95, fixed upon shaft 91. The shaft 91 is driven by a spiral gear wheel 96, with which meshes a spiral pinion 97, fixed on a shaft 98, suitably driven from some other part of the machine.

By the mechanism just described, the impaling pins enter the heads of the successive sheets, or the heads of the sheets are pressed successively upon the pins, by the cooperation of the groove 18^a in the roller 18. When the predetermined number of sheets have been collected in groups upon a collecting cylinder, the impaling pins are momentarily retracted, and the stripping arms 59 are simultaneously momentarily actuated to disengage the sheet heads from impaling pins and direct them into the delivery mechanism.

Stripping means are provided for insuring the separation of the group of sheets from the collecting cylinder, and to direct them forwardly to the delivery mechanism. As embodied, a plurality of stripping blades 111 are fixed on a shaft 112, journaled at 113 and 114 in the side frames, and extending across the machine, just below and in front of the collecting cylinder. The stripping blades are movable into and out of corresponding annular grooves 115, cut in the periphery of the collecting cylinder. The tips of the stripping blades are moved into their grooves, at the moment of delivery of the group of sheets, and direct the heads of the group of sheets below the stripping blades, away from the collecting cylinder, and into the guideway of the delivery mechanism.

The stripping blades, in the embodied form, are resiliently impelled into the sheet-stripping position by suitable means. The embodied form of said means comprises an arm 116, fixed to the shaft 112. Pivotally connected at 117 to the end of arm 116 is a rod 118, which rod is reciprocably mounted in an apertured lug 120, fixed to and projecting inwardly from the side frame of the machine. A helical spring 121 encircles the rod 118 and is in compression between the lug 120 and an adjustable collar 122 fixed to the rod 118. A pinned washer 123 is fixed upon the outer end of the rod 118.

Means are provided for periodically actuating the stripping arms and their connected mechanism. As embodied, there is fixed to

shaft 112 an arm 129, and pivotally connected at 130 to the end of said arm is an actuating rod 131. The other end of rod 131 is pivoted at 132 to the end of one arm of a bell-crank lever 133, which is pivoted at 134 upon the machine frame. On the end of the other arm 135 of bell crank lever 133 is rotatably mounted a cam roller 136, which cooperates with a cam 137, to actuate and control the stripper fingers 111 in the manner already described.

A series of guiding tapes are provided for coperating in the guiding and directing the sheets from the collecting mechanism and to the delivery chains and grippers, and are shown in the drawings. These may be of any known, or other suitable form, are indicated generally by reference numeral 128, and will not be described in detail, except as to the wind-breaking feature, which will be later described. A plurality of supporting and guiding bars 139 are also shown for directing and supporting the groups of sheets from the collecting cylinder to the delivery mechanism, and these likewise may be of any known or suitable form and will not be described in detail.

In accordance with certain features of the invention, and in the present embodied form, each group of sheets as it is carried to delivery is engaged at a plurality of points along either side by a plurality of gripper mechanisms, and is conveyed in horizontal position to and over the pile of delivered sheets, and is there released to drop upon the pile. In accordance with certain features of the invention, means are provided for stretching and smoothing the sheets, these devices being especially useful in the handling of a group of very thin sheets, such as tissue sheets upon which the patterns for women's clothing are printed.

In the embodied form of said means two endless, side-by-side, gripper-bearing sprocket chains 140 and 141 are arranged at either side of the machine, vertically disposed and with long horizontal reaches one above the other. The rear ends of these gripper-bearing chains are located directly in front of the mechanism previously described, the upper and lower reaches of the two endless sprocket chains being in horizontal alinement with each other.

Fixed to the inner side of each of the sprocket chains are a plurality of spring operated grippers 144, each gripper having a jaw 145 fixed to the chain, and a cooperating spring jaw 146, pivotally mounted, and impelled to the closing position with respect to its companion jaw 145 by a coiled spring 147. Each of the pivoted, spring-operated jaws 146 has fixed thereto an actuating arm 148 upon which is pivotally mounted a cam roller 149. These two sets of traveling grippers engage the two side edges of the groups of sheets as they come from the collecting mechanism, convey them to the place of delivery and drop them there.

The sprocket chain 140 at either end of its path runs over flanged supporting and guide rollers 159 and 160, and the sprocket chain 141 at either end of its path likewise runs over flanged guiding and supporting rollers 161 and 162. The roller 159 of chain 140 is rotatably mounted upon a stub shaft 167 journaled on a bracket 168 on the forward end of the machine frame. In like manner the flanged guiding wheel 161 of chain 141 is journaled upon a stub shaft 169 supported by a bracket 170, fixed to the forward end of the other side frame of the machine. The rearward guiding and supporting wheels 160 and 162 are differently mounted in a manner and for a purpose later to be described.

The upper reaches of the two endless gripper carrying sprocket chains 140 and 141 run, respectively, in guideways 179 and 180. The guideway 179 for chain 140 is fixed to and carried by a plurality of brackets 181, which brackets have a slot and bolt adjustment 182 upon the tops of the supporting side frame of the machine, whereby this reach of the gripper-carrying sprocket chain may be adjusted inwardly and outwardly horizontally with respect to the width of the sheet. On the opposite side of the machine, the corresponding gripper-carrying sprocket chain guideway 180 is fixed to and supported by a plurality of brackets 186, which have likewise an adjustable bolt and slot connection 187 with the upper face of the corresponding side frame of the machine, whereby the guideway may be adjusted similarly to that on the opposite side of the machine and as already described.

The bottom reaches of the two gripper-carrying sprocket chains are likewise run in supporting guideways, similar to those described for the upper reaches of the two chains, and these are adjustable in a similar manner, and need not be described in detail, and are designated by reference numeral 191. These bottom guideways are carried on supporting lugs 192, projecting downwardly from the bottom faces of the respective side frames of the machine, and are supported thereby and are horizontally positionable or adjustable relatively thereto, similarly to the guideways for the top reaches of the sprocket chains, already described.

In accordance with one feature of the invention, the front end adjustable brackets for the gripper-carrying sprocket chains are set an exceedingly small distance wider, or farther apart, than the rear end ones, thereby exerting a gentle smoothing and stretching action on the sheets as they are carried forward to delivery. This setting is optional, and may be employed or not, as may be found desirable or advantageous.

The means for opening the grippers 145,

146 to take the group of sheets as delivered from the collecting cylinder in order to carry them to delivery comprises periodically-operating cam mechanism for opening a sufficient number of the grippers at either side of the machine to engage the respective side edges of the group of sheets at various points therealong (Figs. 2, 3 and 7). In said embodied form, a non-rotating shaft 201 is supported in the machine frame at 202 and 203, and is held against rotation by a stop 204. The mechanism at either side is identical, and that shown in Fig. 7 will be alone described. A driving gear 205 is mounted, free to rotate, on a sleeve 206, which sleeve at its left-hand end in Fig. 7 is provided with an annular flange 207, fixed to the non-rotating shaft 201 by a clamping screw 208. Collars 209 and 210 at either side of the gear 205 are fixed to the sleeve 206 by clamping screws 211 and 212, respectively, to maintain the gear in longitudinal position on the sleeve 206.

A gripper-actuating cam 213 is non-rotatable on shaft 201, but is slidable longitudinally of the shaft, to move it into and out of actuating position with respect to the grippers 145, 146. The cam has an actuating face 214 (Fig. 3) which when in the actuating position cooperates with the cam roller 149 of the various grippers. The cam 213 has its hub 215 encircling sleeve 206, and a spline 216 between the sleeve and cam hub keeps the cam from rotation, but permits it to slide longitudinally of the sleeve 206. A friction washer 217 is provided between the cam hub and the hub of the flanged sprocket wheel 160.

The means for moving the gripper-actuating cam 213 along its shaft, to and from operative position with respect to the grippers, comprises a cam groove 218, formed in the hub of the gear wheel 205. A cam roller 219 runs in the cam groove 218, which cam roller is mounted on an arm 220, fixed to the hub 215 of the cam 213. Thus the cam 213 is moved periodically into gripper-operating position and then away therefrom, being in the latter position when no sheets are being delivered from the collecting cylinder to the delivery mechanism.

Thus, through the timing action of cam grooves 218, cams 213 at either side of the machine are moved to operative position, and thereby will open the grippers 144 of both series to a number corresponding to the length of the group of sheets which is being forwarded from the collecting cylinder to the delivery mechanism, the grippers then closing in spaced relation along either side of the group of sheets. As the grippers come downwardly from above at either side of the group of sheets, and at the rear end of the path of travel of the grippers, the bottom jaws of the grippers are swung open by cams 213 to a position (as shown in dotted line in Fig. 7) so that they will pass the edges of the sheets, and will then snap shut on the sheet edges as they move forwardly from the cam. While the sheets are collecting on the collecting cylinder, cams 213 are moved backwardly to non-actuating position and the grippers run by idly.

The embodied form of actuating and controlling means whereby the two series of grippers on the respective sprocket chains are simultaneously opened to deliver the group of sheets comprises two long cam operating strips 251, extending along the entire distance at either side of the group of sheets at the delivery position. These strips 251 are also located just outside and above the respective guideways 191 for the two horizontal reaches of the gripper-bearing sprocket chains 140 and 141. These cam operating strips 251 are supported at a plurality of points in transversely and horizontally disposed guiding and supporting slots, formed in the supporting lugs 192 for the lower sprocket chain guideway 191 (already described).

A plurality of tension springs 252 are connected at 253 to the strips 251 and at 254 to the rear part of the brackets 192. The springs, therefore, resiliently draw the cam actuating strips 151 outwardly to inoperative position.

Means are provided for moving the two cam operating strips 251 inwardly to simultaneously open all the grippers which are gripping each side of a group of sheets to drop the sheets at delivery position. As embodied, pivotally mounted at 255 upon some of the lugs 192 are a plurality of bell-crank levers, one arm 256 of each lever being pivotally connected at 257 to the cam-actuating strip 251.

Pivotally connected at 258 to the other arms 259 of each of these bell-crank levers is a common connecting and actuating rod 260, whereby the levers are rocked together to give a transverse horizontal sliding and parallel actuating movement to the strip 251, against the tension of the springs 252. For the purpose of actuating this entire mechanism, to the arm 259 of the rearmost bell-crank lever, there is pivoted at 269 a rod 270.

The rod 270 at its rear end is pivoted at 271 to one arm of a lever 272, which lever is pivoted at 273 upon the machine frame. On the end of the other arm 272 of the lever is rotatably mounted a cam roller 274, which cooperates with a cam 275, fixed on a shaft 276, having journals 277 in the machine frame. By the foregoing mechanism, the two cam actuating strips 251 are simultaneously given an inward horizontal parallel movement whereby all of the grippers engaging either side of the group of sheets are simultaneously opened to release the sheets

over the stack of delivered sheets and thereby deposit them.

The embodied form of driving means for the sprocket chains 140 and 141 comprises gear wheels 281 and 282, meshing respectively with the upper and outer side of the top reaches of the two sprocket chains. These gear wheels are fixed on a shaft 283, journaled at 284 and 285 in the side frames of the machine.

Additional smoothing means are preferably provided, adapted to operate upon the groups of sheets. Said means as embodied, comprises a narrow transversely-disposed brush 301, movable into and out of contact with the upper face of the group of sheets just where the lower surface of the group of sheets is resting upon and passing over a horizontally and transversely disposed table 302. This table is supported upon a cross beam 303, extending between and supported by, the side frames of the machine.

The brush 301 is mounted to move toward and away from the group of sheets and is timed to come down upon the group of sheets just after the head thereof has passed the brush. For this purpose the brush 301 is mounted on a pair of arms 302, which arms are fixed on a shaft 303, having journal bearings 304 in the machine frame.

Means are provided for resiliently holding brush 301 out of operative position, and in the embodied form thereof, an arm 307 is fixed to a shaft 303. Pivoted at 308 to the end of arm 307 is a rod 309, which reciprocates in an apertured lug 310, fixed to and extending inwardly from the side frame of the machine. A helical spring 311 encircles the rod 309, and is in compression between the lug 310 and an adjustable or positionable screw-held collar 312, mounted upon and variably positionable upon the rod 309.

Positive actuating means are provided for pressing the brush upon the surface of the group of sheets, and as embodied, an arm 315 is fixed to shaft 303, and mounted upon the end of said arm is a cam roller 316, cooperating with a cam 317, fixed on a driven shaft 318, having bearings 319 in the side frames of the machine.

In accordance with one feature of the invention, means are provided also for neutralizing the disturbing action of the surrounding air upon the front end of the group of sheets as it moves forwardly rapidly in the horizontal path, in the grip of the grippers, to the place of delivery. In the embodied form thereof, means are provided for projecting a sheet or current of air forwardly along the top surface of the group of sheets; and also a like sheet of air is projected forwardly along the bottom surface of the group of sheets.

The purpose is to neutralize the normal relative movement of the air, and the disturbing influence thereof upon the rapidly advancing group of sheets. In the embodied form thereof, an air-pressure supply pipe 321 is mounted transversely of the machine above the path of travel of the group of sheets which is carried to delivery. Pipe 321 is supplied with a plurality of forwardly and downwardly disposed nozzles 322, through which streams of air are projected downwardly and forwardly for the purpose described.

A like air-supply pipe 323 is mounted transversely in the machine below the path of travel of the group of sheets, and this pipe is provided with a plurality of forwardly and upwardly directed nozzles 324, adapted to project a sheet of air upwardly and forwardly against the bottom side of the advancing group of sheets.

The effect of these two sheets of traveling air is to neutralize the disturbing action of the surrounding stationary air upon the rapidly advancing group of sheets, and in effect prevents relative movement between the group of sheets and the surrounding air, with the consequent elimination of any disturbing air action upon the traveling group of sheets. If desired, the force of the air action could be increased to create two sheets of air one traveling forwardly against and along the top surface of the group of sheets, and the other traveling forwardly against the bottom group of sheets, and likewise tending to hold the sheets smooth and undisturbed. This effect, as indicated, could be obtained by merely increasing the force of the two air currents.

In accordance with one feature of the invention, a sheet delivery is provided, or a stack table, which is fed gradually downwardly during the progress of the delivery of the sheets, to keep the top of the sheet stack in most favorable relation to the sheet-delivery mechanism. As embodied, a sheet-supporting table 333 is provided with screw-threaded lugs 334 at its corners, which have screw-threaded engagement with upwardly-projecting screw-threaded rods 335. These rods are journaled at their top and bottom ends in bearing blocks 336, mounted upon the machine frame.

Fixed to each of the screw-threaded rods is a bevel pinion 337, these pinions meshing respectively with pinions 338, fixed on a horizontal shaft 339. Gradual and minute step-by-step downward feed is imparted by suitable means to the stack table 333 through the mechanism just described. As embodied, a bevel pinion 340 is fixed on one of the horizontal shafts 339, and meshing therewith is a bevel pinion 341. This pinion is fixed on a short shaft to which is fixed also a pawl and ratchet mechanism 342a, which may be of any known or suitable form. The pawl and ratchet mechanism 342a is actuated by a shaft

343, which has a crank connection with shaft 318.

The driving means for the various driven shafts hereinbefore described, is partly shown in the drawings, but has not been described in detail herein, as such driving means is common and well-known and may be of any known or suitable form.

Other means are provided for neutralizing the disturbing action of the air against the head end of the group of sheets *a*, which are being carried to delivery, and said means may be used together with those already described, or either may be used separately from the other. The present form of means is shown in detail in Figs. 8 and 9. To the upper forwarding tapes 129ª, at suitable intervals, are fixed transversely-extending wind break flaps 224. These flaps are flexibly attached to each of the tapes 129ª, and are adapted to hang down in front of the head of the group of sheets *a*, and cut off the air therefrom and prevent disturbing wind action as the group of sheets is carried forwardly rapidly through the air.

The wind break flaps 224 are attached to the sheets in any suitable manner which will permit them to run over the tape-guiding rollers either against the rollers or on the outside of the tape. As embodied, each flap 224 is mounted, near its top edge, on a transversely-extending wire 225, close to the various tapes 129ª. To attach them to the tapes, a flexible strip 226 is fixed to the upper part of the wind break flap 224 at each of the tapes 129ª, passes through an opening in the tape, and is attached to the tape on the other side thereof. This will permit the flap 224 to swing back against the tape when running between the tape and one of the guide rollers; the flap swinging freely when the opposite side of the guiding tapes runs over a roller. As shown in Fig. 8, the wind break flap 224 hangs downwardly just in front of the head of the group of sheets *a*, as shown in Fig. 8, and constitutes a protection from the disturbing action of the air.

The invention in its broader aspects is not limited to the specific mechanism shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A sheet handling machine including in combination means for collecting a group of sheets, means for directing the collected sheets therefrom to a delivery mechanism, and a delivery mechanism comprising two series of spaced-apart grippers adapted to engage the side edges of the group of sheets, and convey them to the place of delivery and spring and cam controlled means for causing the grippers to release the sheets at the place of delivery, said series being movable into parallel or diverging relation.

2. A sheet handling machine including in combination means for collecting a group of sheets, means for directing the collected sheets therefrom to a delivery mechanism, and a delivery mechanism comprising two series of spaced-apart spring and cam controlled grippers adapted to engage the side edges of the group of sheets, and convey them to the place of delivery, each gripper having a fixed jaw and a movable jaw, and means for causing the grippers to simultaneously release the sheets at the place of delivery.

3. A sheet handling machine including in combination means for collecting a group of sheets, means for directing the collected sheets therefrom to a delivery mechanism, and a delivery mechanism comprising two series of spaced-apart grippers adapted to successively engage the side edges of the group of sheets and convey them to the place of delivery, each gripper having a fixed jaw and a movable jaw, and each movable jaw having an actuating arm provided with a cam roller and a cam controlled sleeve member for operating said cam roller, and spring and cam controlled means for causing the grippers to release the sheets at the place of delivery.

4. A sheet handling machine including in combination means for collecting a group of sheets, means for directing the collected sheets therefrom to a delivery mechanism, and a delivery mechanism comprising two series of spaced-apart spring and cam controlled grippers adapted to successively engage the side edges of the group of sheets and convey them to the place of delivery, spring and cam controlled means for causing the grippers to simultaneously release the sheets at the place of delivery, each of said grippers having a fixed jaw and a movable jaw, said movable jaw having an actuating arm provided with a cam roller, a cam controlled sleeve member for operating said cam roller and a timed actuated cam cooperating with said sleeve member.

5. A sheet handling machine including in combination means for collecting a group of sheets, means for directing the collected sheets therefrom to a delivery mechanism, and a delivery mechanism comprising two series of spaced-apart grippers adapted to engage the side edges of the group of sheets and convey them to the place of delivery, means comprising a cam movable into and out of operative position for causing the grippers to simultaneously release the sheets at the place of delivery, and means for varying the paths of travel of said grippers.

6. A sheet handling machine including in combination means for conveying a group of sheets to delivery and a guard member for protecting the head of the group of sheets from the disturbing action of the air.

7. A sheet handling machine including in combination means for conveying a group of sheets to delivery and means for protecting the head of the group of sheets from the disturbing action of the air comprising a member automatically positionable at the head of the group of sheets.

8. A sheet handling machine including in combination means for conveying a group of sheets to delivery and pneumatically operating means and a guard member for protecting the head of the group of sheets from the disturbing action of the air.

9. A sheet handling machine including in combination means for conveying a group of sheets to delivery, by engaging the side edges of the group of sheets, and horizontally traveling guard means for protecting the head of the group of sheets from the disturbing action of the air.

10. A sheet handling machine including in combination means for conveying a group of sheets to delivery, by engaging the side edges of the group of sheets, and means for protecting the head of the group of sheets from the disturbing action of the air, comprising a member automatically positionable at the head of the group of sheets.

11. A sheet handling machine including in combination means for collecting a group of sheets, means for conveying the collected sheets therefrom to a delivery mechanism, a delivery mechanism comprising two series of continuously traveling spaced-apart grippers, means operating in timed relation with the collecting and conveying means for causing a set of the grippers to engage the group of sheets, and means for causing the grippers to release the sheets conveyed by the set of grippers to the place of delivery.

12. A sheet handling machine including in combination means for collecting sheets in groups, means for conveying the groups of collected sheets therefrom in spaced-apart relation to a delivery mechanism, a delivery mechanism comprising two series of continuously traveling, spaced-apart grippers, means operating in timed relation with the collecting and conveying means for causing sets of grippers to engage the side edges of successive groups of sheets, the intervening grippers remaining non-operative, and means for causing the sets of grippers to release the groups of sheets conveyed by them to the place of delivery.

13. A sheet handling machine including in combination means for collecting a group of sheets, means for conveying the collected sheets therefrom to a delivery mechanism, a delivery mechanism comprising two series of continuously traveling, spaced-apart grippers, means comprising a cam movable into and out of operative position in timed relation with the collecting and conveying means for causing a set of the grippers to engage the group of sheets, and means for causing the grippers to release the sheets conveyed by the set of grippers to the place of delivery.

14. A sheet handling machine including in combination means for collecting sheets in groups, means for conveying the groups of collected sheets therefrom in spaced-apart relation to a delivery mechanism, a delivery mechanism comprising two series of continuously traveling, spaced-apart grippers, means comprising a cam movable into and out of operative position in timed relation with the collecting and conveying means for causing sets of grippers to engage the side edges of successive groups of sheets, the intervening grippers remaining non-operative, and means for causing the sets of grippers to release the groups of sheets conveyed by them to the place of delivery.

15. A sheet handling machine including in combination means for collecting a group of sheets, means for conveying the collected sheets therefrom to a delivery mechanism, a delivery mechanism comprising two series of continuously traveling, spaced-apart grippers, means for varying the space between the series of grippers to accommodate sheets of different width, means operating in timed relation with the collecting and conveying means for causing a set of the grippers to engage the group of sheets, and means for causing the grippers to release the sheets conveyed by the set of grippers to the place of delivery.

16. A sheet handling machine including in combination means for collecting a group of sheets, means for conveying the collected sheets therefrom to a delivery mechanism, a delivery mechanism comprising two diverging series of continuously traveling, spaced-apart grippers, means operating in timed relation with the collecting and conveying means for causing a set of the grippers to engage the group of sheets and means for causing the grippers to release the sheets conveyed by the set of grippers to the place of delivery.

17. A sheet handling machine including in combination a delivery mechanism for a group of sheets comprising means adapted to engage the side edges of the group of sheets, and means for conveying the group of sheets to said sheet-engaging means comprising a member automatically positionable at the head of the group of sheets for protecting them from the disturbing action of the air.

18. In a sheet handling machine the combination of tape means for conveying a group of sheets, and a member pivotally mounted on said tape means and adapted to automatically position itself at the head of the group of sheets to protect them from the disturbing action of the air.

19. A sheet handling machine including in combination a delivery mechanism comprising gripping means for engaging the side edges of a group of sheets, means frictionally engaging the group of sheets to convey the group to said gripping means, and means for protecting the head of the group of sheets from the disturbing action of the air while engaged by said gripping means comprising devices for directing currents of air above and below the group of sheets.

20. A sheet handling machine including in combination a delivery mechanism comprising gripping means for engaging the side edges of a group of sheets, means frictionally engaging the group of sheets to convey the group to said gripping means, a guard member carried by said frictional conveying means for protecting the head of the group of sheets from the disturbing action of the air, and means for protecting the head of the group of sheets from the disturbing action of the air while engaged by said gripping means comprising devices for directing currents of air above and below the group of sheets.

In testimony whereof, I have signed my name to this specification.

RALPH C. SEYMOUR.