

Sept. 8, 1959

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2,903,260

PLANETARY INSERTER MECHANISM

Filed Nov. 21, 1955

3 Sheets-Sheet 1

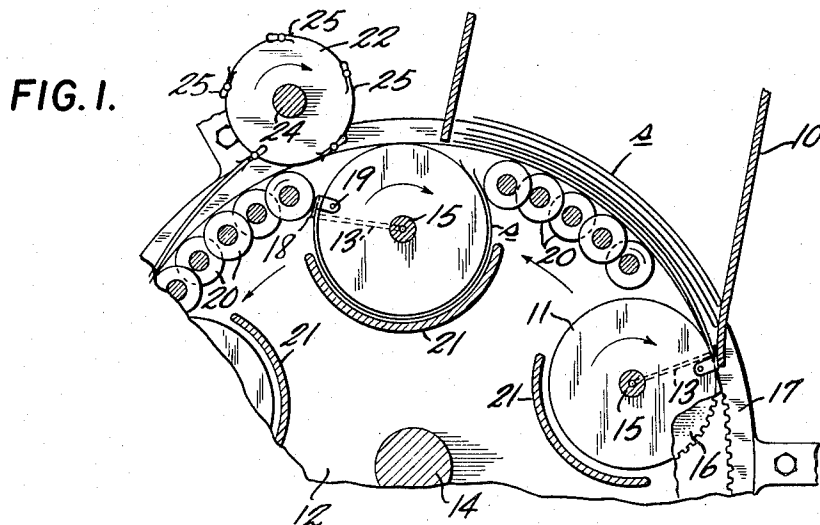


FIG. 1.

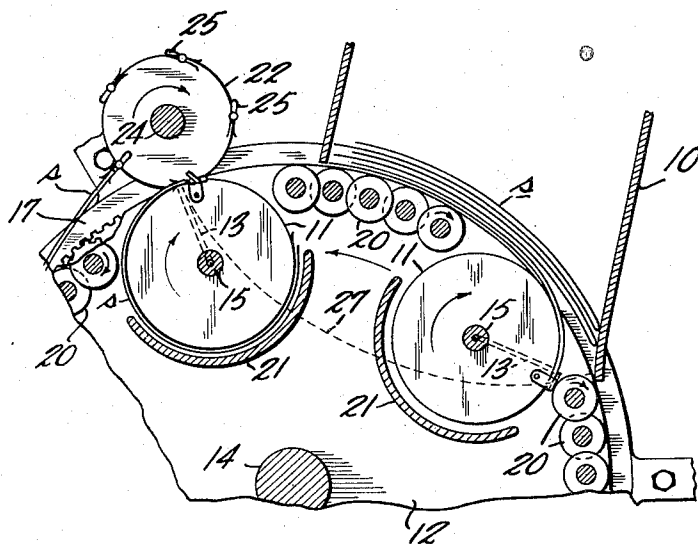


FIG. 2.

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FIG. 3.

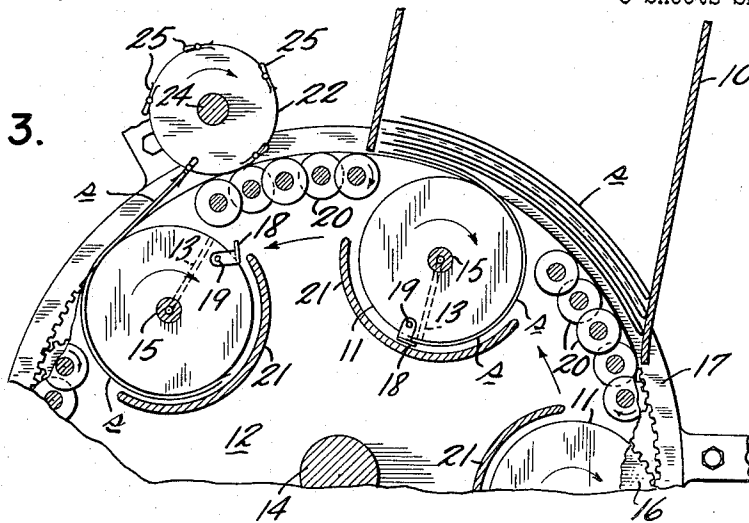
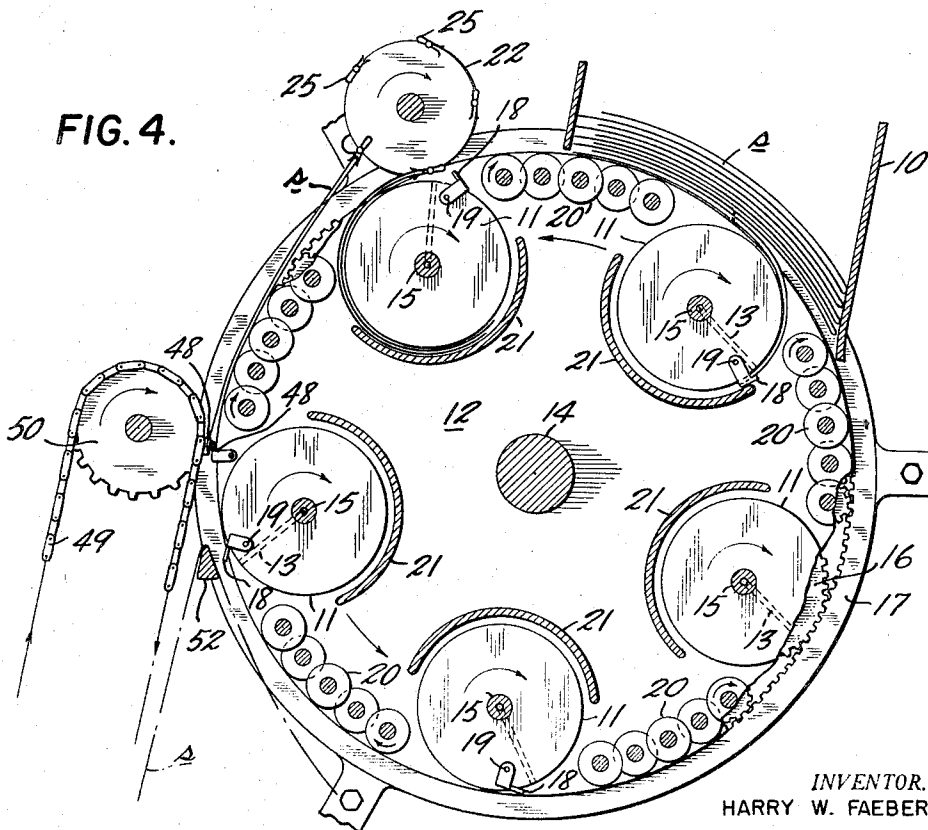


FIG. 4.



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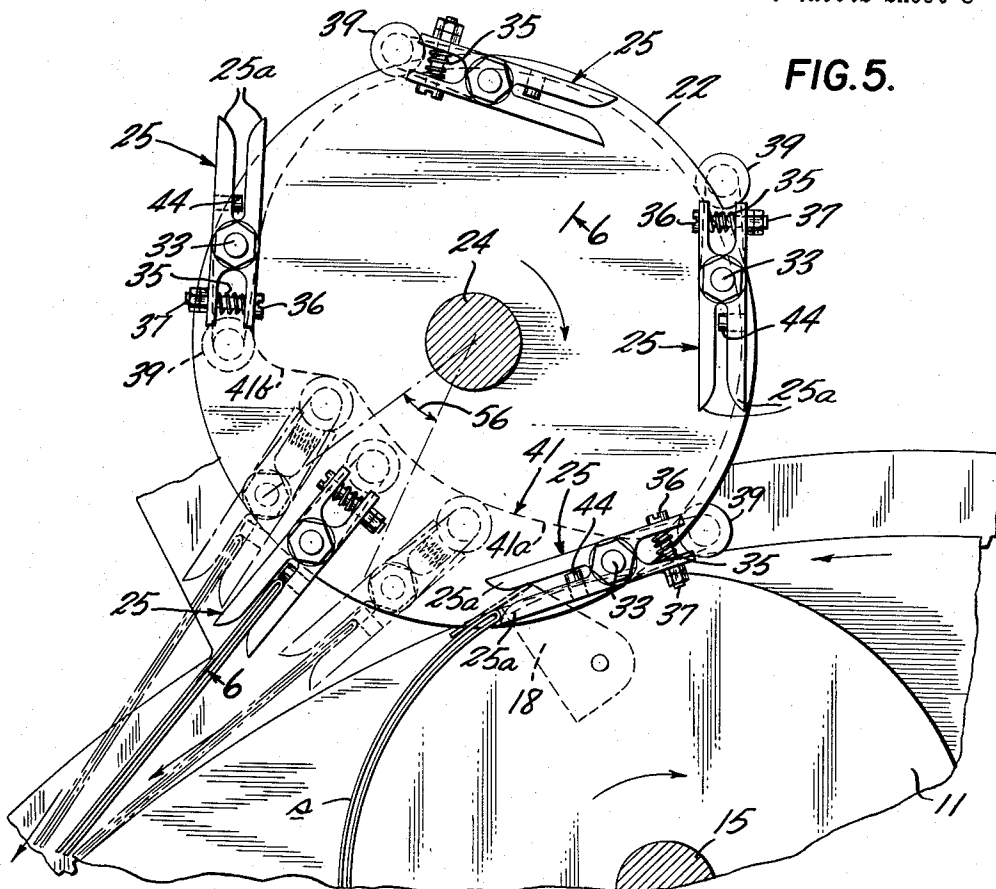
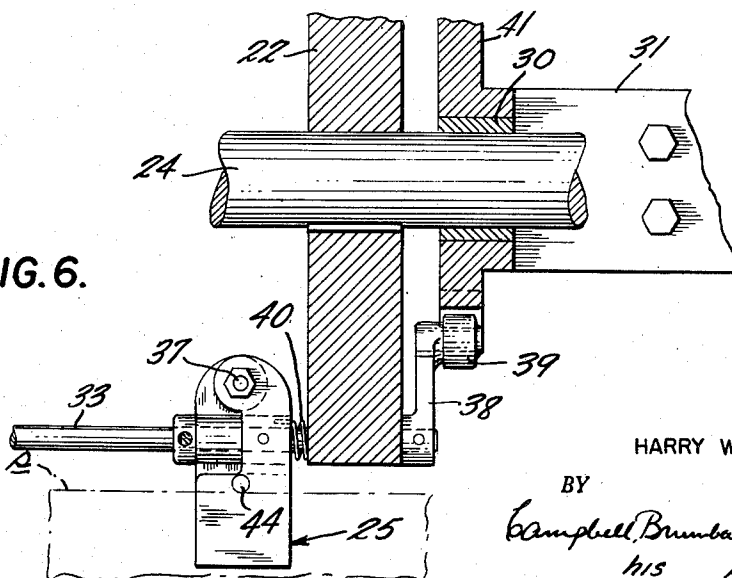


FIG. 6.



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PLANETARY INSERTER MECHANISM

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Application November 21, 1955, Serial No. 547,935

13 Claims. (Cl. 270—54)

This invention relates to sheet collating and inserter systems wherein printed signatures are stacked in a bin and delivered, one at a time, onto a moving conveyor in straddling fashion, that is to say, with the folded edge of the signature across the top of the conveyor and the leaves of the signature hanging downwardly on opposite sides thereof. In systems of this general organization, the conveyor receives a plurality of signatures from different collating or inserter mechanisms, one at a time and one above the other, and in this manner a book is compiled on the moving conveyor ready for stitching or binding.

More specifically, the present invention relates to an improved mechanism for withdrawing the signatures one at a time from a storage bin or hopper and for delivering the signatures in straddling fashion on the moving conveyor. In the mechanism of the present invention, a plurality of gripper carriers is transported in a major orbital path in proximity to the discharge end of the hopper in which the signatures are stored. While travelling in a major orbital path, the gripper carriers are driven in a planetary orbit. As a particular gripper carrier approaches the discharge end of the hopper, the grippers carried thereby are opened, and the folded edge or "backbone" of the sheet is drawn by suction into the open grippers. The grippers then close on the edge of the signature, and the signature is carried by the grippers along the planetary orbit while the gripper carrier itself is translated along the major orbital path to deliver the signature to the conveyor.

An auxiliary gripper carrier is stationed in proximity to the major orbital path along which the planetary gripper carriers are translated, and as the planetary gripper carrier passes in proximity to the auxiliary gripper carrier, the folded edge or backbone of the signature is transferred from the grippers of the planetary gripper carrier to the grippers of the auxiliary carrier. The grippers of the auxiliary carrier to which the folded edge of the signature is delivered transport the signature in a fixed path relative to the moving conveyor and, meanwhile, the body portion of the signature is guided by the planetary gripper carrier toward a pair of sheet engaging members which travel in orbital paths on opposite sides of the conveyor. The grippers of these carriers each engage one of the leaves of the signature and pull the respective leaves downwardly on opposite sides of a saddle disposed above the moving conveyor. The folded edge or backbone ultimately is withdrawn from the grippers of the auxiliary carrier, and the folded edge is pulled downwardly onto the saddle in straddling fashion. When the signature is properly assembled on the saddle, the leaves of the signature are released, and the signature is subsequently slideably discharged from the saddle onto the conveyor in a well known manner.

Although other inserter mechanisms have been proposed for delivering signatures in straddling fashion to a moving conveyor, such as the mechanism shown and described in my co-pending application, Serial No. 442,149,

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filed July 8, 1954, the mechanism of the present invention affords a highly unique arrangement wherein the signatures may be removed from the hopper one at a time in rapid succession and the signature positively handled throughout the entire operation.

For a complete understanding of the present invention, reference may be had to the detailed description which follows and to the accompanying drawings in which:

Figs. 1, 2 and 3 are side elevational views of certain of the parts of the present invention showing the manner in which a signature is withdrawn from the hopper and handled at various stages prior to its delivery to the conveyor;

Fig. 4 is a general side elevational view of the apparatus of the present invention, illustrating still a further step in the handling of the signature;

Fig. 5 is an enlarged side elevational view showing the auxiliary gripper carrier in greater detail; and

Fig. 6 is a cross section view taken substantially along the line 6—6 of Fig. 5, looking in the direction of the arrows.

Referring to the drawings and particularly to Fig. 4, signatures *s* are stacked by hand or in any suitable manner in a hopper 10. Beneath the hopper, a plurality of rotating gripper-carrying cylinders 11 are transported in a circular orbital path by a pair of discs 12 rotatably mounted on a shaft 14. The shafts 15 of each of the gripper carrying cylinders 11 are supported at opposite ends between the discs 12.

While the cylinders 11 are transported in an orbital path by the discs about the axis of the shaft 14, the cylinders are independently rotated by means of the engagement of gears 16 mounted on the shafts 15 with the teeth formed on the inner periphery of a large stationary internal gear 17.

Each of the planetary cylinders 11 carries at its periphery one or more grippers 18 pivotally mounted on a common shaft 19. The grippers 18 are adapted to be opened and closed by cams.

As each of the planetary cylinders 11 approaches the lower discharge end of the hopper 10, the grippers carried by the cylinder open, and the folded edge or backbone of the signature is drawn into the open gripper by suction through radially disposed conduits 13. The signatures, of course, are previously stacked in the hopper in such fashion that the folded edges thereof are all at the same end of the hopper. The grippers 18 close on the folded edge of the signature, and as the cylinder 11 driven by the internal gear 17 rotates in a clockwise direction about its own axis, the signature is peeled from the bottom of the hopper and wound around the surface of the cylinder 11.

A plurality of interlapping rolls 20 is supported by discs 12 at the periphery thereof intermediate adjacent planetary cylinders 11, and these rolls serve not only to support the weight of the signatures in the hopper as they pass in rolling contact beneath the bottom signature in the pile, but they serve also to facilitate the withdrawal of the lowermost signature as it is wound about the periphery of the planetary cylinder 11.

Curved guides 21 are supported between the discs 12 close to the periphery of the rotating planetary cylinders 11 to prevent the trailing edges of the signature from falling away from the surface of the cylinder 11 as the signature is wound about the cylinder.

A cylinder 22 comprising two or more discs which are rotatably mounted on a shaft 24 is mounted in proximity to the path of travel of the planetary gripper cylinders 11. The cylinder 22 carries a plurality of auxiliary grippers or clips 25 equally spaced around the outer periphery thereof, and the folded edge of the signature is transferred from the grippers 18 to one of the clips 25. There

may, of course, be a plurality of clips 25 spaced longitudinally of the cylinder 22 to engage a single signature. The broken line 27 represented in Fig. 2 traces the path of travel of the folded edge of the signature from the time that it is engaged by the gripper 18 to the time that it is delivered to one of the clips 25.

The clip-carrying cylinder 22 is best shown in Figs. 5 and 6. The shaft 24 which supports the cylinder is rotatably mounted within bearings 30 of supporting bracket 31. Each of the clips 25 comprises a pair of finger elements 25a supported on a common shaft 33, and a plurality of such shafts 33 is pivotally mounted in each of the discs comprising the cylinder 22 at equally spaced intervals near the outer periphery of the discs. The clips are supported on the pivotal shafts 33, one each adjacent the inside faces of the discs, and none, one or more inbetween.

The finger elements 25a of one of the clips 25 are urged closed by a compression spring 35 interposed between the inoperative ends of the finger elements on the opposite side of the pivot shaft 33 from the operative ends thereof. The compression spring 35 is supported on the shank of a screw 36 and an adjustable locking nut 37 threadably received by the end of the screw determines the minimum gap between the operative ends of the finger elements 25a.

The extreme ends of each of the pivotal shafts 33 extend outboard of the discs comprising the cylinder 22, and the end of the shaft carries an arm 38 fixed thereto having a roller or cam follower 39 at the end thereof. The shaft 33 is pivotally urged by means of a torsion spring 40 carried on the shaft 33 in a direction to maintain the cam follower roller 39 in contact with the surface of a stationary cam 41 mounted on the supporting bracket 31.

The clips 25 are carried tangentially to the periphery of the cylinder 22 prior to receiving a signature from the grippers 18 of a cylinder 11. This disposition of the clips 25 is determined by the engagement of the cam follower rollers 39 with the raised surface of the cam 41. Thus, as best shown in Fig. 5, the clip is substantially tangentially disposed with respect to both the cylinder 22 and the planetary cylinder 11 at the point at which the folded edge of the signature is presented to the clip 25.

The grippers 18 remain closed on the leading edge of the signature while the folded edge thereof is inserted between the spring-pressed finger elements 25a, and the grippers 18 draw the folded edge of the signature into registered contact with a pin 44 carried by one of the finger elements 25a of each of the clips 25. The registering pins 44 of each of the clips engaging the signature thus will square up the leading edge of the signature.

The clips 25 serve as auxiliary grippers which hold the folded edge of the signature while the continued rotation of the planetary cylinder 11 about its own axis and the translation of the cylinder about the axis of the shaft 14 unrolls the body of the signature toward a pair of sheet-engaging members 48, one of which is carried by a chain 49 and the other of which is carried by the drum.

A plurality of the sheet-engaging members 48 are carried in an orbital path by the chain 49 which passes around sprockets 50, and these sheet-engaging members move in synchronism with the sheet-engaging members carried by and spaced around the drum. Thus, after the signature is fully unrolled by the rotation of the planetary cylinder 11, the edges of each of the leaves of the signature are presented to and engaged by one of the sheet-engaging members 48. These sheet-engaging members pull the leaves of the signature downwardly on opposite sides of a saddle 52 (see Fig. 4) which is disposed immediately above the moving conveyor upon which the signatures are to be delivered in straddling fashion.

Meanwhile, as shown in Fig. 5, the cam follower roller 39 of the clip 25 to which the folded edge of the signature has been delivered comes into contact with a depression 41a in the surface of the cam 41, and the clip 25 is pivoted in a counter-clockwise direction by the spring 40.

Different positions of the clip are represented in phantom lines in Fig. 5.

When the leaves of the signature have been positively engaged by the sheet-engaging members 48, the downward movement of the chains which carry the sheet-engaging members will withdraw the folded edge of the signature from between the spring-pressed finger elements 25a of the clip 25 and pull the signature in straddling fashion upon the saddle 52. The sheet-engaging members 48 will release the leaves of the signature when the signature is properly seated thereon. The signature remains seated on the saddle 52 in straddling fashion until it is slideably removed therefrom by pocket-forming partitions of the moving conveyor. The operation of the sheet-engaging members 48 and the removal of the signature from the saddle onto the conveyor is disclosed in my above-mentioned co-pending application.

It may be noted that in the preferred embodiment of the invention the cam follower roller 39 leaves the surface of the cam 41 throughout the portion of the rotation of the cylinder 22 represented by the angle 56 in Fig. 5. Thus, the clip 25 assumes its maximum counterclockwise position during this portion of the cycle of rotation. Thereafter, the cam follower roller 39 engages the raised surface 41b of the cam 41, pivoting the clip in a clockwise direction to return it to a position tangential with respect to the outer periphery of the cylinder 22 prior to receiving another signature.

The invention has been shown and described in a single preferred form and by way of example only, and obviously many variations and modifications may be made therein without departing from the spirit of the invention. The invention, therefore, is not to be limited to any specified form or embodiment, except insofar as such limitations are set forth in the claims.

I claim:

1. In a mechanism for handling folded signatures and delivering them in straddling fashion to signature-receiving means, a gripper carrier, means for transporting the gripper carrier in an orbital path, means for driving said gripper carrier in a planetary orbital path, a hopper for storing a plurality of signatures therein, the discharge end of said hopper being in proximity to the orbital paths followed by the gripper carrier, a gripper transported by said carrier for engaging the folded edge of a signature and advancing the folded edge of the signature along its planetary orbital path, means for receiving the folded edge of the signature from the gripper of said carrier moving in a planetary orbit, a pair of sheet-engaging members movable in orbital paths on opposite sides of the means for receiving the signature in straddling fashion thereon, the continued movement of the gripper carrier guiding the body of the signature toward said sheet-engaging members, the sheet-engaging members receiving the leaves of the signature and movement of the sheet-engaging members pulling the leaves of the signature downwardly on opposite sides of the signature-receiving means in straddling fashion thereon after the folded edge of the signature is released by the said means for receiving the folded edge of the signature from the grippers of the gripper carrier.

2. In the mechanism for handling folded signatures set forth in claim 1, including a plurality of the said gripper carriers transported along a common orbital path and guide means closely spaced to each of the planetary orbital paths followed by the gripper carriers for guiding the signature received by the gripper carrier.

3. In the mechanism for handling folded signatures set forth in claim 2, including a plurality of rollers carried by said means for transporting the gripper carriers in an orbital path, said rollers being disposed between adjacent gripper carriers and making rolling contact with the lowermost signature in the hopper, thereby supporting the pile of signatures in the hopper.

4. In the mechanism for handling folded signatures

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set forth in claim 1 wherein the means for receiving the folded edge of the signature from the gripper of the gripper carrier comprises a carrier and a signature-receiving clip transported by said carrier.

5. In a mechanism for handling folded signatures, a hopper for storing a plurality of signatures therein, a plurality of planetary rotatable cylinders arranged in circular array, means for supporting the planetary cylinders and transporting them in an orbital path, a stationary internal gear for imparting rotation to said planetary cylinders about their own axes, a gripper carried by each of said planetary cylinders, said gripper engaging the folded edge of a signature within the hopper and winding said signature about its periphery as it is translated in an orbital path and rotated about its axis, means for receiving the folded edge of the signature from the gripper of the planetary cylinder and for holding the folded edge thereof while the continued rotation of the cylinder about its own axis and the movement of its axis in an orbital path unwinds the body of the signature, and sheet-engaging means for receiving the leaves of the signature thus unwound.

6. In the mechanism for handling folded signatures set forth in claim 5 wherein the means for receiving the folded edge of the signature from the gripper of the planetary cylinder and for holding the folded edge of the signature while the planetary cylinder unwinds the body of the signature comprises a carrier and a spring-closed clip transported by said carrier in an orbital path.

7. In the mechanism for handling folded signatures set forth in claim 6, means for pivotally mounting said spring-closed clip to said carrier, and cam means for controlling the pivotal movement of the spring-closed clip.

8. In the mechanism for handling folded signatures set forth in claim 6 wherein the spring-closed clip comprises a plurality of finger elements spring-urged to closed position and registering means carried by at least one of said finger elements for receiving the folded edge of the signature in registered contact therewith.

9. A method of handling folded signatures and delivering them in straddling fashion to signature-receiving means comprising the steps of gripping the folded edge of a signature stored in a hopper, winding the body of the signature about a rotating cylinder, the axis of which is transported in an orbital path, whereby the signature is carried from the hopper toward the signature-receiving means, transferring the folded edge of the signature to an auxiliary gripper, unrolling the signature from the cylinder while the folded edge thereof is held by the auxiliary gripper, moving the auxiliary gripping means in an orbital path engaging each of the leaves of the signature, and pulling the leaves of the signature across the signature-receiving means in straddling fashion and at the same time withdrawing the folded edge of the signature from the auxiliary gripper.

10. In a mechanism for handling folded signatures and delivering them in straddling fashion to signature-receiving means, a hopper for receiving a plurality of signatures, a rotating cylinder, gripping means carried by said rotating cylinder, means for transporting the axis of said cylinder

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in an orbital path, said path being in proximity to the discharge end of the hopper whereby the folded edge of the bottom sheet in the hopper is received by the gripping means and the signature wound about the rotating cylinder as the signature is withdrawn from the hopper, auxiliary gripping means, means for transporting said auxiliary gripping means in an orbital path, the folded edge of the signature being transferred from the gripping means carried by the rotatable cylinder to the auxiliary gripping means, and means for separating the leaves of the signature while the folded edge is held by said auxiliary gripping means in preparation for delivering the signature in straddling fashion to the signature-receiving means.

11. An apparatus for handling folded signatures and delivering them in straddling fashion to a signature receiving means comprising a hopper for receiving a plurality of signatures, a gripping means for receiving the folded edge of a signature from the hopper, a carrier for transporting the gripping means in an orbital path to wind the signature thereon, means for transporting the carrier in an orbital path between the hopper and a point at which the signature is delivered by the gripping means, and auxiliary gripping means for receiving the folded edge of the signature from the above-mentioned gripping means and holding the folded edge while the leaves of the signature are parted in preparation for delivering the signature in straddling fashion to the signature receiving means.

12. An apparatus as set forth in claim 11, including a carrier for transporting the auxiliary gripping means in an orbital path, the signature being transferred from the gripping means to the auxiliary gripping means at a point at which their respective paths cross.

13. An apparatus for handling folded signatures and delivering them in straddling fashion to a signature-receiving means comprising gripping means for engaging an edge of a signature fed thereto, means for transporting the gripping means in an orbital path from the point at which the signature is received by the gripping means to a point at which the signature is delivered thereby, auxiliary gripping means to receive the folded edge of the signature from the gripping means, a carrier for transporting the auxiliary means in an orbital path, means for pivotally mounting the auxiliary gripping means on said carrier, cam means to impart a predetermined pivotal movement to said auxiliary gripping means while it is gripping the folded edge of the signature as it is transported in an orbital path by the carrier, and means for separating the leaves of the signature in preparation for delivering them in straddling fashion to the signature-receiving means.

References Cited in the file of this patent

UNITED STATES PATENTS	
2,219,608	Ackley ----- Oct. 29, 1940
2,279,269	Tornberg ----- Apr. 7, 1942
2,279,270	Tornberg ----- Apr. 7, 1942
2,413,358	Kleineberg ----- Dec. 31, 1946
2,568,604	Bechberger ----- Sept. 18, 1951