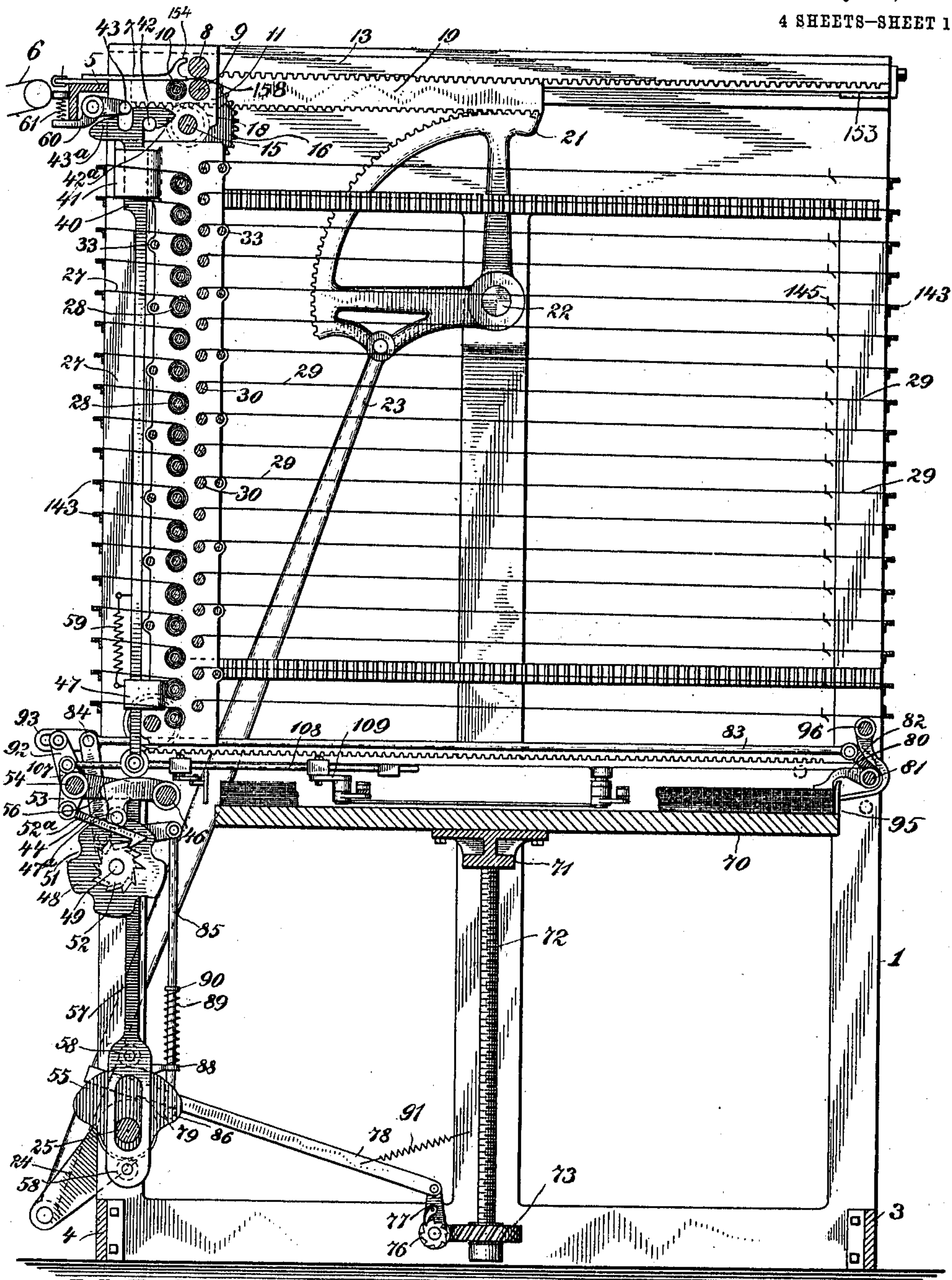


R. A. FREEMAN.
 DELIVERY MECHANISM FOR PRINTING PRESSES.
 APPLICATION FILED OCT. 14, 1901. RENEWED OCT. 12, 1910.

993,162.

Patented May 23, 1911.

4 SHEETS—SHEET 1.



WITNESSES:

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Rudolf Roehrich

Fig. 1.

INVENTOR

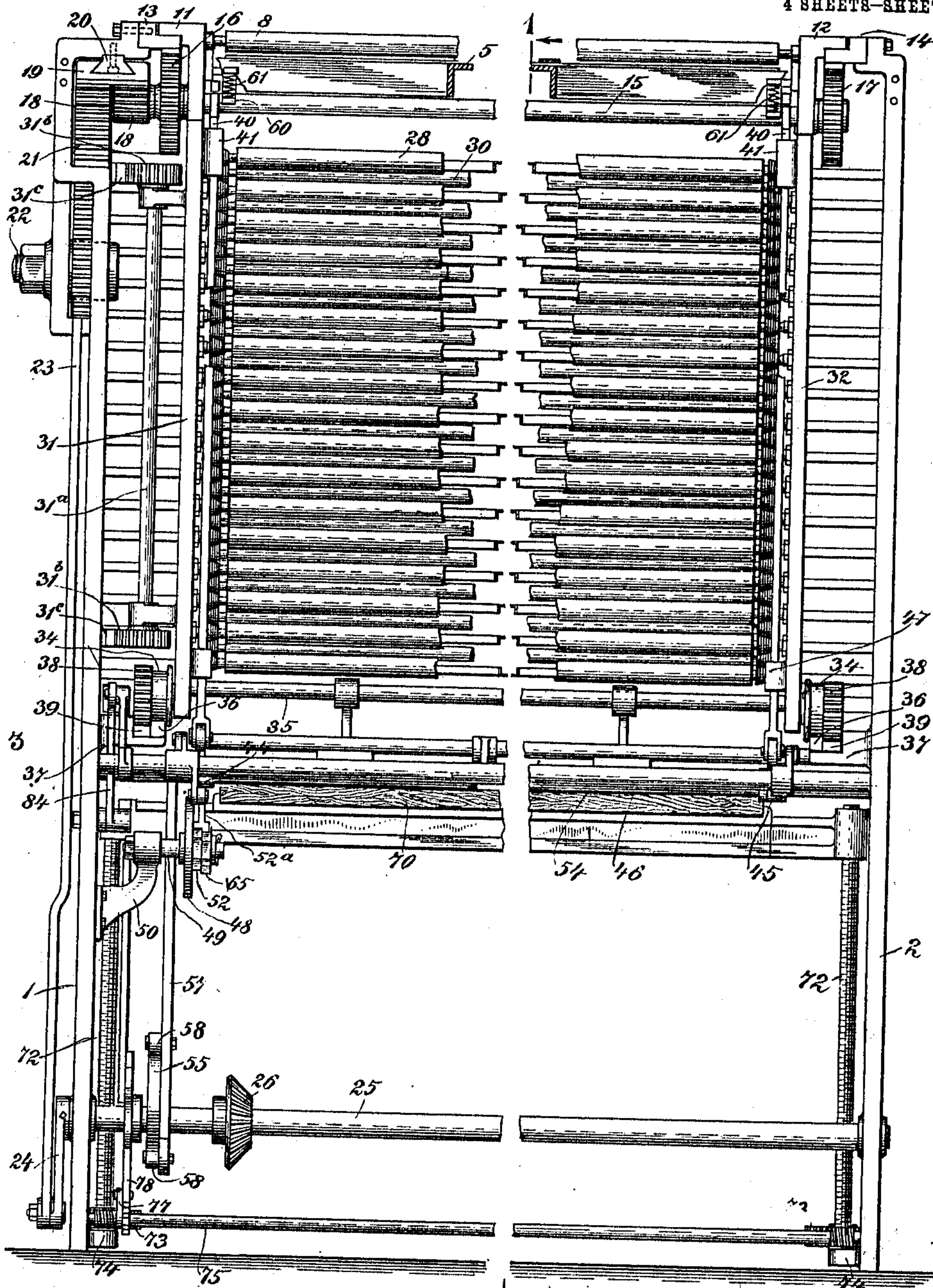
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4 SHEETS—SHEET 2.



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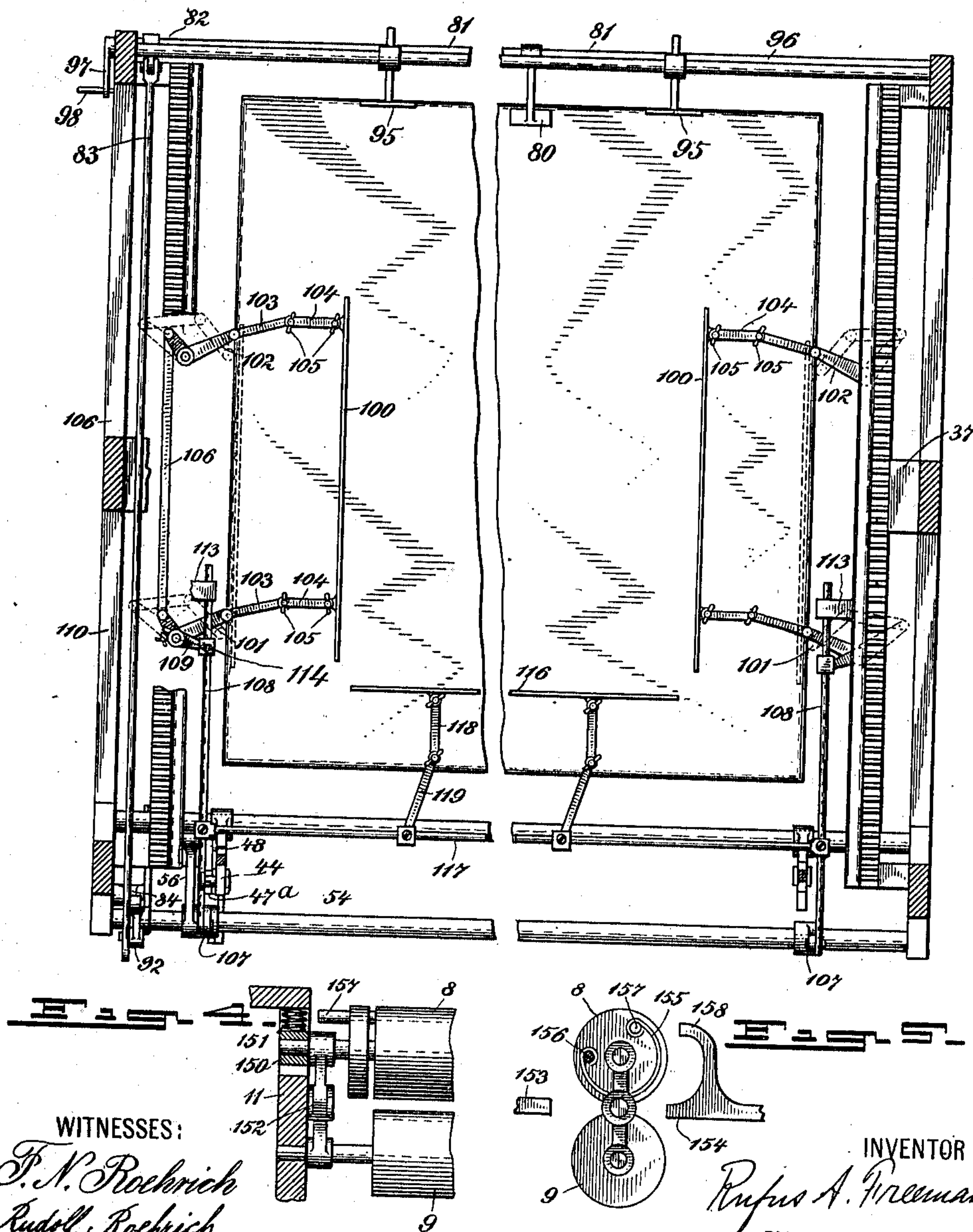
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4 SHEETS—SHEET 3.

Fig. 3.



WITNESSES:

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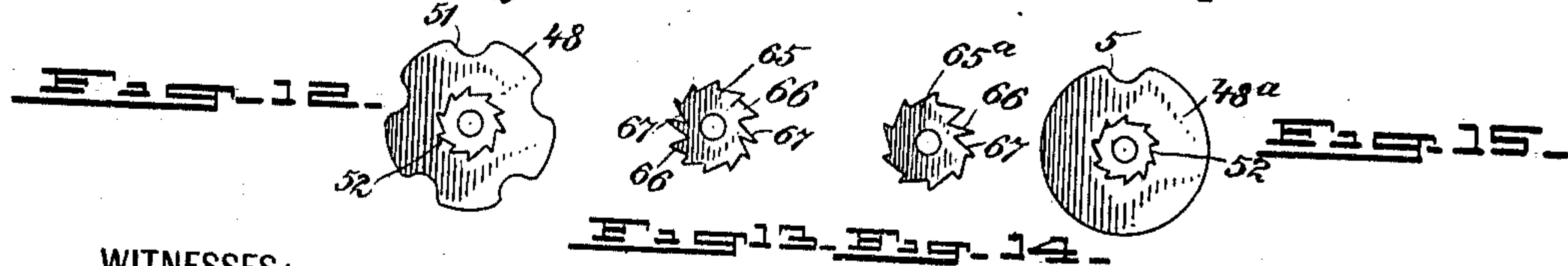
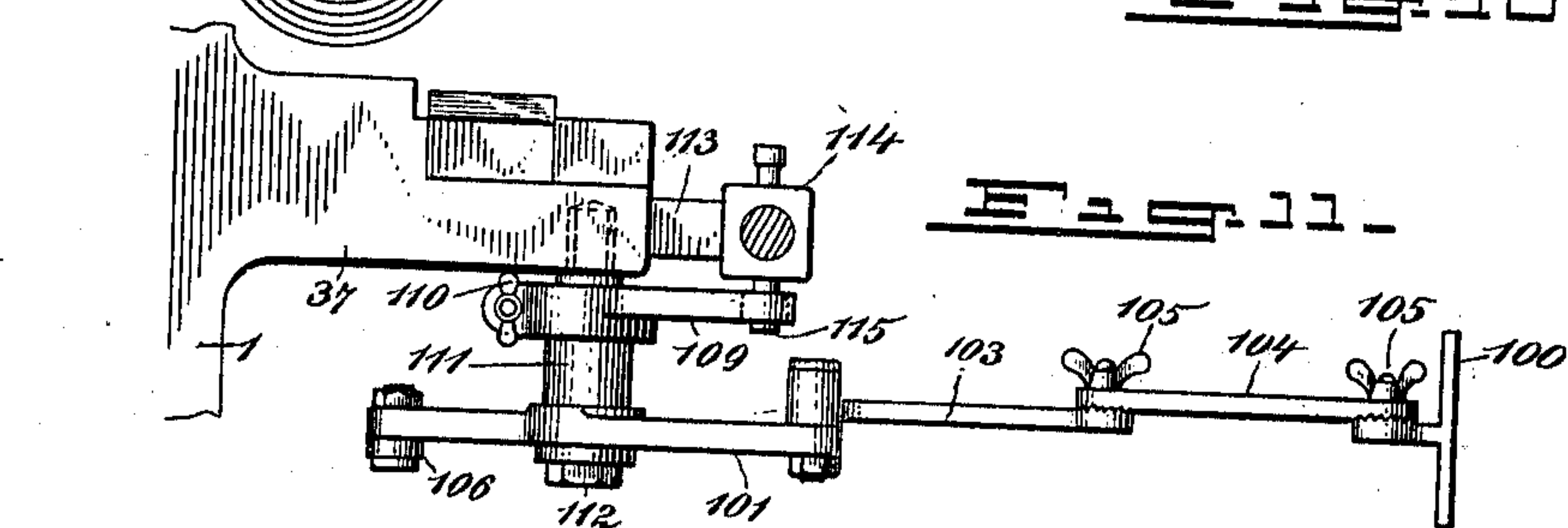
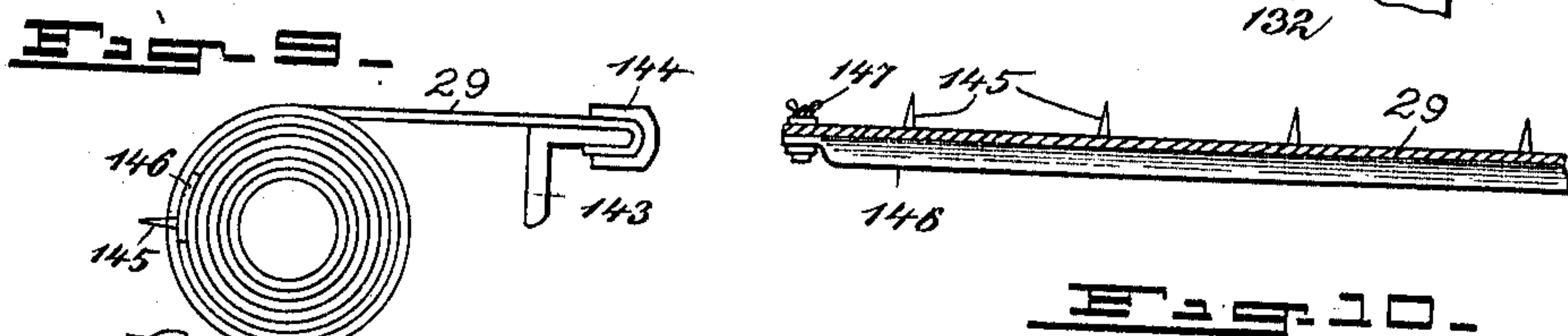
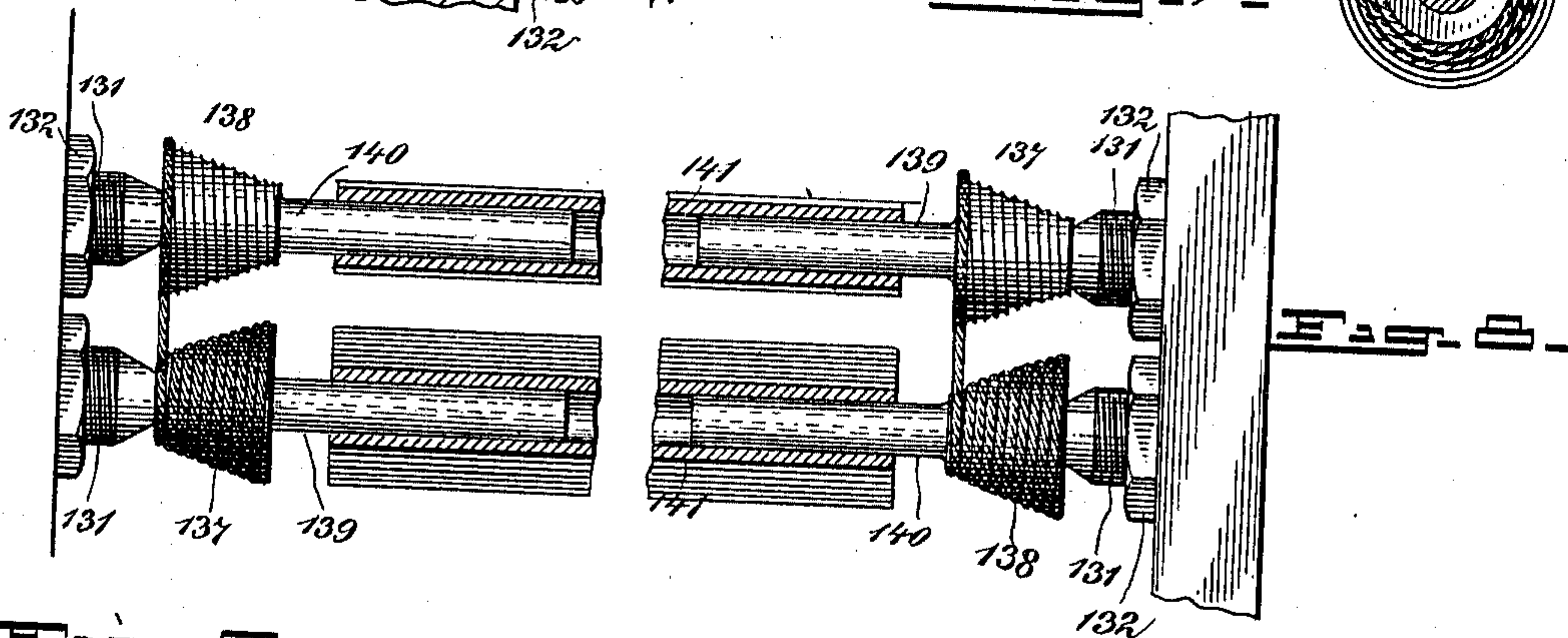
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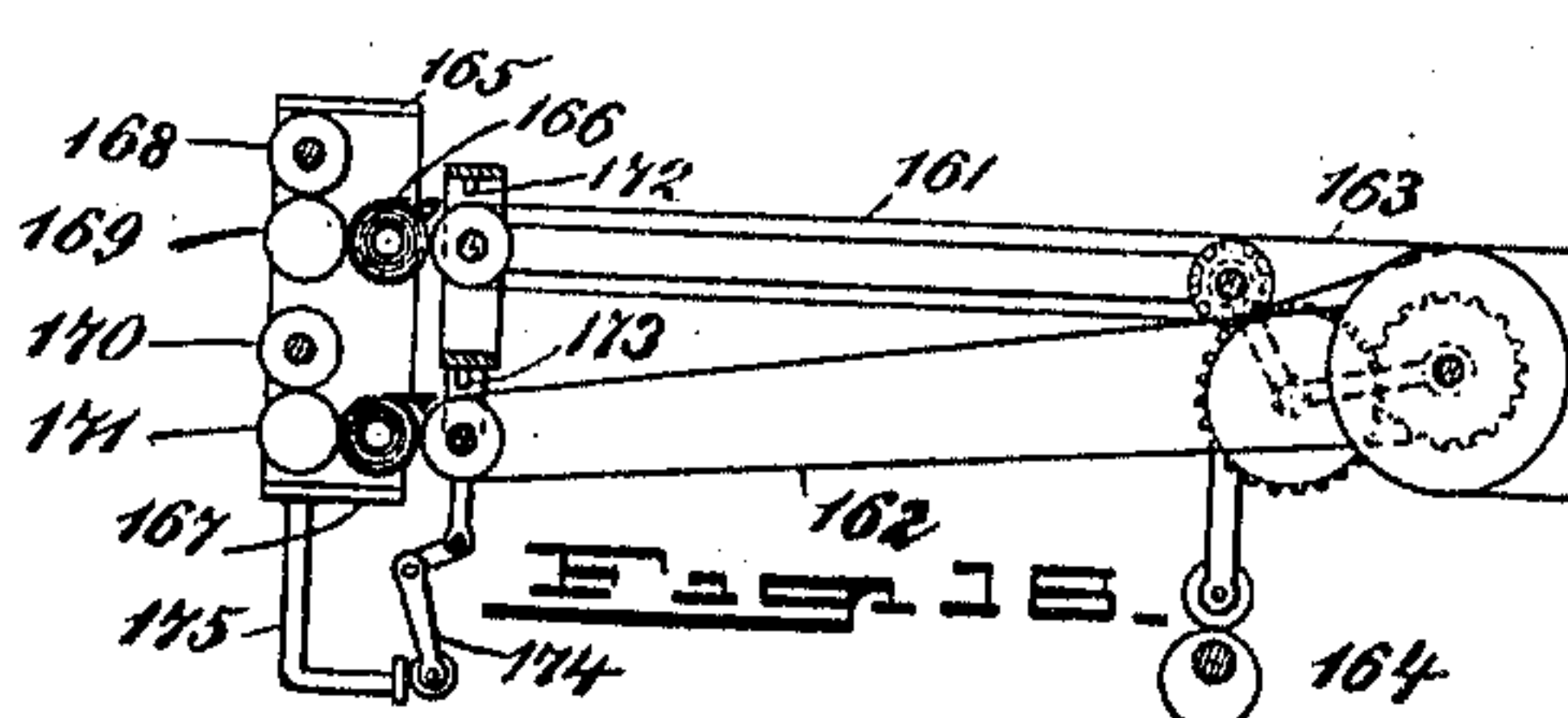
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UNITED STATES PATENT OFFICE.

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DELIVERY MECHANISM FOR PRINTING-PRESSES.

993,162.

Specification of Letters Patent.

Patented May 23, 1911.

Application filed October 14, 1901, Serial No. 78,551. Renewed October 12, 1910. Serial No. 586,790.

To all whom it may concern:

Be it known that I, RUFUS A. FREEMAN, a citizen of the United States, and a resident of Flushing, in the county of Queens and State of New York, have invented certain new and useful Improvements in Delivery Mechanism for Printing-Presses, of which the following is a specification.

My invention relates to a delivery mechanism for printing presses, or the like, and more particularly to that class of deliveries by which sheets of paper, or similar material, are delivered in a flat or unfolded condition in a uniform pile.

Heretofore, in deliveries of the class referred to, it has been the common practice to convey the printed sheets from the press to the top of the pile without providing for any substantial interval to give the ink time to set or become partly dry. When the sheets are once in the pile the air between them is soon forced out by the weight of the superimposed sheets and the drying of the ink is thus prevented or greatly retarded. Then, as the pressure between the sheets increases due to the increase in the pile, there is a tendency for a part of the ink to be transferred or "offset" onto the adjacent sheets. The most difficulty is experienced from this form of offset with the finer grades of printing, and especially with cut work, and multi-color work, and all work done on coated or glazed paper. With these classes of work care must be taken not to let the piles of printed sheets become too large and it is often necessary to insert plain sheets of unglazed paper known as "slip sheets" between the printed sheets to prevent off-set. In any event much labor and a considerable waste of stock is involved in the repeated handling of the paper. A large amount of room is required also, and much time is wasted due to frequent stoppages of the presses.

My invention has for an object to overcome the above mentioned difficulties, the invention being to this end more particularly addressed to the provision of a mechanism of the class referred to whereby the sheets as they come from the press are kept in a separated condition, either singly or in lots of two or more, for a length of time sufficient to let the ink or other substance

thereon set or become partly dry so that it will not be offset onto adjacent sheets by the pressure of the pile; also to the provision of a mechanism whereby the sheets when so dried are automatically piled in regular order in a uniform and continuously increasing pile so as to avoid the constant care of an attendant and frequent stoppages of the press to remove the printed paper.

It is also a primary object of my invention to provide a mechanism of the character described which is self contained and automatic and reliable in operation, and which may be connected to various styles and makes of presses and does not occupy an undue amount of floor space.

These and other objects of my invention will more fully appear from the following description.

My invention consists in the novel parts, improvements and combinations herein shown and described.

The accompanying drawings, which are referred to herein and form a part hereof, illustrate one embodiment of my invention and serve in connection with the description herein to explain the principles of the invention and the best mode in which I have contemplated applying those principles.

Of the drawings Figure 1 is a longitudinal section of a machine constructed in accordance with my invention, the section being taken on the line 1—1 Fig. 2 looking in the direction of the arrows; Fig. 2 is an end elevation of the same as seen from the left Fig. 1; Fig. 3 is a sectional plan view taken on the line 3—3 Fig. 2; Fig. 4 is a sectional view on an enlarged scale showing a detail; Fig. 5 is an end view of the same; Figs. 6 and 7 are views similar to those in Figs. 4 and 5 showing another detail; Fig. 8 is a plan view partly in section illustrating a modification; Figs. 9 and 10 are an end view and a section respectively illustrating a detail; Figs. 11, 12, 13, 14 and 15 are side views illustrating various details; and Fig. 16 is a sectional view illustrating a modification of one feature of the invention.

In accordance with my invention means are provided for conveying the sheets from a printing press or the like, a series of sheet supports are arranged to receive the sheets from the conveyer, means are provided for

operating the sheet supports so that the sheets received at one end of the series are discharged at the other end thereof, and means are provided for receiving the sheets as they are discharged from the sheet supports.

In accordance with the best embodiment of my invention each of the sheet supports is made expansible and contractible and when in operation the sheet supports are alternately expanded and contracted so that the sheets received at one end of the series are discharged at the other end thereof. It is preferable also that the sheet supports are so operated that the sheets are transferred from one support to another throughout the series; also that the sheet supports are made flexible and are fixed at one end and connected to suitably operated rollers at the other end; also that the sheet supports are arranged in a double series oppositely disposed with relation to each other and so operated that the sheets are alternately transferred from one series to the other and thus advanced from one support to the next in each series; also that the means for operating the sheet supports are so constructed that the sheets are kept in a separated condition either singly or in lots of two or more sheets; also that the conveyer for conveying the sheets from the press includes means for depositing the sheets one by one upon the series of supports; also that the sheet conveyer includes a reciprocating sheet dropping mechanism which constitutes the means for operating the series of sheet supports; also that means are provided for either continuously operating the sheet supports with the conveyer mechanism or for operating the sheet supports on every second or other predetermined number of operations of the conveyer mechanism; also that the means for receiving the sheets from the sheet supports are constructed to automatically pile the sheets in a continuously increasing pile.

In accordance with the particular embodiment of the invention shown the delivery mechanism is mounted in a frame which is separate from and independent of the main frame of the press so that the delivery mechanism may be used with various kinds and makes of printing presses or other sheet manipulating machines. The machine shown is particularly designed to be used in connection with a bed and cylinder printing press having what is known in the art as a "front delivery."

Referring to the drawings in detail, the frame of the machine shown consists of a pair of side frames 1 and 2 which are connected together by suitable cross girders 3, 4 and 5. This frame is located at the delivery end of the press and is constructed to support the various parts of the mechanism so as to form a unitary self contained structure

independent of the press structure and connected therewith only by suitable driving mechanism and means for transferring the printed sheets from one structure to the other.

Any suitable form of mechanism may be used for transferring or conveying the printed sheets from the press to the delivery mechanism and depositing them one by one on the series of sheet supports. As shown this mechanism, herein termed the conveyer mechanism, comprises a set of tapes 6 a flexible expanding and contracting support 7 and a pair of nipping rollers 8 and 9. One end of the flexible support 7 is fixed to the frame as by being clamped to the girder 5 and the other end is secured to a roller 10, which, together with the rollers 8 and 9, is journaled in a carriage arranged to reciprocate back and forth from one end of the frame to the other. As shown this carriage consists of a pair of frame pieces 11 and 12 constructed to slide on the upper surfaces of the racks 13 and 14 which are bolted to the upper ends of the side frames 1 and 2. The frame pieces 11 and 12 are connected and caused to reciprocate in unison by means of a shaft 15 which is journaled in the frame pieces and is provided at or near its opposite ends with pinions 16 and 17 adapted to mesh with the racks 13 and 14 respectively.

The carriage may be caused to reciprocate by any suitable means. Preferably and as shown the shaft 15 is provided at one end with a pinion 18 which is preferably somewhat less than half the diameter of the pinions 16 and 17 and is engaged by a short rack 19 which is mounted to slide on a suitable guide 20 carried by the side frame 1 above the pinion 18. A movement of the rack 19 through a certain distance will cause a movement of the carriage in the same direction somewhat less than twice that distance depending on the proportion between the pinions 16 and 18, the proportions between the relative movements and the diameters of the pinions varying inversely to each other.

The rack 19 may be reciprocated by any suitable means. Preferably it is made double the width of the pinion and is engaged at the outer part by a gear segment 21 which is pivoted on a stud 22 and is connected by a link 23 with a crank 24 carried by one end of the main shaft 25, which, as shown is journaled in the lower part of the frame and at the end thereof to be arranged adjacent to the press. The shaft 25 may be driven from a suitable part of the press by any suitable means as by bevel gears one element of which is shown at 26.

In some of its broader aspects my invention is not limited to any particular construction of the sheet supports. Preferably,

however, they should be expansible and contractible, so that they may be operated to receive the sheets at one end of the series, convey them through the series, and discharge them at the other end without occupying a space materially greater in longitudinal and lateral dimensions than the dimensions of the largest sheet which the machine is designed to handle.

10 In accordance with the construction shown, the sheet supports are flexible and are fixed at one end to the frame of the machine and are connected at the other end to rollers which may be reciprocated back and forth from one end of the machine to the other. Preferably and as shown more-
15 over, the sheet supports are arranged in a double series, the supports 27 of one series being fixed at one end to one end of the frame and secured at the other end to a set of rollers 28, and the supports 29 of the other series being fixed at one end to the opposite end of the frame and at the other end to a set of rollers 30. The sets of rollers 28 and 30 are preferably mounted in a single carriage and have a fixed staggered relation to each other, so that as the carriage is reciprocated and the flexible supports are alternately wound up and unwound on the sets of rollers 28 and 30, the sheets are alternately transferred from one series of supports to the other, each sheet being, by the continual reciprocation of the carriage transferred from one support to the next throughout each series and finally discharged at the end of the series opposite to that at which it was received.

The carriage in which the rollers 28 and 30 are mounted consists of a pair of side pieces 31 and 32 which are connected together by a suitable number of rods 33. This carriage is preferably supported by a pair of wheels 34 which are mounted on the opposite ends of a shaft 35 journaled in the lower ends of the side pieces 31 and 32, and rest upon suitable track bars 36, said track bars being mounted upon longitudinal brackets 37 formed on the inner surfaces of the side frames 1 and 2. For the purpose of causing the opposite ends of the carriage to travel in unison, pinions 38 of equal diameter are fixed to the shaft 35 adjacent to the wheels 34 and mesh with longitudinal racks 39 carried by the brackets 37.

55 The carriage for the sheet supports may be reciprocated by any suitable mechanism either in unison with the conveyer carriage or at some slower rate so that two or more sheets may be deposited on the top sheet support between each transferring operation of the sheet supports. Preferably and as shown, the carriage for the sheet supports is connected to and operated by the sheet conveyer carriage, the connections between said carriages preferably being dis-

connectible and constructed to be automatically engaged at predetermined intervals, each engagement being maintained during a complete reciprocation of the conveyer carriage. During the intermediate reciprocations of the conveyer carriage the connections between the carriages are disengaged, the carriage for the sheet supports being locked in a fixed position during these intervals. With this object in view the side pieces 31 and 32 are arranged in line with the frame pieces 11 and 12 and terminate at their upper ends just below the lower ends of said frame pieces and means are provided for alternately connecting each of the side pieces 31 and 32 to the corresponding frame pieces 11 and 12 and to the frame of the machine. The connections shown each consists of a slide piece 40, which is mounted in a slide way 41 formed on the side piece 31 or 32, and is provided at its upper end with a downwardly opening recess adapted to engage a stud 42 on one of the frame pieces 11 and 12, and on the other side with an upwardly opening recess adapted to engage a stud 43 carried by the main frame. The studs 42 and 43 are so located that when the slide 40 is at one limit of its movement, one stud is engaged and the other is disengaged and when the slide is at the other limit of its movement the engagement and disengagement of the studs is reversed. Inclined surfaces 42^a and 43^a are formed on the slide 40 in advance of the recesses to facilitate the entrance of the studs. The carriage for the sheet supports being connected to its operating means at the upper end, suitable means should be provided to cause the lower end to move in unison with the upper end. The means shown consists of a vertical shaft 31^a which is journaled in brackets formed on the side piece 31 and is provided at its opposite ends with pinions 31^b which are equal in diameter and mesh with racks 31^c fixed on the main frame. This mechanism may obviously be duplicated on the opposite side of the machine if desired.

The movements of the slide 40 may be automatically controlled by any suitable mechanism. As shown the slides 40 are extended to the lower end of the carriage for the sheet supports, and are provided at their extremities with anti-friction rollers adapted to engage the upper surfaces of a pair of arms 44 and 45 carried by a transverse rock shaft 46. Guides 47 for the lower ends of the slides are provided on the side pieces 31 and 32. The arms 44 and 45 may be moved up and down to control the operation of the slides 40 by any suitable means. As shown the arm 44 is provided with a stud roller 47^a which is adapted to engage the periphery of a suitably shaped cam disk 48 which is journaled on a stud shaft 49 carried by a

bracket 50 fixed to the inner side of the side frame 1. Fixed to one side of the cam disk is a ratchet wheel 52 which is engaged by a pawl 52^a pivoted to an arm 53 carried by a rock shaft 54. The rock shaft is operated so as to move the cam 48 through the space of one of the ratchet teeth during each operation of the machine by a cam 55 which is mounted on the shaft 25 and is operatively connected to the rock shaft 54 by the arm 56 and the link 57 said link being slotted at its lower end to embrace the shaft 25 and provided with a pair of stud rollers 58 which embrace the cam 55. The cam 55 is preferably so shaped and timed that the disk 48 is moved at some time when the conveyer carriage is not at the inner end of its stroke. It follows from this construction that when the disk 48 has been so moved that the stud roller 47 drops into a recess 51 the slides 40 are lowered out of engagement with the frame studs 43 and into position to be engaged by the carriage studs 42 at the end of the inner stroke of the conveyer carriage, the latter operation being facilitated by the inclined surface 42^a which rides up on the stud 42 and thus raises the slide 40 and allows it to drop back under the influence of gravity with the stud 42 in its recess. This operation may be made more certain if desired by providing a spring 59 which is so connected to the slide 40 as to supplement the force of gravity. When the disk 48 is so operated that the stud roller 47 is forced out of the recess 51 the friction rollers at the lower ends of the slides 40 will, upon the inward movement of the carriage for the sheet supports, ride up on the surface of the arms 44 and 45 and move the slides 40 so as to disengage the studs 42 and come into engagement with the studs 43. The latter operation is facilitated by so mounting the studs 43 that they can yield under the upward pressure of the inclined surface 43^a, and then, at the end of the stroke of the carriages, snap into the upwardly opening recesses in the slides 40. As shown the studs 43 are mounted on one end of the levers 60 which are pivoted at an intermediate point to the girder 5 and are connected at their other ends to tension spring 61.

It will be seen that by providing a recess 51 in the disk 48 for every second, third or other desirable number of the teeth of the ratchet wheel 52 the carriage for the sheet supports will be operated once for every corresponding number of operations of the machine. As many as desired of the disks 48 having different numbers of recesses 51 may be provided. Two of these disks 48 and 48^a are shown, see Figs. 1, 12 and 15, each being provided with a ratchet wheel 52 having ten teeth. The disk 48 has five recesses 51 and the disk 48^a has one recess. In order to further vary the operation of the mecha-

nism the movement of either disk may be periodically interrupted by any suitable means. A convenient means for this purpose consists of an idle ratchet 65 which is larger in diameter than the ratchet wheel 52 and is loosely mounted on the stud 49 so that it may engage the pawl 52^a and normally hold it out of engagement with the ratchet 52. Two adjacent teeth of the ratchet 65 are made deeper than the ordinary teeth so that when they are engaged by the pawl 52^a the latter is permitted to drop into engagement with the teeth of the ratchet wheel 52, the teeth of the ratchet wheels and the recesses of the disk being so arranged with relation to each other that whenever a recess 51 is brought into operation it is moved into engagement with the stud roller 47 on the first movement of the ratchet 52 and is moved out of engagement with the stud roller 47 on the second movement of the ratchet 52. More than one set of deep teeth 66 and 67 may be formed in the idle ratchet 65. And more than one of these ratchets may be provided if desired. The ratchet 65 shown in Fig. 13 is provided with two sets of deep teeth. In Fig. 14 is shown an idle ratchet 65^a with one set of deep teeth 66 and 67. It follows from this construction that the sheet supports may, as by throwing the pawl 52^a out of operation, be continuously reciprocated with the conveyer carriage so as to keep each sheet separate from the others during its passage through the machine; or, by using the disk 48, the sheet supports may be operated on every second operation of the machine so that the sheets are conveyed through the machine in pairs; or, by using the idle ratchet 65 in connection with the disk 48, the sheets may be conveyed through the machine in lots of five; or, by using the disk 48^a, the sheets may be conveyed through the machine in lots of ten; or, by using the idle ratchet 65 in connection with disk 48^a the sheets may be conveyed through the machine in lots of twenty-five; or, by using the idle ratchet 65^a in connection with the disk 48^a, the sheets may be conveyed through the machine in lots of fifty. Obviously, by suitably constructing and combining the ratchet wheels and disks, the paper may be conveyed through the apparatus in lots having any desired number of sheets.

As the sheets are discharged from the lowest sheet support they are deposited on a receiving table 70 located below the series of supports. In order that the table 70 may be lowered as the pile increases thereon its supporting frame 71 is provided at the sides of the machine with nuts adapted to engage screw threaded shafts 72 which are suitably journaled in upright positions on the side frames 1 and 2. The shafts 72 may be operated in any suitable way to automati-

cally lower the table as the pile increases. The means shown consist of worm wheels 73 fixed to the lower ends of the shafts 72 and engaged by worms 74 carried by a transverse shaft 75. The shaft 75 is provided with a ratchet wheel 76 which is operated by a pawl arm 77 pivoted on the shaft and connected at its free end to the link 78 having a shoulder on its under surface adapted to be engaged by the shouldered cam 79 carried by the shaft 25.

In order that the link 78 may be automatically moved out of the path of the cam 79 when the pile of paper on the table 70 is too low the following mechanism is used: A finger or feeler 80 is arranged at the forward end of the pile, said finger being fixed to a transverse shaft 81 journaled in the side frames. Near one end of the shaft 81 is fixed an arm 82 which is connected by a link 83 to one arm of a bell crank lever 84 pivoted at the rear end of the machine and connected by its other arm to a link 85. The link 85 is provided at its lower end with a pin 86 adapted to engage the under surface of the link 78, the link 85 being guided at its lower end by a bracket 88. A compression spring 89 is confined between the top of the bracket 88 and a collar 90 on the link 85 and thus tends to keep the finger 80 in contact with the top of the pile and the link 78 out of engagement with the cam 79 when the pile is low. A spring 91 is provided to return the link 78 and pawl arm 77 after each operation. For the purpose of lifting the finger 80 from the top of the pile to permit the sheets to be deposited thereon the rock shaft 54 is provided with an arm 92 which is arranged to engage the end of the link 83 in such manner as to lift the finger on each oscillation of the shaft 54. A slot 93 is provided in the link 83 to permit the necessary play due to the variable height of the pile. It follows from this construction that whenever the top of the pile gets too low the link 78 will be lifted out of the path of the cam 79 and the lowering mechanism for the table 70 will be thrown out of operation. As soon, however, as the pile increases to its normal height the lowering mechanism for the table will be again brought into operation.

It is in accordance with my invention that suitable means are provided for accurately adjusting the sheets or the lots of sheets as they are deposited on the pile. The means shown comprises a series of vertical fingers 95 which are normally located in a fixed position at the top of the front of the pile. In order that these fingers may be removed so that the pile can be removed from the front of the machine, the fingers 95 are mounted on a transverse shaft 96 adjustably secured in the side frames 1 and 2. The shaft 96 may be held in either of its two

positions by any suitable securing and adjusting means. The means shown, see Fig. 3, consists of an arm 97 secured to one end of the shaft and provided at its free end with a pin 98 which may be inserted in either of two suitably located perforations in the frame.

For the purpose of keeping the sheets in contact with the fingers 95 and adjusting the sheets laterally, movable sheet adjusting guides or "joggers" are provided for the rear and the two sides of the pile. Any suitable means may be provided for operating the joggers. In accordance with the construction shown, see Figs. 3 and 11, each of the side joggers 100 is connected by a pair of adjustable arms to one member of a pair of bell crank levers 101 and 102. The adjustable arms each comprise a pair of links 103 and 104, which are adjustably connected to the jogger plates and to each other by rigid joints held in place by thumb screws 105. The links 103 are loosely pivoted to the bell crank levers 101, the jogger plate 100 together with the adjustable links thus constituting practically a rigid link between two members of the bell crank levers 101 and 102, the other two members of which are directly connected by a rigid link 106. It will thus be seen that the jogger plate when once adjusted will always remain parallel to itself throughout the entire range of the movement of the bell crank levers from the position shown in full lines in Fig. 3 to the position shown in dotted lines. In order to vibrate the jogger plate 100 it is only necessary to operate one of the bell crank levers. As shown this is done by an arm 107 which is fixed to the rock shaft 54 and connected to the bell crank lever 101 by a link 108 and a crank arm 109. In order that the jogger plate may be quickly and accurately adjusted through a limited range without disturbing the links 103 and 104, the arm 109 is adjustably clamped by a clamp screw 110 to a sleeve 111 which forms a part of the bell crank lever 101. The jogger plate 100 is entirely supported by the bell cranks 101 and 102 which are in turn supported on stud bolts 112 fixed to the bracket 37 of the side frame 1 and passing through sleeves 111.

The mechanism for operating the jogger plate 100 is alike on both sides of the machine. The jogger for the rear of the pile is preferably connected to and operated by the links 108. With this object in view links 108 are guided at their outer ends in brackets 113 projecting from the brackets 37, and said links are connected to the arms 109 by blocks 114 having downwardly projecting pins 115 which engage radial slots in said arms.

The rear jogger consists of a plate 116 which is adjustably connected with the

transverse bar 117 by links 118 and 119, said bar 118 being adjustably secured to the links 108 as shown. It will be seen from this construction that the jogger plates are entirely independent of the receiving board and that they may be readily adjusted through a wide range without interfering with other parts of the mechanism.

The rollers 28 and 30 upon which the sheet supports 27 and 29 respectively are alternately wound and unwound may be of any suitable construction and they may be operated in any suitable way to wind up the sheet supports when they are traveling toward the fixed ends of said supports. Preferably said rollers consist, see Fig. 6 of plain steel tubes of a suitable diameter into each end of which is pressed an annular cup 125 in which a series of anti-friction balls 126 are retained by the inner lip 127 and the outer ring 128, said parts being fixed in the end of the tube by a groove 129 and a flange 130. The rollers are supported in operative position by screw studs 131 held in place in the side pieces 31 and 32 by jam nuts 132, said studs having conical ends 133 adapted to engage the anti-friction balls.

As one of the sets of rollers are being wound up while the other set are being unwound the sets of rollers are preferably so connected that the power derived from unwinding one set is utilized to wind up the other set. Any suitable connection between the sets of rollers may be used for this purpose. As shown each roller of each set is paired with a roller of the other set, and each of the pairs of rollers are connected by a belt or ligament which will cause either roller to wind up while the other is unwinding. In order that the surface speed of the flexible supports as they wind up and unwind on the pairs of rollers may be kept uniform, the pairs of rollers are provided at or near one or both ends with oppositely tapering cones which correspond in diameter at their larger and smaller ends to the larger and smaller diameters of the sheet supports when rolled up and unrolled on the core rollers. The cones 134 and 135 are preferably provided with spiral grooves and are connected by a cord or ligament 136 having its ends secured to the cones so that when at either end of the stroke the ligament is wound up from the larger end to the smaller end on the cone carried by the roller from which the sheet support is unwound and is unwound from the cone carried by the other roller. It will be seen that the pair of rollers will thus always be connected by the ligament on diameters corresponding to the diameters of the rolls of the flexible material so that there will be no slack in the latter at any part of the reciprocation of the carriage. Obviously a band would as thus far described answer the same

purpose as the ligament, but the latter preferred for the reason that there can be no slippage which would cause a slack in the sheet supports, the opposite ends of the ligament being always attached to the opposite cones.

In Fig. 8 is illustrated a modification in which the cones 137 and 138 are formed of solid metal and have spindles 139 and 140 which are secured in the opposite ends of the tubes 141 forming the main body of the rollers. In this form no roller bearings are used, the cone pieces being provided with center holes which are engaged by the pivot studs 131. The cones obviously may be used at one end only of the tubes if desired. It will be seen that when the cones are used at both ends of the tubes all the rollers may be identical, it only being necessary to arrange the rollers of each pair reversely with relation to each other. The fixed end of each sheet support is preferably secured to an angle bar 143 extending transversely of the machine and secured at its ends to the side frames 1 and 2, as in this way the sheet supports are accessible from the ends of the machine and the sheets may be removed and replaced when desired. The inner ends of the sheet supports, which supports may be formed of muslin or other suitable fabric, or of a series of tapes or strips of suitable fabric, are preferably secured to the rollers by a suitable cement, and they may be secured in like manner to the angle bars. Preferably however, they are secured to the angle bars by being lapped over the outer edge thereof and clamped in place by suitable clamps as by a strip or strips 144 of sheet metal having a U-shape in section.

For the purpose of keeping the front edges of the sheets in the same vertical plane as the guide fingers 95, and for the further purpose of throwing the front edges of the sheets off from the rollers 30 when at the outer limit of their stroke, each sheet support 29 of the front series is provided with a front gage 145 located in the plane of the guide fingers 95. As shown, each gage 145 consists of a series of pins carried by a transverse bar 146. The pins are passed through the fabric from below, and the bars are secured at their ends to the sheet supports by any suitable means, as by small stud bolts and nuts 147. At the limit of the forward stroke of the rollers 30 the gages are carried far enough around them to make certain that the front edges of the sheets are thrown down onto the supports below. The bars 146 are preferably curved somewhat to stiffen them and make them conform to the shape of the rollers when wound thereon. To keep the sheets against the gages 145, the supports 27 and 29 may be inclined toward the stops, as shown.

The nipping rollers 8 and 9 are provided

principally to grip the forward edges of the sheets and carry them out to the end of the stroke of the conveyer carriage, said rollers being separated on the return stroke of the carriage to allow the sheets to be dropped by the rolling up of the flexible support 7. These rollers may be operated by any suitable means. As shown, see Figs. 4 and 5, the upper roller 8 is mounted in boxes 150 yieldingly supported under springs 151 in slideways formed in the frame pieces 11 and 12. The shafts of the rollers 8 and 9 are connected by toggles 152 which are operated at the opposite ends of the stroke of the conveyer carriage to separate the rollers and bring them together by suitable fixed stops 153 and 154. For the purpose of causing the rollers to nip the forward edges of the sheets a spring 155 is connected at one end to a stud 156 fixed to the frame 11 and at the other end to a stud 157 carried by the roller 8. A fixed stop 158 is arranged at the inner end of the machine to strike the stud 157 at the end of the inward stroke of the carriage and turn the roller 8 a small part of a revolution thus putting the spring 155 under tension. While the carriage is at this end of its stroke, the forward edge of the sheet is driven into the bite of rollers 8 and 9 by the tapes 6 and as the carriage starts forward the spring 155 will turn the rollers slightly and thus cause them to nip the sheet and carry them forward. It will be seen that the rollers act as a gage to straighten up the sheets as well as nip-pers to carry them forward. The stop 158 is for convenience carried by the stop 154.

Where the delivery mechanism is to be used in connection with a rotary or other press which delivers the printed sheets at a rapid rate, the conveyer mechanism is preferably constructed to deposit a plurality of sheets on the sheet supports on every reciprocation of the conveyer carriage. One embodiment of this feature of my invention is illustrated in Fig. 16. As here shown the sheets conveyed from the press by the tapes 160 are alternately directed onto the slower running tapes 161 and 162 by the switch 163 which to this end is moved above and below the surface of the tapes 160 at the required intervals by the cam 164. The reciprocating conveyer carriage 165 is provided with two expansible and contractible flexible supports 166, 167 and with two sets of nipping rollers 168, 169 and 170, 171, which are arranged to receive the sheets from the tapes 161 and 162 and deposit them in pairs on the series of sheet supports above described. In order that the sheets may be accurately timed with relation to the movement of the carriage 165, stop gages 172 and 173 are preferably located at the forward ends of the tapes 161 and 162, said gages being lifted as the car-

riage approaches the inner limit of its stroke by any suitable means, as by a lever 174 one arm of which is connected to the gages and the other arm of which is arranged to be struck by a tappet 175 fixed to the carriage 165.

The operation of the various features of the machine having been fully described in connection with the construction thereof further description of the operation will be unnecessary.

My invention in its broader aspects is not limited to the precise construction shown and described nor to the particular construction by which it may be carried into effect as many changes other than those herein suggested may be made in the construction without departing from the main principles of the invention or sacrificing its chief advantages.

What I claim is:

1. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer and to operate in planes one above another, means for operating the sheet supports so that the sheets received at one end of the series are transferred in a direction transverse to their planes and without movement in those planes to the other end thereof and discharged, and means for receiving the sheets as they are discharged.

2. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a series of expansible and contractible sheet supports arranged to receive the sheets from the conveyer, means for operating the sheet supports so that the sheets as received at one end of the series are kept separated and are discharged at the other end thereof, and means for receiving the sheets as they are discharged.

3. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a series of expansible and contractible sheet supports arranged to receive the sheets from the conveyer, means for expanding and contracting said supports so that the sheets as received at one end of the series are kept separated and are discharged at the other end thereof, and means for receiving the sheets as they are discharged.

4. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a series of expansible and contractible sheet supports arranged to receive the sheets from the conveyer, means for expanding and contracting said supports so that the sheets as received at one end of the series are kept separated and are transferred from one support to another

and discharged at the other end of the series, and means for receiving the sheets as they are discharged.

5. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a series of expansible and contractible sheet supports arranged to receive the sheets from the conveyor and to support a number of them each separately, means whereby the support at one end of the series is expanded to receive a sheet, the intermediate supports caused to transfer the sheet from one end of the series to the other end thereof, and the support at the latter end of the series contracted to discharge the sheet, and means for receiving the sheet as it is discharged.

6. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a series of expansible and contractible sheet supports arranged to receive the sheets from the conveyor and to support a number of them each separately, means whereby the support at one end of the series is expanded to receive a sheet, the intermediate supports caused to transfer the sheet from one support to another throughout the series, and the support at the latter end of the series contracted to discharge the sheet, and means for receiving the sheet as it is discharged.

7. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of flexible sheet supports arranged to receive the sheets from the conveyor, means for operating the sheet supports so that the sheets received at one end of the series are transferred in a direction at right angles to their planes and without movement in those planes to the other end of the series and discharged, and means for receiving the sheets as they are discharged.

8. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a series of flexible sheet supports arranged to receive the sheets from the conveyor, a series of rollers, each of said supports being fixed at one end and connected to a roller at the other end, means for operating the rollers so that the sheets as received at one end of the series are kept separated and are discharged at the other end thereof, and means for receiving the sheets as they are discharged.

9. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a series of flexible sheet supports arranged to receive the sheets from the conveyor, a series of rollers, each of said supports being fixed at one end and connected to a roller at the other end, means for operating the rollers so that the sheets as received at one end of

the series are transferred from one support to another throughout the series and discharged at the other end thereof, and means for receiving the sheets as they are discharged.

10. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a pair of oppositely arranged sheet supports movable in planes one above another, and means for operating the sheet supports so that the sheets received by one support are transferred to the other without movement in their planes and discharged.

11. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a pair of oppositely arranged expansible and contractible sheet supports movable in planes one above another, and means for operating the sheet supports so that the sheets received by one support are by the contraction of one support and the expansion of the other transferred to said other support and discharged.

12. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a pair of oppositely arranged expansible and contractible sheet supports movable in planes one above another, and means for alternately expanding and contracting the sheet supports so that the sheets received by one support are by the contraction of one support and the expansion of the other transferred to said other support and discharged.

13. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of two series of oppositely arranged sheet supports, means for operating the sheet supports so that the sheets received at one end of one series are without movement in their planes alternately transferred from one series to the other and advanced from one support to another throughout each series and finally discharged, and means for receiving the sheets as they are discharged.

14. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of two series of oppositely arranged expansible and contractible sheet supports, means for alternately expanding and contracting the sheet supports so that the sheets received at one end of one series are alternately transferred from one series to the other and advanced from one support to another throughout each series and finally discharged, and means for receiving the sheets as they are discharged.

15. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of two series of oppositely arranged flexible sheet supports,

the supports forming one series being fixed at one end to one end of the machine and connected at the other end to a set of rollers, a series of rollers and the supports forming the other series being fixed at one end to the opposite end of the machine and connected at the other end to a second set of rollers, a carriage in which both said sets of rollers are mounted, and means for reciprocating said carriage, whereby the sheets received at one end of one series are alternately transferred from one series to the other and advanced from one support to another throughout each series and finally discharged, and means for receiving the sheets as they are discharged.

16. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of two series of oppositely arranged flexible sheet supports, the supports forming one series being fixed at one end to one end of the machine and connected at the other end to a set of rollers, a series of rollers, and the supports forming the other series being fixed at one end to the opposite end of the machine and connected at the other end to a second set of rollers, a second series of rollers, a carriage in which both said sets of rollers are mounted adjacent to each other with the rollers of each set opposite the spaces between the rollers of the other set, and means for reciprocating said carriage, substantially as described.

17. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like including a reciprocating conveyer carriage, of a series of sheet supports arranged to receive the sheets from the conveyer carriage, means for operating the sheet supports in unison with the conveyer carriage so that the sheets as received at one end of the series are kept separated and are discharged at the other end thereof, and means for receiving the sheets as they are discharged.

18. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like including a reciprocating conveyer carriage, of a series of expansible and contractible sheet supports arranged to receive the sheets from the conveyer carriage, means operated in unison with the conveyer carriage for expanding and contracting said support to cause them to receive sheets at one end of the series, convey the sheets as received from one end of the series to the other end thereof, and to discharge the sheets at the other end of the series, and means for receiving the sheets as they are discharged.

19. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like including a reciprocating conveyer carriage, of a pair of op-

positely arranged sheet supports, and means for operating the sheet supports in unison with the conveyer carriage so that the sheets received by one support are transferred during the operation of the conveyer carriage to the other support.

20. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like including a reciprocating conveyer carriage, of two series of oppositely arranged expansible and contractible sheet supports, means operated in unison with the conveyer carriage for alternately expanding and contracting the sheet supports so that the sheets received at one end of one series are alternately transferred from one series to the other and advanced from one support to another throughout each series and finally discharged, and means for receiving the sheets as they are discharged.

21. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like including a reciprocating conveyer carriage, of two series of oppositely arranged flexible sheet supports, the supports forming one series being fixed at one end to one end of the machine and connected at the other end to a set of rollers, a series of rollers, and the supports forming the other series being fixed at one end to the opposite end of the machine and connected at the other end to a second set of rollers, a second series of rollers, a carriage in which both sets of rollers are mounted, and means for reciprocating said carriage in unison with said conveyer carriage, whereby the sheets received at one end of one series are alternately transferred from one series to the other and advanced from one support to another throughout each series and finally discharged, and means for receiving the sheets as they are discharged.

22. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of two series of oppositely arranged flexible sheet supports, the supports forming one series being fixed at one end to one end of the machine and connected at the other end to a set of rollers, a series of rollers, and the supports forming the other series being fixed at one end to the opposite end of the machine and connected at the other end to a second set of rollers, a second series of rollers, a carriage in which both said sets of rollers are mounted, and means for reciprocating said carriage, said sets of rollers being so connected that the unwinding of one set of supports is caused to wind up the other set.

23. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of two series of oppositely arranged flexible sheet supports, the supports forming one series being fixed

at one end to one end of the machine and connected at the other end to a set of rollers, and the supports forming the other series being fixed at one end to the opposite end of the machine and connected at the other end to a second set of rollers, a carriage in which both said sets of rollers are mounted, and means for reciprocating said carriage, said sets of rollers being connected in pairs so that the unwinding of each support in one set is caused to wind up a corresponding support in the other set.

24. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a pair of oppositely arranged flexible sheet supports, one support being fixed at one end to one end of the machine and connected at the other end to a roller, a roller, and the other support being fixed at one end to the opposite end of the machine and connected at the other end to a second roller, a second roller, a carriage in which said rollers are mounted, and means for reciprocating said carriage, whereby the sheets received by one support are transferred to the other support and discharged.

25. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a pair of oppositely arranged flexible sheet supports, one support being fixed at one end to one end of the machine and connected at the other end to a roller, and the other support being fixed at one end to the opposite end of the machine and connected at the other end to a second roller, a carriage in which said rollers are mounted, and means for reciprocating said carriage, said rollers being so connected that the unwinding of one support is caused to wind up the other.

26. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer and to operate in planes one above another, means for operating the sheet supports so that the sheets received at one end of the series are transferred without movement in their planes to the other end thereof and discharged, said operating means being so constructed that the sheets as received are kept separated by the supports, and means for receiving the sheets as they are discharged.

27. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like of a series of expansible and contractible sheet supports arranged to receive the sheets from the conveyer, means for expanding and contracting said supports such that the sheets as received at one end of the series may be kept in a separated condition and discharged at

the other end of the series, and means for receiving the sheets as they are discharged.

28. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like including a reciprocating conveyer carriage, of a series of sheet supports arranged to receive the sheets from the conveyer carriage, means whereby the sheet supports may be either continuously or intermittently operated in unison with the conveyer carriage so that the sheets as received at one end of the series may be kept in a separated condition and finally discharged at the other end of the series, and means for receiving the sheets as they are discharged.

29. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like including a reciprocating conveyer carriage, of a pair of oppositely arranged sheet supports, and means whereby the sheet supports may be operated in unison with the conveyer carriage either continuously or intermittently so that the sheets as received by one support may be transferred to the other and discharged.

30. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like including a reciprocating conveyer carriage, of two series of oppositely arranged flexible sheet supports, the supports forming one series being fixed at one end to one end of the machine and connected at the other end to a set of rollers, a series of rollers and the supports forming the other series being fixed at one end to the opposite end of the machine and connected at the other end to a second set of rollers, a second series of rollers, a carriage in which both sets of rollers are mounted, and means whereby said carriage may be reciprocated in unison with said conveyer carriage either continuously or intermittently so that the sheets as received at one end of one series are alternately transferred from one series to the other and advanced from one support to another throughout each series and finally discharged, and means for receiving the sheets as they are discharged.

31. In a sheet delivery mechanism, the combination of a series of sheet supports movable in planes one above another, and means for operating the sheet supports so that the sheets received at one end of the series are transferred without movement in their planes to the other end thereof and discharged.

32. In a sheet drier and delivery mechanism, the combination of a series of expansible and contractible sheet supports, and means for expanding and contracting the sheet supports so that the sheets received at

one end of the series are transferred without movement in their planes to the other end thereof and discharged.

33. In a sheet drier and delivery mechanism, the combination of a series of expandible and contractible sheet supports, means for expanding and contracting the supports to cause them to receive sheets at one end of the series, transfer them from one end of the series to the other end thereof, and to discharge the sheets at the latter end thereof.

34. In a sheet drier and delivery mechanism, the combination of a series of expandible and contractible sheet supports, and means for expanding and contracting the supports to cause them to receive sheets at one end of the series, transfer them from one support to another throughout the series to the other end thereof, and to discharge the sheets at the latter end thereof.

35. In a sheet drier and delivery mechanism, the combination of a series of flexible sheet supports, a series of rollers each of said supports being fixed at one end and connected to a roller at the other end, and means for operating the rollers so that the sheets received at one end of the series are discharged at the other end thereof.

36. In a sheet drier and delivery mechanism, the combination of a series of flexible sheet supports, a series of rollers each of said supports being fixed at one end and connected to a roller at the other end, and means for operating the rollers so that the sheets received at one end of the series are transferred from one support to another and discharged at the other end thereof.

37. In combination, two series of oppositely arranged expandible and contractible sheet supports, and means for alternately expanding and contracting said sheet supports so that the sheets received at one end of one series are alternately transferred from one series to the other and advanced from one support to another throughout each series and finally discharged.

38. In a sheet manipulating machine, two series of oppositely arranged flexible sheet supports, the supports forming one series being fixed at one end to one part of the machine and connected at the other end to a set of rollers, a series of rollers, and the supports forming the other series being fixed at one end to an opposite part of the machine and connected at the other end to a second set of rollers, a second series of rollers, a carriage in which both sets of rollers are mounted, and means for reciprocating said carriage.

39. In a sheet manipulating machine, two series of oppositely arranged flexible sheet supports, the supports forming one series being fixed at one end to one part of the machine and connected at the other end to a

set of rollers, a series of rollers, and the supports forming the other series being fixed at one end to an opposite part of the machine and connected at the other end to a second set of rollers, a second series of rollers, a carriage in which both sets of rollers are mounted, and means for reciprocating said carriage, said sets of rollers being so connected that the unwinding of one set of the supports is caused to wind up the other set.

40. In a sheet manipulating machine, two series of oppositely arranged flexible sheet supports, the supports forming one series being fixed at one end to one part of the machine and connected at the other end to a set of rollers, a series of rollers, and the supports forming the other series being fixed at one end to an opposite part of the machine and connected at the other end to a second set of rollers, a second series of rollers, a carriage in which both sets of rollers are mounted, and means for reciprocating said carriage, said sets of rollers being connected in pairs so that the unwinding of each support in one set is caused to wind up a corresponding support in the other set.

41. In a sheet manipulating machine, a pair of flexible sheet supports, one support being fixed at one end to one part of the machine and connected at the other end to a roller, a roller, and the other support being fixed at one end to an opposite part of the machine and connected at the other end to a second roller, a second roller, a carriage in which said rollers are mounted, and means for reciprocating said carriage.

42. In a sheet manipulating machine, a pair of flexible sheet supports, one support being fixed at one end to one part of the machine and connected at the other end to a roller, a roller, and the other support being fixed at one end to an opposite part of the machine and connected at the other end to a second roller, a second roller, a carriage in which said rollers are mounted, and means for reciprocating said carriage, said rollers being so connected that the unwinding of each support is caused to wind up the other.

43. In a sheet manipulating machine, a pair of flexible sheet supports, one support being fixed at one end to one part of the machine and connected at the other end to a roller, a roller, and the other support being fixed at one end to an opposite part of the machine and connected at the other end to a second roller, a second roller, a carriage in which said rollers are mounted, and means for reciprocating said carriage, said rollers being connected by a ligament attached at its opposite ends to the rollers so that the unwinding of each support is caused to wind up the other.

44. In a sheet manipulating machine, a

pair of flexible sheet supports, one support being fixed at one end to one part of the machine and connected at the other end to a roller, a roller, and the other support being fixed at one end to an opposite part of the machine and connected at the other end to a second roller, a second roller, a carriage in which said rollers are mounted, and means for reciprocating said carriage, said rollers being provided with reversely arranged winding cones to the larger ends of which the opposite ends of a ligament are attached, whereby the unwinding of each support is caused to wind up the other and keep it at a substantially uniform tension throughout the stroke of the carriage.

45. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer, means for operating the sheet supports so that the sheets as received at one end of the series are kept separated and transferred in a direction at right angles to their planes and without movement in those planes to the other ends and discharged, a table for receiving the sheets as they are discharged, and means for automatically lowering said table as the pile increases thereon.

46. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer, means for operating the sheet supports so that the sheets as received at one end of the series are kept separated and transferred in a direction at right angles to their planes and without movement in those planes to the other ends and discharged, a table for receiving the sheets as they are discharged, means for automatically lowering said table as the pile increases thereon, and means for adjusting the sheets upon the pile as they are deposited thereon.

47. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer, means for operating the sheet supports so that the sheets as received at one end of the series are kept separated and transferred in a direction at right angles to their planes and without movement in those planes to the other ends and discharged, a table for receiving the sheets as they are discharged, and means for maintaining a predetermined relation between the sheets during their passage through the machine.

48. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer, means for operating the

sheet supports so that the sheets as received at one end of the series are kept separated and transferred in a direction at right angles to their planes and without movement in those planes to the other ends and discharged, a table for receiving the sheets as they are discharged, guides for determining the positions of the forward edges of the sheets upon the supports, and a fixed guide in substantial alinement with said guides for fixing the position of the sheets on the table.

49. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer, means for operating the sheet supports so that the sheets as received at one end of the series are kept separated and transferred in a direction at right angles to their planes and without movement in those planes to the other ends and discharged, a table for receiving the sheets as they are discharged, means for automatically lowering said table as the pile increases thereon, guides for determining the positions of the forward edges of the sheets upon the supports, a fixed guide in substantial alinement with said guides for fixing the position of the sheets upon the pile, and means independent of the table for adjusting the sheets against said fixed guide as they are deposited upon the pile, substantially as described.

50. In combination with a suitable frame, of a reciprocating member, a carriage, detachable connections between said parts comprising a shiftable member carried by said carriage, a contact member located at one end of the stroke of said reciprocating member, and means for intermittently operating said contact member to cause said shiftable member to be engaged with or disengaged from said reciprocating member.

51. In combination with a suitable frame, of a reciprocating member, a carriage, detachable connections between said parts comprising a shiftable member carried by said carriage and means on the reciprocating member adapted to cooperate with the shiftable member, a contact member located at one end of the stroke of said reciprocating member, and means for intermittently operating said contact member to cause said shiftable member to be engaged with or disengaged from said reciprocating member, said shiftable member being constructed to lock the carriage to the frame when it is disconnected from the reciprocating member, substantially as described.

52. In a delivery mechanism the combination with means for conveying sheets from a printing press or the like, of a reciprocating carriage, a pair of rollers mounted in said carriage, means for directing the sheets into the bight of said rollers when the car-

riage is at the rearward limit of its stroke, means for giving said rollers a partial revolution at the beginning of the forward stroke of the carriage to nip the sheet, and means to separate said rollers on the rearward stroke of the carriage.

53. In a delivery mechanism, the combination with a suitable frame, a carriage movably mounted on said frame, a larger pinion journaled on said carriage, a smaller pinion mounted on the same axis with said larger pinion, a fixed rack meshing with said larger pinion, a movable rack meshing with said smaller pinion, said racks being located on the same side of the axis of said pinions, and means for reciprocating said movable rack comprising an oscillating gear or segment and a crank directly connected with said gear or segment.

54. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer and to operate in planes one above another, means whereby the sheets received at one end of the series of supports are transferred to the other end thereof and discharged, and means for receiving the sheets as they are discharged.

55. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer and to operate in planes one above another, means whereby the sheets received at one end of the series of supports are transferred to the other end thereof by a movement other than a movement in the planes of the sheets, and means for receiving the sheets as they are discharged.

56. In a delivery mechanism, the combination with means for conveying sheets from a printing press or the like, of a series of sheet supports arranged to receive the sheets from the conveyer and to operate in planes one above another, means whereby the sheets received at one end of the series of supports are transferred in a direction transverse to their planes to the other end of the series and discharged, and means for receiving the sheets as they are discharged.

57. In a sheet delivery apparatus, the

combination of a reciprocating carriage, two curtains, each having a terminal supported by the carriage, one of said curtains having its other terminal secured to one side of and independent of the carriage and the other curtain having its corresponding terminal secured to the opposite side of and independent of the carriage, and mechanism to wind up one curtain and correspondingly unwind the other on the reciprocation of the carriage, said curtains arranged to deliver a sheet from the curtain which is being wound up onto the curtain which is being unwound.

58. In a sheet delivery apparatus, the combination of two sets of curtains, a support for one terminal of each curtain of one set, a support for one terminal of each curtain of the other set, and means operative between said supports for winding up one set of curtains and correspondingly unwinding the other set, said winding mechanism operative to deliver a sheet alternately from a curtain of one set to a curtain of the other set.

59. In a sheet delivery apparatus, the combination of two opposed anchorages, two curtains each having a terminal attached to a respective anchorage, and mechanism operative between the anchorages alternately to wind-up one curtain and unwind the other to deliver a sheet from one curtain to the other.

60. A sheet delivery mechanism having in combination rolling and unrolling sheet carriers one of said carriers in its rolling delivering the sheet to the other carrier, and means for rolling and unrolling said carriers.

61. A sheet delivery mechanism comprising a pair of oppositely arranged rolling and unrolling sheet carriers, one of said carriers in its rolling delivering the sheet to the other carrier, and means rolling and unrolling said carriers.

Signed at New York in the county of New York and State of New York this 27th day of September, A. D. 1901.

RUFUS A. FREEMAN.

Witnesses:

EDWIN SEGER,
J. H. FREEMAN.