

(No Model.)

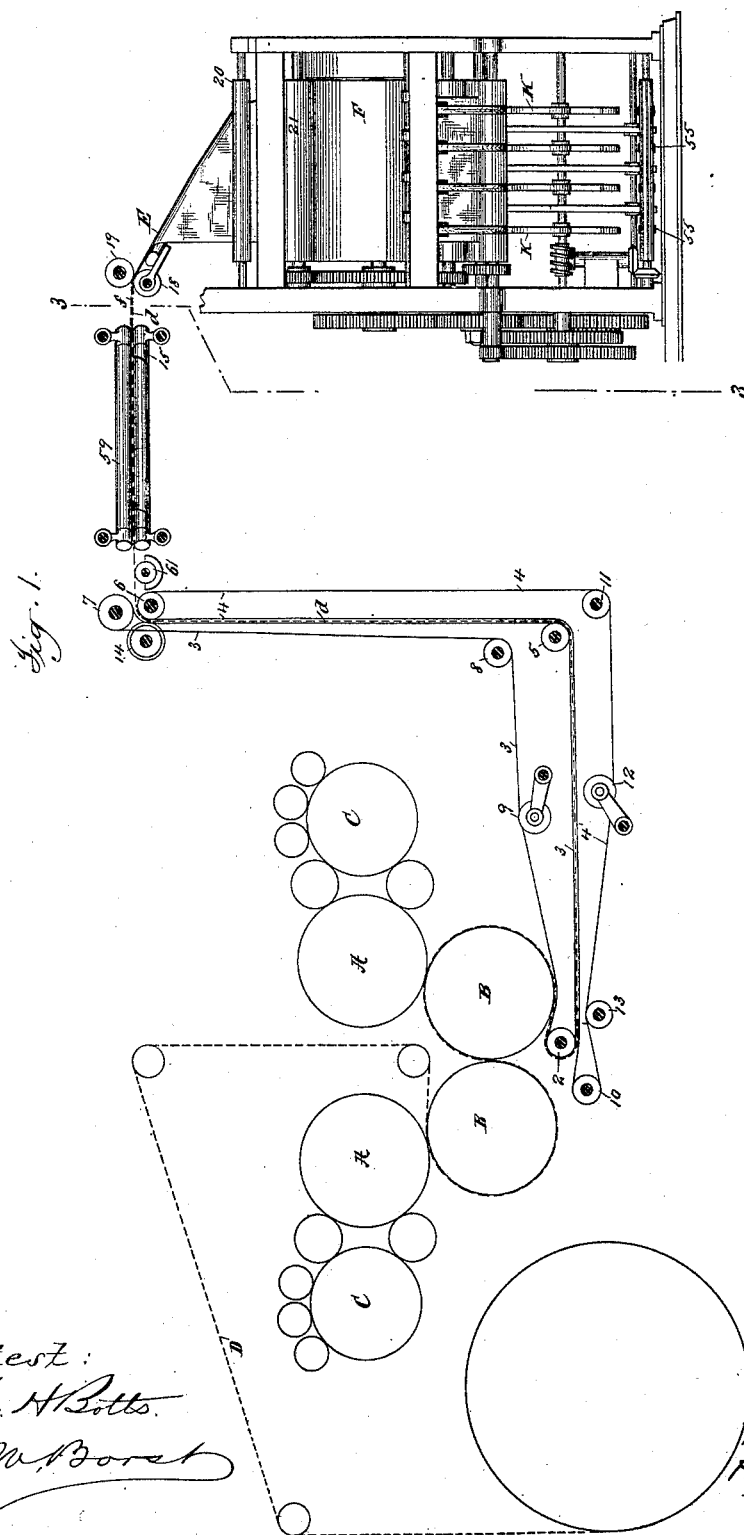
7 Sheets—Sheet 1.

L. C. CROWELL.

DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 419,834.

Patented Jan. 21, 1890.



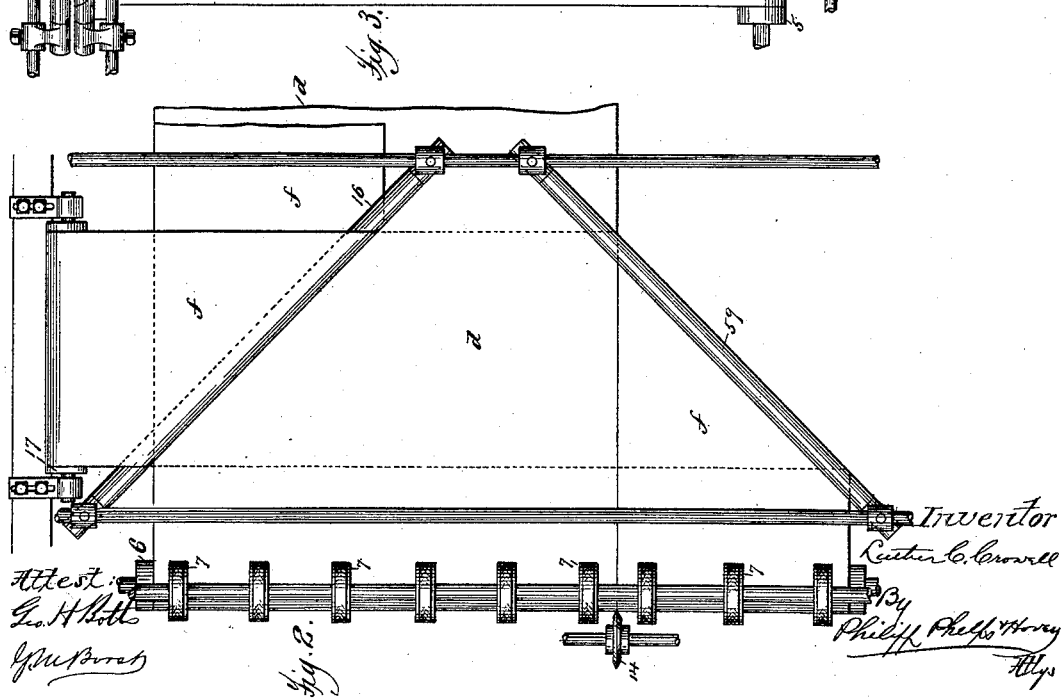
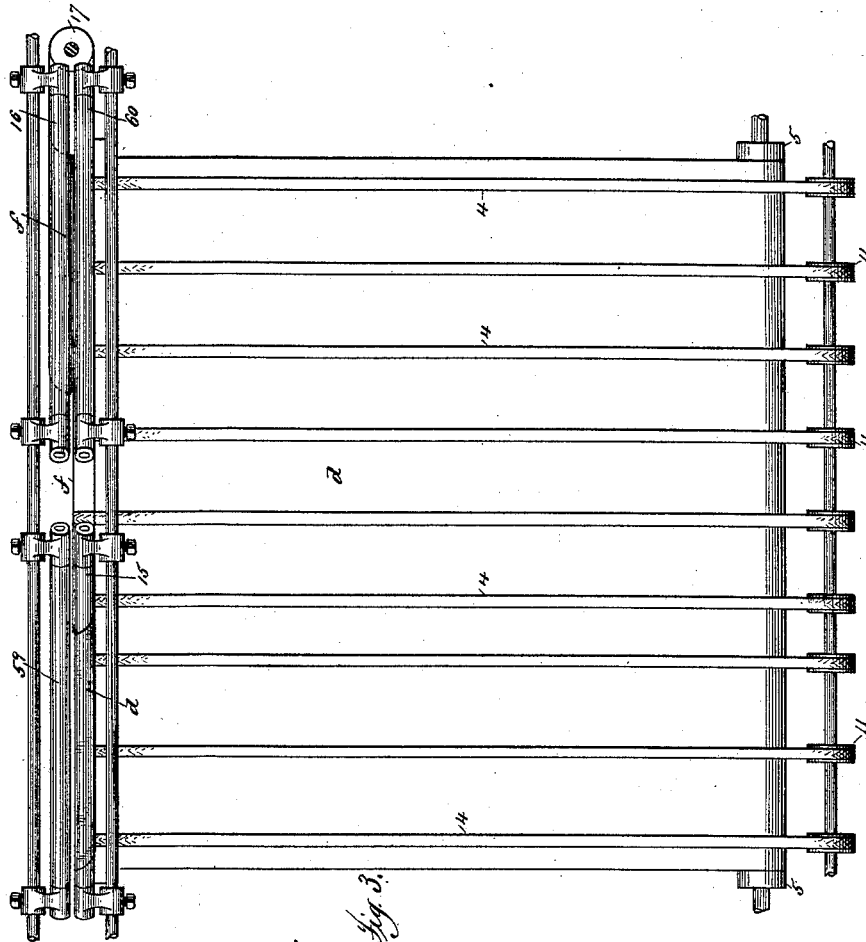
(No Model.)

7 Sheets—Sheet 2.

L. C. CROWELL.
DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 419,834.

Patented Jan. 21, 1890.



(No Model.)

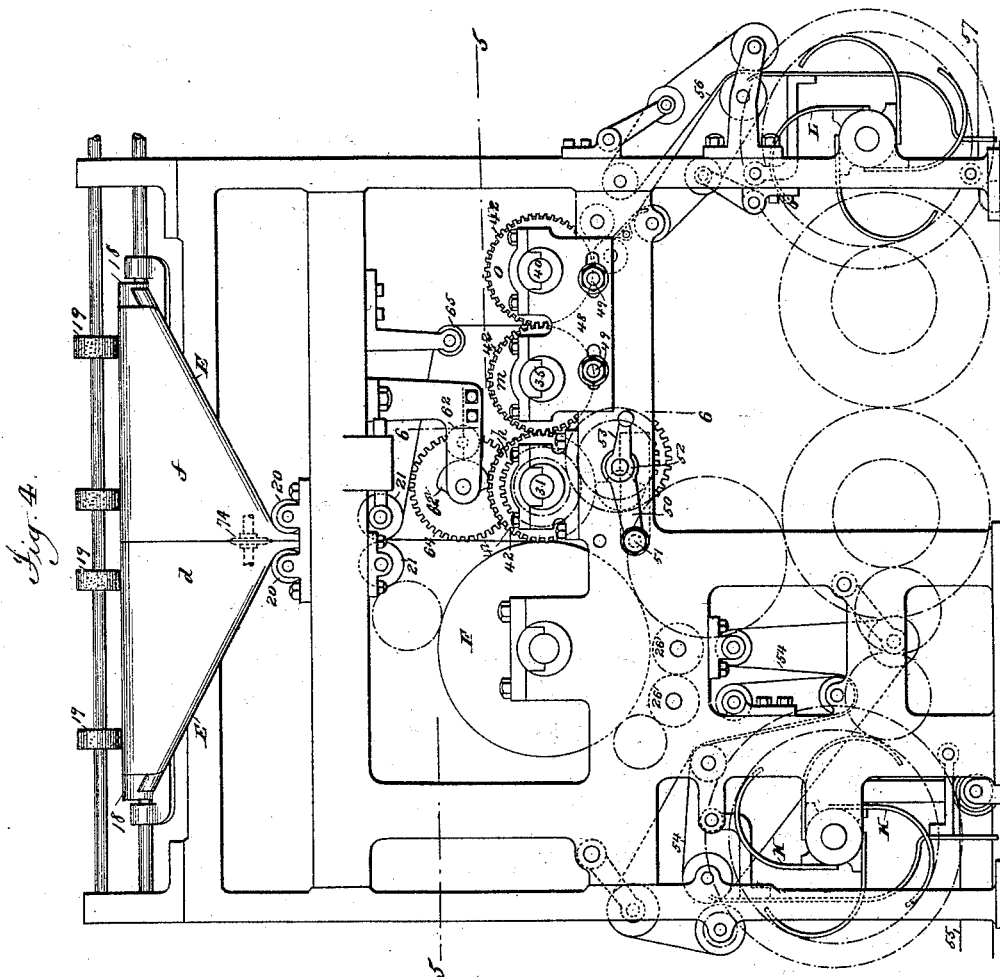
7 Sheets—Sheet 3.

L. C. CROWELL.

DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 419,834.

Patented Jan. 21, 1890.



Attest:

Geo. H. Botts.

J. M. Boser

Inventor

Luther C. Crowell

By

Philip Phelps & Hovey

Attys

(No Model.)

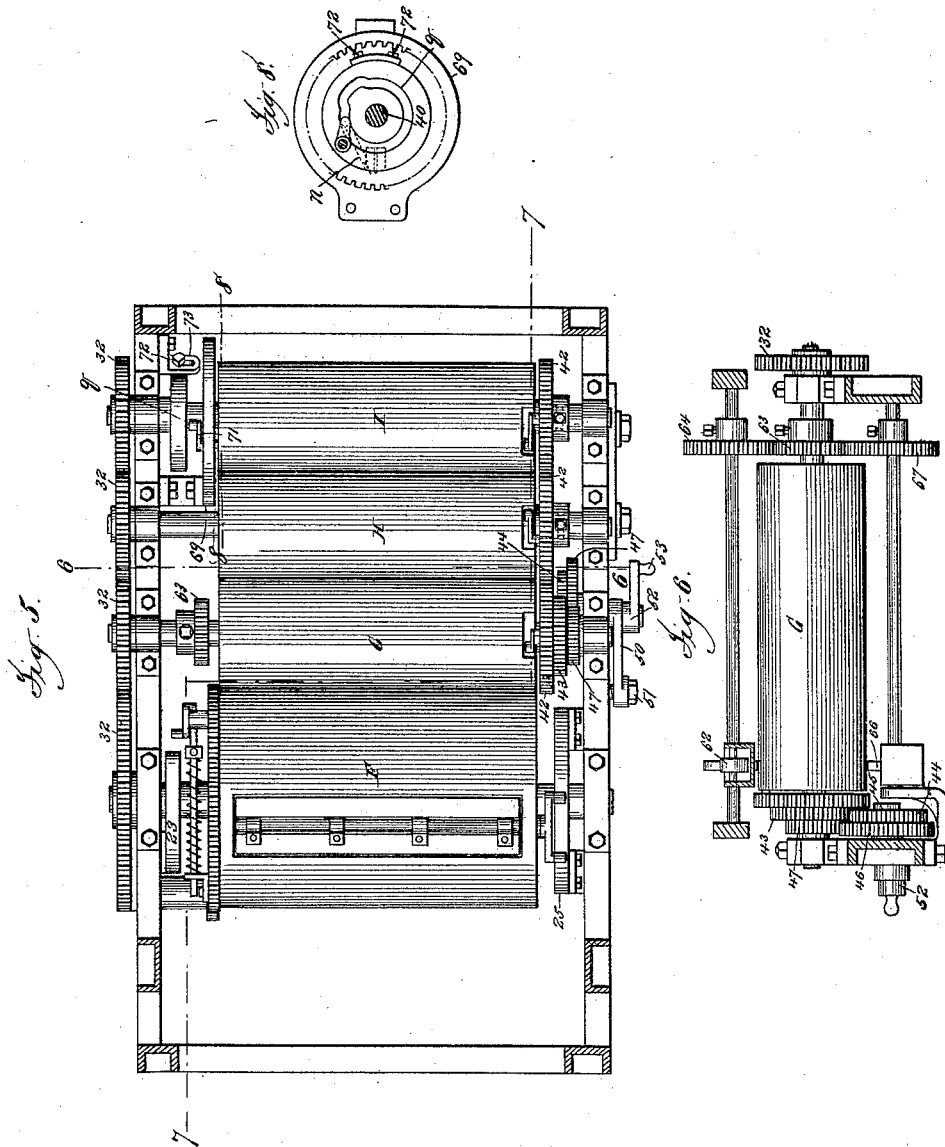
7 Sheets—Sheet 4.

L. C. CROWELL.

DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 419,834.

Patented Jan. 21, 1890.



Attest:

Geo. H. Botta.

J. M. Borst.

Inventor.

Luther C. Crowell

By Philip Phelps Hovey

Attys.

(No Model.)

7 Sheets—Sheet 5.

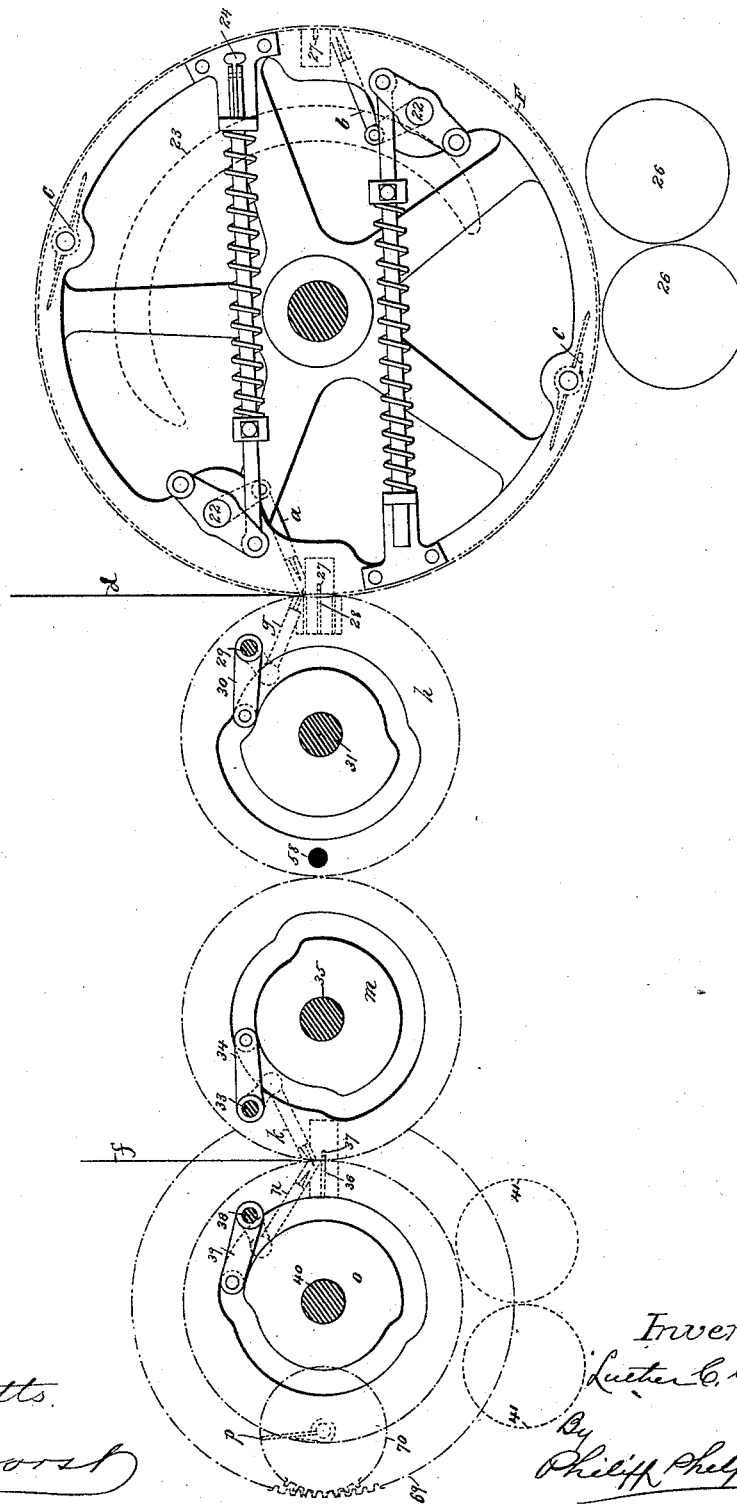
L. C. CROWELL.

DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 419,834.

Patented Jan. 21, 1890.

Fig. 7.



Attest:
Geo. H. Botts.

J. M. Boast

Inventor:

Luther C. Crowell

By *Philip Phelps & Avery*

Attys

(No Model.)

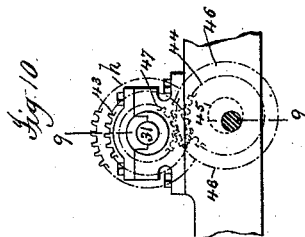
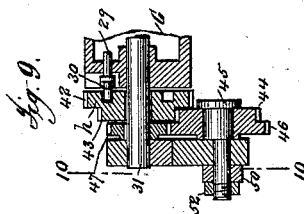
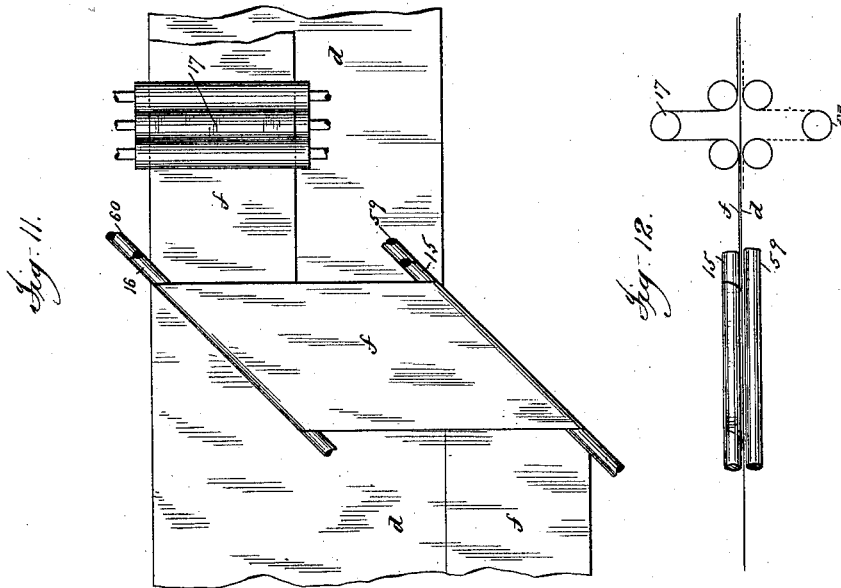
7 Sheets—Sheet 6.

L. C. CROWELL.

DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 419,834.

Patented Jan. 21, 1890.



Attest:
Geo. H. Botts.
J. M. Borst

Inventor:
Lucas C. Crowell
By
Philip Phelps Hony
Atty

(No Model.)

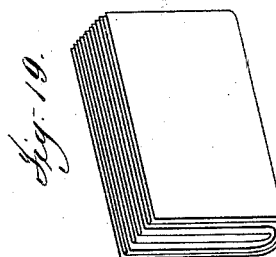
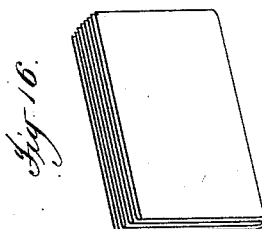
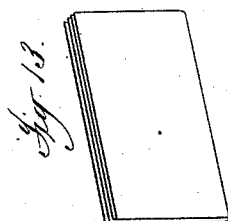
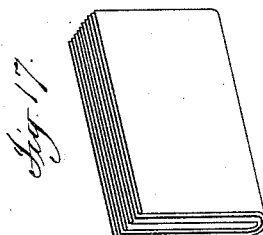
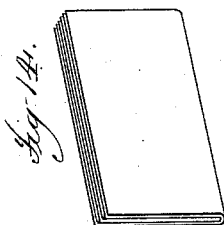
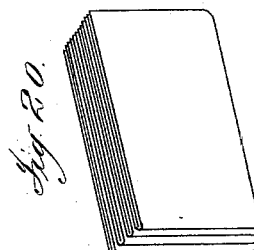
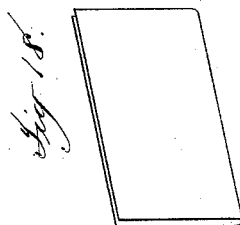
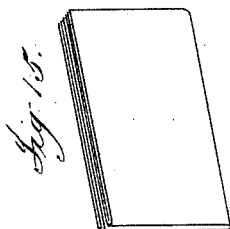
7 Sheets—Sheet 7.

L. C. CROWELL.

DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 419,834.

Patented Jan. 21, 1890.



Attest:
E. H. Betts.
J. M. Dorset

Inventor:
Luther C. Crowell
By *Philip Phelps & Henry*
Attys

UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, NEW YORK.

DELIVERY APPARATUS FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 419,834, dated January 21, 1890.

Application filed April 16, 1889. Serial No. 307,497. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Delivery Apparatus for Printing-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part
10 of the same.

This invention relates to a delivery apparatus designed to be used in connection with a web-printing mechanism to enable the production of a variety of products—that is to say, products containing different amounts
15 of printed matter—the object being to meet the wants of those publishers who desire to issue newspapers the volume of which varies with different days or different issues.

The invention consists in certain improvements in web-associating mechanism, whereby a supplement-web is transferred and associated with a main web, so as to be upon either side of said main web, according to the
25 character of the product to be produced, and also in certain improvements in the delivery mechanism proper, whereby a product consisting of two full sheets and one half-sheet, or what will usually be a ten-page product,
30 can be produced when desired.

The invention also includes various details of construction and combinations of mechanisms, all of which will be hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the delivery mechanism, showing also a diagram of a web-printing mechanism of suitable form to be used in connection therewith. Fig. 2 is a plan view,
40 upon an enlarged scale, of the web-associating mechanism. Fig. 3 is an elevation of the web-associating mechanism, showing also the tapes for conveying the main and supplement webs thereto, the view being taken on the line 3 of Fig. 1. Fig. 4 is an enlarged end elevation of the delivery mechanism, looking from the right of Fig. 1. Fig. 5 is a horizontal section taken on the line 5 of Fig. 4, showing the
45 cutting, collecting, and folding cylinders. Fig. 6 is a vertical section taken on the line 6 of Figs. 4 and 5, looking toward the left. Fig. 7 is an enlarged view of the cams for oper-

ating the sheet-holding pins of the cutting, collecting, and folding cylinders, the same being taken on the line 7 of Fig. 5. Fig. 8 is a section on the line 8 of Fig. 5. Fig. 9 is a section taken on the line 9 of Fig. 10. Fig. 10 is a section taken on the line 10 of Fig. 9. Figs. 11 and 12 are views illustrating a modified form of web-associating mechanism. 60 Figs. 13 to 20 are views illustrating the products.

Referring to said figures, it is to be understood that A B represent form and impression cylinders of a web-printing mechanism of substantially the form shown in my prior application for Letters Patent, filed March 7, 1888, Serial No. 266,393, and C the inking mechanisms thereof. These printing-cylinders are of sufficient length to capacitate them
70 to perfect a web which when split will form a main or full-width web and a half-width or supplement web.

The web D is led from a roll and presented to and delivered from the printing-cylinders in the manner described in my prior application before referred to. After leaving the last impression-cylinder the web passes around a roll 2, and thence into the control of two series of tapes 3 4, by which it is conveyed to the web-associating mechanism. The function of the tapes 3 4 is to provide a suitable feed to maintain the tension of the web between the printing-cylinders and the associating mechanism, and also to carry the
85 leading end of the web in threading up the machine. These tapes are arranged as follows: The tapes 3 pass around the roll 2, thence forward around a roll 5, and upward past a roll 6, returning around pulleys 7 8 and stretching-pulleys 9. The tapes 4 pass around a roll 10, located near the roll 2, thence forward with the tapes 3 around the roll 5 and upward around the roll 6, returning around pulleys 11 beneath stretching-pulleys 12 and above pulleys 13. As the web passes the roll 6, or at some other convenient point before it arrives at the web-associating mechanism, it is acted upon by a slit-ter 14, by which it is split, so as to be divided into a main
100 web *d* and a supplement web *f*.

The delivery mechanism consists of a web-associating mechanism, a longitudinal folding mechanism, a transverse cutting, collecting,

and folding mechanism, and two sheet-piling mechanisms.

The web-associating mechanism consists, primarily, of two turning-bars 15 16 and a register-roll 17, the bars 15 16 being so arranged that the supplement-web *f* being led downward around the bar 15 will be turned at right angles and directed across the path of the main web *d*, and then, being led upward around the register-roll 17 and downward around the bar 16, it will be again turned at right angles, so as to pass forward associated with the main web and overlying one-half its width at one edge, all as best shown in Figs. 2 and 3. The register-roll 17 is made adjustable, as indicated in Fig. 2, so that its position can be shifted to secure the proper register between the printed pages of the main and supplement webs. After being thus associated the main and supplement webs pass forward between a roll 18 and pulleys 19 onto and over a longitudinal folder E, which is, as herein shown, of substantially the form and construction described in my prior Letters Patent No. 331,280, although it may be of other forms shown in my prior Letters Patent.

In passing over the folder E the main web is folded longitudinally upon its central line and the supplement-web *f* is turned around one of the internal guides of the folder, so as to be directed between the external turners 20 and the fold-laying rolls 21 of the folder, associated with but lying upon the outside of the folded main web. After passing the fold-laying rolls 21 the main and supplement webs pass into the control of the transverse cutting and folding mechanism, which will now be described. This mechanism consists, primarily, of four cylinders F G H I, which are arranged side by side in the same, or substantially the same, horizontal plane, though this position may be varied somewhat, if desired. The cylinder F is of a circumference equal to the length of two sheets of the size desired to be produced, and the cylinders G H I are of a circumference equal to the length of one such sheet. The sizes of these cylinders may, however, be varied in those cases where it is not desired to give the greatest possible range of capacity to the machine. The four cylinders named are connected by engaging-gears 32, so as to be driven at the same surface speed, motion being imparted to the cylinders through connections with printing mechanism in the usual manner. The cylinder F is provided with two sets of sheet-holding pins *a b*, which pass through openings in the periphery of the cylinder and are pivoted to the ends of arms extending from rock-shafts 22, which are operated to retract the pins at the proper times by a stationary cam 23, the pins being protruded by springs, and the pins *a* being retained in their retracted position when it is desired to render them inoperative by a latch 24, arranged as shown in my prior Letters

Patent No. 383,800, or in any other suitable manner. Located at the proper points upon the cylinder between the pins *a b* are a pair of rotating folding-blades *c*, which are operated by a cam 25 and co-operate with a pair of folding-rolls 26, to fold the sheets off the cylinder in the usual manner.

The cylinder F is provided just in advance of the pins *a b* with a pair of cutting-grooves 27, which co-operate alternately with a cutting-blade 28, carried by the cylinder G, to sever the web into sheets of a length equal to half the circumference of the cylinder F. The cylinder G is provided just in the rear part of the cutting-blade 28 with a set of sheet-holding pins *g*, which pass through openings in the periphery of the cylinder and are pivoted to the ends of arms extending from a rock-shaft 29. The shaft 29 is provided with an arm 30, having a bowl which travels in the groove of a revolving cam *b*, which is mounted to turn freely upon the shaft 31 of the cylinder G, and is so timed in its movements that the pins *g* are protruded in time to impale the end of the web as it passes between the cylinders F G at one revolution of the cylinder G and retracted to release the end of said web as it arrives at the bite of the cylinders F G at the next revolution of the cylinder G, and so on. The cylinder H is provided with a set of sheet-holding pins *k*, which are arranged the same as the pins upon the cylinder G, and the rock-shaft 33 of which is provided with an arm 34, having a bowl which travels in the groove of a revolving cam *m*, which is mounted to turn freely upon the shaft 35 of the cylinder H, and, like the cam *b*, is so timed in its movements that the pins *k* are protruded at each alternate revolution in time to impale the end of the supplement web as it passes, as will be hereinafter explained, between the cylinders H I, and retracted at the same revolution as the end of the web arrives at the bite of the cylinders H G. The cylinder H is provided just in advance of the pins *k* with a cutting-groove 37, which co-operates with a blade 36, carried by the cylinder I, to sever the supplement-web at each revolution of the cylinders. The cylinder I is provided with a set of sheet-holding pins *n*, arranged just in the rear of the blade 36, and, like the pins *k*, pivoted to arms extending from a rock-shaft 38, having an arm 39, the bowl of which travels in the groove of a revolving cam *o*, which is mounted to turn freely upon the shaft 40 of the cylinder I, and, like the cams *m b*, is so timed in its movements that the pins *n* are protruded at each alternate revolution of the cylinder and alternately with the pins *k* to take the end of the supplement-web as it passes between the cylinders I H and retracted to release the end of the web so taken at the same revolution of the cylinder and in time to permit the web to be folded by a rotating folding-blade *p*, which co-operates with a pair of folding-rolls 41 to fold the web off the cylinder. The fold-

ing-rolls 41 are driven from the cylinder I in the usual manner, and the folding-blade *p* is operated in any suitable manner, preferably by an internal gear 69, within which travels a gear 70 upon the shaft of the blade, as shown and described in Letters Patent No. 171,196.

For the purpose of imparting the necessary movement to the cams *h m o* to cause them to operate the pins *g k n* in the manner just described the peripheries of the cams form engaging-gears 42 of like size, so that the three cams are caused to move in unison, making turn for turn with each other, motion being imparted to the train of gears thus formed, so as to cause the cams to revolve at one-half the speed of their respective cylinders—that is to say, to cause each cam to make one revolution to each two revolutions of its cylinder. For this purpose the cam *h*, which, as before stated, is mounted to turn freely on the shaft of the cylinder G, is provided with a gear 43, which is fixed to the back of the cam and engages with a gear 44, of like size, mounted upon a stud 45, extending from the frame-work. The stud 45 also carries a gear 46, which is fast to the gear 44 and engages with a gear 47, of one-half its size, which is fixed upon the shaft 31 of the cylinder G. By this means the cams *h m o* are caused to revolve in unison, making one revolution to each two revolutions of the cylinders. In producing certain of the products, which will be hereinafter described, it is necessary to render the cylinders H I and their auxiliaries inoperative, and for that purpose the cylinders H I are journaled in bearings which are supported in plates or blocks 48, which are adjustable upon the frame-work, so as to permit the cylinders H I to be moved away from the cylinder G sufficiently to disconnect the two gears 32 of the cylinders G H and the two gears 42 of the two cams *h m*, the plates or blocks 48 being held in either position to which they are adjusted by means of locking bolts or nuts 49, which pass through slotted openings in the plates 48.

In producing certain other products, which will be hereinafter described, it is necessary to render the pins upon the cylinder G inoperative—that is to say, to cause them to remain permanently retracted within the cylinder. To permit this to be readily accomplished, the portion of the stud 45 upon which the gears 44 46 turn is made eccentric, as indicated in Figs. 9 and 10, and the stud is provided outside the frame-work with an arm 50, by which it can be rocked, so as to engage and disengage the gears 43 44 and 46 47, the stud 45 being held in either position to which it is turned by means of a locking-bolt 51, which passes through the end of the arm 50 and enters an opening in the frame-work. To still further provide for the retention of the stud 45 in either position to which it is adjusted, and particularly in position

to hold the gears 43 44 and 46 47 in engagement, the outer end of the stud is provided with a jam-nut 52, preferably having a handle 53, by which it can be readily turned, by which the stud can be securely fastened in either position to which it is turned.

The sheets folded off the cylinder F by the blades *c* and rolls 26 pass from the bite of the rolls into the control of tapes 54, by which they are conveyed to a piling mechanism K, which is of any suitable form, but preferably of the form shown in my prior Letters Patent No. 269,021, and by which they are deposited upon slowly-moving tapes 55. The sheets folded off the cylinder I by the blade *p* and rolls 41 similarly pass into the control of tapes 56, by which they are conveyed to a similar piling mechanism L and deposited upon slowly-moving tapes 57. The two piling mechanisms are suitably driven by any appropriate form of connections with the other parts of the mechanism. The sheets, instead of passing from the rolls 26 41 direct to the piling mechanisms, may of course pass to other folding mechanisms to be further folded.

The remaining features in the construction and organization of the delivery mechanism will be described in connection with a description of its operation in producing the several products, which will now be given.

The printing and delivery mechanism which has been described is capacitated to produce and deliver folded once longitudinally and once transversely the following products, namely: a product consisting of one full sheet, or what will usually be a four-page paper; a product consisting of one full sheet and one half-sheet, or six-page paper; a product consisting of two full sheets, or eight-page paper; a product consisting of two full sheets and one half-sheet, or ten-page paper; a product consisting of two full sheets and two half-sheets, or twelve-page paper. In addition to these products the machine is capacitated to deliver its products in the form of half-sheet or two-page papers, and when producing four, eight, or ten page papers it is capacitated to also produce a like number or double the number of half-sheet or two-page papers, which will be delivered independently of the larger papers, and may form supplements for other products, or be available for any other purposes.

To produce a full sheet or four-page paper, both sets of pins upon the cylinder F are rendered operative, and the pins *g* are rendered inoperative and are held retracted within the periphery of their cylinder. This is done by turning the stud 45 so as to throw the gears 43 44 and 46 47 out of engagement and securing the cam *h* to the end of the cylinder G, so that it will revolve with the cylinder and remain in position to hold the pins retracted. For this purpose the cam is provided with an opening 58, which can be brought into register with a similar opening in the cylinder and

through which a bolt can be passed, so as to lock the cam to the cylinder. The cylinders H I may run idly, or they may be shifted so as to disengage the gears 32 42 of the cylinders G H. A web D of two-thirds width is employed, so as to form only the main web *d*, and after being perfected is led to and over the longitudinal folder, where it is longitudinally folded, and thence passes into the bite of the cylinders F G, where its leading end is taken by one set of the pins *a b* upon the cylinder F and carried around upon that cylinder until the cylinder has made about a half-revolution. The pins which retain the leading end of the web are then retracted by the cam 23, and at the same time the web is folded off the cylinder by the blade *c* into the bite of the rolls 26. At or about the same time that the folding takes place the sheet thus folded is severed from the web by the blade 28 and co-operating groove 27, and the freshly-severed end of the web is taken by the other set of pins *a* or *b* and carried around upon the cylinder F and folded off in the same manner at the proper time, and so the operation is repeated, the product consisting of one full sheet folded once longitudinally and once transversely, as indicated in Fig. 13. The sheets as they pass from the rolls 26 enter the control of the tapes 54 and are conveyed to the piling mechanism K.

To produce a six-page product—that is to say, a product consisting of one full and one half sheet—the adjustments of the cutting and folding cylinders and their auxiliaries remain the same, as just described, and a full-width web D is used, which, after being perfected, is split by the slitter 14, so as to form a main web *d* and a supplement web *f*. The supplement-web *f* may be led around the bars 15 16 and roll 17 and associated with the main web, as before described, in which case it will pass over folder E and enter between the cylinders F G outside the longitudinally-folded main web. The operation will then be exactly the same as already described in connection with the four-page product; but the product will consist of one full sheet folded longitudinally and transversely and one half-sheet folded transversely, the half-sheet being upon the outside of the full sheet, as shown in Fig. 14.

In many cases it may be preferred when producing the six-page product to have the half or supplement sheet inset within the longitudinal fold of the full or main sheet. When this is desired, it can be accomplished by providing the associating mechanism with duplicate turning-bars 59 60, arranged, respectively, above and below the bars 15 16, parallel therewith, as shown, and in such case the supplement-web, instead of being led downward around the bar 15, will be led upward around the bar 59, downward around the roll 17, and upward around the bar 60, thereby being associated with the main web *d* in the same position relatively to the width of the

web as indicated in Figs. 2 and 3, but upon the lower side of the web instead of upon its upper side. The supplement-web will then pass over the longitudinal folder beneath the main web, and will when the main web is folded longitudinally be inset within its fold, so that the half or supplement sheet will be inset within the main sheet, as indicated in Fig. 15. If it is desired to paste the supplement-sheet to the main sheet, it may readily be done by means of a pasting-disk 61, arranged, as indicated in Fig. 1, to apply a line of paste to the edge of the supplement-web.

To produce an eight-page product—that is to say, a product consisting of two full sheets—the pins *a* of the cylinder F will be rendered inoperative by being retracted and held within the periphery of the cylinder, and the pins *g* of the cylinder G will be rendered operative by releasing the cam *h* from the cylinder G and turning the stud 45 so as to throw the gears 43 44 and 46 47 into engagement. The cylinders H I will, however, be rendered inoperative by being moved away from the cylinder G until the gears 42 of the cams *h m* and the gears 32 of the cylinders G H are thrown out of engagement. A two-thirds-width web will be used, so as to produce only the main web *d*, and this web, after being perfected, will be longitudinally folded and enter the bite of the cylinders F G, as in the case of the four-page product. The leading end of the web, however, will be taken by the pins *g* and carried around upon the cylinder G until the latter cylinder has completed a revolution, when the web will be severed by the blade 28, and at or about the same time the pins *g* will be retracted, leaving the freshly-severed end of the web and the leading end of the sheet just severed from the web to be taken by the pins *b* and carried around upon the cylinder F until the latter has completed a half-revolution, when the two longitudinally-folded sheets thus associated will be folded off the cylinder by the blade *c*, thus producing the product indicated in Fig. 16. The third sheet will be taken by the pins *g* and carried around upon the cylinder G and finally associated with the fourth sheet, which, together with the third, will be taken by the pins *b*, and so the operation will be repeated. If it is desired to unite the two longitudinally-folded full sheets in producing this product, it may be done by a pasting-disk 62, which is arranged to apply a line of paste to the folded edge of the sheet as it is carried around upon the cylinder G. As the sheet will be present upon the cylinder G only at each second revolution of the cylinder, it is of course necessary to make the action of the pasting-disk intermittent, so that a line of paste will not be applied to the cylinder when no sheet is present. For this purpose one-half the periphery of the disk 62 is cut away, so that the disk is in contact with the cylinder or the sheet thereon only one-half the time, and the

disk is so driven that it is caused to make one-half of a revolution to each revolution of the cylinder G, it being driven through gears 63 64, properly proportioned for this purpose, and the movements of the disk are so timed that the depressed portion of the disk will be next the cylinder during that revolution of the cylinder when no sheet is present, and vice versa.

It has been found in practice that in applying a line of paste to a moving sheet it is preferable that the surface which applies the paste should move at a less speed than the sheet, so that the sheet will exert a wiping action upon such surface. By this means it is found that the paste is more evenly and perfectly applied. To accomplish this the disk 62 is of only one-half the diameter of the cylinder G, and, making only one revolution to two revolutions of the cylinder, its surface speed when in contact with the sheet will be very much less than that of the sheet, and thus produce the wiping action referred to.

To produce a ten-page product—that is to say, a product consisting of two full and one half sheets—the adjustments of the pins upon the cylinders F G will remain the same as in the case of the eight-page paper just described; but the cylinders H I will be moved toward the cylinder G, so as to bring the gears 32 42 into engagement. A full-width web D will be used, which, after being perfected, will be split and the supplement-web associated with the main web, as indicated in Figs. 2 and 3, and the main web will then be folded, as indicated in Fig. 4. From the rolls 21 the longitudinally-folded main web will pass into the bite of the cylinders F G, while the supplement-web *f* will be led from the roll 21 around a register-roll 65 and enter the bite of the cylinders H I. The leading end of the main web will be taken by the pins *g* and carried around upon the cylinder G, the same as in producing the eight-page paper. The leading end of the supplement-web will be taken by the pins *k* and carried around upon the cylinder H, which cylinder forms a carrier for alternate sheets severed from the supplement-web. When the leading ends of the two webs upon the cylinders G H arrive at the bite of the cylinders, the pins *k* will be retracted, leaving the end of the supplement-web impaled upon the pins *g*, which, remaining protruded, will transfer the leading end of the supplement-web onto the cylinder G and associate it with the leading end of the main web already upon that cylinder, and thus the leading ends of the two webs will be carried around upon the cylinder G by the pins *g* until they arrive at the bite of the cylinders F G. When the parts arrive in this position, the blade 36 will sever the supplement-web, and, the pins *k* being retracted, the leading end of the supplement-web will be taken by the pins *n*, which will at that time be protruded, and be carried around

upon the cylinder I, which forms a carrier for the remaining sheets severed from the supplement-web. At the same time the supplement-web is severed by the blade 36 the main web will be severed by the blade 28, and at or about the same time the pins *g* will be retracted, thereby allowing the pins *b*, which are protruded, to take the freshly-severed end of the main web, and also the leading ends of the sheet severed from the supplement-web and the sheet severed from the main web, and transfer them from the cylinder G to the cylinder F, so that they will be carried around upon the latter cylinder associated with the leading end of the main web, and will at the proper time be folded off the cylinder into the bite of the rolls 26 by the blade *c*, after which the blade 28 will again sever the main web, the freshly-severed end being taken by the pins *g*. The leading end of the supplement-web taken by the pins *n* will be carried around upon the cylinder I until the folding-blade *p* arrives in proper position to fold the end of the web into the bite of the rolls 41, at which time the pins *n* will be retracted to release the leading end of the web. When the cylinder I has completed its revolution, the blade 36 will again sever the supplement-web, and the freshly-severed end will be taken by the pins *k* and carried around upon the cylinder H and associated with the leading end of the main web, as before described, and so the operation will be repeated, each alternate sheet severed from the supplement-web being associated with two longitudinally-folded full sheets severed from the main web, thus producing the ten-page product shown in Fig. 17. The alternate sheets severed from the supplement-web and folded between the rolls 41 will pass into the control of the tapes 56 and be delivered to the piling mechanism L, thus producing a half-sheet or two-page product folded as indicated in Fig. 18. The two-page products thus produced will be equal in number to the ten-page products produced at the same time, and may form supplements to other papers. For example, if the entire edition of a paper is to be of ten pages, one-half the edition may be printed in the manner just described, thus producing one-half the number of ten-page papers required and an equal number of two-page supplements. After one-half the edition has been thus printed the plates for the supplement pages may be removed from the form-cylinders and a two-thirds-width web used for the remainder of the edition, thus delivering one-half the edition in eight-page papers, with which the surplus supplements produced during the printing of the first half of the edition can be associated by hand, or the surplus supplements or two-page sheets may be printed with other matter. If it is desired to paste together all the pages of the ten-page product thus produced, it may be done by providing the cylinder G with an additional pasting-disk 66, which is of the same form and operated in

the same manner as the disk 62, it being driven from the gear 63 through a gear 67. By this means the disk 66 will apply a line of paste to unite the longitudinally-folded full sheet with the supplement sheet as the two are associated upon the cylinder G, while the disk 62 will apply a line of paste to the supplement sheet, so as to unite it to the longitudinally-folded full sheet as the two are associated upon the cylinder F.

To produce a twelve-page product—that is to say, a product consisting of two full and two half sheets—the operation will be exactly the same as in producing the eight-page paper already described, except that a full-width web D will be used, which will be split, and the supplement and main webs associated in either of the ways described for producing a six-page paper, thus producing the products shown in Figs. 19 and 20. In this case the supplement-sheets, if inset within the longitudinal fold of the full sheets, as shown in Fig. 20, may be pasted thereto by the pasting-disk 61, and the two six-page parts of the twelve-page paper may be united by a line of paste applied by the disk 62, the same as in producing the eight-page paper.

It is of course to be understood that in producing the four-page and six-page papers the disks 62 66 will be thrown out of operation, which can readily be done by shifting the gears 64 67 or the gear 63, and that in producing the ten-page paper the disk 61 will be lowered out of operative position, and that in producing the twelve-page paper the disk 66 will be rendered inoperative by shifting the gear 67.

If in any case it should be desired to deliver the entire product of the machine in the form of half-sheet or two-page papers, it can be done in the following manner: For this purpose the shaft 38, which operates the pins *n* of the cylinder I, is at its end opposite the arm 39 extended through the space within the gear 69, and is provided with an arm 71, having a bowl which is arranged to enter the path of a stationary cam *q*, which is loose upon the shaft 40 of the cylinder I and is capable of adjustment to and from the cylinder, it being held in any position to which it is adjusted by means of bolts 72, which pass through slots in a fixed bracket 73. The cam *q* is so formed that when it is adjusted up to the cylinder I, so as to receive the bowl of the arm 71 into its path, it will operate the pins *n* so as to cause them to be protruded at each revolution of the cylinder to take the end of the supplement-web as it passes the bite of cylinders H I and be retracted at the same revolution of the cylinder in time to release the sheet and permit it to be folded off the cylinder by the blade *p*.

In operating the machine to produce the products which have been described the cam *q* is of course adjusted away from the cylinder I, so as to remove it from the bowl upon the arm 71. If, however, it should be desired

to deliver the whole product of the machine in the form of half or two-page sheets, the adjustments of the pins and their operating devices of the cylinders F G will be the same as in producing the four-page product. The gears 32 of the cylinders G H will remain in engagement. The cams *m o* and their gears 42 will be moved outward upon the shafts 35 40, so as to be disconnected from the cam *h* and so as to remove the bowls of the arms 34 39 from the paths of the cams. The pins *k* will be retained in a retracted position, and the cam *q* will be adjusted up to the cylinder, so that the bowl of the arm 71 will enter its path. A web D of two-thirds width will be used, and this web, after being perfected will be split by a slitter 74, which may be located as indicated by dotted lines in Fig. 4, or in any other suitable position. After passing the rolls 21 one half of the web will be led to the cylinders F G and operated upon the same as the longitudinally-folded full sheets, while the other half of the web will be led to the cylinders H I and will be severed into sheets and folded in the same manner.

If it should be desired to produce four-page products and an equal number of half-sheet products, the adjustments and operation will be exactly the same, except that a full-width web will be printed, the main web being longitudinally folded and led to the cylinders F G and the supplement-web being led to the cylinders H I.

To produce eight-page products, and at the same time half-sheet or two-page products, the operation will be the same as last described, except that the pin-operating devices of the cylinders F G will be adjusted as heretofore described in connection with the eight-page product.

In conclusion, it is to be remarked that the associating mechanism which is described may be varied somewhat without departing from the invention. If it is not desired to inset the supplement of the six and twelve page papers, the turning-bars 59 60 may be omitted; or the turning-bars, instead of being arranged at right angles to each other, may be arranged parallel, as shown in Figs. 11 and 12. In such case, however, the supplement-web, instead of passing over the register-roll 17 after it has passed over the first turning-bar and before it has passed over the second, will pass over both bars and then over the roll 17, as indicated, and in this case, the same as in the construction first described, the additional set of turning-bars 59 60 may be provided and an additional register-roll 68, so that the supplement-sheets of the six and twelve page products can be inset if desired, as indicated in Fig. 12.

What I claim is—

1. The herein-described web-associating mechanism, consisting of duplicate turning-bars arranged in different planes, whereby the transferred web may be brought upon either

side of the web with which it is associated, substantially as described.

2. The herein-described web-associating mechanism, consisting of duplicate pairs of turning-bars 15 59 and 16 60, the bars of each pair being parallel and arranged in different planes, whereby the transferred web may be brought upon either side of the web with which it is associated, substantially as described.

3. The combination, with a sheet-collecting mechanism for associating sheets severed from a main web, of a sheet-carrier, as the cylinder H, for presenting alternate sheets severed from a supplement-web to said sheet-collecting mechanism to be associated with the sheets severed from the main web, substantially as described.

4. The combination, with a sheet-collecting mechanism for associating sheets severed from a main web, of a sheet-carrier, as the cylinder H, for presenting alternate sheets severed from a supplement-web to said sheet-collecting mechanism to be associated with the sheets severed from the main web, and a sheet-carrier, as the cylinder I, for delivering the remaining sheets severed from the supplement-web as a separate product, substantially as described.

5. The combination, with a sheet-collecting mechanism for associating sheets severed from a main web, of a pair of cutting-cylinders H I for severing a supplement-web into sheets, one of said cylinders having sheet-retaining devices for taking alternate sheets and presenting them to said sheet-collecting mechanism, and the other of said cylinders having sheet-retaining devices for taking the remaining sheets, substantially as described.

6. The combination, with a sheet-collecting mechanism for associating sheets severed from a main web, of a pair of cutting-cylinders H I for severing a supplement-web into sheets, one of said cylinders having sheet-retaining devices for taking alternate sheets and presenting them to said sheet-collecting mechanism, and the other of said cylinders having sheet retaining and folding mechanisms for taking the remaining sheets and folding them as a separate product, substantially as described.

7. The combination, with a pair of cutting, collecting, and folding cylinders F G, of a pair of cutting-cylinders H I, one of said last cylinders being provided with sheet-retaining devices for taking alternate sheets and presenting them to said collecting-cylinders, and

the other of said last cylinders being provided with sheet-retaining devices for taking the remaining sheets, substantially as described.

8. The combination, with a pair of cutting, collecting, and folding cylinders F G for operating upon a main web, of a cylinder H, having sheet-retaining devices for taking alternate sheets severed from a supplement-web and presenting them to said collecting-cylinders, substantially as described.

9. The combination, with the cylinder G, having sheet-retaining pins, of the cam h and gear 43, turning loosely upon the shaft of said cylinder to operate said pins, the gear 47, fixed upon the cylinder-shaft, and the gears 46 44, connecting the gears 47 43, substantially as described.

10. The combination, with the cylinder G, having sheet-retaining pins, of the cams h and gear 43, turning loosely upon the shaft of said cylinder to operate said pins, the gear 47, fixed upon the cylinder-shaft, the gears 46 44, connecting the gears 47 43, and the eccentric 45, supporting said gears 46 44, whereby the pins can be put into and out of operation, substantially as described.

11. The combination, with a longitudinal folder, of a web-severing and sheet collecting and folding mechanism and a cylinder H for presenting alternate sheets severed from a supplement-web to said sheet-collecting mechanism, substantially as described.

12. The combination, with a longitudinal folder, of a web-severing and sheet collecting and folding mechanism, a cylinder H for presenting alternate sheets severed from a supplement-web to said sheet-collecting mechanism, and a cylinder I for taking the remaining sheets severed from said supplement-web, substantially as described.

13. The combination, with a web-associating mechanism for associating a main and a supplement web, a longitudinal folder for folding said main web, a web-severing and sheet-folding mechanism for operating upon the longitudinally-folded main web, and a separate web-severing and sheet-folding mechanism for operating the supplement-web, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

T. H. PALMER,
EDWARD R. WOOD.