

(No Model.)

10 Sheets—Sheet 1.

L. C. CROWELL.  
PRINTING AND DELIVERY MECHANISM.

No. 405,016.

Patented June 11, 1889.

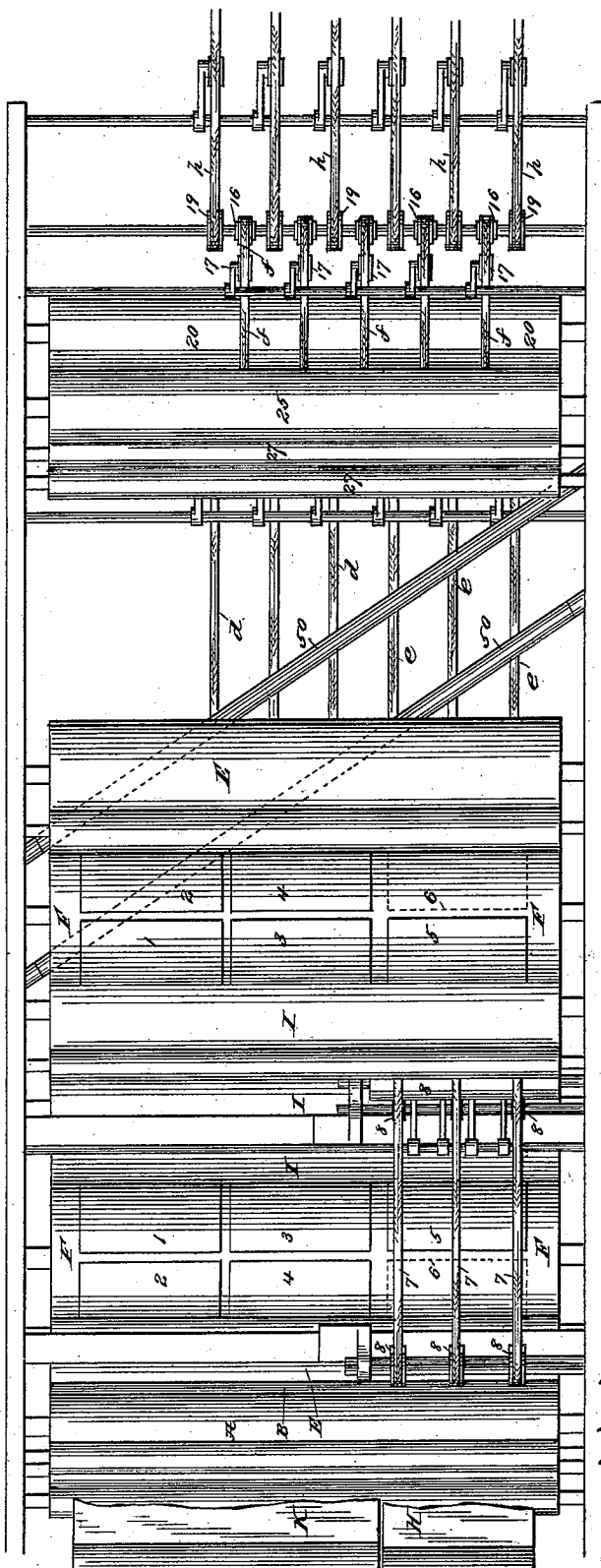


fig. 1:

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Lester C. Crowell  
by  
Philip H. H. H. H.  
H. H. H.

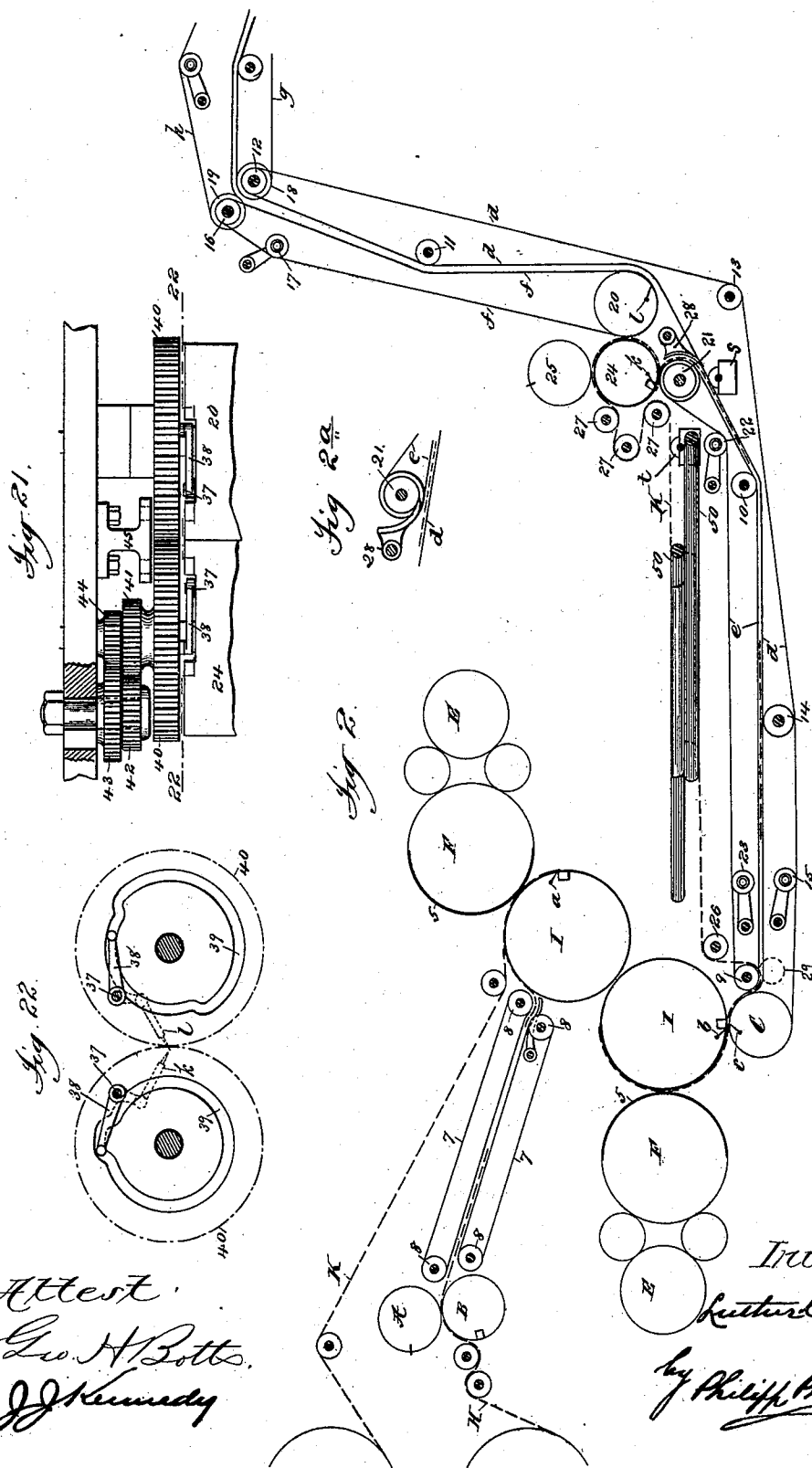
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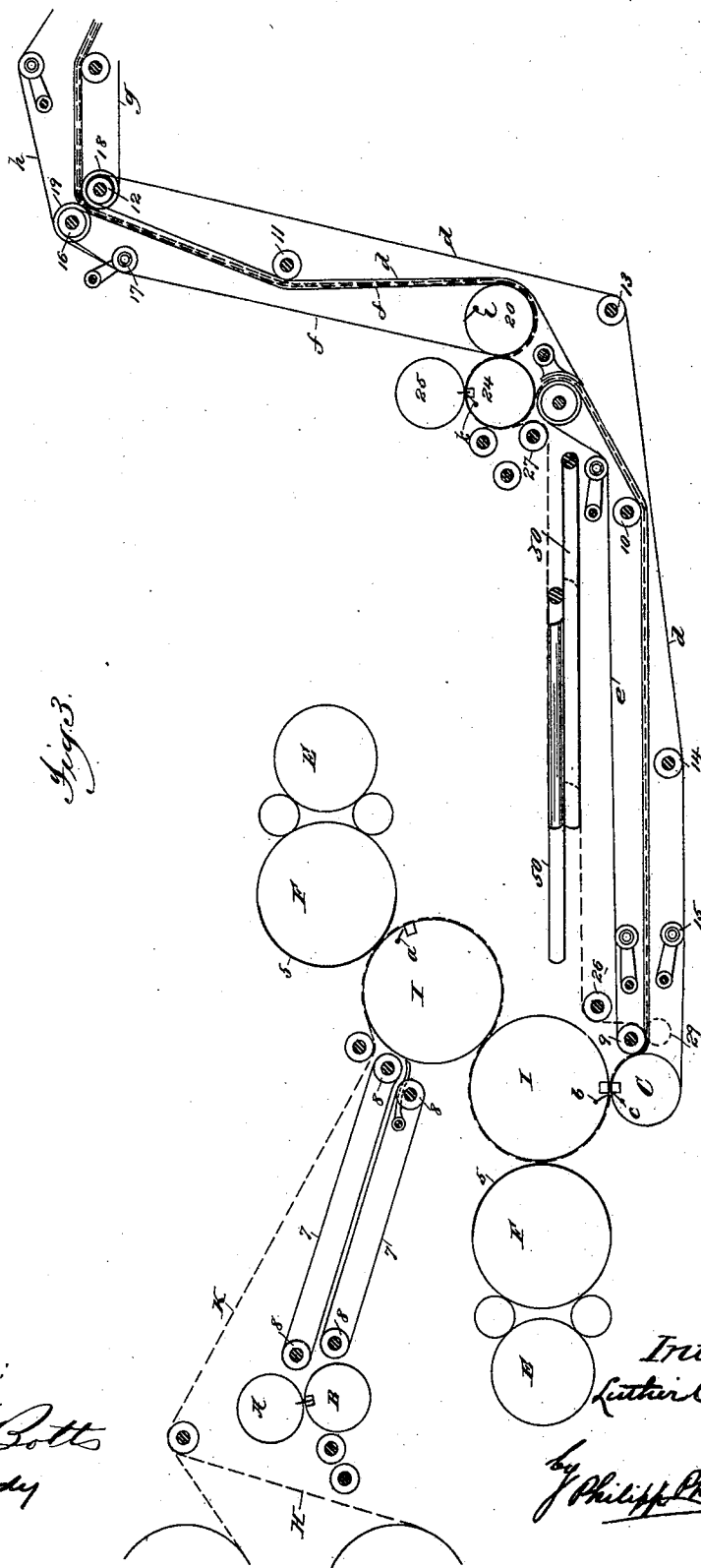
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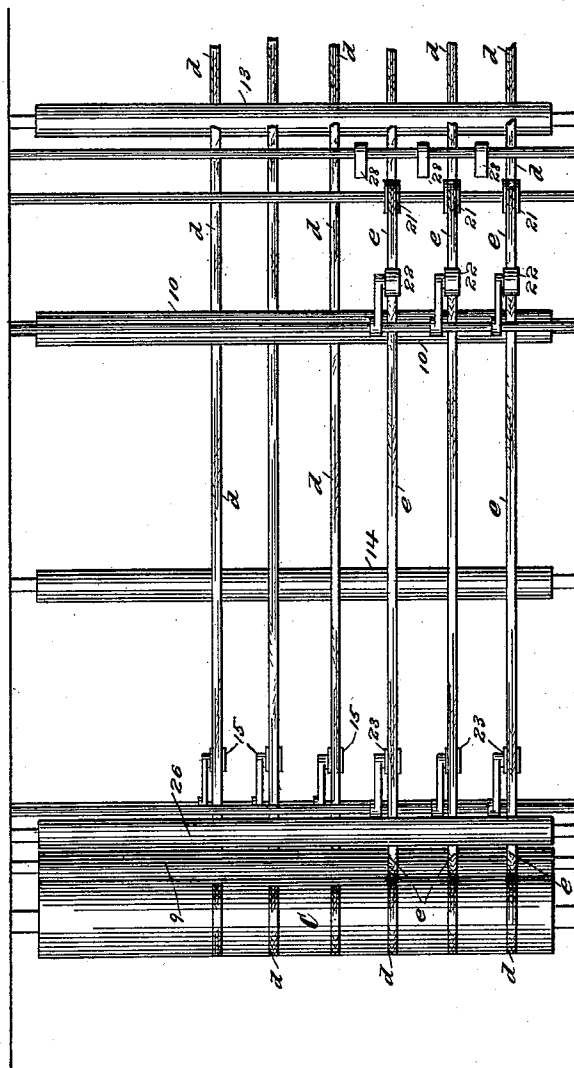
10 Sheets—Sheet 4.

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*Fig. 4.*



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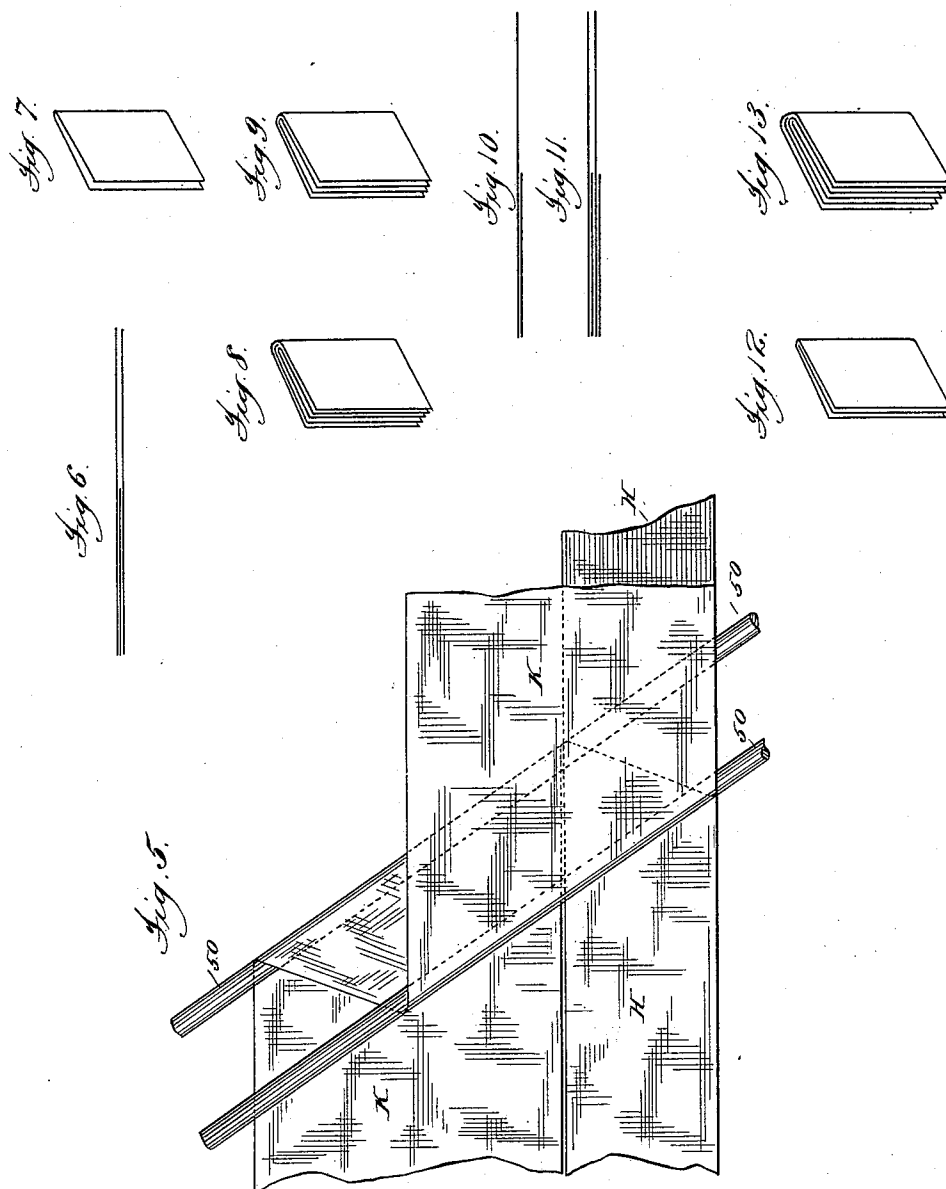
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10 Sheets—Sheet 5.

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10 Sheets—Sheet 6.

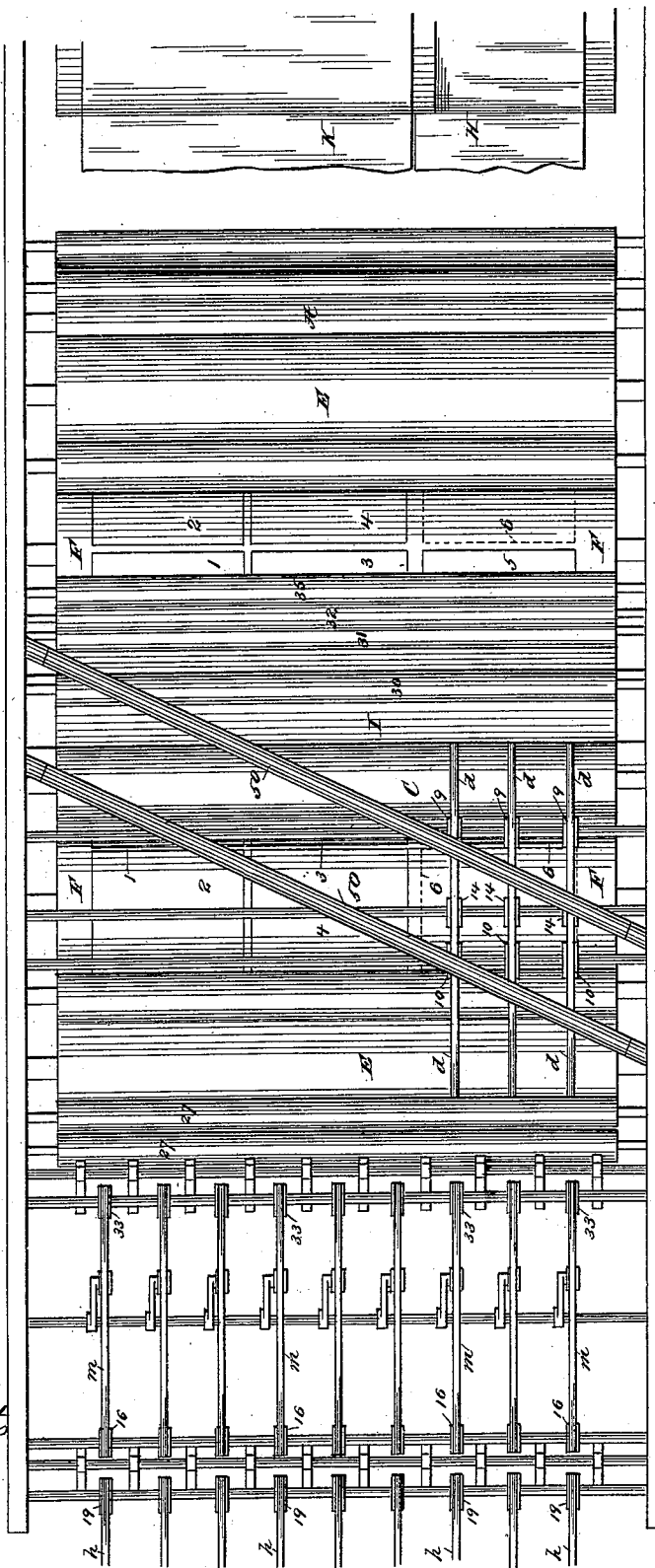
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*Fig. 14.*

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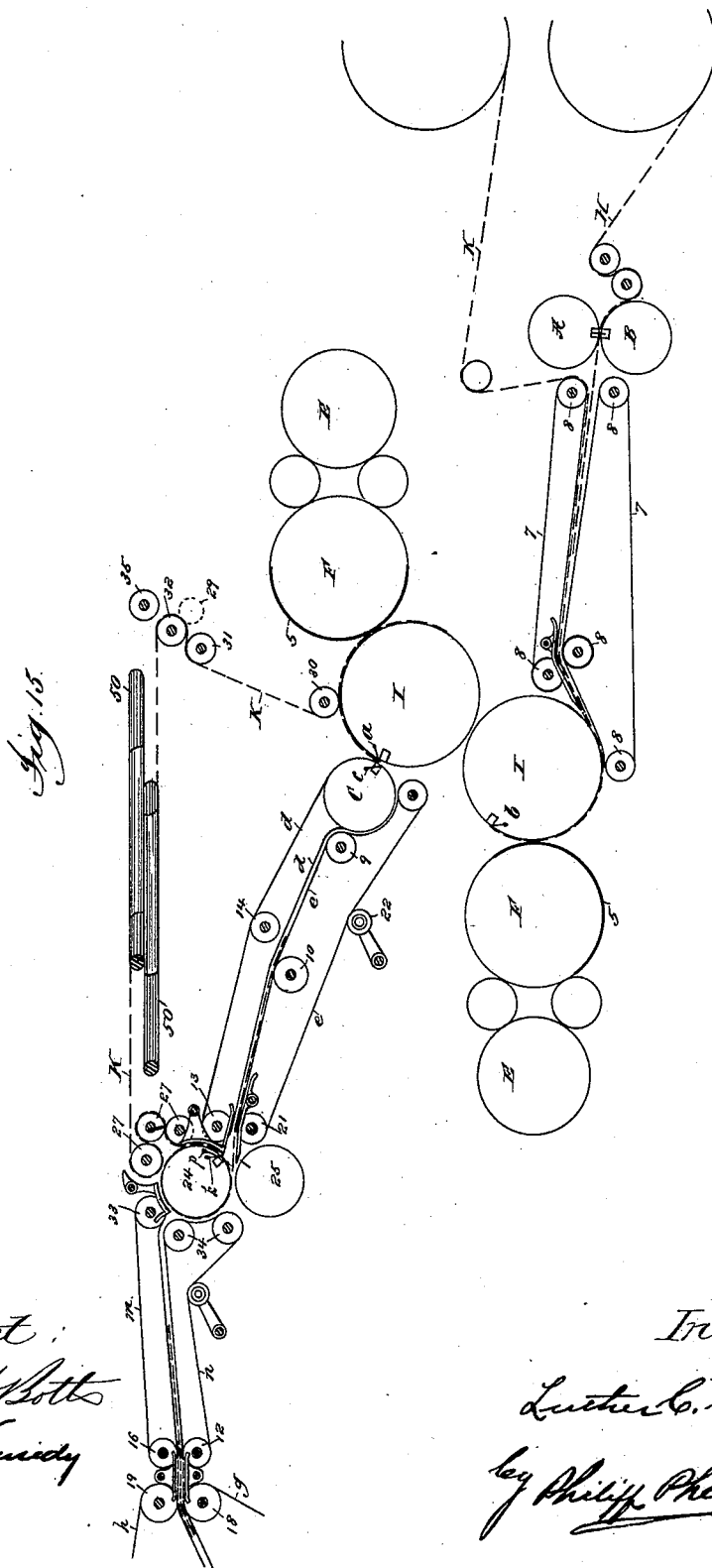
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10 Sheets—Sheet 7.

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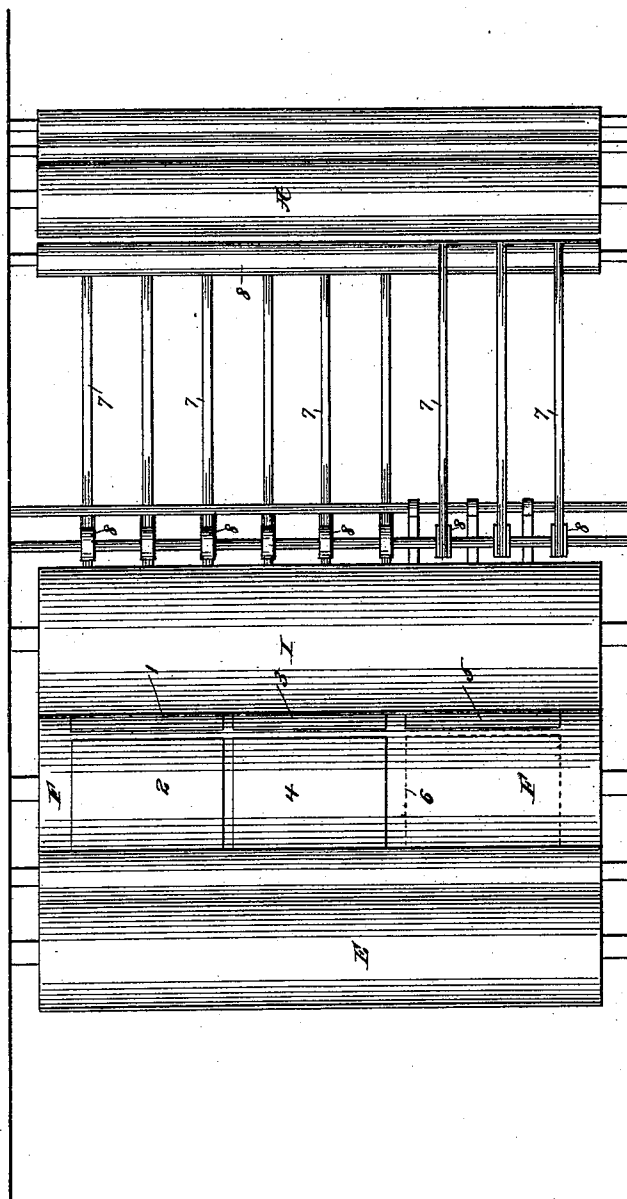
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*Fig. 16.*



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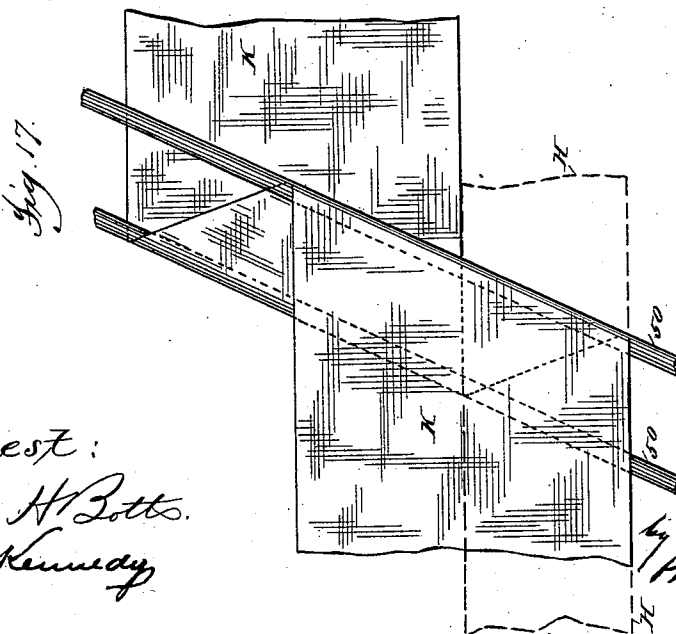
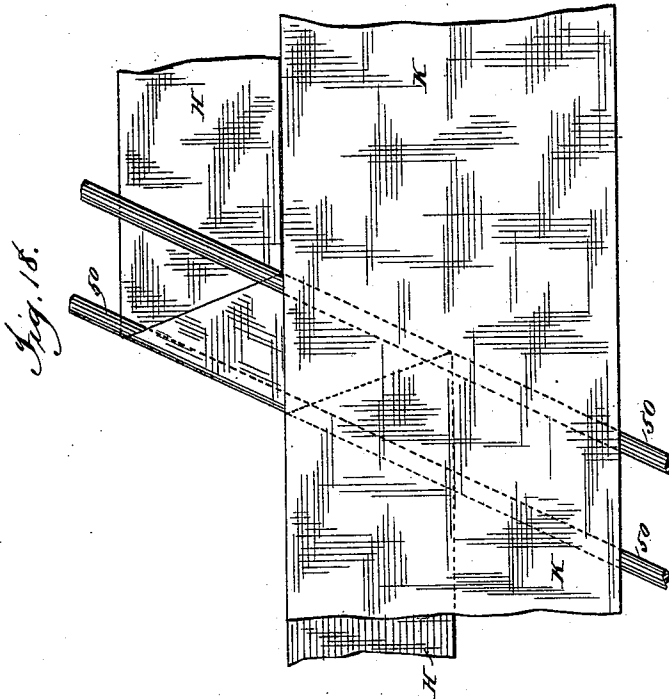
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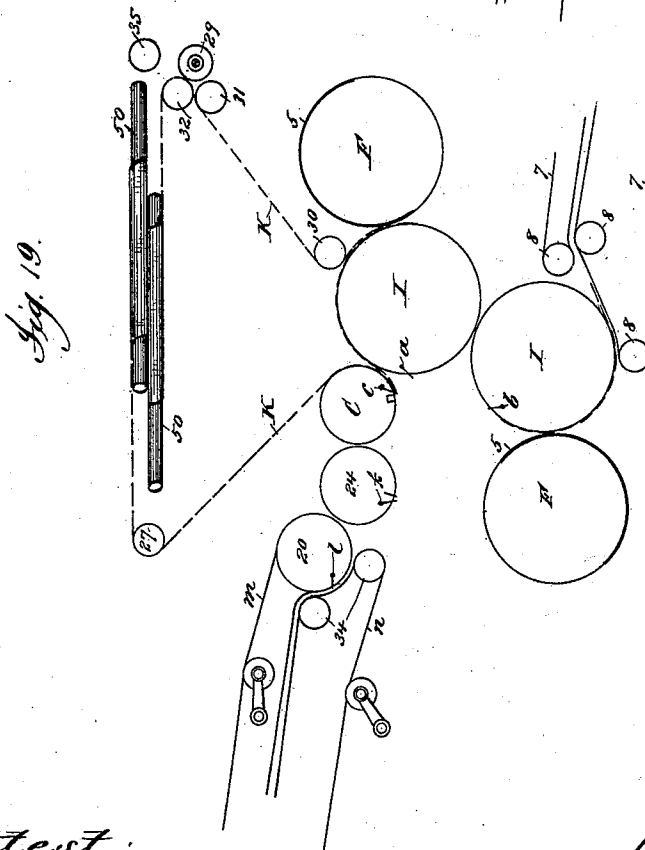
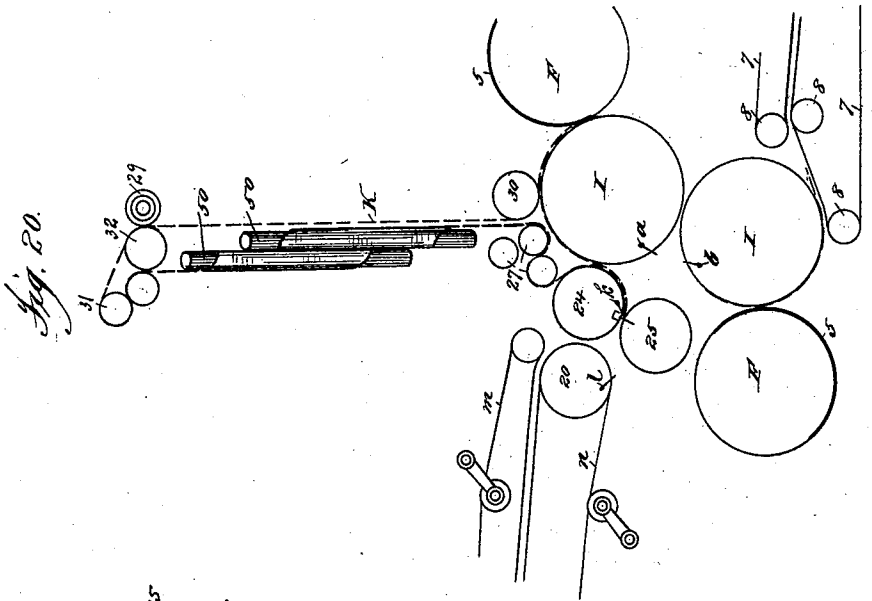
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10 Sheets—Sheet 10.

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Patented June 11, 1889.



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*Chas. H. Roth*  
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*Attorneys*

# UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR TO ROBERT HOE, PETER S. HOE, STEPHEN D. TUCKER, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

## PRINTING AND DELIVERY MECHANISM.

SPECIFICATION forming part of Letters Patent No. 405,016, dated June 11, 1889.

Application filed March 8, 1888. Serial No. 266,606. (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 Printing and Delivery Mechanism, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to a web printing and delivery mechanism, which is especially designed to meet the wants of that class of printing establishments where it is desired to issue newspapers of a size and volume which varies with different issues.

It is the object of the invention to provide a comparatively simple and compact machine having but a single printing mechanism, which will be capable of producing a large variety of different-sized products and at a high rate of speed.

It is also the object of the invention to so organize the printing and delivery mechanisms that the half or supplement sheet of a six-page or ten-page product may be inset, and in the case of the ten-page product inset between the two full sheets which form eight of the ten pages.

The invention consists, principally, in the means for presenting the supplement-web to the printing mechanism and in the organization of web-associating and sheet-collecting mechanisms, whereby the sheets of the product are associated to be presented to the folding mechanism.

As a full understanding of the invention can only be given by an illustration and a detailed description of an organized machine embodying the same, all preliminary description will be omitted and a full description given, reference being had to the accompanying drawings, which illustrate several embodiments of the invention.

In said drawings, Figure 1 is a plan view of the principal parts of a printing and delivery mechanism embodying the invention. Figs. 2, 2<sup>a</sup>, and 3 are diagrammatic sectional elevations of the same, illustrating the operation of the machine in producing different-sized products. Fig. 4 is a plan view of the lower portion of the machine, showing the arrangement of certain of the tapes. Fig. 5 is

a plan view of the web turning and associating mechanism. Figs. 6 to 13, inclusive, illustrate the different-sized products. Figs. 14 and 15 are views similar to Figs. 1 and 2, illustrating a modified organization of the invention. Fig. 16 is a plan view of the lower portion of the machine shown in Figs. 14 and 15, showing particularly the tapes for conducting the web or webs to the printing-cylinders. Figs. 17 and 18 are plan views of the web turning and associating mechanism of the organization shown in Figs. 14 and 15. Figs. 19 and 20 are views similar to Fig. 15, showing other modified organizations. Figs. 21 and 22 are views illustrating the means for operating the pins upon the collecting-cylinder and upon the cylinder which coacts therewith, Fig. 22 being a section taken upon the line 22 of Fig. 21.

Referring now particularly to Figs. 1, 2, and 4, it is to be understood that F I represent, respectively, the form and impression cylinders of the printing mechanism. These cylinders are arranged in any suitable relation to each other, preferably in substantially the relation shown, and are provided with the usual inking mechanisms represented by the rolls and cylinders E.

The form-cylinders are of sufficient length to carry three forms (for convenience called "plates") abreast, and are preferably of sufficient size to receive two plates circumferentially, making six plates, 1 2 3 4 5 6, to each cylinder, as indicated.

The impression-cylinders I are provided with sets of sheet-holding pins *a b*, which extend one-third the length of the cylinders and are located between the ends of the blankets and in the position occupied by the blank spaces between the plates 5 6. These pins are so arranged upon the cylinders that the two sets of pins come together at each revolution of the cylinders. These pins are preferably of the form shown in my prior Letters Patent, No. 255,723, and are operated in any suitable manner—as, for example, by a mechanism similar to that shown in the said Letters Patent—so as to be protruded and retracted at the proper times to take and release the supplement-sheets, as will be hereinafter more fully explained.

Located upon the receiving side of the first

form and impression cylinder is a pair of cutting-cylinders A B, which are of a circumference equal to the length of a sheet and are provided with a cutting-blade, which is arranged and operates in the well-known way to partially, but not wholly, sever the web passing between them. These cylinders may extend the entire width of the machine, as shown, or may be of a length equal only to one-third the width of the machine.

Located between the cutting-cylinders and the first impression-cylinder are a series of accelerated parting-tapes 7, which occupy one-third, or about one-third, the width of the machine and pass around the pulleys 8, located, respectively, adjacent to the cutting-cylinders and the first impression-cylinder. These tapes operate in the usual and well-known manner to complete the severance of the sheets from the web.

The cutting-cylinders A B are driven at one-half the surface speed of the printing-cylinders, while the accelerated tapes 7 are driven at a speed equal to the surface speed of the printing-cylinders.

Located adjacent to the second impression-cylinder is a delivery-cylinder C, which is provided with a set of impaling-pins *c*, similar to the pins *a b*, and which are or may be operated in a similar manner. These pins are so arranged that as the impression-cylinder and the cylinder C are revolved the two sets of pins *b c* will come together at each revolution of the impression-cylinder. The operating mechanism of the pins is so timed that as the pins are thus brought together the pins *b* will be retracted to release the sheet held by them, while the pins *c* will be protruded to take said sheet and transfer it onto the cylinder C.

It is of course to be understood that grippers may be employed in place of the pins *a b c*, the grippers being operated in the usual manner to take and release the sheets at the proper times; but the pins will usually be preferable.

Extending from the cylinder C is a system of taping which operates to convey the sheets or aid in conveying the web, as the case may be, to the sheet-collecting mechanism, and to convey the sheets thence to the folding mechanism or the delivery mechanism proper, which is not shown in the present case. This system of taping consists of five sets of tapes *d e f g h*, which are arranged as follows: The set of tapes *d* pass around the cylinder C, and thence forward beneath rolls 9 10, and thence partially around a cylinder 20 and upward past a roll 11 and around pulleys 12, returning beneath rolls 13 14 and stretching-pulleys 15. The tapes *f* pass around the cylinder 20 and upward with the tapes *d* past the roll 11 and around pulleys 16, located adjacent to the pulleys 12, returning around stretching-pulleys 17. The tapes *g h* pass around pulleys 18 19, mounted upon the same shafts that carry the pulleys 12 16, and operate to receive

the sheets from the tapes *d f* and convey them to a longitudinal folder or other suitable folding or delivery mechanism. (Not shown.) The tapes *e* occupy only one-third the width of the machine and pass around the roll 9 and forward with the corresponding ones of the tapes *d*, beneath the roll 10, and around a roll 21, located near the cylinder 20, returning beneath and above stretching-pulleys 22 23.

Located adjacent to the cylinder 20 is a sheet-collecting cylinder 24, which is provided with a set of impaling-pins *k*. Co-operating with the cylinder 24 is a second cylinder 25, which is provided with a cutting-blade so positioned as to co-operate with a cutting-groove upon the cylinder 24, just in advance of the pins *k*, to sever the web as the latter passes between the two cylinders, as will be herein- after explained.

The cylinder 20 is provided with a set of impaling-pins *l*, similar to the pins *k* and operated in a similar manner, which act to take the sheets from the cylinder 24 at the proper time and transfer them to the cylinder 20 and deliver them into the control of the tapes *d f*. The pins *k l*, which are or may be of substantially the form and arranged in substantially the manner shown in my prior Letters Patent, No. 317,740, are operated in such manner that the sheets may be collected upon the cylinder 24 or be allowed to pass that cylinder without being collected. For this purpose the operating devices of the pins *k* are so arranged that those pins can be retracted at each revolution of the cylinder or at each alternate revolution of the cylinder, while the devices which operate the pins *l* are so arranged that those pins can be correspondingly protruded. To effect this, the shafts 37, (see Figs. 21 and 22,) upon which the pins *k l* are mounted, are provided with rock-arms 38, having studs or bowls which travel in cam-grooves 39, formed in the faces of a pair of engaging gears 40, which are mounted to turn freely upon the shafts of the cylinders 24 20. One of the gears 40 is provided upon its outer face with a gear 41, which is rigidly secured to it, and engages with a similar gear 42, mounted to turn upon a stud projecting from the frame-work. The gear 42 is fixed to a second gear 43, which engages with a gear 44, of one-half of the size of the gear 43, which is fixed upon the shaft of one of the cylinders. From this it results that when the gears 42 43 are in engagement with the gears 41 44 the cams 39 are caused to revolve with the cylinders 20 24, but at only one-half the speed of the cylinders—that is to say, the cams will make one revolution to two revolutions of the cylinder. The stud upon which the gears 42 43 are mounted is made capable of movement in the frame, as indicated in Fig. 21, so that the gears 42 43 can be thrown out of engagement with the gears 41 44, and when this is done the gears 40 and cams 39 may be secured in a fixed position in any suitable manner, as by bolts passing

through a bracket 45 and entering the gears. The cams 39 are so formed that when in their fixed position they will act to protrude and retract the pins *k l* at each revolution of the cylinders 24 20, and thus prevent the collection of the sheets upon the cylinder 24. When, however, the cams are operated by the train of gears, they revolve with the cylinders, but at one-half speed, and thus cause the pins *k l* to be protruded and retracted only at each alternate revolution of the cylinders, so that the sheets will be collected by the cylinder 24.

Located between the second impression-cylinder and the collecting-cylinder 24 is a web-associating mechanism consisting of two parallel turning-bars 50, which are arranged obliquely across the path of the web in such position that one of the webs, or one part of the web, upon being led around the bars will be transferred laterally a sufficient distance to be brought over the other part of the web and in position to be associated therewith, as will more fully appear when the operation of the machine is described.

The frame-work for supporting the various parts is partially indicated in several figures of the drawings, but the gearing and connections for transmitting motion to the various parts have been entirely omitted. Such gearing and connections, however, constitute no part of the present invention, and being of the ordinary form can readily be supplied by any one familiar with the art. Many of the details in the construction of the several parts are also omitted, as the different parts are in themselves common and well known, and a detailed description and illustration of their construction are therefore unnecessary in order to convey a full understanding of the invention.

It is also to be remarked that the form and construction of the several parts can be considerably modified without departing, essentially, from the invention, as the invention relates more particularly to the general organization of the machine and the manner of combining the several mechanisms than to the construction of the individual mechanisms.

The machine thus organized is capacitated to produce the following variety of products, namely: a product consisting of one full sheet, a product consisting of one full and one half sheet, a product consisting of two full sheets, a product consisting of two full sheets and one half sheet, and a product consisting of two full sheets and two half sheets.

The manner of operating the machine in producing the product consisting of two full sheets and one half sheet, or what will usually be a ten-page paper, will be first described. When it is desired to produce this product, the plates 6 will be omitted from the form-cylinders and the pins *d b c* will be rendered operative. The cutting-cylinders A B,

which, as before stated, are driven at a surface speed equal to one-half the surface speed of the printing-cylinders, will be put into operation, and also the accelerated tapes 7 and the pins *k* will be retracted and the pins *l* protruded at each alternate revolution of the cylinders 24 20. A main web K, of two-thirds the full width of the machine, or, in other words, of a width to be perfected by the plates 1 2 3 4, (see Fig. 1,) will be led directly to the printing mechanism, (see Fig. 1,) in position to be perfected by these plates. After being perfected the web K will pass beneath the roll 9 and upward around a roll 26, and thence around the bars 50, by which it will be transferred laterally one-half its width, as shown in Fig. 5, after which it will pass around register-rolls 27, (see Fig. 2,) and between the cutting and collecting cylinders 24 25, where its leading end will be taken by the pins *k* and carried around by the cylinder 24. A second or supplement web H, (see Fig. 1,) of one-half the width of the web K, will be led between the cutting-cylinders A B, (see Fig. 2,) by which it will be partially severed into sheets, and will then advance between the accelerated tapes 7, at one-half the speed of the web K, until its leading end arrives in the bite of the pulleys 8, adjacent to the first impression-cylinder, when it will be nipped by the pulleys and its speed accelerated so as to complete the severance of the first sheet and advance its leading end onto the impression-cylinder. The parts will be so timed that the leading end of the sheet will be thus advanced onto the impression-cylinder in proper position to be taken by the pins *a* and carried around upon that cylinder, so as to receive an impression upon one side from the plate 5, carried by the first form-cylinder. The sheet thus held by the pins *a* will be carried around upon the first impression-cylinder until the pins *a b* come together, when the pins *a* will be retracted and the pins *b* protruded, so that the sheet will be taken by the latter pins and transferred onto the second impression-cylinder, thus bringing the side of the sheet already printed next to the second impression-cylinder and the unprinted side in position to be printed by the form 5 upon the second form-cylinder. The sheet will be carried around upon the second impression-cylinder until the pins *b c* come together, when the pins *b* will be retracted and the pins *c* protruded, so as to take the sheet and transfer it onto the cylinder C, from which cylinder it will be stripped by the tapes *d* and pass into the control of the tapes *d e*. After one sheet has been thus severed from the web H and accelerated, the end of the web will continue to advance between the tapes 7 until it passes into the bite of the pulleys 8, when a second sheet will be severed from the web in the same manner, and at the time this takes place the pins *a* will have again arrived in position to take this second sheet, and so the

operation will be repeated. Owing to this acceleration of the sheets severed from the web H, each sheet will, as it passes forward between the tapes *d e*, be separated from the following sheet by a space equal to the length of a sheet, as shown in Fig. 2. As the first sheet arrives at the roll 21, it will be directed around that roll by a switch 28, and its leading end will arrive at the cylinder 24, in position to be taken by the pins *k* and carried around upon that cylinder imposed upon the leading end of the web K, which latter web has, by reason of being transferred laterally, been brought into position directly above the path of the sheets severed from the web H. The leading end of the web K and the sheet severed from the web H will be carried around upon the cylinder 24 until the blade carried by the cylinder 25, coacting with the groove of the cylinder 24, severs the web K, just in advance of the pins *k*, leaving the freshly-severed end of the web K impaled upon the pins and imposed upon the sheet severed from the web H, the half-sheet being inset between the full sheet and the end of the web, as indicated in Fig. 6. The two sheets and the leading end of the web thus collected will be carried around upon the cylinder 24 until the pins *k l* come together, when the pins *k* will be retracted and the pins *l* protruded, so as to take the two sheets and the end of the web and transfer them onto the cylinder 20, where they will be carried around upon said cylinder until stripped from the pins by the tapes *f*, when they will pass into the control of the tapes *d f*. When the cutting-blade upon the cylinder 25 again comes into operative position, the second sheet will be severed from the web K, leaving the freshly-severed end of the web impaled upon the pins *k*, and the operation will be repeated.

The collected sheets after leaving the cylinder 20 will pass forward between the tapes *d f* and be delivered into the control of the tapes *g h*, by which they will be conveyed to a longitudinal folder or other folding mechanism and be folded, so as to produce the ten-page product illustrated in Fig. 8, the half or supplement sheet of this product being inset between the main or full sheets.

If it should not be desired to have the half sheets severed from the web H inset between the full sheets severed from the web K, the switch 28 may be shifted, as shown in Fig. 2<sup>a</sup>, so that the half sheets, instead of being directed around the roll 21 to the collecting-cylinder, will be directed forward beneath the roll 21, and be associated with the full sheets as the latter pass into the control of the tapes *d f*.

To produce a product consisting of two full sheets, or what will usually be an eight-page paper—such as shown in Fig. 9—the operation will be exactly the same as just described, except that the web H will be omitted, and in such case the pins *a b c*, the cut-

ting-cylinders A B, and accelerated tapes 7 may be rendered idle; or, instead of operating in this manner, the plates 1 2 may be omitted and the plates 6 supplied and the web K moved laterally, so as to pass to the printing-cylinders, in position to be perfected by the plates 3 4 5 6. In such case the pins *a b c* would be rendered idle, and the web, instead of being led upward around the roll 9 and forward above the roll 26 and around the turning-bars, would be led directly forward between the tapes *d e* and around the roll 21 to the cylinder 24.

To produce a product consisting of one full sheet, or what will usually be a four-page paper—such as shown in Fig. 7—the operation will be exactly the same as described in connection with the eight-page product, except that the pins *k l* will be made to operate at each revolution of the cylinders 24 20, so that the sheets severed from the web K, instead of being collected, will pass forward singly between the tapes *d f*. In this case of course the plates upon the form-cylinders will be duplicated, so that two papers will be printed at each revolution of the cylinders.

To produce a product consisting of one full sheet and one half sheet, or what will usually be a six-page paper—such as shown in Fig. 12—the form-cylinders will each be provided with six plates, the plates 1 3 5 being duplicates of 2 4 6. The pins *a b c* will be rendered inoperative, and the pins *k l* will remain the same as in producing the four-page paper. The web H will be led directly to the printing-cylinders, as indicated in Fig. 3; or, as will be preferable, a single web equal to the entire width of the machine will be employed. In either case the cutting-cylinders A B and the accelerated tapes 7 may of course be rendered idle. The web or webs, after being perfected, will pass beneath the roll 9, and if a single wide-web is used it will be acted upon at that point by a slitter 29, so as to be divided into two webs K H. The web K will be led around the turning-bars and to the cylinders 24 25, the same as first described, while the web H will pass forward between the tapes *d e* and to the cylinder 24, as shown in Fig. 3, where, owing to the transfer of the web K, it will become associated with the latter web, and the leading ends of the two webs will be taken by the pins *k* and carried around upon the cylinder 24 until the pins *k l* come together, when the pins *l* will take the leading ends of the webs and transfer them to the cylinder 20, from which they will be taken by the tapes *f* and carried forward between the tapes *d f*, superimposed as shown in Fig. 10.

When the cutting-blade of the cylinder 25 comes into position to coact with the groove of the cylinder 24, the two webs will be severed, leaving the freshly-severed ends of the webs impaled upon the pins *k*. The sheets thus severed from the webs will be delivered

by the tapes *d f* to the tapes *g h*, and the full sheet will be folded, thus producing the product shown in Fig. 12.

To produce a product consisting of two full sheets and two half sheets, or what will usually be a twelve-page paper, the operation will be exactly the same as last described, except that the twelve plates upon the form-cylinders will each contain different matter, and the pins *k l* will be operated to collect sheets upon the cylinder 24 the same as in producing the eight and ten page products. The result of this will be that the sheets severed from the webs will pass forward between the tapes *d f* superimposed, as shown in Fig. 11, and the product when folded will be of the form shown in Fig. 13.

The organization of the machine which has been described may be varied considerably without departing from the essential features of the invention. In some cases it may be preferred that the web or webs should be led to the printing mechanism so that the lower form and impression cylinders will act first upon the web. If this should be desired, it can readily be accomplished by organizing the machine as shown in Figs. 14 to 18. This organization is substantially the same as that already described, but it is varied in some few particulars. In this case the under set of the accelerated tapes 7 extend across the entire width of the machine, while the upper set occupy only one-third the width of the machine, as in the organization first described. The web K is led around the roll 8 at the side of the tapes 7, and is carried forward by the under set of the tapes 7 to the first impression-cylinder, the under set of the tapes thus affording a means of carrying the web which aids in threading the machine. The web H, after passing between the cutting-cylinders A B, passes between the tapes to the first impression-cylinder, the same as first described. The tapes *d* in this case terminate at and return around the roll 13, which is located adjacent to the collecting-cylinder 24. The tapes *e* are arranged substantially the same as in the organization first described. The web K, instead of leaving the last impression-cylinder at the cylinder C, is led from the cylinder around a roll 30 and thence around guide-rolls 31 32 to the turning-bars, where it is transferred laterally, as shown in Fig. 17, and thence passes to the rolls 27, the same as in the organization first described. The cylinder 20 is in this case omitted, and the collecting-cylinder 24 is provided with a set of lifting-fingers *p*, which are constructed and operated similar to those described in my prior Letters Patent, No. 276,672, to direct the sheets off the cylinder into the control of two sets of tapes *m n*, which pass, respectively, around pulleys 33 34, adjacent to the cylinder, and return around the pulleys 16 12, and operate to convey the sheets from the collecting-cylinder to the tapes *g h*. In this case

the pins *k* may also be arranged as shown in the Letters Patent just referred to.

The operation of the machine thus organized in producing a ten-page product is the same as in the organization first described, except that the associated sheets, instead of being taken by the pins *l* of the cylinder 20 and delivered to the tapes *d f* to be conveyed to the tapes *g h*, are directed off the cylinder 24 by the fingers *p* into the control of the tapes *m n*.

In producing the eight-page product, the web H and the plates 6 may be omitted and the web K led through the machine in exactly the same way as in producing the ten-page product, just described; or the plates 1 2 may be omitted and the plates 6 supplied and the web K moved laterally, so as to be in position to be perfected by the plates 3 4 5 6. The pins *a b c* being in this case idle, the web K may be led either around the cylinder C and between the tapes *d e* to the cutting and collecting cylinders 24 25, or it may be led from the roll 30 around the roll 35, and thence above the turning-bars to the rolls 27 and to the cutting and collecting cylinders, the collecting-cylinder being in either case operated the same as in producing the ten-page product.

To produce the four-page product, the web K may be led in either of the ways just described, the fingers *p* upon the collecting-cylinder being operated so as to direct each sheet separately off of the cylinder and into the control of the tapes *m n*.

To produce the six-page product, the plates will be arranged and the web or webs led to the printing mechanism, the same as in the organization first described. After being perfected, the web or webs will be led around the rolls 30 31 32, and if a single wide web be used it will be split by the slitter 29 as it passes the roll 32. From the roll 32 the web K will pass around the roll 35 to the rolls 27, while the web H will pass around the turning-bars 50, so as to be transferred laterally into position beneath the web K, as shown in Fig. 18, and will then pass to the rolls 27, associated with the web K. From the rolls 27 the associated webs will pass to the cutting and collecting cylinders and be severed into sheets and delivered to the tapes *m n*, the fingers of the cylinder 24 being in this case operated at each revolution of the cylinder.

To produce the twelve-page product, the operation will be the same as in producing the six-page product, except that the plates upon the printing-cylinders will not be duplicated and the fingers of the collecting-cylinder will be operated only at each alternate revolution of the cylinder, so that two pairs of sheets will be collected before they are directed off the cylinder.

The organization shown in Fig. 19 is substantially the same as that last described, except that in this case the tapes *d e* and the

cylinder 25 are omitted and the collecting-cylinder 24 is located adjacent to the cylinder C. The cylinder C is provided with a cutting-groove located just in advance of the pins *c*, and the collecting-cylinder 24 is provided with a coacting-blade located just in advance of the pins *k*. The cylinder 24 is also provided in this case with a coacting-cylinder 20, similar to the cylinder 20 in the organization first described, having a set of pins *l*, which act to take the sheets from the collecting-cylinder at the proper times and deliver them to the tapes *m n*, the former of which, in this case, pass around the cylinder 20, to be conveyed to the tapes *g h*, and thence to the delivery mechanism proper.

The operation of mechanism thus organized in producing the various products is exactly the same as described in connection with Figs. 14 to 18, except that the web or webs after leaving the roll 27 instead of passing to the collecting-cylinder 24 pass to the cylinder C, and thence between the cylinders C and 24, where it or they is or are severed into sheets. The operation of the cylinders 24 and 20 in collecting and disposing of the sheets and in disposing of the sheets without their being collected is exactly the same as in the organization first described.

In the organization shown in Fig. 20 the cylinder C is omitted and the collecting-cylinder 24 is located adjacent to the impression-cylinder, and in about the position occupied by the cylinder C in the organization shown in Fig. 19. The collecting-cylinder in this case is equipped the same as in Figs. 1 to 4, and is provided with the co-operating cutting and delivery cylinders 25 20, the latter having pins *l*, the same as in said figures. In this case, also, the turning-bars 50 instead of being arranged horizontally, as in Fig. 19, are arranged vertically. The operation of this organization is exactly the same as that shown in Fig. 19, except that the web or webs is or are cut into sheets as it or they pass between the cylinders 24 25, the same as in the organization first described.

If it should be desired to unite the sheets forming the product, the machine may be provided with suitable pasting apparatus, as *s t*, (see Fig. 2,) which will be operated in the usual manner to apply lines of paste to the web K and the web H or the sheets severed from that web.

What I claim is—

1. The combination, with a form-cylinder, of a co-operating impression-cylinder provided with sheet-retaining devices extending a portion of its length, whereby a web may be printed by one end of said cylinders and sheets by the other, substantially as described.

2. The combination, with a form-cylinder, of a co-operating impression-cylinder provided with sheet-retaining devices extending a portion of its length, means for presenting two

webs to said cylinders side by side, and a cutting mechanism for dividing one of said webs into sheets before it is printed, substantially as described.

3. The combination, with a form-cylinder, of a co-operating impression-cylinder provided with sheet-retaining devices extending a portion of its length, means for presenting two webs to said cylinders side by side at different speeds, and a cutting mechanism for dividing one of said webs into sheets before it is printed, substantially as described.

4. The combination, with the form-cylinders F, of the impression-cylinders I, provided with coacting sheet-retaining devices *a b*, extending a portion of the length of the cylinders, means for presenting two webs to said cylinders side by side and at different speeds, a cutting mechanism for dividing one of said webs into sheets before it is printed, and a cylinder having sheet-retaining devices for taking the sheets from the last impression-cylinder, substantially as described.

5. The combination, with the form-cylinders F and the impression-cylinders I, provided with sheet-retaining devices *a b*, of means for presenting a web and sheets side by side to said cylinders, and web-turning mechanism for transferring the web laterally, after being printed, into position to be associated with the sheets, substantially as described.

6. The combination, with the form-cylinders F and the impression-cylinders I, provided with sheet-retaining devices *a b*, of means for presenting a web and sheets side by side to said cylinders, web-turning mechanism for transferring the web laterally, after being printed, into position to be associated with the sheets, and a web-cutting and sheet-collecting mechanism, substantially as described.

7. The combination, with the form-cylinders F and the impression-cylinders I, provided with sheet-retaining devices *a b*, of means for presenting a web and sheets side by side to said cylinders, tapes for conveying the sheets from the last impression-cylinder, and web-turning mechanism for transferring the web laterally into position to be associated with the sheets, substantially as described.

8. The combination, with the form-cylinders F and the impression-cylinders I, provided with sheet-retaining devices *a b*, of means for presenting a web and sheets side by side to said cylinders, tapes for conveying the sheets from the last impression-cylinder, web-turning mechanism for transferring the web laterally into position to be associated with the sheets, and a web-cutting and sheet-collecting mechanism, substantially as described.

9. The combination, with a web-cutting and sheet-collecting mechanism for operating upon a main web, and tapes for conveying



the collected sheets from the collecting mechanism, of tapes for conveying supplement-sheets to said collecting mechanism to be associated with the main sheets, and a switch  
5 for directing the supplement-sheets either to the collecting mechanism or to the tapes leading therefrom, substantially as described.

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

LUTHER C. CROWELL.

Witnesses:

J. A. HOVEY,

J. J. KENNEDY.