(No Model.) 8 Sheets—Sheet 1.

L. C. CROWELL.

DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 383,799. Patented May 29, 1888.

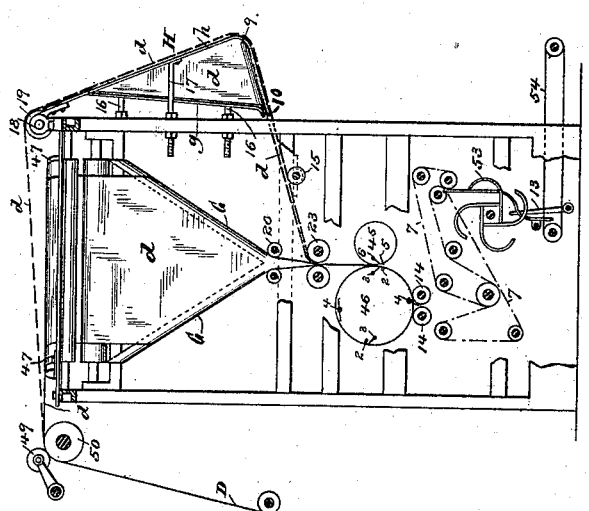
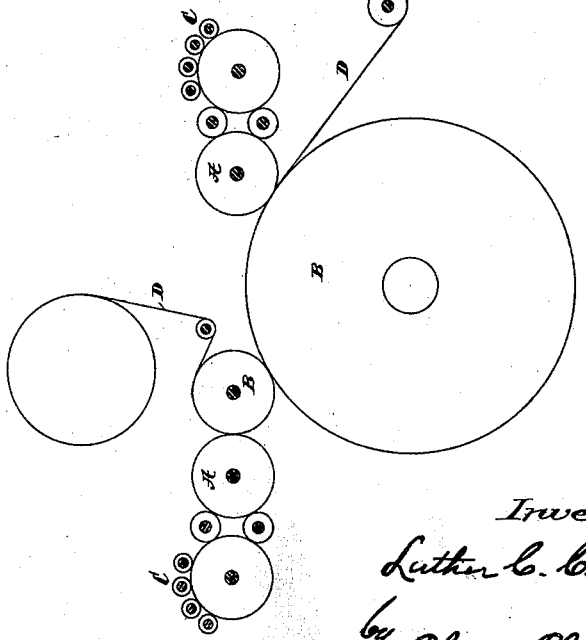


Fig. 1.



Attest:
Geo. H. Bates
F. M. Bond.

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by Philipp Philips & Hoory.
Attys.

(No Model.)

8 Sheets—Sheet 2.

L. C. CROWELL.

DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 383,799. Patented May 29, 1888.

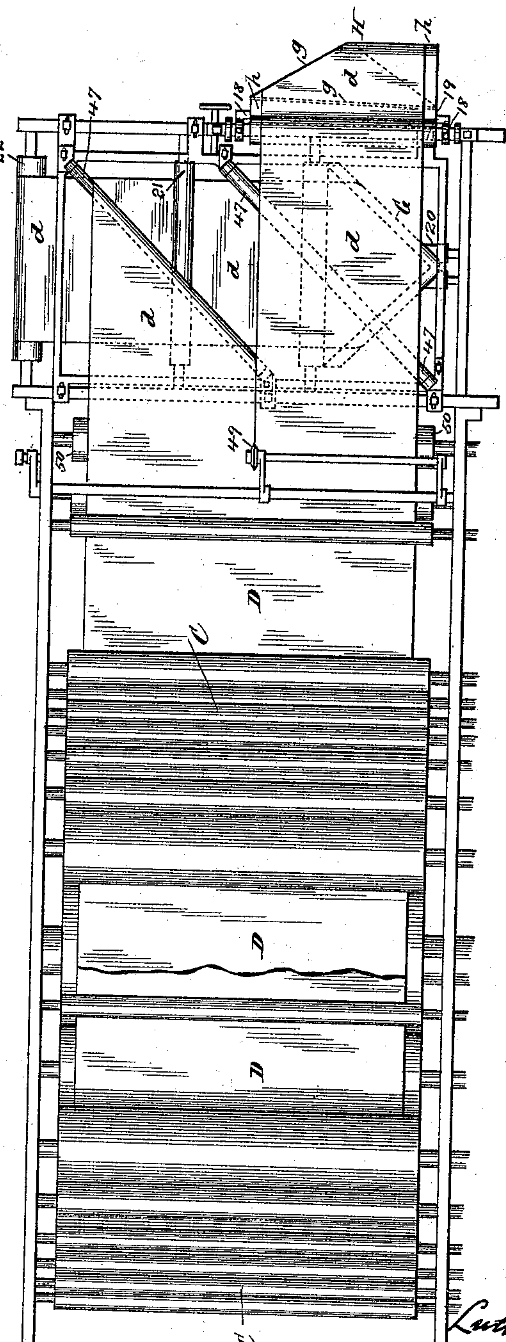

Fig. 2.

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(No Model.) 8 Sheets—Sheet 3.

L. C. CROWELL.

DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 383,799. Patented May 29, 1888.

Fig. 9.

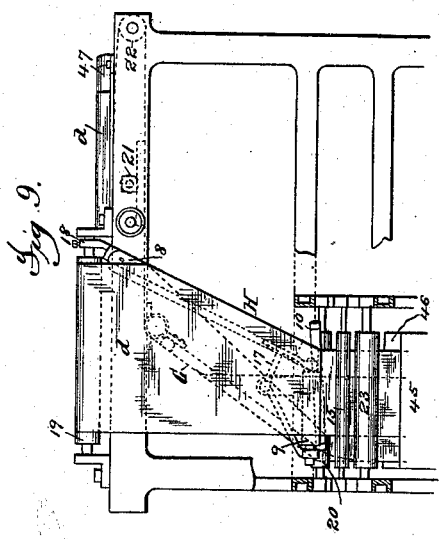
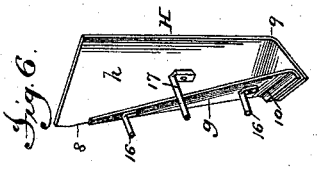


Fig. 6.



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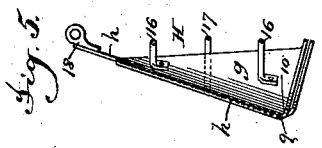


Fig. 4.

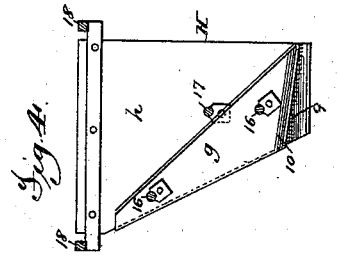
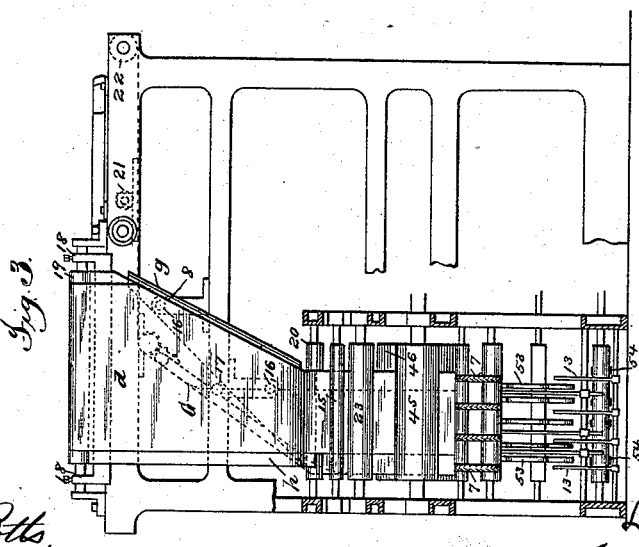


Fig. 3.



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(No Model.) 8 Sheets—Sheet 4.

L. C. CROWELL.

DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 383,799. Patented May 29, 1888.

Fig. 8.

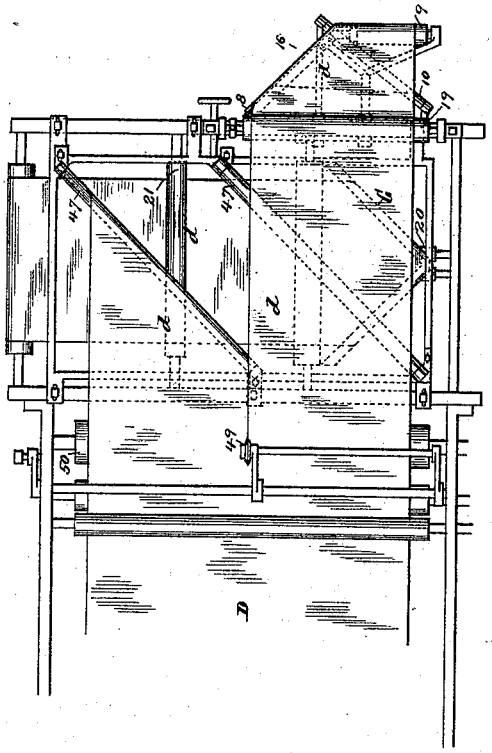
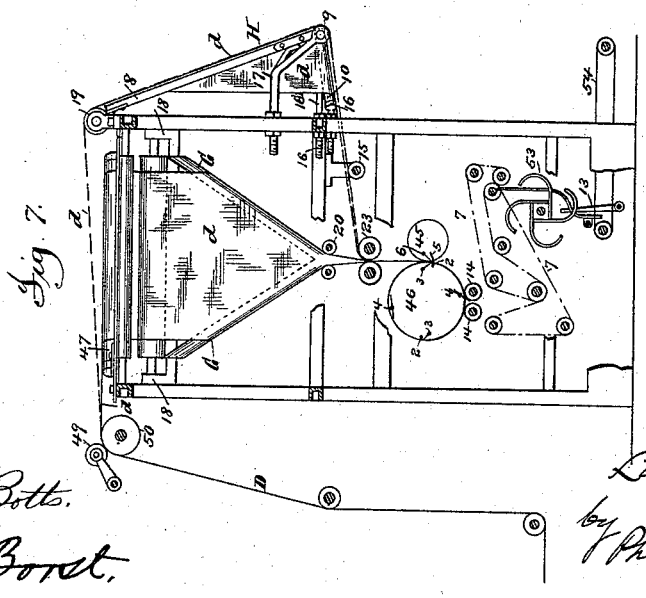


Fig. 7.



Attest:
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(No Model.) 8 Sheets—Sheet 5.

L. C. CROWELL.

DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 383,799. Patented May 29, 1888.

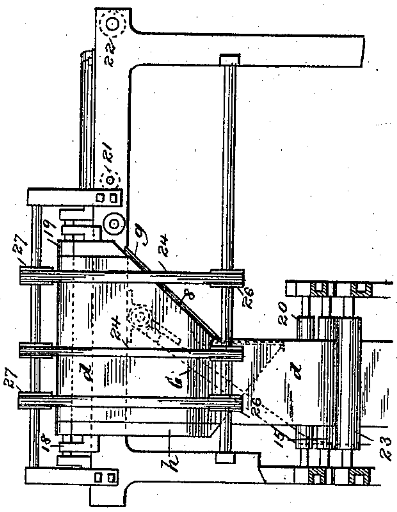

Fig. 12.

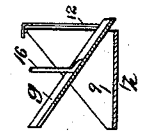

Fig. 15.

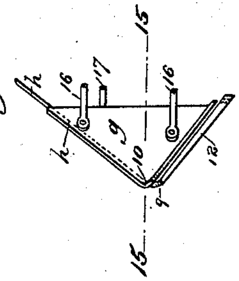

Fig. 14.

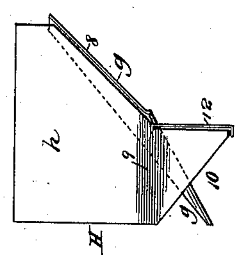

Fig. 13.

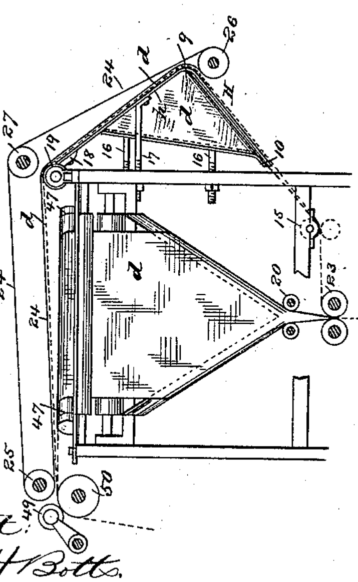

Fig. 10.

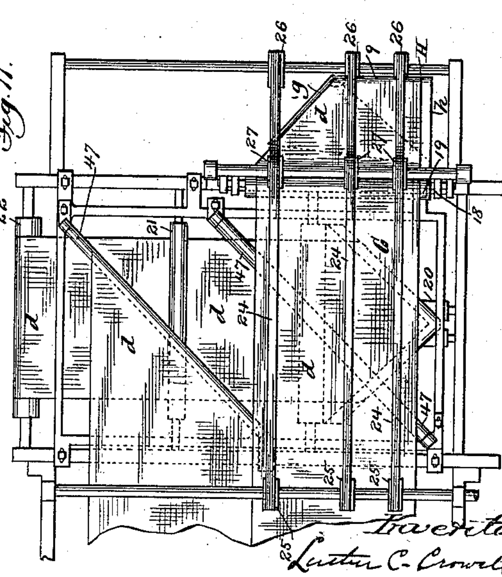

Fig. 11.

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(No Model.) 8 Sheets—Sheet 6.

L. C. CROWELL.

DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 383,799. Patented May 29, 1888.

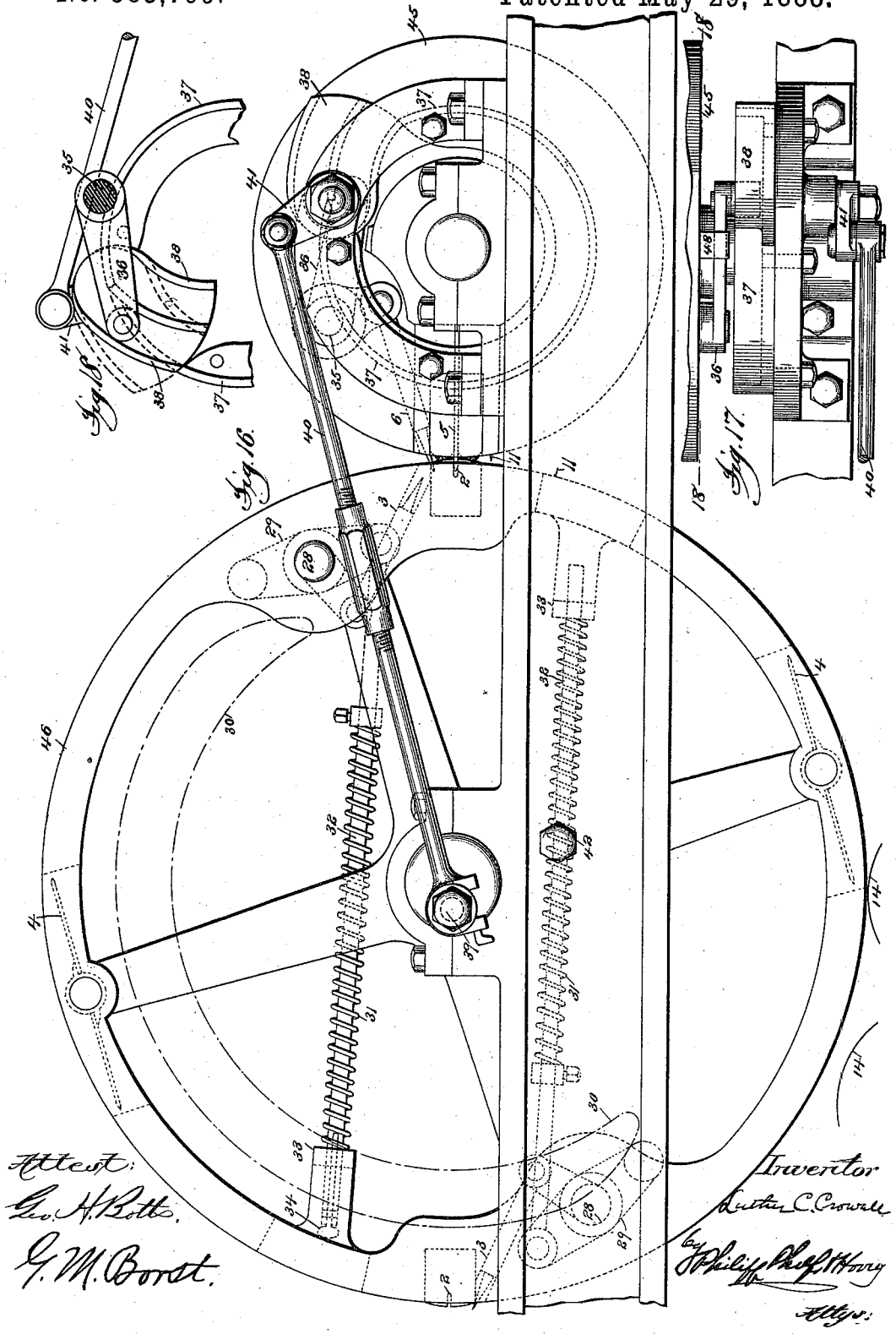

Fig. 16.

Fig. 18.

Fig. 17.

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(No Model.) 8 Sheets—Sheet 7.

L. C. CROWELL.

DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 383,799. Patented May 29, 1888.

Fig. 24.

Fig. 25.

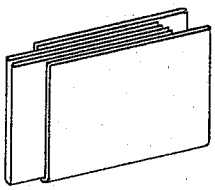


Fig. 26.

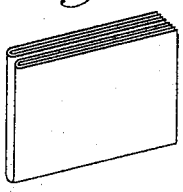


Fig. 19.

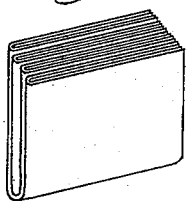


Fig. 20.

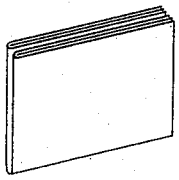
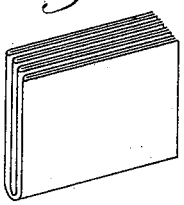


Fig. 21.



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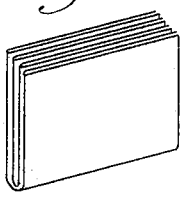

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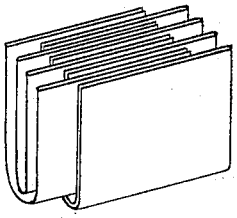

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(No Model.) 8 Sheets—Sheet 8.

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DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 383,799. Patented May 29, 1888.

Fig. 27.

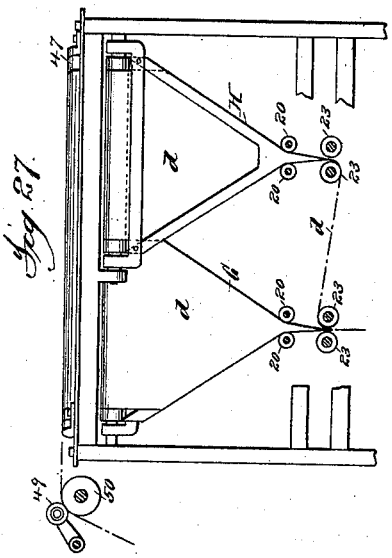


Fig. 29.

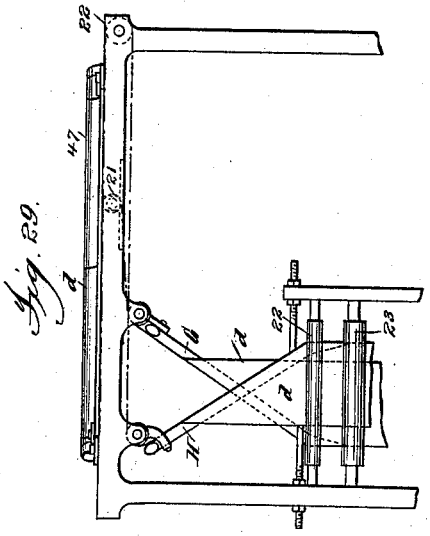


Fig. 18a.

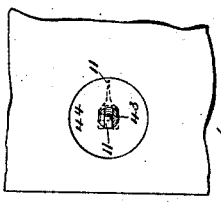


Fig. 18b.

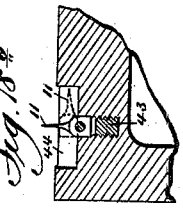
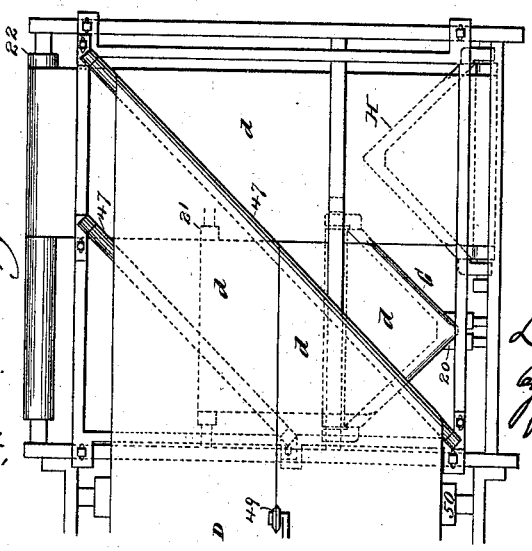


Fig. 28.



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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, ALL OF NEW YORK, N. Y.

DELIVERY MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 383,799, dated May 29, 1888.

Application filed November 9, 1887. Serial No. 254,669. (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 Mechanism for Printing-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to a delivery mechanism which is especially designed to be used in connection with a web-printing mechanism which prints upon a plurality of webs or upon a wide web which is split longitudinally into a plurality of narrower webs after being printed, it being the object of the invention to produce a simplified form of delivery apparatus by which a plurality of webs thus printed can be delivered in products of various sizes or volumes—as, for example, in products composed of one, two, or four sheets.

To this end the invention consists, principally, in a novel arrangement of a plurality of longitudinal folders with relation to the other parts of the mechanism whereby the full capacity of the printing mechanism can be utilized in producing single-sheet products without duplicating the entire delivery mechanism.

The invention also embraces certain other novel features and combinations of parts, all of which will be hereinafter fully explained, and particularly pointed out in the claims.

As a full understanding of the invention can best be given by an illustration and a detailed description of an organized delivery mechanism embodying the same, all preliminary description will be omitted and a full description given, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation (parts of the framework being broken away) of a delivery mechanism embodying the invention, showing also a diagram of the principal parts of the printing mechanism. In this, as also in the remaining views of the drawings, the gearing and many of the minor details of the mechanism are omitted, as such parts can readily be supplied by any ordinarily-skillful mechanic, and if shown would only tend to create confusion. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation, partly in section, looking from the left of Figs. 1 and 2. Fig. 4 is an inside view of one of the longitudinal folders. Fig. 5 is an edge view of the same, looking from the left of Fig. 4. Fig. 6 is a perspective view of the same. Figs. 7, 8, and 9 are views similar to Figs. 1, 2, and 3, illustrating a modified construction of one of the longitudinal folders, which will be hereinafter referred to. Figs. 10, 11, and 12 are also similar views illustrating another change or modification. Fig. 13 is a front or outside view of the folder detached. Fig. 14 is an edge view looking from the right of Fig. 13. Fig. 15 is a horizontal section taken on the line 15 of Fig. 14. Fig. 16 is an enlarged end view of the cutting, folding, and associating cylinders. Fig. 17 is a partial plan view of the same. Fig. 18 is a section taken on the line 18 of Fig. 17, showing the parts in a different position. Figs. 18^a and 18^b show a detail which will be hereinafter explained. Figs. 19 to 26 are views showing the different-sized products. Figs. 27, 28, and 29 are views similar to Figs. 7, 8, and 9, illustrating an organization in which two folders of the same form are used.

Referring to said drawings, it is to be understood that the printing mechanism is of substantially the ordinary form, consisting of form-cylinders A, impression-cylinders B, and inking mechanisms, (represented by the rolls and cylinders C,) all of which are arranged in the usual manner and are of sufficient length to capacitate the machine to operate upon a double-width web.

The web D is led from a roll, and after passing between the first form and impression cylinders to be printed upon one side is led between the second form and impression cylinders to be printed upon its other side, and then passes over a roll, 50, where it is operated upon by a slitter, 49, and split into two longitudinal sections or narrow webs, *d*, which narrow webs are then led to the delivery mechanism.

The delivery mechanism, as herein illustrated, consists of a web-turning or turning and associating mechanism of ordinary form, composed of two web-turners, 47, two longitudinal folders, G H, a transverse cutting, folding, and associating mechanism composed of two cylinders, 45 46, and a sheet-piling mechanism composed of a rotary S-shaped

fly, 53, and a series of slowly-moving belts or tapes, 54.

The web-turners 47, composing the web turning and associating mechanism, are arranged obliquely across the paths of the webs *d*, so that when the two webs are led around their respective turners they will be turned at right angles to their previous course and brought one directly beneath the other. The web-turners 47 are adjustable, so that they can be shifted to secure the proper adjustment.

The folder G is of substantially the form and construction illustrated and described in United States Letters Patent No. 331,280, heretofore granted to me. It may, however, be of any other suitable form. The external turners 20, and also the fold-laying rolls 23, which co-operate with this folder, are, however, for a purpose that will presently appear, made slightly longer than in the construction shown in said Letters Patent.

The folder H is located upon the outside of the frame-work of the machine in a position substantially at the side of the folder G. This folder (see Figs. 4, 5, and 6) consists of an internal plate, *h*, arranged in a slightly-inclined position and turned inward at its lower end, so as to provide an internal guide, 9, to act upon one half the width of the web, and is cut away on one side, so as to form an oblique internal guide, 8, for the other half of the width of the web. The internal guide 9 is, as will be observed, arranged at right angles to the travel of the web. This plate *h* is supported at its base upon arms 18, which are loosely mounted upon the bushings of the shaft of a roll, 19, located at the base of the plate, and is adjustably supported at its lower end by means of a rod, 17, extending from the frame-work of the machine. Co-operating with the plate *h* is an external plate, *g*, which extends along the oblique guiding-edge 8 of the plate *h* and inward, and is formed at its lower edge to provide an external turner, 10, which acts to turn the half of the web which passes over the guiding-edge 8 inward and double it over onto the other half of the web, as indicated in Fig. 1. The plate *g* is also adjustably supported by rods 16, extending from the frame-work of the machine.

The two folders G H are positioned with relation to each other so that the two webs, after being longitudinally folded, will, as they pass between the fold-laying rolls 23, overlap with the folded edge of each projecting beyond the unfolded edge of the other. Located between the folder H and the fold-laying rolls 23 is a guide-roll, 15, over which the web folded by the folder H is led as it passes to the rolls 23.

The folder H is adjustable to enable it to properly fold webs which vary somewhat in width, to permit which the arms 18 are adjustable upon their supporting-bushings, while the openings in the frame-work which receive the rods 16 17 are elongated to permit a corresponding movement of the webs.

The cutting, folding, and associating mechanism is composed of two cylinders, 45 46, and a pair of folding-rolls, 14, which are equipped and operate upon the same general plan shown and described in my prior Letters Patent, No. 317,740. The details of the equipment of the cylinders 45 46 are, however, somewhat different from what is shown in said Letters Patent, and will be described.

The cylinder 46 (see Fig. 16) is of a circumference equal to the length of two of the sheets to be produced, and is provided at opposite points with two cutting-grooves, 2, and at the proper points between these grooves with a pair of rotary folding-blades, 4, which operate in the usual manner to fold the sheets from the cylinder into the bite of the folding-rolls 14. The cylinder 46 is also provided with two sets of sheet-holding pins, 3, which are located just in the rear of the cutting grooves 2. These pins pass through openings in the periphery of the cylinder and are pivoted upon the ends of arms extending from rock-shafts 28, journaled in the heads of the cylinder and provided with arms 29, having studs or bowls which are engaged by a stationary cam, 30, in such manner as to retract the pins at the proper times. The pins are normally held in their protruded position by means of springs 31, which act upon rods 32, which are pivoted to arms extending from the shafts 28 and pass through guides 33 upon the cylinder-head. In order to hold one set of the pins permanently retracted, which will sometimes be necessary, as will be hereinafter explained, the rod 32 of that set of pins is provided with a latch, 34, which is arranged to engage with the guide 33, so as to hold the rod and prevent the spring 31 from protruding the pins. This latch forms no part of the present invention, as it is claimed in a companion application, filed November 10, 1887, Serial No. 254,765. It is also to be remarked that any other suitable or convenient means may be employed for holding the one set of pins retracted.

The cylinder 45 is of a circumference slightly less than one-half the circumference of the cylinder 46, and is provided with a cutting-blade, 5, of the ordinary form, which is arranged to co-operate with the grooves 2 in such manner as to sever a sheet from each web at each revolution of the cylinder 45. This cylinder is also provided with one set of impaling-pins, 6, which are pivoted upon arms extending from a rock-shaft, 35, which is journaled in the heads of the cylinder and is provided with an arm, 36, having a stud or bowl which travels on a concentric guide, 37. The guide 37 is provided with a shifting cam, 38, which is arranged to direct the bowl of the arm 36 from the inside to the outside, and vice versa, of the guide and thus rock the shaft 35 and retract and protrude the pins 6 at the proper times. The movement of the arm 36 is limited in each direction by stops

48, projecting from the cylinder-head. The proper movement of the switch 38 is imparted from a crank-pin, 39, upon the shaft of the cylinder 46, which is connected by a rod, 40, with an arm, 41, extending from the pivot of the switch 38.

It will sometimes be necessary, as will be hereinafter explained, to hold the pins 6 permanently retracted. To effect this, the rod 40 will be disconnected from the crank-pin 39 and hooked onto a stationary stud, 42, provided for that purpose. When the rod 40 is thus hooked onto the stud, the switch 38 will be held in a central position, (see dotted lines in Fig. 18,) so that the bowl of the arm 36 will be prevented from passing to the inside of the guide 37, and the pins will, as a consequence, remain retracted. The delivery mechanism thus organized is capacitated by slightly different adjustments to deliver the full capacity of the printing-machine, either in the form of one, two, or four sheet products, folded once longitudinally and once transversely, or three-fourths the full capacity of the printing machine in products consisting of one full and one half-sheet or two full and two half-sheets, folded to the same dimensions.

The operation of the mechanism in delivering these different products is as follows: If it is desired to utilize the full capacity of the printing-machine in producing four-paged papers—that is to say, papers consisting of one full sheet—the folders G H will both be used, the pins 6 of the cylinder 45 will be permanently retracted, and both sets of pins of the cylinder 46 will be rendered operative. The full-width web D will be used, and, after being printed, it will be split and one of the webs *d* will be led around the inner one of the turners 47, and thence around the roll 22 to the longitudinal folder G, and thence, after being longitudinally folded, to the cylinders 45 46. The other web *d*, instead of passing around the other turner 47, will pass directly forward over the roll 19 and downward over the folder H. As the web passes over the plate *h*, the inner half the web will be acted upon by the edge 10 of the plate *g* and turned inward around the oblique guiding-edge 8, so as to be laid over onto the other half of the web, thus folding the web longitudinally. The web thus folded will then be led over the roll 15 and between the fold-laying rolls 23 to the cylinders 45 46.

It will be observed, as before stated, that the two folders G H are so positioned that the two webs as they pass between the fold-laying rolls 23 are overlapped, as indicated in Figs. 3 and 24. In this condition the two webs will pass into the bite of the cylinders 45 46, where the leading ends of the webs are taken by one set of the pins 3 and carried around upon the cylinder 46 until the folding-blade 4 arrives in proper position to fold the sheets between the rolls 14, when the pins will be retracted and the blade operated to fold the sheets between the rolls. Just previous to this the blade 5, co-operating with the groove 2, will have severed the sheets, leaving the freshly-severed ends of the webs impaled upon the other set of pins 3, and the operation will be repeated. After passing the rolls 14, the sheets will emerge in the condition shown in Fig. 25, and will then pass into the control of the tapes 7 and be conveyed to the fly 53, and by it piled upon the belts 54 in the usual manner. The mechanism may also be provided with a counting mechanism, 13, similar to that described in my prior Letters Patent, No. 331,282, which will operate to divide the sheets into lots of any desired number.

By reference to Fig. 25 it will be seen that the two products, each consisting of a single sheet, are delivered one partially within the other. If the two webs passed between the fold-laying rolls 23 and the cylinders 45 46 in such position as to be in line with each other, then the two products would when they received their transverse fold be folded wholly one within the other, and if this were the case the operation of separating the two products, which of course is necessary, would be slow and difficult; but the sheets not being wholly one within the other it becomes possible to separate them readily by simply grasping the folded edges of the two sheets and drawing them apart, and this can be done by taking the sheets in packs of twenty or more at a time. This operation of separating the sheets is also rendered much easier by reason of the fact that the sheets are overlapped at their free edges. This peculiar manner of delivering the sheets greatly simplifies the delivery mechanism, as by this means the single transverse cutting, folding, and associating mechanism by being very slightly increased in length is enabled to operate upon both webs, and thus an extra mechanism of this character is avoided.

If it is desired to utilize the full capacity of the printing machine in producing two-sheet or eight-page products, the operation may be exactly the same, except that the web *d*, which in the case just described passes over the folder H, will be led around its turning-bar 47 and thence around the roll 21, which is adjustable to secure the proper register, so as to be superimposed upon the other web, in which condition the two associated webs will pass over the folder G. The product in this case will be delivered in the form shown in Fig. 26.

When it is desired to utilize the full capacity of the printing-machine in producing products consisting of four-sheet or sixteen-page papers, the operation will be the same as in producing the two-sheet product just explained, except that the rod 40 will be hooked onto the crank-pin 39, so as to render the pins 6 of the cylinder 45 operative, and one set of the pins upon the cylinder 46 will be rendered inoperative by being held retracted, as shown in Fig. 16. As the leading ends of the associated and longitudinally-folded webs arrive at the

bite of the cylinders 45 46, the cam 38 will have been rocked to the position shown in Fig. 16, so as to direct the bowl of the arm 36 to the inside of the guide 37 and protrude the pins 6, which pins will then take the leading ends of the webs and carry them around upon the cylinder 45 until that cylinder has completed a revolution, when the webs will be severed by the blade 5, and, the cam 38 having by this time been rocked to the position shown in Fig. 18, the bowl of the arm 36 will be directed to the outside of the guide 37, so as to retract the pins 6 and release the ends of the webs. Just before or just after this takes place the operative set of the pins 3 of the cylinder 46 will take the webs and also the forward ends of the two sheets upon the cylinder 45 and carry the ends of both the webs and the sheets forward upon the cylinder 46, so that the sheets will become associated with the leading ends of the webs. When the cylinder 46 has made a half-revolution from this point, the blade will again sever the webs, the pins 6 taking the freshly-severed ends, and the pins 3 will be retracted to release the forward ends of the associated pairs of sheets, and the blade 4 will be operated to fold them transversely between the rolls 14. The product thus produced will consist of two pairs of longitudinally-folded sheets associated and folded transversely together, as indicated in Fig. 19.

To produce products consisting of one full sheet and one half-sheet, the adjustment and operation will be the same as in producing products consisting of two full sheets, except that the web D will be of three-fourths width, so that one of the webs *d* will be half-width. The webs will then be associated and folded, as indicated at Fig. 20.

To produce products consisting of two full sheets and two half-sheets—such as shown in Fig. 21—the adjustment and operation will be the same as in the case of the four sheet product, except that the web D will be of three-fourths width.

Products consisting of two full sheets may also be produced, as shown in Fig. 22, by using a web D of half-width and operating the cylinders 45 46 the same as in producing the four-sheet product, or, as shown in Fig. 23, by using a web D of full width, leading one of the webs *d* over each longitudinal folder and operating the cylinders 45 46 in the same manner.

Still other variations in the size and form of the product produced may be obtained by increasing the circumferential capacity of the printing-cylinders, and by arranging the mechanism for operating the pins and folding-blades so as to associate three or more sheets or pairs of sheets. This can readily be done by any ordinarily-skillful mechanic if any such range of capacity should be desired in any particular case.

Still greater capacity and range in the size of the product may be obtained by using a supplement-web in addition to the main web, and such supplement-web can be supplied from any supplement-printing mechanism located at the side of the delivery, or in any other convenient position. When a supplement-web of one-half the width of the main web is used, a three-sheet product can be produced by adjusting and operating the delivery mechanism the same as in producing the two-sheet product already described, or a six-sheet product may be produced by adjusting and operating the mechanism the same as in producing the four-sheet product already described.

It is of course necessary that the pins 3 should be retracted to release the leading ends of the sheets as soon as the folding-blade 4 commences to act to fold the sheets between the rolls 14. From this it results that there is a time, after the sheets have been released from the pins 3 and before they are fully nipped by the rolls 14, that they are not under positive control, and during this interval they are liable to slip backward slightly upon the cylinder 46. To avoid this, the cylinder 46 is provided with two or more stationary pins, 11, which are so positioned as to impale the margins of the sheets near their rear ends, and thus prevent the sheets from slipping backward on the cylinder when released by the pins 3. The pins 11 are preferably pivoted in the ends of studs 43, (see Figs. 18^a and 18^b,) which are screwed into the cylinder and arranged so that when not needed they can be turned down into recesses 44, formed in the cylinder. It is also found preferable in practice to provide the cylinder 45 with similar pins 11, arranged to impale the rear ends of the sheets, so as to aid in holding them snugly upon the cylinder.

The folder H may be modified considerably as to its form without departing from its essential features. For example, as shown in Figs. 7, 8, and 9, the internal member of the folder, instead of being formed of a plate, *h*, the edges of which form the internal guides, 8 9, may be formed of a bar, 8, arranged obliquely to form the internal guide 8, around which one-half of the web passes, and a bar or roll, 9, which joins with the end of the bar 8 and is arranged to form the internal guide 9, around which the other half of the web passes, this bar and roll being supported by rods 17, extending from the frame of the machine, the same as in the case of the plate. In the case shown the end of the bar 8 forms a bearing for the journal of the roll 9, and is so shaped as to correspond to the shape of the plate *h* at the corresponding point. In this case, also, the external member of the folder, instead of being a plate, the edge 10 of which forms the external turner, consists of a bar, 10, arranged obliquely across the web in the same position occupied by the edge 10 of the plate *g*. This bar is supported by rods 16, the same as in the case of the plate.

In the construction shown in Figs. 10 to 15 the internal and external members of the folder are composed of plates *h g*, the same as in the construction first described; but in this case the folder is so arranged that the angle of the web in passing over the guiding-edge 9 is considerably greater than in the first case, and this in some cases will be an advantage. In this case, also, the folded web passes beneath instead of above the roll 15. In this case, also, the plate *h* is provided with a spring, 12, which lies within the fold of the web and aids in creasing and defining the fold-line.

In some cases it will be found advantageous to provide tapes to aid in conducting the web to and over the folder H. A convenient arrangement of tapes for this purpose is also illustrated in Figs. 10 to 12. As shown in these figures, the tapes 24 for this purpose pass around pulleys 25, located above or near the roll 50, thence forward with the web over the roll 19, thence downward along the inclined face of the plate *h*, and around pulleys 26, located just below the edge 9, returning around pulleys 27. Inside tapes may also be provided, if in any case it should be desirable, but such tapes will not usually be necessary. The roll 15 may be provided with a companion roll, as indicated by dotted lines in Fig. 10, and these rolls may be driven to effect the positive feed of the web.

The forms of the folder H which have been described are regarded as the best for the purpose; but the invention is not limited to the employment of a folder of either of these constructions, as a longitudinal folder of any approved form may be employed without departing from the essential features of the invention.

Figs. 27, 28, and 29 illustrate an organization in which the folder H is of the same form as the folder G, but is arranged to point in the opposite direction. In this case one of the turning-bars 47 and the roll 22 are extended, so as to accommodate the full width of the web.

To produce the single-sheet product shown in Fig. 25, both of the webs *d* are led around the bar 47, one web then passing around roll 21 to the folder G, and the other around roll 22 to the folder H. The web which passes over the folder H is then led between the fold-laying rolls 23 of the folder G, as shown in Fig. 27. In other respects the operation is the same as already described.

The form of folder H shown in Figs. 1 to 15 is not herein claimed, as it forms the subject-matter of my prior application for Letters Patent, filed October 13, 1887, No. 252,226.

The cutting, folding, and associating cylinders 45 46, instead of being arranged parallel with the printing-cylinders, may, if preferred, be arranged at right angles to those cylinders. In such case, of course, the web turning and associating mechanism would have to be correspondingly modified.

In producing the products shown in Figs. 19, 21, and 22 it may be desired that the sheets or pairs of sheets which are associated after being folded longitudinally should be pasted together along the line of the longitudinal folds. This, if desired, can be readily done by providing a suitable pasting mechanism at any convenient point which will operate to apply a line of paste to one of the sheets or pairs of sheets adjacent to the longitudinal fold-line, so that when the two sheets or pairs of sheets are associated upon the cylinder 46 they will be united by this line of paste.

What I claim is—

1. The combination, in a delivery mechanism, of a plurality of longitudinal folders set side by side and one slightly in advance of another, so as to deliver their folded products overlapped, substantially as described.

2. The combination, with a transverse cutting mechanism, of a plurality of longitudinal folders set side by side and one slightly in advance of another, so as to deliver their folded webs to said cutting mechanism in an overlapped condition, substantially as described.

3. The combination, with a transverse folding mechanism, of a plurality of longitudinal folders set side by side and one slightly in advance of another, so as to deliver their folded products to said transverse folding mechanism in an overlapped condition, substantially as described.

4. The combination, with a transverse cutting and folding mechanism, of a plurality of longitudinal folders set side by side and one slightly in advance of another, so as to deliver their folded webs to said cutting and folding mechanism in an overlapped condition, substantially as described.

5. The combination, with a transverse cutting mechanism, of a plurality of longitudinal folders set side by side and one slightly in advance of another, so as to deliver their folded webs to said cutting mechanism in an overlapped condition, and a web-associating mechanism arranged to associate and deliver the webs to one of said longitudinal folders, substantially as described.

6. The combination, in a delivery mechanism, of a plurality of reversibly-arranged longitudinal folders set side by side and one slightly in advance of another, and so as to deliver their folded products overlapped, with their folded edges in opposite directions, substantially as described.

7. The combination, with a longitudinal folder, G, and a web-turner, of a second longitudinal folder, H, so arranged as to deliver its folded product overlapped upon the product of the first folder, said second folder consisting of an internal guide arranged at right angles to the web across its path of travel, an internal guide arranged obliquely across the path of one part of the web, and an external turner arranged to turn the web over the oblique internal guide, substantially as described.

8. The combination, with the rock-shaft 35, carrying the pins 6 and having the rock-arm 36, of the cam 38, for rocking the shaft, and the rod 40 and crank 39, for operating the cam, substantially as described.

9. The combination, with the rock-shaft 35, carrying the pins 6 and having the arm 36, of the concentric guide 37, cam 38, rod 40, and crank 39, 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,
G. M. BORST.