

(No Model.)

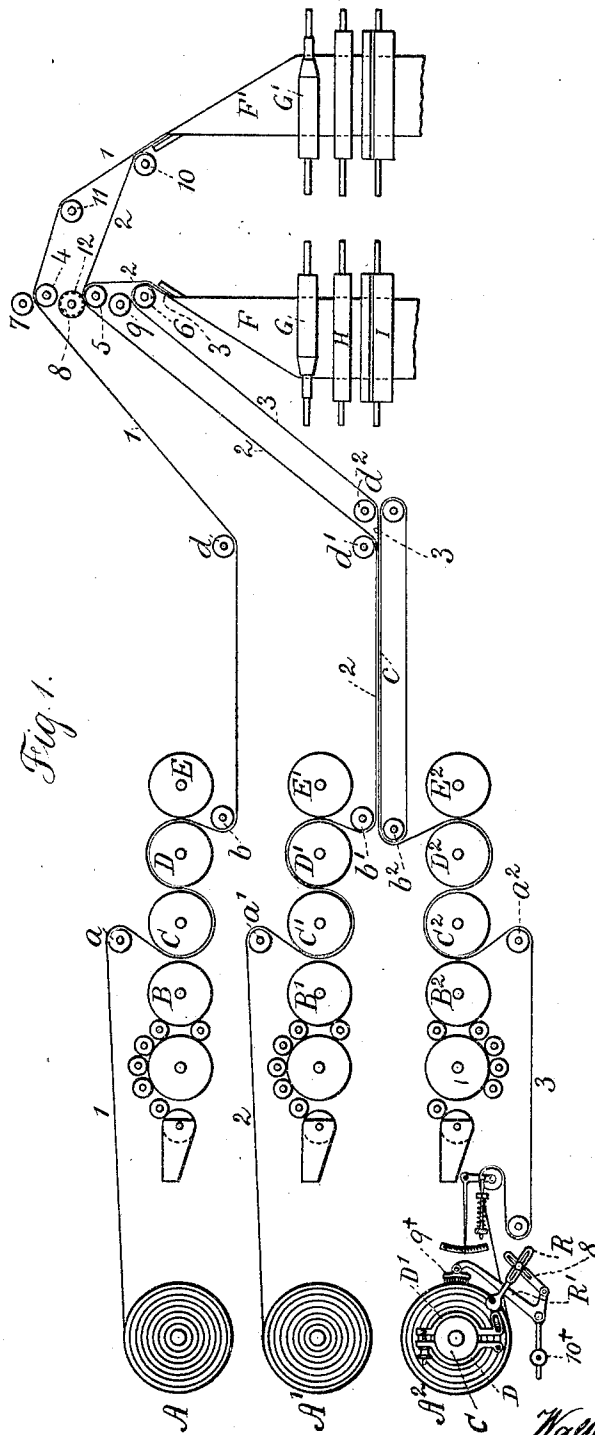
2 Sheets—Sheet 1.

W. SCOTT.

SHEET DELIVERY MECHANISM FOR PRINTING PRESSES.

No. 586,716.

Patented July 20, 1897.



Witnesses:
J. Stair
Chas. H. Smith

Inventor:
Walter Scott
per Lemuel W. Perrell

(No Model.)

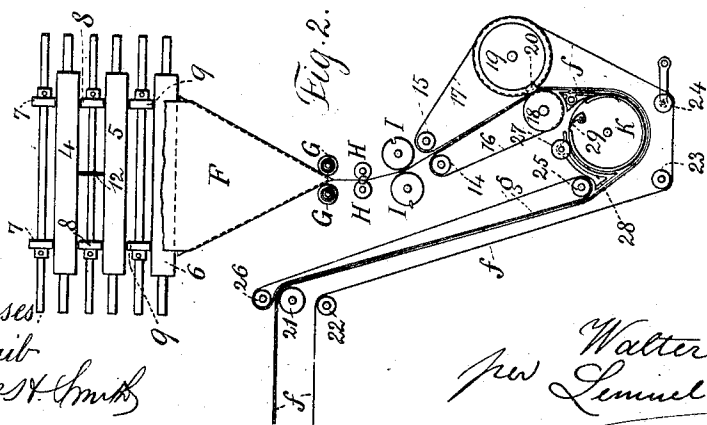
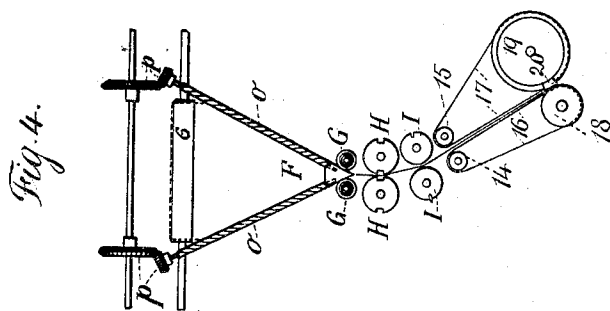
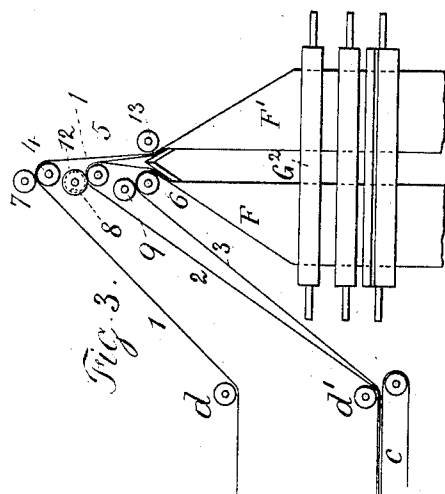
2 Sheets—Sheet 2.

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Att'y

UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF PLAINFIELD, NEW JERSEY.

SHEET-DELIVERY MECHANISM FOR PRINTING-PRESSES.

SPECIFICATION forming part of Letters Patent No. 586,716, dated July 20, 1897.

Application filed March 5, 1894. Serial No. 502,333. (No model.)

To all whom it may concern:

Be it known that I, WALTER SCOTT, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented an Improvement in Sheet-Delivery Mechanism for Printing-Presses, of which the following is a specification.

The present invention relates to that class of printing-machines in which the paper is drawn from a roll, the web passed through and printed, folded, cut, and delivered.

In printing newspapers two, three, or more webs have been made use of, and these have been run through the printing-machine containing separate presses adapted to print upon each web, as in my Patent No. 467,265, and in such press the webs have been brought together and folded longitudinally. The inclines over which the webs have been passed have in some instances stood in the same direction and in other instances in opposite directions.

In my present improvement the inclines that fold the web longitudinally are placed in the opposite directions, as this is most convenient in associating the printed webs, and I simplify the arrangement of rollers and give greater facility for directing the webs by placing the roller over which two or more of the webs pass so that the side of the roll from which the webs diverge is equidistant from the entering ends of the two folding-inclines that stand in opposite directions, and I combine with this roll a second roll immediately adjacent to the upper end of the folding-incline for guiding the paper as it passes upon such incline, thereby avoiding the necessity of guiding the advancing end of the web of paper through between two closely-adjacent rolls at the ends of the folding-inclines. I also arrange the folding-inclines in such a manner that one of the webs can be split longitudinally and one part pass upon one incline and the other part upon the other incline to be folded with the full-width webs that pass over such inclines, and I fold the webs longitudinally by the action of rolls that flatten the fold without producing creases in the same, and I have discovered that it is advantageous to apply considerable tension to the webs as they pass over the folding-inclines

and between the flattening-rolls in order to prevent the paper forming into creases or puckers, and with this object in view the webs are perforated transversely and a breaking-bar applied to pull the printed product away from the web upon the line of perforations, and the rolls which intervene between the breaking-bar and the folding-incline are made with reference to relieving the pressure upon the folded webs at the moment when the cutting or breaking operation takes place, thereby causing the pull which is applied to the sheets in breaking the folded product away from the web to act upon the web as it lies upon the folding-incline to apply sufficient tension thereto to straighten out the paper properly and reduce the risk of the formation of creases or folds to a minimum.

In the drawings, Figure 1 is a diagrammatic view illustrating the present improvement as applied to a printing-machine adapted to print from three rolls of paper. Fig. 2 is an elevation representing the cutters, the breaker-bar, and the rolls acting with the same. Fig. 3 is a modification in the arrangement of the folding devices that may be used with the present printing-machine. Fig. 4 is a diagram illustrating a modification in the drawing-rolls.

The rolls of paper are represented at A A', A², the first plate-cylinders at B B' B², the first impression-cylinders at C C' C², the second impression-cylinders at D D' D², and the second plate-cylinders at E E' E², and I remark that the inking devices for the respective plate-cylinders may be of any desired character and the devices illustrated are of ordinary construction.

In the upper press illustrated the web 1 passes over the roll *a* and down between the first plate-cylinder B and the first impression-cylinder C, beneath such impression-cylinder C, up over the second impression-cylinder D and down between the same and the second plate-cylinder E and around a guide or delivery roll *b* and beneath the roll *d* to the rolls of the folding mechanism hereinafter described.

In the middle press of the printing mechanism the web 2 from the roll A' passes over the guide-roll *a'* and between the plate-cylinder B' and first impression-cylinder C', over

the second impression-cylinder D' and down between the same and the second plate-cylinder E', below the roller b', and along beneath the roller d' and to the folder.

5 In the lower or third press of this printing-machine the web 3 passes from the roll A², beneath the roll a², up between the first plate-cylinder B³ and the first impression-cylinder C², over such impression-cylinder and down
10 below the second impression-cylinder D², and up between the same and the second plate-cylinder E², and over the roll b² and along upon tapes c to the roll d², and thence to the folding mechanism.

15 By the arrangement thus far described it will be observed that the webs 2 and 3 are brought together and supported by the tapes c, and the surface that was printed by the plate-cylinder E² rests upon the tapes c, and
20 the surfaces that have been printed by the plate-cylinders B' B² in giving the first impression are brought together, and in consequence of the distance traveled by the webs before they come together there is but little
25 risk of offset the one on the other, especially in view of the fact that such surfaces have been embossed to a slight extent by the pressure upon the opposite sides of the respective sheets by the plate-cylinders E' and E², and
30 the last impressions upon these webs 2 and 3 coming outwardly are freely exposed to the air, and hence the ink becomes sufficiently set by the time the webs reach the folding mechanism so that there is but little risk of
35 offset when the webs 1, 2, and 3 are associated together and folded longitudinally and cut transversely.

The folding-inclines F and F' are of a width adapted to receive the paper of the webs flatwise at the upper ends, and they converge to the pairs of folding-rolls G G', so as to fold the webs longitudinally as they are passed down over such folding-inclines, and the rolls 4, 5, and 6 are immediately over one another and parallel with the top edge of the folding-incline F, and the rolls 7, 8, and 9 act to grip the respective webs to such rolls 4, 5, and 6, and it is preferable that the rolls 7, 8, and 9 only act upon the margins of the paper, so as
50 not to press upon the printed portions thereof.

It will be apparent that when the webs 1, 2, and 3 are all brought together and folded upon the incline F the surface of the web 1 which is uppermost in passing to the roll 4 is brought
55 into contact with the surface of the incline F, and the three webs are folded together and pass through between the pair of rollers G to the perforators hereinafter described; but if the printed products are to be separated the web 2 is divided longitudinally by a slitter 12
60 upon the shaft of the margin-rolls 8, and one half of the web 2 passes over to the folding-incline F' with the web 1, and the other half of the web 2 passes to the folding-incline F
65 with the web 3, and in both instances the half-web comes next to the folding-incline, and hence is carried through by the full-width

web, and when the printed webs are thus disposed the half-web 2 passes over a roll 10 at the upper end of the folding-incline F', and the full-width web passes over the same roll 10, but it is advantageous to employ an adjusting-roll 11, which may be raised or lowered to bring the whole and the half web into proper register.

75 In some kinds of printing it is desirable to fold one web longitudinally on the incline F' and to fold two webs longitudinally on the incline F, but by the arrangement before described two webs can be folded on the incline F' and one on the incline F, or the web 2 can be slit longitudinally, and the products passing over the folding-inclines F and F' will occupy exactly the same relation to each other, because the incline F' stands in the reverse
85 direction to the incline F, and the pages will come in the proper relation to each other upon the respective inclines and in the folded products without making any change in the disposition of the forms upon the respective plate-cylinders, because the web 3 is printed by the plate-cylinder B² on the opposite side thereof from the impression given by the plate-cylinder B upon the web 1, and these surfaces of the respective webs come into contact with the folding-inclines F and F', respectively, and the surfaces of these webs that are printed by the plate-cylinders E and E² come uppermost upon such inclines, and the half-web 2, (when said web is slit longitudinally,) that comes upon the folding-incline F', is beneath the same pages that the other half of the web is beneath upon the incline F, it being understood that for two similar products the same matter is to be printed upon
105 the webs 1 and 3 and printed in duplicate upon the web 2.

It is advantageous to separate the folding devices, as represented in Fig. 1; but if the folding-inclines are brought closely together, as represented in Fig. 3, the sheets will be associated in exactly the same manner as before described and will be passed off between the pair of long folding-rolls G² in substantially the same manner as they will be between the pairs of shorter folding-rolls G and G'. In this case it is only necessary to employ a guide-roll 13 over the folding-incline F' instead of using the rolls 10 and 11.

120 In both of the arrangements represented the sides of the rolls 5 and 4 over which the webs pass are in line with the upper end of the folding-incline F, and hence the webs passing to that folding-incline F from one or both rolls are free and unobstructed, so as to be easily guided by the pressman; and when the rollers are arranged as shown in Fig. 3 the upper ends of the inclines F and F' are equidistant from the point of contact of the webs with the roll 5, so that the webs can be carried from that roll to either of the inclines without changing the adjustment and without obstruction due to numerous guiding-rolls that have heretofore been necessary, and

in this Fig. 3 the web 2 is represented as slit longitudinally and one half passed to the incline F and the other half to the incline F', and the web 1 is shown as passing over the roll 4 and the web 3 as passing over the roll 6, but two or all of the webs can be passed over the roll 4 or 5 and be led to the folding-inclines F and F', or either of them, as the register of the webs will not be disturbed by changing from one incline to the other, because the contact of the web with the roll is directly over the apex of the inclines.

The devices hereinafter described are substantially the same when used with short rolls and with separate folding devices, one for each folder F F', as they will be when made longer, so as to correspond in length with the roll G², to act upon the two longitudinally-folded webs or products; but, as before intimated, it is advantageous to make use of separate folders and the rolls and cutters associated therewith, so as to more readily adjust the folding and cutting devices in bringing them to the proper register. This arrangement, as represented in Fig. 1, allows for the folders to be run entirely separate. Hence they only require adjustment to act in harmony with the webs as they reach such folding devices instead of having to adjust the webs to bring them to the proper position for being simultaneously folded by one folding mechanism, as in Fig. 3. In Fig. 2 I have represented the rolls and devices that act with the folding-incline F, such devices being duplicated to act with the folding-incline F' or made longer, so as to act upon both folded webs.

The rolls of the pair of rolls G, located at the apex of the folding-incline F, are made conical adjacent to the fold in the web, so that pressure is not applied by such rolls G directly to the fold; but the fold is free to draw over the point of the incline F, which point is preferably slightly below the plane passing through the axes of the rolls G, and it is advantageous to keep these rolls G at a slight distance apart, so as not to apply pressure to the paper as it passes through between them, but the rolls H are set sufficiently close together to act as drawing-rolls in pulling the paper of the web along over the incline F and passing the same down to the perforating-cylinders I, which latter perforating-cylinders are of usual character, one having a blade of points and the other a groove into which such points pass, thereby making a line of perforations transversely of the printed and folded webs, and after the webs have been thus folded and perforated they pass between the rolls 15 and 14, over which pass the tapes or belts 16 and 17, the tapes 16 passing around a roll 18 and the tapes 17 passing around a roll 19, having a breaker-bar 20, which breaker-bar may be constructed and operate substantially the same as that represented in Letters Patent No. 484,251, granted to me October 11, 1892.

The rolls H are grooved longitudinally and geared together in such a manner that the longitudinal grooves coincide for a greater or less portion of the revolution of the rolls. Hence when these longitudinal grooves coincide the tension upon the paper is momentarily relieved and the cutting-cylinders do not grip the paper. Neither do the rolls G nor the rolls 14 and 15, and the parts are so proportioned that at the moment the breaker-bar 20 grips the paper against the roller 18 with an accelerated movement, so as to break the sheets away from the web upon the line of the transverse perforations, the longitudinal grooves in the rolls H coincide, so that the tension, which is considerable, that is applied by the breaker-bar to the folded sheets in breaking them away from the web applies a pull to the webs as they lie upon the folding-incline, and hence the webs are exposed to a tension that extends back to the upper ends of the folding-inclines, and the webs are drawn out straight and any wrinkles are removed or any tendency to pucker or run untrue compensated, and the webs are made to register by the tension drawing out any slackness in either web.

By this improvement a great benefit is obtained in insuring the proper movement of the webs through the press, because the pull acts upon every folded product as separated and effectually rectifies any tendency to irregularity in the movement and the paper is not thereby injured, because it possesses more or less elasticity, and any frictional detention that may arise at one part or upon one web is compensated so as to maintain the register of the respective pages as they are brought together in folding and cutting the webs.

If it is desired, larger rolls H may be made use of, each having two grooves, so as to relieve the grip upon the folded webs twice in each revolution, as illustrated by the diagram, Fig. 4, instead of once each revolution, as represented in Fig. 2.

The webs folded longitudinally, associated together as before indicated, and perforated and separated as described may be delivered in any desired manner. I have represented an imposing-cylinder K, with belts *f* passing around the same and around the roll 19 and over the rolls 21 22 and beneath the rolls 23 and 24, the latter of which is preferably a tightener, and the belts *g* pass around the rolls 25 and 26, and there is a binding-roll 27, acting in connection with guides 28 to keep the associated sheets together as they may be held by the grippers 29 upon the imposing-cylinder K, so as to bring two or more printed products together before delivering them at the roll 25 and between the belts *f* and *g*, by which they are conveyed to any suitable folding mechanism, but this part of the apparatus may be dispensed with and the longitudinally-folded webs pass from the breaker-cylinder 19 to any suitable folder.

In Fig. 4 I have represented rolls *o* at the

edges of the folding-incline F, which rolls *o* are driven by gearing *p* at a surface speed slightly faster than the speed of the web of paper passing over such folding-incline F. These rolls aid in applying a slight tension to the web of paper as it passes over such folding-incline, and it is advantageous to apply in the surfaces of each roll a helical groove similar to a screw-thread to spread the paper and prevent the formation of wrinkles in the paper as it passes over the incline, and these rolls are also advantageous because they lessen the tendency to blur or rub the ink in passing around the edges of the folding-incline, because the surface speed of such rolls approximates the surface speed of the paper itself.

It is generally advantageous to relieve the gripping action of the drawing-rolls H twice for each rotation of the perforating-cylinders, in order that the gripping action may be released at the time the perforators pass into the paper, and hence said perforators will apply a tension to the paper when the paper is free to be acted upon as it passes over the folding-incline, as well as when the breaker-bar 20 acts upon the folded web or product to pull the same away from the advancing end of the web at the perforations. Thereby there are two forces applied to the web of paper of each product that is delivered.

If one web is under greater tension than the adjoining web, the sheet is separated from said web first by the action of the breaker-bar, and instantly thereafter the separation takes place at the line of perforations in the web which is slacker. Thereby the slack web is the last one pulled up, which takes place during the time that the tighter web has the opportunity to slightly contract, and in this manner the constant equalization is going on once for each product delivered as the same is broken away from the web, and this is in addition to the pull before mentioned which results from the action of the perforators at the time when the drawing-rolls H cease their hold upon the folded webs.

I remark that the pulling action of the drawing-rolls H may be relieved or lessened, for the purposes aforesaid, by flattening one or both rolls or by grooving them, as aforesaid, or by automatically lessening the force by which they are pressed toward each other in any suitable manner.

In printing-machines of the character hereinbefore described I have found difficulty in regulating the tension applied to the web as it is passed through the printing-press, because as the web lessens in diameter as the web is pulled off the leverage of the web against the friction detaining device applied to the roll lessens. I therefore apply to the web an automatic tension-regulator for lessening the tension according to the diameter of the roll, and with this object in view the clamps D D' are applied to the friction-wheel C, that is upon a shaft or arbor passing through

and connected with the paper-roll A, and there is a lever R, provided with a cam, that acts against one end of the clamping-segment D', the other end of such clamping-segment D' being connected by an adjusting-screw with the clamping-segment D, which latter is attached at its lower end by a stud to the frame of the printing-press, and the lever R' has a block 9^x at its outer end, which rests against the surface of the paper of the roll A², and there is a spring or weight 10^x for turning the lever R' and pressing the block 9^x toward the roll, and the rod 8 connects the lever R' to the lever R, and this rod is adjustable by a slot in the lever R, so as to vary the action of the levers R and R' in applying greater or less pressure from the cam to the clamping-segment D', and the pressure and friction are relieved or lessened automatically as the roll of paper becomes smaller as the web is drawn off.

It will be apparent that the rolls H may be adjusted so that the grooves coincide accurately, and hence the pull will be relieved only during the time that the grooves coincide, but if one groove is slightly in advance of the other the time during which the hold will be relieved is increased, and only one roll may be grooved instead of both, and a flat surface on the roll will answer the same purpose as a groove and be the equivalent of the same.

In cases where I have before employed rolls and a folding-incline, the apex of which is below a plane passing through the axes of such rolls, the ends of the rolls have been behind or back of the folding-incline.

In the present device the ends of the rolls G at the sides of the apex of the incline are conical, as aforesaid, and I find that the conical surfaces keep the fold toward the apex of the incline in such a manner as to insure a perfect longitudinal fold without the risk of tearing the paper or forming creases or wrinkles, and this result appears to be effected in consequence of the conical ends of the rolls coinciding with the shape that the paper web assumes as it is being drawn along over the apex of the incline.

In printing-presses such as shown in my Patent No. 558,424, where the guide-rolls have straight ends or are turned down to a smaller diameter, as represented in Fig. 6 of said patent, and when the web is running tight or with a normal tension, the point of the longitudinal folder within the fold of the paper keeps such paper in its proper condition for the fold to be made in line with the said point by the drawing-rolls, but should the web become loose the apex of the folding-incline does not fully distend the fold in the paper and it is liable to run through with false folds or creases, resulting from the looseness of the paper or from coming into contact with the angular portion of the roll, but where the ends of the roll are made conical, as in the present improvements, the paper is kept in

the form of a narrow loop, which is by the rolls pressed toward the place where the single fold is ultimately given in the paper by the drawing-roll, thus avoiding the false folds or creases which have sometimes been made, in the manner before indicated.

I claim as my invention—

1. The combination in a printing-machine, of two presses for printing upon separate webs and forwarding such webs in one general direction and in a flat condition, a roll over which such webs pass, two folding-inclines having converging edges and standing in opposite directions, a roll adjacent to the receiving end of each incline between which rolls and the inclines the webs of paper pass, the side of the roll from which the webs diverge in passing to the inclines being over and equidistant from the entrance ends of such inclines, so that the webs of paper can be passed in either direction without throwing the printed matter out of register, substantially as set forth.

2. The combination in a printing-machine, of two presses for printing upon separate webs and forwarding such webs in one general direction and in a flat condition, a roll over which such webs pass, two folding-inclines having converging edges and standing in opposite directions, a roll adjacent to the receiving end of each incline between which rolls and the inclines the webs of paper pass, the side of the roll from which the webs diverge in passing to the inclines being over and equidistant from the entrance ends of such inclines, so that the webs of paper can be passed in either direction without throwing the printed matter out of register, guide and drawing rolls for drawing the folded webs over both inclines, and cutters or perforators acting simultaneously on both folded webs, substantially as set forth.

3. The combination in a sheet-delivery mechanism, of a folding-incline, revolving perforating-cutters, forwarding rolls between the folding-incline and the perforating-cutters, one of such forwarding-rolls having a longitudinal depression for liberating the pull upon the folded web periodically, and a breaker-bar acting to pull the perforated sheets or product from the web when the forwarding-rolls cease their hold upon the same for applying a tension to the web upon the longitudinal incline for straightening such web and maintaining uniformity in the delivery of the product, substantially as set forth.

4. The combination with a folding-incline for folding a web of paper longitudinally, of rolls adjacent to the apex of the folding-incline, such rollers being cylindrical, except at the end portion closely adjacent to the apex of the incline where such rolls are conical for guiding the paper near the fold, and forwarding-rolls for applying tension to the web of paper after the same has passed the folding-incline and its rollers, substantially as set forth.

5. The combination with a folding-incline, of rollers at the edges of the incline, and gearing for driving the same at the surface speed or nearly so of the paper, forwarding-rolls for acting upon the web after the same has been folded, and perforating-rolls for perforating the web transversely, substantially as set forth.

6. The combination in a sheet-delivery mechanism, of a folder for folding the web of paper longitudinally, forwarding-rolls with a longitudinal depression for releasing the grip upon the folded web periodically, mechanism for perforating the web transversely, and a breaker-bar acting to apply tension to separate the sheet or sheets at the line of perforations from the web and to apply a tension upon the web as it passes over the longitudinal folding mechanism, substantially as set forth.

7. The combination in a sheet-delivery mechanism, of a folder for folding the web of paper longitudinally, forwarding-rolls with a longitudinal depression for releasing the grip upon the folded web periodically, mechanism for perforating the web transversely, a breaker-bar acting to apply tension to separate the sheet or sheets at the line of perforations from the web and to apply a tension upon the web as it passes over the longitudinal folding mechanism, rollers and belts or tapes for conveying the perforated web from the perforator to the breaker-bar, substantially as set forth.

8. The combination with the folding-incline over which the paper passes and is folded longitudinally, of a perforating device and drawing-rolls acting intermittently upon the web to apply tension to the same and to liberate or lessen the hold of such drawing-rolls upon the web while the perforating devices are acting upon the web to apply tension to the same, substantially as set forth.

9. The combination with the folding-incline, of drawing-rolls acting intermittently upon the folded web of paper, a perforating device and a breaker-bar acting to separate the product from the web at the time the drawing-rolls cease to act upon the web, substantially as set forth.

10. The combination in a folding and sheet-delivery mechanism, of an incline over which the web is folded longitudinally, perforating mechanism and a breaker-bar, drawing-rolls between the folding-incline and the perforating mechanism, such drawing-rolls acting automatically and intermittently to liberate their hold upon the folded web during the perforating operation and during the breaking operation, substantially as set forth.

11. The combination with the axis for the web or roll of paper, of a friction-wheel and friction mechanism acting upon the wheel, the lever R' and block resting upon the surface of the roll of paper, a cam for acting upon the friction-clamp, and a connection therefrom to the lever R', whereby the friction

tion applied to detain the web as drawn from the roll is automatically regulated according to the size of the roll of paper, substantially as set forth.

- 5 12. The combination with the folding-incline and the roll over which the web of paper passes to such incline, of converging rolls at the edges of the incline, bevel-gearing and a shaft by which such rolls receive a rapid
10 rotary movement as the paper passes around such rolls and is folded, substantially as set forth.

13. The combination with the folding-in-

cline over which the web is folded longitudinally, of two rolls for acting on the folded web, such rollers having conical ends that are closely adjacent to and support the paper as it passes from the apex of the folding-incline, substantially as specified.

Signed by me this 26th day of February, 20 1894.

WALTER SCOTT.

Witnesses:

GEO. T. PINCKNEY,
A. M. OLIVER.