4 Sheets—Sheet 1.

L. C. CROWELL.

Printing-Machine.

No. 212,444. **Patented Feb. 18, 1879.**

Fig. 1.

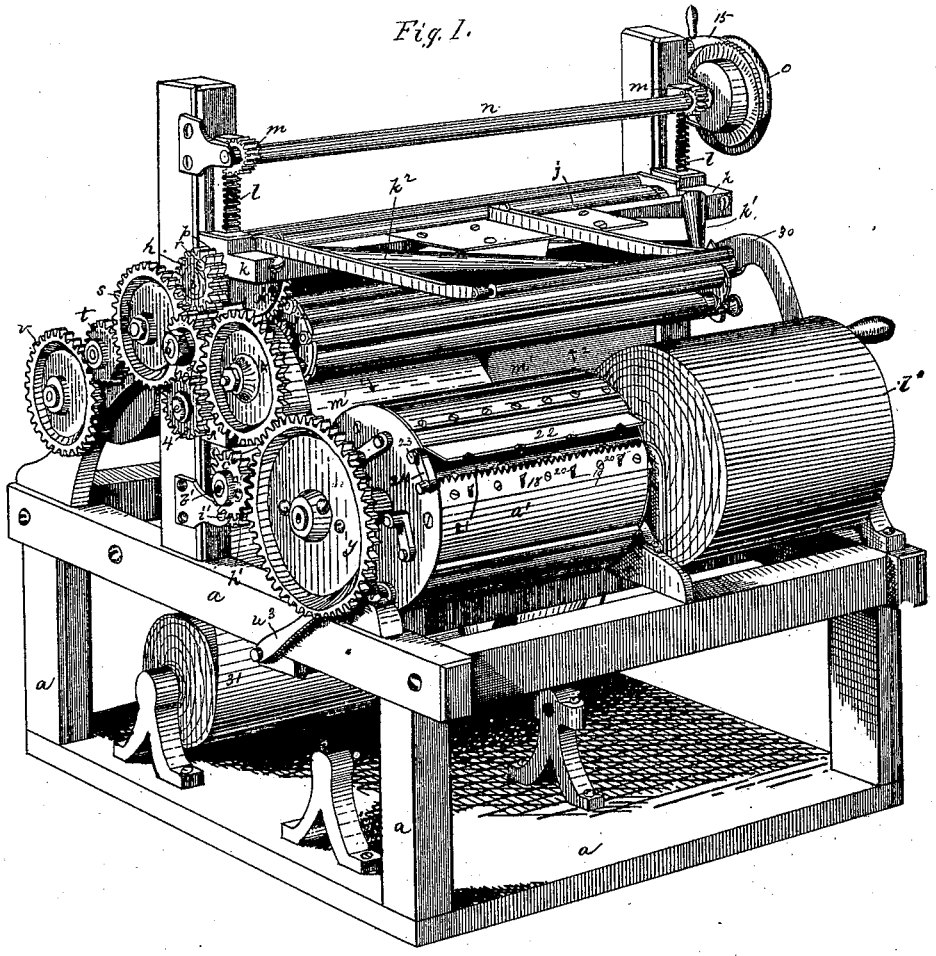


Fig. 7.

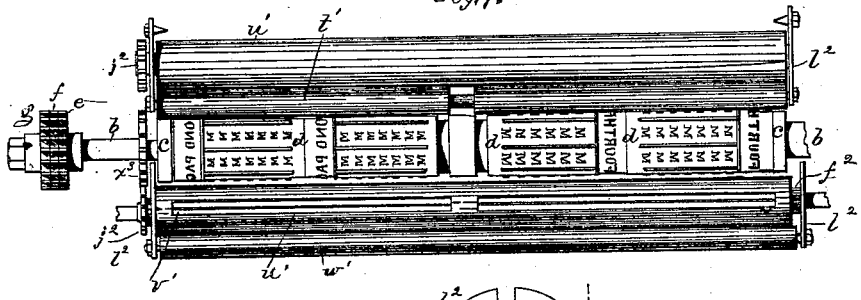
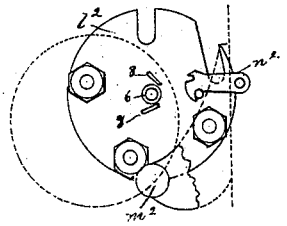


Fig. 12.



Witnesses.
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C. C. Perkins.

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Luther C. Crowell
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L. C. CROWELL.

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Fig. 2.

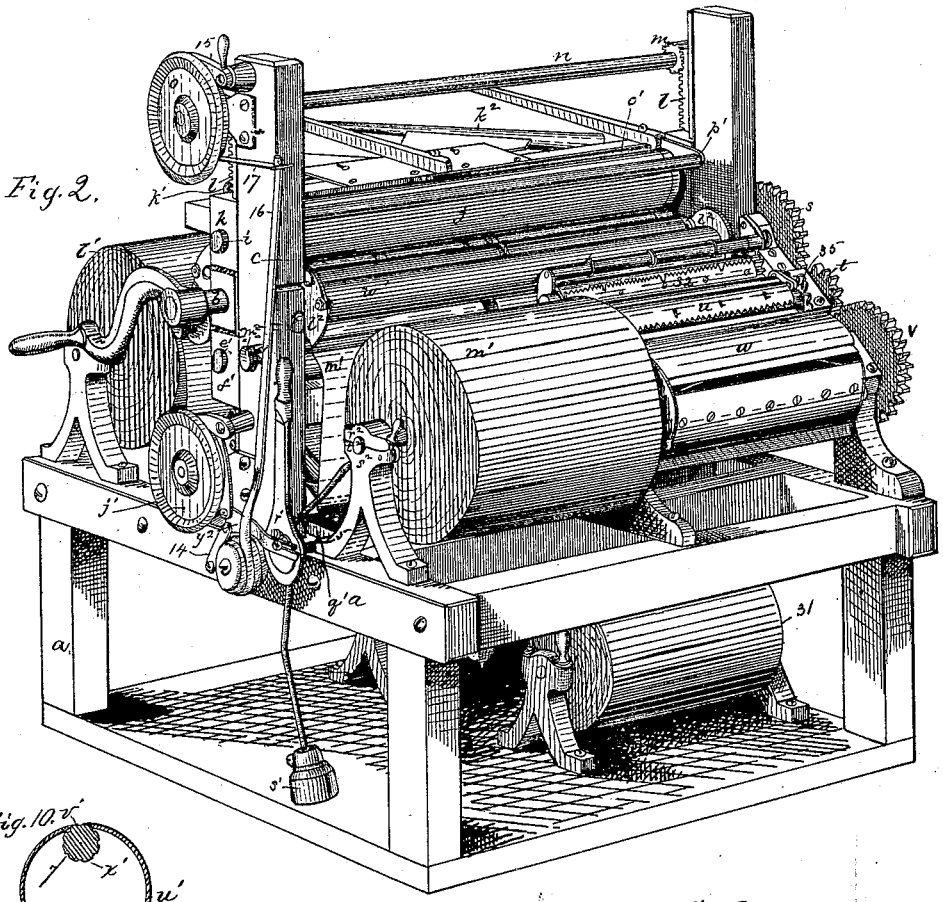


Fig. 10.

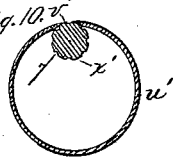


Fig. 9.

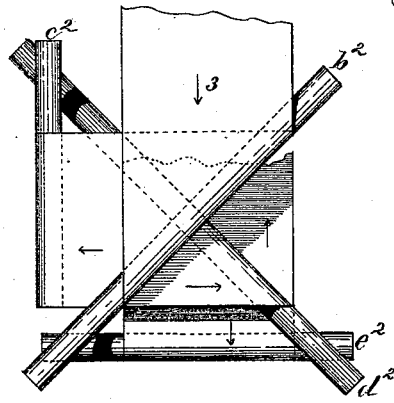


Fig. 8.

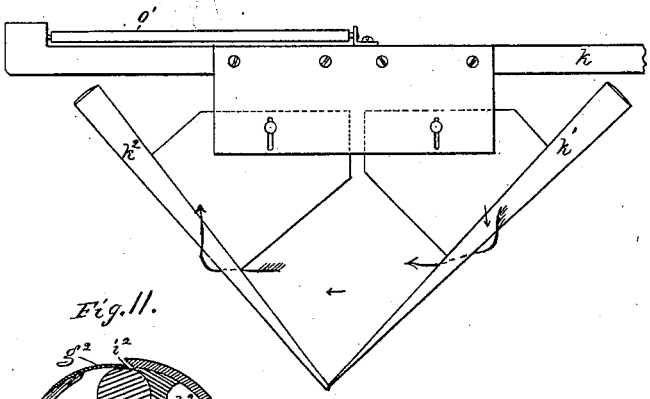
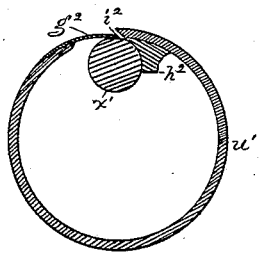


Fig. 11.



Witnesses.

W. J. Pratt.

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4 Sheets—Sheet 3.

L. C. CROWELL.

Printing-Machine.

No. 212,444. Patented Feb. 18, 1879.

Fig. 3.

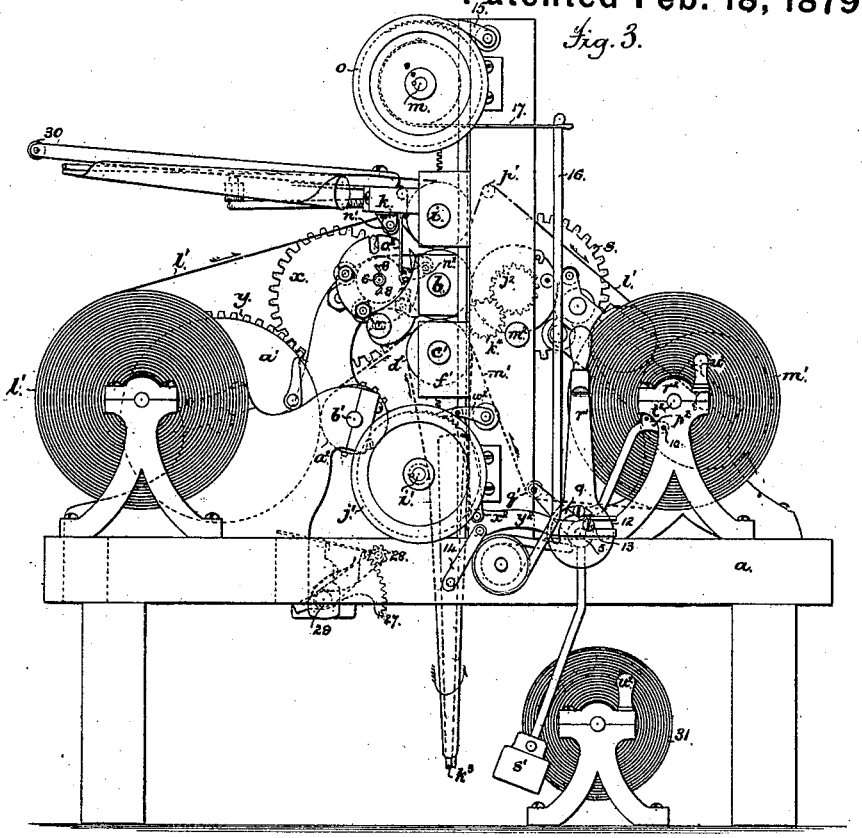


Fig. 5.

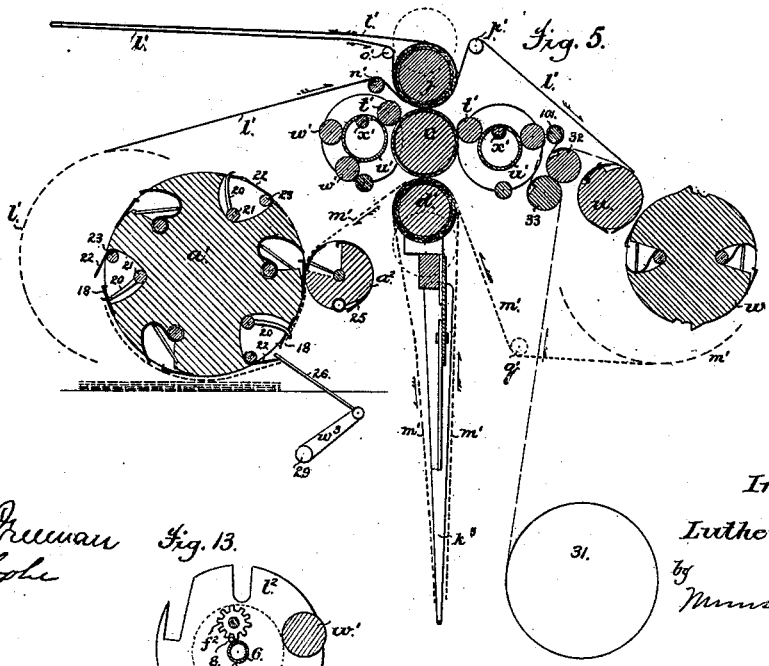
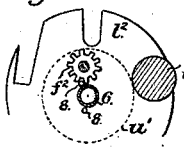


Fig. 13.



Attest,

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Attorneys.

4 Sheets—Sheet 4.

L. C. CROWELL.
Printing-Machine.

No. 212,444. **Patented Feb. 18, 1879.**

Fig. 4.

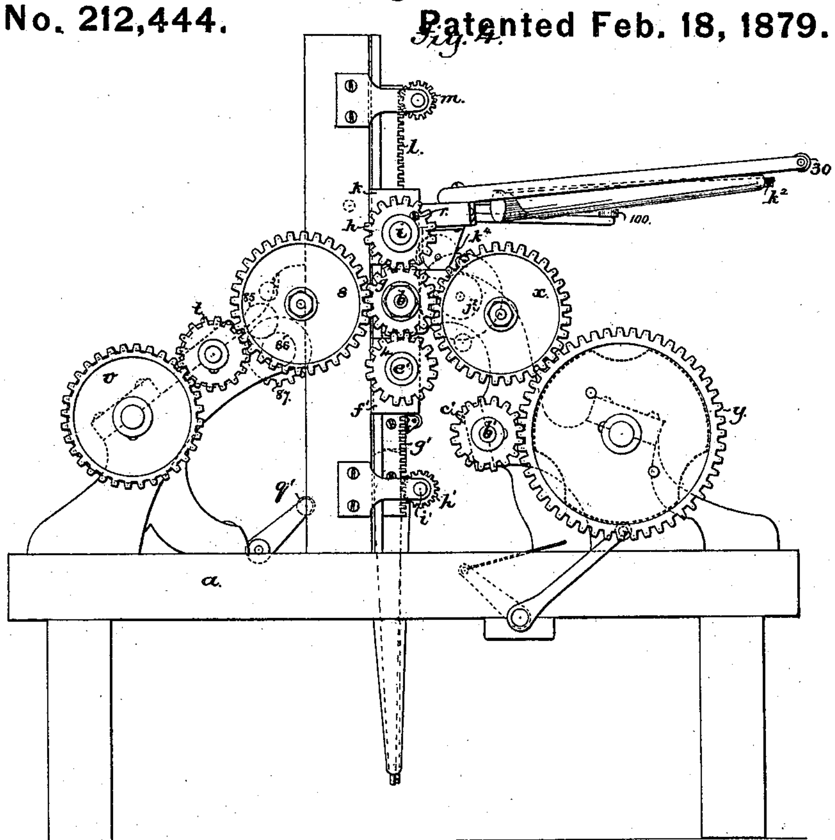
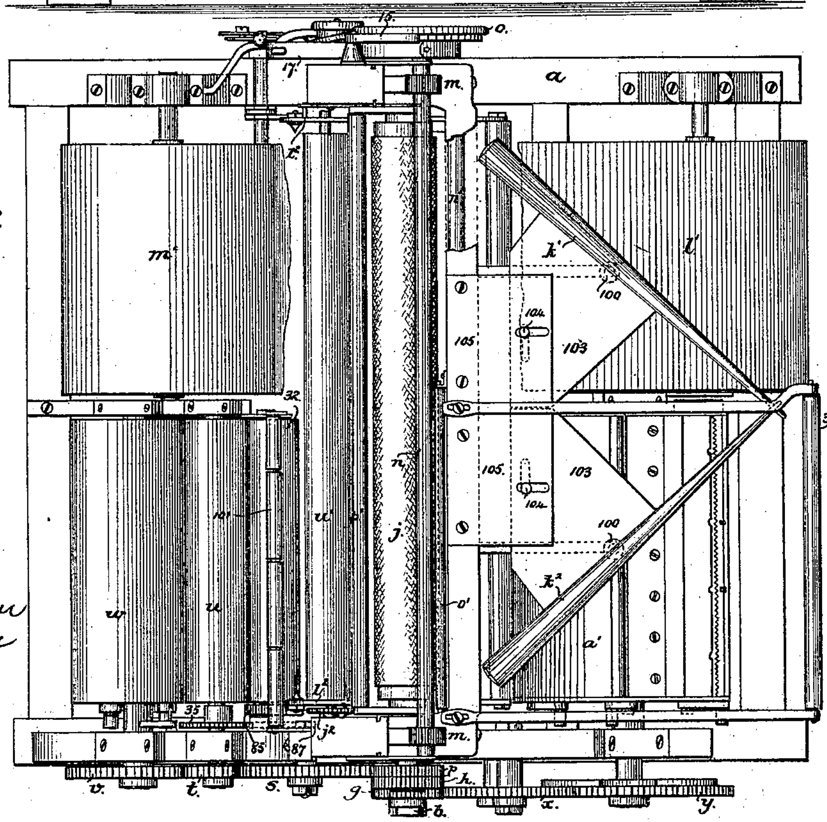


Fig. 6.



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L. W. Cobb

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N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO R. HOE & CO., OF NEW YORK CITY.

IMPROVEMENT IN PRINTING-MACHINES.

Specification forming part of Letters Patent No. **212,444**, dated February 18, 1879; application filed May 9, 1877.

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Printing-Machines, of which the following is a specification:

This invention relates to improvements in web-printing machines, and has reference to such a construction of a machine that a web of paper may be printed upon one side in said printing-machine, and then be immediately turned by a web-turner, so as to be printed upon its other side in the same printing-machine, this preferably being done while the paper is yet in web form.

In the embodiment of my invention herein illustrated the stereotype or other type used to print the web is placed upon a long type-cylinder, so that after the web is printed upon one side at one end of such type-cylinder it may be turned and moved laterally for at least its width, and be printed upon its other side at another portion of such type-cylinder.

To print a web upon both sides but one impression-cylinder is needed.

After the web has been printed upon both sides it may be led to a folding and delivering mechanism, in order that the newspaper or other product may be cut from the web and be delivered either folded or flat.

Two or more webs controlled by independent web-turners may be led to and be printed by means of one long type-cylinder, one impression-cylinder being employed for each web.

If desired, however, the web-turner may be so shaped that it will turn the web after it has been printed upon one side, and redeliver it to a portion of the cylinder in the same plane in which it was first printed—that is, without transferring said paper laterally.

In such an arrangement, however, the forms for the pages would be so imposed upon the cylinder that the single web meeting it at two places would so print both sides of the web that when severed into sheets and folded the pages would fall in proper order.

In this second plan the type-cylinder used would be of such diameter as to adapt it to support type.

In connection with this printing-machine I employ devices to automatically remove the impression-cylinder for each web away from the type-cylinder whenever a web breaks. I have also adapted a supplement cutting and feeding mechanism to operate in connection with a rotary delivery, so as to deliver a supplement in contact with the main web, in order that the supplement may be folded with the paper to accompany it. This supplement may be a quarter, half, or whole sheet.

I have also produced a novel device for delivering the ink to the form-rollers. It is composed of a cylinder, within which the ink is placed, and through the periphery of which it is delivered at intervals in regulated quantities.

Figure 1 represents, in perspective, a printing-press provided with my improvements, the press being viewed from its front end. Fig. 2 is a similar view as seen from the back of the press. Fig. 3 is a right-hand side elevation. Fig. 4 is a left-hand side elevation. Fig. 5 is a sectional elevation taken through the right-hand end of Fig. 2. Fig. 6 is a plan view. Fig. 7 is a plan view of the type-cylinder and inking apparatus. Fig. 8 is a plan view of one form of web-turner, the arrows showing the direction of movement of the web. Fig. 9 is a plan view of a modified form of web-turner to reverse the web without transferring it laterally, the arrows showing the direction of movement of the web. Fig. 10 is an enlarged section of the ink-delivering cylinder. Fig. 11 is a modification thereof. Fig. 12 is an enlarged view of the end of the inking apparatus, showing it in its two positions. Fig. 13 is an inside face view of one of the brackets supporting the inking mechanism, illustrating the mode of moving the inking-roller.

The frame *a* of the machine may be of suitable shape to properly sustain the working parts.

In this instance of my invention the main driven shaft *b* of the machine serves as the axis of the type-cylinder *c*, the latter being shown as a long cylinder provided with two or more annular series of curved stereotype-plates, *d*, Fig. 7, attached in any usual way,

and positioned according to the number of pages to be printed.

The type-beds may be held by spring-clamps, such as I am about to show and describe in another application for Letters Patent.

The type-cylinder *c* (shown in Fig. 7) has one end adapted to print one side of the web, while the other end is adapted to print the opposite side of the same web.

The shaft *b* is shown as supplied at one end with three pinions, *e f g*, Figs. 1 and 7, of equal size and having a like number of teeth.

The pinions *e* and *g* are loose upon the shaft *b*, and the pinion *f* is fixed thereto. The latter pinion engages a pinion, *h*, fast on the shaft *i* of the impression-cylinder *j*, which latter extends the whole length of the type-cylinder *c*, and is provided in any usual way with a blanket or yielding surface. This shaft *i*, supporting the impression-cylinder, is hung in bearings fixed to a sliding frame, *k*, provided with racks *l*, adapted to be raised and lowered by means of pinions *m* on a shaft, *n*, having a pulley, *o*, which may be moved by hand to raise or lower the impression-cylinder, and thus adjust its relation to the type-cylinder and consequent pressure thereon, or to retain it out of operative position therewith, or it may be automatically rotated to lift the impression-cylinder to stop the delivery of a broken web, as will be hereinafter described. At one side of this pinion *h* is placed loosely on the shaft *i* a pinion, *p*, which latter pinion is adapted to be coupled to the pinion *h* by means of a screw or equivalent, *r*, so that the two pinions may move in unison, as they ordinarily will, and act as if both were fixed to the shaft *i*, or as if the two pinions were made as a single broad pinion. The two pinions, as *p h*, are, however, preferred, in order that one may be made to run loosely at times if it should be desired to discontinue the operation of one of the sheet-delivery mechanisms.

The pinion *p* engages the teeth of the pinion *e*, loose on the shaft *b*, and it drives the intermediate pinion *s*, that engages the pinion *t* on one of the cylinders *u* of the sheet-delivery mechanism, (shown in Figs. 2 and 6,) the pinion *t*, in turn, engaging the pinion *v* of the second cylinder, *w*, of the said sheet-delivery apparatus. These two cylinders *u* and *w* may be provided with devices to sever, fold, and deliver sheets of paper in any of the ways described in United States Patents No. 186,309 or No. 188,779, to which reference may be had.

As the special construction of the delivery-cylinders so far alluded to is not specifically and separately claimed herein, it is deemed unnecessary to further describe them or their operation, which latter is also fully explained in the patents mentioned.

The third pinion, *g*, (it being loose on the shaft *b*,) engages an intermediate pinion, *x*, that engages and operates the pinion *y* on the shaft of the cylinder a^1 of the second pair of sheet-delivery cylinders. The second cylinder, a^2, of this second pair of delivery-cylinders has its shaft at b^1, and it derives motion through the pinion c^1.

The second pair of delivery-cylinders may be made as described with reference to the first pair.

When both pairs of delivery-cylinders are to be employed the pinions *h p* will be coupled together, and the pinion 4, fast on the shaft of the second impression-cylinder, d^1, will be engaged by pinion *f*. This pinion 4 is broad enough to also engage the loose pinion *g*, and the latter, so driven, actuates the pinion *x* and operates the second pair of delivery-cylinders.

Instead of the pinion 4 being made broad, as shown, I may employ two narrow pinions capable of being coupled together by a locking device, as heretofore described with reference to the pinions *h p* and the coupling-screw *r*.

The second impression-cylinder, d^1, has its shaft e^1 mounted in sliding bearings f^1, provided with racks g^1, raised or lowered by pinions h^1 on a shaft, i^1, provided with a hand-wheel, j^1, adapted to be operated, as described, in connection with the first impression-cylinder, *j*.

Attached to the movable sliding frames, carrying the shafts of the impression-cylinders, and so as to rise and fall with the impression-cylinders, are web turning or directing devices, (shown in Figs. 1 to 6 as curved surfaces or members k^1 k^2,) placed at, or nearly at, right angles to each other, as shown in Figs. 6 and 8, and also in the United States Patent No. 181,250, to which reference may be had. The webs to be printed on both sides or perfected are wound in rolls and placed as shown at l^1 m^1.

The curved surfaces or members of the web-turning devices herein described may be so supported as to be capable of adjustment with relation to each other. One means of accomplishing this is shown in Fig. 6, the same consisting of attaching plates 103, secured to fixed plates 105 by clamp-screws 104.

The end of the web l^1 is led over the guide-roller n^1, supported in bearings *k*, as in Fig. 3, and thence between the impression-cylinder *j* and the type-cylinder *c* at one end of the latter, and returning over the upper side of the impression-cylinder it is led over the top of the member k^1 of the web-turner, thence under such member, across, under, and up over the member k^2 of the web-turner, from whence it passes over a guide-roller, o^1, under the impression-cylinder *j*, bringing the unprinted side in contact with the printing-surface at the opposite end of the type-cylinder at which the web first met the type-cylinder, and thence the web extends over the guide-roller p^1 to and between the cylinders *u w* of the first pair of delivery-cylinders.

The web of paper m^1 is led under a pivoted tension-roller, q^1, connected by arms with a rocker-shaft, 5, provided with a handle, r^1, and a counterbalancing arm and weight, s^1, and thence over the impression-roller d^1, between

it and the type-cylinder at its under side, then downward about a web-turner, k^3, substantially such as shown and described as consisting of the members k^1 k^2, and thence upward about the impression-cylinder at the opposite end of the type-cylinder, where the other side of the web is printed, and thence the web printed on both sides is led to the second pair of delivery-cylinders, a^1 a^2, one cylinder of which is shown in Fig. 1, and by which cylinders it may be delivered folded, as in my former patents, or be delivered flat.

Instead of the paper being delivered in the manner I have described, it may be severed into sheets and delivered by any desired form of apparatus.

It will thus be observed that the web l^1 is printed on one side by passing in contact with the upper side of the type-cylinder c at one end thereof, and that its opposite side is printed by passing in contact with the same or upper side of the type-cylinder at the other end thereof, or at the end opposite that which printed its first side, the said web, after receiving an impression upon its first side, being shifted laterally and turned over to present its second side to the same type-cylinder; also, that the web m^1 is simultaneously printed on its first side by passing in contact with the under side of the type-cylinder at one end thereof, is then shifted laterally and presented with its opposite or second side to the under side, but opposite end, of the same type-cylinder.

So far as described the web-turners have been represented as shaped and described as operating to shift the web laterally and present opposite sides or faces of the web to different portions of a type-cylinder, considered as to its length; but, if desired, a web may be printed on a cylinder substantially equal in length to the width of the web, and the web may be so turned by a web-turner as to bring the opposite side of the web into contact with a portion of the periphery of the type-cylinder, against which that side of the web first printed does not have contact. In such form I would employ an impression-cylinder at each point where the web meets the type-cylinder. Such a form of web-turner is shown at Fig. 9, wherein a web of paper, moving in the direction of the arrow 3, passes over one member, b^2, of a web-turner, then over a roller, c^2, back and about a second member, d^2, of a turner, and thence about a roller, e^2, after which the web again moves to the impression and type cylinders.

The type-cylinder is furnished with ink by inking mechanisms on opposite sides of it, one of which mechanisms will now be described. Only one form-roller, t^1, (of which there may be many,) is shown in Fig. 5, the same being of common construction. The ink is supplied from a feeding-cylinder, u^1, (see Fig. 10,) wherein such cylinder is shown in section. This cylinder u^1 has a hollow journal, 6, (see Figs. 3 and 12,) through which it may be supplied with ink, and at its periphery it is slotted, as at v', to permit the passage of ink therethrough, to be first spread by the distributing-rollers w^1 on the surface of cylinder u^1, and then to be taken up by the form-rollers t^1. Within the cylinder is placed a fountain-roller, x^1, provided with longitudinal grooves 7 to retain ink. The periphery of this fountain-roller projects into the slot v' in the cylinder, and one edge of the cylinder removes the ink therefrom to be spread by the rollers w^1. The fountain-roll x^1 will be so moved or rotated by its pinion f^2 on its shaft, (see Figs. 7 and 13,) that engages adjustable pins or teeth 8, projecting from the inner face of one of the brackets l^2 supporting said shaft as the cylinder u^1 is rotated, that the fountain-roller will bring a fresh supply of ink to the surface of the cylinder just after the slotted portion of such cylinder passes the last form-roller t^1, that applies the ink directly to the type. The quantity of ink delivered will depend upon the speed of rotation of the fountain-roller with relation to the speed of the cylinder w^1.

The construction of this cylinder may be modified, as shown at Fig. 11, wherein the cylinder is provided with a spring-like edge, g^2, at the point where it is slotted. Inside the cylinder there is a shoe, h^2, against which the fountain-roller x^1 works. This fountain-roller is adapted to take up ink and hold it upon its surface at intervals, so that such portions of the fountain-roller present lines of ink at the opening in the cylinder-surface, and the spring-like edge removes the ink from the fountain-roller through the slot i^2 in the cylinder. When the cylinder u^1 is once coated it is thereafter kept well covered with ink.

In this last modification the periphery of the fountain-roller will act upon the spring and lift it, so that the inclined edge of the spring will force the ink taken by it from the inking-roller to the surface of the cylinder. The quantity of ink delivered will be regulated by rotating the fountain-roller faster or slower within the cylinder w^1. If desired, one or more of the distributing-rollers w^1 w^1 may be reciprocated longitudinally.

The journal at one end of the cylinder u^1 is provided with a pinion, j^2, which is engaged by an intermediate pinion, k^4, on the frame k, it deriving its motion from a pinion, x^3, on the shaft b of the type-cylinder. The cylinder u^1 and distributing-rollers are sustained in brackets l^2, pivoted at m^2, so that the inking mechanism may be removed from contact with the type-cylinder, or be held in gear therewith by a catch, n^2. Any other construction of inking apparatus suitable for the purpose may be employed.

When the impression-cylinder j and its sliding carrying-frame are depressed a hook, o^2, (see Fig. 3,) thereon passes below the end of catch n^2, so that when the frame k is lifted the catch n^2 is disengaged by the hook o^2 to permit the ink-

ing devices to fall away from the type-cylinder. Each set of inking devices will be held and operated in substantially the same way.

The hand-lever r^1 is provided with an eccentric slot, 9, or a cam to operate a brake-lever, p^2, having its fulcrum at 10, and connected with the cap r^2 of the journal-box s^2, that sustains the shaft t^2, upon which the rolled web of paper m^1 is mounted. This cap is, at one end, adapted to be held down by an adjustable holding device, u^2, pivoted to the lower portion of the bearing.

The paper passing under the tension-roller q', if there is too much friction on the axle, lifts the roller, turns the rock-shaft and the handle r^1 in opposition to the weight s^1, and causes the eccentric 9 to lift the end of lever p^2 and the cap r^2, to lessen the pressure upon the axle t^2, thus permitting the web to be delivered more readily. Each shaft carrying a roll of paper will be operated upon in like manner.

The hand-wheel j^1 on shaft i^1 is provided with a ratchet to be engaged by a pawl, w^2, connected in some suitable way with the tension-roller q', that bears upon the web of paper on its way to the impression-cylinder. In Fig. 3 this catch is connected with a link, x^2, attached to a bar, y^2, slotted at 12, to receive a pin, 13, on the handle r^1. The forward end of this bar y^2 is supported on a link, 14.

The impression-cylinder d^1, adjusted to press the web of paper upon the type-cylinder, is held in position by the pawl w^2. If the web breaks, the tension-roller will descend, thereby permitting the rock-shaft, to which it and the weight s^1 are attached, to rock or move under the action of the weight in assuming its lowest position, and in so doing the pin 13 in the slot 12 pushes the bar y^2 longitudinally and lifts the pawl w^2, which permits the impression-cylinder to fall away from the type-cylinder.

The hand-wheel o of the shaft m, adapted to control the position of the impression-cylinder j, is provided with a ratchet, (shown in Fig. 3,) to be held by a pawl, 15, adapted to be lifted through the action of suitable links and arms when the web l^1 breaks, substantially as described for pawl w^2.

In Fig. 3 I have shown a strong spring, 16, connected by strap 17 with the hand-wheel o, which, when the pawl 15 is lifted by the breaking of the web l^1, or by hand, will rotate the hand-wheel o and shaft m, and lift the impression-cylinder j from the type-cylinder. A weight might be used instead of this spring 16.

To enable the cylinder a^1 to deliver paper flat, I apply to it, in addition to its usual nipping-surfaces, a knife, 18, having a serrated edge, and provided with slots 19, (Fig. 1,) through which pass hooks 20, attached to a rocking shaft, 21, operated by a suitable cam, substantially as before described in the United States patents heretofore referred to. Next to this knife I arrange an oscillating blade, 22, held on a rock-shaft, 23, provided with an arm, 24, (see Fig. 1,) adapted to strike a suitable cam or stud on frame a during the rotation of the cylinder a^1, so as to throw the edge of such blade 22 out away from the cylinder a^1 immediately after the cutter 18, co-operating with a second serrated plate, 25, on the other rotating cylinder a^2 of the delivery apparatus, severs the web transversely. This movement of the blade 22 throws the end of the severed sheet away from the periphery of the cylinder a^1, and permits the fly 26 to engage and hold the end of the sheet down upon a yielding surface or a pile of papers. The arms of this fly 26 project from a shaft mounted in arms w^3, and provided with a pinion, 28. The arms w^3 project from a rock-shaft, 29, having a lever, u^3, operated by a cam on the axis of or in connection with the cylinder a^1. As the arms w^3 are moved downward, the pinion 28, which engages the teeth of a stationary segment, 27, is rotated, thereby raising the fly. The hooks 20, as the web is severed, enter the end of the web and carry it forward, and hold it until the web is again severed to form a sheet, and the hooks holding the sheet are then withdrawn as the fly strikes and holds the rear end of the sheet.

It will be understood that the jaws or nipping-surfaces of the cylinder a^1 during this operation are so held as not to grasp the sheet or web and fold it, as in my former patent, and so as not to interfere with delivering the sheet flat. If it is desired to deliver both webs l^1 and m^1 to the second pair of delivery-cylinders, a^1 a^2, the web l^1 may be led backward over a leading-roller, 30.

In my method of delivering a supplement in connection with the regular sheet, I first print the web for the supplement in any desired way, and then wind it again into a roll, which I place as at 31. The end of this printed supplement web, if the supplement is to be a fractional part of a sheet, is led between a pair of cutting-rolls, 32 33, geared together by pinions 85 86, provided with knives to sever, or almost sever, the web at proper intervals, such rolls feeding the supplement web at about half the speed of the main web.

The shaft of the supplement cutting-roll 32 is provided with a pinion, 87, engaged and operated by a pinion, 35, on the shaft of cylinder u. This pinion 35 may be disconnected from the shaft when it is desired to throw the rollers 32 33 out of action.

The end of the supplement web or sheet is delivered between the main web and the cylinder u, as shown in Fig. 5, from which point the web and supplement sheet move together and the supplement is folded with the paper. If the supplement web is not completely severed between the rollers 32 33, the cylinder u will act to draw the web sufficiently fast to completely sever the supplement sheets from it. When the supplement web is passed between the rolls 32 33, it will deliver a supple-

ment one-half the length of the main sheet, whether the paper being delivered is a quarto or a folio. If a folio supplement is to be delivered, then the supplement web will be led directly over the cylinder *u*, and pass with the main web between the cylinders *u* and *w*, and the paper may then be either a folio or a quarto.

An endless traveling marked belt may be placed so that one side will travel in a direction parallel with the movement of the web between the surface of the roll and the delivery mechanism, and with the same speed. This will be used to ascertain the position with relation to the supplement-cutters of the unprinted spaces on the supplement web in order that the web may be cut only at these unprinted portions. If the web is so placed that it is cut through the printed portion, the friction on the shaft carrying the roll of paper is increased until the unprinted spaces register with the cutters.

Adjustable stops may be attached to the frame or to the bearings of the shaft *b*, against which the bearings *k* of the impression-cylinders may rest to regulate its position with relation to the surface of the type-cylinder.

A narrow endless belt may be made to extend, say, from the upper side of the impression-cylinder, thence about the members k^1 k^2 of the turning device, and over the guide-roller p^1, thence down under it and over guide-pulleys placed on vertical studs 100 below the turning device and back to the under side of the impression-roller from which the belt started, and thence under the roller and up over it to the point of starting. The end of the web l^1 may be attached to the belt and be drawn about the turner by merely revolving the impression-cylinder *j*.

If one web breaks its impression-cylinder will be so changed in position as not to co-operate with the type to print, and its delivery will be thrown out of operation until the web is started anew or a fresh web of paper placed in position in the press ready to be printed. During this time the continued printing of the other web is not interfered with, except for a space of time sufficient to set the teeth of the driving-gear in proper position, (indicated by marks on the gears,) so that the delivery as it severs the web will do so on the margins or unprinted spaces.

When printing a supplement the delivery mechanism may be disengaged, as described, and suitable driving mechanism be connected with the type-cylinder to rotate a shaft, upon which the printed web may be wound.

Devices for securing the blankets and yielding material to the impression-cylinders, and also improvements with reference to the ink-distributing apparatus, will form the subject of another application for Letters Patent which I am about to make.

Instead of producing friction on the shafts carrying the rolls of paper by means of caps, as at r^2, it is evident that the shafts t^2 may be provided with small drums, as are warp-beams of looms, and a strap or band about such drum may be tightened through the movement of the tension-roller and its shaft.

Instead of the racks and pinions to move the bearings of the impression-cylinders away from the type-cylinders, I may provide each bearing of the impression-cylinders with a screw. Each screw may then be extended through a hollow bevel-pinion having an internal screw-thread to fit the thread of the screw, they acting as the teeth of the rack. This pinion will be held so that it may rotate but not move vertically, and bevel-pinions placed on the shaft *n*, instead of the plain pinions, will rotate the hollow pinions and raise or lower the screw and the bearings of the impression-cylinders.

It is evident that the supplement web might be one of the main webs of a folio paper.

The third, fourth, fifth, and sixth pages of a quarto may be printed on one web and wound in a roll and placed in the bearings of the supplement-carrying roller and be led to the delivery-cylinders. The later news may be printed on the first, second, seventh, and eighth pages of the web being printed, and said web may be led direct from the type or impression cylinders to the delivery-cylinders overlying the printed web first described, and by applying paste to the central unprinted portion of either web a quarto sheet cut, pasted, and folded one or more times may be delivered with great rapidity.

I do not herein claim the method of incorporating a printed supplement with a newspaper and then simultaneously folding and delivering the same, as this I propose to make separate application for.

I do not herein claim a pair of cylinders provided with serrated knives, the teeth of which mesh into and lap past each other, as this I propose to make separate application for.

I do not herein claim the specific turning device illustrated in Fig. 9.

I claim—

1. The combination, with the type-cylinder, of a web-turner to turn a web of paper printed by said cylinder upon one side, whereby the opposite side of the web may be presented to the same type-cylinder to be printed, substantially as described.

2. The type-cylinder and web-turner, to reverse a web of paper, so as to present both of its sides to the type-cylinder, in combination with an impression-cylinder, substantially as described.

3. A type-cylinder, in combination with a web-turner adapted to turn a web of paper printed upon one side at one end of the cylinder, so that its opposite side may be printed by type arranged on the cylinder in the direction of its length beyond the type used to print the first side of the web, substantially as described.

4. The impression-cylinder, in combination

with a web-turner adapted, substantially as described, to rise and fall in connection with it.

5. In combination, a type-cylinder to print a web of paper, a web-turner to turn the web to be printed upon both its sides, an impression-cylinder, an inking apparatus, and a rotatory delivery mechanism, substantially as and for the purpose described.

6. The impression-cylinder and the web-turner, in combination with and adapted, substantially as described, to be moved toward or from the type-cylinder.

7. The impression-cylinder and its shaft and pinions, to move the bearings of such cylinder, and a pawl and ratchet, to hold the shaft and bearings in adjusted position, in combination with mechanism adapted, substantially as described, to release the pawl to permit the impression-cylinder to be moved automatically away from the type-cylinder.

8. The tension-roller to bear upon the web of paper, in combination with the pawl to hold the shaft *i* in position, and with means, substantially as described, to connect the tension-roller and pawl, whereby the pawl may be released when the web breaks, substantially as set forth.

9. The tension-roller, the rock-shaft, the weight s^1, and eccentric 9, in combination with the lever p^2 and cap r^2, to increase or decrease the holding-friction on the shaft, substantially as set forth.

10. The gears *e f g* on the type-cylinder, combined with and so as to operate the two impression-cylinders and delivery apparatus through the connected gearing, whereby the disengagement of the pinions of either impression-cylinder from the pinions of the type-cylinder will stop the rotation of such impression-cylinder and its connected delivery.

11. The combination, with the pair of delivery-cylinders, of the supplement-rollers, adapted to sever or partially sever a printed supplement web and deliver it in contact with the main web to be folded and delivered.

12. The combination, with a type-cylinder to print a web and a web-turner to present both sides of the web to the type-cylinder, of a rotating cylinder provided with knives to sever the web, hooks to penetrate and hold the web until after a portion of it is severed therefrom to form a sheet, and a vibrating blade to move the end of the sheet not held by the hooks away from the cylinder, so as to be engaged by a fly, substantially as described.

13. The longitudinally-slotted ink-delivering cylinder and the rotating fountain-roller and its attached pinion, in combination with the pins 8, to graduate the rotation of the fountain-roller, substantially as described.

14. The ink-delivering cylinder and ink spreading and distributing rollers, mounted in a pivoted frame, in combination with a catch to hold the frame and rollers in operative position, and a hook to release the catch when the impression-cylinder carrying-frame is moved away from the type-cylinder, substantially as described.

15. The type-cylinder and its fast pinion, in combination with the impression-cylinder and its double pinion and locking device, whereby, by disconnecting the part of the double pinion which moves the delivery mechanism, the press may be operated to print without moving the delivery, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

G. W. GREGORY,

W. J. PRATT.