(No Model.) 3 Sheets—Sheet 1.

C. B. COTTRELL.

FEEDING APPARATUS FOR PRINTING MACHINES.

No. 422,572. Patented Mar. 4, 1890.

Fig. 1.

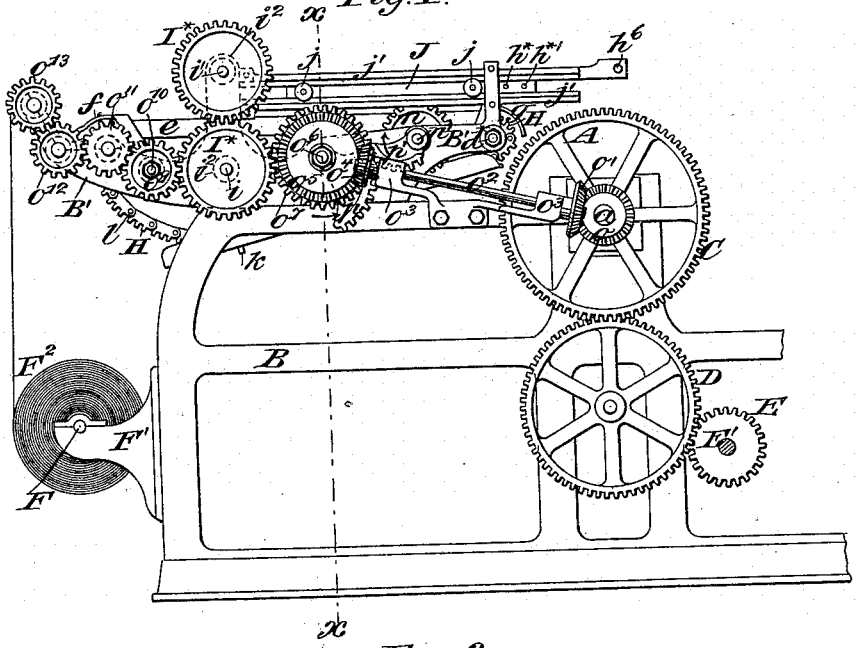
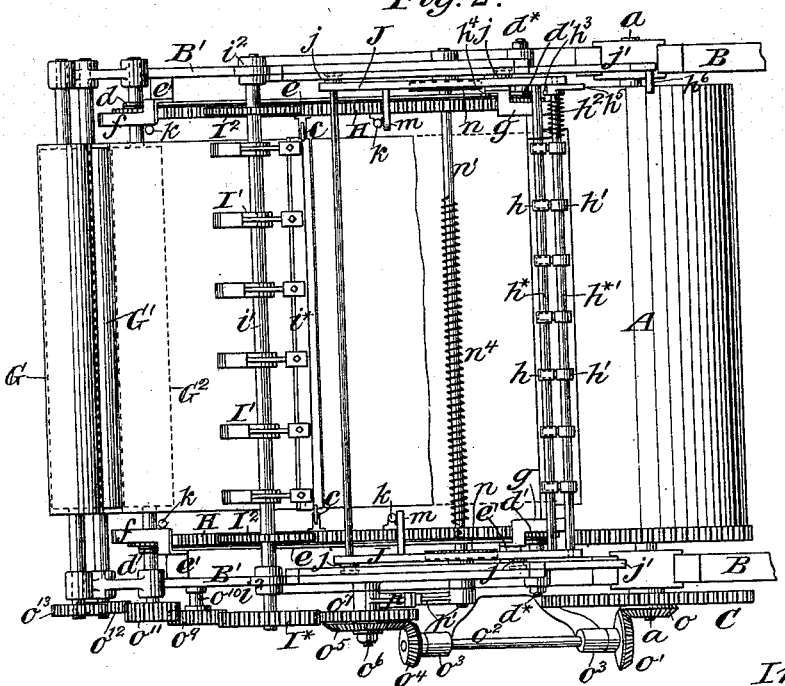


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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FEEDING APPARATUS FOR PRINTING MACHINES.

No. 422,572. Patented Mar. 4, 1890.

Fig. 3.

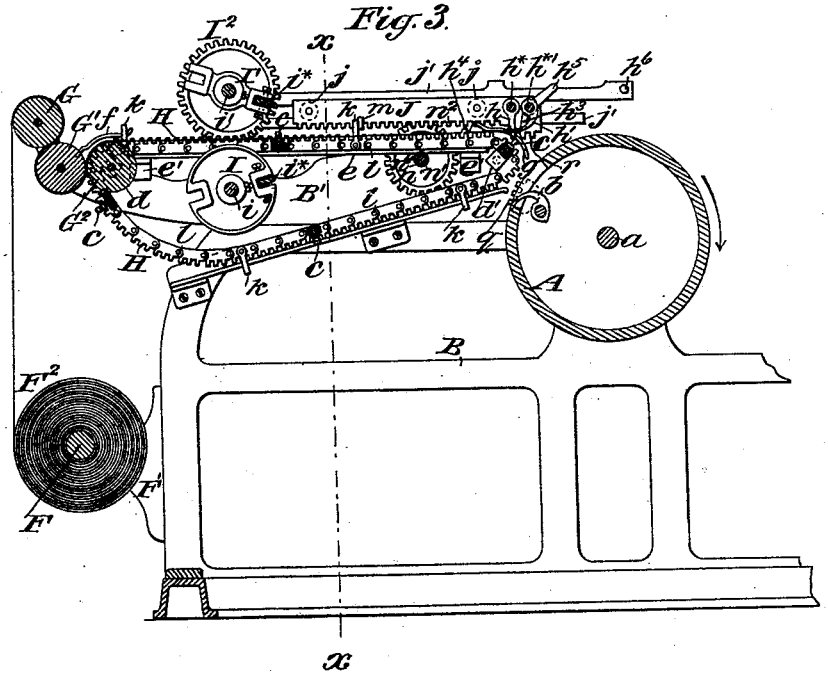


Fig. 4.

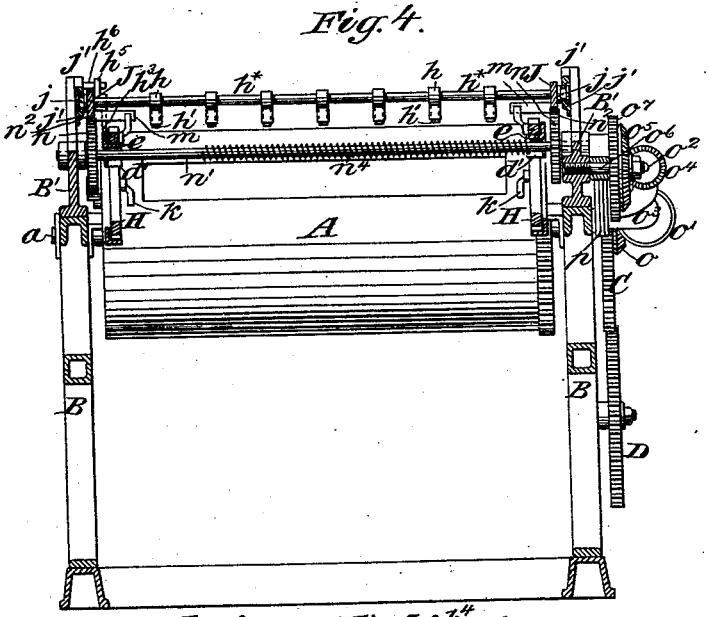


Fig. 6.

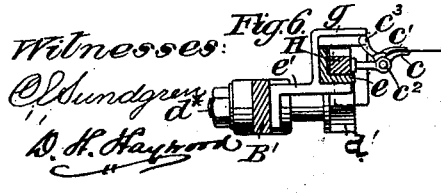
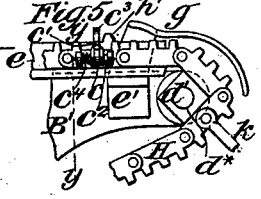


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

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FEEDING APPARATUS FOR PRINTING MACHINES.

No. 422,572. Patented Mar. 4, 1890.

Fig. 7.

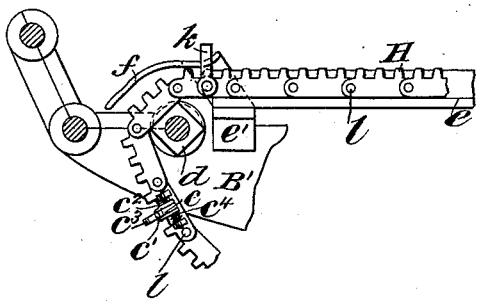
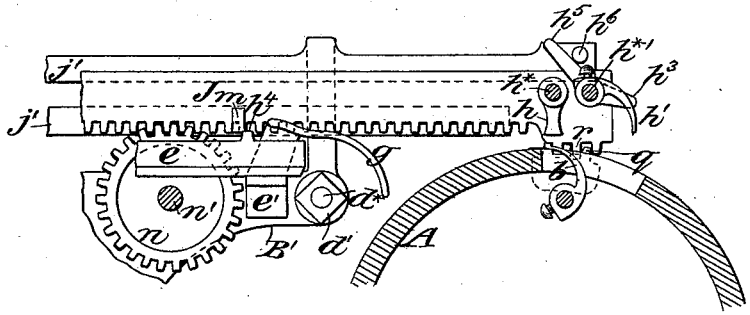


Fig. 8.



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UNITED STATES PATENT OFFICE.

CALVERT B. COTTRELL, OF WESTERLY, RHODE ISLAND.

FEEDING APPARATUS FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 422,572, dated March 4, 1890.

Application filed November 23, 1889. Serial No. 331,333. (No model.)

To all whom it may concern:

Be it known that I, CALVERT B. COTTRELL, of Westerly, in the county of Washington and State of Rhode Island, have invented a new and useful Improvement in Feeding Apparatus for Printing-Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to what is known as a "roll-feed," the paper being supplied to the printing-machine from a roll or continuous web and cut into sheets, which are successively fed to the impression-cylinder.

I will first describe my invention with reference to the accompanying drawings, and afterward point out its novelty in claims.

Figure 1 represents a side elevation of the impression-cylinder of a printing-machine and of the feed mechanism applied thereto. Fig. 2 is a plan corresponding with Fig. 1. Fig. 3 represents a vertical section parallel with Fig. 1. Fig. 4 is a transverse sectional view taken in the line $x\,x$ of Figs. 1 and 3, looking toward the cylinder. Figs. 5, 6, and 7 are detail views, which will be hereinafter explained. Fig. 8 is a view corresponding with Fig. 3 of a part of the cylinder and part of the carriage and its appurtenances by which the cut sheets are presented to the cylinder. Figs. 5, 6, 7, and 8 are on a scale twice that of Figs. 1 to 4, inclusive.

Similar letters of reference designate corresponding parts in all the figures.

A designates the impression-cylinder of a two-revolution printing-machine, the shaft a of said cylinder being supported in bearings in the usual way in the side frames B of the machine, and being driven in any suitable manner—as, for instance, by spur-gearing C D E—from the main shaft E′ of the machine. The said cylinder is represented as furnished with grippers b, which may be of the usual kind for taking the paper from the feeding apparatus.

F designates a roller, the journals of which are supported in bearings in brackets F′, secured in the side frames B for carrying the roll or continuous web of paper F^2 to supply the machine.

G G′ G^2 are feed-rollers arranged above the roller F, their journals running in bearings in side frames B′, which are supported on the top of the main side frames B.

H H are two endless toothed racks, which, with the series of grippers $c\ c'$ attached thereto, constitute an endless carrier, to which the paper is transferred by the feed-rollers G G′ G^2 as it is drawn by the said rollers from the roll F^2.

I I′ are rotary cutter-stocks fastened on shafts $i\ i'$ and carrying cutting-blades $i^*\ i^*$, which constitute a rotary cutter or rotary shears for cutting into sheets the web of paper taken from the feed-rollers G G′ G^2 by the grippers $c\ c'$ of the endless carrier. These shafts $i\,i'$ are geared together to rotate synchronously by gears I^*.

J is a reciprocating carriage for receiving from the endless carrier H $c\ c'$ the sheets cut by the rotary cutter or shears from the web F^2 and presenting the said sheets to the grippers of the impression-cylinder.

The endless toothed racks H are composed of short toothed sections or links pivoted together by pins l, and they are carried by two short polygonal rollers d, which are loose on the shaft of the feed-roller G^2, and two similar polygonal rollers d', which are fitted to turn freely on studs d^*, secured in the frames B′ B′ near the impression-cylinder A. One of the rollers d is shown dotted in Fig. 3, and one of those d' is shown in full in the same figure. All of said rollers are visible in the plan, Fig. 2. One of the said rollers d' is shown on a larger scale in Figs. 5 and 8, of which Fig. 5 is a view corresponding with Fig. 3 of the right-hand end of one of the frames B′ and of the adjacent part of one of the endless racks and its appurtenances, and Fig. 6 a transverse section in the line $y\ y$ of Fig. 5. One of the said rollers d is also shown in Fig. 7, which is a view corresponding with Fig. 5 of a part of the endless rack and its appurtenances near the other end of the frame B′. The said endless racks are geared with and driven by gears I^2 on the shaft i' of the upper cutter-head, and hence proper relative movements are preserved between the cutter and the carrier to produce a certain length of sheet.

The upper courses of the two endless racks H H are arranged to run on fixed horizontal guides e, supported on brackets e', which are

secured to the side frames B′, and being thus supported the upper courses of the racks are enabled to be driven by the gears I² toward the cylinder A with a pushing motion. The grippers *c c′*, attached to the two racks H H, project inward from the said racks for the purpose of taking hold of the edges of the web of paper, and they are opposite each other—that is to say, those on one rack are opposite those on the other rack, and the distance between the grippers lengthwise of the racks is equal to the length of the sheets to be cut. The lower jaws *c* of the said grippers are firmly secured to their respective racks. The upper jaws *c′* are pivoted, as shown at c^2 in Fig. 6, to the lower jaws *c*, and are furnished with outward projections or tail-pieces c^3, to be operated upon by stationary cams *f g*, (see Figs. 5 and 7,) which are secured to or formed upon the brackets *e′* for the purpose of producing the opening of the said grippers at the proper time for receiving the web of paper from the feed-rollers, and of delivering the paper after it has been cut into sheets to the reciprocating carriage J, by which the sheets are delivered to the impression-cylinder. The movable jaws of the grippers, when not opened by their tail-pieces running under the cams, are closed by the action of springs c^4 (see Fig. 5) coiled upon the pins c^2.

The reciprocating carriage J consists of a rectangular frame arranged above the endless carrier, and is furnished on its sides with rollers *j*, to run between fixed horizontal ways *j′*, which are supported upon and above the said side frames B′. This reciprocating carriage has at the end nearest the impression-cylinder a set of grippers *h h′*, for taking the sheets from the endless carrier and presenting them to the grippers of the impression-cylinder. The jaws *h* of these grippers are firmly affixed to a bar *h**, which is firmly secured in the side bars of the said reciprocating carriage J and forms a rigid part of the said carriage. The jaws *h′* are all affixed to a bar *h*′*, which is pivoted in the side bars of the said carriage. A spring h^2, (see Fig. 2,) coiled around this bar *h*′*, serves to close the said grippers. On one end of the last-mentioned bar there is an arm h^3 for opening the said grippers to receive the sheet from the endless carrier when the said arm is brought by the movement of the said carriage into contact with a stationary cam projection h^4 (see Fig. 8) on one of the stationary guides *e*. There is also provided on the said bar another arm h^5 for opening the said grippers to allow the cylinder-grippers to take the sheet therefrom when the said arm is brought by the movement of the carriage into contact with a stationary pin h^6, (see Fig. 8,) provided on one of the upper ways *j′*.

The reciprocating carriage J has a movement toward and partly over the impression-cylinder given to it first by means of tappets *k*, attached to the endless racks of the carrier H, acting against lugs *m* on the side bars of the carriage; second, by spur-gears *n* on a shaft *n′*, supported in bearings in the side frames B′, the said spur-gears gearing with toothed racks n^2 on the lower edges of the said side bars, and, third, by a few teeth on the cylinder itself, as shown at *q* in Fig. 3, which pass into and out of gear with teeth *r* on one of the side bars of the carriage, the said teeth *r* being represented in Fig. 3 as slightly below the teeth of the racks n^2. The first part of the said movement is at a speed corresponding with the continuously-uniform speed of the endless carrier, which is less than the surface speed of the impression-cylinder, the second part of the said movement is gradually accelerated to bring it up to a speed corresponding with the surface speed of the cylinder, as will be hereinafter more fully described, and the third part of the movement is at the speed last mentioned. The movement of the reciprocating carriage in the reverse direction or away from the cylinder is produced by a spring n^4, coiled around the said shaft *n′* and secured at one end to said shaft and at the other to one of the guides *e*, the said spring bringing back the said carriage to the end of the ways *j′ j′*.

The rotary cutter-stocks I I′ and cutting-blades *i* i** may be such as are the subject-matter of my Letters Patent No. 391,949, dated October 30, 1888. The shafts *i i′* of the said cutters are arranged above and below the upper courses of the endless carrier and supported in adjacent bearings i^2 on the framing of the machine, the shafts being so arranged that the cutters will act upon the web of paper while the latter is carried between them by the endless carrier.

The feed-rollers, the rotary cutters, the endless carrier, and the spur-wheels *n* for moving the reciprocating carriage are all represented as deriving motion from the cylinder-shaft *a* through a bevel-gear *o* on the said shaft, the said bevel-gear gearing with and driving a bevel-gear *o′* on one end of an inclined shaft o^2, which works in fixed bearing o^3, attached to the outside of one of the main side frames B of the machine, the said shaft o^2 being furnished at its other end with a bevel-gear o^4, gearing with and driving a bevel-gear o^5, which rotates on a fixed stud o^6, secured in one of the side frames B′. To this bevel-gear o^5 is secured a spur-gear o^7, which gears with and drives the spur-gear I* on the lower cutter-shaft *i*, and thus drives the rotary cutters, and at the same time drives the endless carrier through the upper cutter-shaft *i′*, and the gears I² thereon gearing with the toothed racks of said carrier. The spur-gear I* last mentioned gears with a spur-gear o^9, which turns on a fixed stud o^{10}, secured in the adjacent side frames B′. The said gear o^9 gears with a spur-gear o^{11} on the shaft of the feed-roller G², and so drives all the feed-rollers, the said rollers being geared together by the spur-gear o^{11} and spur-gears o^{12} o^{13} on the feed-rollers G′ and G.

All the gearing hereinabove described is so proportioned that the cutter operates once for every two revolutions of the cylinder, and the endless carrier moves a distance equal to the length of the sheet to be printed during two revolutions of the cylinder.

The shaft n', hereinabove mentioned carrying the spur-gears n, is driven through two eccentric toothed sectors p p', of which p is caused to rotate continuously, being secured to the spur-gear o^7 and bevel-gear o^5, hereinbefore mentioned, and p' is fast on the shaft n'. The shortest radius of the sector p corresponds with the longest radius of the sector p', and hence as in its continuous rotation the sector p comes with its shortest radius into gear with the sector p' at its largest radius, as will be understood by reference to the arrows in Fig. 1, indicating the direction of rotation of the sectors, the shaft n', the spur-gears n, and the carriage will be driven through the said sectors with a gradually-increasing velocity. The longest radius of p and the shortest radius of p' are relatively so proportioned as to drive the carriage at the same speed as the surface speed of the cylinder.

Having now described the operations of the several parts of the machine, I will in conclusion briefly describe the operation of feeding the continuous web to the endless carrier, the cutting of the web into sheets while on the said carrier, the transferrence of the sheets from the said carrier to the reciprocating carriage, and the presentation of the sheets by said carriage to the cylinder. The web of paper passes over the feed-roller G under the feed-roller G′, and over the feed-roller G^2. When passing over the roller G^2, the side grippers c c' on the endless racks of the carrier take the edge of the paper and carry it between the rotary cutters i^*, which cut it into proper lengths to form sheets, leaving the back end of each sheet free and the front end in the said grippers, so that one pair of grippers on each endless rack has each sheet near its front edge. The side grippers c c' carry the front edge of the sheet to the grippers h h' of the reciprocating carriage, which is stationary against the rear end of the ways j, the grippers h h' at this time being held open by the arm h^3 being in contact with the cam projection h^4. The reciprocating carriage is then started by the tappets k k of the endless carrier coming in contact with its lugs m, and the grippers h h' are closed by the spring h^2 to take a sheet. The reciprocating carriage now moves with the endless carrier toward the cylinder until the two eccentric-toothed sectors p p' are brought into gear by the continuous rotation of the sector p, and the simultaneous rotation of the sector p', which is produced by the turning of the shaft n' by the action of the toothed racks n^2 of the carriage upon the spur-wheels n, and the carriage is then driven by the said sectors at a gradually-accelerated velocity until its speed reaches that of the surface of the cylinder when its teeth r come into gear with the teeth q on the cylinder, as shown in Fig. 8, and its movement toward and over the cylinder is completed by the cylinder itself in such manner that perfect register of the sheet is insured. As the reciprocating carriage thus approaches the end of its movement, its grippers h h' are opened by the arm h^5 on its gripper-bar h^* coming against the fixed pin h^4, leaving the sheet free to be taken by the cylinder-grippers. After the teeth q' on the cylinder pass beyond those of the reciprocating carriage the latter is left free to be returned by the action of the spring n^4 on the shaft n' and its gears n to a position to receive a new sheet from the endless carrier.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the impression-cylinder of a printing-machine, of an endless carrier for carrying the end of a continuous web of paper, a cutter for cutting sheets from said web in said endless carrier, and a reciprocating carriage for receiving the sheets from said endless carrier and presenting them to the impression-cylinder, substantially as herein described.

2. The combination, with the impression-cylinder of a printing-machine, of an endless carrier for carrying the end of a continuous web of paper, feed-rollers for feeding the continuous web to said endless carrier, a cutter for cutting sheets from said web in said endless carrier, and a reciprocating carriage for receiving the cut sheets from said endless carrier and presenting them to the impression-cylinder, substantially as herein described.

3. The combination, with the impression-cylinder of a printing-machine, of an endless carrier for carrying the end of a continuous web of paper, a cutter for cutting sheets from said web in said endless carrier, a reciprocating carriage for receiving the cut sheets from said endless carrier and presenting them to the cylinder, tappets on said endless carrier for transmitting motion to the said reciprocating carriage from said carrier, and a train of gearing, including eccentric segments between said carriage and the main shaft of the machine, for continuing the motion of the said carriage at a gradually-accelerated velocity, substantially as and for the purpose herein described.

4. The combination, with the impression-cylinder of a printing-machine, of an endless carrier for carrying the end of a continuous web of paper, a cutter for cutting sheets from said web in said endless carrier, a reciprocating carriage for receiving from the endless carrier the sheets so cut and presenting them to the cylinder, tappets on said endless carrier for transmitting motion therefrom to said reciprocating carriage, and a train of gearing, including eccentric segments between said carriage and the main shaft of the ma-

chine, for continuing the motion of said carriage at a gradually-accelerated velocity, and teeth upon the cylinder and upon said carriage for completing the movement of said carriage at a speed corresponding with the surface speed of the cylinder, substantially as and for the purpose herein described.

5. The combination, with the endless carrier constructed with toothed endless racks and a cutter having a rotary shaft with a cutter-head and cutting-blade thereon, of gears on the said cutter-shaft gearing with the teeth of said racks for transmitting to the carrier its necessary movement through the rotary cutter, substantially as and for the purpose herein described.

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