(No Model.)

5 Sheets—Sheet 1.

E. LIETZE.

PRINTING MACHINE.

No. 444,412. Patented Jan. 6, 1891.

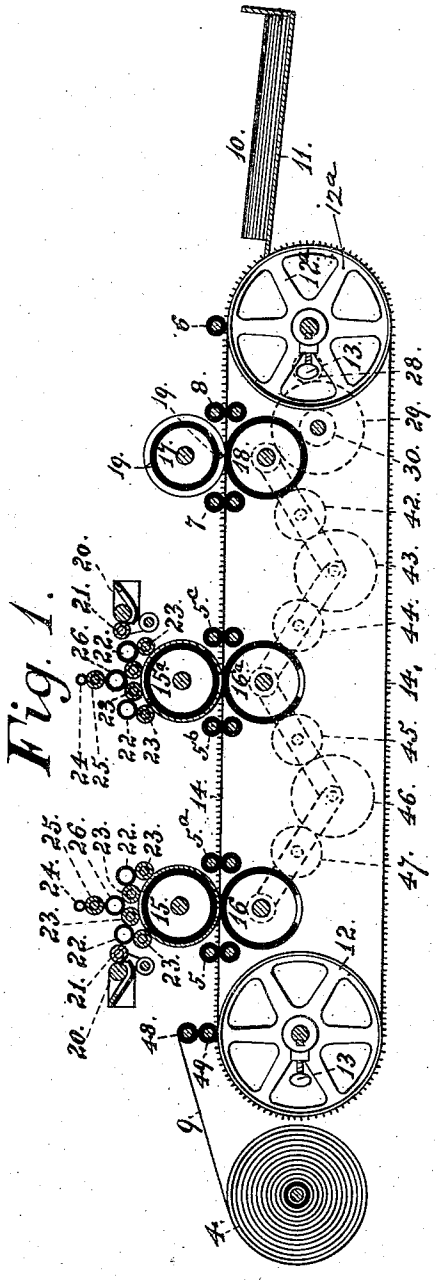


Fig. 1.

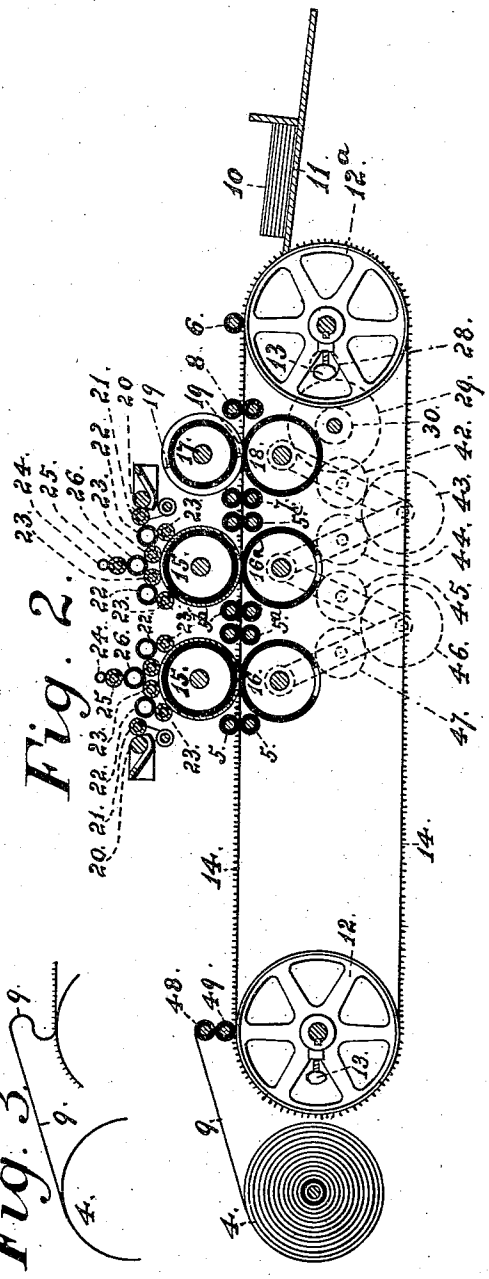


Fig. 2.

Fig. 3.

Witnesses.

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(No Model.) 5 Sheets—Sheet 2.

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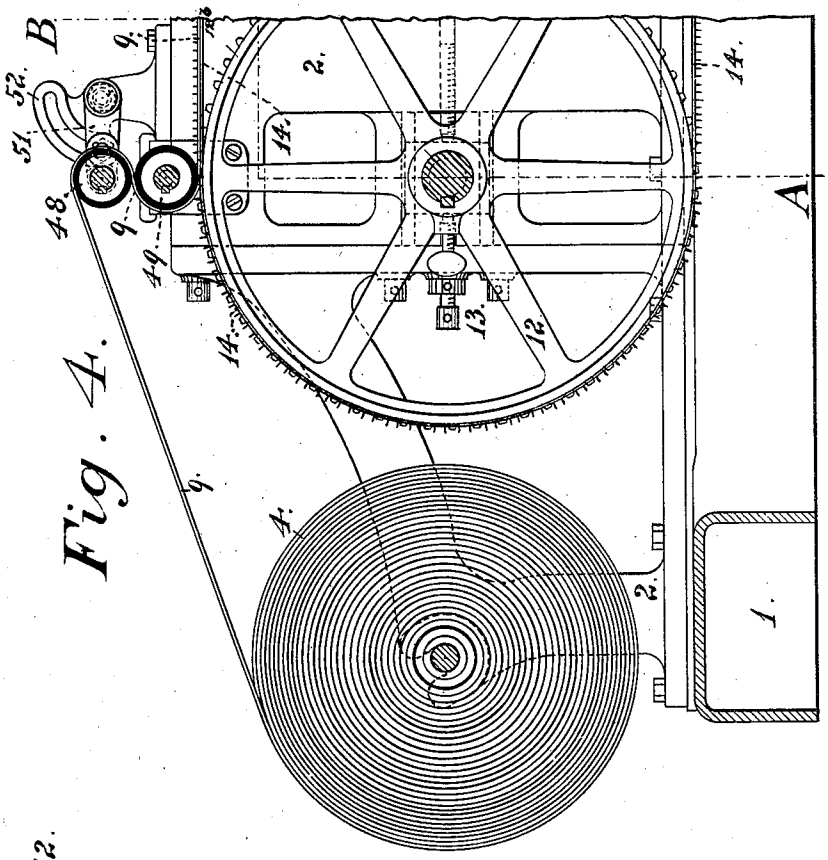


Fig. 4.

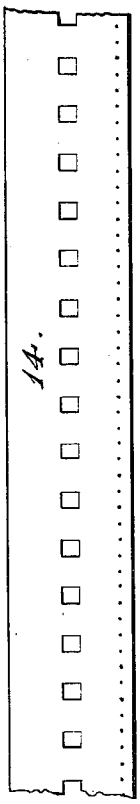


Fig. 6.

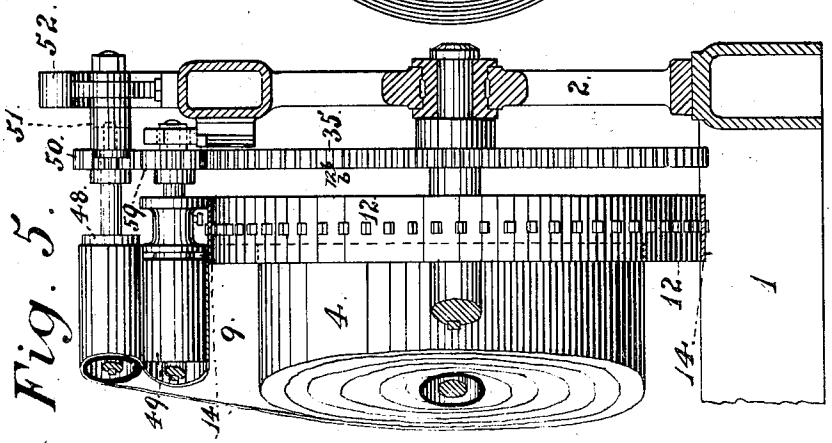


Fig. 5.

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Fig. 7.

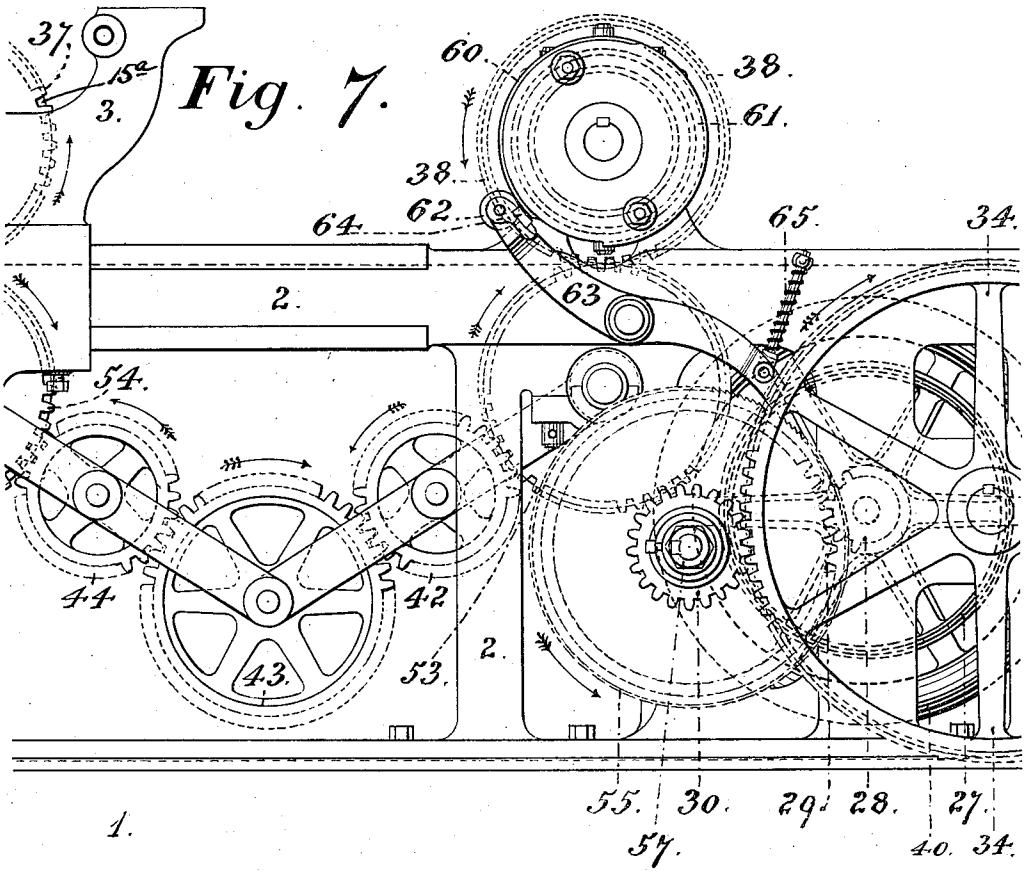


Fig. 9.

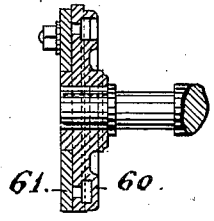


Fig. 10.

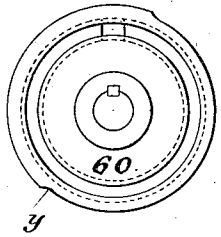
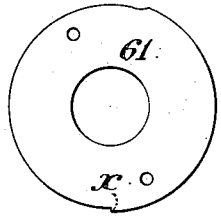


Fig. 11.



Witnesses.
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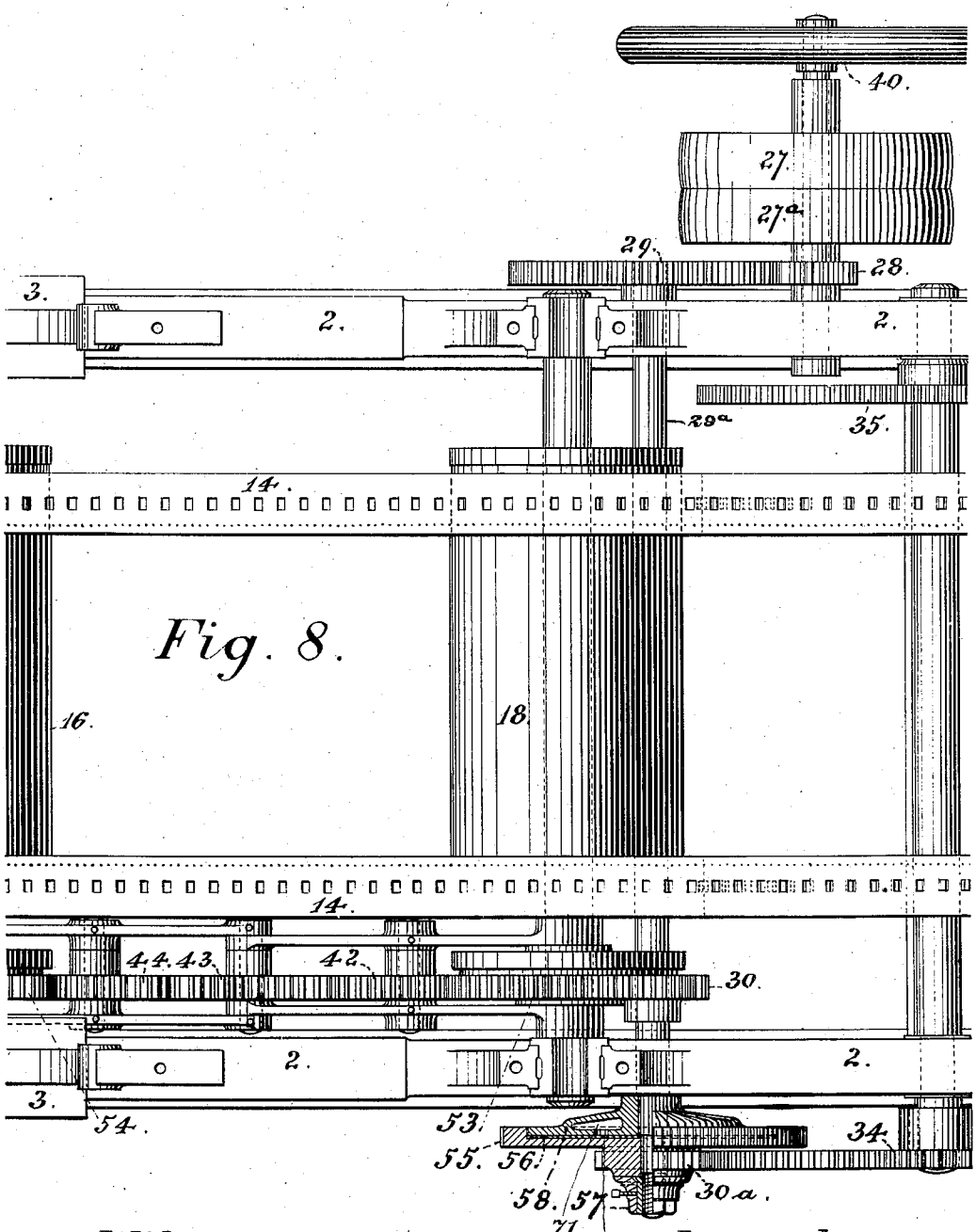


Fig. 8.

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(No Model.)

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E. LIETZE.

PRINTING MACHINE.

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Fig. 12.

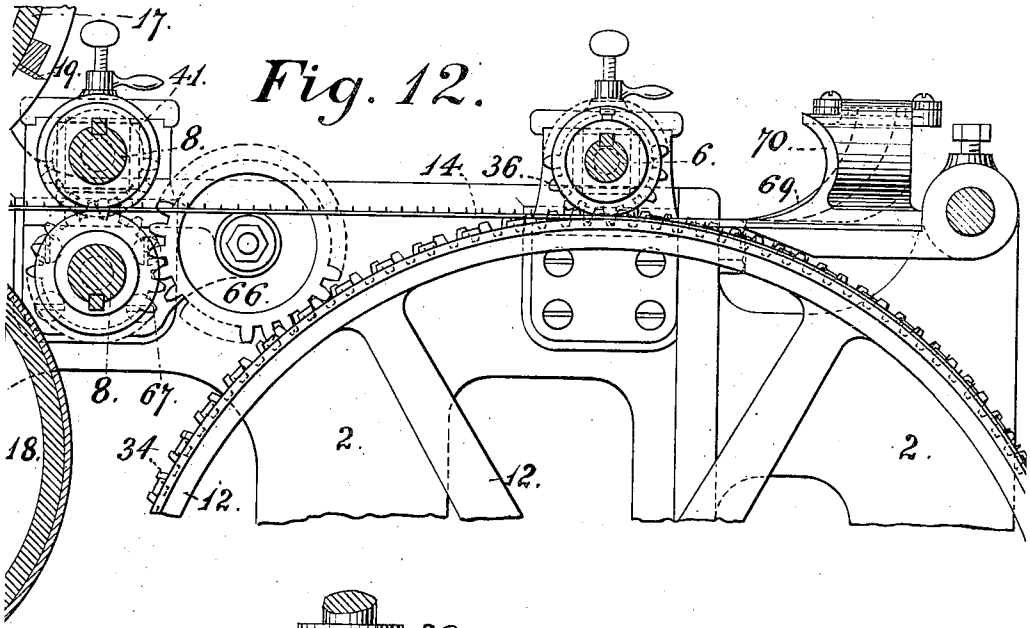
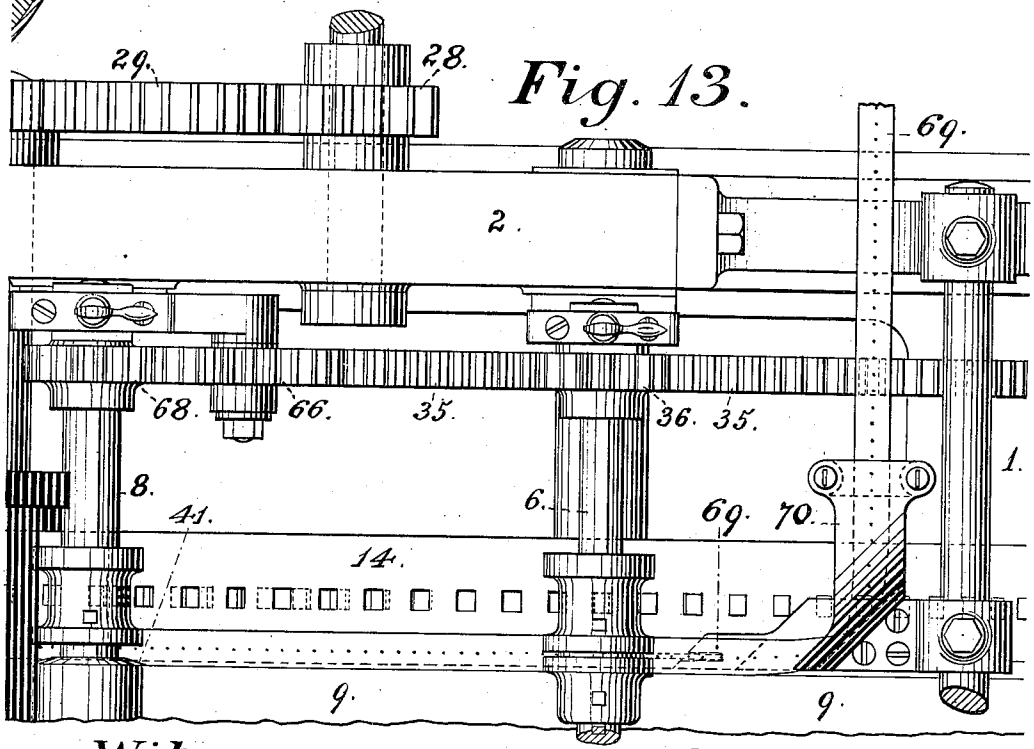


Fig. 13.



Witnesses.

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UNITED STATES PATENT OFFICE.

ERNST LIETZE, OF CINCINNATI, OHIO.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 444,412, dated January 6, 1891.

Application filed June 3, 1890. Serial No. 354,168. (No model.)

To all whom it may concern:

Be it known that I, ERNST LIETZE, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Printing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the improvements in printing-machines hereinafter to be more fully described and claimed.

In the drawings, Figure 1 is a side view showing the feed mechanism and the operating-cylinders only, the various sets of operating-cylinders being at their farthest distance apart. Fig. 2 is the same as Fig 1, the said operating-cylinders being adjusted at their nearest point together. Fig. 3 is a diagram illustrating the path of the material around the first set of feed and pressure rollers. Fig. 4 is a detail in section showing the arrangement of said first set of feed and pressure rollers. Fig. 5 is an end view and section showing the arrangement of feed mechanism and pressure-rollers. Fig. 6 is a detail of the feed-band. Fig. 7 is a detail side view showing the detent mechanism for the feed apparatus. Fig. 8 is a plan view of a portion of the machine, showing the gearing. Figs. 9, 10, and 11 are details of the adjustable cam operating the detent. Fig. 12 is a detail side view showing the knives and the guide for removing the perforated edges cut from the material, and Fig. 13 is a plan view of the same.

In printing-presses of the general type known as "web presses" it is desirable to have an arrangement of operating-cylinders which shall be adjustable relatively one to another in order to accommodate themselves to the printing of sheets of different sizes, and said adjustment should be possible without interfering with the gearing driving said cylinders. Inasmuch as it sometimes happens that the pattern or form to be printed on the web of material fed into the press is not an aliquot part of the circumference of the operating-cylinder, it becomes necessary to have a feed mechanism which can be stopped while the blank portion of the cylinder is passing, and which shall start off again when the working portion of the cylinder comes up to the point of tangency. It is also desirable to so arrange the connecting mechanism of the parts that the partly or wholly severed sheets shall remain under control until the moment of their delivery onto the outlay-table, and to provide suitable apparatus for removing those portions of the material trimmed from the finished sheets. To accomplish these objects and others not specifically enumerated and to produce a printing mechanism which shall be simple and adjustable in its construction and positive in the action of all its parts, I have designed the apparatus herein described and illustrated, in which the feed mechanism, consisting of the endless bands 14, running over the pulleys 12 12^a, is similar to that described in the joint application of myself and Henry Barth, filed June 3, 1890, Serial No. 354,093. As in the arrangement described in said application, the continuous web of material 9 comes from the roll 4, passes over the feed-roller 48, under the feed-roller 49, by which it is pressed onto the projections of the endless band 14 of the feed mechanism. It is then carried forward through the feed-rollers 5, 5^a, 5^b, 5^c, 7, and 8, and the operating-cylinders 15, 16, 15^a, 16^a, 17, and 18, and the printed and separated sheets are delivered upon the outlay-table 11 in a pile 10. The two or more sets of operating-cylinders 15 16 15^a 16^a are provided with an inking apparatus. More sets of operating-cylinders would be employed if more than two colors were to be used in printing. Said cylinders are journaled in the adjustable carriages 3 (see Fig. 7) and have the form-rollers 23, the vibrating ink-distributing cylinders 22, the riding rollers 24 25 26, the dip-roller 21, and the ink-fountain 20, or some equivalent inking apparatus operating in conjunction therewith. The carriages on which the operating-cylinders 15 16 15^a 16^a are mounted are adjustable along the bearings thereof, they being shown in Fig. 1 in their position farthest apart and in Fig. 2 in their position nearest together, the adjustment varying according to the pattern which is to be printed upon the material. Motion is transmitted from one of said pairs of oper-

ating-cylinders to another by means of the links shown in dotted lines, pivoted together, and having their free ends pivoted to the axes of the cylinders 15, 16, 15ª, 16ª, 17, and 18. Gears which have their axes coinciding with the points about which these levers are pivoted are connected together by intermediate gears supported by the links, so that from the gear 53 on the cylinder 18 there is a continuous train of gearing 42 43 44 to the gear 54 on the cylinder 16ª, and from there the train 45 46 47 extends to the cylinder 16. The web of material 9 passes over the feed-roller 48 49 in the shape indicated in Fig. 3, and is thereby smoothed and subjected to the proper tension before it is attached to the feed mechanism. The roller 48 is mounted on the pivoted arms 51, which are adjustable by means of a bolt passing through the curved slot 52 in the standard, whereby the position of the roller 48 may be varied. The roller 49 and pulleys 12ª 12 are capable of axial adjustment by means of set-screws in the well-known way, as indicated in Figs. 4 and 5. The feed-band 14 is perforated so that the sprocket-teeth 12ᵇ may mesh therewith.

The detent mechanism for the feed-gear is illustrated in Figs. 7 and 8. Motion being transmitted to the shaft 29ª, on which the gear 29 is mounted, by means of the pinion 28, fast and loose pulleys 27 27ª, and fly-wheel 40, we have the disk 58 rigidly keyed to said shaft. The disk 55, concentric therewith, is loosely mounted on the shaft, and revolves therewith only when sufficient pressure is exercised by screwing down the nut 57 to compel the disk 58 to transmit its motion through the leather packing-disk 56 to the disk 55. The disk 58 is made hollow at 71, as shown in Fig. 8, and within the reservoir thus made oil is stored, which is fed through the openings 72 to the leather friction-disk. Under normal conditions, therefore, motion from the shaft 29ª is transmitted to the gear 30ª thereon, and this meshing into the gear 34, which is keyed on the shaft bearing the pulleys 12ª, drives the feed mechanism. If any obstruction to the revolution of the disk 55 is presented, however, it will stop, the friction of the leather disk being overcome. Such an obstruction is periodically presented by the detent-lever 63, which is forced down by the spring 65 to engage the ratchet-teeth of the disk 55 when the cam which operates the detent mechanism will permit it. Said cam may be of any construction which renders it adjustable; but the preferred form is that illustrated in Figs. 9 to 11, in which the cam-plates 60 and 61 are adjustably held together by means of bolts, as clearly illustrated. When said plates are fastened together, the beginning of the cam is by means of a gradual rise y, (shown in Fig. 10,) while the termination of the cam is abrupt, as shown at x. The adjustment of the two cam-plates one upon the other will evidently regulate the time during which the detent-lever may be in engagement with the ratchet-teeth on disk 55, as will be easily seen from Fig. 7. In order to give a quick action to said detent-lever, the block of steel 64, so arranged as to form a rectangular offset, affords the last point of support for the detent-lever on the cam, so that at the moment the edge of the block 64 passes the abrupt termination of the cam at x the detent will instantly drop into position. The friction-roller 62 rolls easily up the portion y of the cam, and lifts the detent out of engagement without any shock to the machinery.

The cylinder 17 is the knife-cylinder, having one or more adjustable knives 19, which, when pressed against the incision-cylinder 18, make a transverse cut in the web of material 9 passing through the press. Said cylinders are of the same diameter as the other operating-cylinders 15 16 15ª 16ª, and by means of the gears 38 37, &c., these cylinders are caused to revolve at the same speed. If, therefore, the adjustable cam-plates be so arranged that the distance from x to y coincides exactly with the blank space on the printing-cylinders, it is evident that the feed mechanism will stand still while said blank space is passing, and the succession of patterns upon the material will be continuous with no intervening space between.

In the feed-rollers 8 or in any equivalent rollers are fixed the second set of rotary knives 41. The transverse knives 19 are so arranged that they do not quite extend to the row of perforations formed by the projections on the feed-bands. Consequently after the material has passed said transverse knives it is still held together by the continuous edges and is under control of the feed mechanism. The rotary knives 41 are placed sufficiently far inside of this row of perforations to intersect the transverse cuts made by the knives 19, and so separate the material into distinct sheets, while the continuous ribbon formed by the perforated edge portions runs along with the feed-bands 14. The sheets are removed to the outlay-table 11 by any suitable apparatus of tapes or its equivalent, and to remove the perforated edges from the feed-bands I employ the curved and bifurcated guide 70, the split or bifurcated end of which straddles the line of projection of the feed-band and lifts the ribbon 69 therefrom. The guide 70 is then bent in the form of a helix to a right angle, and the waste portion of the material is thereby led off at right angles to the line of travel of the completed sheets. Motion is transmitted to the pressure-roller 6 by the pinion 36 meshing with the gear 34, Fig. 12. Motion is similarly transmitted by the pinions 66, meshing with gear 35, to the pinions 67 and 68 on the rollers 8. Motion is transmitted to the knife-cylinder 17 by the gear 38, meshing with the gear 53, and to the printing or form cylinder 15ª by the gear 37, meshing with the gear 54. In the same way motion is given to the feed-rollers

48 and 49 by the pinions 50 and 59 (see Fig. Fig. 5) from the gear 35, it being understood that the driving-power was transmitted in the first place from the shaft 29^a by the pinion 30 to the gear 53 and by the pinion 30^a, Fig. 8, to the gear 34.

The operation of my invention is evident from the foregoing description. The different sets of operating-cylinders are arranged at a distance apart equal to the length of the pattern being printed or equal to some multiple of that length. If the length of the pattern is an aliquot part of the circumference of these cylinders, then the stereotype-plates will completely cover the surfaces of said cylinders, and all parts of the machine will run continuously, the detent mechanism being thrown out of gear; but if the length of said patterns is such that a portion of each printing-cylinder—say one-tenth part—is left blank, then the cam-plates 60 and 61 are so adjusted that the distance from x to y will be one-tenth part of the circumference of said cam-plate and equal to one-tenth said printing-cylinder. Consequently the detent will act and the feed mechanism will stop while this blank tenth part of each operating-cylinder is passing. The pattern having thus been printed upon the continuous web in a regular succession of reproductions, the transverse knives 19 are so arranged as to cut between said patterns, and the material held together by the continuous edges is then fed along to the rotary knives 41, which are adjusted to the exact width of the pattern and cut out each separate and complete sheet, the continuous ribbons formed by the perforated edges of the material passing out through the guides 70, while the sheets are deposited upon the outlay-table.

The advantages of my construction are evident from its adjustability and simplicity of construction and the ease with which the adjustment may be made without complicated calculations or resort to tedious cut and try methods.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a machine for printing a continuous sheet, the combination of two or more pairs of operating-cylinders, the carriages in which said cylinders are mounted being adjustable along the line of the continuous sheet, and flexible trains of gearing transmitting motion from one set of said pairs of cylinders to another, substantially as described.

2. The combination of two or more sliding carriages adjustable with respect one to another, links which are pivoted one to another and to the carriages, gear-wheels whose axes coincide with said pivotal points, and intermediate gear-wheels mounted on said links, whereby motion may be conveyed from the mechanism mounted on one carriage to that mounted on the other independent of the relative positions of said carriages, substantially as described.

3. The combination of a feeding mechanism, a friction member in the line of gearing transmitting motion to said feed mechanism, a detent for the feeding mechanism, the knife-cylinder, and the detent-actuating apparatus which consists of the two cam-plates adjustable one upon the other, substantially as described.

4. The combination of a feed mechanism, a friction member in the line of gearing transmitting motion to said feed mechanism, a detent for the feed mechanism, the knife-cylinder, and the adjustable cam which revolves with said cylinder and actuates the detent, together with the operating cylinder or cylinders revolving at the same circumferential speed as the knife-cylinder, substantially as described.

5. The combination, with a cam which terminates suddenly and rises again gradually, of a detent-lever, a rectangular offset which affords the last bearing-point of the lever upon the cam, and a friction-roller which lifts the lever up onto the cam again, substantially as described.

6. The combination of the feed mechanism, which consists of two endless bands with rows of projections thereon, a set of transverse knives which do not quite extend to the said rows of projections, mounted on a knife-cylinder, and a second set of rotary knives upon a separate cylinder, which cut from the continuous web of material the edges which have been perforated by the feed mechanism, thereby forming a succession of separate sheets, substantially as described.

7. The combination of the feed mechanism, which consists of two endless bands with rows of projections thereon, a set of transverse knives which do not quite extend to the said rows of projections, mounted on a knife-cylinder, and a second set of rotary knives upon a separate cylinder, which cut from the continuous web of material the edges which have been perforated by the feed mechanism, thereby forming a succession of separate sheets, together with the forked and curved guides for removing said perforated edge portions, substantially as described.

8. The friction-gear for intermittent feed mechanism composed of a wheel formed of two parts pressed together by a screw, one of said parts being made hollow to form an oil-reservoir, a leather disk between said parts, and passages from said oil-reservoir to said disk, substantially as described.

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