(No Model.)

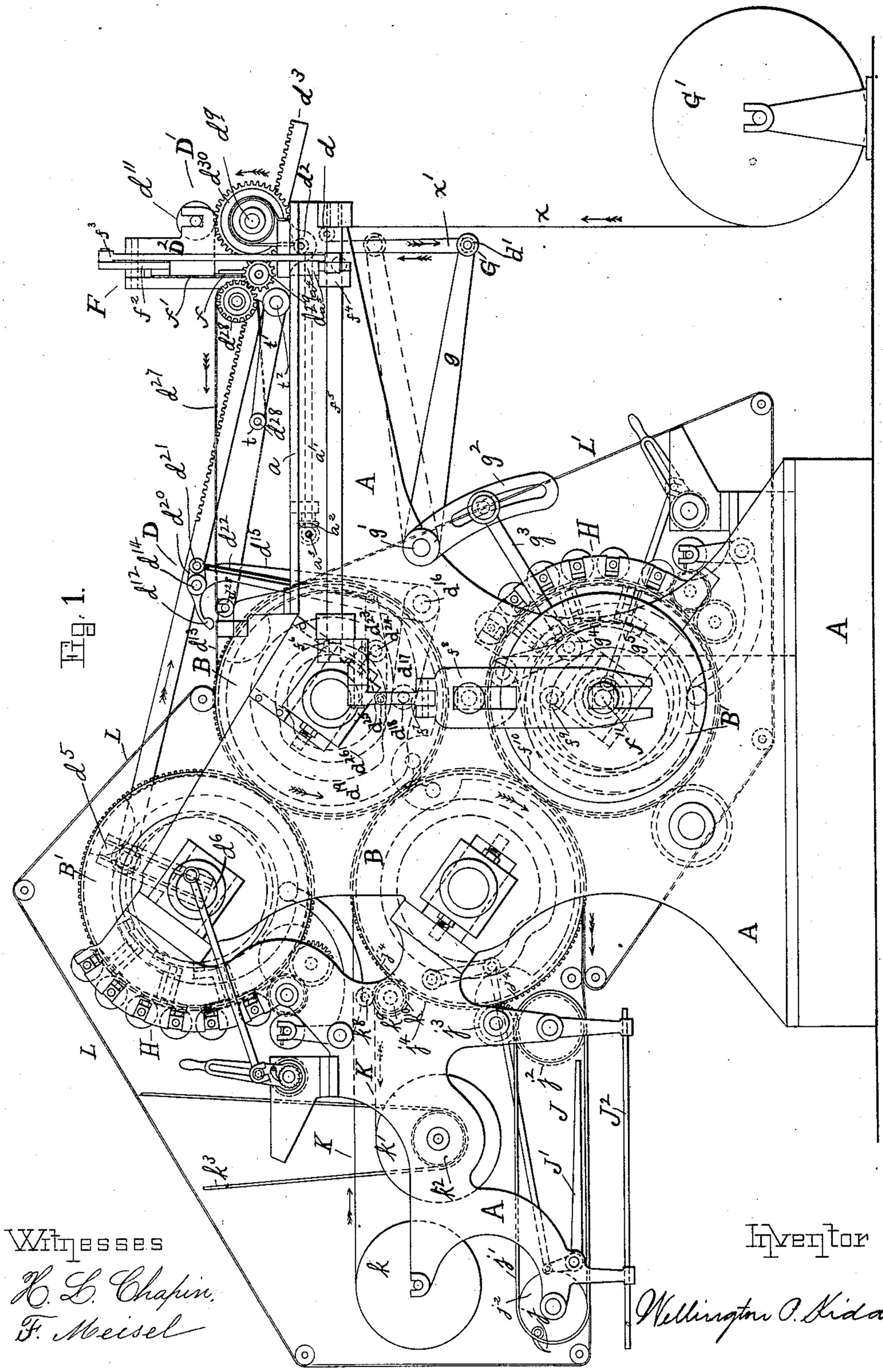
5 Sheets—Sheet 1.

W. P. KIDDER.

PRINTING MACHINE.

No. 432,413. Patented July 15, 1890.

Fig. 1.



Witnesses

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F. Meisel

Inventor

Wellington P. Kidder

(No Model.)

5 Sheets—Sheet 2.

W. P. KIDDER.

PRINTING MACHINE.

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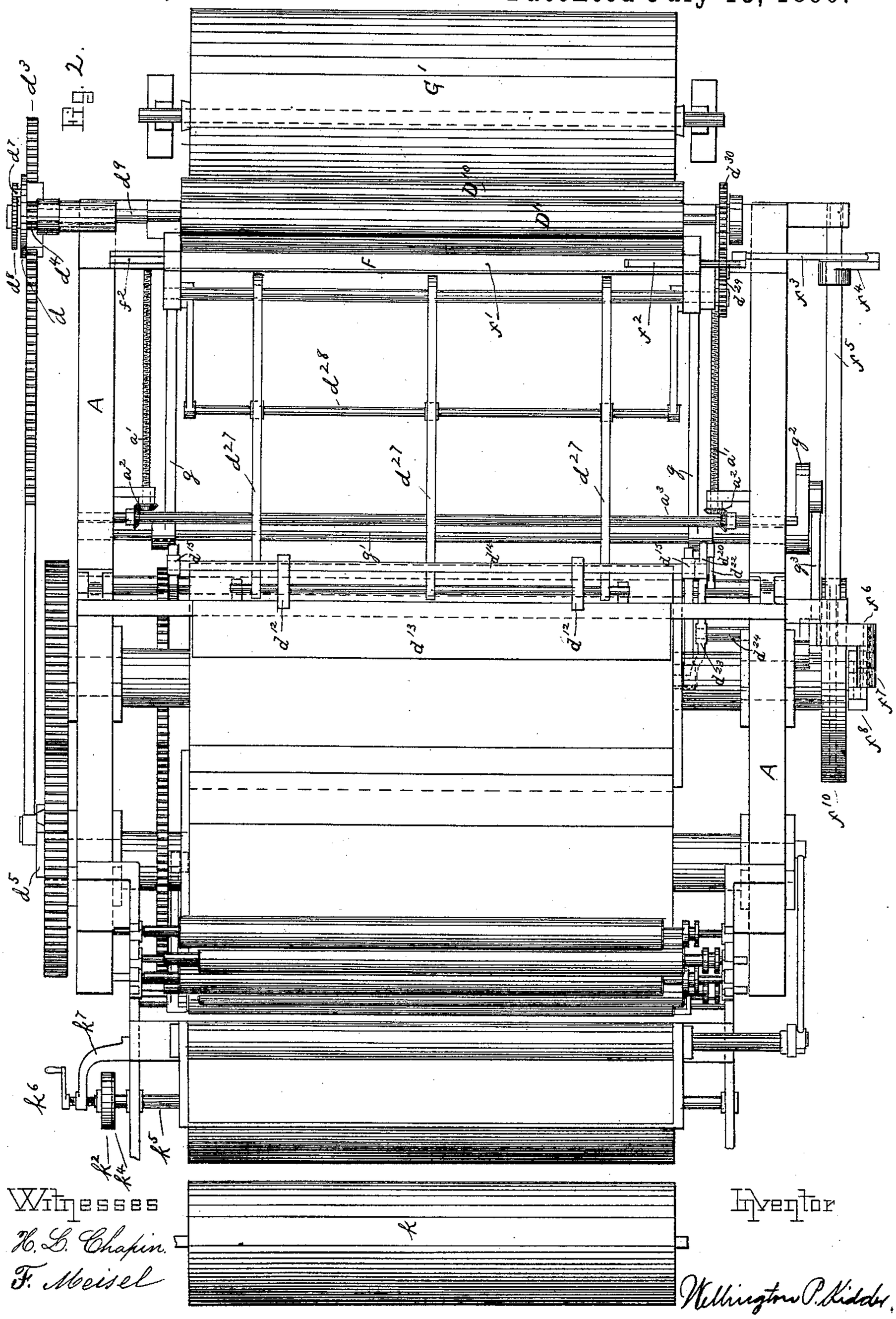

Witnesses

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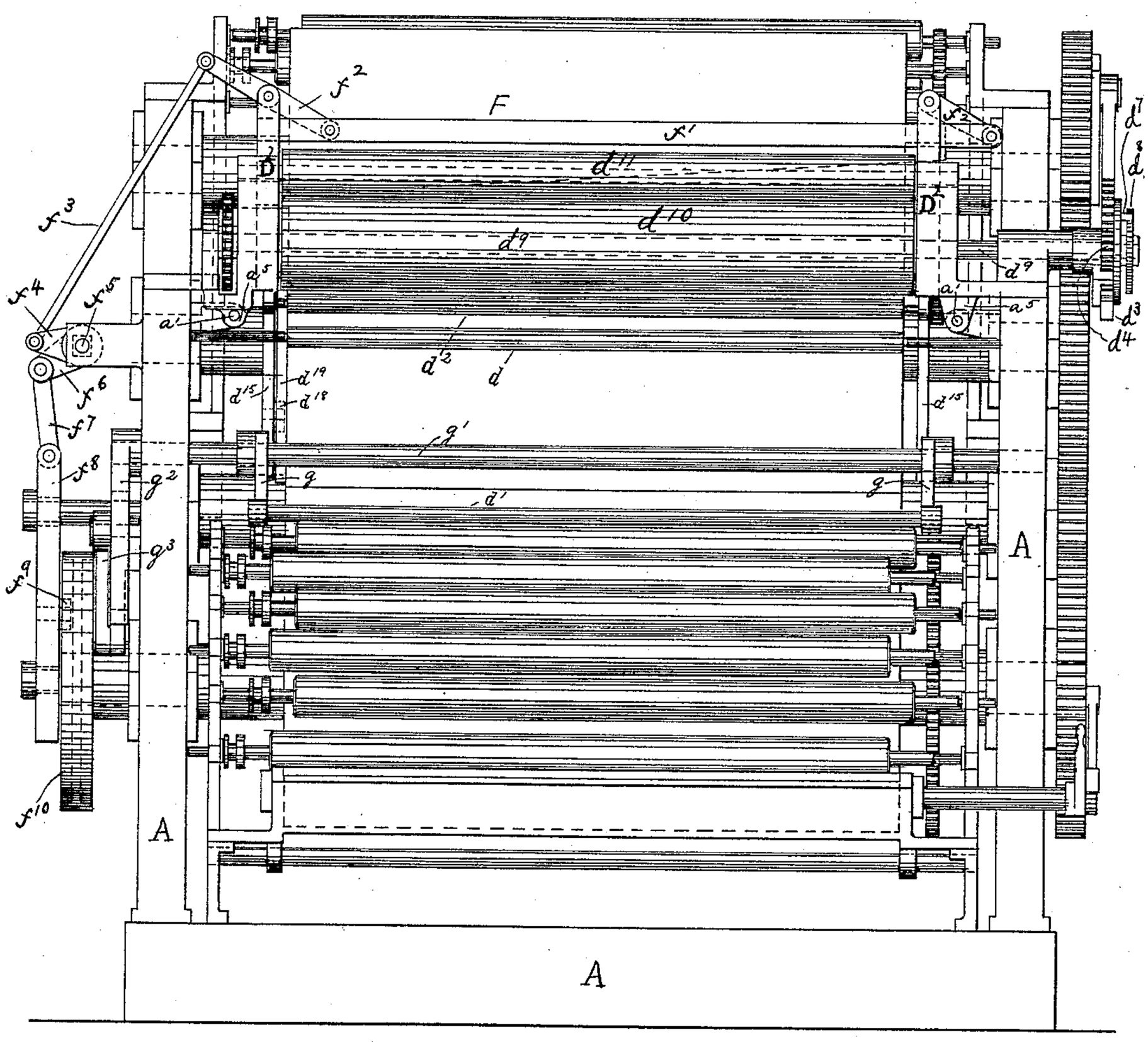
5 Sheets—Sheet 3.

W. P. KIDDER.

PRINTING MACHINE.

No. 432,413. Patented July 15, 1890.

Fig. 3.



Witnesses

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(No Model.) 5 Sheets—Sheet 4.

W. P. KIDDER.

PRINTING MACHINE.

No. 432,413. Patented July 15, 1890.

Fig. 5.

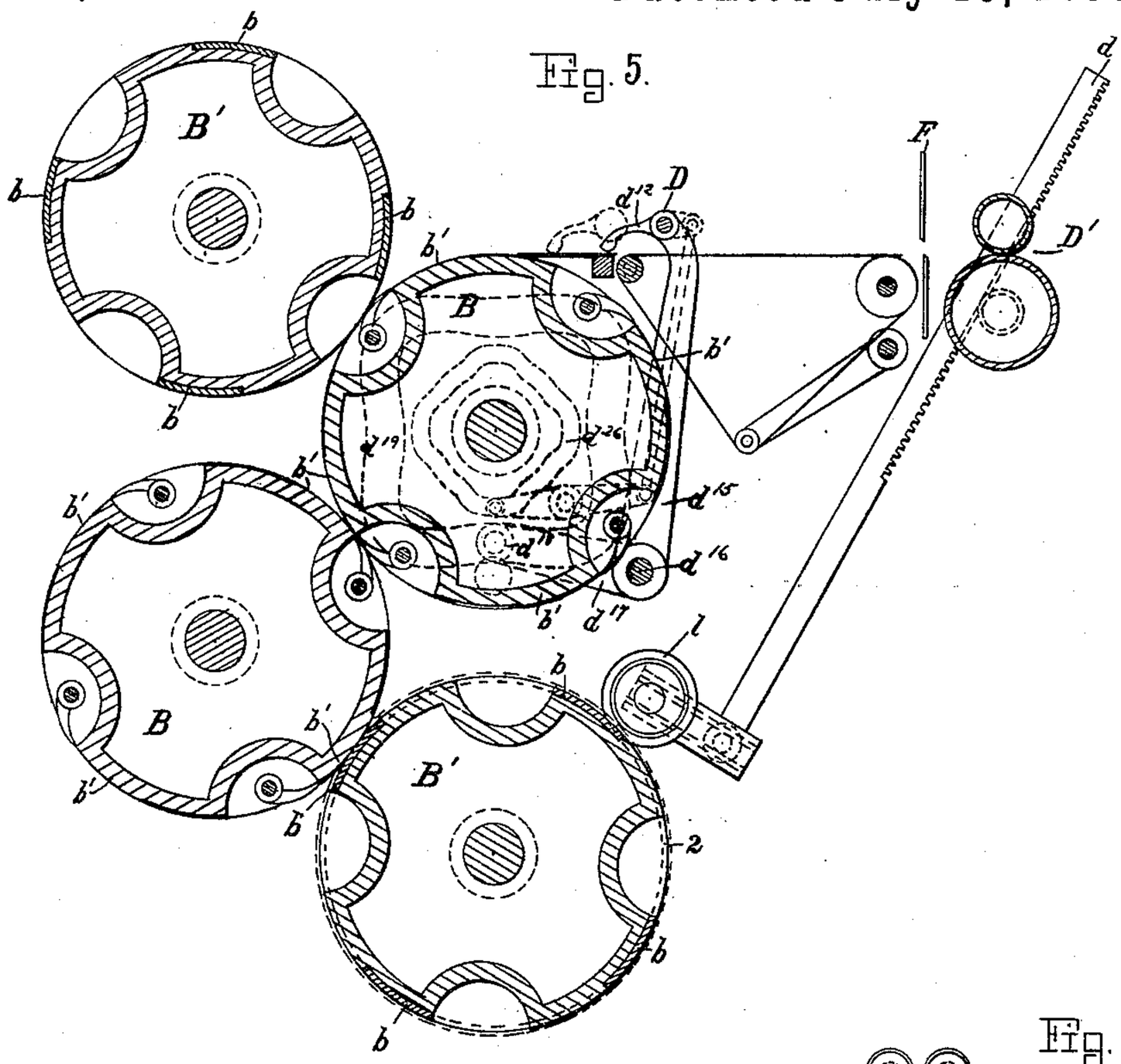


Fig. 6.

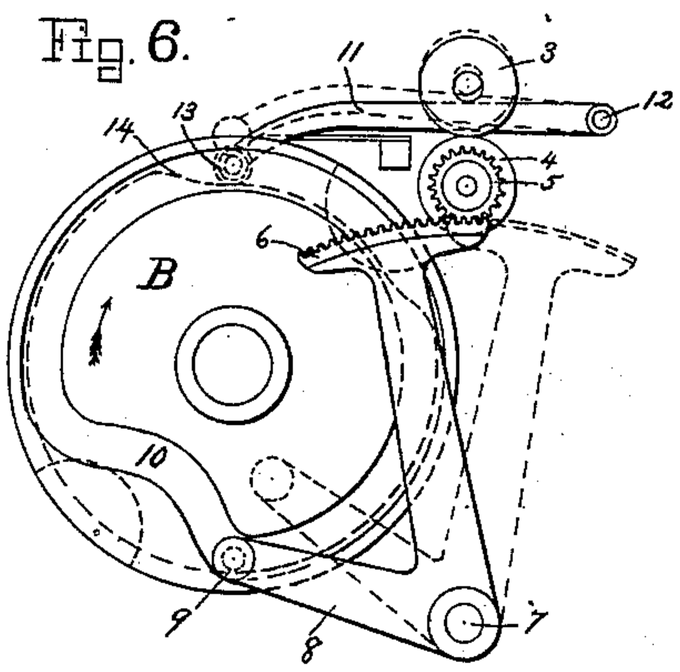
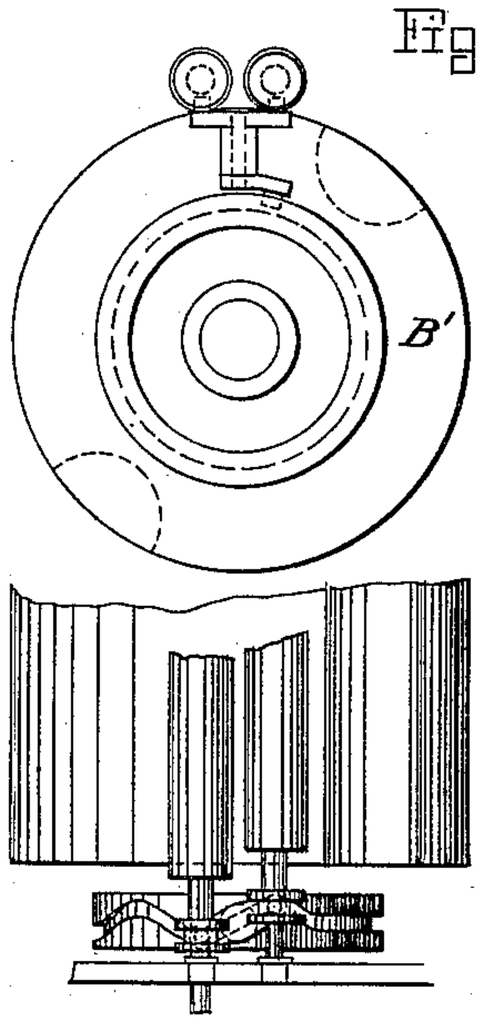


Fig. 4.



Witnesses

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(No Model.) 5 Sheets—Sheet 5.

W. P. KIDDER.

PRINTING MACHINE.

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Fig. 7.

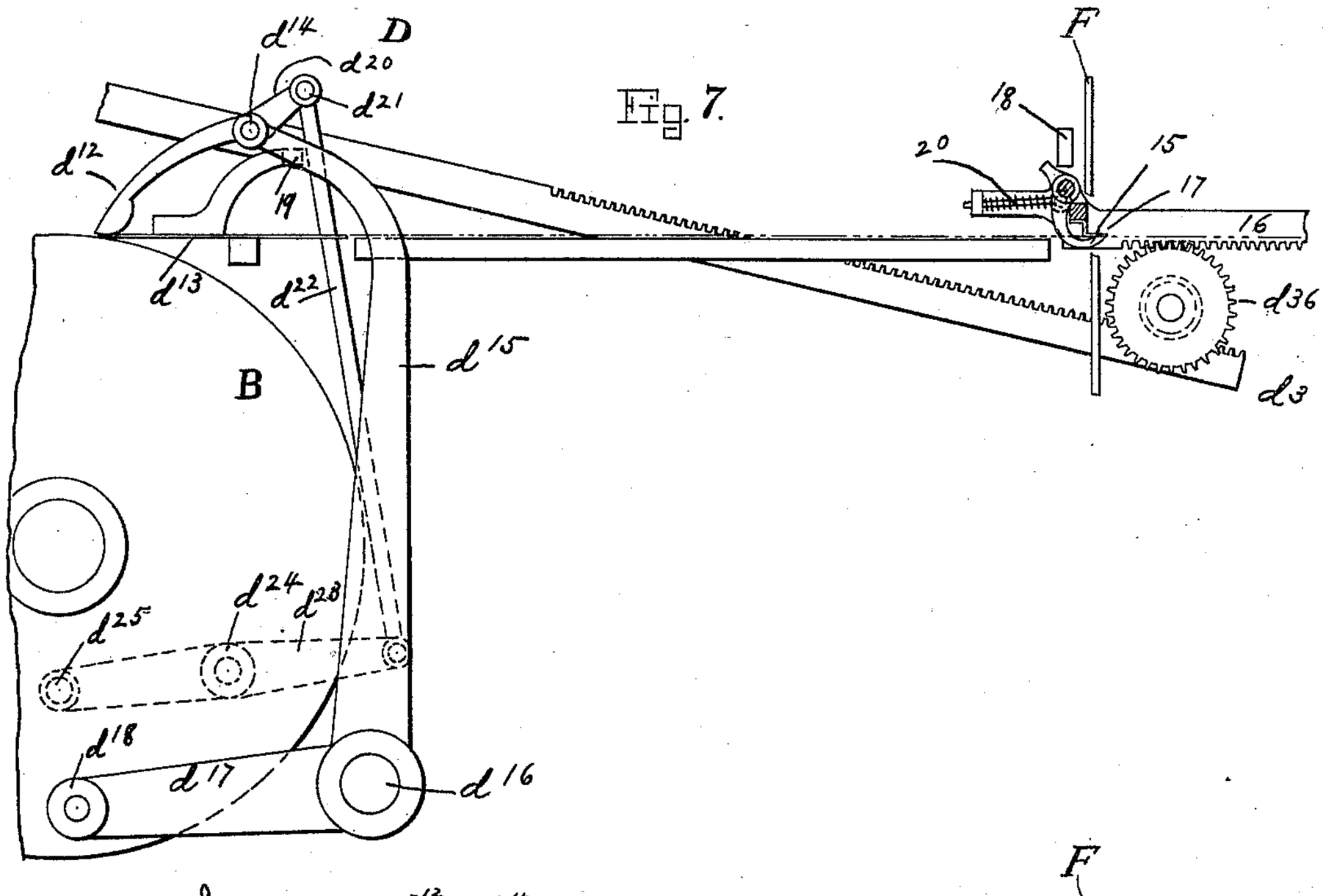
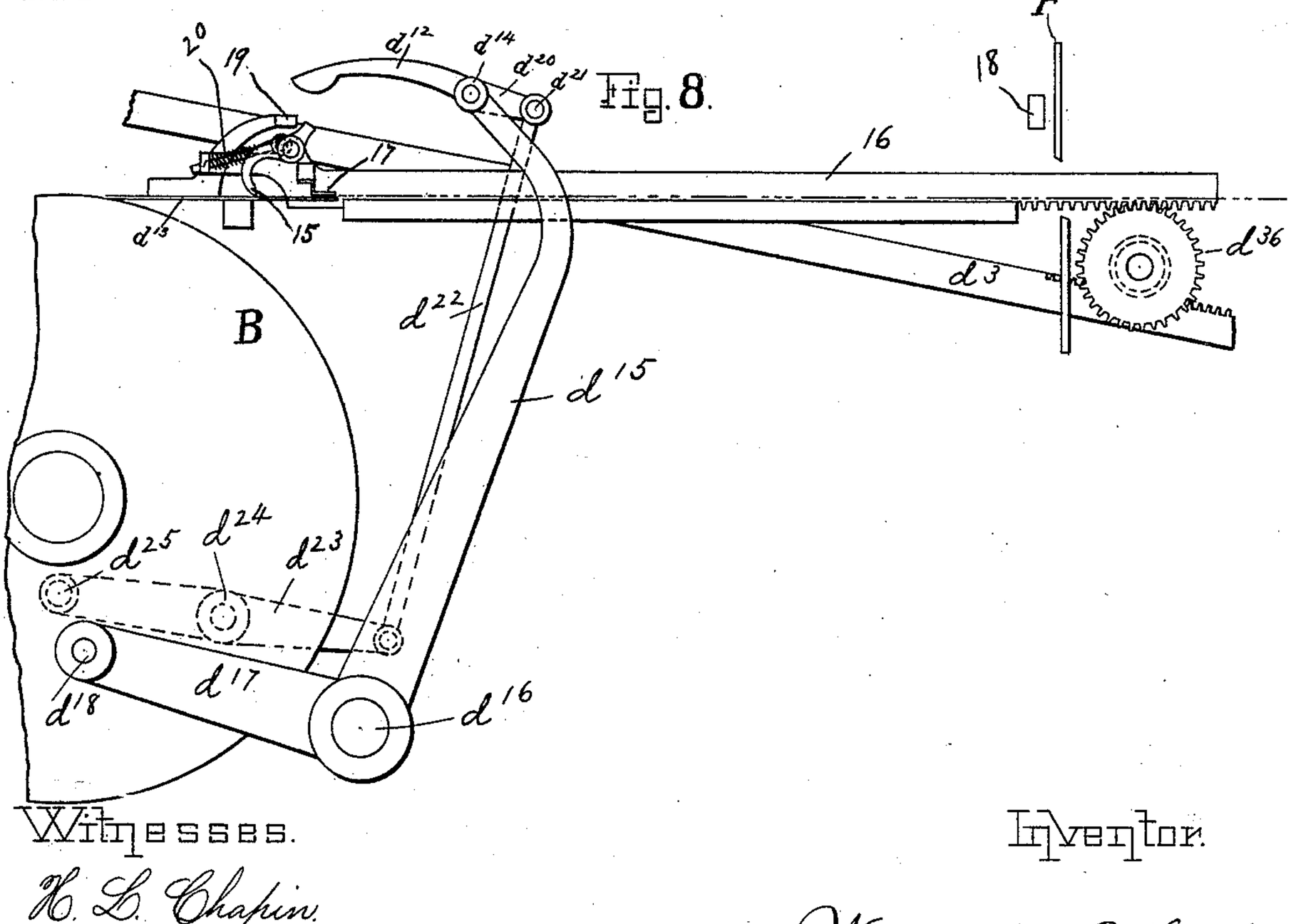


Fig. 8.



Witnesses.
H. L. Chapin.
F. Moeisel

Inventor.
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UNITED STATES PATENT OFFICE.

WELLINGTON P. KIDDER, OF BOSTON, MASSACHUSETTS.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 432,413, dated July 15, 1890.

Application filed August 14, 1889. Serial No. 320,741. (No model.)

To all whom it may concern:

Be it known that I, WELLINGTON P. KIDDER, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of one form of machine embodying my invention. Fig. 2 is a top plan of the same. Fig. 3 is an end elevation of the same. Fig. 4 shows an end view and a partial plan of ink-distributing mechanism. Figs. 5, 6, 7, and 8 show modifications, Fig. 5 illustrating a feed the motions of which vary in number in a given interval according to the number of forms carried by the impression-cylinders, and also illustrating impression-cylinders carrying a number of forms each. Fig. 6 shows a modified form of my auxiliary feed. Figs. 7 and 8 show a modified form of my intermittent feeding device in two positions.

The object of my invention is to produce a high-speed printing-press adapted to print different-sized sheets within the maximum—that is, sheets varying in size from a visiting-card to a newspaper.

In the drawings, in which I show the features of my invention embodied in the best form now known to me, although it is obvious that they may be embodied in constructions different from that shown, A is a frame, B are impression-cylinders, and B′ form-cylinders.

D is an auxiliary feed; D′, an intermittent feed; F, a sheet-severing device; G, a compensating device for converting a continuous feed of the web into an intermittent feed and keeping unwound paper under tension between roll G′ and the intermittent feed D′.

G′ is a roll from which the web passes to the feeding devices.

H is the inking apparatus, and J the sheet-delivering apparatus.

The impression and form cylinders will vary in number, as will be plain to all skilled in the art. Each form-carrying cylinder is provided with one or more forms *b*, each impression-cylinder being formed with an impression-surface *b′*, corresponding to the forms.

The features of my invention will be most readily understood from a description of the operation of the form of my machine shown in the drawings.

The operation is as follows: A web *x* is unwound from roll G′ and carried to the intermittent feed D′ over the rolls *d*, *d′*, and d^2, and is propelled forward by the intermittent feed D′ to the auxiliary feed D, by which a severed sheet is fed to the cylinders. Feed D′ is best actuated by a rack d^3 and pinion d^4, driven by a crank d^5, fast on shaft d^6 of a cylinder B′, and by a pawl d^7 and ratchet d^8. When rack d^3 moves in one direction, (see arrow in Fig. 1,) pawl d^7 engages the ratchet d^8 on shaft d^9 of the roll d^{10}, which is a member of the intermittent feed D′, (the other member being roll d^{11},) and the feed is actuated to draw the web and to propel the web through the severing device F. This severing device in this case consists of blades *f f′*, blade *f* being stationary and blade *f′* reciprocated toward and away from blade *f* by means of links f^2, connecting blade *f′* and the bracket D^2. One of the links f^2 is connected by a rod f^3 to a rocker-arm f^4, fast on rocker-shaft f^5, journaled in frame A, and actuated by another rocker-arm f^6, fast on rocker-shaft f^5, and connected to a link f^7, pivoted to a sliding bar f^8, provided with a cam-roll f^9, working with cam f^{10} on shaft f^{11} of one of the form-cylinders B′. (See Figs. 3 and 1.) The parts are so timed that just before the sheet is severed from the web the paper is seized by the auxiliary feed D. An excellent form of this feed is found in the combination of clamping-fingers d^{12} and a plate d^{13}, mounted on frame A. The fingers d^{12} are mounted on a rod d^{14}, journaled in rocker-arms d^{15}, fast on rocker-shaft d^{16}, journaled in frame A. Shaft d^{16} has an arm d^{17}, carrying a cam-roll d^{18}, working with cam d^{19} in a cylinder B. (See Fig. 1.) The rocker-arms d^{15}, shaft d^{16}, and arm d^{17}, carrying the cam-roll d^{18}, obviously form what I will call a "cam-connection"—that is, these parts connect the auxiliary feed D with a cam to actuate it. Rod d^{14} is provided with a rocker-arm d^{20}, fast on it, and this rocker-arm d^{20} is pivoted at d^{21} to connecting-rod d^{22}, pivoted to rocker-arm d^{23}, pivoted in frame A at d^{24}, and carrying a cam-roll d^{25}, working with a cam d^{26} on a cylinder B. (See Fig. 1.) Cam d^{26},

through its connections with rod d^{14}, raises the fingers d^{12} to receive the sheet, and the rod d^{14} is then rocked to clamp the paper between fingers d^{12} and plate d^{13} by an opposite movement of the cam. The sheet is guided between the fingers d^{12} and plate d^{13} of the auxiliary feed D by any suitable mechanism—say by supports d^{27}, (which are preferably carrying-tapes, as shown,) mounted on friction-rollers d^{28}, one of the rollers d^{28} being driven by a gear d^{29}, meshing with gear d^{30} on shaft d^{9}. The supports d^{27} are made adjustable to suit the different distances of the intermittent feed D′ and gearing mechanism F from the cylinder B by the swinging take-up roll t, mounted in the rocker-arms t', pivoted on the rocker-shaft t^2, which is journaled in the frame of the intermittent-feed mechanism D′. Rocker-arms t' are fast to rocker-shaft t^2, the rocker-shaft t^2 being partially rotated to raise or lower the take-up roll t to any desired position, and is made fast by any suitable friction device, as a set-screw. The inner end of the sheet being now gripped, the severing mechanism divides a sheet from the web, and the severed sheet is propelled to an impression-cylinder B, provided with some suitable gripper or clamping device—say tapes L and L′. The auxiliary feed D is so timed and constructed as to feed the severed sheet to the cylinder at a speed equal or very nearly equal to the surface speed of the cylinder, and this is its main function and one of the most important features of my invention. Feed D is an intermittent feed, and the plate d^{13} has a highly-polished surface and the fingers d^{12} should be friction-tipped. I prefer to form them with rubber tips. The movement of rocker-arm d^{15} gives the fingers a push motion toward the cylinder, and the consequence is that the fingers slide the sheet to the cylinder, and, owing to the timing of the cam d^{19}, the auxiliary feed D is accelerated from start to finish, and the sheet reaches the tapes L and L′ at a speed substantially equal to the surface speed of the cylinder. The great advantage of this feature of my invention is that the sheet is advanced to the clamping device, tapes, or metallic grippers, as the case may be, in such wise that the clamping device may move gradually to receive the sheet, and this is of the utmost importance when an intermittent feed is employed in a high-speed machine.

It is important that the web be unwound continuously to avoid jerking and undue strain on the paper in its unwinding from the roll, and that this continuous movement of the web be converted at the severing mechanism into an intermittent movement, so that the paper may be at rest when the severing mechanism acts. Inasmuch as the feed D′ is idle part of the time, (being intermittent to allow the severing mechanism to act,) it must feed when in service at a speed greater than the normal speed of the web as the web leaves the roll, and to enable this to be done I interpose between the roll G′ and the feed D′ a compensating device G, consisting, in the form shown, of a roll d', pivoted in rocker-arms g, fast to rocker-shaft g', pivoted in frame A. Another arm g^2, fast on rocker-shaft g', is pivoted to rod g^3, carrying a cam-roll g^4, which engages with cam g^5, fast on shaft f^{11} of a cylinder B′. As during its period of motion the intermittent feed D′ carries the paper at a greater speed than the normal speed of the web while it is unwinding from the roll G′, and as during the periods of rest of feed D′ the motion of the roll G′ continues, it follows that such regular continuous movement of roll G′ as is essential to prevent breaking the web cannot satisfy the demands of the intermittent feed, and, therefore, I provide a surplus of unwound paper to be drawn from by the intermittent feed independently of the normal resistance to the pull of feed D′ occasioned by the weight of roll G′, and this surplus of paper so freed very largely from resistance to the pull of feed D′ is found in the loop of the web, which is formed by passing the paper around the rolls d d' d^2. Roll d' is a "dancing roll," so called, and lies in loop x' of web x, and is given a downward movement during the idle periods of the intermittent feed to lengthen the loop x' to correspond to the flow of paper from roll G′. When the intermittent feed moves the paper, the dancing roll d' rises, (see dotted lines in Fig. 1), the position of the dancing roll d' and its lever g depending, of course, on the size of sheet to be severed, surrendering the surplus of paper in the lengthened loop, and thereby making up to the intermittent feed D′ the deficiency in the unwinding of roll G′. Care must be taken in timing the motion of cam g^5, which actuates the dancing roll d' through connecting-rod g^3, lever g^2, rocker-shaft g', and lever g, in order that the unwinding of roll G′ be uniform and without material variation in respect of tension. The throw of the roll d' is variable by means of the slotted lever g^2 and the adjustable connecting-rod g^3 to adapt the machine for sheets of different lengths. The length of paper fed at each movement of the intermittent feed depends on the amount of rotation given by rack d^3 to rolls d^{10} d^{11}. The throw of rack d^3 is adjusted by varying its points of connection with the adjustable crank d^5. The bracket D^2, in which rolls d^{10} d^{11} are mounted, slides freely on tracks a in this form of my machine, carrying with it the severing device F, and is actuated by screws a', provided with beveled gears a^2, which mesh with beveled gears on shaft a^3, which receives a crank (commonly a hand-crank) and is rotated to drive the screws a' simultaneously. The screws a' pass through nuts a^4, mounted on extensions a^5 of bracket D^2.

By adjusting the sheet-severing mechanism F it is plain that the front end of the sheets may be brought always to the auxiliary feed regardless of the size of the sheets, and this is a radical novelty with me. By feeding the

front end of the sheets always to the same point they reach the position in which they are seized by the auxiliary feed from which they are advanced by the auxiliary feed to the cylinders.

The severing mechanism F is, solely for convenience, mounted on the same bracket D^2, which supports the feed D′, but may be quite independent of it, if desired. The rotation of the intermittent feed D′ is adjusted by varying the throw of rack d^3, this being a convenient construction for adjusting the rotation of the intermittent feed.

The forms *b* are secured on their cylinders in any suitable manner and are inked by any suitable mechanism H, which will be readily understood by all skilled in the art without particular description. From the auxiliary feed D the sheet is carried between the cylinders in a manner too well-known to require description, and is received from the cylinders by any suitable delivering mechanism J, in this case provided with grippers *j*, mounted on a band *j′*, running over pulleys j^2, which are driven by gears j^3, meshing with gears j^4 on a cylinder B. It is convenient to use a fly J′ in connection with delivering mechanism J and to provide a table J^2 to receive the sheets if the sheets are not to be discharged into a folding-machine. Offset web K is wound from roll *k* to roll *k′* by a friction-pulley k^2, driven, say, by a belt k^3, the pulley k^2 being coupled to a friction-flange k^4, fast on shaft k^5 of roll *k′*. In order to prevent the friction-winding, which is controlled by adjusting the friction-pulley k^2 k^4—say by a screw k^6, mounted in a bracket k^7 on frame A—from pulling the web K from the cylinders at a rate of speed greater than the surface speed of the cylinders—that is, to keep the web K traveling at a speed equal to the surface speed of the cylinders—I provide grip-rolls k^8 k^9, roll k^8 being mounted in bearings in frame A and exerting a pressure against roll k^9, which is mounted in bearings in frame A and driven by its gear k^{10}, meshing with gear j^4 on a cylinder B, and drives roll k^9 at a speed equal to the surface speed of its cylinder B. The offset web K is held against the cylinder B, so as to have a speed substantially the same as the surface speed of the cylinder, by the tapes L L′, which, serving as clamps, not only receive the severed sheet, but also serve to hold the offset web against the cylinder, as stated.

The sheets are carried through the machine, preferably, by tapes L L′, the operation of which will be readily understood by all skilled in the art without particular description. The parts unlettered will be readily understood by those skilled in the art without description.

In Fig. 5 I show a modification, the cylinders B′ being provided each with two or more forms *b* and combined with a multiplied intermittent feed D′ and a multiplied auxiliary feed D, rack d^3 in this case being driven by a gear 1, meshing with gear 2 on a cylinder B′. The severing mechanism F is of course multiplied in its operation to correspond to the movements of feed D′. The auxiliary feed D is also multiplied, say, by cam d^{19} on cylinder B working with cam-roll d^{18} on rocker-arm d^{17}, fast to rocker-shaft d^{16}, carrying arms d^{15}, supporting fingers d^{12}, as hereinbefore described. Cam d^{26} in this case is formed to give a multiplied motion to fingers d^{12}. By this construction I am enabled to print a number of sheets at each revolution of the cylinder, which may, of course, vary in number from two upward.

In Fig. 6 a modification of the auxiliary feed D is shown. In this construction a pair of grip-rolls 3 4 are used in place of fingers d^{12}. Grip-roll 3 is actuated by friction contact with roll 4, and roll 4 is driven by gear 5, meshing with segment 6, pivoted to frame A at 7, and having an arm 8, with a cam-roll 9, engaging cam 10 on a cylinder B. When segment 6 is in the position shown in full lines in the drawings, grip-roll 3 is in position to be raised by lever 11, pivoted on frame A at 12, and provided at its other end with cam-roll 13, engaging cam 14 on cylinder B. When roll 3 is raised, a sheet is fed between the rolls by the intermittent feed D′, and movement of cam 14 allows lever 11 to drop, gripping the sheet between rolls 3 and 4. Cam 10 now actuates segment 6 to bring it to the position shown in dotted lines, thus feeding the sheet to the cylinder with the equivalent of the push motion obtained by the fingers d^{12}. The segment 6, pivoted to frame A at 7, and having an arm 8, carrying the cam-roll 9, is the equivalent of the parts which I have hereinbefore termed "a cam-connection."

In Figs. 7 and 8 a modification of the intermittent feed above referred to is shown, the two figures illustrating the parts in different positions. In this construction reciprocating grippers 15 seize the inner end of the sheet, and these grippers are actuated by racks 16, which are driven by gears d^{36} at each side of the machine. Grippers 15 clamp the web against a bearing 17, and are actuated to do this by coming in contact with a stop 18, being opened to receive the web by the stop 19 and kept open by spring 20 until it is returned against stop 18.

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

1. In a printing-press, the combination of a cylinder, its clamp, an auxiliary feed, a sheet-severing device, and an adjustable intermittent feed with a support maintained in a fixed plane and supporting a sheet from the severing device to the cylinder and clamp, the auxiliary feed and adjustable intermittent feed being independent one of the other, substantially as and for the purpose set forth.

2. In a printing-press, the combination of a cylinder, its clamp, an auxiliary feed, a sheet-severing device, and an adjustable in-

termittent feed, the auxiliary feed surrendering the sheet to the cylinder and clamp at a speed corresponding to the surface speed of the cylinder, substantially as and for the purpose set forth.

3. In a printing-press, the combination of a cylinder, its clamp, an auxiliary feed, a sheet-severing device, and an intermittent feed with a paper-roll support and a compensating device, substantially as and for the purpose set forth.

4. In a printing-press, the combination of a cylinder, its clamp, a feed, and means, substantially such as described—for example, a cam and a cam-connection connecting the cam and the feed—to accelerate the speed of the feed to cause the feed to surrender a sheet to the cylinder and clamp at the surface speed of the cylinder, all substantially as and for the purpose set forth.

5. In a printing-press, the combination of an adjustable intermittent feed D′, severing mechanism F, independent auxiliary feed D, and adjustable carrier d^{27}, substantially as and for the purpose set forth.

6. In a printing-press, the combination of the intermittent feed D′ with dancing roll d' and its cam g^5, and means, substantially such as described—for example, adjustable crank d^5, arms g, rocker-shaft g', lever g^2, having a slot, and links g^3, one link g^3 having a pin working in a slot in lever g^2—to vary the stroke of the dancing roll according to the adjustment of the intermittent feed, all substantially as and for the purpose set forth.

7. In a printing-press, the combination of a cylinder B, intermittent feed D′, auxiliary feed D, and means, substantially such as described—for example, arms d^{15}, rocker shaft d^{16}, lever d^{17}, cam-roll d^{18}, and cam d^{19}—for actuating the auxiliary feed to deliver a sheet to the cylinder at a speed corresponding to the surface speed of the cylinder, all substantially as and for the purpose set forth.

WELLINGTON P. KIDDER.

Witnesses:
F. MEISEL,
HERBERT L. CHAPIN.