

**No. 686,926.**

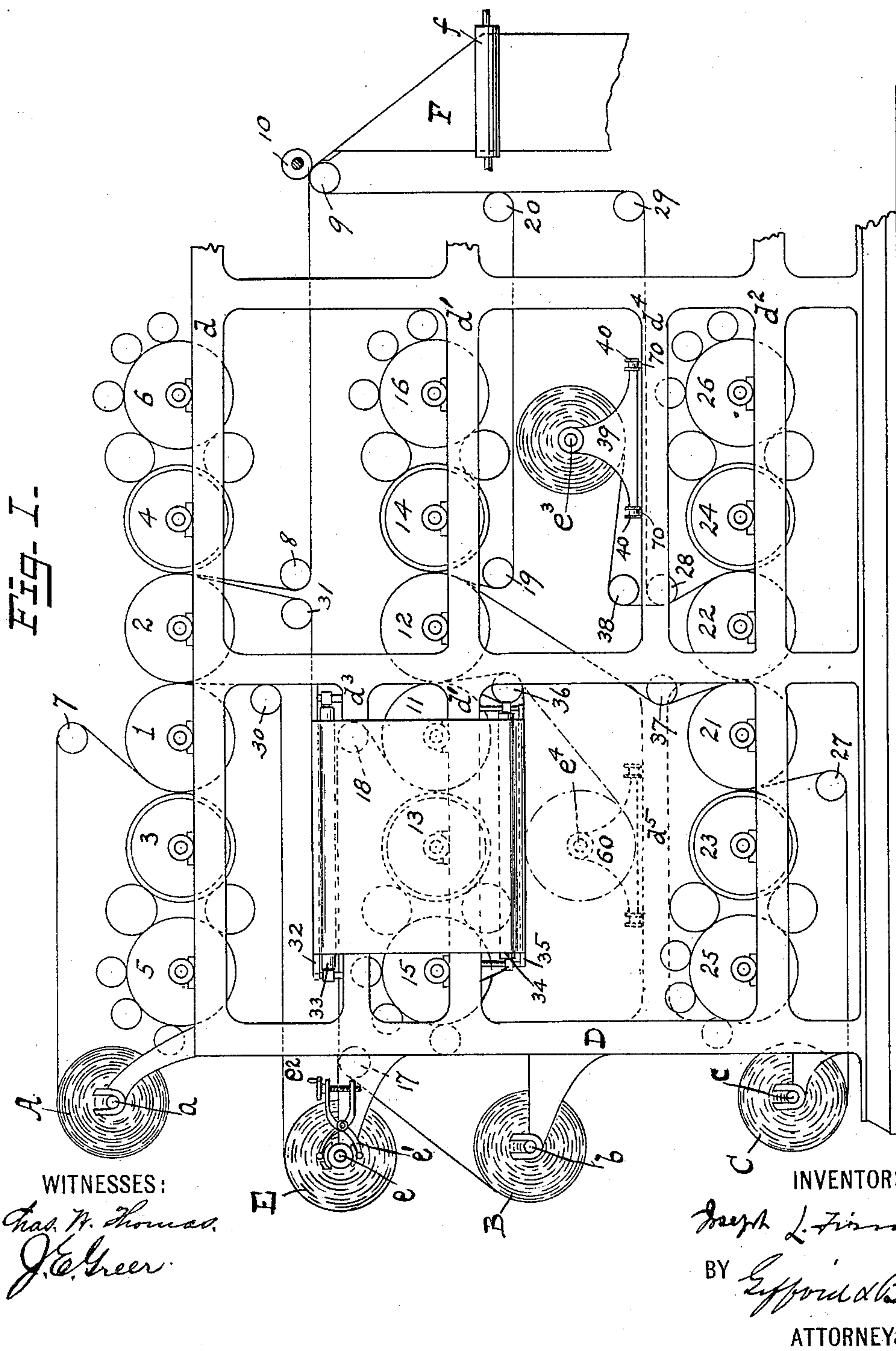
**Patented Nov. 19, 1901.**

**J. L. FIRM.  
PRINTING PRESS.**

(Application filed July 5, 1898.)

(No Model.)

**2 Sheets—Sheet 1.**



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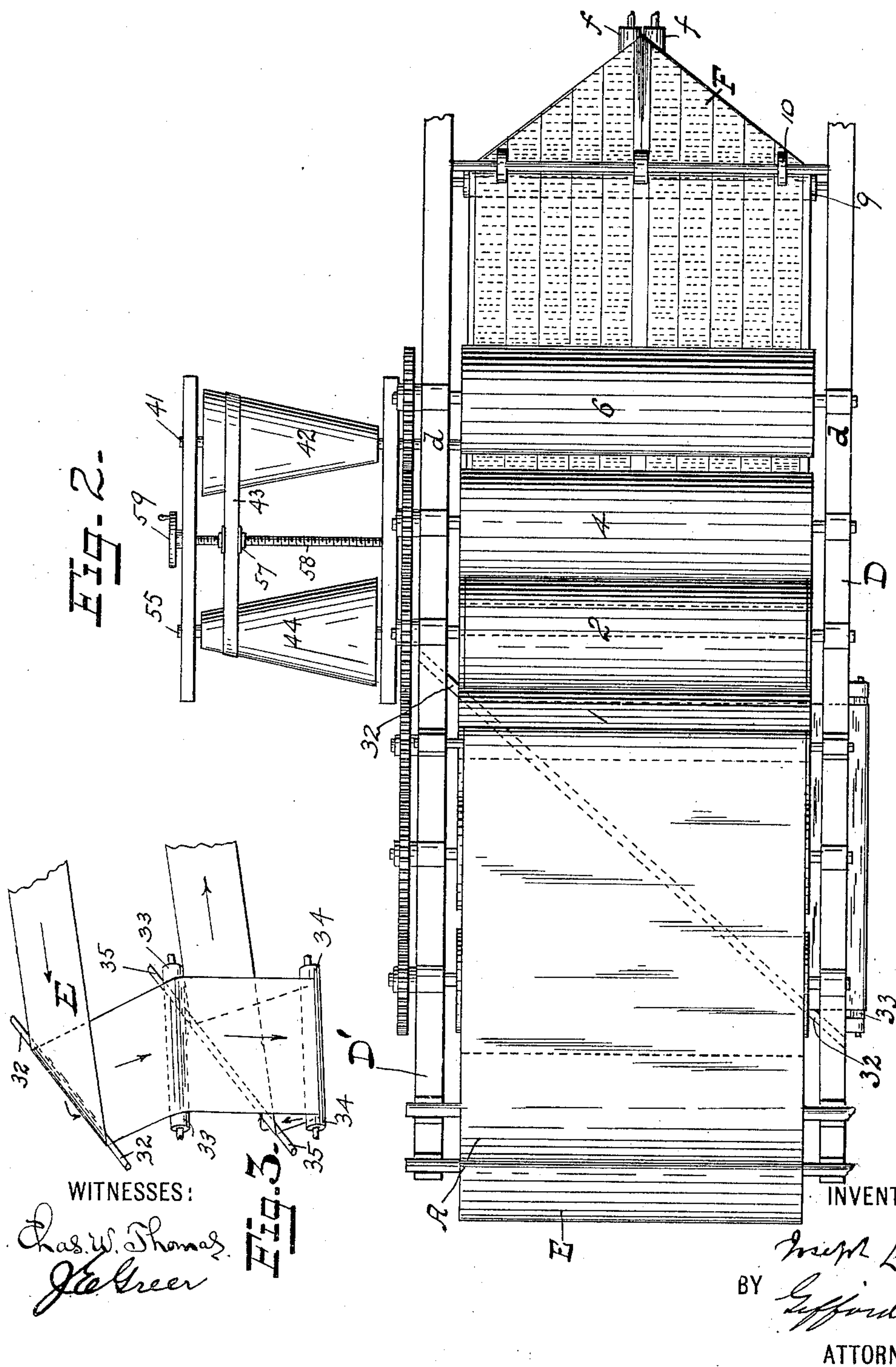
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(No Model.)

**2 Sheets—Sheet 2.**





# UNITED STATES PATENT OFFICE.

JOSEPH L. FIRM, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY, OF CHICAGO, ILLINOIS.

## PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 686,926, dated November 19, 1901.

Application filed July 5, 1898. Serial No. 685,126. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH L. FIRM, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Printing-Presses, of which the following is a specification.

In the accompanying drawings, Figure 1 is a side view of the printing mechanism with a portion of the folding mechanism indicated in diagram. Fig. 2 is a plan of the same. Fig. 3 is a detail.

A, B, and C are three webs of paper rolled to start with on the cores *a*, *b*, and *c*, which cores are supported in suitable bearings on brackets connected with the frames *D D'*, so that said cores are parallel with the axes of all the printing-cylinders hereinafter referred to.

E is an offset web, which at the starting-point is rolled upon the core *e*, mounted upon a bracket connected with the frame *D*, so as to be parallel with the said printing-cylinders. This core is provided with a suitable tension device *e'*, acting frictionally to produce a tension on the offset web E, which is adjustable by the hand-screw *e''*.

The cylinders employed for printing the web A are the impression-cylinders 1 2, form-cylinders 3 4, and inking-cylinders 5 6, all preferably arranged in the order shown, with their axes in the same horizontal plane and having their bearings on the top of the horizontal members *d* of the frame. The web A passes from its roll over the guide-roll 7 downward to these printing-cylinders and thence passes downward and under the guide-roll 8 and horizontally to the collecting-rolls 9 10, the guide-roll 7 being above the row of printing-cylinders and the guide-roll 8 being below said row and between it and the row of printing-cylinders by which the web B is printed.

The cylinders employed for printing the web B are the impression-cylinders 11 12, form-cylinders 13 14, and inking-cylinders 15 16, all preferably arranged in the order shown, with their axes in the same horizontal plane and having their bearings on the top of the horizontal frame members *d'*. The web B passes from its roll over the guide-rolls 17 and 18 downward to these printing-cylinders and thence downward and under the guide-roll 19 and horizontally to and under the guide-roll 20 and upward to the collecting-rolls 9 and 10,

the guide-roll 18 being above the row of printing-cylinders for web B and the guide-roll 19 being below the same, so that the web B enters horizontally above its row of printing-cylinders and makes its exit horizontally below the same.

The cylinders employed for printing the web C are the impression-cylinders 21 22, form-cylinders 23 24, and inking-cylinders 25 26, all preferably arranged in the order shown, with their axes in the same horizontal plane and having their bearings on the top of the horizontal frame members *d''*. The web C passes from its roll horizontally below its row of printing-cylinders, underneath the guide-roll 27, and up between its printing-cylinders and thence up to the guide-roll 28 and horizontally under the guide-roll 29 and upward to the collecting-rolls 9 and 10.

The offset web E passes from its roll under suitably-adjusted tension horizontally to and under the guide-roll 30; thence upward and between the web A and impression-cylinder 2; thence downward and under the guide-roll 31; thence horizontally to the diagonal bar 32, by which it is turned at right angles; thence horizontally to and over the guide-roll 33; thence vertically downward outside of the frame members *d'''* and *d'''* and under the guide-roll 34; thence horizontally inward and under the diagonal bar 35, by which it is turned again, so as to run longitudinally between the side frames of the machine. Thence it runs horizontally to and under the guide-roll 36; thence upward and between the web B and impression-cylinder 12; thence downward by the guide-roller 37 and between the web C and impression-cylinder 22; thence upward by the guide-roller 28 and over the guide-roller 38 to its receiving-roll upon the core *e''*. This core is mounted upon a trolley-frame 39, running upon wheels 40, so as to be readily removable through the opening between the frame members *d''* and *d'''*, upon the latter of which members its trackway is mounted, said trackway consisting of the rails 70 70, extending between the two side frames *D D'*.

The tension being applied by the device *e'* to the offset roll E at its starting-roll, it is essential that the receiving-core *e''* be driven at a proper speed to take it up, which speed must slow down as the receiving-roll increases



in diameter. For this purpose the core  $e^3$  is connected with an aligned shaft 41, to which is fixed a cone-pulley 42, driven through the belt 43 from an inverse cone-pulley 44, fixed to the shaft 55, which shaft 55 may be fixed to and in alinement with the shaft 56 of the impression-cylinder 22. The belt 43 is provided with a belt-shifter 57, adjustably mounted on a screw 58, which screw may be turned by a hand-wheel 59 or, if desired, by mechanism constructed so as to shift the belt 43 automatically as the diameter of the roll on the core  $e^3$  increases. Thus either the operator or such automatic mechanism may adjust the belt 43 so as to slow down the speed of the core  $e^3$  and keep the surface speed of the increasing roll thereon constantly at or near the surface speed of the impression-roll 22, around which the offset web E passes last before reaching its receiving-roll.

Up to the present point the courses described for the webs of paper A, B, and C and for the offset web E have involved the following general plan of operation: The webs A and C, respectively, entering horizontally from above and below the printing mechanisms, depart therefrom horizontally between the top and middle printing mechanisms and between the middle and bottom printing mechanisms, respectively. The web B, entering horizontally between the top and middle printing mechanisms, departs horizontally between the middle and bottom printing mechanisms in a position intermediate the webs A and C. The offset web E enters horizontally between the middle web B and one of the outside webs, as A, (which may be either A or C,) and after contacting with such outside web it is carried laterally around the edge of web B into a position between the middle web B and the other outside web, as C, (which may be either C or A,) and is finally rolled up in a position between the web B and one of the outside webs C or A, its supply-roll and receiving-roll having their axes parallel with the printing-cylinders. The machine may, however, be run for printing only two webs, as B and C, in which case the supply-roll for the offset web may be located, as shown in dotted lines, on the core  $e^4$ , mounted upon a trolley-carriage 60, supported by rails on the frame member  $d^5$ . Thus the supply-roll and the receiving-roll of the offset web will both be located within the frame of the machine between the two rows of cylinders, by which the middle web B and an outside web, as C, respectively, are printed, or both might be between the two rows of cylinders by which webs A and B are printed. The offset web E in this case will pass directly from its supply-roll on the core  $e^4$  to the guide-roll 36, as shown in dotted lines, and thence will proceed, as before described, to the receiving-roll on the core  $e^3$ .

F is the former, and  $f f$  the folding-rollers, of the mechanism by which the collected webs A, B, and C are longitudinally folded, said folding mechanism being located, as shown, on the opposite end of the machine from the end at which the webs enter.

I claim—

1. In combination, three web-printing mechanisms having parallel cylinders an offset web, mechanism for holding the supply and receiving rolls of said offset web and intermediate guides arranged, substantially as described, whereby said offset web is guided longitudinally in contact with each of said webs of paper and intermediate two of said contacts is turned laterally and run around the edge of the intermediate web of paper.

2. In a printing-machine, in combination, the side frames D, D' each having the horizontal members  $d$   $d'$  and  $d^2$ , three mechanisms each adapted to perfect a separate web and each having its bearings upon a pair of said horizontal frame members, an offset web, mechanism whereby said offset web is guided in contact with each of said webs of paper and intermediate two of said contacts is turned laterally and run outside of one of said horizontal members and in again.

3. The combination with a series of web printing and perfecting mechanisms, superposed in substantially the same planes, of an offset web, means for conducting the offset web through a portion of one of said printing mechanisms with the web being printed, and means for successively conducting the same offset web through portions of a plurality of said other printing mechanisms with the webs being printed thereby.

4. In combination, a plurality of web-printing mechanisms having parallel cylinders and each adapted for perfecting a single web of paper, an offset web, mechanism for guiding said offset web into contact with each web of paper, an offset-web roll, a positive driving mechanism for said web-roll having driving connection with a member of the printing mechanism and containing means for varying the speed of said web-roll relative to that of the printing mechanism.

5. In combination, a plurality of web-printing mechanisms having parallel cylinders and each adapted for perfecting a single web, an offset web, mechanism for guiding said offset web into contact with each web being printed, an offset-web roll and a positive driving mechanism for said offset-web roll comprising cone-pulleys one connected with a member of one of the printing mechanisms and the other being adapted for connection with the shaft of the offset-web roll.

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Witnesses:

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FRED S. KEMPER.