2 Sheets—Sheet 1.

J. L. FIRM.

ROTARY PERFECTING PRESS.

No. 170,542. Patented Nov. 30, 1875.

Fig. 1.

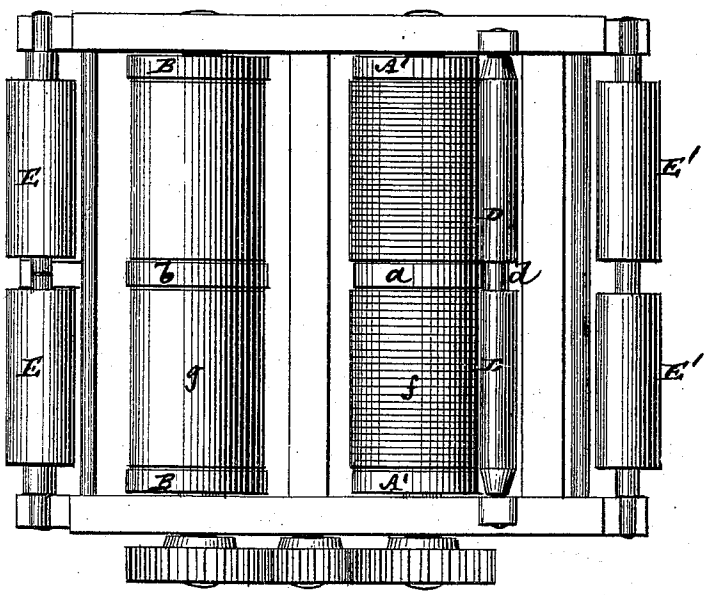
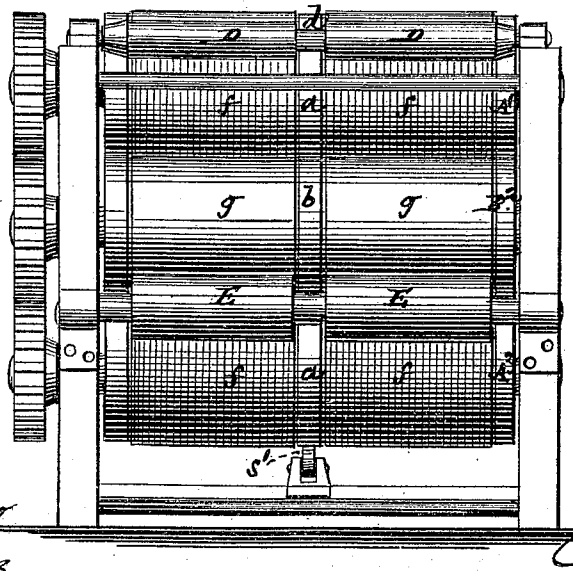


Fig. 2.



Witnesses
John Becker
Fred. Haynes

J. L. Firm
by his Attorneys
Brown & Allen

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

2 Sheets—Sheet 2.

J. L. FIRM.

ROTARY PERFECTING PRESS.

No. 170,542. Patented Nov. 30, 1875.

Fig. 3.

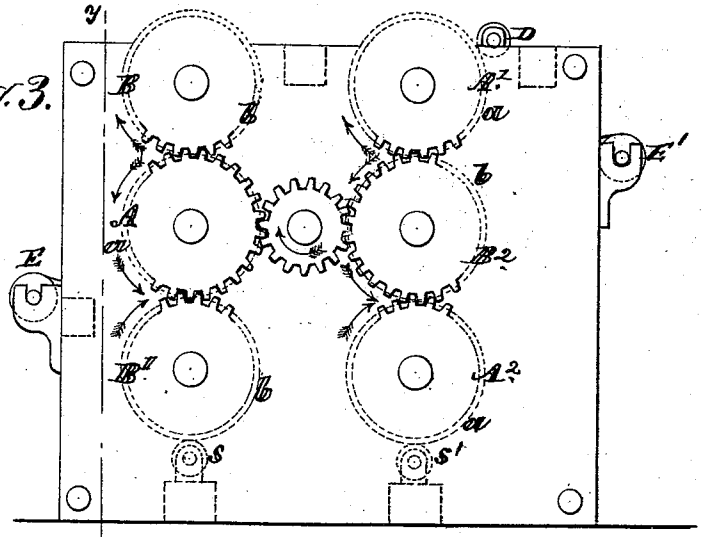


Fig. 4.

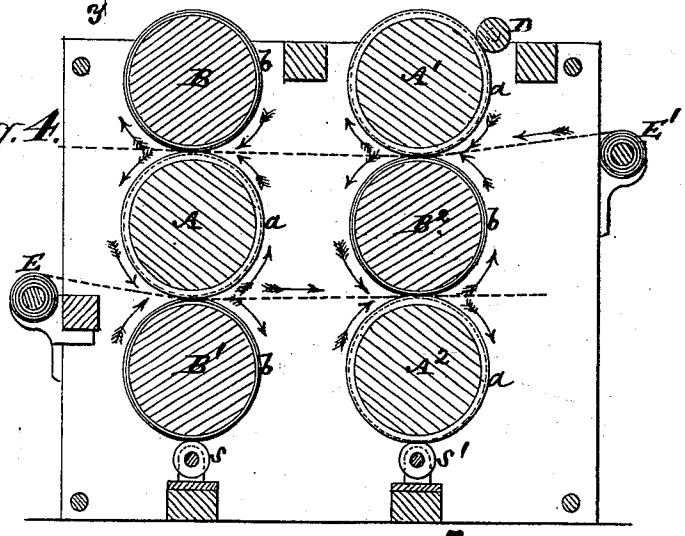
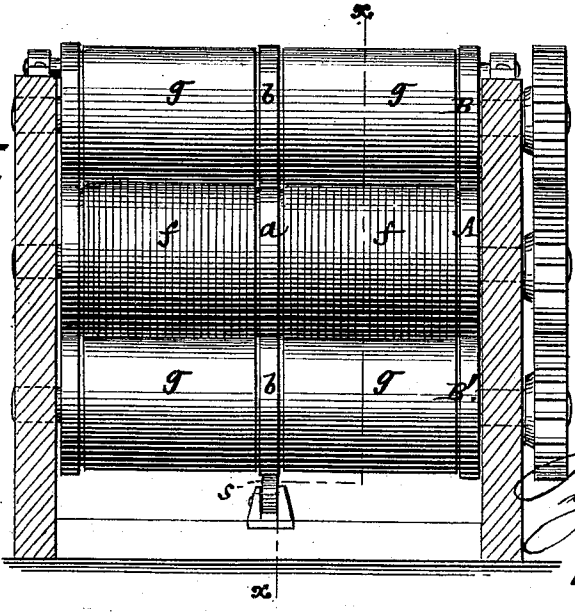


Fig. 5.



Witnesses
John Becker
Fred Haynes

J. L. Firm
by his Attorneys
Brown & Allen

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

UNITED STATES PATENT OFFICE.

JOSEPH L. FIRM, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF HIS RIGHT TO CALVERT B. COTTRELL AND NATHAN BABCOCK, OF WESTERLY, R. I.

IMPROVEMENT IN ROTARY PERFECTING-PRESSES.

Specification forming part of Letters Patent No. **170,542**, dated November 30, 1875; application filed September 28, 1875.

CASE D.

To all whom it may concern:

Be it known that I, JOSEPH L. FIRM, of the city, county, and State of New York, have invented certain new and useful Improvements in Rotary Perfecting-Presses; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

The invention has reference to rotary printing-presses, and more particularly to rotary perfecting-presses.

The invention consists in a certain combination of a transversely-divided paper-supply cylinder or roll, forming two or more independent supply cylinders or rolls, and serving to feed two or more independent webs, side by side, and a single form-cylinder and single impression-cylinder constructed to simultaneously print said webs as they pass from the supply cylinders or rolls to or between said form and impression cylinders.

The invention also consists in a combination of one or more single form-cylinders with annular bearings between duplicate forms carried by each of said cylinders, and one or more single impression-cylinders having like intermediate annular bearings for operation, in combination with the intermediate annular bearings of the form-cylinders and lower supporting-rollers, whereby the form and impression cylinders, when constructed to print in duplicates or series arranged side by side throughout the length of said cylinders, are intermediately supported the one by the other, and are prevented from springing.

Figure 1 represents a plan of a rotary printing-press in part in accordance with the invention, and constructed to simultaneously print on both or opposite sides of four independent webs of paper. Fig. 2 is a front or one-end view of the same; Fig. 3, a side view thereof; Fig. 4, a vertical section on the irregular line *x x*, and Fig. 5 a further vertical section on the line *y y*.

A is a duplicate form-cylinder—that is a cylinder carrying two independent circular forms, *f f*, arranged side by side in the length of said cylinder, but separated by an intermediate annular bearing or ring, *a*. This duplicate form-cylinder is arranged to work in connection with an upper duplicate impression-cylinder, B, and a lower duplicate impression-cylinder, B^1, both of which have their impression-surfaces *g g* arranged to correspond with the forms of the cylinder A, and the duplicate impression-surfaces of which are separated by annular bearings or rings *b*, arranged so that they bear or work in contact with the intermediate ring or bearing *a* of the form-cylinder A. By this construction the form and impression cylinders are supported intermediately of their length, the one by the other, and prevented from springing or yielding sufficiently to interfere with the impression, and are thus held in their proper positions independently of the boxes in the frame of the press, and the amount of strain that would otherwise fall upon such long cylinders is avoided. A roller, *s*, which should be adjustable up or down, is arranged under the intermediate bearing *b* of the lower impression-cylinder B^1 to give a solid intermediate lower bearing or rest to said cylinder. Such construction and intermediate support of the form and impression cylinders allows of an increased number of impressions being simultaneously made from or by the same cylinders on independent webs, as will be hereinafter more fully explained, and by increasing the number of intermediate bearings *a b* and roller-supports *s* the number of form and impression surfaces, lying side by side throughout the length of said cylinders, may be increased so as to act upon a still greater number of webs simultaneously. At the opposite end of the press is a similarly-arranged series of cylinders with duplicate form and impression surfaces *f g* separated by intermediate bearing-rings *a b*, also a lower intermediate adjustable supporting-roller, s^1, all for action in relation with each other, as hereinbefore described with reference to the first series of cylinders and their lower supporting-roller; but in this last or opposite series of cylinders the upper and lower cylinders A^1 A^2 are both

form-cylinders, and the intermediate cylinder B^2 an impression one.

The several cylinders throughout the two series, which thus consist of three form-cylinders and three impression-cylinders, may be driven by connecting-gearing as and in the direction indicated by arrows in Figs. 3 and 4.

The several form-cylinders A A^1 A^2 are each provided with an inking-roller, D, one only of which, namely that belonging to the form-cylinder A^1, is here shown. These inking-rollers are cut or divided intermediately of their length, as at *d*, in order that their supply of ink to the form-cylinders may be restricted to the form-surfaces *f*, and so that the intermediate bearing rings or surfaces *a b* of the form and impression cylinders may be kept free from being smeared and from smearing with ink the margins of the paper while the impressions are being taken.

Each series of cylinders A B B^1 and A^1 A^2 B^2 have the paper supplied to them in independent webs, corresponding, as regards number, with the number of form-surfaces in the width of the press. These separate webs of paper, which, for the press shown in the drawing, are four in number, are taken from supply cylinders or rolls at opposite ends of the press. Each of these rolls is cut or divided transversely, so as to form two or more independent supply cylinders or rolls corresponding with the number of webs to be fed side by side from the same end of the press to the single form-cylinder A or A^1, and single impression-cylinder B^1 or B^2 on such end of the press. This transversely-divided construction of the supply-rolls is only shown at the right hand of Fig. 1, in which E E are independent rolls in the same axial line for supplying independent webs side by side to the form-cylinder A and impression-cylinder B^1; but it is designed that the paper-supply cylinders or rolls E′ E′ at the other end of the press for supplying independent webs to the form-cylinder A^1 and impression-cylinder B^2 should be similarly separated and independent one of the other, and in any further reference to the rolls E′ E′ in this specification said rolls E′ E′ will be considered as independent of each other. This transverse division or construction of the paper-supply rolls, so as to form virtually-independent rolls for feeding independent webs side by side to a single form-cylinder and single impression-cylinder constructed to permit two webs at a time, is important, inasmuch as provision is thereby made for any difference in diameter of the rolls of paper, or dampness of the latter, or tension of the webs, and for adjusting the rolls longitudinally to make the paper properly margin with the forms.

Guide-rollers may be interposed between said rolls E E′ and the printing-cylinders, to properly direct the webs to and between said cylinders.

In the operation of the press the independent webs of paper from the rolls E′ E″ are first and simultaneously passed between the form-cylinder A^1 and the impression-cylinder B^2, which prints the one or upper side of the two webs passing in between said cylinders. Said webs then pass on in a straight line or course to the impression-cylinder B and form-cylinder A, between which they pass and receive an impression on their under or opposite side or face. While two webs of paper, passing in one direction through the press are thus being printed on both sides, other two webs, drawn from the rolls E′ E″, are passing in a reverse direction, first between the form-cylinder A and impression-cylinder B^1, and from thence to or between the impression-cylinder B^2 and the form-cylinder A^2, thus also printing such second set of webs on both of their sides or faces.

In this way four webs or rolls of paper are simultaneously printed on their opposite sides or faces by only three form-cylinders and a like number of impression-cylinders.

The same system of form and impression cylinders may be used with cylinders arranged to admit of a vertical instead of a horizontal passage of the webs of paper through the press.

I claim—

1. The combination of two or more independent paper-supply cylinders or rolls arranged side by side in an axial direction at the same end of the press, and serving to feed two or more independent webs side by side, a form-cylinder, having two or more circular forms side by side in direction of its length, and an impression-cylinder, having a corresponding number of impression-surfaces similarly arranged, substantially as described.

2. A form-cylinder, constructed as described, with one or more intermediate annular bearings, *a*, between its forms, in combination with an impression-cylinder, constructed with one or more intermediate and similarly-arranged annular bearings, *b*, between its impression-surfaces, for operation the one against the other, essentially as herein set forth.

3. The combination of one or more lower supporting-rollers, *s s′*, with the intermediate annular bearings *a* or *b* of the form and impression cylinders, substantially as specified.

JOSEPH L. FIRM.

Witnesses:

HENRY T. BROWN,

MICHAEL RYAN.