

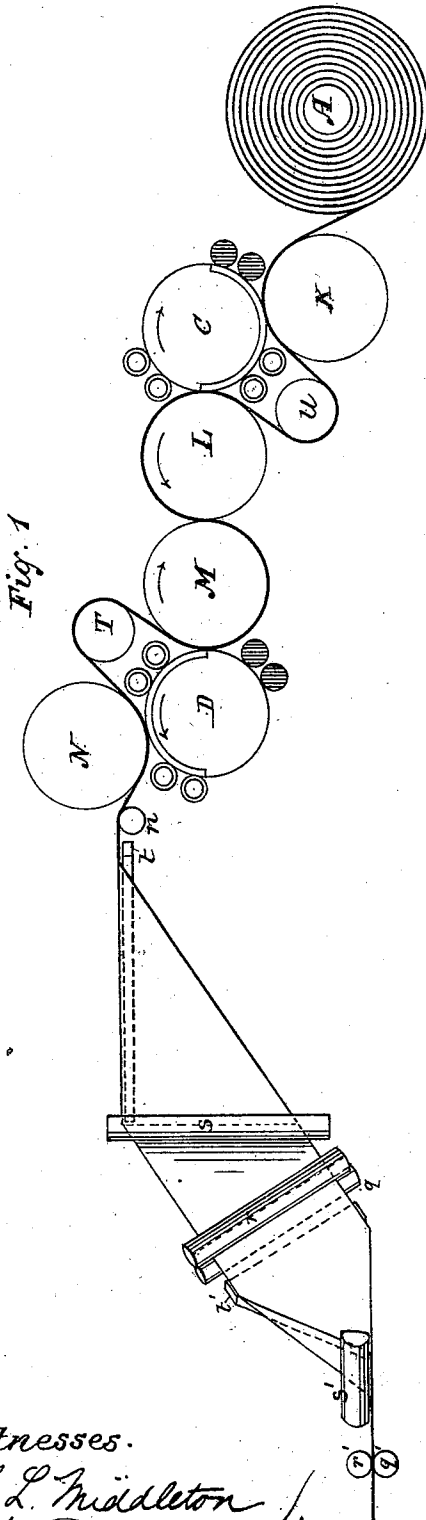
(No Model.)

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E. ANTHONY.  
PRINTING PRESS.

No. 273,430.

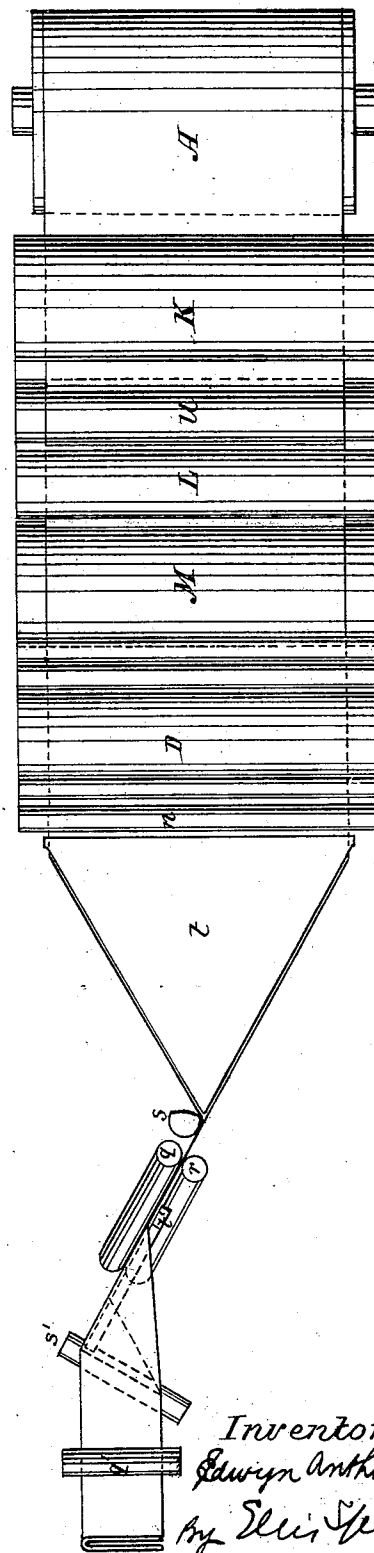
Patented Mar. 6, 1883.



Witnesses.

F. L. Middleton  
H. L. Malden

Fig. 2.



Inventor.

Edwyn Anthony

By Ellis Spear

Atty

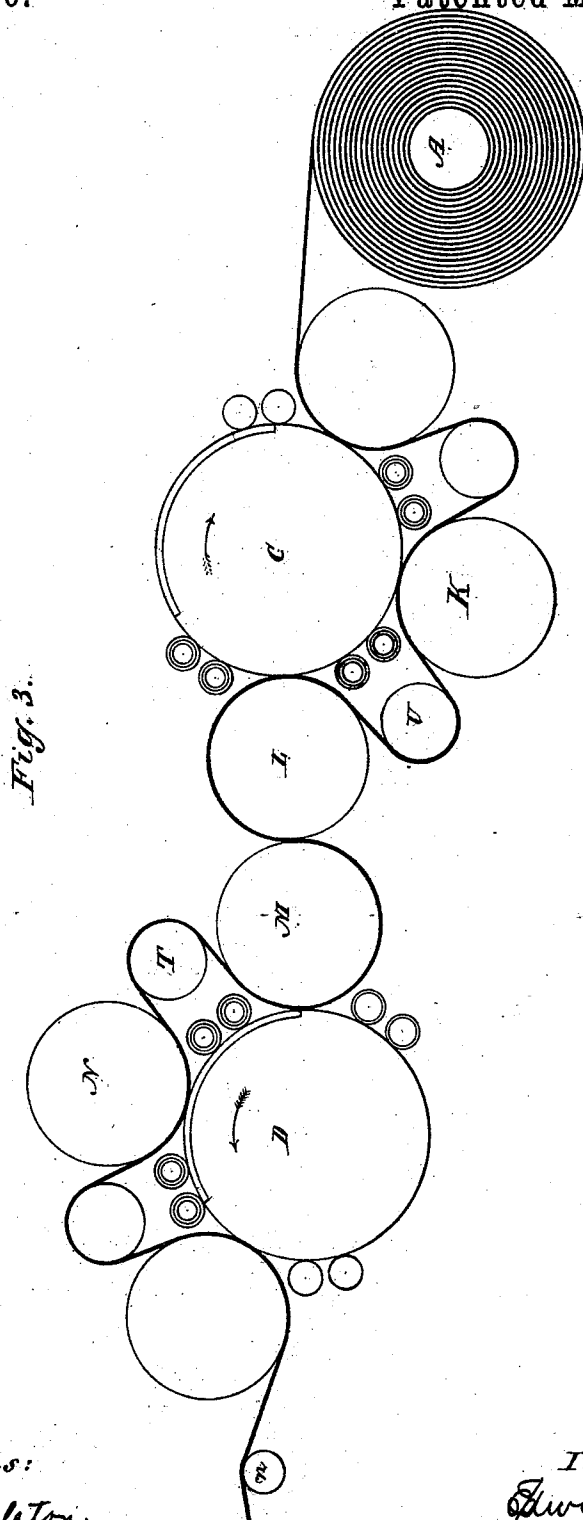
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4 Sheets—Sheet 2.

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PRINTING PRESS.

No. 273,430.

Patented Mar. 6, 1883.



Witnesses:  
F. L. Middleton  
Walter D. Nelson

Inventor:  
Edwyn Anthony  
By Ellis Spear  
Atty

(No Model.)

4 Sheets—Sheet 3.

E. ANTHONY.  
PRINTING PRESS.

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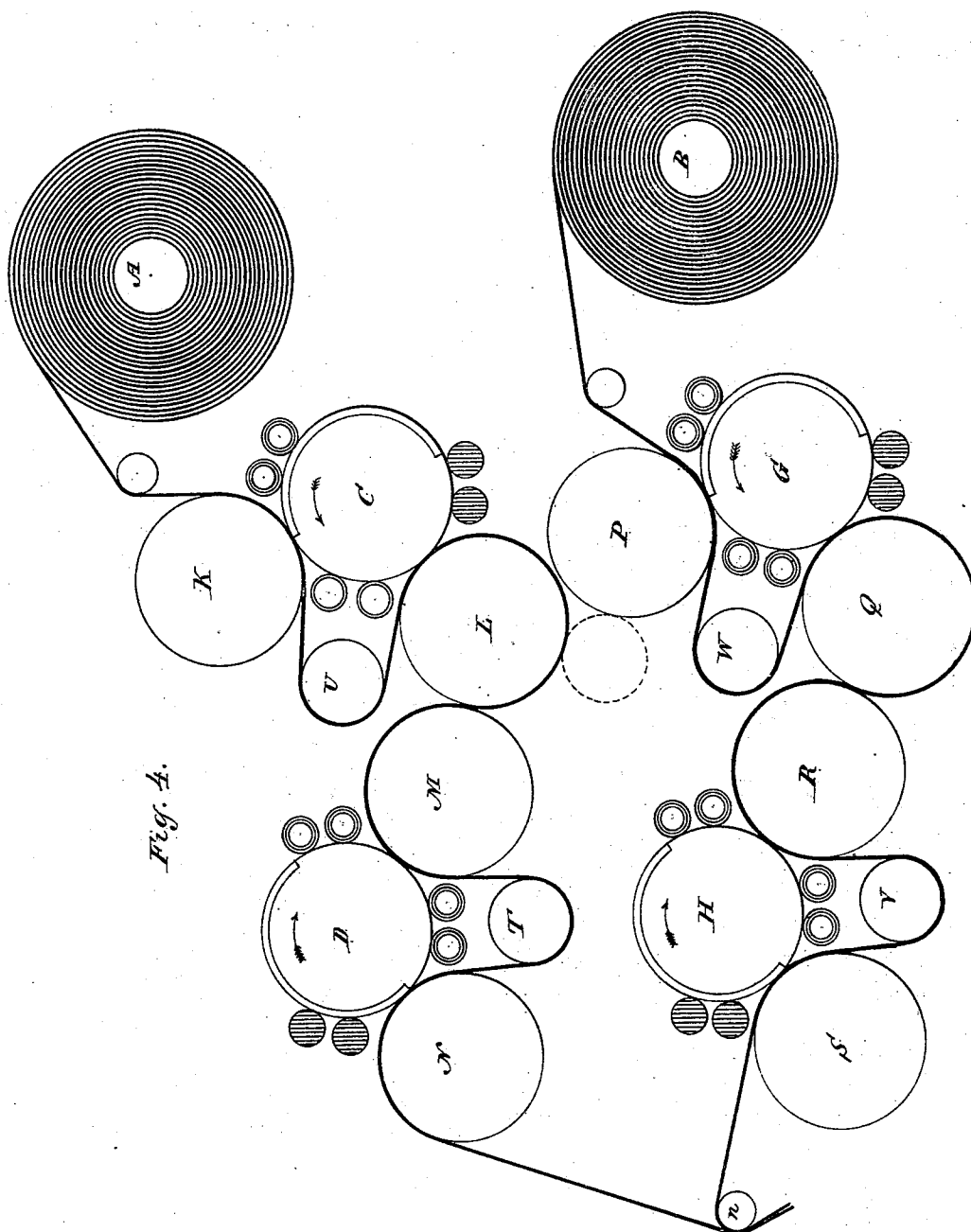


Fig. 4.

Witnesses:

*F. L. Middleton*  
*Walter Malow*

Inventor:

*Edwyn Anthony*  
By *Eli Spear*  
Atty

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Fig. 5.

Two Pages.	Four Pages.	Six Pages.	Eight Pages.	Ten Pages.	Twelve Pages.	Fourteen Pages.	Sixteen Pages.
Roll A. 2.	4. 1.	6. 1. 4.	8. 1. 4. 5.	10. 1. 6. 7.	12. 1. 6. 7.	14. 1. 8. 9.	16. 1. 8. 9.
Roll B.				3.	10. 3.	12. 3. 6.	14. 3. 6. 11.

Fig. 14.

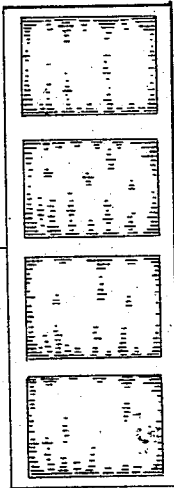


Fig. 15.

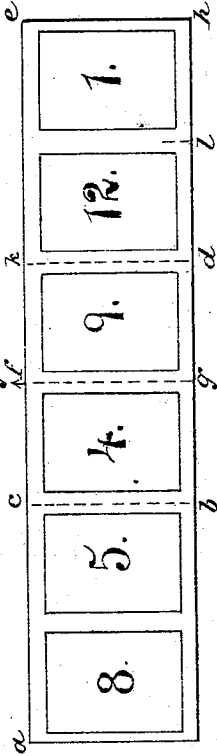


Fig. 6.

Four Pages.	Six Pages.	Eight Pages.
Roll A. 4. 1. 4. 1.	6. 1.	8. 1. 8. 1.
Roll B.	3.	6. 3. 6. 3.

Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.



Witnesses.

F. L. Middleton

Walter Mulderon

Inventor.

Edwyn Anthony

By Ellis Spear

Atty

# UNITED STATES PATENT OFFICE.

EDWYN ANTHONY, OF NEW YORK, N. Y.

## PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 273,430, dated March 6, 1883.

Application filed November 27, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, EDWYN ANTHONY, a subject of the Queen of Great Britain, residing at New York, in the county and State of New York, have invented a new and useful Improvement in Printing-Presses, of which the following is a specification.

Figure 1 is a side, and Fig. 2 a bottom, view of a machine illustrating my said invention when applied to the printing of eight and fewer paged papers. Fig. 3 shows a modification of the printing mechanism shown in Fig. 1. Fig. 4 refers to the case of sixteen and fewer paged papers. Figs. 5 and 6 show the number, breadths, and positions of the webs used in Fig. 4, according to the number of pages contained in the paper which it is printing. Fig. 7 shows in perspective two webs—one on the other—after they have been run together over the roller *n*. Fig. 8 shows in perspective how two webs, and Fig. 11 how one web, issues from the larger of the two longitudinal folding devices shown in Fig. 1. Fig. 9, in perspective, and Fig. 10, plan view, show how they issue from the smaller folding device shown in Fig. 1, Figs. 12 and 13 being corresponding figures for one web; and Figs. 14 and 15 indicate the way of arranging the forms on the form-bearing cylinders.

Whatever paged paper a machine is required to print, I arrange the forms on each cylinder all in one line, as shown in Figs. 14 and 15, instead of putting, as heretofore, half the number of forms in one line and the other half in another line behind it. Thus, for the same number of pages, the cylinder must be twice the usual length, while, with the same diameter of cylinder, the part of the circumference occupied by the forms will be only half the fraction of the whole circumference which it usually is.

In brief and general terms, the method of constructing machines in accordance with my invention may be described as follows: The maximum number of pages to be printed being settled, we take the axes of the form-bearing cylinders as long as is convenient in practice. If the length be enough to arrange half of the forms in one line on one such cylinder (the direction of the columns being in the direction of motion of the cylinder) and the other

half on another such cylinder, only two such form-bearing cylinders and one roll of paper are required; but if all the forms cannot be thus placed on two cylinders, I use four such cylinders and two rolls of paper, and, if these last are not enough, yet two more cylinders and another roll, and so on until there are enough cylinders to receive all the forms. I make the circumference of each cylinder two or three, or four, or &c., times the length of one form, twice the said length being in general the most convenient form to adopt. Each roll is printed in precisely the same way—that is to say, each pair of form-bearing cylinders completely prints on both sides one web of paper. The webs, whatever their number, are brought together over a single roller after they have been printed on both sides, and their after treatment is absolutely independent of the number and relative breadths of the webs, depending solely on the number of pages abreast, which, at its fullest capacity, the machine will print. Moreover, whatever the number of pages abreast, the result attained by the after treatment is the same, and the means of attaining it are in all cases very similar. By folding the webs (by any suitable mechanism) along one or more longitudinal lines (the webs at pleasure being either cut or not cut along the said lines) they are brought into the form of a web on which a four-page paper is printed, with all the pages the same way up, and the columns lying in the direction of motion of the web—that is to say, several such webs will be running one on the other together with (when the number of different pages is an odd multiple of two) a one-page broad web; and if the webs have been severed along the aforesaid longitudinal lines of fold, all these webs will be distinct webs; but if they have not, the number of distinct webs will obviously be the same as the number of rolls used. The after processes of transverse cutting, further folding, when desired, and delivery may be done in any suitable way, the problem being in all cases the same—namely, to construct mechanism for folding, &c., a four-page paper—for several webs running on one another in the manner herein described may clearly be transversely severed and folded, just as if they were

a single web; and any paper of fewer pages than the maximum number which the machine can print can be printed by suitably choosing the number and the breadths of the rolls used, no alteration or adjustment of the folding or other mechanism being needed.

I will now give a more detailed description of my invention when applied, first, to the printing of eight or fewer pages, and, secondly, to the printing of sixteen or fewer pages, the largest number of pages that can be placed abreast on the machine being in each case supposed to be four.

In Fig. 1 (which illustrates the case of an eight-page paper) there are four pages abreast. The forms only occupy half the circumference of the cylinders C D, and two impression-cylinders are required in connection with each of them. Had the forms been arranged in the usual way, only two pages would have been abreast, the whole surface of C and of D would have been covered with forms, and only one impression-cylinder would have been needed for each form-bearing cylinder. For eight-paged papers I usually arrange four pages in a line, as in Fig. 14, and this number, in the case of papers whose pages are about the average width, necessitates the axes of the printing-cylinders, of the roll, of the inking-rollers, &c., being as long as is convenient in practice. When, however, the pages are of less breadth, (as is usually the case with books,) five, six, as in Fig. 15, or a greater number of forms may be placed abreast, as hereinafter discussed.

As before remarked, when the maximum number of pages which can be placed abreast is not sufficient to print the required number of pages, then I use two additional form-bearing cylinders and another roll, and run the two webs together after they have been printed on both sides. (See, for example, Fig. 4.) Similarly any number of additional rolls may be used, and all run together over a roller—such as *n*—after they have been printed on both sides.

Recurring to Figs. 1 and 2, A is the roll of paper; C D, the form-bearing cylinders, the circumferences of the said cylinders being twice the length of a form. L K are impression-cylinders in connection with C, and M N similar ones in connection with D. U T are carrier-cylinders which conduct the web from K to L and M to N, respectively.

The length of the pages of a newspaper are usually such as to make the diameters of C and D, Fig. 1, convenient in practice; but when this is not the case the circumference of C and of D must be taken three or four or more times the length of a form, additional impression and carrier cylinders being correspondingly added. Fig. 3 illustrates the case when the circumferences of C and D are three times the length of a form, the added carrier and impression cylinders being unlettered.

Referring to Figs. 1 and 2, it is clear that

the web will pass onto the roller *n* completely printed on both sides, its distances of travel from K to L, from M to N, and from the point of contact of C and L to the point of contact of D and M being of course properly adjusted. The first half of Fig. 5 shows the breadth and position of the web and the way the pages must be imprinted thereon for papers from two to eight pages, inclusive. Thus for a six-page paper we should put pages 5, 2, 3 on cylinder C and pages 6, 1, 4 on cylinder D. From the roller *n* the web must be conducted to a mechanism which will fold it longitudinally along the line X Y, Fig. 5. Any suitable mechanism may be used for this purpose—for example, that described in the specification of British Letters Patent No. 2,764, year 1862, or in the specification of British Letters Patent No. 3,319, year 1870, or in United States Patent No. 263,749, dated September 5, 1882. The last-mentioned apparatus is that shown in Figs. 1 and 2. The web passes from the roller *n* over the triangular piece *t*, thence round the fixed segmented cylinder *s*, and from there passes between the two rollers *r q*. It will now be traveling as shown in perspective by Fig. 11. Its further course will depend on the mode of delivery adopted. If no additional folding is required, it may be taken directly to cutting-cylinders and delivered in any suitable way; but if it is desired to be further folded, then from the rollers *r q* it may be conducted to the triangular piece *t'*, thence round the fixed segmented cylinder *s'*, and from there between the rollers *r' q'*. From between the last-mentioned rollers it will issue, as shown by Figs. 12 and 13, and it must be conducted to any suitable cutting-cylinders, to be severed transversely into lengths equal to the length of a page plus suitable margins (see dotted lines, Fig. 13)—i. e., into lengths equal to half the circumference of C or D, whence it passes to the delivery mechanism or to receive further folds, as may be desired.

Considering, now, the case of a machine which is to print any paper from two to sixteen pages, inclusive, the roll A, Fig. 4, is printed on by precisely similar mechanism to that shown in Figs. 1 and 2. The roll B is printed by similar mechanism, G H being the form-bearing cylinder, P Q R S the impression-cylinders, and W V the carrier-cylinders. The dotted circle is for the purpose of calling attention to the fact that P and L rotate in same directions, and that a convenient way of connecting the two printing mechanisms is by a toothed wheel in gearing with toothed wheels on the axes of P and L, respectively. The two webs, after passing over the roller *n*, must be conducted through longitudinal folding apparatus in precisely the same way as is the one web in Figs. 1 and 2. Fig. 5 shows the number, breadth, and position of the webs corresponding to the different-paged papers that the machine will print. Taking the case of sixteen pages, we see, Fig. 5, two full-breadth rolls must

be used, the pages being imposed on the form-bearing cylinders so that they may be printed on in the order therein shown. The webs will pass over the roller *n*, one on the other, as shown in perspective by Fig. 7. After passing through the first longitudinal-folding apparatus they will be as shown in perspective by Fig. 8. In this state they may be conducted to cutting-cylinders for the purpose of being transversely severed, and the pages may be delivered with or without further folds; or they may be conducted to a second suitable folding device—such, for example, as that in Figs. 1 and 2—from which they will issue, as shown in perspective by Fig. 9, from which they will pass to cutting-cylinders, to be severed transversely along the dotted lines, Fig. 10, and thence pass to suitable delivery or further folding mechanism, as may be desired.

It will be observed that we often have alternative ways of printing a fewer number of pages than the maximum number the machine will print. For example, a six-page paper may be printed by the use of one three-quarter-breadth roll—i. e., three-quarters of the breadth of the widest roll the machine will print—as indicated in Fig. 5, or by the use of one half-breadth and of one quarter-breadth roll, as indicated in Fig. 6; a ten-page paper, as shown in Fig. 5, or by the use of one three-quarter-breadth and one half-breadth roll; a twelve page, by the use of two three-quarter-breadth rolls, and so on. Moreover, in printing a number of pages, not exceeding half the maximum number, we can often double the productive capacity by duplicating the stereotype-plates. Additional folding mechanism will, however, be needed. For example, a four or eight page paper may be printed from a single set of plates, as shown in Fig. 5, or by the use of two sets, as in Fig. 6. In this last case, as just remarked, the course of the roll or rolls, after passing over the roller *n*, will be different to what it was before. The web or the two webs together (as the case may be) must be longitudinally cut along the line *X Y*. One strip must then, just as before, pass through the two longitudinal-folding apparatus (or their equivalents) shown in Figs. 1 and 2; but the other strip must pass to other folding and delivery mechanism provided for the purpose. This mechanism may be precisely like that through which the other strip passes after issuing from the first longitudinal-folding device.

It is obvious that in all cases the web or webs may be longitudinally cut along the line *X Y*, either before or during their passage through the longitudinally-folding apparatus; and when the said longitudinal cutting is done before such passage, then in place of a longitudinal-folding device any suitable mechanism may be substituted which will bring the two strips together. Such mechanisms are well known, and as no claim to them is herein made it is unnecessary to describe or illustrate

them. The after folding and delivery, the number and breadths of the rolls, &c., will all be the same as before; but the order of the pages on the web will depend on which sides of the strips are brought in contact. If the same as when longitudinal-folding devices are used, then the order will be unchanged; but if the under side of one strip is brought into contact with the upper side of the other, (an impossibility without longitudinal cutting,) then the order is changed. For example, in a sixteen-page paper the order of the pages on web A will be 16, 1, 12, 5, and on web B 14, 3, 10, 7, instead of as in Fig. 5. When the web or webs (as the case may be) have not been cut longitudinally and they are traveling, as indicated by Fig. 11 or Fig. 8, then, if desired, a thin strip may be longitudinally cut from the side on which are the letters *X Y*. The result of this operation is that practically the web or webs become in the same state as if they had been severed along *X Y* before they had entered the longitudinal-folding device.

When a larger number of forms than four can be placed abreast the printing mechanism is the same as before, the axes of the impression-cylinders, &c., being of course of proportionate length. In fact, Figs. 1, (up to the roller *n*,) 3, and 4 remain the same, however many pages are abreast; but the treatment of the webs after passing over the roller *n*, though similar, will not be identical with what it is when four pages are abreast. It will differ for different numbers of pages abreast, and any particular case may be treated in more ways than one, though all substantially the same and leading to the same result—that is, as before remarked, we ultimately get two-page-abreast webs running on one another with or without one-page abreast-webs running with them. For example, suppose six pages abreast to be the limit. Here we can print papers of from two to twelve pages, inclusive, by the use of one roll only. If a larger number is required, we must use more than one roll, and the webs will, as before, pass together over the roller *n*. The after treatment in this, as in all other cases, is precisely the same, whether the webs be one or many, since the several webs are together, and they virtually become one web for folding, cutting, and delivery purposes. We will therefore take the case of a twelve-page paper. Here we require only one roll, and the forms may be imposed so that the pages are printed on the web in the order shown in Fig. 15. We may now, by any suitable longitudinal-folding device, fold *de* under *cd*, and *ab* over *cd*. The web then becomes similar to Figs. 8 and 11, and may now be treated as hereinbefore described; but by differently arranging the order of the pages we might have begun by folding *ag*, Fig. 15, under *fh*, and afterward folding *fd* over *kl*, (or &c.,) and again we get the web into a state similar to Fig. 8 or Fig. 11. By the use of two webs twelve and less paged papers may be printed by printing mechanism capa-

ble of taking only three pages abreast, and eight and less paged papers by mechanism capable of taking only two pages abreast. In this last case only one longitudinal-folding mechanism will be required.

In all the foregoing the axes of the form-bearing cylinders need not be parallel to one another, provided suitable mechanism is provided to conduct the webs from one cylinder to the other; and also, if required, to cause all the webs to pass over the roller *n* with their edges lying in the same pair of parallel planes; and in saying that the circumference of the form-bearing cylinders must be a multiple of the length of a form, I mean the length of a form plus proper margins, as any one skilled in the art will at once understand.

All the foregoing is also applicable to the case of cutting before printing, the sheets of course being suitably conducted between tapes, and the circumferences of the form-bearing cylinders becoming multiples of the length of a form plus proper margins plus the distance between successive sheets at the time they are printed.

What I herein claim as my invention is—

1. In a web-printing press, the combination of a plurality of form-bearing cylinders (on each of which three or more forms are placed

all abreast in a line parallel to the axis thereof, and the columns lying in the direction of its rotation) with impression and carrier cylinders, all substantially as described.

2. In a web-printing press, the combination of a plurality of form-bearing cylinders (on each of which three or more forms are placed all abreast in a line parallel to the axis thereof, and the columns lying in the direction of its rotation) and impression and carrier cylinders, with mechanism for bringing together different portions of a traveling web without stopping the motion thereof, all substantially as described.

3. In a web-printing press, the combination of a plurality of form-bearing cylinders (on each side of which three or more forms are placed all abreast in a line parallel to the axis thereof, and the columns lying in the direction of its rotation) and impression and carrier cylinders, with mechanism for bringing together different portions of a traveling web and mechanism for afterward longitudinally folding the said web without stopping the motion thereof, all substantially as described.

EDWYN ANTHONY.

Witnesses:

W. H. MITCHELL,  
CHAS. RAETTIG.