

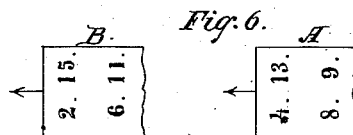
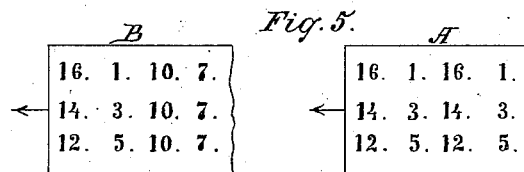
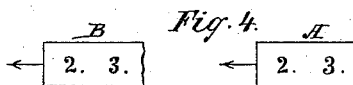
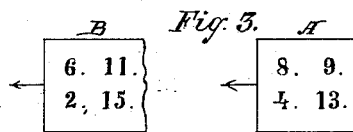
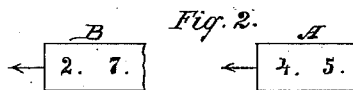
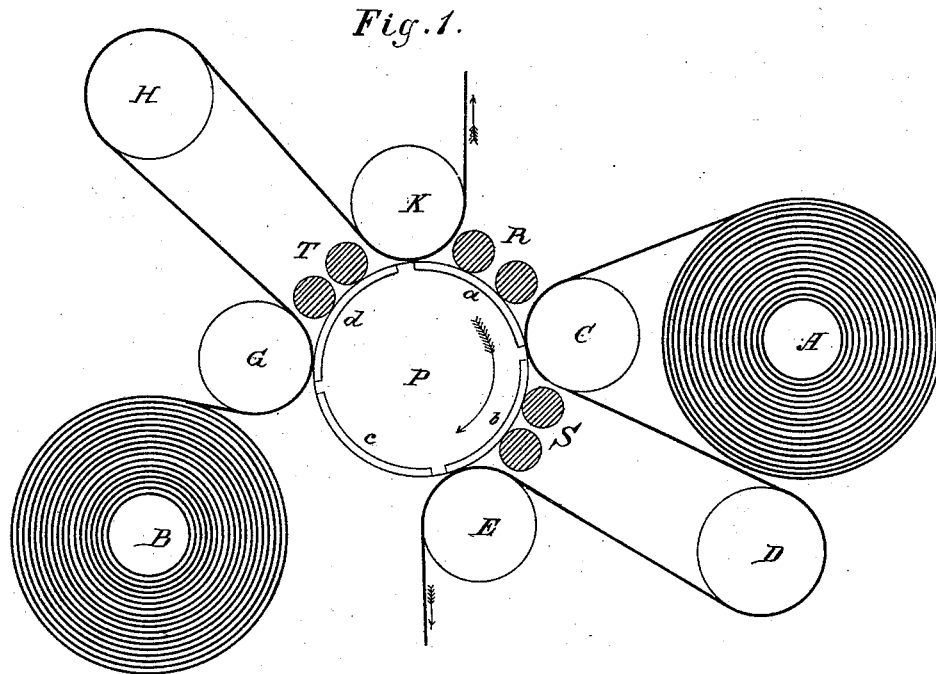
(No Model.)

3 Sheets—Sheet 1.

E. ANTHONY.
PRINTING MACHINE.

No. 302,312.

Patented July 22, 1884.



WITNESSES:

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L. W. Sully

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ATTORNEYS

(No Model.)

3 Sheets—Sheet 2.

E. ANTHONY.
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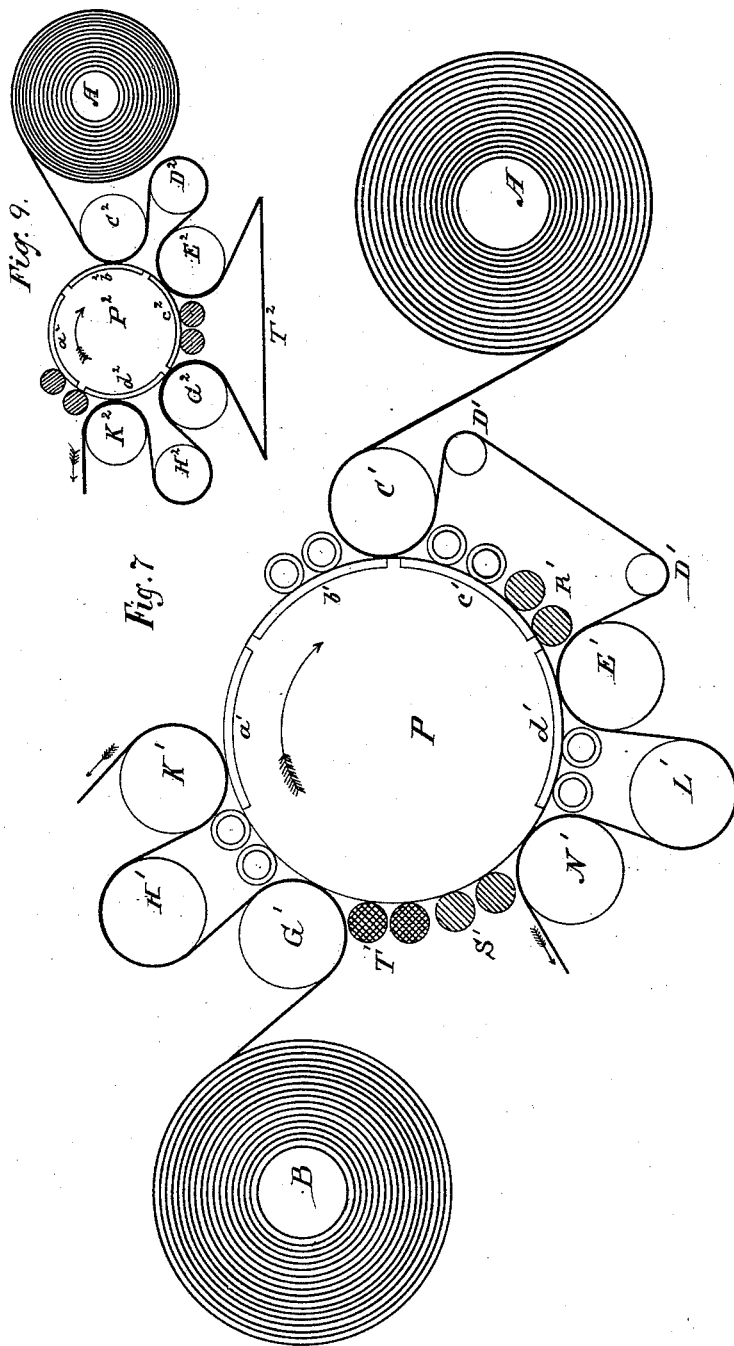
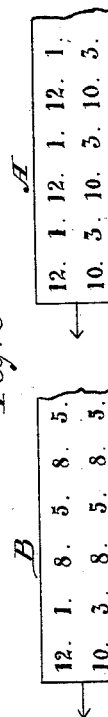


Fig. 9.

Fig. 7

Fig. 8



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 10.

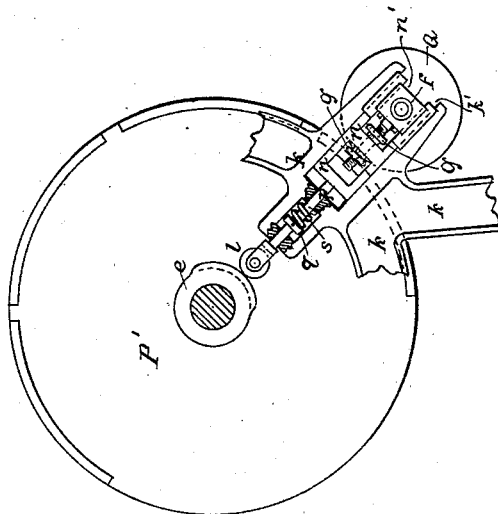
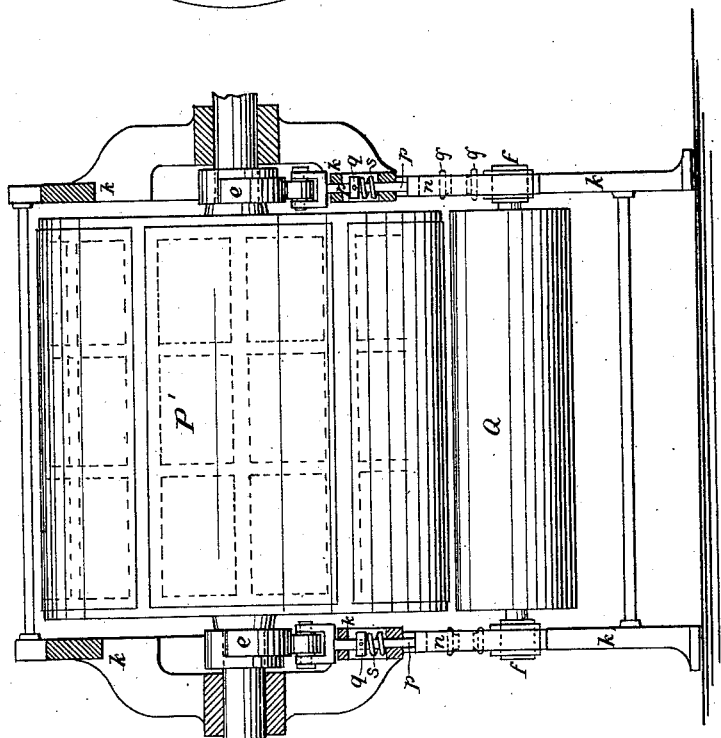


Fig. 11.



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UNITED STATES PATENT OFFICE.

EDWYN ANTHONY, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO R. HOE
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PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 302,312, dated July 22, 1884.

Application filed April 27, 1883. (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 Jersey City, county of Hudson, State of New Jersey, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification.

My invention consists in a printing-machine comprising a form-bearing cylinder and impression-cylinders caused to oscillate to and from the form-cylinder, so as to be in working contact with some of the forms and kept out of working contact with the remaining forms, whereby the web may be continuously printed on, but yet not receive impressions which are exact counterparts of the forms on the cylinder. Thus only a portion of the forms may be imprinted on the web, or some of them may be repeated oftener than others. Again, two webs may be continuously printed on by the same printing-cylinder, so that entirely different matter is imprinted on the two webs; or it may be partly identical and partly different. These results I attain by arranging in conjunction with a form-bearing cylinder one or more impression-cylinders, some or all of which are caused by cams or other suitable devices to periodically rise and fall, or move away from and toward the form-cylinder, so as to suspend or effect the printing operation, as the case may be. This movement is hereinafter referred to as "oscillating," but may be reciprocating. When an impression-cylinder is in what may be called its "rise" position, the web passing round it does not get printed on; but when it is in its "fall" position, then the web is being printed wherever a form is crossing the line joining the centers of the impression and form-bearing cylinders. By passing the web round a suitable number of impression-cylinders, and suitably fixing its distance of travel between successive ones, the web may be continuously printed on. The forms may occupy the whole surface of the cylinder, or a fraction thereof, the rule being no longer necessary that the whole circumference must be some multiple of the arc occupied by the forms, and that the number of impression-cylinders round which the web passes must equal the said multiple.

It is evident that a great variety of results may be produced by varying the number of impression-cylinders, the times of the oscillations, &c., and that the said oscillations may be produced in many different ways. In the drawings I show how any required oscillation may be produced; but of course any other equivalent device for moving the impression-cylinders to and from a working printing relation to the form-cylinder may be used without departing from my invention; and I give one or two illustrations of the printing of a web with oscillating cylinders, though it is plain that this system of oscillating cylinders may be applied in an almost innumerable variety of ways, and to an almost innumerable variety of cases.

Figure 1 is a side view of a form-cylinder and its adjuncts illustrative of my invention, Figs. 2, 3, 4, 5, and 6 showing various ways of imprinting the webs. Fig. 7 is a side view of another form-cylinder and its adjuncts, Fig. 8 showing one way of imprinting the webs. Fig. 9 illustrates the case of both sides of the web being printed by the same form-cylinder, and Figs. 10 and 11 are a side and end view, respectively, of a device for causing the oscillation of an impression-cylinder.

Referring to Fig. 1, P indicates the form-cylinder, C E G K impression-cylinders, and H D carrier-rollers. S R T denote three pairs of inking-rollers, and they must be, in connection with an inking apparatus, (not shown,) adapted to ink continuously. If only two forms are placed round the cylinder P and the impression-cylinders do not oscillate, then it is clear that the two webs may be continuously printed on with identical matter. Thus, if the webs were one-breadth webs, they might be printed on as shown in Fig. 4, and by conducting them to another similar form-cylinder the other side of the webs may be continuously printed, so that four-page papers are printed on each web. When thus printing, the inking-rollers R are not required. Now, if four forms (marked *a b c d*) are placed round cylinder P, and the impression-cylinders C and E are caused to oscillate so as only to print from the forms *a* and *b*, while the impression-cylinders K and G oscillate so as to

print only from the forms *c* and *d*, then it is clear that an eight-page paper may be printed, as indicated in Fig. 2, four pages being printed on the web A, and four on the web B, the other side of the webs being, of course, printed by a similar form-cylinder and its adjuncts. If the webs are two-breadth webs, then with the same oscillation of the impression-cylinders a sixteen-page paper may be printed, as shown in Fig. 3, (forms on lengthwise,) or in Fig. 6, (forms on breadthwise,) the other side of the webs being, as before, printed by a similar form-cylinder and its adjuncts. In these cases, also, the inking-rollers R are not required. Again, if the impression-cylinder G does not lift at all and the impression-cylinder K be permanently lifted, so as not to print, and if the impression-cylinders C and E oscillate, so as to print only from the forms *a b*, then all four forms *a b c d* will be printed on the web B, and only two forms, *a b*, on the web A. Thus, if the webs were three-breadth ones, a sixteen-page paper might be printed, as indicated by Fig. 5, the other side of the web being printed by a similar cylinder and its adjuncts. In this case inking-rollers will be required between cylinders E and G. The resulting printed web will require to be slit longitudinally into three webs, each one page wide, and divided into sheets each two pages long, and by proper lateral transference of those portions of the three webs that have received impressions from the forms *a b* and longitudinal association of the same with a portion of one of said webs that has received impression from the forms *c d* a sixteen-page product will be formed; and it is evident that by other arrangements of the oscillations numerous other results may be obtained.

In Fig. 7 there are five impression-cylinders, and the circumference of the form-cylinder equals six times the breadth of a form. Impression-cylinders C' E' N' are used in printing the web A, and impression-cylinders K' G' in printing the web B, and D' L' H' are carrier-cylinders used to properly conduct the webs. S' and R' indicate two pairs of inking-rollers, (connected, of course, with suitable apparatus, not shown,) both of which ink the inking-table formed by the part of the surface of cylinder P' which is not occupied by forms. T' denotes a pair of inking-rollers connected with an inking apparatus. (Not shown.) They do not ink the inking-table, but they ink the forms as they pass round. The other rollers (not lettered) are form-inking rollers of the usual kind. Now, let impression-cylinders C' E' N' oscillate so as to print the forms *a' b'* only; let impression-cylinder G' not oscillate, and therefore print all the forms, and let impression-cylinder K' oscillate so as to print forms *c' d'* only; then, if two-breadth rolls are employed, a twelve-page paper may be printed, as indicated by Fig. 8, the other side of the web being printed by a similar form-cylinder and its adjuncts. These webs, properly divided into sheets, will be gathered or asso-

ciated to form twelve-page papers in a manner sufficiently indicated with relation to the product shown by Fig. 5 to need any further explanation. If three forms only are placed round form-cylinder P', and the cylinders do not lift, two being employed for each web, then with the one-breadth rolls six-page papers can be printed, and so on. It is evident that this system of oscillating impression-cylinders may be applied whatever fraction of the whole circumference is occupied by the forms, the only limitation being that the said circumference must be a multiple of the breadth of a form, (plus, of course, suitable margins,) and whether they are placed in two or more distinct portions or all together; and it is also clear that the system may be used when both sides of the web are printed by the same form-cylinder—as, for instance, in Patent No. 212,880, dated March 4, 1879. For example, in Fig. 9, P² marks the printing-cylinder, T² indicates the turning apparatus, C² E² indicate impression-cylinders which print one side of the web, and G² K² impression-cylinders which print the other. D² and H² designate the usual carrier-cylinders. As before, the two pairs of inking-rollers must be in connection with continuous inking apparatus. The impression-cylinders C² E² must oscillate so as to print the forms *a² b²* only, and the impression-cylinders G² K² must oscillate so as to print only the forms *c² d²*. Thus a four, an eight, or a twelve page paper may be printed, according as a one, a two, or a three breadth web is employed, and the web will have different forms printed on its opposite sides, instead of the two sides being fac-similes of one another, as in the aforesaid patent.

Recurring now to the mechanism for causing the oscillations, *e*, Figs. 10 and 11, is a cam fastened on the shaft of the printing-cylinder. Its shape depends on the number and periods of the oscillations which the impression-cylinder is required to make. In the drawings, the impression-cylinder will be raised about one-third of the time, and makes one oscillation for each revolution of the printing-cylinder. Whether each oscillating cylinder will need a separate cam depends on the relative nature of the oscillations. Thus in Fig. 9 one cam may operate on both the impression-cylinders C² and E², and another of the same shape, but keyed on the shaft in precisely the opposite direction, may operate on both impression-cylinders G² and K².

k is the main frame of the machine, and it has extending brackets forming a recess, *k'*, in which the sliding frame *n* oscillates, the said sliding frame *n* containing grooves for the purpose of properly guiding it. The sliding frame has an extending bar, *p*, which is also guided in the main frame, and which carries at its other end a friction-roller, *l*, in a forked bearing. The bar and frame are pressed toward the center of the shaft of the form-cylinder P' by the spring *s*, one end of which rests against the main frame and the other against

the shoulder *q* of the bar *p*. The sliding frame *n* contains a recess, *n'*, in which the bearing *f* of the impression-cylinder *Q* is adjustable by means of the screw *h* and the nuts *g*. The said screw *h* is firmly fixed to the bearing *f*, and passes freely through a cylindrical space in the sliding frame *n*. The impression-cylinder may be adjusted so that when printing the sliding frame *n* shall rest in contact with the main frame *k* of the machine, being firmly kept in contact therewith by the pressure of the spring *s*; or it may be adjusted so that the friction-roller *l* remains in contact with the cam while the impression-cylinder is printing.

The foregoing description describes the mechanism on either side of the machine. Of course, precisely the same mechanism is required on each side, as is shown in Fig. 11. The distance of travel of the web between successive impression-cylinders will naturally have to be suitably adjusted in each case; but it was unnecessary to give the particulars of the same in the illustrations, because such adjustments are familiar to those skilled in the art. And it is evident that all the foregoing applies to the case of cutting before printing, the sheets of course being suitably conducted by tapes, and the circumference of the printing-cylinder and the distances of travel being suitably adjusted in view of the space between successive sheets at the time of printing. The

oscillation of the impression-cylinders will produce an alternate tightness and slackness of the web; but since the oscillation may be very small this will not cause any inconvenience in practice. If it should do so, it may be easily remedied by causing rollers to be kept by springs constantly pressed against the web, thus keeping it tight; or the rollers may be caused to move with the impression-cylinder in such a way that its distance of travel may remain the same for both the rise and fall positions of the cylinder.

What I claim herein as my invention is—

1. In a printing-press, the combination of a form-bearing cylinder with an impression-cylinder, and mechanism for causing said impression-cylinder to oscillate to and from said form-cylinder in such manner as to come into printing contact with certain of the forms and be kept out of printing contact with the remaining forms; all substantially as described.

2. In a printing-press, the combination of a form-bearing cylinder with a plurality of impression-cylinders, and mechanism for causing one or more of the said impression-cylinders to oscillate to and from said form-cylinder, all substantially as described.

EDWYN ANTHONY.

Witnesses:

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G. C. R. DROEGE.