(No Model.) 7 Sheets—Sheet 1.

E. ANTHONY.

PRINTING MACHINE.

No. 263,745. Patented Sept. 5, 1882.

Fig. 1

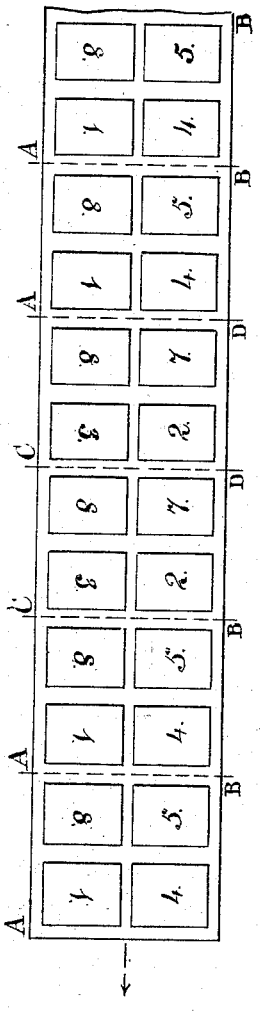


Fig. 2

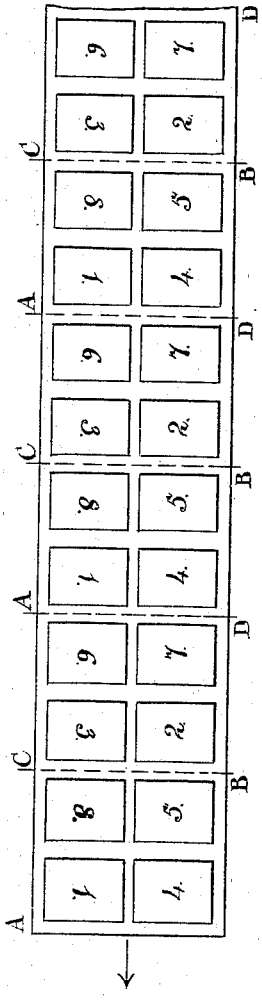


Fig. 3.

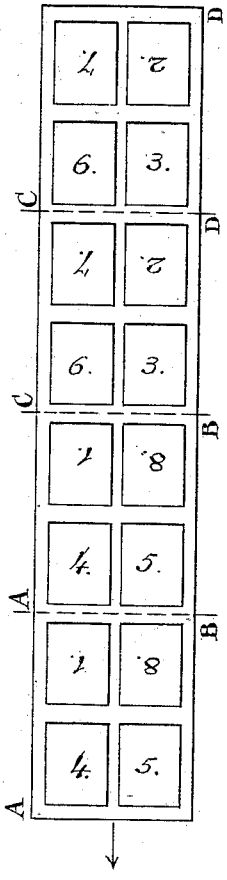
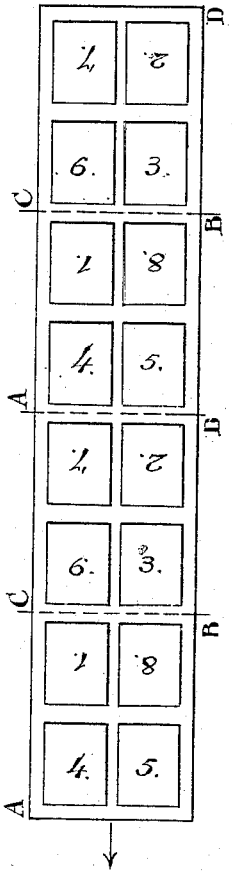


Fig. 4.



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(No Model.) 7 Sheets—Sheet 2.

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Fig. 5.

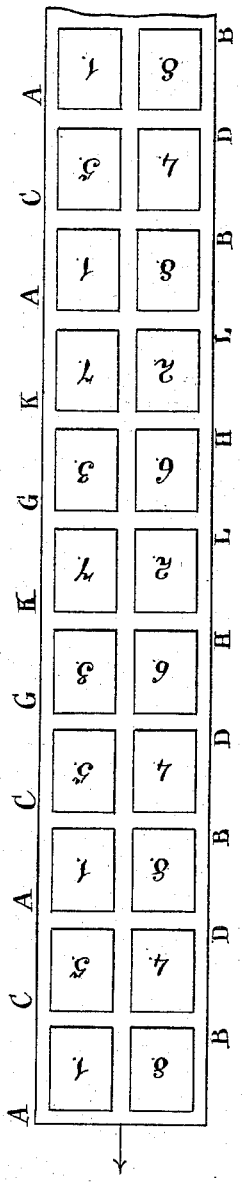


Fig. 6

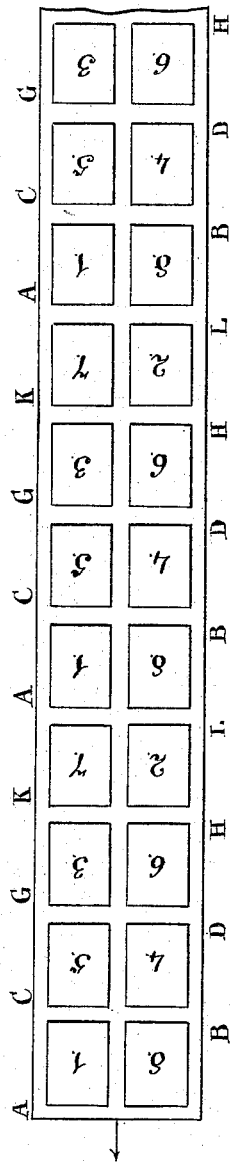


Fig. 8.

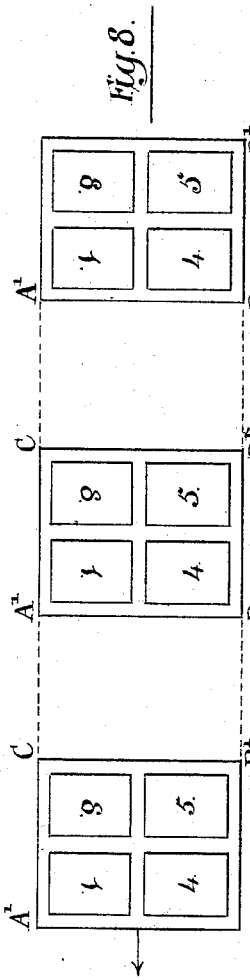
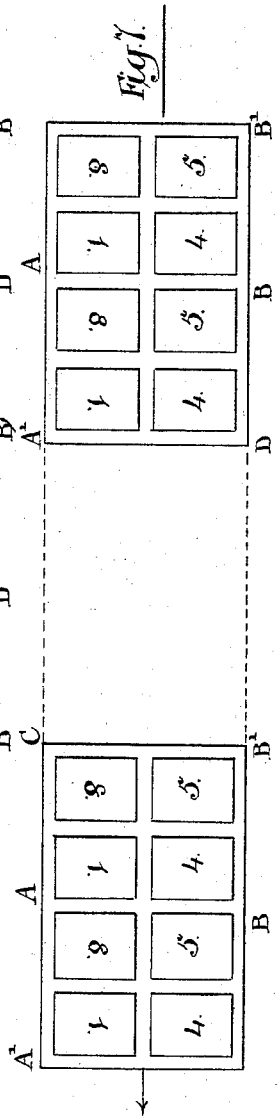


Fig. 7.



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(No Model.) 7 Sheets—Sheet 3.

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PRINTING MACHINE.

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Fig. 9.

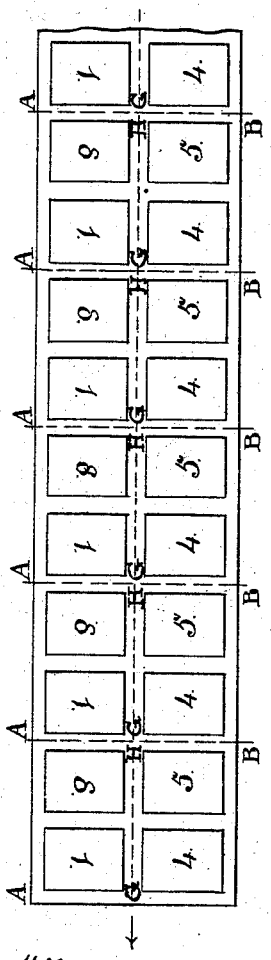


Fig. 10.

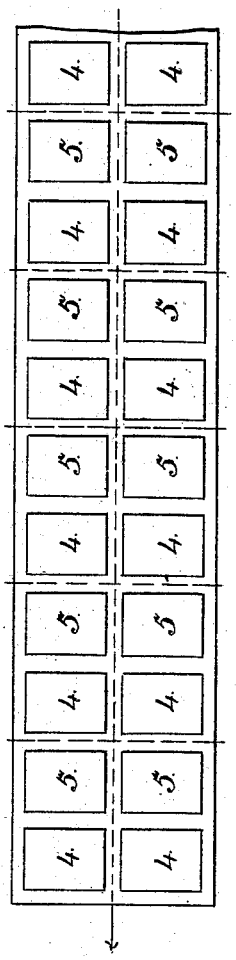


Fig. 11.

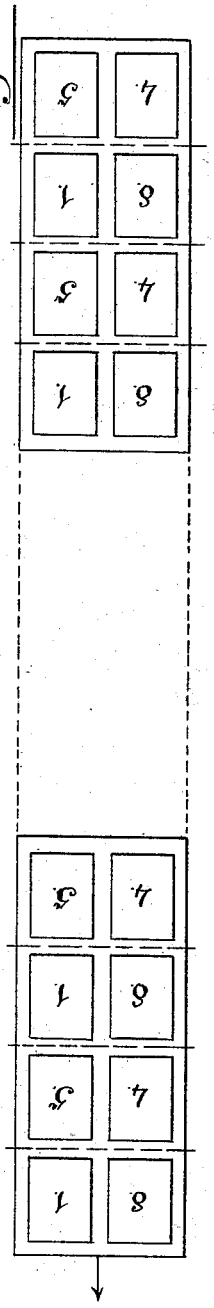
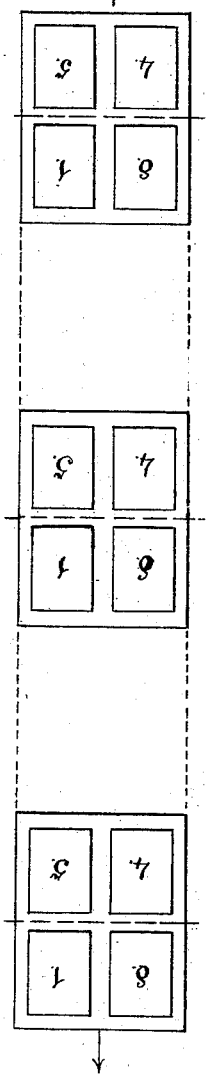


Fig. 12.



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(No Model.) 7 Sheets—Sheet 4.

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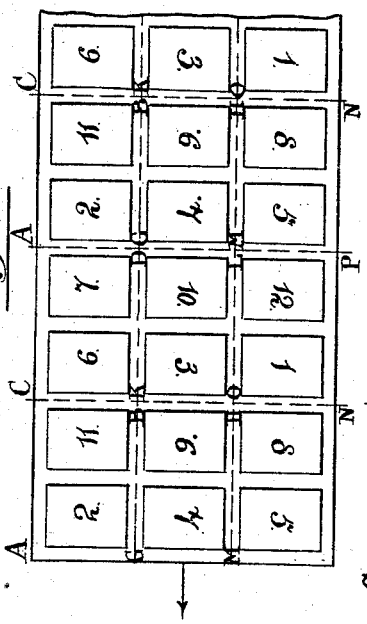
PRINTING MACHINE.

No. 263,745. Patented Sept. 5, 1882.

Fig. 15.



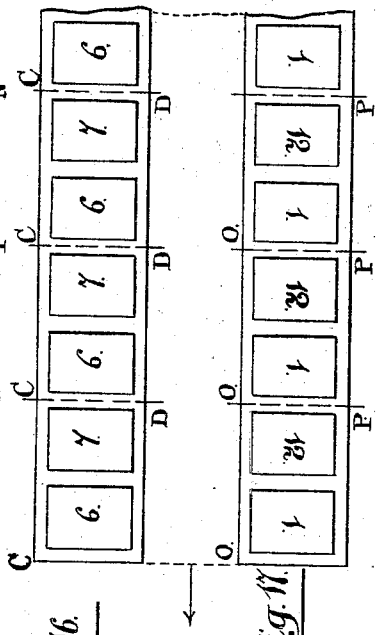


Fig. 17.

Fig. 13.

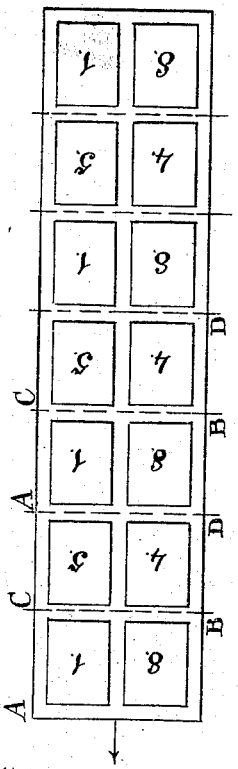


Fig. 14.

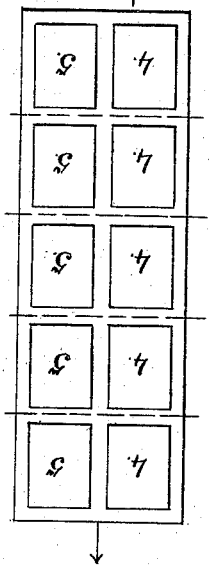
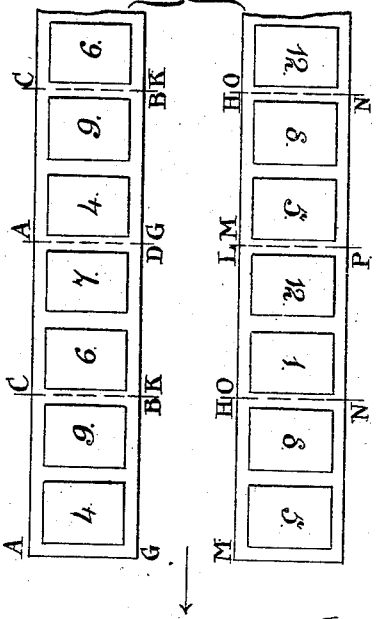


Fig. 16.



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(No Model.) 7 Sheets—Sheet 5.

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PRINTING MACHINE.

No. 263,745. Patented Sept. 5, 1882.

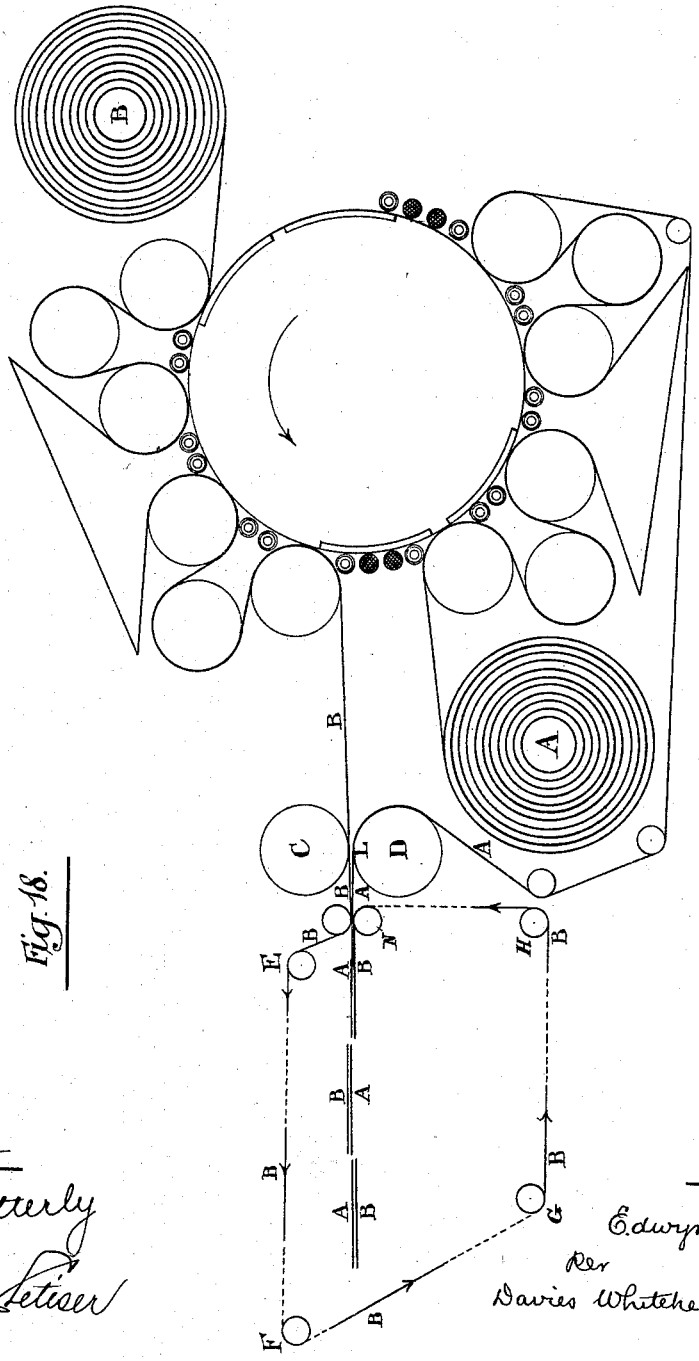

Fig. 18.

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(No Model.) 7 Sheets—Sheet 6.

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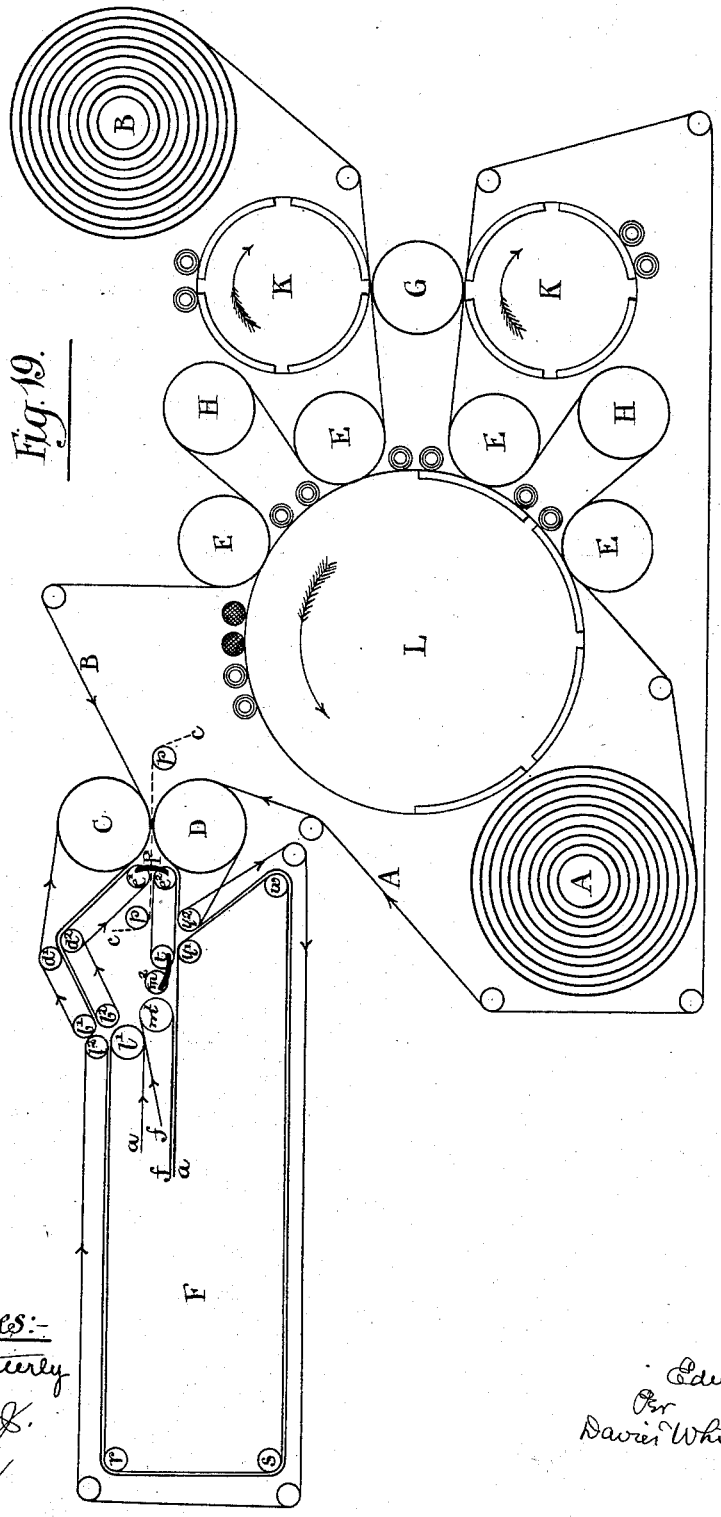
PRINTING MACHINE.

No. 263,745. Patented Sept. 5, 1882.

Fig. 19.



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(No Model.) 7 Sheets—Sheet 7.

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PRINTING MACHINE.

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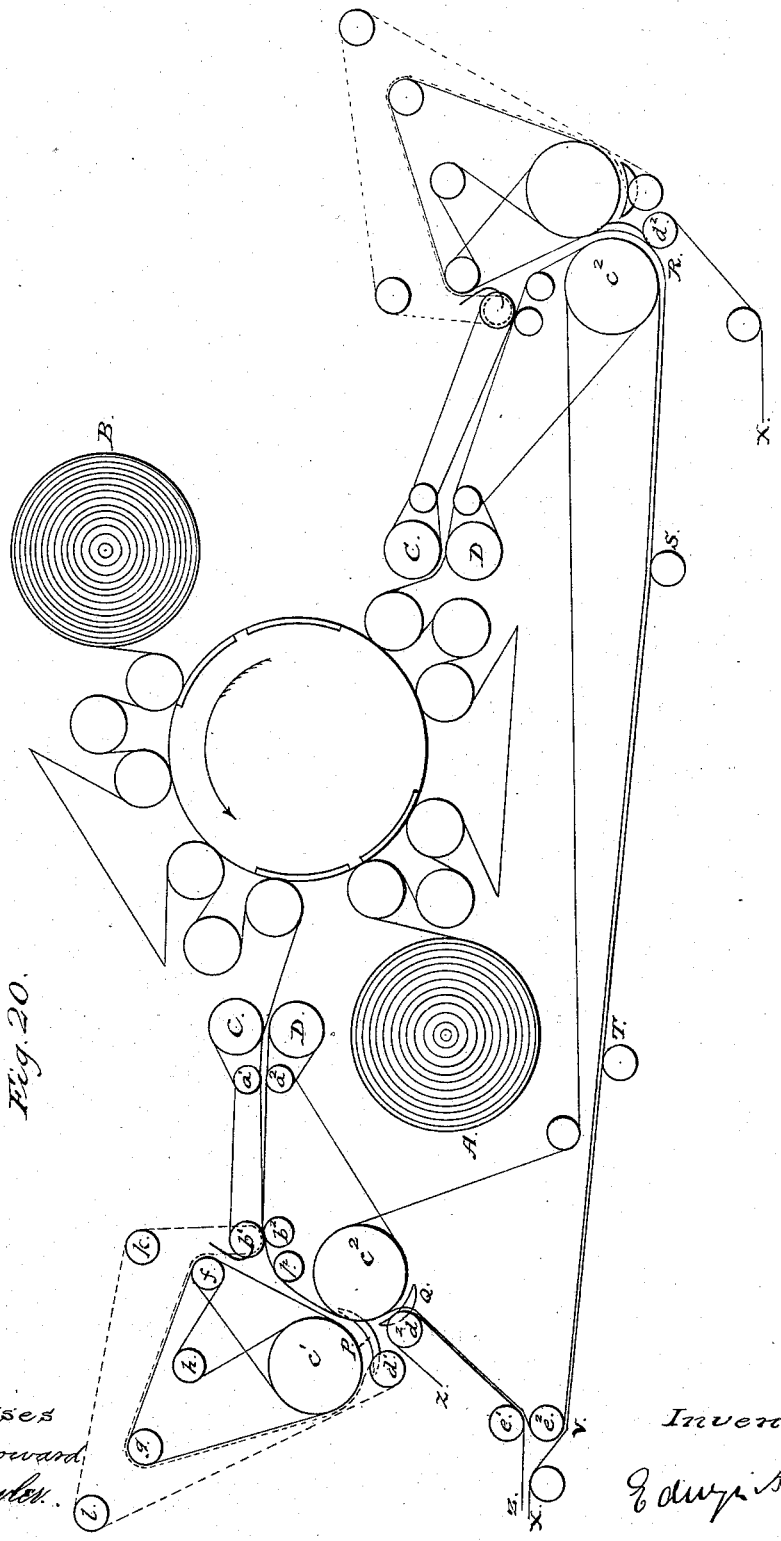

Fig. 20.

Witnesses
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E. M. Fowler.

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UNITED STATES PATENT OFFICE.

EDWYN ANTHONY, OF NEW YORK, N. Y.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 263,745, dated September 5, 1882.

Application filed May 12, 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 temporarily in the city of New York, in the State of New York, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification.

The object of my invention is to simplify the delivery and folding apparatus of printing-presses which print from two rolls of paper and in such a way that both the rolls are printed on alike and that the same matter is printed on each side of a roll. Provided the rolls issue printed on in the manner just described, my invention is applicable, whatever be the nature of the printing mechanism.

Figure 19 illustrates one such printing mechanism, and Fig. 18 (which is taken from the specification of British Letters Patent No. 1,127, year 1875) exhibits another. Figs. 1 to 6 show the way in which the webs must issue in order that my invention can be applied. Figs. 7 to 14 illustrate the various stages which the webs pass through in the process of association when the papers are to be delivered folded. All these figures refer to eight-page papers. Figs. 15 to 17 are similar figures for a twelve-page paper.

Considering the case of an eight-page paper, the forms may be placed on the form-bearing cylinder or cylinders, so that after the webs have been printed on both sides each will come out printed, either as indicated in Fig. 1 or in Fig. 2, (forms on sidewise,) or as in Fig. 3 or Fig. 4, (forms on lengthwise.) In the latter case, when we wish to deliver the papers folded, it is better to arrange the forms so that the webs may come out printed as shown in Fig. 5 or in Fig. 6, instead of as in Figs. 3 and 4. In Figs. 1 and 3 each portion A B is repeated twice consecutively, and likewise C D. If the portions are repeated three, four, or more times, what follows will still obviously apply, and it is needless to illustrate such cases by separate diagrams. Heretofore the two webs have been cut, folded, and delivered separately when they issue from the printing mechanism printed on in the way hereinbefore described. By bringing them together, as hereinafter explained, we greatly reduce the mechanism required for the above purposes.

We will first consider the case of open delivery. After each web has been printed continuously on both sides we run them together, bringing either of the two webs onto the top of the other one. When the webs are cut before printing they must of course be brought together after the cutting; but when they are cut after printing it is usually more convenient to bring them together before cutting, because then one pair of cutting-cylinders will serve to cut both webs. Whether the webs come out, as in Figs. 1, 2, 3, or 4, we bring the same part of one web onto the same part of the other. Thus the A B's of the one web must fall onto the A B's of the other, and the C D's of the one onto the C D's of the other. The two webs thus brought together may now be treated as one web and delivered in any suitable way.

When we deliver folded we must consider separately the cases of the forms on sidewise and of the forms on lengthwise.

Forms on sidewise.—In addition to the transverse cuts, the webs must be cut longitudinally along their central lines in any suitable way. The dotted lines in the figures indicate where these transverse and longitudinal cuts are to be given. These may be made while the webs are together, so that one apparatus will serve the purpose. We may adopt either of two plans for bringing them together. We may treat each web separately and bring in any suitable way the A B's of each web onto the C D's of the same web. (See Figs. 1 and 2.) Each web will now be traveling as in Fig. 7 (corresponding to Fig. 1) or as in Fig. 8, (corresponding to Fig. 2.) The spaces C D will be equal to the breadths A B, or greater, if the motion of the sheets has been accelerated. We can therefore, by properly fixing the distance of travel of the two webs, make them run in one stream, as illustrated in Fig. 9, an interval being between consecutive papers if the motion has been accelerated. If the web be now severed longitudinally along the dotted line, Fig. 9, then each half-sheet A H, together with the half-sheet underneath it, makes up a complete paper, and, similarly, each half-sheet G B, with the half-sheet underneath it, makes up a complete paper. The stream thus shown must now be conducted to a folding apparatus suitable for folding papers, reaching it in the form

indicated. If preferred, the stream on either side (say A H of Fig. 9) may be turned the other side up in any suitable way before it reaches the folding mechanism. In this case the stream would reach the folders in the shape indicated by Fig. 10, and the folding mechanism must of course be correspondingly modified. The other way of bringing the webs together is the following: Let the one web (call it No. 1) run constantly in the same path. Let the A B portions of the other (call it No. 2) run on to the top of the C D portions of No. 1, and its C D portions underneath the A B portions of No. 1. This may be accomplished by running the C D portions of No. 2 (we suppose No. 2 web to be running above No. 1 web) beyond the folding apparatus and returning them underneath web No. 1, or by turning the C D portions out of their path by a suitable apparatus and bringing them back underneath No. 1. The webs will now be in the state shown in Figs. 9 or 10, as the case may be, and the after treatment will be as before.

Forms on lengthwise.—The arrangement of the forms being such as will bring the webs out printed as shown in Figs. 5 and 6, the method of procedure is similar to the preceding case; but no longitudinal cutting is required. The dotted lines in Fig. 13 indicate where the transverse cuts are to be made. Treating each web separately, the A B's go onto the G H's and the C D's onto the K L's. The webs are then traveling as in Fig. 11 or Fig. 12, and, being run into one stream, become as in Fig. 13; or (similarly to the case previously described of the forms on sidewise) No. 1 web may be run constantly in one path, and the A D's of web No. 2 run onto the G L's of No. 1 and the G L's of No. 2 run underneath the A D's of No. 1. The webs having by either plan been brought into the state shown in Fig. 13, they may be either so conducted to the folding apparatus, or the A B's may be first turned the other side up by any suitable mechanism, so that the papers will go to the folding mechanism, (of course suitably modified,) as shown in Fig. 14.

Devices for cutting a web longitudinally or transversely, for separating sheets into two paths, for bringing two or more sheets together, &c., are well known, and to such devices I herein make no claim.

Figs. 18 and 19 illustrate one of the methods of treatment hereinbefore mentioned. After printing on both sides, each web is conducted by suitable rollers to the same pair of cutting-cylinders, C D, Fig. 18. Issuing at L, they need not again be separated when the delivery is open, but they may go direct to the delivery apparatus. Since, however, the sheets are running some one way up and some the other, it will be necessary (if it is desired to deliver them all lying the same way up) either to separate them into two streams and deliver them onto separate boards, or to pass half of the sheets through a suitable reversing mechanism, and thus bring them the same way up as the other half. The path of the webs to the left of the cylinder C D (shown in Fig. 18) refers to the case of folded delivery. When they are to be folded, then (treating them in one of the ways hereinbefore explained) the web A will go in one path to the folding mechanism, alternate portions of the other web, B, going with it, and alternate portions being diverted and conducted by suitable rollers and tapes in a path, E F G H N, till they rejoin web A underneath the same.

Fig. 19 illustrates another printing mechanism and shows in detail arrangements for bringing the webs together, as hereinbefore explained. Each of the form-bearing cylinders K K L has placed on it a set of eight forms, (each containing one of the eight pages which make up the paper in question.) The rolls are printed on one side by passing between cylinders G and K, and another by passing between cylinders E and L, as the figure indicates. It is obvious that the forms may be arranged on the cylinders so that the webs shall pass between the cutting-cylinders C D printed on as shown in Figs. 2, 4, or 6. Tapes (as indicated by the dotted line pass between C and D) and around the rollers p p, their ends c c being run together by suitably-placed skew-pulleys. The knife carried by one of the cylinders C D has small portions cut away at intervals, and the aforesaid tapes are placed so that when the knife comes around they may run between the said intervals.

P is a guard which enters grooves cut for the purpose in the rollers e' e^2. Its object is to prevent any possibility of either of the webs getting between e' and e^2.

Tapes pass around b', d', b^2, d^2, e', and e^2, and also round d' C and Y^2 D. The last two sets of tapes are fixed so that they may pass between the before-mentioned intervals of the knife.

The rollers l^2 l' m' m^2 touch a circle whose center lies in the common tangent of d' d^2, and the pair of rollers b' b^2 oscillate in an arc of a circle whose center is coincident with that of the circle previously spoken of. Their oscillation is timed so that they deliver sheets alternately between l^2 l' and m' m^2, and their oscillation may complete the severance of the web, which the knife has not entirely effected.

The foregoing remark only applies when the webs are printed on as shown in Figs. 2, 6, and 15. Of course when the web is as shown in Figs. 1 and 5 the oscillation must be timed so as to let two consecutive sheets pass between l' l^2, and then two between m' m^2, and so on, and, similarly, three, four, or more consecutive sheets must pass at each oscillation if three, four, or more sheets are traveling consecutively the same way up.

A set of tapes start from a', pass round l, r, s, w, and y', and thence to a. Their ends a_1 a_1 must of course be run together; but their course previous to doing so will depend on the folding mechanism F, which may be of any suitable kind and placed somewhere in the space

$l' r s w y'$. A set of tapes starting from l^2 pass round r, s, w', and y^2, and are thence returned by suitably-placed rollers to l^2. Tapes also pass round m', their ends $f f$ being ultimately run together, their previous course depending on the folding mechanism.

A guard is fixed with its ends running into grooves in the rollers m^2 t. Its object is to prevent the oncoming web and sheets from coming against the roller m^2, whose motion is in the contrary direction. The course of the webs may now be easily traced. The web A passes between the cylinder D and the dotted-line tapes, thence round e^2 and along between the tapes f and a. The web B passes between C and the dotted-line tapes, thence between d' d^2 to the oscillating rollers b' b^2. The sheets delivered by the last-mentioned rollers between m' and m^2, pass along between the tapes f and a above the web A, the sheets delivered between l^2 l' pass round r s w, then between y' y^2, and finally between the tapes f and a, but underneath the web B.

The completion of the severance of the web A and the folding may now be done in any suitable way. When the other method of treatment hereinbefore mentioned is adopted separate pairs of cutting-cylinders will be required for each web, and the rest of the treatment be what has already been described for that case.

When it is desired by the mechanism of Fig. 19 to deliver the sheets unfolded all that is necessary is to remove the tapes c', which pass round the rollers p, to connect the cylinder D and the roller e^2 by tapes, similarly to the way in which the cylinder C and the roller d^2 are connected, as hereinbefore explained, and to stop the oscillation of the pair of rollers b' b^2, fixing them opposite the rollers m' m^2. The distance of travel of the webs must of course be such that the same parts come together as they pass between the cylinders C and D. Thus both webs will pass between e^2 and C, d^2 and d', b^2 and b', and m^2 and m', finally issuing between the tapes $a f$, whence they must be conducted to any suitable open delivery apparatus, as hereinbefore explained.

The other method hereinbefore described of treating an eight-page paper which is to be delivered folded is illustrated by Fig. 20. There are two pairs of cutting-cylinders, C D, one pair for each web. The course of the webs till they reach the said cylinders is shown in the drawings, and it may be easily traced. Considering the left-hand portion of the figure, the rollers a' a^2 rotate with the same surface-velocity as do C and D, while all the rollers to the left of the said rollers rotate with a somewhat greater surface velocity. There is a slight interval between a' a^2, while b' b^2 are close together, so that they may bind the sheets and complete their severance, which has not been entirely effected by the cutting-cylinders a' C as also a^2 D are connected by tapes, indentations being made in the knife carried by the cutting-cylinder, so as to admit of their free passage, b' a'; also, b^2 a^2 are connected by tapes, loose pulleys running on the axes of a' a^2, (the said rollers having grooves in them for that purpose,) round which the tapes pass. The roller b' is also provided with loose pulleys, round which the tapes indicated by the dotted line pass. The course of these last-mentioned tapes is clear from the drawings. Tapes also pass round f c', another set round g c' h f, and another round a^2 b^2 p c^2. The ends z z of the tapes which pass round the rollers d^2 e' are of course ultimately joined, their path before they do so depending on the subsequent folding mechanism, &c. Tapes pass round c^2, d^2, e^2, and c^2 (to the right of the figure.) The tapes whose ends are denoted by x x are of course ultimately joined, their path before they do so depending on the subsequent folding mechanism, &c. Between f b' a guide is placed to prevent the oncoming sheets touching the roller b', which rotates in the direction contrary to their motion.

P Q are guides or switches, which must be operated on by cams or other suitable devices. They must be capable of oscillation round the centers of c' c^2, respectively, so as to be in the position shown in the left-hand side of the figure while two sheets are being collected in the circuit formed by the rollers f g c', and then move to the position shown in the right hand of the figure, so as to permit the two collected sheets to pass out between the rollers c^2 d^2.

A similar mechanism to that just described is shown to the right of the figure. It seems unnecessary to more particularly describe the said devices, because I do not herein claim them, and any suitable device for collecting sheets in pairs may be used. Thus the web B issues from between d^2 c^2, and thence between e' e^2, traveling as indicated in Figs. 7, 8, 11, or 12. Similarly, the web A issues from between c^2 d^2, (right hand of the figure,) passes along R S T V, and thence between the tapes x z. The length of R S T V must be adjusted so that the two webs, which become one stream when they get between the tapes, (whose ends are denoted by $x z$,) will be traveling as indicated in Figs. 9 or 13.

I do not herein claim the method just described, because I intend to make a separate application for Letters Patent for the same.

It is clear that when the delivery is unfolded the foregoing methods are applicable to all papers, whatever the number of their pages, and that similar methods apply to papers of a larger number of pages than eight when the papers are delivered folded. For example, suppose, in printing a twelve-page paper, the forms are arranged so that the webs come out printed as shown in Fig. 15. Then, treating each web separately, we bring, by any suitable way, the G H's onto the A B's and the K L's under the O P's. Each web will then be traveling as shown in Fig. 16, A B consisting of two sheets and C D of one sheet, and, similarly, O P consisting of two sheets and M N of one

sheet. Now let No. 1 web run constantly in the same path, and let the A N's of No. 2 web run underneath the C P's of No. 1 web, and the C P's of No. 2 web run on the A N's of No. 1. The webs will then be running as in Fig. 17. As before, they may be taken in that state to the folders; or the O P's may be first turned the other way up, so as to bring both streams the same way up.

The mechanism for thus treating a twelve-page paper may be such as is shown in Fig. 19, with the addition of mechanism for longitudinally severing each web (along the lines indicated in Fig. 15) and of mechanism for afterward cutting transversely the so-severed central part of the web and laterally transferring alternate portions of it, respectively, onto the two so-severed outside portions of the web, all before the cylinders C and D, Fig. 19, are reached.

What I herein claim as my invention is—

The combination of mechanism for printing two webs (so that both sides of each web are printed on alike) with mechanism for cutting the webs and associating alternate portions of one of the webs with the upper and alternate portions with the under side of the other web, all substantially as described.

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