

(No Model.)

E. ANTHONY & J. E. HARVEY.

2 Sheets—Sheet 1.

WEB REVERSING APPARATUS FOR PRINTING MACHINES.

No. 263,750.

Patented Sept. 5, 1882.

Fig. 2.

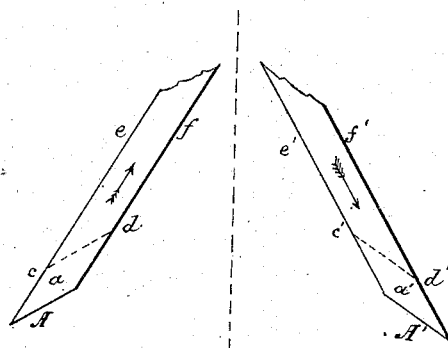


Fig. 4.

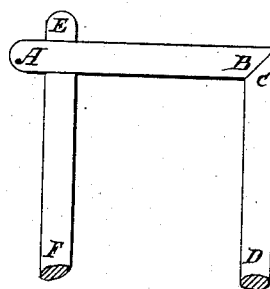


Fig. 1.

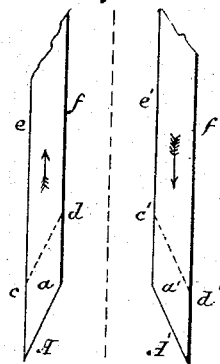


Fig. 5.

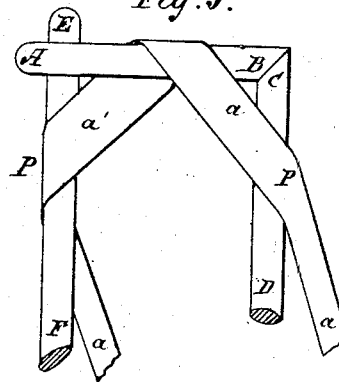


Fig. 3.

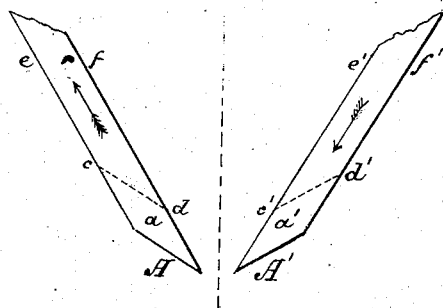
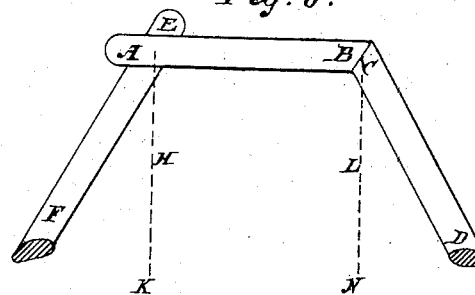


Fig. 6.



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Fig. 7.

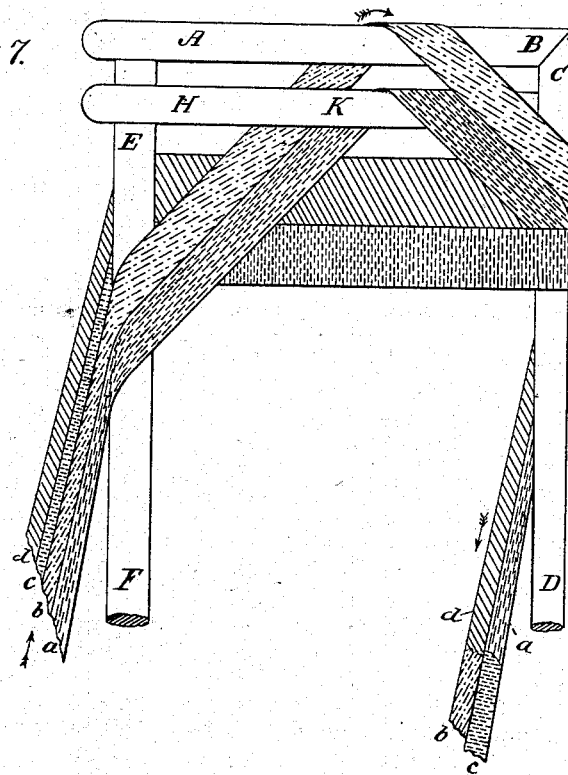


Fig. 8.

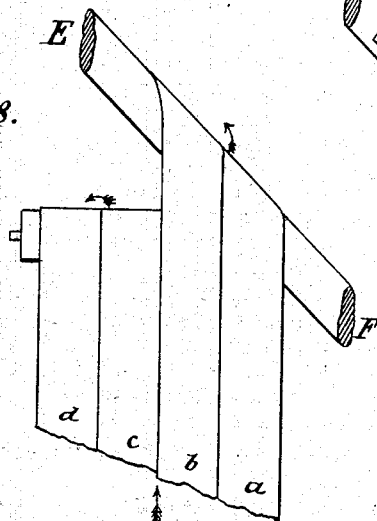
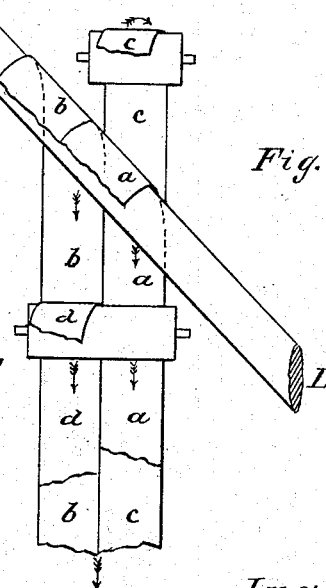


Fig. 9.



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UNITED STATES PATENT OFFICE.

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WEB-REVERSING APPARATUS FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 263,750, dated September 5, 1882.

Application filed May 16, 1882. (No model.)

To all whom it may concern:

Be it known that we, EDWYN ANTHONY and JACOB EDWARD HARVEY, subjects of the Queen of Great Britain, residing at the city of New York, in the county and State of New York, have invented a new and useful Improvement in Web-Reversing Apparatus for Printing-Machines, of which the following is a specification.

Our invention consists of an apparatus, herein described and claimed, for reversing the sides of a traveling web or sheets in tapes in such a way that the web, after passing through the apparatus hereinafter described, is opposite its former position, and its plane parallel or at an angle to the plane of its former position, and the lines drawn across it perpendicular to its edges are parallel to their former positions.

Figures 1 to 3 show the different portions of the web before entering and after leaving the devices which constitute this invention. Figs. 4 and 5 show the apparatus which causes the web to enter and leave, so that its position relatively to itself before entering and after leaving is that shown in Fig. 1. Fig. 6 is an apparatus to which Figs. 2 and 3 apply; and Figs. 7, 8, and 9 illustrate a modification of the apparatus suitable for treating in a certain way webs traveling as these shown.

Thus (Figs. 1, 2, and 3,) if A is the web about to enter the apparatus, and A' the web on leaving it, then the edge *ce* is opposite to the edge *d'f'* and the edge *d'f* opposite to *c'e'*. Any line *cd* drawn perpendicularly across the web is parallel to any similarly-drawn line *c'd'* and *a'a'*, representing different sides of the web. *a* and *a'* face one another. In Fig. 1 the plane of the web on entering is parallel to the plane of the web in leaving the apparatus. In Figs. 2 and 3 the said planes are inclined to one another. Considering the former case first, A B, C D, E F, Fig. 4, are three cylinders whose diameters need not be equal. A B and C D are fastened together so that their axes are perpendicular to one another and that they have a common tangent plane on the side of them remote from that on which the cylinder E F lies. The said cylinder E F is fixed so as to touch the cylinder A B and to be parallel to the cylinder C D. The edge of the web on entering and leaving the appa-

ratus may make any convenient angle with the axes of the cylinders E F and C D. As an example, take the case of the radii of the three cylinders, all equal, and forty-five degrees the angle which the edge of the web makes with the axis of E F as it enters, then the web must run over this cylinder so that its central line first touches it in a point, P, Fig. 5, whose distance from the axis of A B is equal to half the distance between the axes of the cylinders E F and C D. To conduct the web to the cylinder E F a roller (not shown in the figure, call it R,) must be placed in the case we are taking so as to have its axis at an angle of forty-five degrees with the axis of E F, and also to have a common tangent plane with the cylinder E F, which said tangent plane shall likewise be perpendicular to the axis of the cylinder A B. Similarly the web, after leaving the cylinder C D, must be conveyed to another roller (call it R') having the same position relatively to that cylinder which the first roller has to the cylinder E F. The course of the web can be traced by an inspection of Fig. 5. Coming from the roller R it passes over the cylinder E F, thence under and over the cylinder A B, and from there over the cylinder C D to the roller R'. The web thus issues from the apparatus parallel and opposite to its position before entering it.

If it is desired that the web should not come out opposite to itself, but should be shifted transversely, all that is necessary is that the web should be passed over E F so that its central line may not pass over the said point P, but should first meet the cylinder E F in some point situated above or below it. Then each edge of the web will be shifted transversely by a space equal to twice the distance between this last-mentioned point and the said point P.

When it is desired that the web after passing through the apparatus should come out not parallel to itself, but as shown in Fig. 2, it is necessary to fix the cylinders differently from the arrangement in Fig. 4. More ways than one will accomplish the object in view. A convenient arrangement is illustrated by Fig. 6. Let the cylinders be arranged as in Fig. 4, except that E F and C D are not fixed perpendicular to A B, but inclined at an angle thereto. Thus if H K, L N are drawn perpen-

dicular to A B, Fig. 6, and parallel to the plane to which the axes of the three cylinders, Fig. 4, are parallel, and if the angle between the planes of the web on entering E F and on leaving C D is $2e$, and a is the angle which the edges of the web make with the axes of E F and C D, then we must fix E F and C D, Fig. 6, so that the sine of the angle between H K and the axis of E F and between L N and the axis of C D is equal to sine e multiplied by cosine a . For example, if the apparatus is fixed so that the edges of the web make an angle of thirty degrees with E F and C D, and the angle between the plane of the web on entering the cylinder E F and the plane of the web on leaving the cylinder C D is required to be ninety degrees, then the angle between F E and H K and between C D and L N must be thirty-seven degrees forty-six minutes, approximately. If the web is desired to come out as in Fig. 3 instead of as in Fig. 2, then the cylinders must be placed exactly as just described, except that E F and C D must be fixed on the other sides of H K and L N to what they are in Fig. 6.

The modification last described we do not claim, but state it herein to show how the apparatus may be modified to meet that case, the precise arrangement indicated never having been previously described.

When the web comes out as in Fig. 2 we may, by suitably fixing the three cylinders, cause the edge of the web to enter and leave the cylinder A B at right angles, so that A B may rotate—in other words, may be an ordinary roller. The axes of the three cylinders cannot in this case be taken parallel to the same plane.

We may add one, two, or more cylinders like A B to Figs. 4 or 6, and thus virtually obtain two or more apparatus, by which two or more webs may be treated. Thus the four cylinders shown in Fig. 7 compose, as it were, two such apparatus as are shown in Fig. 4. One web may be reversed by being passed over E F, H K, C D, which may be regarded as one apparatus such as Fig. 4; and another web be reversed by being passed over E F, A B, C D, which may be regarded as another apparatus such as Fig. 4. For example, suppose there are two webs such as a and b , Fig. 7, and it is required to reverse a and bring it onto the one side of a third web, c , and to reverse b and bring it onto the other side of a fourth web, d , the planes of the webs on leaving the apparatus, as likewise the lines drawn perpendicularly across them, to be parallel to their previous positions, to the apparatus Fig. 4 add a cylinder, H K, fixing it so as to be par-

allel to A B, to touch F E, and to have a common tangent plane with D C and A B. The breadths a and b pass through the reverser, as shown by Fig. 5, a passing under H K, and b under A B, and thence both over C D. The breadths c and d do not pass through the reverser, nor do they touch either of the cylinders E F, C D. The breadth c is conducted by suitable rollers (not shown in Fig. 7) under E F, then over C D, while the breadth d is similarly conducted under E F and under C D. Thus the breadths b and d are brought together, and the breadths a and c , a being on the contrary side of c to that which b is of d .

Figs. 8 and 9 show the webs respectively approaching the cylinder E F and receding from the cylinder C D. Taking the particular case of the diameters of the four cylinders, all equal, and entering the web with its edge inclined at an angle of forty-five degrees to the axis of the cylinder E F, then the distance between the axes of the cylinders H K and A B must be equal to any one of the equal breadths a , b , c , and d ; and if P be the point in which the central line of the breadth b meets the cylinder E F, the distance of P from the axis H K must be equal to half the distance between the axes of E F and C D. Of course when the web is in sheets it must travel between tapes in the usual way. The tapes must be passed through the apparatus in the manner previously explained with reference to the web; and since in general they will not come out opposite to the positions they had on entering, their ends must be run together by means of skew-pulleys or other suitable devices.

We do not claim the use of a fixed cylinder for deflecting the path of a traveling web, because that device is shown in the specification of Rose's British Letters Patent, No. 12,715, year 1849, and in the specification of Sandeman's British Letters Patent, No. 3,319, year 1870; but

What we do herein claim as our invention is as follows:

Three cylinders, A B, C D, E F, arranged so that E F and C D each make an angle not less than a right angle with A B, that A B and C D have a common tangent plane, and that E F touches A B on the side of it remote from the said tangent plane, whereby the sides of a traveling web or of sheets in tapes are reversed, all substantially as described.

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