(No Model.) 2 Sheets—Sheet 1.

W. H. RANKIN

MACHINE FOR FORMING PAPER, CLOTH, OR OTHER FABRIC INTO TWO OR MORE PLY.

No. 302,938. Patented Aug. 5, 1884.

Fig. 1.

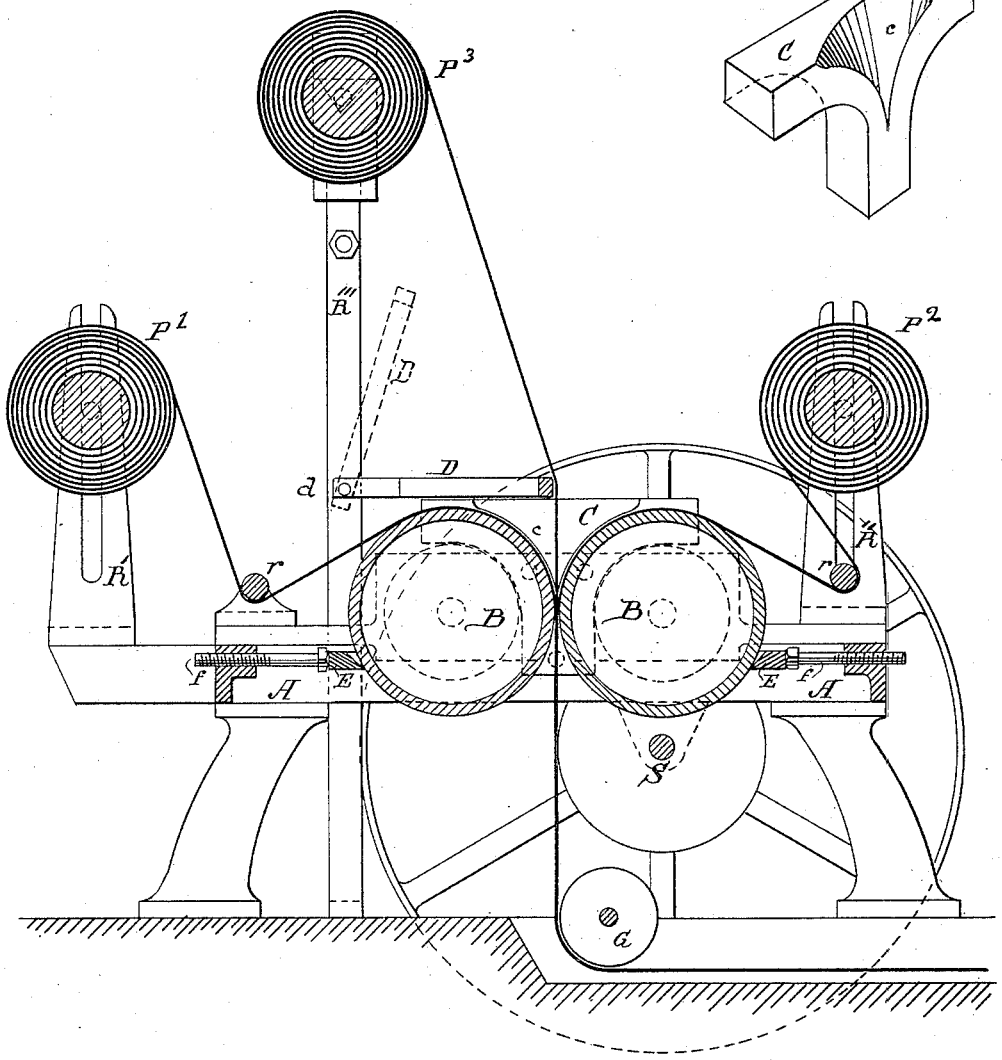
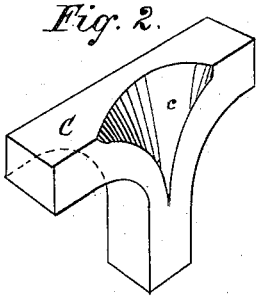


Fig. 2.



Witnesses.

John A. Hunt Jr.

James M. Tully

Inventor.

William H. Rankin

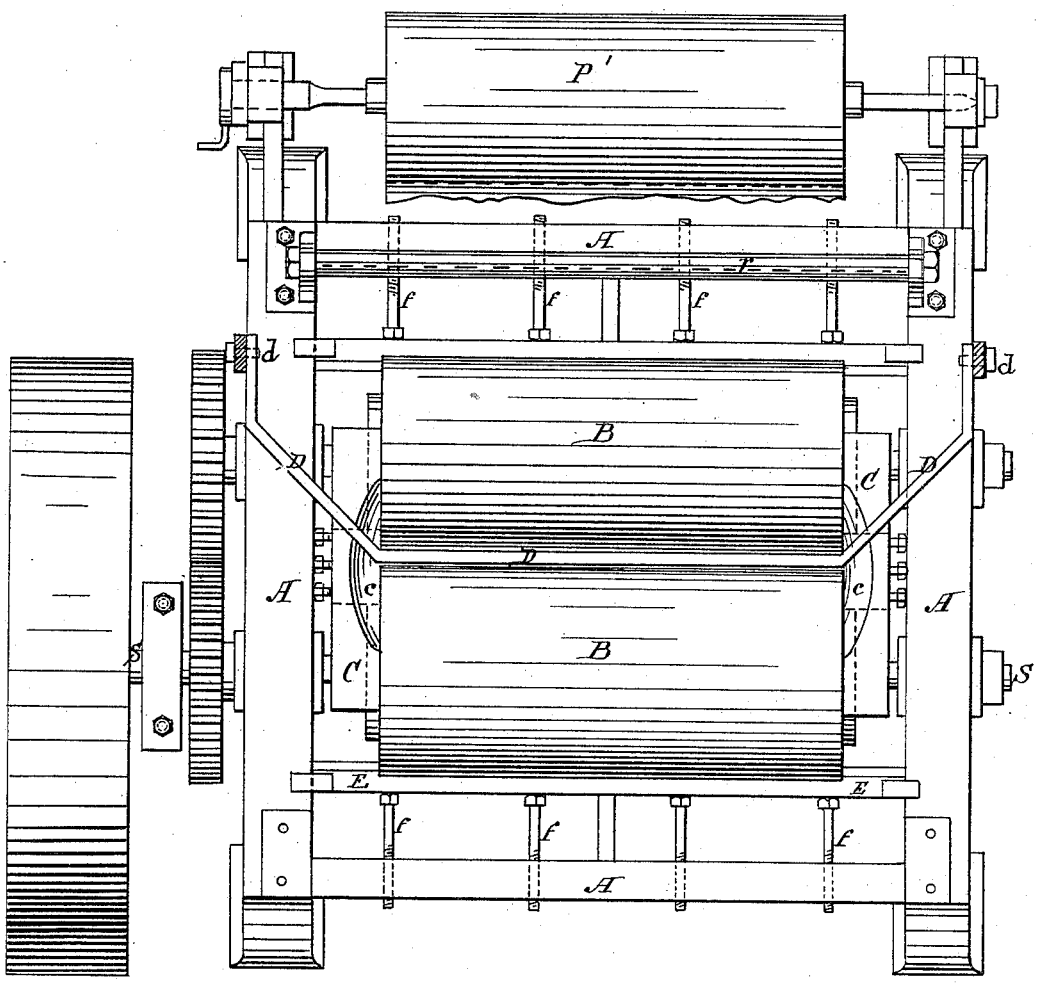
(No Model.) 2 Sheets—Sheet 2.

W. H. RANKIN.

MACHINE FOR FORMING PAPER, CLOTH, OR OTHER FABRIC INTO TWO OR MORE PLY.

No. 302,938. Patented Aug. 5, 1884.

Fig. 3.



Witnesses.
John P. Hunt, Jr.
James M. Tilly.

Inventor.
William H. Rankin

UNITED STATES PATENT OFFICE.

WILLIAM H. RANKIN, OF ELIZABETH, NEW JERSEY.

MACHINE FOR FORMING PAPER, CLOTH, OR OTHER FABRIC INTO TWO OR MORE PLY.

SPECIFICATION forming part of Letters Patent No. 302,938, dated August 5, 1884.

Application filed April 21, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. RANKIN, of the city of Elizabeth, Union county, in the State of New Jersey, and a citizen of the United States, have invented a new and useful improvement in machines for forming paper, cloth, or other fabric into two or more plies by means of asphaltum, paste, glue, or other plastic adhesive substance, so as to form one uniform thickness of a homogeneous nature, of which the following is a specification.

Machines heretofore used for putting together two or more plies or layers of paper, or paper and cloth, or of any sheets or webs of fabric, so as to form one, usually consists of sets or pairs of rollers or cylinders—if for forming two-ply, one set of two rollers or cylinders, usually of iron or of other metallic substance, and of any desirable dimensions, but of equal diameters, and usually being in length equal or nearly equal to the width of the paper or cloth or other fabric to be put together. They are adjusted and made to revolve in a horizontal position upon pivots or bearings so adjusted by means of any of the well-known mechanical devices with adjustable screws or springs, or both, so as to be readily adjusted to the thickness of the material required to be passed between them. Their ends are also adjusted to a yoke or collar, which fits closely to the ends of the cylinders, and as near water-tight as may be, passing below the centers or axis of said cylinders, and rising so that the upper edge is at any required distance above the opposing lines of the faces of the two cylinders, usually to the height of the cylinders themselves, which yoke or collar forms, with the upper opposing surfaces of the cylinders, a trough for the introduction and holding of paste, paint, glue, asphaltum, or other substance used in holding the paper or other fabric together. The paper or other fabric to be united in one thickness is hung on pivoted rollers parallel with the said cylinders, and at any required angle above the plane of the axis of the cylinders over and between which the paper or fabric is to pass—one roll at either side of the said cylinder. The cylinders are provided with a yoke or end piece fitting snugly to the ends of the cylinders. This yoke may be of hollow metal, for the introduction of steam for the purpose of keeping warm and pliable the paste or other substance used as a layer between the layers of paper or other fabric for uniting them. The paper or other fabric as it unrolls is passed underneath a smaller roller or friction-rod, usually placed a little below the upper surface of the cylinders, and then brought up and over the said cylinders, and the two webs or sheets of paper, cloth, or other fabric are carried over and in contact with the faces of and between the two cylinders, receiving upon their opposing surfaces, in their passage through the trough, formed as above described, whatever desired substance may be used for a layer or coating material for uniting the two thicknesses of paper when brought together and pressed between the opposing cylinders. There is thus formed, on passing the fabric over and between the cylinders, and through the trough formed by means of the yokes adjusted to the ends of the cylinders supplied with the necessary adhesive substance, and in manner aforesaid, a two-ply fabric, which is carried out from under the cylinders and along upon a moving bed or apron or rollers, to any desired distance from the place of uniting the same, and rolled up for future use in rolls of any desired size. When more than two-ply fabric is desired to be made, the usual method has been to pass the two-ply already formed, as above described, between a second set of cylinders set in the same manner as above described, when it is united to a third sheet or web of paper, cloth, or other fabric, by the same compound or adhesive substance, and by the same mechanical devices; or the first-formed two-ply is taken and passed between the same cylinders with a third web or sheet, as before described, thus forming a three-ply fabric, and so continued to the formation of any number of ply fabric. The three-ply fabric thus formed is liable to imperfections from lack of uniformity of the tension of the third ply with the already-formed two-ply, one ply of the latter becoming the center of the three-ply to be thus formed, and also from lack of uniformity of temperature of the plastic or adhesive material used for uniting the same,

and thereby prevents so perfect a union as might be desired, often resulting in blistering or the starting in places of the last layer of fabric from the other portion which makes up the three or four ply; and also the machinery to produce the three-ply must be duplicated, or else the two-ply must be passed through the same machine a second time to take a third layer, thereby very greatly increasing the expense in machinery or manual labor, or both, of the manufacture of three-ply over the two-ply, besides the cost of the material used. By my improvements I obviate these difficulties and form or make a better and more perfect three-ply fabric, or any of more than two-ply, and at a less expense than the methods heretofore used.

My improvement and invention consists, first, in forming the yoke or collar C, (which at the ends of the cylindrical rollers, and in conjunction with them, forms the trough for the paste or other substance to be applied to the paper or other fabric,) dishing or scooped out on the inner side, so that the ends of the trough will extend beyond the ends of the rollers for any convenient distance, substantially as seen in the drawings, C *c*, Figs. 2 and 3; and, secondly, in means for aiding the passing a third sheet of paper or other fabric through the same trough and between the same rollers or cylinders at the same time with the two for the outer surfaces, and thus at one operation form a three-ply material, as seen at R‴, D, and P^3, Fig. 1 of the drawings, P′ and P^2 containing the fabric for the two outer layers of paper, and P^3 that for the third or inner ply, and D an adjustable friction-bar pivoted at *d* for the purpose of guiding the inner ply and giving it the proper tension as it passes between the rollers B B with the other two-ply. If a fourth ply is required, a second friction-bar may be added and the two adjusted to the proper position. By extending the length of the trough beyond the ends of the cylindrical rollers it permits the liquid or semi-liquid paste or other substance used for uniting the layers of paper or other fabric to be poured into the trough at any point, and to flow freely around the edges of the third or inner ply or sheet or sheets of paper or other fabric held between the two outer sheets while descending through the trough, and thus become applied to the two sides of the inner sheet or sheets of fabric. The yoke C, as well as the rollers B B, may be made hollow and adjusted to hot steam-pipes for the reception of steam for heating or preserving the temperature of the semi-liquid paste, asphalt, or other substance used in forming a layer between and holding together the fabric, or saturating the same to make it water-proof.

In the drawings, Figure 1 represents a side elevation of my improved machine. Fig. 2 shows the improved yoke or collar detached, which forms, with the rollers B B, the trough for holding the paste or other substance used in cementing together and waterproofing the fabric. Fig. 3 is a plan or top view of my improved machine.

A A is the frame that supports the machine, and S the driving-shaft.

B B are two cylindrical rollers, so arranged by means of set-screws and springs as to be easily adjusted to any required thickness of paper or fabric to be passed between them, and at the same time to have the proper amount of pressure in forming the two or three or other ply of material.

C is the yoke or collar.

P′ P^2 are two rolls of paper or fabric held in stanchions R′ R″, which form the outer layers, and P^3 is a roll making an inner ply held on a stanchion, R‴.

D is a friction-bar pivoted as at *d*, which may be adjusted at any required angle for holding taut, guiding, and steadying the fabric from the roll P^3 as it is fed between the rollers and the two outer layers of paper or fabric.

r r are small friction-rollers for holding taut the paper or other fabric as it passes over the cylinders B B, and G is a small friction-roller, beneath which the formed two or three or other ply fabric passes as it is carried off in any convenient way and to any convenient place in its finished state from the machine.

Having described my invention, what claim, and desire to secure by Letters Patent, is—

1. The yoke or collar C, having a depression or cavity, *c*, upon its face, for the purposes specified.

2. In combination, the rollers B B and yoke C, substantially as and for the purposes specified.

3. In combination, the rollers B B, yoke C, and friction-bar D, substantially as and for the purposes specified.

WILLIAM H. RANKIN.

Witnesses:

JOHN P. HUNT, Jr.,

JAMES M. TULLY.