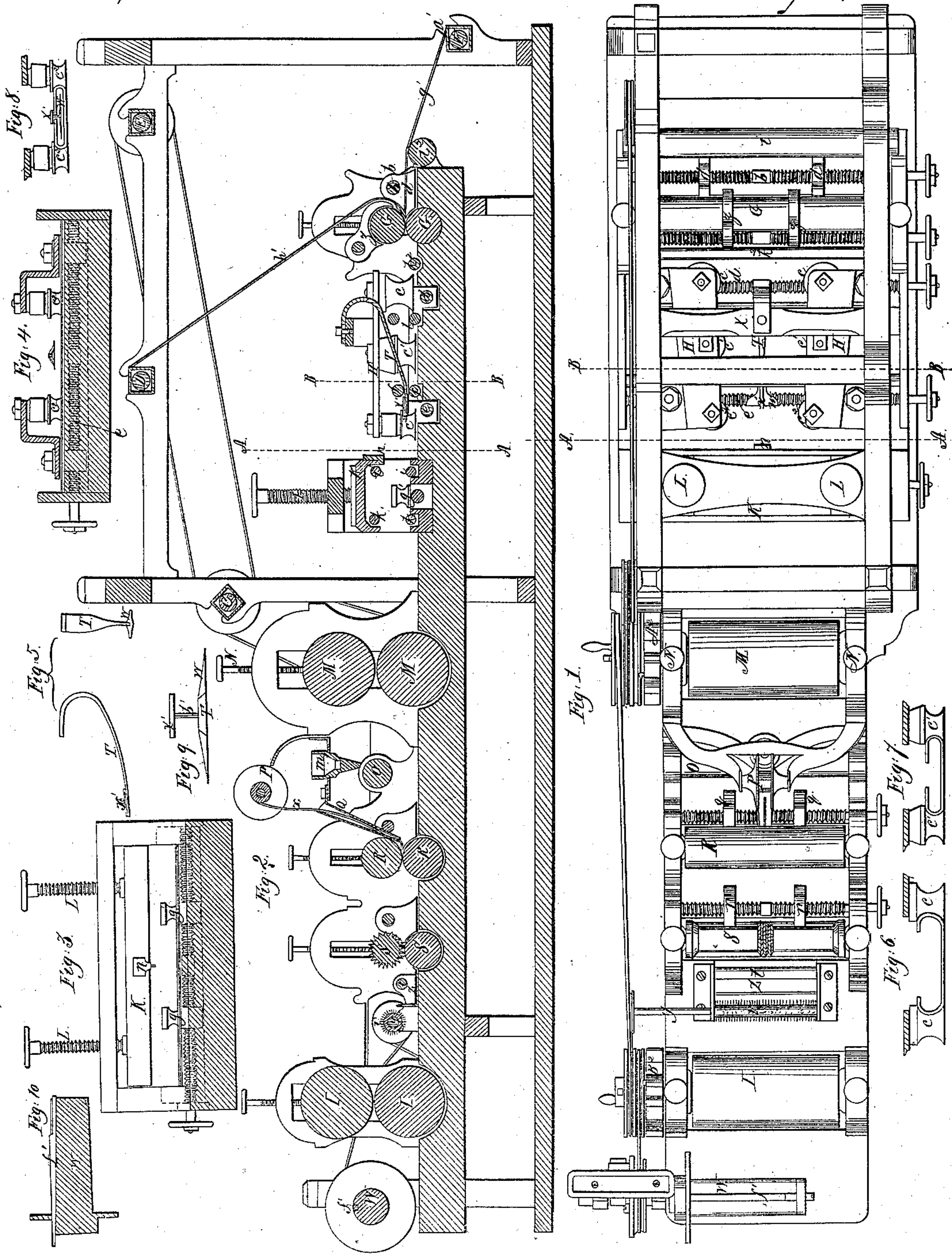


R. Hale,

Belting Machine,

N^o 17,216.

Patented May 5, 1857.



UNITED STATES PATENT OFFICE.

ROBERT HALE, OF ROXBURY, MASSACHUSETTS.

MACHINE FOR MAKING INDIA-RUBBER BELTING.

Specification of Letters Patent No. 17,216, dated May 5, 1857.

To all whom it may concern:

Be it known that I, ROBT. HALE, of Roxbury, in the county of Norfolk and State of Massachusetts, have invented a new and
5 Improved Machine for the Manufacture of India-Rubber Belting, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part of this specification, in
10 which—

Figure 1, is a plan of the machine. Fig. 2, a longitudinal section through the same. Fig. 3, a section on the line A, A, and Fig. 4, a section on the line B, B, of Figs. 1, and
15 2. Figs. 5 to 10 details to be referred to hereafter.

India rubber belting for driving machinery has heretofore been manufactured entirely by hand, the canvas or duck after
20 being covered with an adhesive mixture being folded together and rolled or rubbed down. This process is liable to many objections: 1st, it is tedious and expensive; 2nd, the belting is liable to be blistered during the process of vulcanization by the air
25 bubbles which it is found impossible entirely to remove from between the folds; 3rd, it cannot be made of so uniform width by hand as is desired.

By means of my machine I am enabled to manufacture a belting free from all the above objections, and in order that others skilled in the art may be enabled to build and use my machine, I will proceed to describe its construction and operation.
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The canvas after being prepared with the adhesive compound as heretofore is cut of the proper width and rolled up with a lining of cotton cloth between each fold to prevent the different layers from adhering to each other, and is placed in the machine upon rolls D, and F.
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I will first describe the operation of laying the simplest form of belt (2 ply) and afterward the manner of making the more complex and heavier kinds.
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For a two ply belt, a single strip of duck is employed of double the width of the intended belt. This strip is folded over an equal amount upon each side, the two edges meeting in the center and there forming a joint.
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This operation is performed upon the machine as follows: The prepared material is wound with its lining upon a hollow shaft
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or sleeve a' , that is slipped upon the roll F, that has its bearings in the framework of the machine. Entering between the rolls G, the strip is kept in the center of the machine by the guides a, a , which are adjusted in their distance apart by turning the right and left screw b , upon which they are carried. From the rolls G, the strip passes to the folding wheels which are deeply grooved rolls c, c', c^2 , of the relative size represented in Fig. 2, and are hung in frames H, which are caused to approach or recede from each other at either end by the right and left screws d and e , the two rolls c^2, c^2 , being at a distance from each other about equal to the width of the belt to be formed. Entering between the rolls c, c , the edges of the strip of canvas are bent up as seen in Fig. 6, the bending being effected by the concave form of the rolls c . Thence the partially bent strip passes to the rolls c', c' , where it is still further bent and curved over as seen at Fig. 7. The strip now passes between two walls f, f , by which the folds are brought nearer together though not in contact (Fig. 8,) they being now kept from touching each other by the anti-adhesive bar or separator T, which is constructed and operated as follows: The shank of this bar is secured to a cross timber X, of the machine by screws or otherwise. At its forward end the shank terminates in a thin blade b' to the bottom of which is secured a thin plate w , which passes between the folds of the material and keeps them separated until they are brought into the required position with respect to each other. The blade b' serves to preserve the seam in the center of the belt and the narrow top plate w' prevents the edges from rising out of position. The rolls c^2, c^2 , (Fig. 8) now nearly complete the bending and the imperfectly formed belt passes between the rolls i, i' , a knife edge or point n , upon the adjustable frame K, passing into the joint between the two edges and insuring that the seam be always in the center of the belt. By the rolls i, i' , the surfaces are brought together though not with a very great pressure. The belt now passes between the rolls g, g' the distance between which is gaged by turning the right and left screw which carries them, these rolls determine with great accuracy the final width of the belt, which then
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passes immediately to the rolls K, K', where the two plys are brought more closely together and caused to adhere. The rolls i' , k' , run in a frame K, which is brought
 5 down by the screws L, L. In Figs. 2, and 3 this frame is seen drawn up out of its working position. The belt now passes to the calendering rolls M, M, which are brought down by the screws N. Here the
 10 belt is subjected to a heavy pressure by which the two plies are brought into the closest possible contact and all air bubbles are forced out. It now remains to cover the joint between the edges where they are
 15 lapped over in the center of the belt. This is accomplished as follows: From the calendering rolls M, the belt passes beneath a roll O around the center of which is wound a few folds of cloth, thread, or other
 20 fibrous material which is kept moistened with camphene from a suitable vessel m , the drip from which is regulated by a cock or otherwise in a well known manner. As the belt passes beneath the roll O, the saturated
 25 strip of cloth is pressed against the joint in its center and the parts are thereby moistened and rendered still more adhesive. A narrow strip of india rubber x is now brought from the reel or spool P through
 30 the trough or tunnel Q, and is laid over the center of the belt, covering the joint, down upon which it is firmly pressed by the rolls R, between which the belt now passes. To insure the placing of the strip of india rubber upon the center of the belt, adjustable
 35 guides q , are employed which operate like those already described. The belt now passes between the guides r and between another pair of rolls S, the upper one of
 40 which is slightly enlarged in diameter in its center, this enlargement being roughened or covered with blunt teeth, the length of which is somewhat exaggerated in Figs. 1, and 2, by which means the strip of india
 45 rubber is forced to unite still more closely with the surface of the belt and the joint between the folds is filled. The belt now passes down into a box Z of powdered soap stone beneath the roll t , this dusting of
 50 the belt is rendered necessary in order to prevent its surfaces from adhering to each other when it is rolled up. The superfluous dust having been removed by a brush v , upon the revolving shaft y , or other suitable
 55 contrivance, the belt passes through the last pair of calendering rolls I, and thence out of the machine, being wound upon the drum W. This drum has an inclined groove plowed lengthwise beneath its
 60 surface, into which fits a wedge shape tongue or strip f' . While the winding of the belt upon the drum is taking place, the strip is driven in the position represented in Figs. 1 and 10. When it is desired to
 65 remove the roll of belting from the drum

the strip is driven back and the roll is easily removed.

The drum is driven by a well known friction pulley which it is not necessary further to describe but which is adjusted to put sufficient strain upon the belt to wind it into a compact roll. The belt is carried through the machine by power applied to the lower calendering rolls M, a band from which drives the lower roll I, the upper rolls M and I, being connected with the lower ones by cog wheels A^2 , B^2 . 70 75

To form a three ply belt, a strip g' of double the width of the intended belt is passed from the roll F, in between the rolls G, and guides a as before. A center piece or "middle" h' , from the roll D of one half the width of the other strip is passed between the guides z and enters between the roll G' with the other strip, sufficient pressure being here applied to cement the two closely together, the edges of the upper strip are then turned over upon the "middle" by the rolls c c' c^2 and the operation continues as before. 80 85 90

For a four ply belt, a "middle" is formed either by passing a wide strip through the main machine, or upon another set of forming rolls operating in conjunction with the main machine, this "middle" being afterward covered as in the three ply belt; in this case the joint in the "middle" should be thrown to one side, that it may break joint with the external seam of the belt. 95

As the strips of canvas are unrolled from the rolls D and F, their linings are wound up on the rolls C, and E, which are driven by bands from some moving part of the machine. To avoid friction and economize the power necessary to operate the machine, the strips of canvas are caused to run upon rollers i^2 k^2 l^2 . 100 105

In place of the rolls c c' c^2 for the purpose of bending the stock and forming the belt, I sometimes employ mold-board shaped or curved formers which are arranged in frames similar to those which carry the rolls c , c' , c^2 , and are like them adjusted as regards their distance apart to correspond to the width of the belt to be formed. The friction of the material against these curved formers is however much greater than when the rolls are employed for which reason the latter are to be preferred. 110 115

The above described machine when the calendering and pressing rolls are of the proper length is adapted to making belts of any width, the only part of the machine which it is requisite to change for the different widths of belts being the anti-adhesive bar or separator T. 120 125

What I claim as my invention and desire to secure by Letters Patent is—

1. The manufacture of machine belting by folding and cementing strips of india rubber 130

cloth by a series of mechanical devices substantially such as described.

2. I claim the method herein described of moistening the seam and applying the india
5 rubber strip thereto for the purpose set forth.

3. I claim the manner herein described

of applying the middle for a belt of three or more plys, by means of guides, the two being united in the manner set forth.

ROBERT HALE.

Witnesses:

SAM. COOPER,

P. E. TESCHEMACHER.