

(No Model.)

A. BROADNAX.

BELTING FOR DRIVING MACHINERY.

No. 340,280.

Patented Apr. 20, 1886.

Fig. 1.

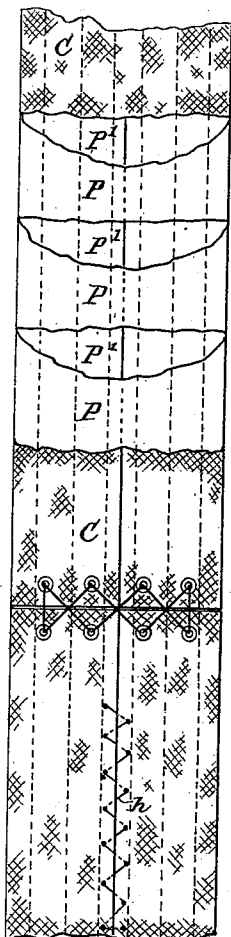


Fig. 2.

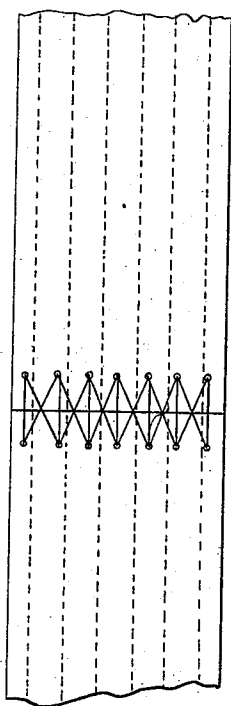


Fig. 5.

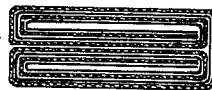


Fig. 6.



Fig. 8.

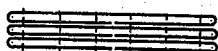


Fig. 9.

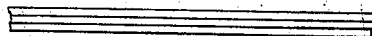


Fig. 3.

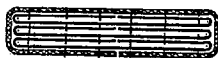


Fig. 4.

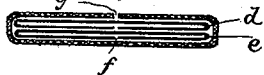
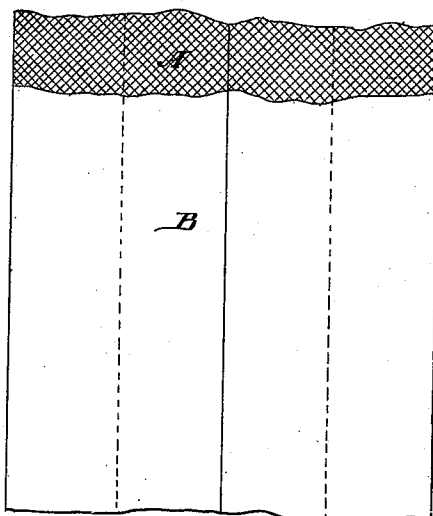


Fig. 7.



Witnesses.

Charles S. Self
Edw. M. Pull

Inventor.

Amos Broadnax

UNITED STATES PATENT OFFICE.

AMOS BROADNAX, OF BROOKLYN, NEW YORK.

BELTING FOR DRIVING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 340,280, dated April 20, 1886.

Application filed November 23, 1885. Serial No. 183,610. (No model.)

To all whom it may concern:

Be it known that I, AMOS BROADNAX, a citizen of the United States, residing at Brooklyn, Kings county, in the State of New York, have invented certain new and useful Improvements in Belting for Driving Machinery, of which the following is a description in such full, clear, and exact terms as to enable any one skilled in the arts to which it appertains or with which it is most nearly connected to make and use the same, reference being had to the accompanying drawings, making part of this specification, and to the figures and letters of reference marked thereon, similar letters representing the same parts in the different figures.

Figure 1 is a plan of the inside of the belt, intended to run next the pulley, one end of it being shown in sections, exposing the several laminae of canvas and paper of which the belt is composed. Fig. 2 is a plan of the outside of the belt, showing how its ends are joined with eyelets, and the rows of stitching by which its several laminae are held together. Fig. 3 is a cross-section of Figs. 1 and 2. Fig. 4 is a cross-section of a similar belt, only thinner, the same being composed of but two double laminae of paper and two single laminae of canvas, but folded in the same way that Fig. 3 is folded, the latter being composed of three double laminae of paper and two single laminae of canvas. Figs. 5 and 6 are transverse sections of similar belts of canvas and paper, but having the canvas and paper differently folded to constitute the belt. Fig. 7 is one form of the unfolded canvas and paper, and is intended to illustrate one method of folding such canvas and paper of which the belt is composed. Fig. 8 is a cross-section of a laminated paper belt composed of double laminae of paper stitched together and covered with shellac or other suitable varnish to protect it from dampness; or it may be made of water-proof paper.

The invention consists of a new article of manufacture, being a laminated belt composed of paper and canvas or of a compilation of double-laminated paper only stitched together by parallel rows of stitching and folded, as hereinafter set forth.

I am aware that a paper belt as such is old. I am also aware that a laminated canvas belt

is old; but I am not aware that there is any belt composed wholly of paper or of paper and canvas made upon the plan of my belt—that is, embracing the features of my invention. 55

The belt of my invention may be made in various ways, all being modifications of the same thing. For example, assume A, Fig. 7, to be a strip of tight hard woven canvas having, by preference, its warp-thread stouter than the weft, by which a thin strong canvas is produced, and which may be woven to the desired width and length. This canvas is first saturated with linseed-oil. The oil is then squeezed out of it between suitable rollers, after which it is put into a suitable stretching frame or machine, such as is now in use, by which the canvas is stretched until its tensile elasticity is exhausted. The canvas being thus stretched, it is allowed to remain in the stretcher until the oil has sufficiently dried to set upon the fiber and lose its fluid quality; but while the canvas and oil are still soft and pliable, it is stretched or spread out upon a suitable table, and covered with one, two, or more strips of paper of the desired thickness, and of the same size as the canvas. The edges *a* of the canvas and paper are then folded over on the line *c*, making the folds at *b*, after which are folded *b* and *b* upon each other. The result is a belt composed of four thicknesses of canvas and four thicknesses of paper, if the paper be of but a single thickness before folding; but if the paper be of two thicknesses before folding, the result will be a belt composed of four thicknesses of canvas and eight thicknesses of paper, and so on, the paper and canvas being interfolded, as above set forth, and the whole being thus sewed together by parallel rows of stitching, close enough to insure the necessary strength and to draw the several laminae hard together. The belt, being thus completed, is thoroughly painted on the outside, and is ready for use as soon as the paint is sufficiently dried. 95

The belt thus produced has great strength and durability, and is absolutely non-elastic, and being once properly drawn over the pulleys and its ends properly joined, need never be cut to take it up, as it yields no slack, or practically no slack, in operating. The tensile elasticity of the canvas being exhausted be-

fore folding it with the paper, and the paper itself having no tensile elasticity, the resulting belt is as firm as a metal band.

It will be observed that the canvas is stretched before folding, so as to equalize the strain on the canvas and paper, the canvas being elastic and the paper non-elastic. If the canvas were folded with the paper before stretching, all the strain would come upon the paper, and the canvas yielding to the strain of the applied power would disrupt the belt, and of course the canvas could be neither stretched nor oiled after folding it with the paper without saturating and breaking the paper and destroying the belt. The oil in this construction of belt makes the canvas quite pliable, and is necessary to protect both the paper and canvas from dampness, and to keep the latter from cutting when the belt is operating on a small pulley, while at the same time, the oil being sufficiently dried before the canvas is folded with the paper, does not affect the integrity and strength of the paper, which both the oil and canvas are intended to protect, not only from dampness, but also from abrasion, the fiber of the canvas being relied upon to protect the paper and to hold the stitching in this form of construction.

The belt made up as above described gives good results, especially upon a large pulley; but for ordinary-sized pulleys in general use a cheaper and better method of making the belt is as follows: Cut the paper in strips twice as wide as it is desired to make the belt, then fold over the two edges, as shown by *d e* in Fig. 4, until they meet in the center at *f*. The result is a belt half the width of the paper strips, consisting of two thicknesses of the paper or one folded lamina. Now make as many of these folded laminae as may be necessary to produce the necessary thickness and strength of belt, piling them one upon the other, as shown in Fig. 3. Then take a strip of canvas of the necessary width treated in oil, dried, and stretched as before, and wrap it around the paper laminae, drawing its edges together, as at *g*, by a coarse over and under hand stitching, as shown by *h*, Fig. 1. Then stitch the whole (paper and canvas) together, as before, and as shown by Figs. 2 and 3, painting the belt on the outside, as before. The method of building up the belt upon this plan is plainly shown by Figs. 1 and 3, *c*, Fig. 1, representing the canvas; *P*, the top side of the folded paper laminae, which is cut away to show a section, *P'*, of the bottom side of the same double laminae. By this method of making the belt both of its edges are made exactly alike, and each folded or double lamina is independent of all the others, being held together only by the stitching, so that the several double laminae can accommodate themselves to the periphery of the pulley independently of each other, the stitching yielding sufficiently to allow the several double laminae to slip slightly upon each other, sufficient to avoid wrinkling of the

inside lamina. This is a feature of the greatest value in the case of belts intended to run upon small pulleys, as it prevents the belt from cutting its inside laminae by crimping upon the face of the pulley, and it also equalizes the strain upon the several laminae composing the belt. This feature of the belt will be best appreciated by reference to Fig. 9, which illustrates a longitudinal section of the belt composed of four double laminae. Assume, now, that all these laminae be glued together, so as to form in substance but one thickness of paper. All three of the inside laminae would crimp in bending around the pulley, throwing nearly the whole strain on the outside laminae, and rapidly cutting off the inside one, whereas if the several laminae, instead of being glued together, be simply sewed sufficiently to hold them, they will slip upon each other in drawing around the pulley, making the outside laminae longer than the inside ones, the inside laminae drawing smooth upon the surface of the pulley, and the successive outside laminae drawing smooth upon each other, and each taking their due proportion of the strain upon the belt.

From the foregoing statement it will be seen that if the feature above described is to be made available the several laminae of the belt cannot be glued together, nor can the belt be stitched with too tight a tension, so as to deprive the belt of its pliability.

Another advantage of making the belt as above described consists of the folded edges of the several double laminae, there being no raw edge of the paper at the edge of the belt—a feature that adds very greatly to the strength and durability of the belt.

Small belts to be operated indoors may be made upon the plan above described wholly of paper with excellent results, the belt being thoroughly varnished on the outside with a good pliable varnish, especially in all cases where no shifting-fork is used on the belt.

Instead of making the belt as above described, it may of course be made by folding the paper upon itself, as shown by Fig. 6, the folded paper belt being inclosed in canvas treated as before; but a belt made in this way is not so good as that last described, for the reason that each lamina is a part of all the others, so that the one cannot slip on the other and draw smooth upon themselves and upon the pulley. The inside laminae in this case will kink or wrinkle upon the surface of a small pulley and go rapidly to pieces.

As a substitute for the paper, a material known as "vulcanized fiber" may be used, either single or double, with good results, in combination with the canvas or without it, and in some cases this same material may be used as a substitute for the canvas as a suitable casing for the paper, and as a substitute for the canvas leather may be used, even split leather makes a very good protecting and binding casing for the paper; but the best material

to use in combination with the paper is canvas treated as above described. The paper best adapted for the purpose is long-fibered hemp or manila paper, quite thin, made with
 5 good sizing and well calendered; but any strong paper is well adapted for the purpose.

In making the belt I have used the various belting glues, pastes, or cements for cementing or gluing together the respective double laminae of the paper, and also the leather or canvas on the paper; but I prefer to make the belt without any glue or cement of any kind. The belt is strong enough without the glue or cement, is more pliable, and cheaper to make.

15 It will be observed that in the manufacture of this belt a folded felted fabric (paper) and a textile spun fabric (cloth and thread) are combined, the paper being used on account of its non-elastic firmness, and folded to augment its strength, the thread being used to unite the several laminae of the paper or paper and cloth, and the cloth to protect the paper from abrasion, the paint and oil being used to soften the cloth and protect both it
 20 and the paper from dampness, the oiling applied to the cloth and sufficiently dried to prevent it from being absorbed by the paper before the cloth and paper are combined together. In many cases, however, the oiling may be omitted and the belt be simply painted
 25 on the outside, and where the belt is to be used in a dry room both the oil and paint may be omitted, and in many cases the stretching of the canvas may also be omitted, the paper in that case supplying the strength and firmness, the canvas being used merely to protect the paper. It is better, however, to stretch the canvas before combining it with the paper; but in no case must the belt be put
 30 in the stretchers after it is stitched, although it is very much improved by passing it through

a set of calender-rollers to compress and smooth it.

Having now described my improvement in machine-belting, the points or features of novelty as they are at present understood are designated in the following claims, for which I desire to obtain Letters Patent, it being understood that leather is a substitute for the canvas, and that vulcanized fiber or other well-known material adapted for this purpose may be used as a substitute for the paper or canvas without departing from the substance of the invention.

I claim—

1. A laminated belt consisting of folded laminae of paper and canvas combined and stitched together, substantially as described. 55
2. In a belt consisting of canvas and paper, the paper folded in double laminae independently of each other and of the canvas, the paper laminae being inclosed by the canvas and stitched, substantially as described. 60
3. In a belt consisting of canvas and paper, the paper and canvas interfolded and stitched together, as set forth. 65
4. In a belt composed of canvas and paper, the combination of stretched, oiled, and dried canvas with paper inclosed by the canvas, the paper and canvas being united to form the belt. 70
5. A belt consisting of several separate laminae of paper infolded, covered, and stitched together, substantially as described.
6. A belt consisting of separate laminae of paper combined with canvas, said canvas inclosing the paper and united thereto to form the belt, substantially as described. 75

AMOS BROADNAX.

Witnesses:

CHAS. C. BULL,
J. EDGAR BULL.