

(No Model.)

2 Sheets—Sheet 1.

T. ROBINS, Jr.  
CONVEYER BELT APPARATUS.

No. 571,604.

Patented Nov. 17, 1896.

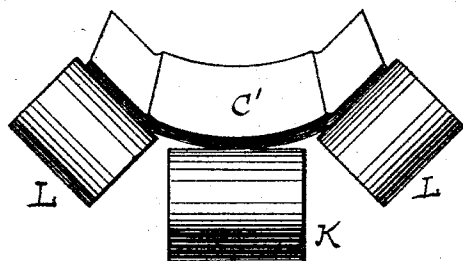


Fig. 1.

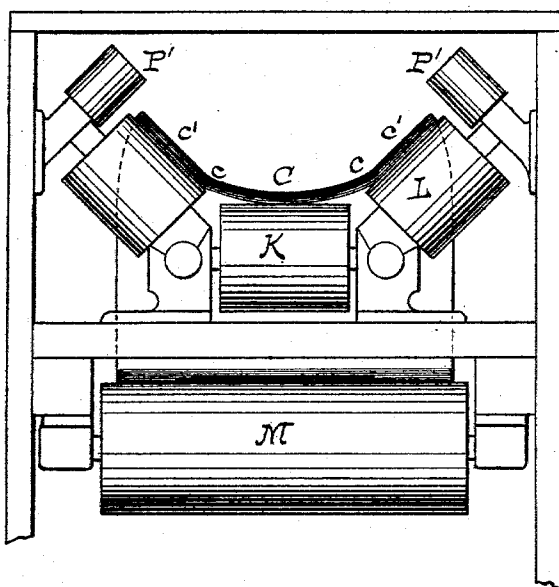


Fig. 2.

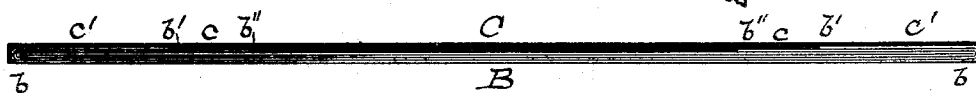


Fig. 3.

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Fig. 4.

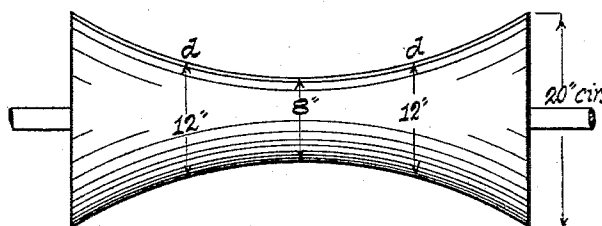
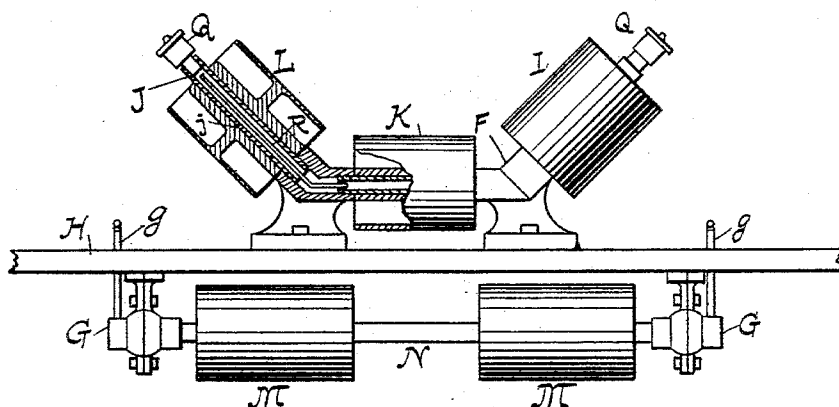


Fig. 5.



Witnesses

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# UNITED STATES PATENT OFFICE.

THOMAS ROBINS, JR., NEW YORK, N. Y.

## CONVEYER-BELT APPARATUS.

SPECIFICATION forming part of Letters Patent No. 571,604, dated November 17, 1896.

Application filed September 19, 1896. Serial No. 606,311. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS ROBINS, JR., of New York city, New York, have invented certain new and useful Improvements in Conveyer-Belt Apparatus, of which the following is a description, referring to the accompanying drawings, which form a part of this specification.

My invention includes the details of the belt itself and of all the carrying-pulleys upon which it runs.

So far as the invention relates to the belt itself it is closely connected with my prior patent of June 13, 1893, No. 499,472, forming in certain aspects an improvement upon that patent. In my prior patent I described a belt composed of a facing of rubber or other suitable wearing material, which presented in cross-section a thick central portion and thinner or attenuated side portions, by means of which the life and wear of the belt may be increased to the maximum for a given amount of material. The wear, coming more upon the middle of the facing than upon the edges, cuts away the middle portion at a far greater rate than the side portions. Furthermore, the ore or other material is usually delivered with considerable drop or velocity against the middle portion of the belt, and the greater yielding of my thickened portion of the facing receives the ore with less injury to the belt than if the wearing-face were thinner and consequently less yielding. I have found that there are some difficulties presented in the use of a belt which is thicker at the central portion than at the side portions, for in running over the pulleys the edges of the belt frequently rub against the side rollers and sometimes are turned or curled over by this action. Moreover, the wear consequent upon the rubbing of the belt against the side rolls wears away and roughens the edges of the belt, and may in some instances even cause tearing or other injury.

The present improvement preserves all the advantages of my former patent and at the same time gives to the belt a maximum thickness of the facing material at the center of the belt, while the two edges of the belt possess the maximum stiffness, so that they may be turned up by means of the pulleys and form a trough having a sufficiently flexible

bottom combined with stiff, tough, upturned sides or edges. These stiff edges extend from pulley to pulley with hardly perceptible sag. My improved pulleys are so designed that the edges may be properly held in turned-up position, while less friction and resultant wear of the belt, combined with decrease of required driving-power and increase of life and economy in the pulleys themselves, is obtained.

The invention is of so simple a nature that it will be readily understood from a description of the accompanying drawings, which illustrate one preferred embodiment of it.

Figure 1 shows diagrammatically the belt of my earlier patent as in use upon the supporting-pulleys. Fig. 2 shows the complete present invention in use. Fig. 3 shows a cross-section of the belt on a somewhat enlarged scale. Fig. 4 shows a well-known form of trough-pulley. Fig. 5 shows my improved pulleys.

Throughout the drawings like letters of reference indicate like parts.

The canvas or other backing portion of the belt is lettered B and the more elastic facing C. In the belt shown in Fig. 3 the center of the belt consists of four plies of canvas and rubber, suitably vulcanized, and a wearing-facing C of softer rubber and equal or greater thickness than the backing at that point. Near the extreme edges of the belt it will be seen that the canvas plies are doubled by the turning back of the edges of two or more of the plies, so that at these points the belt is six-ply. The bottom ply is turned back and extends only to the point of *b*, while the next ply extends somewhat farther at each side of the belt to the points *b'*. The total thickness of the belt is uniform or nearly uniform throughout, the rubber facing C being very much reduced where the canvas is thickest at *c'*. The intermediate portions of the facing between the edges of the plies *b b'*, as at *c*, are of a thickness about double the thickness at the points *c'* and considerably thinner than the central portion. Such a belt is very flexible between the points *b'' b''*, and near the edges *c' c'* it is comparatively stiff, so that when in position on the pulleys, as shown in Fig. 2, the belt possesses the advantages of forming a trough having stiff

sides and a flexible bottom, allowing it to conform readily to the pulleys. The stiff edges or sides of the belt, in addition to improving the action of the belt, obviate the danger of the curling over or tearing at the edges by contact against the side guides or pulleys P' and prevent the sagging down between pulleys. Comparing this belt with Fig. 1, it will be seen that the belt of Fig. 1 is stiffest at the central portions, and the extreme edges are the weakest points. On the other hand, the belt of Figs. 2 and 3 presents the same increased thickness of wearing-surface at the center as does Fig. 1, combined with stiffness of the edges and great flexibility between edges and center, as at c. It must not be understood that the present invention is in any way limited to any precise number of plies of canvas or to the use of any particular kind or quality of material, nor is it necessary that the belt should be the same total thickness at all points.

In joining the ends of my improved conveyer-belt to make it a continuous or endless belt I prefer to use the method for which I have already obtained a patent, and which consists in bringing the two ends of the belt together and fitting the plies and the rubber surface carefully together in the manner of a scarf or other tapered joint, and then, after applying suitable cement, vulcanizing the joints by means of heat and pressure, as by the use of steam-heated clamping devices. The joint when so formed is of equal thickness and of equal strength to the rest of the belt, and if vulcanized in a manner similar to that employed in the manufacture of the belt it produces a true endless belt, which is as little affected at the joint by moisture, heat, and other influences as at other points in the length of the belt. Such a belt is particularly valuable for conveying liquids or semiliquids.

The wear, loss of power, and expense of running is further reduced by my improved pulleys. (Shown in Fig. 5 and diagrammatically in Fig. 2, while Fig. 4 shows the form now in common use.) On Fig. 4 I have indicated that the diameter at the middle of the roller is eight inches, while that of the ends is twenty. If, then, the belt rests with true rolling contact without slip on the middle of the roller, there is a slip of one foot between each edge of the belt and roller for each eight inches of travel. In practice there will be slip at both the middle and the edges, the points of no slip being at about d. The slip at the center, therefore, is about four inches for each foot of travel, and the slip at the edges about eight inches for each foot. An enormous amount of power is thereby lost and great wearing of the belt is caused. In Figs. 2 and 5, only true rolling-contact is possible, as the pulleys are each of equal diameter at all points.

One preferred form of my improved pulley-mounting is as follows: The brackets F

and G, Fig. 5, are secured to a transverse plank or support, as H. These brackets F are cast hollow. The angle or turn-up shafts J and the shaft of pulley K are preferably of double, extra-heavy, one-inch wrought-iron pipe, turned smooth and driven or tapped into the brackets F. Grease-cups Q are tapped into the ends of the turn-up shafts. A small hole j in the side of the shaft J allows the oil or grease to pass into the pulley-bearings. All the pulleys L K L turn freely on their shafts. Special provision may be made for conducting the oil to the center pulley. Thus I have shown a small oil-pipe R, extending from just below the grease-cup into the shaft of the center idler K. The oil from the cup feeds simultaneously into the shaft J and tube R. The return-idlers M are mounted on a solid steel shaft N, which turns in the end bearings G. The bearings are a simple form of ball-and-socket type, the outer shells of which are cast in two pieces without coring. Oiling is accomplished by the oil-tubes g, which run down through the support H into the bearings G. Small plugs may close the upper end of these tubes to keep out dust. The angle of the turn-up shafts may vary at will, from thirty degrees to forty-five degrees being advantageous in most cases. So, also, the dimensions of the several parts may be proportioned to suit requirements. I do not mean to limit myself to the details shown, but have described what I consider the preferable form of my invention. In Fig. 5 I have omitted the idlers P' of Fig. 2. These may be mounted and used wherever a tendency of the belt to work off one of the side pulleys L is observed.

Having now fully set forth my improvement in one of its preferred forms without enumerating any of the modifications which may be made by mere skill in the art and without departing from the principles of the invention, I claim, and desire to secure by these Letters Patent of the United States, the following:

1. As an article of manufacture, the conveyer-belt having a wearing-face thicker at the central portions and thinner at the side portions, and combined with a backing which is thicker at the side portions and thinner at the central portions, substantially as set forth.

2. As an article of manufacture, a belt for conveyers and other uses presenting in cross-section, a wearing-face, and a body portion or backing which is thicker at the edges and thinner and more flexible at one or more points nearer to the middle of the belt, the belt thus combining relatively stiff edges with one or more relatively flexible points between the edges, substantially as set forth.

3. A conveyer-belt consisting of a backing and a facing which has a thickened central portion, the said belt having stiffened edges or side portions, substantially as set forth.

4. A conveyer-belt of approximately uni-

form thickness, composed of suitable treated canvas and rubber, combined with a relatively greater number of plies of the canvas at or near the edges of the belt than in the middle, substantially as set forth.

5 The supporting-pulleys L, K, L, the hollow bearings F therefor, and the horizontal and turn-up hollow shafts secured in the said bearings, and the oil devices mounted on the  
10 ends of the turn-up shafts, substantially as set forth.

6. In combination, the two brackets or cast-

ings suitably supported, the horizontal pulley mounted between them, the turn-up shafts secured in the said brackets or castings, and  
15 the pulleys L loosely turning thereon, substantially as set forth.

In testimony whereof I have set my hand this 18th day of September, 1896.

THOMAS ROBINS, JR.

Witnesses:

GEORGE H. SONNEBORN,  
THOMSON H. PALMER.