No. 625,340. Patented May 23, 1899.

B. A. LEGG.

POWER TRANSMITTING BELT.

(Application filed Apr. 22, 1889.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

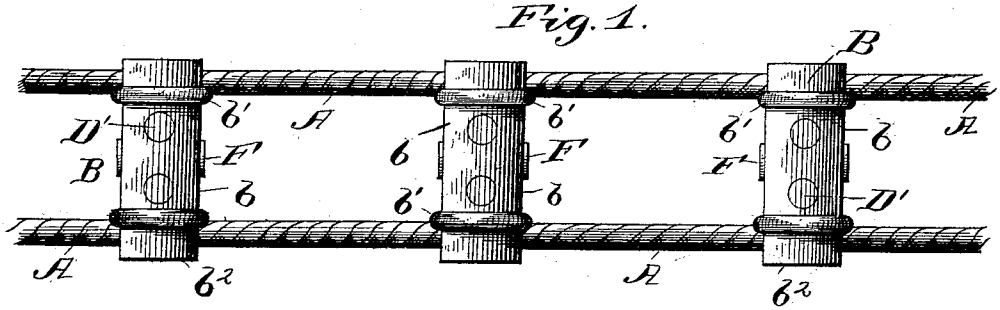


Fig. 2.

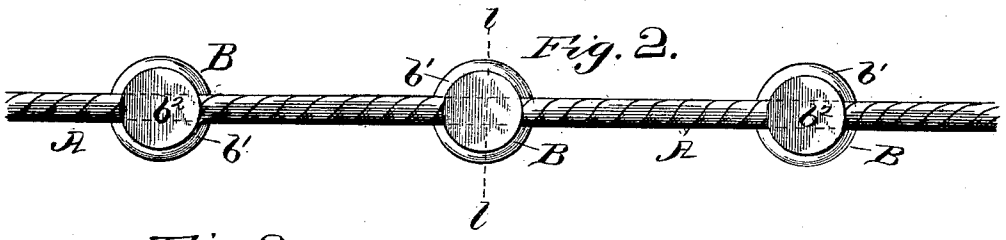


Fig. 3.

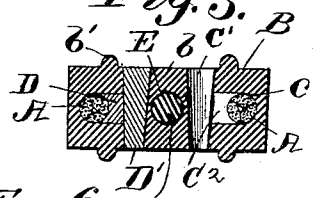


Fig. 4.

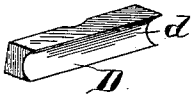


Fig. 5.

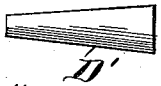


Fig. 6.

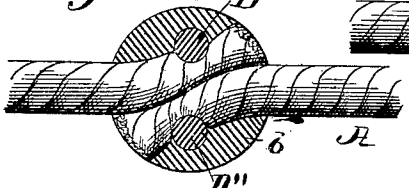


Fig. 6a.

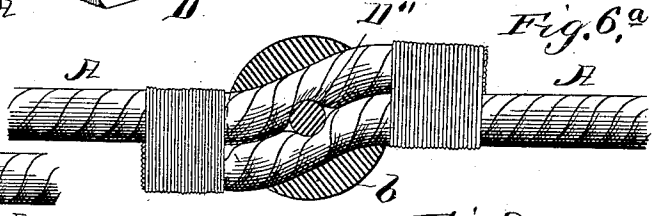


Fig. 7.

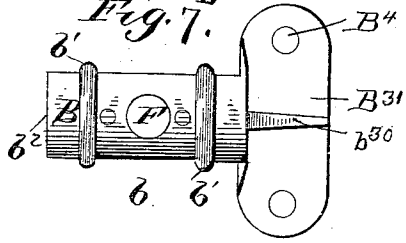


Fig. 8.

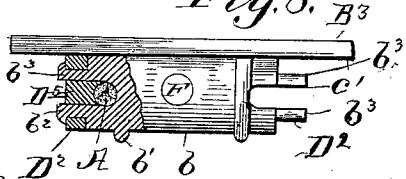


Fig. 9.

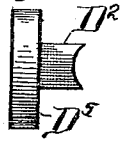
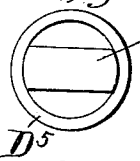


Fig. 9a



Witnesses:
J. B. McGirr.
N. L. White.

Inventor,
Benjamin A. Legg
by Doubleday & Bliss
attys

No. 625,340. Patented May 23, 1899.

B. A. LEGG.

POWER TRANSMITTING BELT.

(Application filed Apr. 22, 1899.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 14.

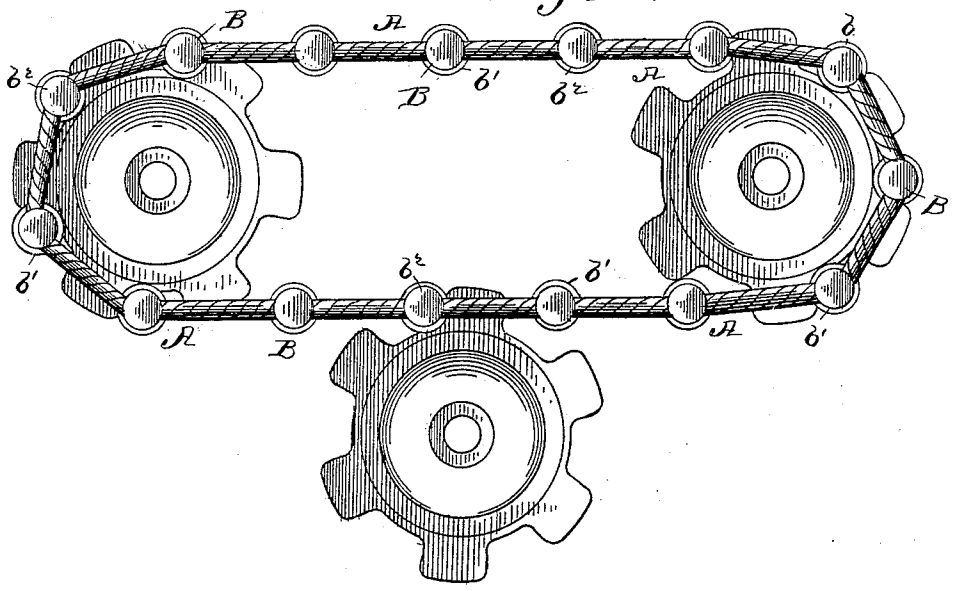


Fig. 11.

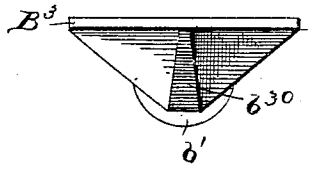


Fig. 12.

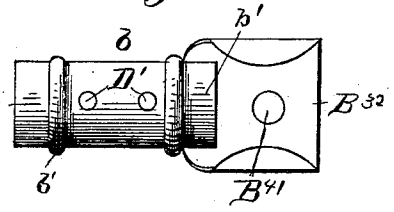


Fig. 13.

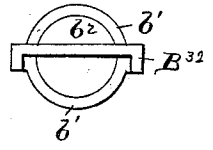
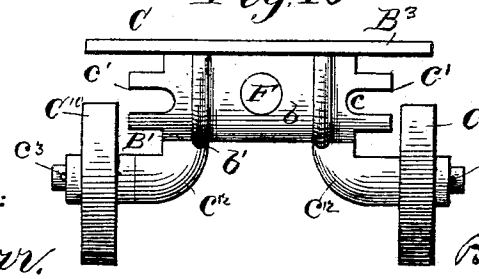


Fig. 10



Witnesses:
J. H. McGivr.
N. L. White.

Inventor.
Benjamin A. Legg
by Doubleday & Bliss
attys

UNITED STATES PATENT OFFICE.

BENJAMIN A. LEGG, OF COLUMBUS, OHIO, ASSIGNOR TO JOSEPH A. JEFFREY, OF SAME PLACE.

POWER-TRANSMITTING BELT.

SPECIFICATION forming part of Letters Patent No. 625,340, dated May 23, 1899.

Application filed April 22, 1889. Serial No. 308,114. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN A. LEGG, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Power-Transmitting or Driving Belts, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in belt-gearing or driving-belts adapted to transmit power from one wheel to another, and while all of the features herein set forth are applicable to belting of which all of the parts are of metal yet some of the features of construction herein set forth are capable of use in making belting of ordinary rope, leather, or materials other than metal.

Figure 1 is a plan view of a section of a drive-belt embodying my improvements. Fig. 2 is a side view of the parts in Fig. 1. Fig. 3 is a cross-section on the line *l l* of Fig. 2. Fig. 4 is a detail view of a gib employed for securing the parts together. Fig. 5 is a detail view of a lock-pin. Figs. 6 and 6ª illustrate, on an enlarged scale, two manners of fastening together the ends of a cable or rope. Fig. 7 is a detail view of a modification of cross-bar or sprocket-bar. Fig. 8 is a side elevation, partly in section, illustrating a modified form of attachment or cross-bar and means for connecting the cable thereto. Fig. 9 is an edge view, and Fig. 9ª is a face view, of one of the parts shown in Fig. 8. Figs. 10 to 13 illustrate, somewhat in detail, other modifications of some of the parts. Fig. 14 is a side elevation showing one manner of employing a driving-belt constructed in accordance with my invention.

In the drawings, A A represent two parallel cables, which for most purposes I prefer to be wire rope or cable.

Heretofore metallic belting comprising wire rope or cable has been constructed in several ways. It has been in one earlier form of belting provided with tapering lugs adapted to effect a frictional engagement with a grooved wheel. In another case two strands have been used running continuously through the belt; but said strands have been both bent at the places where the sprocket clips or lugs were attached—that is, either bent so as to cross each other at intervals or so bent as to provide inwardly-turned portions, which inwardly-turned parts were fastened by clips on metallic cross-bars. The bending of the cable in the earlier constructions was for the purpose of securing an effectual grip of the clip or sprocket-bars. Such bending of the cables, either to cross each other or to provide inwardly-turned holders for the clips, is objectionable, both on account of the labor and expense involved in manufacturing the belting in that manner and also because of its marring and weakening the cable.

One of the objects of the present invention is to provide a belt which shall engage positively with the sprocket-teeth of an ordinary sprocket-wheel and have metallic sprocket-lugs or cross-bars secured thereto by separately-formed fastening devices.

Another object is to provide a power-transmitting belt consisting of strands of wire rope the ends of which are rigidly fastened in a sprocket attachment, whereby the belt becomes endless, and a series of sprocket-bars arranged intermediate of the ends of the rope and each having a portion above the rope and a similar integral portion below the rope, and clamping or gripping devices movably supported in said sprocket-bars and adapted to hold the rope firmly between themselves and the body of said bars, whereby the frictional engagement between the rope and bars can be controlled without varying the positions of the upper and lower parts of the sprocket-bars.

Referring to the drawings, B B represent the sprocket bars, lugs, or clips, they being placed at equal intervals and constructed and secured in place and to the cables A A as follows: Each sprocket-bar has a central shank portion *b*, preferably round in section, though it may be of any suitable shape. Near the ends of this shank part *b* there are flanges *b'* *b'*, which project radially from the part *b*, they lying by the inner sides of the cables and extending far enough from the shank *b* to act as guards for the cables and prevent them from coming in contact with the sprocket-

teeth. The portions of the sprocket-bars which extend beyond the flanges b' are indicated by the letters b^2 b^2. These portions are provided with apertures c for the reception of the cables. These apertures may be, as shown in Fig. 3, entirely surrounded by the body of the sprocket-bar and the cable passed through them longitudinally, or they may be, as shown in Figs. 8 and 10, the inner terminations of grooves c', which open through the ends of the sprocket-bar, so that the cables may be slipped in and out laterally. In the construction first described and illustrated in Figs. 1 to 3 there is formed a slot c^2, extending inward from each aperture c and communicating with a transverse aperture C', having one or more tapered or inclined walls.

D designates a gib-block or clamp-piece having a concaved surface d, adapted to fit snugly against the adjacent side of the cable when placed in position in the slot c^2. After the gib has been thus placed in position a tapered or wedge-like pin or key D' is inserted into the adjacent aperture C' and driven tightly into place. This pin or key D' thus acts to force the gib-block D outwardly and tightly against the cable, and by means of it such a grip can be attained between the engaged parts that the sprocket lug or bar B is effectually prevented from moving longitudinally of the cable under any ordinary strains. By using a fastener, clamp, or gripper of this sort I prevent cutting or marring of the wires or filaments of the cables.

Heretofore cable-belts have had attaching blocks or bars secured to them by forming each of the attachments in two halves or parts, then placing one part above and the other part below the cable and producing a grip by drawing the two parts together by a bolt or by rivet-pins formed integral with one of the halves or parts. It will be seen that my mode of and devices for attaining the clamping are different from these, and are thus different for the following purposes: These wire cables vary in their cross-diameters in comparison one with another not only as wholes, but at different places along each one. Even when new the cable will be at some places slightly thinner, at others thicker, and after considerable use, wear, and stretch this variation in diameter is increased. Now if the attachment block or bar is made in two pieces to be clamped together by bolts or rivets there must always be a space left between the adjacent surfaces of the two parts, for if they were brought close together and against each other at the first clamping there would be practically no grip exerted on the cable when from use the diameter of the cable at that point had been reduced. Where the cable is thicker, the block-halves are held apart more than where it is thinner, and this leaving of the block-halves more or less apart opens up the liability of loosening. To obviate all this, I provide an attachment or bar which has the parts that serve as abutments for the clamping action integral with each other, for in the construction shown it will be seen that each attachment has the part above the cable integral with the part below the cable, so that there is no separation between them, and the liability of loosening when under strain or in engagement with the sprocket-teeth of the wheels is obviated. The fastening devices D and D' are made separately from the attachment or bar and are secured thereto in such manner that whether the cable is thicker or thinner at the places of attachment the parts of the sprocket-bar itself are not moved, as the wedge-clamp can be moved or adjusted slightly whenever occasion requires to tighten the grip. In other words, the clamping is done independently of any movement of the parts of the sprocket-bar itself, it merely providing the abutments against which the clamping action is exerted. Even the riveting of the wedge-pin does not prevent adjusting it and the clamp-block from time to time when necessary.

In Figs. 8, 9, and 10 I have illustrated the means for fastening the sprocket-bars and cables together, which are above referred to as being of a modified character from that shown in detail in Fig. 3—that is to say, here the cable at each point of attachment to a bar or sprocket-piece is inserted laterally into a groove c', which extends through the end of the cross-bar. The end portions b^2 of the sprocket-bar B are provided with projecting tongues b^3, which extend beyond the outer open end of the grooves c'. After the cable is in place the gib D^5 is placed against it, said gib in this case being preferably made integral with a ring D^2, which fits over the tongues b^3, the latter being long enough to project outside of said ring and have their ends riveted against the same, as shown in Fig. 8, for the purpose of holding the gib D^5 tightly against the cable. With a connection of this sort also a taper-pin D' or equivalent can be used instead of the ring D^2 and tongues b^3, a suitable body of metal with a properly-shaped aperture transverse to the cable and outside thereof being provided.

I have shown in Figs. 7 to 13 of the drawings devices to illustrate the fact that the bar or sprocket-lug B can be formed with or have attached to it plates or other devices forming parts of carriers or adapted to have carrier-bars or other conveying devices secured thereto. In Fig. 7 I have shown the cross-bar or attachment as provided at one end with a plate B^{31}, in which are formed apertures B^4 to receive bolts by which carrier or conveying attachments can be secured to the sprocket-bar. The plate B^{31} is shown as being braced and strengthened by a web b^{30}. Fig. 9 represents an end view of the form of attachment shown in Fig. 7. In the form shown in Fig. 8 a plate or bar B^3 is attached

to and extends the entire length of the attachment or cross-bar. In Figs. 12 and 13 I have illustrated a different form of plate B^{32}, which is secured to one end of the sprocket-bar b' and provided with a bolt-passage B^{41}. The carrying or conveying attachments may be of various forms, depending upon the nature of the work designed to be accomplished. In the form shown in Fig. 10 the sprocket-lugs are provided with or connected to wheels or rollers C^{10}, which rollers can be arranged to travel along a suitable guideway in the manner well known in this class of conveyers. As shown, the wheels C^{10} are mounted on short axles c^{12}, depending from a sprocket-lug b and secured thereon by keys or pins c^3 in the ordinary manner.

E indicates apertures through the bars or sprocket-lugs b, they being adapted to receive plugs F, of wood, rubber, or equivalent material, to take the impact of the wheel-tooth upon the bar, or vice versa, and to prevent wear and the rattling noise incident to sprocket-chains when in use. As shown, these plugs F project slightly beyond the surface of the sprocket-lug, and when worn can be readily removed and others substituted.

The ends of each cable A can, in order to provide an endless belt, be brought together and fastened in any suitable way, two methods of fastening them being illustrated in Figs. 6 and 6^a. By examining these figures it will be seen that the sprocket bar or attachment which splices or holds together the two ends of the cable is formed in such way that while the exposed parts of such cable are in substantially the same draft-line the end parts extend on lines which are inclined toward the normal or main line of the cable, so that said end parts can be bent and fastened. The ends of the passages through these connecting sprocket attachments can, as shown in Fig. 6, be widened or expanded to enable the ends of the ropes to be frayed out somewhat. By an examination of the last said figures it will be seen that neither end of the cable offers any obstruction to the entrance of the other end, each being independently secured in position and to the connecting-bar attachment, and it will be noticed that the space or passage within the attachment provided for each end of the cable is of greater width at the end of the cable than it is at the point where the body of the cable enters the attachment—that is, the space within which each end of the cable is secured is tapered or reduced somewhat from one end to the other. It will also be seen that this part of my invention is applicable to the connecting of the ends of a rope or cable irrespective of the use to which such rope or cable may be put—that is, this feature of my improvement can be advantageously used in connection with other forms of driving or power-transmitting belts than the particular embodiment of my invention herein illustrated.

I am aware of the fact that attachments have been fastened to cables in various ways after having the ends inserted therein, as is illustrated in the earlier patents to Bleichert, No. 380,983, Hager, No. 202,812, and others, pins being used in some cases, blocks in others, and solder or lead in others for holding the rope in a tapered or flaring hole formed in the socket or attachment, and therefore I do not broadly claim such features; but I believe myself to be the first to have devised an endless power-cable adapted to move continuously around supporting or driving sprocket-wheels, which said cable has its ends brought together and inserted in one attachment-bar in such way as to have the parts at the very ends overlap and lying at an inclination to the main parts of the cable, such main or exposed parts of the cable running out from the attachment-bar in both directions in the same straight draft-line.

As indicated in the drawings, the ends of the cable within the connecting-bar may be secured by pins D^{11}, similar to those hereinbefore described, which extend through suitable longitudinally-extending passages and contact with the strands of the cable ends, although, as before set forth, I am aware that various other means may be employed for securing such ends in position, whereby the draft parts on opposite ends of the attachment will occupy the relative positions set forth.

The passages for the cable ends extend through the connecting attachment from side to side, so that both ends of the rope are exposed and accessible, as will be seen.

If desired, the ends of the cable may, as indicated in Fig. 6^a, be carried through the connecting attachment and fastened to the adjacent section of the body of the cable by means of fine wire wrapped around the projecting end and the body of the cable. As stated, in the form illustrated in Fig. 6 the ends are carried nearly to the surface of the attachment and are spread out somewhat. In both cases the parts lying within the connecting sprocket attachment are inclined to the main part of the cable. By overlapping the end parts of the cable and placing them on lines inclined to the main draft-line a construction superior to those earlier ones with which I am acquainted is produced. The overlapping enables me to shorten up the attachment longitudinally of the cable, so that it need not be of greater cross dimensions than those of the other attachments on the belt, and it can therefore as readily pass around a small wheel and allow the conveyer-cable to conform to a periphery of short radius, which is not the case when the end parts of the cable are in the same line throughout. The inclining of the end parts of the cable insures

that the parts that come out from the sprocket attachment shall be opposite to each other, as shown in said Figs. 6 and 6a.

By examining Fig. 14 it will be seen that the guard-flanges b' are so constructed and arranged in relation to the cables and also in relation to the wheels and the teeth that they not only act as aforesaid to protect the cables from wear at points adjacent to the cross-bars, but also relieve them from wear and abrasion from the periphery of the wheel, said flanges serving as supports and providing the points of contact with said periphery. It will be further seen from the same figure that a drive-belt made as above described can be caused to engage with a wheel either above or below it, owing to the fact that the bars or sprocket-lugs are shaped and constructed above the cables in substantially the same manner that they are below them and the upper strand of each cable being related to the top sides of the wheels substantially as is the lower strand to the lower sides of the wheels, so that it is immaterial which side of the bar comes in contact with the wheels, and in this respect the construction herein differs materially from that heretofore used having tapering or V-shaped lugs on one side and flattened bodies on the other side of the cable. It will be seen that the bars or sprocket-lugs are locked against rotation, so that the flanges, guards, or supports b' are always held properly in relation to the wheels. The bars or lugs are also held against lateral displacement from the cables, so that the rectilinear sprocket-apertures shall always be of the same dimensions. This is largely due to the fact that the cables each lie against a thick stop or abutment on one side and have clamps or fasteners movable in the plane of the cables and toward said stops. Each cable has its clamp or fastening device independent of the other, so that it shall be tightly gripped irrespective of any slight irregularities of the cable at the point of attachment. I avoid the use of two threads by employing the clamping-block and the wedge that can be riveted.

What I claim is—

1. The herein-described power-transmitting or driving belt, consisting of strands of wire rope having their ends rigidly fastened in a sprocket attachment or bar, whereby the belt becomes endless, bars arranged intermediate of the ends of the rope, and each having a portion above the rope and a similar portion integral therewith below the rope, and clamping or gripping devices movably supported in said cross-bars and adapted to hold the rope firmly between themselves and the body of said bars, whereby the frictional engagement between the rope and sprocket-bars can be controlled without varying the positions of the upper and lower parts of the bars, substantially as set forth.

2. The herein described power-transmitting or driving belt consisting of strands of wire rope having their ends brought together, overlapped and rigidly joined to a sprocket attachment or bar, whereby the belt becomes endless, sprocket-bars, intermediate of the ends of the rope, each having a part above the rope and a part below the rope, and the independent gripping devices arranged within said sprocket-bars for engaging with the outer surface of and clamping the rope therein, substantially as set forth.

3. The combination with the strands of wire rope, of the bar for engaging with a sprocket-tooth having the tooth seats or recesses for the said strands and the fixed stops outside of the said strands integral with said bar and the movable stop or clamping device inside of the strands independent of the bar, the parts of the cross-bar above, outside, and below the wire ropes being integral, substantially as set forth.

4. An endless power-transmitting or driving belt formed of two parallel wire ropes, each rope having its ends overlapped, and cross-bars secured to and locked against rotation upon the said wire ropes, each of said cross-bars having projections integral therewith above and below the ropes, in combination with a sprocket-wheel having teeth adapted to pass between said ropes, but kept out of contact therewith by the aforesaid projections, substantially as set forth.

5. An endless power-transmitting or driving belt formed of wire ropes, and cross-bars secured thereto, said cross-bars having apertures through which the said ropes are passed, in combination with independent clamping-blocks and wedges, substantially as set forth.

6. In an endless power-transmitting belt, the combination of a wire rope having its ends connected together whereby it becomes practically endless, a series of attachments or sprocket-bars each having an aperture or passage for the rope and a recess and passage for a clamp-block and wedge, respectively, a clamp-block fitted in the recess in the attachment or cross-bar, and a wedge in the passage provided therefor, substantially as set forth.

7. The combination with the attachment or sprocket-bar having a hole through it from side to side, of the cable having its ends housed and secured within said hole and its body portion extending out therefrom at points substantially opposite and in the same straight line, substantially as set forth.

8. The combination with the attachment or sprocket-bar having a passage extending through it from side to side, of the cable having its ends extending into said attachment and its body portion extending outwardly on the same straight line in opposite directions from said attachment, the end portions of

the cable within the attachment being inclined to the line of the body portion of the cable, substantially as set forth.

9. The combination with a cable-connecting attachment having a passage therethrough, of a cable having portions or sections extending in a straight line from opposite sides of the bar, the ends of said cable-sections being oppositely inclined and extending into the passage in said bar or connecting attachment, and means for securing said ends firmly against movement away from said bar, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

BENJAMIN A. LEGG.

Witnesses:
O. P. BAKER,
R. B. SMITH.