(No Model.)

L. A. CASGRAIN.

POWER TRANSMITTING BAND.

No. 538,895. Patented May 7, 1895.

Fig: 1.

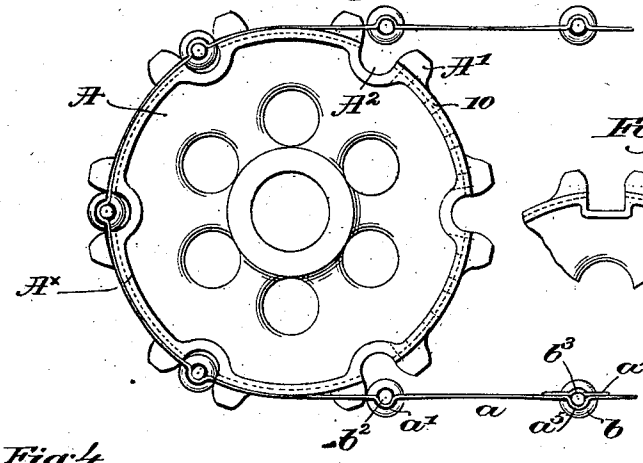


Fig: 2.

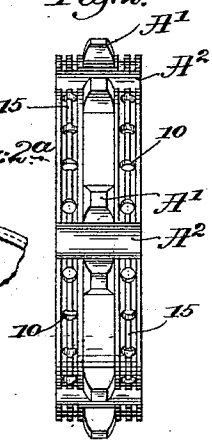


Fig: 2a.

Fig: 4.

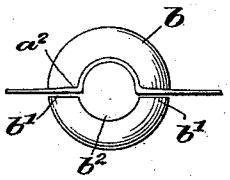
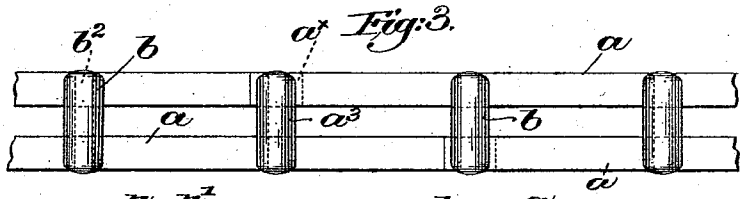


Fig: 3.



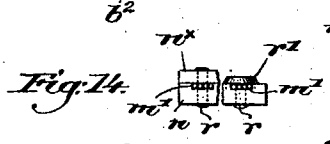


Fig: 14.

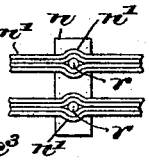


Fig: 13.

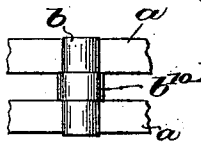


Fig: 12.

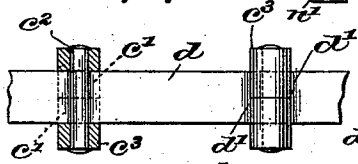


Fig: 5.

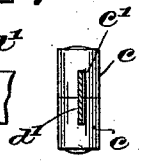


Fig: 5a.

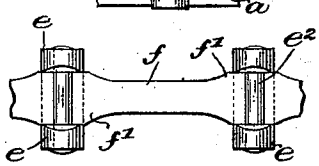


Fig: 6.

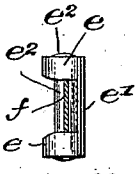


Fig: 6a.

Fig: 11.

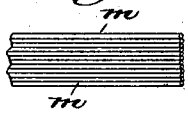


Fig: 7

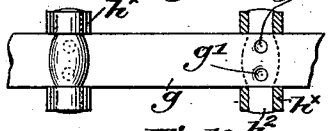


Fig: 7a.

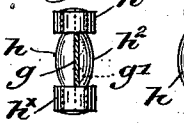


Fig: 7b.

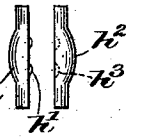


Fig: 8.

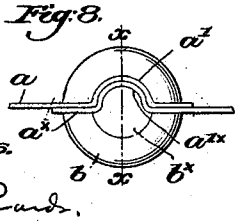


Fig: 10.

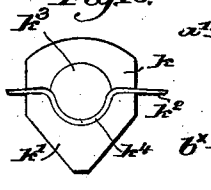
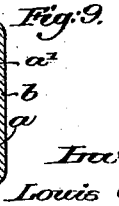


Fig: 9.



Witnesses.

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by Crosby & Gregory. attys

UNITED STATES PATENT OFFICE.

LOUIS A. CASGRAIN, OF WINCHESTER, MASSACHUSETTS.

POWER-TRANSMITTING BAND.

SPECIFICATION forming part of Letters Patent No. 538,895, dated May 7, 1895.

Application filed December 1, 1894. Serial No. 530,528. (No model.)

To all whom it may concern:

Be it known that I, LOUIS A. CASGRAIN, a subject of the Queen of Great Britain, but residing at Winchester, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Power-Transmitting Bands, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to flexible connections between and for transmitting power from one to another sprocket or similar wheel, suitable devices on or forming a part of the band or belt co-operating with the periphery of the wheels. Such connections have been composed of a series of pivotally connected links of various forms, and also light, flexible metallic bands having devices rigidly secured thereto to co-operate with the sprocket wheels have been devised, and to such latter class of flexible connections this invention more particularly relates.

My invention has for its object the production of a flexible connection of light weight and great strength, containing no joints and requiring no lubrication, so eliminating the wear due to friction, noiseless in operation, and of cheap and simple construction.

In accordance therewith my invention consists in various details of construction hereinafter fully described in the specification, and particularly pointed out in the claims.

Figure 1, in side elevation, represents a portion of a flexible connection embodying my invention in engagement with a sprocket-wheel adapted to co-operate therewith. Fig. 2 is a face view of the sprocket-wheel. Fig. 2^a is a detail of a modified form of periphery of the sprocket-wheel. Fig. 3 is a plan view of a portion of the flexible connection shown in Fig. 1. Fig. 4 is an enlarged view, in side elevation, of one of the sprocket-engaging devices or driving members forming a part of the band or connection. Figs. 5 to 7^b are views of modified forms of flexible bands to be described. Fig. 8 is an end view of one of the driving members connecting the ends of the band shown in Figs. 1 and 3. Fig. 9 is a longitudinal section thereof, on a smaller scale, taken on the line $x\,x$. Fig. 10 is a modified form of driving member, and Figs. 11 to 14 are modified forms of transmitting-bands to be described.

Referring to Figs. 1, 3 and 4, I have therein shown the transmitting band as formed of two thin strips or belts of metal a, properly tempered to give the necessary flexibility, and connected at suitable intervals by what I shall hereinafter term driving members, meaning thereby a suitable device arranged transversely to the length of the belt or band, and each having a portion or portions adapted to be engaged by the sprocket wheel. In the figures referred to, the said members are formed as substantially cylindrical bars b, having a central bore and slotted inwardly from each end as at b', the depth of the slots being substantially equal to the width of each of the metallic strips a, the said slots being somewhat below the longitudinal center of the member, as best shown in the enlarged end elevation, Fig. 4, in order that the pull of the band will exert as little twisting strain thereon as possible, so that when the member is in engagement with the sprocket, the tendency of the strain on the band will be to pull straight ahead and without twisting the members in their seats on the wheel.

The metallic strips a are suitably convexed or corrugated, as at a', and the quantity of metal adjacent each corrugation is increased, in this instance such portion of the metal being thicker, as at a^2, so that the part of the band or strip adjacent to each corrugation is made stronger than the parts of the strip intermediate said corrugations, the metal gradually decreasing in thickness in opposite directions from the corrugations.

The shape of the corrugations a' is such that they may be slipped into the driving members, the corrugations entering the concavities formed by one side of the longitudinal opening therein, with the adjacent straight portions of the strip held in the slots b', so that each member is provided with a strip or belt receiving seat.

A pin b^2 having one portion of its surface curved to correspond to the lower side of the longitudinal opening in the driving member, and the other portion curved to snugly fit the interior of the convexity a' of the strip a, is

then driven into the member, tightly holding or wedging the belt in its seat.

As shown in Fig. 4, the slots b' in the driving members are preferably a little wider than the thickness of the strip a to allow slight play of the latter in passing around the sprocket, the convex portions being out-turned or upon the outer side of the belt or band when in use.

The central or unslitted portion, as a^3, of each member, which also serves in this instance to connect the parallel strips a, is adapted to be engaged by the teeth A′ of the sprocket wheel A, the teeth thereon being arranged in pairs, as shown, and the periphery between each pair of teeth is concaved at A^2 to admit and form a seat for the inner half of the member b as it passes around the wheel.

In all other belts or bands of a similar nature, so far as I am aware, the driving member or cross bar is connected thereto by suitable rivets passing through the material of the belt, and thereby weakening it at such point of attachment, and in such belts, the breakage usually occurs adjacent to the driving member by reason of the fact that as the latter enters between the teeth or into a peripheral depression of the sprocket wheel, it is retarded slightly by friction in reaching its seat, and the belt is bent somewhat sharply immediately adjacent the member, and before it reaches the easy curve provided by the intervening peripheral portions of the sprocket wheel. This bending, slight though it is, is repeated every time any particular member is being seated on the sprocket wheel, and the subsequent straightening out of the bend causes the metal soon to be cracked or fractured at the bending point. By increasing the amount of metal in the belt at the point where such bending takes place, viz., at the sides of the driving member, as at a^2, I strengthen the strip at its weakest point the metal gradually decreasing in thickness in opposite directions away from the driving member, to the normal thickness of the belt, and, furthermore, I attach the strip or strips firmly to the driving members without puncturing or removing any of the metal. The ends of the two strips are overlapped and inserted in the slitted end of one of the members, and preferably I join the said belts at different members, as shown in Fig. 3.

In Fig. 8 the end $a^\times$ is shown as corrugated and inserted into the concavity formed by one of the corrugations a' in the other end of the belt, the inner corrugation $a'^\times$ however, being made smaller for this purpose, and the slot to receive the two thicknesses is slightly increased in width for that purpose, while the retaining pin $b^\times$ is appropriately shaped exteriorly. As shown in Fig. 9, the said pin is thicker at the end of the member through which the one strip passes than at the end where the two ends of the other strip are overlapped.

As shown most clearly in Fig. 9, I preferably upset the heads of the pins to positively prevent their accidental displacement.

Instead of thickening the metal, I may strengthen it adjacent the convexity by a short auxiliary strip of metal, as a^4, Fig. 1, passed through the slot in the end of the driving member b, and slightly corrugated oppositely to the corrugation a^5 of the main strip, while a suitably shaped retaining pin b^3 is inserted between the two oppositely turned corrugations.

While the belt or band shown in Fig. 3 is composed of two parallel endless strips a secured together and in parallelism by the members b, I may make the belt or band of a single thin strip of metal, as shown in Figs. 5 to 7^b inclusive.

Referring to Figs. 5 and 5^a, the members are made in two like parts c, slotted at their inner or adjacent ends at c', to be slid onto opposite edges of a single metallic strip or band d, which latter is convexed as before to enter the longitudinal central opening or seat in each of said parts, and when the two parts of each member are slid upon the strip d, from opposite sides, as shown in Figs. 5 and 5^a, a retaining pin c^2 is driven through the two parts and the ends upset to hold them firmly together. In this instance of my invention the metal of the strip is increased in thickness at d' adjacent the corrugation for the purpose hereinbefore set forth, and the slots c' are made slightly wider than the thickness of the strip at such point, to permit the slight play described. The unslotted outer ends c^3 of the two-part member project beyond the longitudinal edges of the metal strip d, and will be engaged by the teeth or projections on the sprocket wheel.

In Figs. 6 and 6^a, I have shown still another modification, in which the driving members are cut away at their central portion to leave solid ends e connected at the under side of the belt by the integral portion e', the ends having a cylindrical longitudinal opening therethrough, while the connecting part e' has a semi-circular depression registering with said openings, the depression receiving the corrugation of the band f, while a suitably shaped retaining pin e^2 is driven through the solid ends e' and through the concaved side of the corrugation in the band f to rigidly hold it in place. The band is increased in strength at the point of connection with the driving members by widening it as at f'.

While I have not shown end views of the members shown in Figs. 5 and 6, it is to be understood that the longitudinal openings therein which receive the convex portions of the metallic strips, and the external shape of the retaining pins, will be substantially as shown in Fig. 4.

In Figs. 7, 7^a and 7^b, I have shown a construction of driving member adapted to be secured to a band g having in place of the corrugations pits or depressions g' therein,

to be entered by projections h' on the inner side of one of the halves h of the driving member, the other half h^2 having depressions h^3 therein to receive the convex sides of the pits g'. The two halves are thus brought together on opposite sides of the strip g, and collars $h^\times$ are forced over the semi-cylindrical ends of the halves and up to the edges of the strip g, as clearly shown in Figs. 7 and 7^a, after which the ends of the halves are upset slightly to retain the collars in place, although instead of retaining the collars in place by such means, I might thread them interiorly to engage the threaded ends of the halves h and h^2. The collars form the portions of the members which are engaged by the teeth of the sprocket wheel, while the thickened body portion of the halves h, h^2, are adapted to enter the depressions or seats in the periphery of the sprocket wheel.

In Fig. 10, I have shown a modified form of driving member to be engaged by a differently shaped sprocket wheel, the member k having converging lower sides k', the belt k^2 being held therein by a pin k^3, shaped as described and engaging the corrugated part k^4 of the strip or belt.

In Fig. 12, I have shown a construction similar to that shown in Fig. 3, with the exception that I have provided the member with a loose collar b^{10} held between the two metal strips a, and to reduce the friction when engaging with the sprocket wheel.

Instead of using a flat metallic band, I might use a series of wires, as m, Fig. 11, placed side by side to form a thin metallic belt, and crimped or convexed at regular intervals to be held in the different forms of members described, and in the same manner as the metal strips are secured, but in Figs. 13 and 14, I have shown a modified form of member n, having in its flat surface two recesses of a depth equal to the diameter of one of the wires m', four such wires being shown as passed through each recess, the recesses being rounded laterally, as at n' Fig. 13, to receive the laterally bent portions of the wires, which are tightly retained in the bent portions of the recess by rivets r extended through the member n, two wires of each set of four passing around one side and two around the other side of each rivet.

To complete the member, I may either secure a cap-piece, as $n^\times$ at the left of Fig. 14, to the part n, or I may make the head r' of the rivet large enough to cover the recesses in the part n of the member.

The band or belt hereinbefore described is light, strong, and noiseless in its operation, and requires no lubrication, as there are no joints in it to wear out or abrade, and for these reasons the band is particularly adapted for bicycles or similar vehicles, as dirt or dust will not readily collect upon it, and if it should so collect, can be quickly cleaned.

The periphery $A^\times$ of the sprocket wheel, shown in Figs. 1 and 2, is provided with a series of holes or openings 10 extending therethrough, to allow dust or dirt collecting on the exterior of the wheel to shake through, and thereby keep the periphery clean, and if desired I may groove the periphery, as at 15, Fig. 2, to form alternate elevations and depressions in the periphery for the same purpose.

I claim—

1. A power transmitting band consisting of a thin metallic belt convexed at suitable points, a series of transverse driving members each provided with a belt seat, concaved to receive one of the convexed portions of the belt, and a retaining device to clamp the convexed portion of the belt in the concaved belt seat of the driving member, substantially as described.

2. A power transmitting band consisting of a thin metallic belt convexed at equi-distant points, a series of transverse driving members each provided with a longitudinal bore and slotted for a part of its length and intersecting the bore at one side its center, to receive the belt at its convexed portion, and a retaining pin adapted to be driven into the bore of the member, to clamp the convex portion of belt therein, substantially as described.

3. A power transmitting band consisting of a thin metallic belt, and a series of transverse driving members secured thereto at equi-distant points, the material of the belt being thickened at the portions whereat the driving members are attached, the belt gradually decreasing in thickness in opposite directions away from the driving members to the normal thickness of the belt, substantially as described.

4. A power transmitting band consisting of a thin flexible metallic belt convexed at equidistant points and reinforced adjacent thereto, and a series of transverse driving members provided each with a depression to receive one of the convexed portions of the belt and secured thereto, substantially as described.

5. A power transmitting band consisting of a thin flexible metallic belt convexed at equidistant points, and reinforced adjacent thereto, a series of transverse driving members having each a belt receiving seat, concaved to receive a convex portion of the belt, and means to clamp the belt in its seat, substantially as described.

6. A power transmitting band consisting of a thin flexible metallic belt convexed at equidistant points and reinforced adjacent thereto, and a series of driving members each having a depression to receive one of the convexed portions of the belt, and slotted below its longitudinal axis to receive the parts of the belt adjacent the convexity, and retaining devices to clamp the driving members to the belt, substantially as described.

7. A power transmitting band consisting of a thin metallic belt convexed at suitable

points, a series of transverse driving members each provided with a belt seat, concaved to receive one of the convexed portions of the belt, and a retaining device to clamp the driving member to the belt, one of said driving members receiving and holding both ends of the belt, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS A. CASGRAIN.

Witnesses:
GEO. W. GREGORY,
EMMA J. BENNETT.