

(No Model.)

J. APPLEBY.
DRIVE CHAIN.

No. 441,815.

Patented Dec. 2, 1890.

Fig. 8.

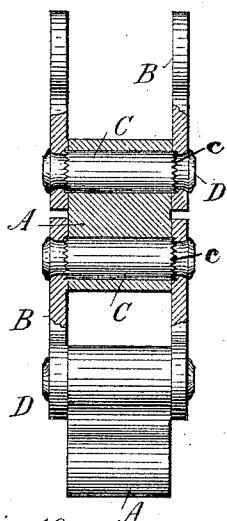


Fig. 10.



Fig. 11.

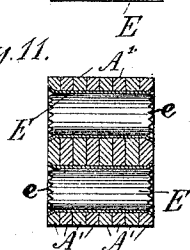


Fig. 12.



Fig. 1.



Fig. 2.



Fig. 3.

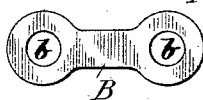


Fig. 4.

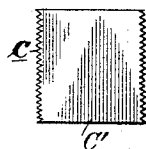


Fig. 5.

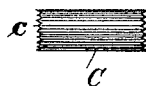


Fig. 6.



Fig. 7.

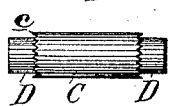
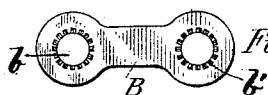


Fig. 9.



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UNITED STATES PATENT OFFICE.

JOSEPH APPLEBY, OF BIRMINGHAM, ENGLAND.

DRIVE-CHAIN.

SPECIFICATION forming part of Letters Patent No. 441,815, dated December 2, 1890.

Application filed August 25, 1890. Serial No. 362,958. (No model.) Patented in England September 20, 1888, No. 13,559.

To all whom it may concern:

Be it known that I, JOSEPH APPLEBY, engineer, a subject of the Queen of Britain, residing at 60 Caroline Street, Parish of Birmingham, in the county of Warwick, in England, have invented certain new and useful Improvements in Chains for Bicycles, Tricycles, and other like Vehicles, also for Lawn-Mowers and Similar Machinery, (for which Letters Patent have been obtained in Great Britain, No. 13,559, dated September 20, 1888,) of which the following is a specification, reference being had to the accompanying drawings.

Heretofore in the ordinary driving-chains the outer or side blanks have been united to the inner or intermediate blocks by means of rivets, which necessarily must be soft in order to admit of riveting the blocks working on such rivets, and the blanks being also soft. Now in order to produce a driving-chain which shall have soft side blanks, and yet afford hard wearing-surfaces between the rivets and the inner blocks, I make a chain of the following construction:

This my improved chain consists of hardened-steel or iron blocks, soft rivets cut off from plain wire and without shoulders, and a hardened-steel tube or sleeve on the rivet or interposed between it and the blocks, and, moreover, formed with end projection or teeth, which before the riveting is effected are by pressure embedded into the side blanks, forming depressions therein. By this means I obtain a cheap driving-chain possessing great strength and durability, inasmuch as I provide hardened-steel wearing-surfaces together with the toughness of soft rivets and soft side blanks. I am also enabled by this invention to produce a chain of an intermediate character—that is to say, a better one than the aforesaid ordinary one, but not so good as what I call an “improved chain” in its best form, and I for that purpose, while retaining the hard-steel sleeve or tube on the plain rivets without shoulders, make the blocks of an unhardened material.

My aforesaid hard sleeve or tube and soft unshouldered rivets are also applicable to ordinary chains in which the blocks are made in one or more pieces.

Figure 1 of the accompanying drawings is

a side view, and Fig. 2 an end view, of one of the blocks of the chain. Fig. 3 is a side view of one of the outer blanks. Fig. 4 shows a flat piece of thin sheet-steel, and Fig. 5 shows the same formed into a tube. Fig. 6 is a side view of one of the rivets of the chain, and Fig. 7 shows a rivet with a steel tube placed thereon. Fig. 9 is a side view of an outer blank after being formed with depressions for the purpose of my invention. Fig. 8 is a part sectional elevation of my improved chain. Fig. 10 is a side view of a steel-lined tube, and Fig. 11 a section of a compound block provided with such lined tubes. Fig. 12 is a side view of an outer blank to be used with such block.

My improved driving-chain is constructed as follows:

A indicates a block, preferably of mild steel, said block being of the desired dimensions, and through the ends thereof are formed holes *a* of a size to receive the pin or rivet which may be employed. I prefer to use case-hardened blocks, though for cheapness I use unhardened blocks.

B indicates the side pieces or blanks, each of which has holes *b* formed therein at each end, into which holes are adapted to be fitted the ends of the rivets D, presently described.

C indicates a tube, formed by rolling from a blank, such as shown at C', Fig. 4, said blank being provided with teeth or projections *c* at two of its opposite edges, whereby the completed tube C will have such teeth *c*, as shown in Fig. 5.

The tube C is made slightly longer than the block, and is sufficiently small in diameter to pass freely through the holes *a*. The tube after being formed may be hardened and tempered.

D indicates the rivets which I employ, formed from a piece of round soft-steel wire of such a diameter as to cause the rivet to fit tightly within the steel tube C, as shown in Fig. 7. The said rivets have no shoulders and are of sufficient length to cause them to project beyond the ends of the tubes C and project within the holes *b* in the side blanks B, as seen in Fig. 8.

In constructing my improved chain from the blocks A, side blocks B, tubes C, and rivets D, I arrange the said parts in the following

manner: I first take the tubes C described and fit within each one of the rivets D, with the ends of the latter projecting beyond the ends of the tube, whereby substantial joint-pins are formed, as shown in Fig. 7. I then take one by one of the described side blanks B and insert within each hole *b* thereof one of the combined rivets and tubes, Fig. 7, with the teeth or projections *c* at one of the ends of the tubes C abutting against the side blanks. I then place the blocks A upon the tubes C, and take other side blanks and fit the same on the other ends of the rivets and press the side blanks together, whereby the teeth at each end of the tubes C will be caused to bite into the side blanks and form a substantial shoulder, leaving space enough to allow the blocks A to work freely, after which the ends of the rivets are clinched or riveted, as shown in section in Fig. 8, thus preventing the joint-pins from turning, and consequently wearing the holes in the side blanks and becoming loose. By pressing the teeth *c* of tubes C into the side blanks the latter are caused to have a series of depressions around each hole *b*, as shown at *b'*, Fig. 9.

The construction of the chain is continued in the before-described manner until the chain has reached the required length. Its ends are then joined together in any ordinary manner, as by means of a screw and lock-nut.

Instead of using a block A formed from one piece of metal, I may, as shown in Fig. 11, employ a block consisting of a series of blanks A', pierced at each end, in which case I line the holes thus formed with a steel tube E, running from end to end of the block, said tube E being toothed at its ends, whereby the teeth *c* may be pressed into the blanks (which may be countersunk) to fix the parts firmly together; or the tube E may have no teeth, and the ends thereof may be simply bulged over into the countersunk portions of the blanks. The interior diameter of the tube E should be such as to adapt the rivet D, with its tube C, to fit therein.

The blanks B, being made of iron or similar material, I generally leave soft; but the blocks A may be hardened or case-hardened and the inside steel tube C hard. This improves the wearing surface, it having one long even bearing instead of wearing on the edges of the holes in each of the said blanks, as heretofore.

Having described my invention, what I claim is—

1. In a driving-chain, the combination, with the side blanks provided with openings, as described, of pins passing through said openings and riveted at their ends to the side blanks, and a tube surrounding each of said pins and provided at its ends with teeth or projections adapted to be pressed into the side blanks, for the purpose specified.

2. In a driving-chain, the combination, with the side blanks provided with openings, as described, and the block fitting between the side blanks and having openings adapted to align with the openings in the side blanks, of pins passing through the openings in the block and side blanks, and a tube surrounding each of said pins and provided at its ends with teeth or projections adapted to be pressed into the side blanks, for the purpose specified.

3. In a driving-chain, the combination, with the side blanks provided with openings, as described, and a block consisting of a series of separate blanks provided with aligned openings and fitting between the side blanks, and lining-tubes fitted within the aligned openings of the block, of pins passing through the said lining-tubes and the openings in the side blanks, and a tube surrounding each of said pins and provided at its ends with teeth or projections adapted to be pressed into the side blanks, for the purpose specified.

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