No. 667,830. Patented Feb. 12, 1901.

A. STEWARD.

DRIVING BELT AND PULLEY.

(Application filed June 20, 1900.)

(No Model.) 2 Sheets—Sheet 1.

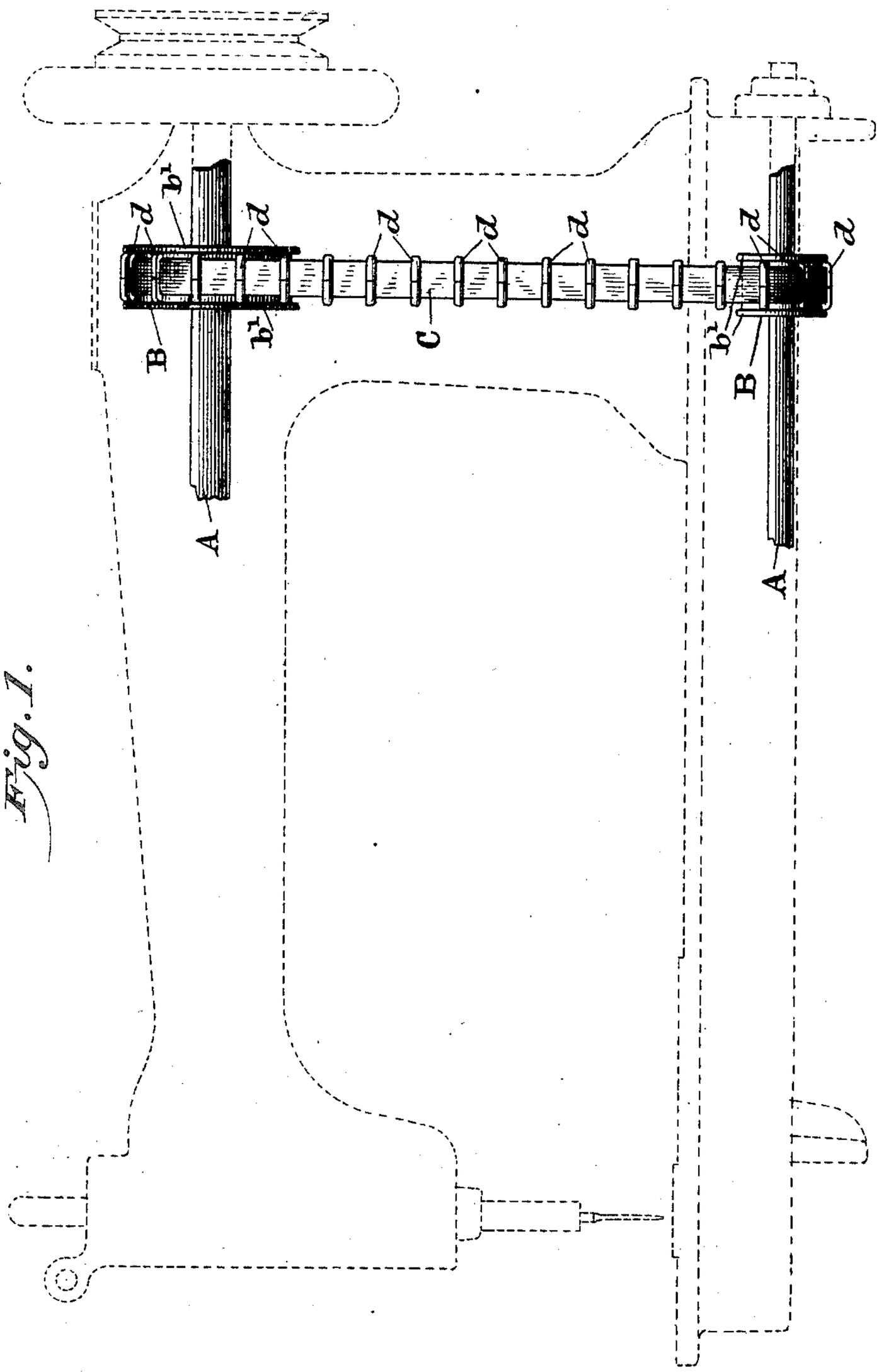

Fig. 1.

WITNESSES:

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Fig. 2.

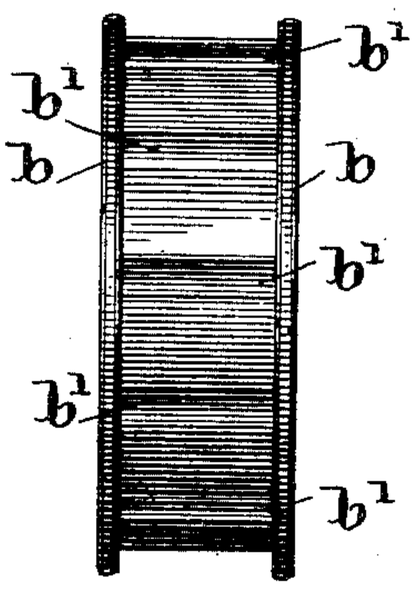


Fig. 4.

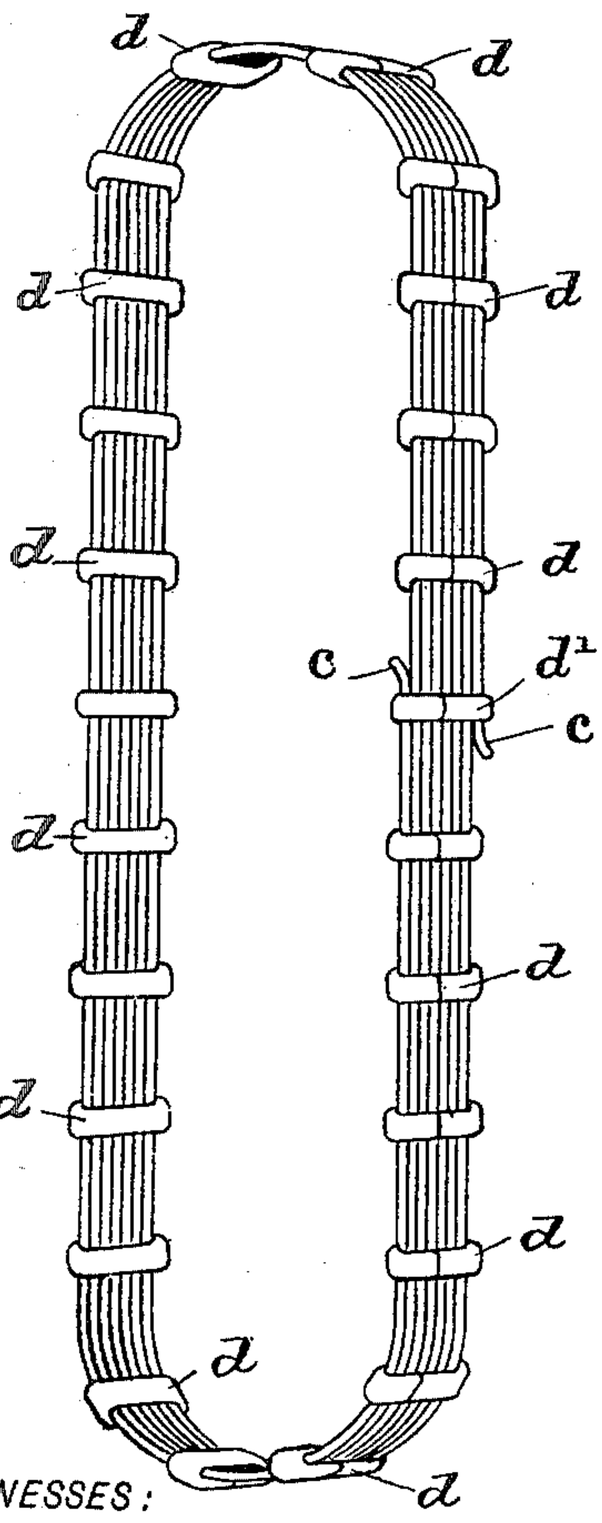


Fig. 3.

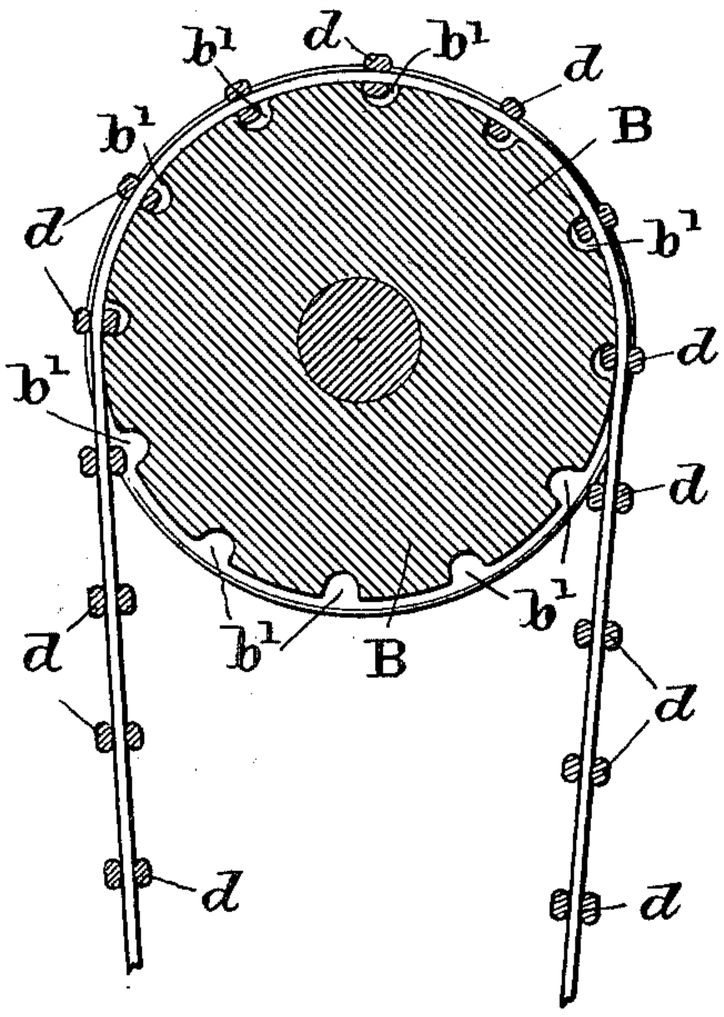


Fig. 5.

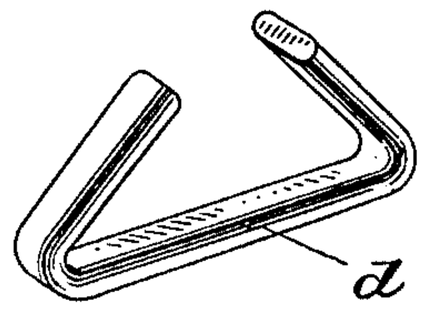
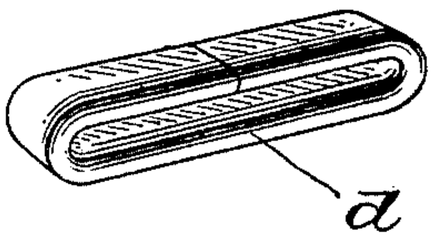


Fig. 6.



WITNESSES:

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S. Kind.

INVENTOR

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UNITED STATES PATENT OFFICE.

AURELIUS STEWARD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE.

DRIVING BELT AND PULLEY.

SPECIFICATION forming part of Letters Patent No. 667,830, dated February 12, 1901.

Application filed June 20, 1900. Serial No. 21,008. (No model.)

To all whom it may concern:

Be it known that I, AURELIUS STEWARD, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Driving Belts and Pulleys, of which the following is a specification.

My invention relates to driving mechanism for use with shafting where constant and uniform regularity of motion is required, as in sewing-machines and the like, where mechanism driven by one shaft must work in exact time and unison with mechanism driven by one or more coöperating shafts, and hence where no slipping, as of an ordinary belt, can be allowed.

I am aware that non-slipping belts have been employed which were provided with holes to engage corresponding spurs set in pulleys; but these are found objectionable both on account of the tendency of the holes to be drawn farther apart and also to be stretched and worn oblong to so great a degree as to destroy the necessary accuracy in the movements of the coöperating parts, which objection is overcome by a belt constructed as herein described. In the construction of a belt for such purposes I use a cord which for best results is composed of the finest, longest, and most inelastic fiber and of a size and strength commensurate with the power which the belt is intended to convey or the labor it is intended to perform.

In the accompanying drawings, which form a part of this specification, Figure 1 represents a pair of shafts with their applied pulleys and equipped with my improved belt. Fig. 2 is one of the pulleys enlarged to better show its formation. Fig. 3 is a vertical sectional view of the same and a portion of the belt as applied. Fig. 4 is a perspective view of the belt as completed. Fig. 5 is an enlarged perspective view of one of the clamps as formed preparatory to placing upon the belt; and Fig. 6 is a clamp, also in perspective and enlarged, as shaped when clasped upon the belt.

Like letters designate like parts throughout the several drawings.

As seen in Fig. 1, A A represent a pair of shafts, which may be of ordinary construction. B B are pulleys, and C a belt, each of my special construction. *b b* are flanges on each side of said pulleys, and *b'* represents grooves made longitudinally with the shafts in the belt contact-surface of the pulleys. *c* represents the parallel-lying layers of cord which constitute the belt, and *d* metal clamps which embrace said layers of cord and hold them permanently together.

The flanges *b* upon the pulleys, though sometimes desirable, are not especially an essential element of their construction.

The grooves *b'* in the pulleys are of sufficient depth that the clamps will have no contact with the bottom of the same and of sufficient width that the clamps may enter freely and without contact, except upon that side of the groove toward which the strain of the belt would tend to incline them, as shown in Fig. 3.

The grooves in all pulleys driving or being driven by the same belt are exactly equidistant in order that all of said grooves may coincide with the clamps upon the belts.

The belt C is preferably formed of one continuous cord, whose successive layers or coils are laid closely together side by side in sufficient numbers to constitute collectively the width of the belt desired and the ends of the cords so overlapped that both may be embraced by at least one of the clamps, as shown at *d'*, Fig. 4. The clamps *d*, having been bent into form, (shown in Fig. 5,) are placed around the several coils of the cord and then so compressed that the ends may meet, as shown in Fig. 6, and the parallel inner sides of the clamps embedded into the yielding surface of the cords sufficiently to hold them against displacement by any usage to which the belt is liable to be subjected.

To produce a belt which is practically inelastic and which will retain the same length through all conditions, I have found fibers possessing the qualities of length and inelasticity to the greatest degree, such as fine linen fiber, to be preferable in order that but a small amount of twist may be required to hold the fiber in place, and by the use of such fibers and the application of the clamps at short intervals, which confine and prevent the fray-

ing of the fibers, the amount of twist required in the manufacture of the belt is reduced to a minimum.

It is found that fibers of the class above mentioned partake of the character of wood and are not expansive longitudinally to any appreciable extent, and cords composed of such fiber, if but slightly twisted, partake of the same character. In such slack-twisted condition the fibers all lie practically parallel with the cord, and their expansion laterally by dampness, to which they are very susceptible, does not affect the belt longitudinally to any appreciable extent. When the strands composing a cord are much twisted, however, the individual fibers become coiled, and consequently exceedingly elastic, and the elasticity of the finished cord is thereby greatly increased, and the individual strands which compose the completed cord are made to lie so much transverse to the line of the cord that the expansion and contraction of the fibers transversely by climatic changes to which a belt may be subjected so affects the length of the belt as to destroy its practical utility.

As a means of forming the belt to an exact and predetermined length I have found it most convenient to form it upon a cylinder whose circumference equals the length of belt required and after inserting the clamps into equidistant and closely-fitting grooves in said cylinder to compress said clamps upon the belt while the latter remains in that condition. As an exact length is a necessary requisite in such a belt, the inner surfaces of the clamps are made plain that they may compress the cord without corrugating it, and hence the belt is not shortened by their application. As they are compressed upon the belt to secure them against displacement, the fibers, while compressible transversely, are not affected longitudinally, and the compression has no perceptible effect upon the length of the belt, the accuracy of which is one of its most essential requisites.

It will be seen from the foregoing description that the clamps upon the belt serve a double purpose, first, to engage the pulleys with practically the same certainty as geared wheels, and thereby insure the working of the shafts in exact unison, and, second, to so secure the fibers in the cords as to render unnecessary a degree of twist sufficient to destroy the inelasticity and stability, which are indispensable in belting when employed for the purposes described.

The metal of which the clamps are composed is of such density or consistency and temper that when compressed there will exist no perceptible tendency to spring apart or open and release the cords inclosed in their embrace.

The clamps are placed equidistant upon the belt, the distance being such as to correspond with the grooves in the pulleys, as shown in Fig. 3.

While it is preferable to construct each belt with one continuous cord, yet many pieces may be used if ends are properly overlapped and secured beneath the clamps without serious detriment and without departing from the spirit of my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an endless driving-belt, the combination of a substantially inelastic cord wound in successive coils of predetermined lengths side by side in sufficient numbers to constitute the width of belt, with a series of clamps secured thereon and adapted to coöperate with corresponding grooves in pulleys engaged by said belt, each of said clamps being formed of a single piece of metal bent into substantially oblong shape around said cord-coils and pinched or compressed thereon sufficiently to prevent displacement, substantially as and for the purposes described.

2. In a power-transmitting apparatus, a substantially inelastic cord wound in a series of coils side by side and sufficient in number to constitute the width of a belt, and a series of equidistant clamps embracing said coils and compressed thereon sufficiently to prevent displacement, combined with pulleys provided with equidistant grooves to correspond and coöperate with the said clamps, substantially in the manner and for the purposes set forth.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut, this 16th day of June, A. D. 1900.

AURELIUS STEWARD.

Witnesses:
J. S. FINCH,
C. N. WORTHEN.