No. 688,522. Patented Dec. 10, 1901.

A. HORNER.

CANE TRANSPORTATION SYSTEM.

(Application filed Aug. 13, 1901.)

(No Model.) 3 Sheets—Sheet 1.

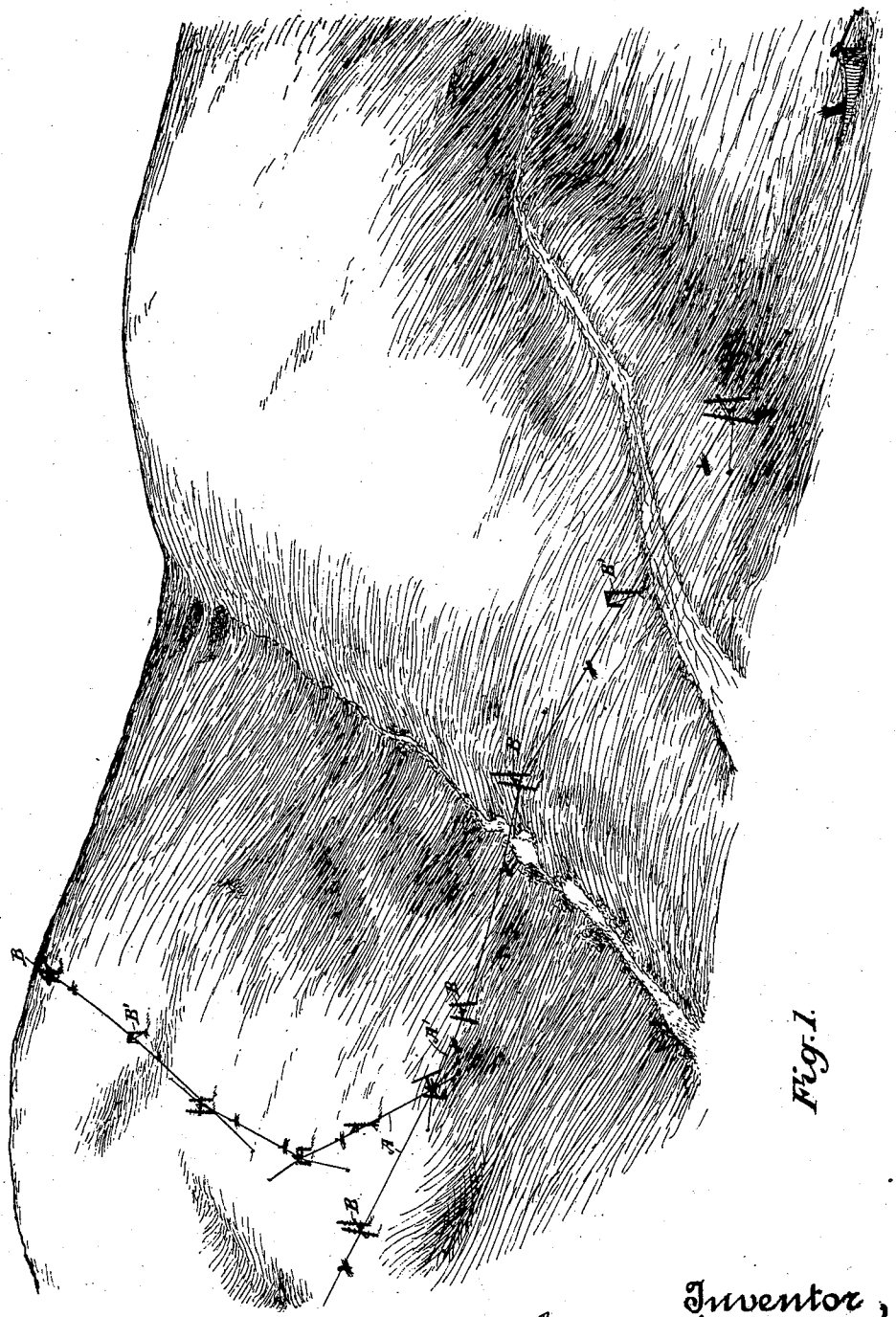


Fig. 1.

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Fig. 2.

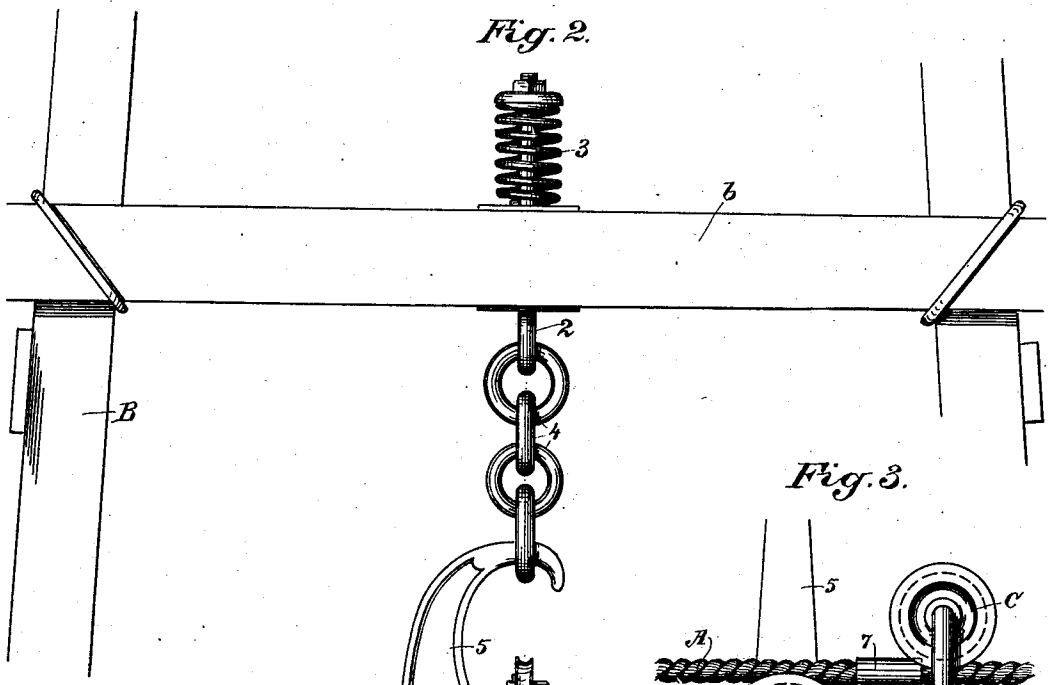


Fig. 3.

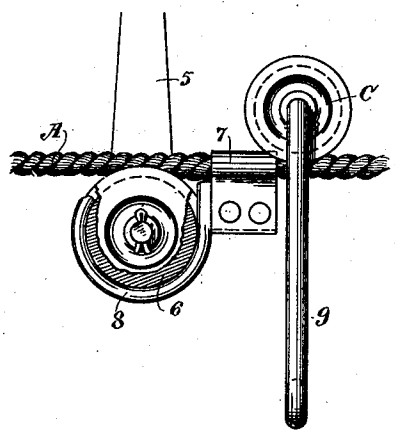
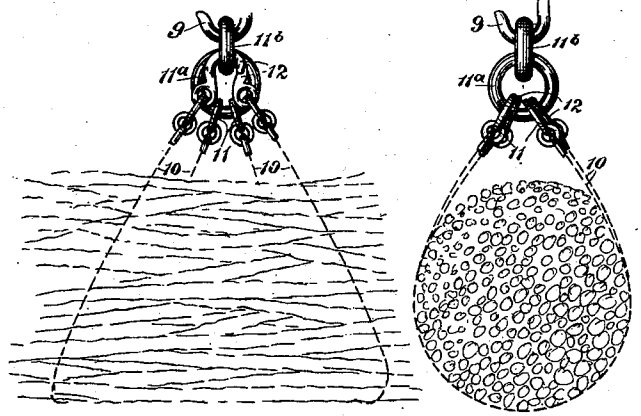


Fig. 4.



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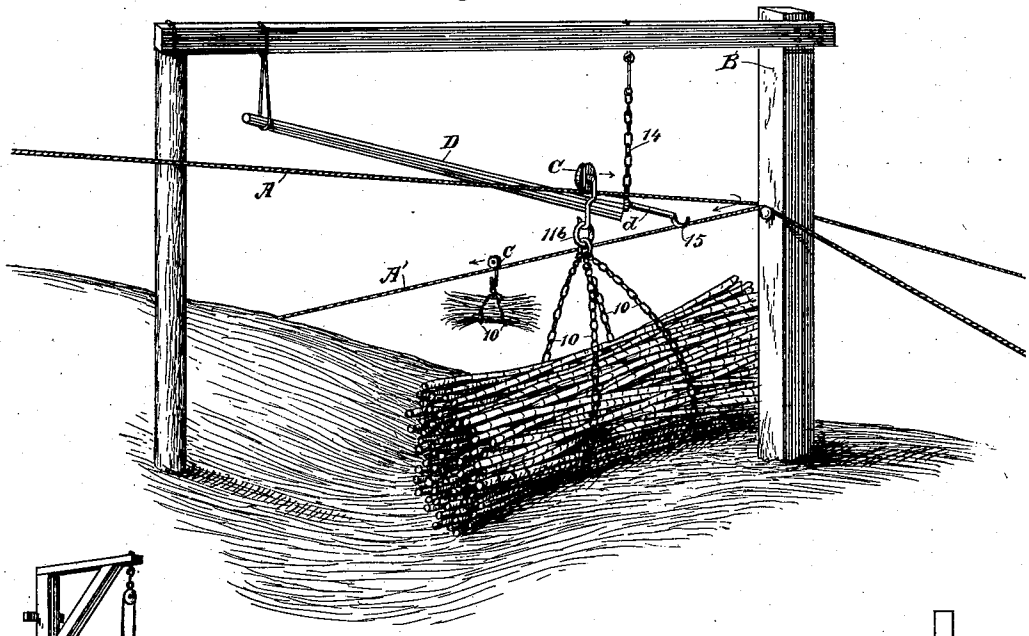
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CANE TRANSPORTATION SYSTEM.

(Application filed Aug. 13, 1901.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 5.



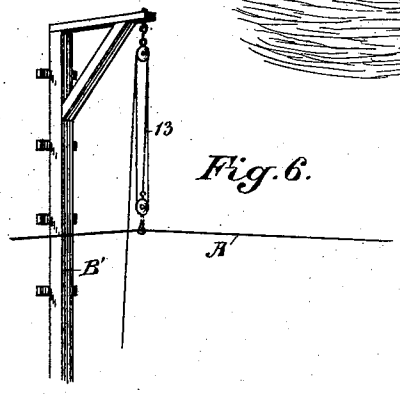
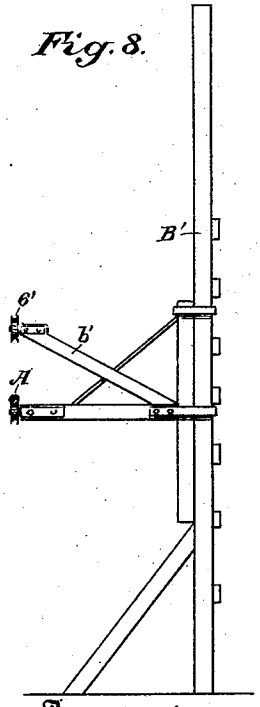


Fig. 6.

Fig. 8.



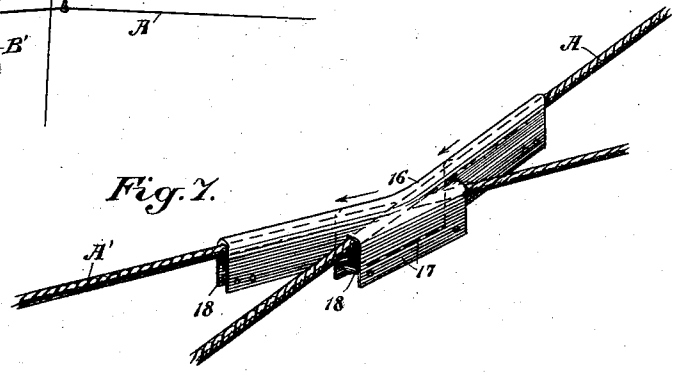


Fig. 7.

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UNITED STATES PATENT OFFICE.

ALBERT HORNER, OF PAAUILO, TERRITORY OF HAWAII.

CANE-TRANSPORTATION SYSTEM.

SPECIFICATION forming part of Letters Patent No. 688,522, dated December 10, 1901.

Application filed August 13, 1901. Serial No. 71,907. (No model.)

To all whom it may concern:

Be it known that I, ALBERT HORNER, a citizen of the United States, residing at Paauilo, Island of Hawaii, Territory of Hawaii, have invented an Improvement in Cane-Transportation Systems; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in trolley systems for the transportation of cane and the like.

Its object is to furnish a simple economical means of delivering the bundled cane from some distant part of the field to the mill by gravitation.

It consists of a stationary cable or series of cables supported upon pulleys above the ground, upon which cable the trolley hooks or carriers are hung with their load. It also consists of specific means of supporting the cable-carrying pulleys whereby the cable adjusts itself to the passing loaded trolley, means by which the cable is prevented from being thrown off the pulleys, means by which the load is transferred from one cable to another, means for elevating the cable at intermediate points, a bundle-carrier by which the bundle of cane may be carried with its longitudinal axis parallel or transverse to the line of travel, and of details more fully to be hereinafter set forth.

Having reference to the accompanying drawings, Figure 1 is a general view of the system. Fig. 2 shows the mechanism for supporting the cable at the main loading-stations. Fig. 3 is a detail view of the cable-clamping device. Fig. 4 shows the bundle suspended at right angles to the line of travel. Fig. 5 represents a transfer-station. Figs. 6 and 8 are views of portable intermediate stations. Fig. 7 shows a frog connecting the cables at a point of transfer.

This system is for use especially in a rolling or hilly country, as it is dependent upon gravitation and will operate on any grade above four per cent. or even two per cent. with some classes of work. It has been applied with particular advantage on the cane plantations of the Hawaiian Islands, where the nature of the ground is very uneven. Here it has been found possible to transport as much as two hundred and fifty tons of cane in a period of ten hours a distance of one and one-half miles over a single stretch of cable. The mills are usually situated in the lower portions of the plantations, and to these points the cable-lines are laid on suitable gradients. A represents such a cable suitably anchored at either end and having spans varrying according to the contour of the country from seventy-five to eighteen hundred feet. At the terminals any desired means may be employed to tighten the cable, as it is essential that it should always be as taut as possible, for throughout its length there must be a gradual descent from its upper to its lower end, and where sags occur between supports sufficient impetus must have been given to the traveling load to carry it over the supports. The manner in which these difficulties are obviated will be shown shortly.

B is a frame or gallows from which the cable is suspended. The points at which certain of these frames are situated are known as "loading-stations." The cable is supported on these frames in the following manner: From the arm or cross-beam *b* of the frame extends downwardly the eyebolt 2, supported on the spiral spring 3. To the end of the eyebolt is secured a short section of chain 4, from which depends the drop-holder or cable-carrier 5. This holder is preferably made with an extended base portion, so as to give sufficient bearing for the axle of the cable-supporting pulley 6. Adjacent to the pulley is a flat metal clamp 7, secured to the cable and having a hook-arm 8 encircling and partially inclosing the edge of the pulley on the under side of the cable, yet allowing the free revolution of the pulley. This device is intended to prevent the cable jumping the pulley when a load passes over it. The bundled cane is carried on this cable by means of the trolley-hook C, which consists of a trolley-wheel having its axle provided with a downward hook extension 9 at one end. The size of the trolley-wheel varies according to the grade—*i. e.*, the steeper the grade the less the diameter of the wheel. The weight of a bundle of cane is generally about two hundred and fifty pounds. The combination of the spiral spring, vertically-movable eyebolt, chain, drop-holder, and pulley offers a flexible antifrictional support for the cable and

relieves any jar or bump of the passing loaded trolley, while the cable is prevented from leaving the pulley-support by reason of the clamp-hook secured to the cable; yet at the same time the said clamp in no way interferes with the free passage of the trolley.

To obviate the difficulties arising by the lateral swaying of the bundles caused most frequently by the wind, I have devised a simple binder for the cane whereby the bundle may be hung up on the trolley-hook with its longitudinal axis either in the direction of travel or transverse thereto, according as the wind is blowing in said direction of travel or transverse thereto. By suitable means the cane is pressed into compact bundles of uniform size and then bound for transportation. This binder consists of a chain or chains 10, of a length approximately equal to the circumference of one of the pressed bundles, having attached to one end preferably three large links 11 11^a 11^b and on the other end a securing-hook 12. Thus it is seen that as either the link 11^b or the link 11 is hooked onto the trolley the bundle will stand parallel or transverse to the cable. Some such provision as this is not only necessary to prevent swaying, but on slight grades and with a headwind it is necessary to reduce resistance as much as possible, as these bundles present a considerable expanse to the action of the wind.

At suitable intervals are loading-stations. B′ represents one of these stations. In order to give a proper impetus to the loaded trolley, it is frequently necessary to elevate the cable at these points. For this purpose a hoisting mechanism, as a block and tackle 13, is disposed intermediate of the holder 5 and the overhead support. The trolley-hook, with its bundle, is placed upon the cable, and by means of the block and tackle the cable is then lifted to the necessary height. The trolley is then released, and it carries its load to the terminus by gravitation, or instead of the block and tackle these frames B′ may be provided each with an upper auxiliary arm b', having a pulley 6′, upon which the cable is shifted when a loading-station is to be established at that point.

As the initial loading-point may often be several miles from the mill, it is necessary from time to time to transfer the load from one cable-line to another, or several tributary lines or feeders may converge to a point, whence the product of all is sent on over a single cable. The lower termini of all these cables approach near enough to the surface of the ground so that the bundles of cane will come in contact gradually with the ground, thereby serving as a brake, causing a slackening of the speed and final stopping of the bundles. At these points of transfer the ends of the "incoming" cables A and the "outgoing" one A′, as they may respectively be designated, intersect one another, so that a bundle can be shifted from one of the former and upon the latter by either of the following means: First, where the two diverging cables approach more nearly a straight line I employ an automatic switch or frog plate 16, as shown in Fig. 7. This consists of a plate bent over the cables at their point of intersection, so as to form a track-section leading from one cable to the other. The frog is secured to the cables by means of the bolts or rivets 18 passing through the leaves 17. Secondly, where the two lines extend more acutely from each other, so the curve of the frog-section would be too short for the trolley to pass over, I have a lever mechanism whereby a bundle can be lifted from one cable to another. A lever D is hung from a suitable overhead support by a flexible connection 14. The weight-arm d of this lever is provided with a hook 15, with which a bundle is engaged, as in the ring 11. The operator readily swings the bundle from cable A to cable A′, the flexible connection 14 and the length of the arm d giving sufficient latitude for all purposes.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An overhead transportation system consisting in the combination with a fixed cable and one or more cables intersecting therewith, of frames upon which said cables are supported, vertically-yielding supporting means for the cables, a trolley-hook carriage adapted to travel over the cables by gravitation, and means for shifting said trolley from one cable to the other.

2. The combination in a trolley-line transportation system of a cable fixedly secured at either end, intermediate supports for said cable, said supports consisting of pulleys and means whereby they are yieldingly suspended, a carriage adapted to travel over said cable by gravitation, and clamping devices by which the cable is prevented from being thrown off the pulleys by the passing carriage.

3. The combination in a trolley-line transportation system of a stationary cable, supports for said cable, said supports comprising a frame, a pulley upon which the cable rests, connections of said pulley with the frame whereby a limited vertical and lateral movement of the pulley is permitted, and a carriage adapted to travel over the cable by gravitation.

4. The combination in a trolley-line transportation system, of a cable fixedly secured at either end, intermediate supports therefor consisting of frames, pulleys upon these frames, and upon which the cable rests, connections of said pulleys with the frames whereby a limited vertical and lateral movement of the pulleys is permitted, a clamp secured upon said cable adjacent to each pulley and having a projection adapted to engage said pulley and prevent the cable from being thrown off the pulley, and a carriage adapted to travel over said cable by gravitation.

5. The combination in a trolley-line trans-

portation system of a cable fixedly secured at each end, intermediate yielding supports for said cable, a trolley having its axle provided with a downward hook extension, said trolley adapted to travel over said cable by gravitation, and means by which the cable may be elevated at points intermediate of its ends.

6. The combination in a system for the transportation of cane, of a cable fixedly secured at the ends, intermediate supports for the cable consisting of frames and suspended cable-carriers having extended base portions which carry pulleys and upon which pulleys the cable rests, a trolley-hook adapted to travel over said cable by gravitation, and a means by which the bundle of cane may be suspended from said trolley-hook with its longitudinal axis parallel or transverse to the line of the cable.

7. The combination in a system for the transportation of cane, of a stationary cable fixedly secured at the ends, supports for this cable consisting of frames having arms, holders dependent from said arms, said holders having a limited vertical and lateral movement, pulleys journaled in said holders and upon which the cable rests, means by which the cable is prevented from being thrown off these pulleys, a trolley-hook carriage adapted to travel over the cable by gravitation, auxiliary arms on said frames, and upon which the cable may be temporarily shifted to elevate the cable at that point, to form a loading-station, a second fixed cable adjacent to the lower terminus of the first-named cable, a frame-support in conjunction with each of said cables, and a lever mechanism fulcrumed thereon whereby the load from one cable may be transferred to the other.

In witness whereof I have hereunto set my hand.

ALBERT HORNER.

Witnesses:
F. B. WEEKS,
A. J. CAMPBELL.