No. 656,949. Patented Aug. 28, 1900.

D. B. CRUICKSHANK & G. C. LUTHER.

CABLE CONVEYER.

(Application filed May 14, 1900.)

(No Model.) 2 Sheets—Sheet 1.

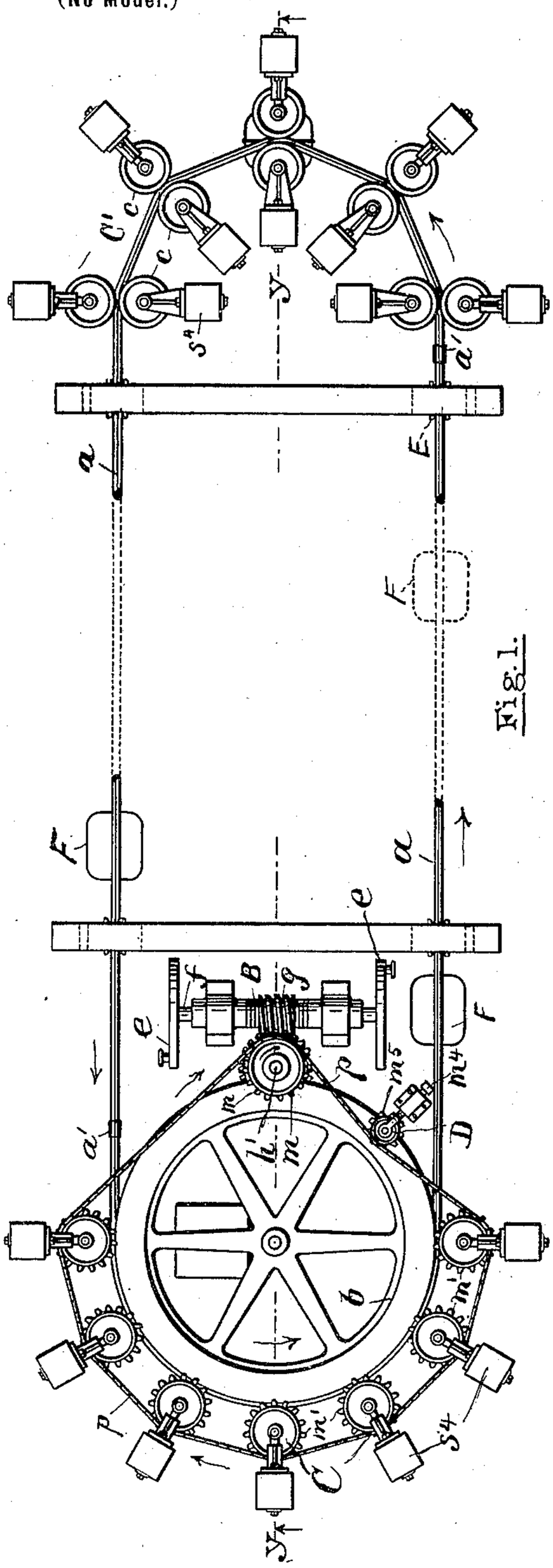

Fig. 1.

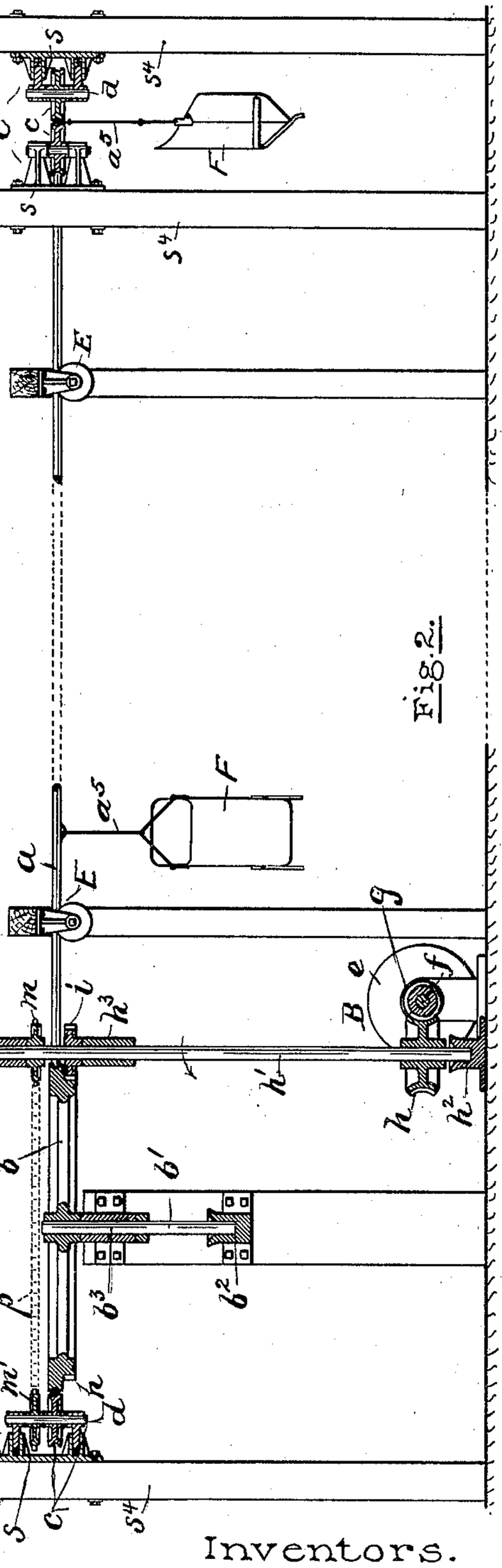

Fig. 2.

Witnesses.
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David B. Cruickshank.
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by Geo. H. Remington & Co.
Att'ys.

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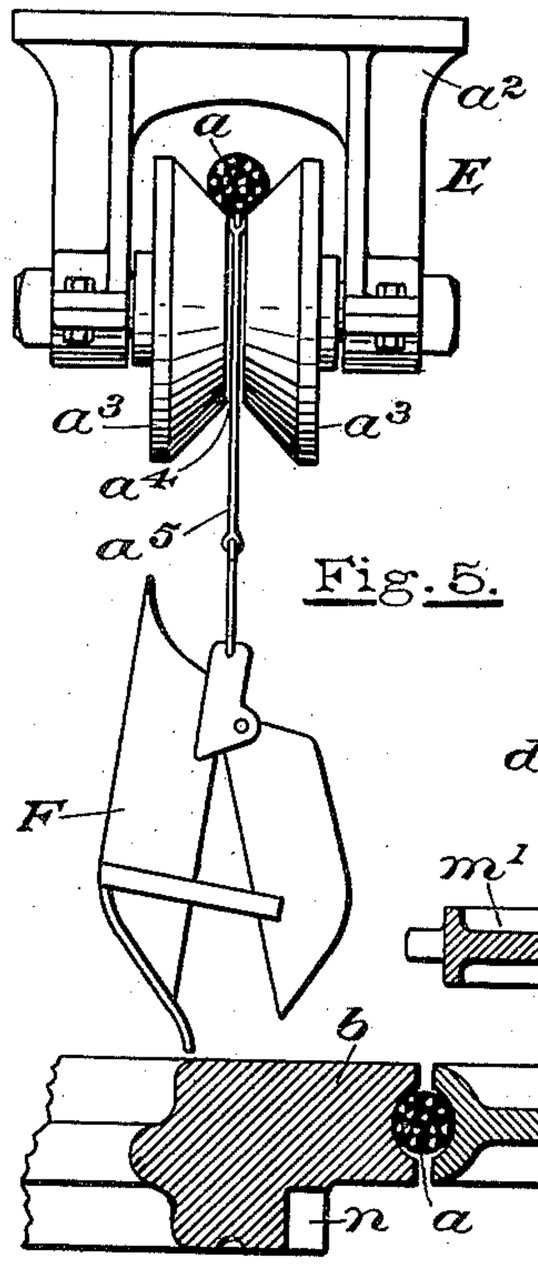

Fig. 5.

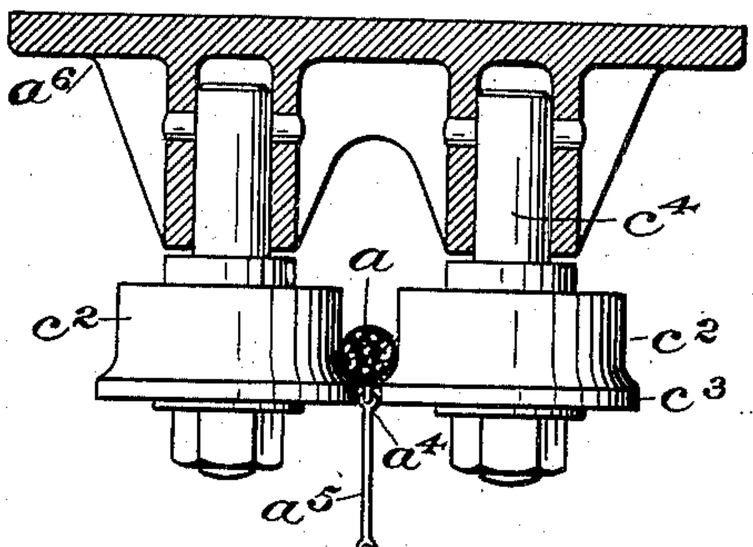

Fig. 4.

Fig. 3.

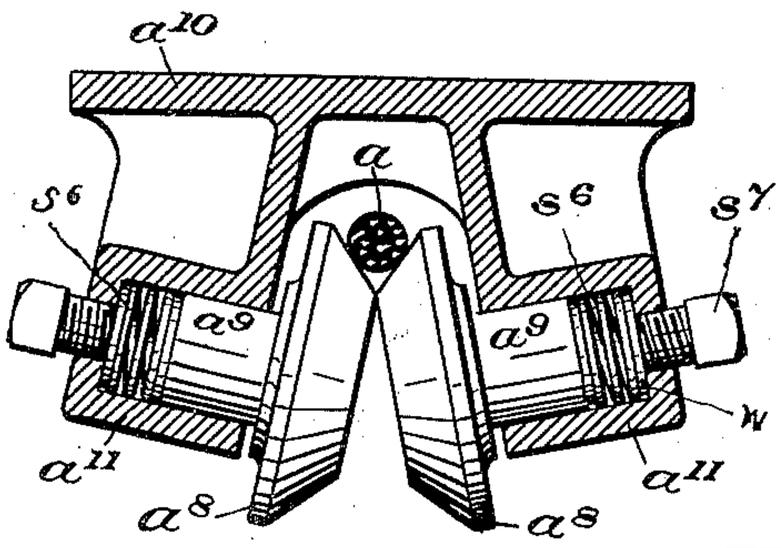

Fig. 7.

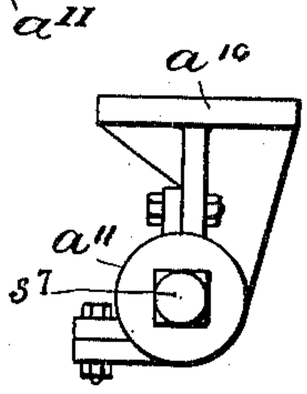

Fig. 8.

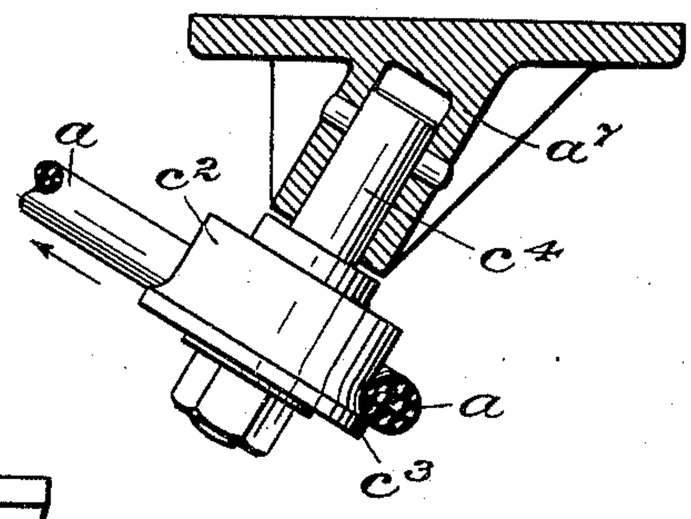

Fig. 6.

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UNITED STATES PATENT OFFICE.

DAVID B. CRUICKSHANK, OF PROVIDENCE, RHODE ISLAND, AND GARDNER C. LUTHER, OF SWANSEA, MASSACHUSETTS.

CABLE CONVEYER.

SPECIFICATION forming part of Letters Patent No. 656,949, dated August 28, 1900.

Application filed May 14, 1900. Serial No. 16,560. (No model.)

To all whom it may concern:

Be it known that we, DAVID B. CRUICKSHANK, a subject of the Queen of Great Britain, and a resident of Providence, in the county of Providence and State of Rhode Island, and GARDNER C. LUTHER, a citizen of the United States of America, and a resident of Swansea, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Cable Conveyers, of which the following is a specification.

Our invention relates to improvements in aerial cable conveyers—such, for example, as are employed for transporting merchandise or other material suspended from the cable, the latter being continuously actuated or propelled in any suitable manner.

The object we have in view is to provide cable conveyer systems with mechanism adapted to actuate or propel the cable with a greater degree of efficiency, the device being comparatively simple and inexpensive and not liable to get out of order.

In carrying out our invention the periphery of the main driving pulley or drum around which the cable runs has combined therewith a series of auxiliary positively-driven yieldingly-mounted supporting-sheaves arranged contiguous thereto and having the cable supported by and between the adjacent faces of the said pulley and sheaves. By means of this device the cable may be driven at a comparatively-uniform rate of speed, owing to the fact that it is practically impossible for it to slip. We may state that the peripheral speed or velocity of the large driving wheel or pulley and that of the smaller driving-sheaves is the same. Consequently the cable will run with a greater degree of smoothness or uniformity, as before stated. Another advantage possessed by our improved cable-driving system is that the small driving-sheaves are adapted to automatically yield sufficiently to permit not only the passage of the traveling cable, but also of the couplings or connections secured thereto, to which latter the articles or merchandise being transported are attached.

In the accompanying two sheets of drawings, Figure 1 is a plan view of a "cable conveyer," so called, embodying our improvements. Fig. 2 is a longitudinal central sectional view taken on line *y y* of Fig. 1. Fig. 3 is a vertical sectional view, enlarged, taken through the center of one of the auxiliary driving-sheaves and its supporting-bracket. Fig. 4 is a similar section showing a manner of supporting the cable on idler pulleys or sheaves. Fig. 5 is a modification of the device shown in Fig. 4. Fig. 6 is a partial sectional view showing a sheave arranged to support the cable when running at an angle. Fig. 7 is a sectional view showing the cable-supporting pulleys yieldingly mounted, the axes being arranged in different planes; and Fig. 8 is an end view of the same on a reduced scale.

The following is a detailed description of our improved cable conveyer. The system or apparatus as a whole is indicated in the drawings by A.

The engine or other suitable primary motor B may be located where most convenient. In the drawings the engines have been omitted, since they form no novel part of the invention.

The crank-shaft *f* has a crank *e* at each end adapted to be coupled or connected to any suitable engine or driving mechanism. Power is transmitted from the shaft *f* to the main driving sheave or pulley *b* by means of a worm *g*, secured to said shaft, which drives the worm-gear *h*, in turn secured to the upright shaft *h'*, supported in lower and upper bearings h^2, h^3, and h^4. The cable-pulley *b*, having a comparatively-large diameter, is secured to the upper end of the vertical shaft *b'*, mounted to revolve in bearings b^2 b^3. The under side of the pulley is provided with gear-teeth *n*, meshing into the small driving-gear *i*, secured to shaft *h'*. As thus arranged it is clear that upon rotating the engine-shaft the large wheel or sheave *b* will be actuated through said gearing, &c., its speed being reduced in proportion to the size of the gears, as is well known. The major portion of the construction thus far described has, however, been employed by others prior to our invention.

The device forming the essential feature of our improvement resides in the employment

of positively-driven auxiliary sheaves combined with the pulley *b*, &c. In the drawings we have represented a series of seven. These are arranged about the semicircumference of the driving-drum *b*.

C designates the auxiliary driving devices just referred to. Each is provided with a vertical bracket *s*, adapted to be secured to a post s^4 or other suitable support. A horizontal socketed hub s^3 is formed at or near each end of the bracket, into which the shanks d^2 of the upper and lower bearings *d'* are slidably fitted, springs *s'* being located at the bottom of the sockets and bearing against the ends of said shanks. (See Figs. 2 and 3.) Screws or stop-pins s^2, fitted into a short longitudinal groove formed in the shanks d^2, serve to limit the endwise movement of the bearings. A vertical shaft *d* is mounted to revolve in said bearings, the same having a small sheave *c* and sprocket-wheel *m'* secured thereto, all as clearly shown. It will be seen that the faces of the several driving wheels or sheaves *b* and *c* are grooved to receive the cable *a*. Now in order to rotate the auxiliary sheaves *c* simultaneously and at the same peripheral velocity as that of the main sheave *b* an endless chain or flexible connection *p* is mounted on a sprocket-wheel *m*, secured to shaft *h'* and passed around the several sprocket-wheels *m'* of the auxiliary driving devices C. (See Fig. 1.) It will be seen that the faces of the small sheaves do not bear against the larger sheave, but all bear against the cable *a*, (see Fig. 3,) the result being that the cable is positively driven around with the sheave *b*, all the sheaves meanwhile being driving members. Another important feature of this arrangement is that whenever the couplings or connections *a'*, located at intervals along the traveling cable, attempt to pass between the faces of the sheaves *b* and *c*, the latter, together with its shaft and connected parts, yields outwardly or radially, resisted by the tension of the springs *s'*, thereby for the instant increasing the distance between the said faces sufficiently to permit the passage of the coupling, the springs operating to automatically return the sheaves, &c., to their normal working position immediately thereafter, the action being repeated as the coupling encounters each auxiliary sheave successively.

We have indicated at D, Fig. 1, a device for taking up the wear and elongation of the driving-chain *p*. Any well-known analogous device or means may, however, be employed for this purpose. Upon turning the screw m^4 in the proper direction the idler sprocket-wheel m^5 is adapted to engage the chain with more or less pressure, as desired.

The opposite end of the cable conveyer system may be arranged substantially as shown in Figs. 1 and 2, wherein the cable *a* is represented as being supported between the faces of idler-sheaves *c*, which in turn are secured to vertical shafts *d*, mounted to revolve in upper and lower bearings *d'*, yieldingly supported in the socketed hubs s^3 of the brackets *s*, fastened to upright posts s^4 or in any other suitable manner. In fact the supporting device C', just described, is in all respects the same as that located at the driving end of the system, except that in the former the small chain-wheels *m'* are omitted.

The two ends of the cable conveyer system may be fixed several hundred feet apart, the cable itself being endless and constituting, if need be, a continuously-running belt.

The intermediate or straight portions of the cable can be supported in any suitable manner or as represented in Figs. 4, 5, and 7. E, Fig. 5, indicates a device well adapted for the purpose, the same consisting of the casting or bracket a^2 and a pair of laterally-separated idler-sheaves a^3, mounted therein, having beveled faces arranged to form a V, in which the cable is supported and travels. The inner ends of the sheaves are separated, so as to form a space a^4 between them for the free passage of the connections a^5. The latter, secured to the traveling cable, are adapted to carry the load or buckets F, which are to be transported along the length of the cable.

In Fig. 4 is represented a modified form of the cable-supporting device. In this case the idler or supporting sheaves c^2 are mounted to turn on the vertical studs or pins c^4, fixed into the under side of the bracket a^6. The sheaves have practically-straight faces, terminating at the lower edge in the enlarged flange c^3, which forms practically the support for the cable. In this arrangement the flanges are separated laterally to form a space a^4 for the passage of the cable connection a^5, as before stated.

In Fig. 6 the cable *a* is represented as traveling in an inclined plane, the cable being supported by and passing around a flanged idler-sheave c^2, mounted on a stud c^4, fixed into the bracket a^7. The axis of the stud is vertical to the plane of the traveling cable, the sheave itself being substantially as represented in Fig. 4.

In some cases the cable-supporting sheaves may be arranged as shown in Fig. 7. As drawn, the sheaves a^8 are substantially the same as the sheaves a^3. (Represented in Fig. 5.) They have beveled faces or rims; but the axes of the sheaves in this construction are arranged at an angle in different planes. The hubs or shanks a^9 are fitted to turn freely in the sockets or bearings a^{11} of the double bracket a^{10} and are resisted by stiff springs s^6, mounted in the bottom of the sockets. Screws s^7 are employed for adjusting or regulating the tension of said springs. In this arrangement the upper inner edges of the two sheaves are practically in contact with each other when in the normal position, as represented; but upon the entrance between them of the cable connection or coupling the sheaves will be forced apart sufficiently to permit its

passage, after which the springs operate to immediately return the sheaves to the normal working position.

The manner of operation of our improved cable conveyer mechanism is as follows: Assuming that steam, electricity, or any other suitable agent be employed for actuating the vertical driving-shaft h' the latter, through the medium of the gears i and n, will then cause the large sheave or cable drum b to revolve, say, in the arrow direction, power being also transmitted from said shaft h' to the chain p, thereby at the same time rotating the several auxiliary driving-sheaves simultaneously and in unison with the sheave b. Now since the endless cable a is supported at the driving end of the system between the faces of the several sheaves $b\,c$ it follows that the cable must be propelled at a rate of speed equal to that of the frictional gripping-surface of the sheaves. It is to be understood that the other portions of the cable a are supported in any suitable manner—as, for example, by idler-sheaves, &c., as represented in Figs. 1, 2, 4, 5, and 7. If the conveyer be employed, say, for transporting sand, gravel, &c., from trenches or other excavations, the cable would be provided at intervals with connections a^5, to which suitable scoops or buckets F are detachably secured. The filled buckets are carried along by the cable and their contents readily discharged at any desired point along the cable without detaching them therefrom, the empties being returned to the charging or filling station, where they are again refilled, the cable meanwhile continuously traveling at a practically-uniform rate of speed.

We claim as our invention and desire to secure by United States Letters Patent—

1. In a cable conveyer system of the class described, the combination with the endless suitably-supported cable and a mounted and actuated main driving drum or sheave arranged to carry and propel the cable, of an auxiliary cable-driving device, the same consisting of a yieldingly-mounted positively-driven sheave arranged with respect to the rim of the main sheave, and having the cable interposed between and in frictional engagement with the peripheral faces of said sheaves, whereby the latter is capable of propelling the cable without slip while at the same time the auxiliary sheave member is adapted to yield laterally so as to permit the passage of the cable coupling or connection between said faces.

2. The combination of a mounted cable-carrying driving-sheave, a series of auxiliary sheaves, located around the periphery of said driving-sheave and arranged to receive a cable between the adjacent faces or surfaces of the driving and auxiliary sheaves, and a driving-chain or flexible connection arranged to actuate the several auxiliary sheaves simultaneously, substantially as described.

3. In a cable conveyer system, the auxiliary driving device, substantially as hereinbefore described, the same consisting of the sheave member having its rim or face adapted to receive a cable, a driving-shaft having the sheave secured thereto, bearings for said shaft, a bracket or casting member having said bearings slidably mounted therein, and springs interposed between the bearings and said bracket, whereby the sheave is capable of yielding in a lateral direction, for the purpose specified.

4. In a cable conveyer system, the combination with the main driving sheave or pulley b arranged to revolve in a horizontal plane, the endless conveyer cable a mounted on and actuated by said sheave, and a chain-driving wheel m, the series of yieldingly-mounted auxiliary driving devices C arranged around the periphery of and coöperating with said sheave in actuating the cable, chain-wheels m' forming a part of said devices C, and an endless chain p mounted on the said wheels for transmitting power from the wheel m to the auxiliary driving devices simultaneously, substantially as described.

5. In a cable conveyer system, a cable-supporting device consisting of a pair of pulleys or sheaves having their axes inclined toward each other, a bracket or casting provided with bearings having said sheaves revolubly mounted therein, springs interposed between the hubs of the sheaves and the ends of the bearings, whereby the faces of the sheaves are kept in the normal working position, and means for controlling the tension of said springs.

Signed by us at Providence, Rhode Island, this 9th day of May, A. D. 1900.

DAVID B. CRUICKSHANK.
GARDNER C. LUTHER.

Witnesses:
GEO. H. REMINGTON,
CHARLES W. BOARDMAN.