W. K. PAGE.

BELT CONVEYER.

APPLICATION FILED MAR. 9, 1918.

1,313,111. Patented Aug. 12, 1919.

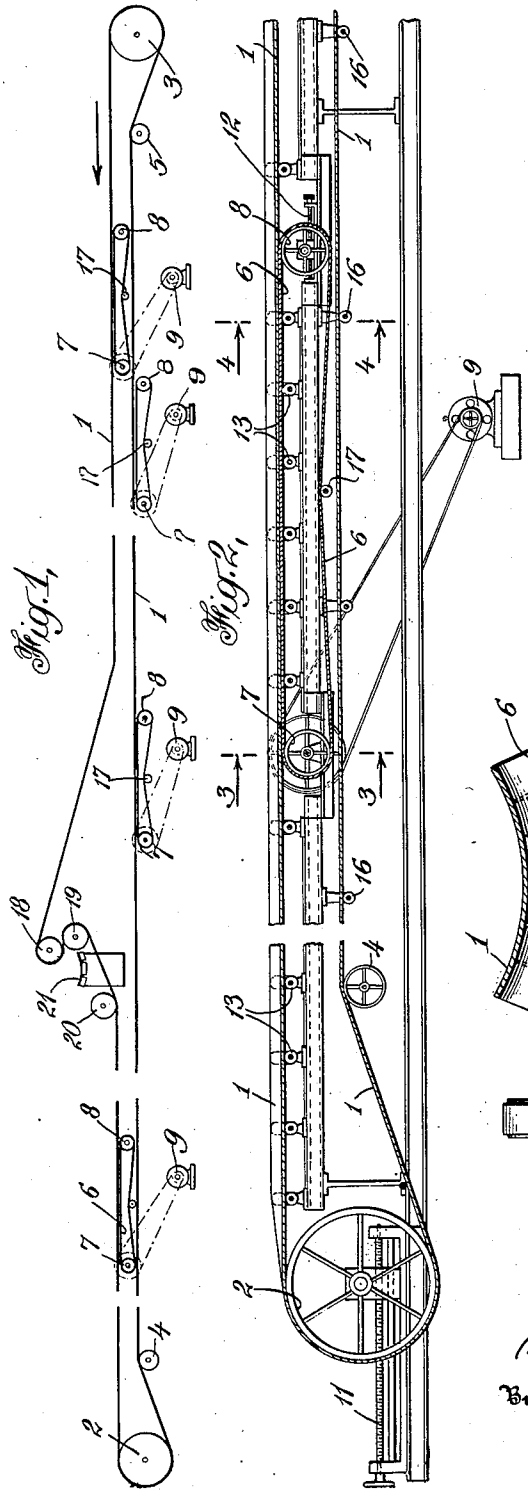


Fig. 1,

Fig. 2,

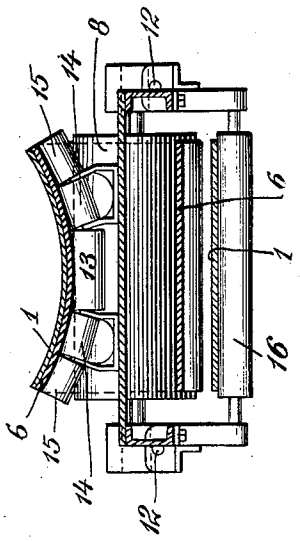


Fig. 4,

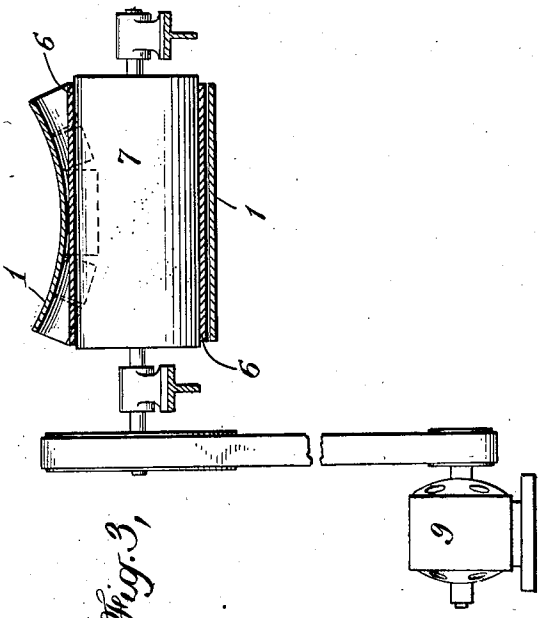


Fig. 3,

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BELT CONVEYER.

1,313,111. Specification of Letters Patent. Patented Aug. 12, 1919.

Application filed March 9, 1918. Serial No. 221,350.

To all whom it may concern:

Be it known that I, WILLIAM KINGMAN PAGE, a citizen of the United States, residing at Orange, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Belt Conveyers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in belt conveyers for conveying ore or other material over long distances.

Where belt conveyers are utilized for conveying material over long distances it has been found that there is a rapid destruction of the belt due to the excessive stretch and strain to which it is subjected. It has been customary to drive such belt conveyers from one or both of its ends so that the entire load on the belt, and the belt itself, would be pulled from but a single point in the total length of travel. With belt conveyers having a belt travel of as much as from 500 to 1000 feet or even more, and with a load on the belt amounting to as much as several hundred pounds per running foot, in the case of a belt three feet wide, an excessive stretch and strain is put upon the belt and a large amount of power is required at the driving pulley at the end of the belt. In order to enable the desired load to be carried for considerable distances it has been found necessary to make the belt of correspondingly increased strength and thickness.

Where the material to be conveyed is of a corroding nature, it tends to work into the belt and further contribute to the rapid destruction of the belt, this action being promoted by the excessive stretch and strain to which the belt is subjected.

The difficulty of operating a belt of considerable length in the manner described is further increased by the friction of the idlers on which the conveyer is supported, this friction being increased both by the load on the belt and by the added weight of the belt made necessary to provide for its satisfactory operation.

The present invention relates to improvements in belt conveyers according to which the driving of the conveyer is effected in a novel and improved manner with resulting decrease in the stretch and strain applied to the belt and with the substantial avoidance of the objections above noted and increased smoothness of operation of the conveyer.

According to the present invention provision is made for driving the main conveyer belt by installing a number of independently driven auxiliary belts located at various points along the main belt and supporting and driving it independently at these different points along its line of travel. The invention will be described more in detail in connection with the accompanying drawings illustrative of one embodiment thereof, in which—

Figure 1 shows, diagrammatically, sections of a belt conveyer embodying the invention; Fig. 2 shows on a somewhat enlarged scale sections of the conveyer of Fig. 1; Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2; and Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2.

As indicated in the drawing, the main conveyer belt is indicated at 1 and passes over the end pulleys 2 and 3 which may be provided with independent driving means (not shown). The main belt is supported along its upper side by a series of idlers 13, 14 and 15 arranged at regular intervals and on its return side by another set of idlers 16, as illustrated in Figs. 2 and 4. The upper idlers are arranged to give the belt a trough shape so that it will retain the material which it is to carry. Idlers 4 and 5 are shown near the ends of the belt between the end pulleys 2 and 3 and the series of idlers 16.

Along the upper and lower sides of the main belt are arranged a series of auxiliary belts 6 arranged to pass over auxiliary end pulleys 7 and 8 and to be driven by motors or other suitable mechanism 9 at the same speed as the main belt. As illustrated in Figs. 2, 3 and 4 these auxiliary belts 6 pass between the main belt and the upper series of idlers which support the main belt so that the weight of the main belt and its load is supported on the auxiliary belt. On its return side, the auxiliary belt is illustrated as passing over the idler 17 to prevent its interference with the return side of the main belt.

A suitable support is provided for the dif-

ferent series of idlers and for the end pulleys of the main belt, as indicated conventionally in Fig. 2. Provision is also made for tightening the main belt and taking up its slack as well as for tightening the auxiliary belts, one suitable type of tightening device being indicated conventionally at 11 for the end pulley 2 and a similar tightening device at 12 for the end pulley 8 of the auxiliary belt.

The main belt may be arranged to discharge its load at one or more intermediate places along its line of travel. One such discharge point has been illustrated conventionally in Fig. 1 where the main belt passes over the pulleys 18, 19 and 20 and discharges its load on to the cross-belt 21 from which the material can be transferred into storage tanks or receptacles or to the desired place of discharge.

The driving means for the auxiliary belts as above pointed out are arranged to drive the auxiliary belts at the same speed as the main belt so that the load of the main belt and the driving thereof will be distributed. In the case of electrically operated units, such as illustrated, the motors are designed with approximately identical characteristics and variations in speed from no load to full load sufficient to insure each motor receiving its proper proportion of the load with resultant uniform belt tension and smoothness of operation. That is to say, if the load is increased unduly at one place along the conveyer, the increased load will tend to make the motor upon which the added burden is placed run more slowly so that the load will be equalized by the other motors pulling more nearly their proportionate share of the load.

The main belt conveyer may be uni-directional or it may be reversible so that it will operate in either direction and carry the load from either end toward the center or from the center toward either end, as well as between intermediate points, in either direction.

The auxiliary belts will be made of a width substantially the same as that of the main belt which they are to support and drive.

The number of auxiliary belts can be varied with the length of the main belt and with the load which it is designed to carry. So also the distance apart of the auxiliary belts will depend upon the load to be carried by the main belt and the length of the auxiliary belts. The auxiliary belts may thus be for example, twenty feet long, in the case of a belt three feet wide, and be arranged from one hundred to four hundred and fifty feet apart along the main belt.

Auxiliary belts may similarly be provided at one or more points along the return side of the belt where the belt is of excessive length, one such auxiliary belt being illustrated in Fig. 1.

Where the main belt is to be reversible, the auxiliary belts will similarly be reversible and will be driven by reversible motors or by other mechanism which will provide for driving in either direction.

As the result of the driving of the main belt in the manner described, according to the present invention, the length of the main belt can be materially increased while its thickness can be very materially decreased, thus effecting a very considerable saving in the cost of the belt as well as in the weight of the belt which is required for successful operation. So also there is a materially lessened strain or stretch of the main belt so that it is less subject to deterioration. It is also possible to accommodate the main belt more readily to irregularities, such as elevations or depressions, encountered in conveying material for long distances. It is also possible to carry increased loads without excessive strain upon the main belt or upon the auxiliary driving belts and their motors, and the load on the belt, as well as the load of the belt itself, and the frictional resistance on the idlers (particularly when not properly lubricated), are all equalized and divided up among the various auxiliary driving belts.

The size and construction of the main conveyer belt and of the auxiliary belts can be varied and will in practice vary with the requirements of the conveyer such as the load to be carried and other considerations. Standard types of belt construction now commonly used in similar conveyers are available for use according to the present invention, but the main belt is not required to be as thick or to withstand such excessive strains as are incident to the use of belt conveyers in the manner heretofore practised for conveying material over long distances.

It will be understood that the details of the construction of the conveyer parts, such as the driving mechanism and the supporting mechanism for the belts, can be varied in its details of construction from those conventionally illustrated in the drawing and that variations in the construction and arrangement of the various parts can be made without departing from the spirit and scope of the invention.

I claim:—

1. A belt conveyer adapted to convey materials over long distances comprising a main belt of fibrous material having an excessive length in proportion to its width and thickness, a plurality of supporting idlers disposed along the path of travel of the belt and a plurality of independently driven auxiliary belts disposed along the path of travel of the main belt adapted to contact with the idlers and with the main belt so as to exert

a simultaneous driving and supporting action.

2. A belt conveyer of the character described comprising a main belt of fibrous material driven at its extremities, said belt having an excessive length in proportion to its width and thickness, a plurality of idlers arranged to support the belt in a trough shape disposed along the path of travel of the main belt, and a plurality of independently driven auxiliary belts, disposed along the path of travel of the main belt, said auxiliary belts interposed between the idlers and the main belt so as to exert simultaneous driving and supporting action.

3. A belt conveyer of the character described comprising a main belt of fibrous material driven at its extremities, said belt having an excessive length in proportion to its width and thickness, a plurality of supporting idlers disposed along the path of travel of the underside of the working surface of the main belt, said idlers adapted to support the belt in a trough shape, and a plurality of independently driven auxiliary belts of fibrous material disposed along the path of travel of the working surface of the main belt, said auxiliary belts interposed between the idlers and the main belt and adapted to support and drive the main belt.

4. A belt conveyer of the character descirbed comprising a main belt of fibrous material driven at its extremities, said belt having an excessive length in proportion to its width and thickness, a plurality of supporting idlers disposed along the path of travel of the underside of the working surface of the main belt, said idlers adapted to support the belt in a trough shape, a plurality of independently driven auxiliary belts of fibrous material disposed along the path of travel of the working surface of the main belt, said auxiliary belts interposed between the idlers and the main belt adapted to support and drive the main belt and a plurality of independently driven auxiliary belts disposed along the return path of travel of the main belt adapted to support and drive the main belt along the return path of travel.

In testimony whereof I affix my signature.

WILLIAM KINGMAN PAGE.