Dec. 25, 1951 M. A. KENDALL 2,580,229

LONG RANGE HAULAGE CONVEYER SYSTEM

Filed March 11, 1949 3 Sheets-Sheet 1

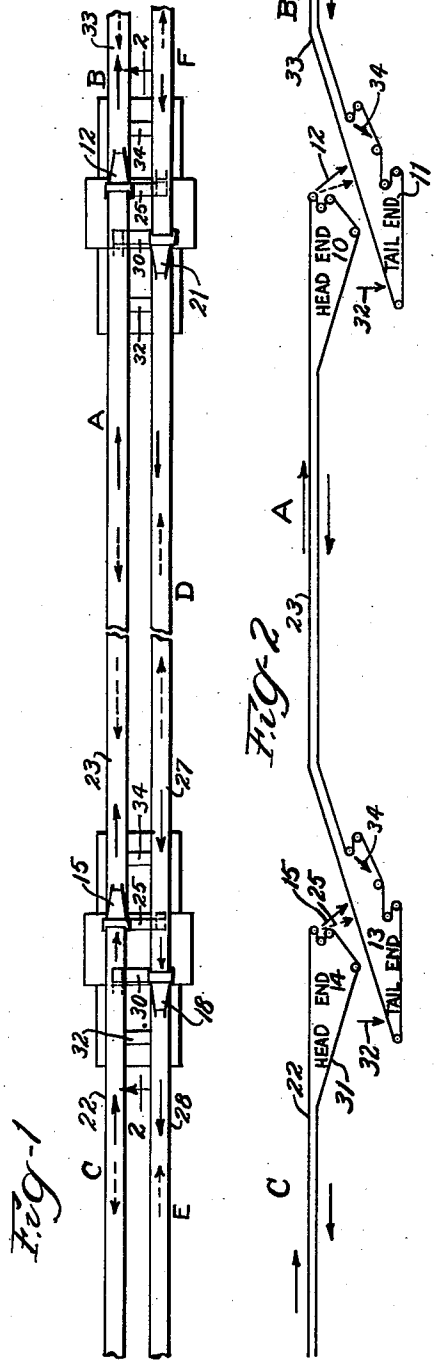


Fig-1

Fig-2

Fig-3

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LONG RANGE HAULAGE CONVEYER SYSTEM

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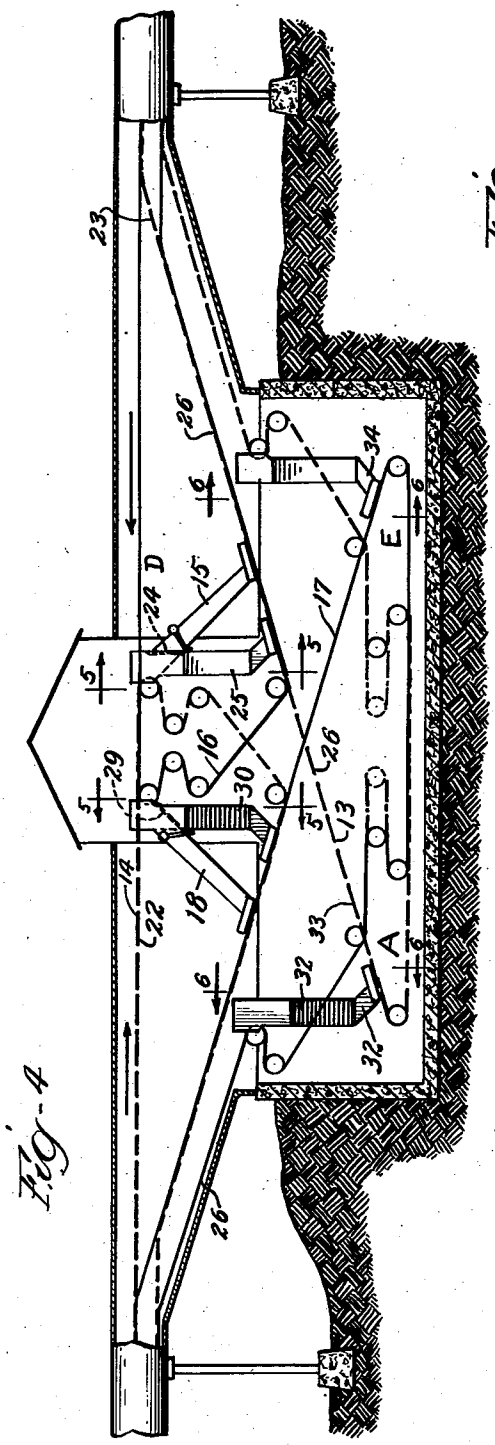


Fig-4

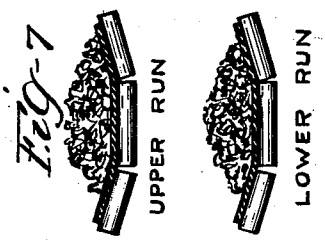


Fig-7

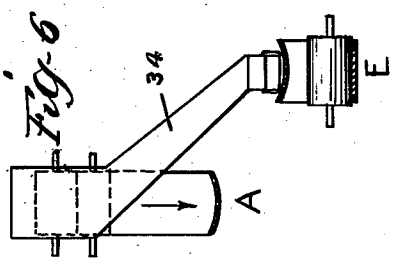


Fig-6

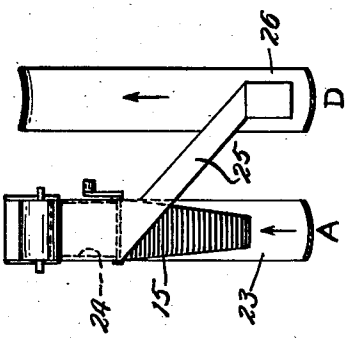


Fig-5

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LONG RANGE HAULAGE CONVEYER SYSTEM

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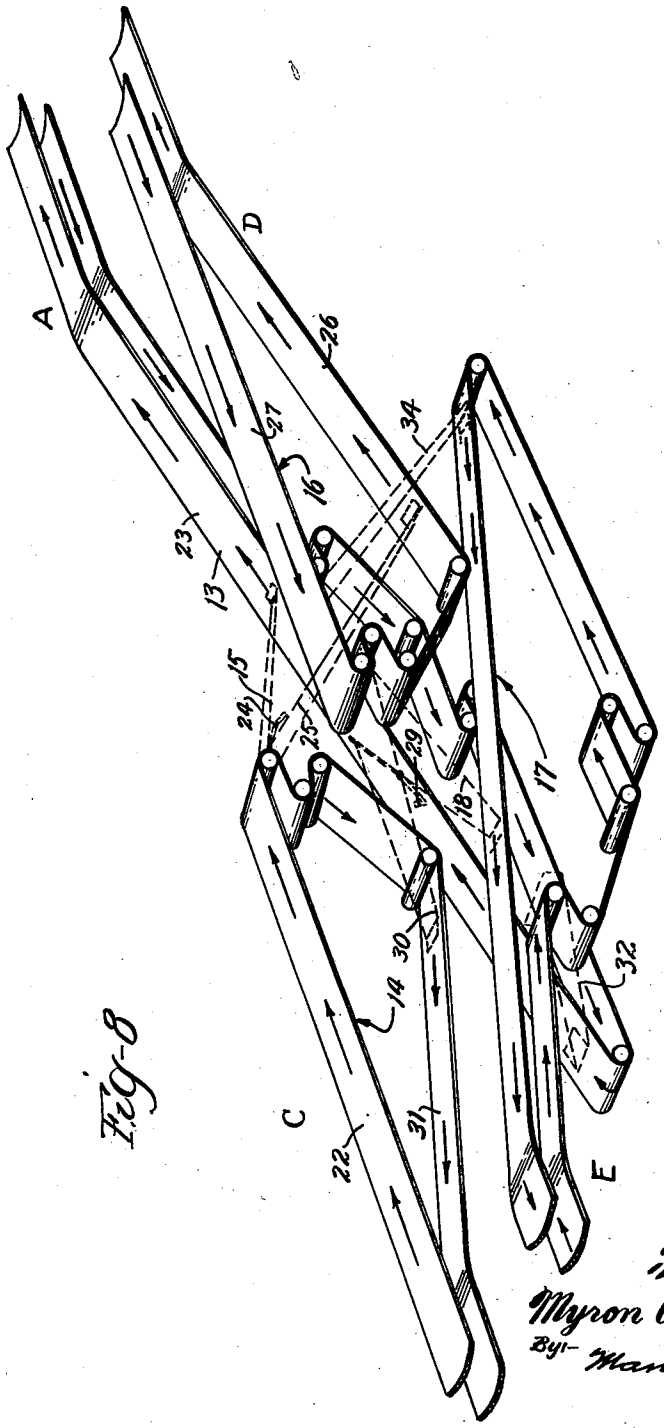


Fig-8

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UNITED STATES PATENT OFFICE

2,580,229

LONG-RANGE HAULAGE CONVEYER SYSTEM

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7 Claims. (Cl. 198—45)

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This invention relates to long range haulage by belt conveyors, and has for its principal object to provide for continuous haulage in opposite directions while permitting any conveyor unit to be separately emptied, stopped, serviced or repaired without interrupting the continuity of flow in either direction.

Generally speaking, this is accomplished by providing two tandem series of belt conveyors, side by side, running in opposite directions with all the conveyors in each series running in the same direction but opposite to that of the other, and each (except the last) normally delivering to the next in series to provide continuous flow throughout each series, and equipping each conveyor unit (except the last) in each series with means to transfer a load from its upper run to the lower run of the next conveyor in the other series, and means to transfer load from its lower run to the upper run of the next conveyor in the other series.

With this arrangement, by merely throwing a gate, any conveyor or unit can be by-passed without interrupting the continuity of flow in each direction. The by-passed conveyor can be stopped, loaded or emptied within its own length, and can be subjected to any sort of maintenance, service, repair, or replacement while the haulage continues uninterrupted in both directions.

In the drawings:

Fig. 1 is a plan view of a length of the two series of conveyors, one with normal haulage to the right, as indicated by arrows in solid lines, and emergency or by-pass haulage to the left, as indicated by arrows in dotted lines; and the other with normal haulage to the left, as indicated by arrows in solid lines, and emergency or by-pass haulage to the right as indicated by arrows with dotted lines:

Fig. 2 is a side elevation of a portion of the series with normal haulage on the upper run toward the right;

Fig. 3 is a similar view of the other series with normal haulage on the upper run to the left;

Fig. 4 is a side elevation of the adjacent ends of two conveyors of each series, or the adjacent ends of four conveyors, two organized for normal haulage to the right and two organized for normal haulage to the left with provision for emergency or by-pass haulage;

Fig. 5 is a section taken on each of the lines 5—5 of Fig. 4;

Fig. 6 is a section taken on each of the lines 6—6 of Fig. 4;

Fig. 7 is a cross-section through any one of the

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conveyor units in the intermediate portion indicating haulage in one direction on the upper run and the opposite direction on the lower run; and

Fig. 8 is a perspective view of the four end sections illustrated in Fig. 4.

These diagrammatic illustrations are chosen for simplicity, and preferred for that reason.

In Fig. 2, the diagram shows a conveyor unit A for haulage to the right on the upper run, and to the left on its lower run. Its head end 10 is arranged to deliver to the tail end 11 of another unit B through a normal service chute indicated by the arrow 12.

The tail end 13 of the conveyor unit A is arranged to receive from the head end 14 of the conveyor unit C through a normal service chute indicated by the arrow 15.

Practical considerations limit the length of a single conveyor unit, but an arrangement such as indicated in Fig. 2 is satisfactory for long range haulage by any number of units in a series.

In Fig. 3, a conveyor unit D for normal haulage to the left on the upper run has its head end 16 arranged to deliver to the tail end 17 of a conveyor unit E through a normal service chute 18, and its tail end 19 to receive from the head end 20 of a conveyor unit F through a normal service chute indicated by the arrow 21.

The units A, B, and C correspond to those shown at the upper side of Fig. 1; and the units D, E, and F correspond to those shown at the lower side of Fig. 1.

In Fig. 8, the intersection or overlapping of the head end 14 with the tail end 13 of the conveyors C and A, respectively, and the head end 16 with the tail end 17 of the conveyors D and E, respectively, are shown in perspective.

From this, it will appear that the upper run 22 of the conveyor unit C has its head end 14 arranged to deliver through the normal service chute 15 to the upper run 23 of the conveyor A. Also, there is provision by throwing a gate 24 for delivery instead from the upper run 22 through an auxiliary service chute or by-pass chute 25 to the lower run 26 of the conveyor unit D, which is travelling to the right in the same direction as the upper run 22 of the conveyor unit C.

Also, in Fig. 8, it will be seen that the upper run 27 of the conveyor unit D has its head end arranged to deliver through a normal service chute 18 to the upper run 28 of the conveyor unit E, or by means of a gate 29 to deliver through an auxiliary service or by-pass chute 30 to the lower run 31 of the conveyor unit C.

Assuming the section Fig. 5 to be taken on the line 5—5 at the right in Fig. 4, the normal service chute 15 appears at the left in Fig. 5 leading to the inclined portion of the upper run 23 of the conveyor unit A, while the auxiliary service chute 25 extends across to the conveyor D of the other series, and delivers onto the inclined portion of the lower run 26.

Assuming that the conveyor unit A is to be by-passed by running the material from the upper run of the unit C along the lower run 26 of the unit D, it must then be transferred to the upper run of the unit B. This is accomplished by an auxiliary service or by-pass chute 32, which is shown at the left in Fig. 4, between the lower run 26 of the unit D and the upper run 33 of the unit B. Its position is also indicated in Fig. 3 by the arrow 32.

The unit E in Fig. 8 is shown with a corresponding auxiliary service or by-pass chute 34.

Each conveyor, except the last, in each series will have a normal service chute corresponding to those shown at 12, 15, 18, and 21, transferring from the corresponding upper run of one conveyor unit in the series to the upper run of the next unit in the series in a forward direction.

Associated with those normal service chutes and controlled by means of a gate corresponding to those indicated at 24 and 29 in Fig. 8 will be an auxiliary service or by-pass chute corresponding to those shown at 25 and 30 in Fig. 8. Also, each tail end in the series, except the last, will have an auxiliary chute corresponding to those shown at 32 and 34 in Fig. 8 and 34 in Fig. 6 for connecting the lower run of the one conveyor to the upper run of the next in the opposite series.

With this arrangement, merely throwing the corresponding gate to change the transfer from a normal series chute to an auxiliary or by-pass chute will be sufficient to cut out a conveyor unit. It may then be stopped immediately. It may be allowed to clear itself by running its length, and afterwards stopped. Hence, it will be available for any sort of inspection, service, repair, replacement, for any length of time while the flow continues in both directions uninterrupted. The operator does not have to choose his time or conform it to any action by any other operator. Throwing the gate one way bypasses the unit. Throwing it the other way puts it back in service.

A basic unit may comprise a belt with its support, drive, etc., a normal service chute at the head end to transfer load from its upper run to the upper run of the next in series, an auxiliary service chute to transfer load from its upper run to the lower run of the next in series, a gate between those chutes to choose between them, and an auxiliary service chute to transfer load from its lower run at the tail end to the upper run of the other series.

The last unit in each series may have a discharge chute from the upper run only, and the first unit of each series may have a discharge chute from the lower run only.

The many advantages of a conveyor system embodying the present invention may be illustrated by the following:

The conveyor units may be started in series, the last belt first, to prevent any pile-up at the intersection, or overlapping, and to keep the starting load low.

Any unit may be stopped for minor or major

cause without interference with the flow in either direction.

Any unit may be serviced to any extent from some small adjustment to replacement of belts and motors without shut-down of any other part of the system. Hence, regular and adequate service may be expected.

Any unit may be emptied completely without interrupting the flow of material in either direction.

In the normal course of things, belts must be replaced, mechanical parts must be inspected and lubricated periodically, and this invention permits a progressive, regular inspection, lubrication, and replacement without interrupting flow in either direction.

I claim:

1. In long range haulage apparatus, a series of belt conveyors running in the same direction and adapted to deliver the head end of one to the tail end of the next in series, a second series of belt conveyors running in the direction opposite to that of the first series and adapted to deliver the head end of one to the tail end of the next in series, and means to transfer load from the upper run of a conveyor in one series to the lower run of the next conveyor in the other series, and from the lower run of a conveyor of one series to the upper run of the next conveyor of the other series.

2. In long range haulage apparatus, a series of belt conveyors running in the same direction and adapted to deliver the head end of one to the tail end of the next in series, a second series of belt conveyors laterally offset from and running in the direction opposite to that of the first series and adapted to deliver the head end of one to the tail end of the next in series, and a chute for conducting material from the upper run of a conveyor in one series to the lower run of the next conveyor in the other series.

3. In long range haulage apparatus, a series of belt conveyors running in the same direction and adapted to deliver the head end of one to the tail end of the next in series, a second series of belt conveyors running in the direction opposite to that of the first series and adapted to deliver from the head end of one to the tail end of the next in series, and means to transfer load from one run of one conveyor in one series to the opposite run of the next conveyor in the other series.

4. In long range haulage apparatus, a series of belt conveyors running in the same direction and adapted to deliver the head end of one to the tail end of the next in series, a second series of belt conveyors running in the direction opposite to that of the first series and adapted to deliver from the head end of one to the tail end of the next in series, means to transfer load from one run of one conveyor in one series to the opposite run of the next conveyor in the other series, and a gate for controlling the said transfer means.

5. In long range haulage apparatus, a series of belt conveyors in tandem running in the same direction, a chute for transferring load from each conveyor to the next in the series, a second series of belt conveyors in tandem running in the direction opposite to that of the first series, a chute for transferring load from each conveyor of each series to such next in the series, an auxiliary chute for each conveyor except the last in the series for transferring load from one run of one

series to the opposite run of the other series, and a gate for controlling the auxiliary chute.

6. In long range haulage apparatus, a first series of belt conveyors having upper runs driven in one direction, each conveyor having a tail end to receive loads and a head end from which the loads are delivered, a chute for conducting to the tail end of each successive conveyor articles moving from the head end of the preceding conveyor of said series, a second series of conveyors laterally offset from and parallel to the conveyors of said first series, each conveyor of said second series having a tail end for receiving a load and a head end from which the load is delivered, the upper runs of the conveyors of said second series being driven in the direction opposite to said first-named direction, and the conveyors of each series being generally laterally registered with the conveyors of the other series, a chute for delivering loads to the tail end of each succeeding conveyor of the second series from the head end of the preceding conveyor of such series, and means for rendering any of said chutes inoperative and for delivering a load from the upper run of the head end of a conveyor of one series to the lower run of a conveyor of the other series.

7. In long range haulage apparatus, a first pair of conveyors in generally end to end relation

having their upper runs traveling in the same direction, a second pair of conveyors arranged generally in end to end relation and having their upper runs driven in the opposite direction, means for transferring articles from the leading conveyor of each pair to the following conveyor of the same pair or from the leading conveyor of one pair to the lower run of the leading conveyor of the other pair, and means in the lower run of the leading conveyor of each pair for removing articles therefrom.

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