

No. 732,499.

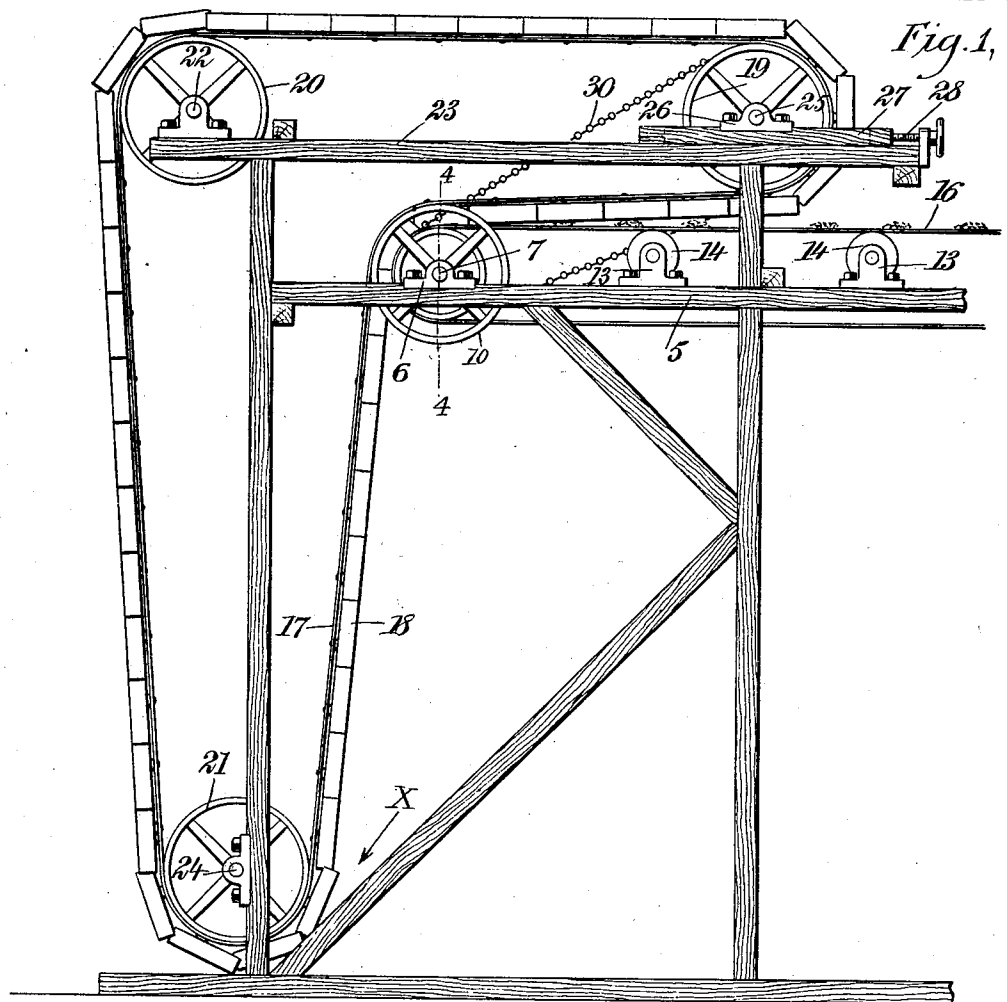
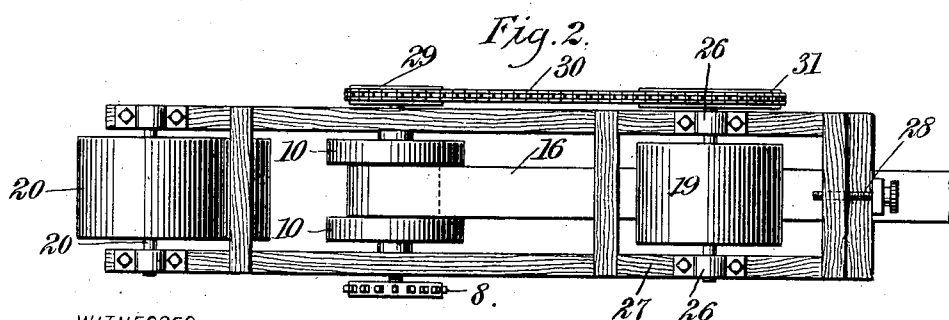
PATENTED JUNE 30, 1903.

L. S. AUSTIN.
APPARATUS FOR HOISTING AND CONVEYING.

APPLICATION FILED JAN. 6, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

Edward Thorpe
H. J. Beruhoff

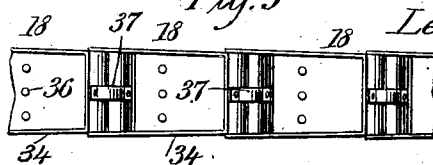
Fig. 5

INVENTOR

Leonard S. Austin

BY

ATTORNEYS,

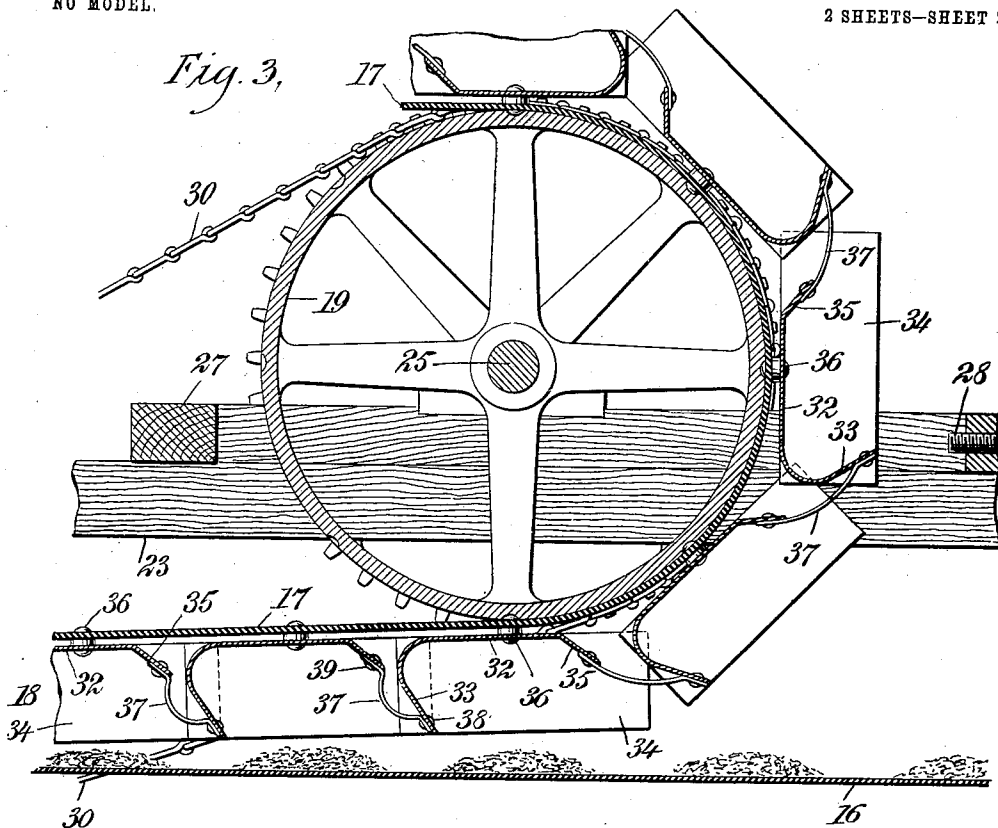
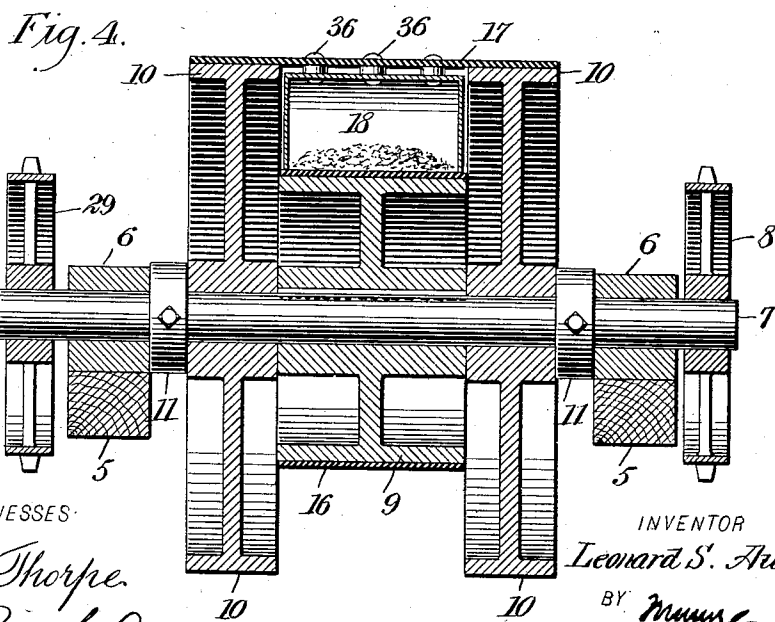


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UNITED STATES PATENT OFFICE.

LEONARD S. AUSTIN, OF NEW YORK, N. Y.

APPARATUS FOR HOISTING AND CONVEYING.

SPECIFICATION forming part of Letters Patent No. 732,499, dated June 30, 1903.

Application filed January 6, 1903. Serial No. 137,985. (No model.)

To all whom it may concern:

Be it known that I, LEONARD S. AUSTIN, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Apparatus for Hoisting and Conveying, of which the following is a full, clear, and exact description.

My invention relates to apparatus for hoisting and conveying, the same being adapted for the transportation of many different kinds of material in a loose condition.

In this system I employ two endless conveyers, one of which is a bucket conveyer and the other a belt or apron conveyer. The two conveyers travel over or around pulleys mounted on a common shaft in such a way that the material is transferred from one to the other without the shock or "drop" characteristic of many prior transporting systems, and at the same time the belt or apron conveyer and pulley coöperate with the bucket conveyer at the meeting-point, so as to close the open sides of a series of buckets and prevent the premature discharge of the load. I also contemplate the use of a novel type of bucket conveyer wherein each bucket is fastened at a single point, as by a row of rivets, to the endless member or apron of such conveyer. The individual attachment of the buckets secures a certain amount of pliability in the bucket conveyer necessary to pass around the pulleys; but to hold the buckets in alined relation when moving in a straight path they are constructed to overlap at their ends and are equipped with yieldable connections, each of said connections being preferably in the form of spring metal attached to the back portion of one bucket and to a lip at the open end of an adjacent bucket. The spring connections act to steady and prevent sidewise displacement of the buckets when passing around the pulleys.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the novelty will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure is a side elevation of a portion of a

hoisting and conveying apparatus constructed in accordance with my invention. Fig. 2 is a plan view of the mechanism shown by Fig. 1, omitting the bucket conveyer. Fig. 3 is an enlarged vertical section through a portion of the bucket conveyer, illustrating the driving-pulley thereof. Fig. 4 is a vertical section on the line 4 4 of Fig. 1, and Fig. 5 is a detail plan view of a portion of the bucket conveyer.

In carrying my invention into practice I provide a suitable framework to support certain shafts of the conveying system. The beams 5 are equipped with suitable shaft-bearings 6, adapted to support the main shaft 7, said shaft being provided at one end portion with any suitable means for driving the same. In Fig. 4 the driving means is shown as a sprocket-gear 8, fastened to the shaft 7; but it will be understood that a pulley adapted to be propelled by a belt or any equivalent driving device may be employed for propelling the shaft 7. This shaft is equipped with pulleys adapted to receive a belt or apron conveyer and an endless bucket conveyer, said pulleys being shown more particularly by Figs. 2 and 4. The pulley 9 is fast with the shaft, while the pulleys 10 are loosely mounted on said shaft 7 and disposed on opposite sides of the pulley 9. The pulleys are fitted to the shaft 7 between its journal-bearings 6, and said pulleys are confined in proper relation to each other by the collars 11, which are preferably clamped on the shaft adjacent to the idle pulleys 10. The beams 5 are also provided with supports 13, adapted to sustain a series of idle rollers 14, said rollers being disposed below the upper active lead of an endless conveyer belt or apron 16. This conveyer belt or apron is fitted snugly to the fast pulleys, so as to be driven thereby, and said conveyer belt or apron is equal in width to the face of the pulley 9. The active lead of this conveyer belt or apron is dished transversely in a manner well understood by those skilled in the art by employing a train of idle rollers 14, each roller having a concave periphery. From this description it will be understood that one of the endless conveyers, such as the apron or belt 16, has its bight at one end portion fitted snugly to the pulley 9 in a way to be driven or pro-

pelled thereby; but I would have it understood that the conveyer apron or belt may be driven in any other way preferred by a skilled constructor.

5 The idle pulleys 10 are of larger diameter than the fast pulley 9, and said idle members are engaged by an endless bucket conveyer, which in the present instance is shown in the form of an elevator adapted to take a load of
10 loose material from a point below the shaft 7, whereby the bucket conveyer operates to transport the material in an upward direction and to deposit the load of its buckets on the upper active lead of the conveyer belt or apron 16. This bucket conveyer may consist of suitable sprocket-chains or an endless belt equipped with a plurality of buckets, which are attached to said chains or belts in a way to have a limited turning movement when passing around the pulleys, said
20 buckets being disposed in overlapping relation in order that they may telescope when moving in a straight path. In the embodiment of the invention herein disclosed the bucket conveyer is equipped with an endless belt or apron 17 and a plurality of buckets 18, the detailed construction of which will hereinafter appear. The belt or apron 17 of this bucket conveyer fits snugly to the idle
30 pulleys 10 on the shaft 7, and the buckets 18 lie within or between the side edges of the endless apron 17. Furthermore, this apron or belt passes around a driving-pulley 19 and around other idle pulleys 20 21. The idle pulley 20 is carried by a shaft 22, journaled in suitable bearings on the beams 23, provided at the upper part of the frame, said pulley 20 being disposed in substantially the same horizontal plane as the driving-pulley
40 19. The other idle pulley 21 for the bucket conveyer is carried by a shaft 24, journaled in suitable bearings at the lower part or foot of the frame and adjacent to the loading-point, (indicated by the arrow X in Fig. 1.) The driving-pulley 19 is mounted on a shaft 25, journaled in suitable bearings 26, the latter being secured to a slidable frame 27 under the control of an adjusting-screw 28, said frame and screw being mounted on the beams
50 23 of the framework in a way to adjust the pulley 19 relative to the pulley 20, and thereby take up any slack in the belt of the bucket conveyer.

One portion or lead of the endless bucket conveyer travels in an irregular course from the loading-point toward the driving-point, as will be seen by reference to Fig. 1, wherein the series of loaded buckets move in an upward path from the pulley 21 over the idle
60 members 10 of the compound pulley and thence to the driving-pulley 19. The series of buckets after passing the pulley 21 travel in a substantially vertical path to the idle pulleys 10, and thereafter said series of buckets move in nearly a horizontal path adjacent to the upper active lead of the conveyer-apron 16; but at this point the series of buck-

ets moves in a straight path, which diverges somewhat from said active lead of the conveyer-apron 16, (see Figs. 1 and 3,) thus giving the series of buckets the necessary clearance relative to the conveyer-apron. 70

In my improved hoisting and conveying system the endless apron 16 and the endless bucket conveyer preferably travel at the same speed; but to enable the bucket conveyer to pass around the pulleys which drive the conveyer-apron and to bring the buckets into close relation to the conveyer-apron I employ the pulleys 10, of larger diameter than
80 the pulley 9, and this also enables me to make the driving-pulley 19 for the bucket conveyer of the same diameter as the pulleys 10, whereby the pulleys 10 and 19 of large diameter may advantageously be employed for the buckets to travel easily and freely around the same. In view of the fact that the driving-pulley 19 and the idle pulleys 10 exceed the diameter of the fast pulley 9, which drives the conveyer-apron, and of the further
90 fact that it is desired to have the conveyer-apron and the bucket conveyer travel at the same speed I find it necessary to employ gearing between the shaft 7 of the pulleys 9 10 and the shaft 25 of the bucket-conveyer driving-pulley, which will compensate for this variation in the diameter of the pulleys 10 19 relative to the pulley 9. The shaft 7 is provided with a sprocket-gear 29, which is engaged by an endless sprocket-chain 30, that
100 fits a sprocket-gear 31, secured fast to an end portion of the shaft 25. These sprocket-gears are of such relative diameters as to drive the large pulley 19 of the bucket conveyer at the same peripheral speed as the smaller fast pulley 9, which impels the conveyer-apron 16, and by giving the desired proportions to the parts of the train of gearing I am able to make the pulleys 9 and 19 drive the conveyer-apron 16 and the endless
110 bucket conveyer at the same lineal speed.

Each bucket 18 has its bottom and back made in a single piece of metal, which is bent to the shape shown more particularly by Fig. 3, the bottom being indicated at 32 and the back at 33, and said bucket is furthermore provided with side plates 34, the latter being fastened to the bottom and the back by flanging and riveting the parts in any approved way. The bottom 32 is provided at
120 its front edge with an inclined lip 35, while the back is curved at the line where it stands off from the bottom, said back being inclined relative to the bottom and disposed at an angle thereto. This construction allows the bucket to be quickly and cheaply manufactured, said bucket having an open side and end, while the bottom 32 closes the opposite side and the back 33 closes the rear end. The entire bucket is fastened at a single transverse line to the belt or apron 17 of the bucket conveyer by a series of rivets 36, (see Figs. 3 and 4,) said rivets being located about midway between the open front end
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and the closed rear end thereof. The side plates 34 of each bucket are inclined slightly and are projected at their front ends beyond the lip 35 of the bucket-bottom, and this construction gives to the bucket a longitudinal tapering form, whereby the contracted front end or the side plates 34 of one bucket are adapted to overlap the corresponding side plates at the rear wide end of a preceding bucket. The lip 35 prevents premature discharge of the load by centrifugal action when the bucket conveyer moves at high speed.

The tapered form of the buckets and the overlapping disposition thereof are shown more clearly by Fig. 5 and indicated by Fig. 3. When the series of buckets travel in a straight path, either horizontal, vertical, or inclined, the side plates of the buckets have the described overlapping relation, as indicated by the drawings; but as the bucket conveyer passes around the pulleys they are free to take different angular positions, substantially as shown by Figs. 1 and 3, thus permitting the buckets to pass easily and freely around said pulleys. This advantage is secured by fastening each row of buckets by a single rivet or line of rivets at or near the middle portion thereof to the belt or chains of the bucket conveyer. I find it desirable, however, to provide means which operate to steady the buckets and hold them in their proper relative positions, and to this end I employ pliable connections between the adjacent ends of the buckets, each connection extending from the open front end of one bucket to the closed rear end of a preceding bucket. In Figs. 3 and 5 of the drawings these pliable connections are represented in the form of spring-straps 37, each strap being preferably curved under normal conditions and having one end fastened, as by a rivet 38, to the outer edge of the back 33, while its other end is riveted, as at 39, to the inclined lip of a following bucket. The spring-straps are disposed in the plane of the longitudinal axis of the buckets, so as to be out of the way, and they take the curved or bowed form shown by Fig. 3 as the buckets travel in a straight path; but when the buckets turn on the rivet or row of rivets in passing around the pulley these straps are strained, substantially as shown at the right in Fig. 3. The buckets are of less width than the apron 17 of the endless bucket conveyer, and as they approach the pulleys on the shaft 7 said buckets pass between the idle pulleys 10 and fit snugly to the bight of the apron 16 and the surface of the fast pulley 9, whereby the open sides and front ends of the buckets are closed by the pulley 9 and the apron 16 in a way to retain the load of material in said buckets as they pass over the pulleys on the shaft 7. The series of buckets adjacent to the upper lead of the conveyer-apron 16 are adapted to discharge or dump their loads upon said conveyer-apron without shock, and the load is

adapted to be automatically and continuously transferred from the bucket conveyer to the conveyer apron or belt.

In the operation of the improved system power is applied to the shaft 7, which drives the pulley 9, thereby impelling the conveyer-apron and the bucket conveyer at equal speeds. The material to be transported is delivered at the foot of the bucket conveyer in a way for the buckets to take up the load, and the movement of this conveyer causes the apron 17 to pass around the pulleys 10, while the buckets travel between said pulley members in a way to present their open sides to the conveyer 16. This conveyer and the pulley 9 close the open sides and ends of the buckets as they travel around the pulleys 9 and 10. The material is discharged from the buckets without shock to the conveyer 16 by the inversion of the series of buckets over the active lead of the apron 16, which conveyer carries the load in a preferably and approximately horizontal path to the point of discharge. The endless buckets pass around the pulleys 19, 20, and 21, and they are thus moved from the point of discharge back to the loading-point.

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

1. A hoisting and conveying system having two conveyers arranged for certain leads thereof to run in proximity to each other, one of said conveyers being a loading-conveyer and delivering its load from the under side of its lower lead, and the other conveyer being arranged for an end portion thereof to receive the load so discharged from the loading-conveyer.

2. A hoisting and conveying system having two conveyers traveling at equal speeds, one of said conveyers being a bucket conveyer, and the other conveyer having one of its leads arranged to close certain of the buckets preliminary to the discharge of the load therefrom.

3. A hoisting and conveying system comprising two endless conveyers, and a series of pulleys turning on coincident axes around both of which said conveyers are adapted to travel, a portion of one conveyer overhanging and occupying a diverging relation to a lead of the other conveyer.

4. A hoisting and conveying system comprising a conveyer, a bucket conveyer arranged for a series of buckets to move in a slightly-divergent path relative to said conveyer, and pulleys on a single shaft, one of said pulleys serving to drive the first conveyer and other pulleys supporting a part of the bucket conveyer.

5. A hoisting and conveying system comprising two conveyers traveling at equal speeds, and a pulley mounted on a common shaft to both conveyers, the parts being relatively arranged for a lead of one conveyer to move in a path substantially parallel to an

upper lead of the other conveyer, whereby the material may be discharged from one conveyer to the other without shock.

6. A hoisting and conveying system comprising pulleys mounted on a common shaft, a conveyer-apron fitted to and driven by one of said pulleys, and a bucket conveyer also fitted to said pulley which is arranged to close said buckets as they travel around the pulley.

7. A hoisting and conveying system comprising two conveyers traveling at equal speeds, one of said conveyers being an apron or belt, and the other conveyer equipped with a series of buckets, and pulleys mounted on a common shaft to both conveyers, one of said pulleys being arranged to drive the conveyer-apron, and the other pulley being operatively fitted to the bucket conveyer; the bight and pulley of the conveyer-apron being disposed relatively to the bucket conveyer to close the open sides of the buckets as they pass around the pulley.

8. A hoisting and conveying system comprising driving and idler pulleys on a single shaft, a conveyer-apron fitted to the driving-pulley, and an endless bucket conveyer operatively fitted to the idler pulley and having its buckets arranged to pass between said idler pulleys and to overhang the conveyer-apron.

9. A hoisting and conveying system comprising driving and idler pulleys on a common shaft, a conveyer-apron fitted to said driving-pulley, a bucket conveyer having a pulley, an endless bucket conveyer fitted to the idler pulley and to said pulley of the conveyer driving-shaft, and gearing between the common pulley-shaft and said driving-shaft to propel the latter and drive the bucket conveyer at a speed equal to the conveyer-apron.

10. A hoisting and conveying system comprising a driving-pulley, idler pulleys on the same shaft with the driving-pulley and of larger diameter than said driving-pulley, a bucket-conveyer shaft having a pulley of corresponding diameter to the idler pulleys, gearing between the common pulley-shaft and the bucket-conveyer shaft, a conveyer-apron fitted to the driving-pulley, and a bucket conveyer operatively disposed to the idler-pulley members and to the pulley on the conveyer driving-shaft.

11. A bucket conveyer having a series of buckets each fastened upon a single transverse line to a suitable conveyer member, and connections between the unconfined end portions of said buckets of the series for retaining them in proper relation.

12. A bucket conveyer comprising a movable member, and a series of buckets individually fastened to said movable member by a single row of fasteners located at or about the middle of said buckets, and a pliable connection between the unconfined end portions of the adjacent buckets of each pair.

13. A bucket conveyer having a suitable carrying member, and a series of buckets

fastened individually to said carrying member, the closed end of one bucket being connected with the open end of a following bucket by an intermediate connection.

14. An endless bucket conveyer having a series of buckets, and spring connections between adjacent buckets of the series.

15. An endless bucket conveyer having a series of individually-supported buckets, and flexible straps each having one end fastened to one bucket and its other end fastened to a succeeding bucket.

16. A conveying system comprising two conveyers arranged for certain leads thereof to run in overhanging relation and approximately in the same direction, one conveyer discharging its load directly to the other conveyer, and the receiving-conveyer being arranged to partially close the loading-conveyer.

17. A conveying system comprising two conveyers arranged for certain leads thereof to run in adjacent paths, one conveyer being a bucket conveyer and overhanging the other conveyer, certain of the buckets of one conveyer being closed by a lead of the other conveyer.

18. A conveying system comprising two conveyers movable at equal speeds and arranged for certain leads thereof to run in paths adjacent to one another, one of said conveyers being a bucket conveyer and the other conveyer having a lead disposed in such relation to the buckets as to close certain of them prior to the transference of the load.

19. A conveying system comprising two conveyers arranged for certain leads thereof to run in adjacent paths, one conveyer being movable in a divergent path relative to the other conveyer.

20. A conveying system comprising two conveyers arranged for certain leads thereof to run in paths in close proximity to each other and in the same general direction, one conveyer being a bucket-loading conveyer and the other an off-bearing conveyer, and means for preventing premature discharge of the load from the bucket conveyer as it moves adjacent to the off-bearing conveyer.

21. A conveying system comprising two conveyers arranged for certain leads thereof to run in paths in close proximity to each other and in the same general direction, one conveyer being a bucket-loading conveyer and the other an off-bearing conveyer, and a pulley around which the off-bearing conveyer passes, said pulley and the conveyer being effective in closing the buckets as they approach the unloading-point relative to the off-bearing conveyer.

22. An endless bucket conveyer having a series of buckets each fastened on a single transverse line at a point intermediate of the length thereof to a carrying member of the conveyer, each bucket having a closed rear end and an open front end, and a connection between the closed and open ends of adjacent

buckets, said connections being independent of the carrying conveyer members.

23. A bucket conveyer having a series of tapered overlapping buckets, each having a closed rear end and an open front end, each bucket being also provided at said open front end with an inwardly-extending lip that is disposed at an angle to the bucket-bottom.

24. The combination of a conveyer having a series of buckets on one side thereof, a pulley engaging with that side or face of the conveyer having said buckets, and another conveyer adjacent to one lead of said bucket conveyer.

25. The combination of a conveyer having on one side thereof a series of buckets of less width than the carrying conveyer member, pulleys engaging with the side of the conveyer having said buckets and at the sides of the latter, and another conveyer in coöperative relation to the bucket conveyer.

26. An endless bucket conveyer comprising a suitable carrying member, and a series of buckets attached individually thereto, each bucket having an open side and front end, and also provided with an inclined lip at the open front end.

27. The combination of a shaft having idle and driving pulleys, a conveyer-apron fitted to the driving-pulley, and a bucket conveyer having a carrying member, and a series of buckets attached to said carrying member, said buckets being of less width than the carrying member and adapted to pass between the idle pulleys.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEONARD S. AUSTIN.

Witnesses:

JNO. M. RITTER,
H. F. BERNHARD.