No. 874,365. PATENTED DEC. 17, 1907.

S. F. JOOR.

CONVEYER.

APPLICATION FILED MAR. 8, 1906.

3 SHEETS—SHEET 1.

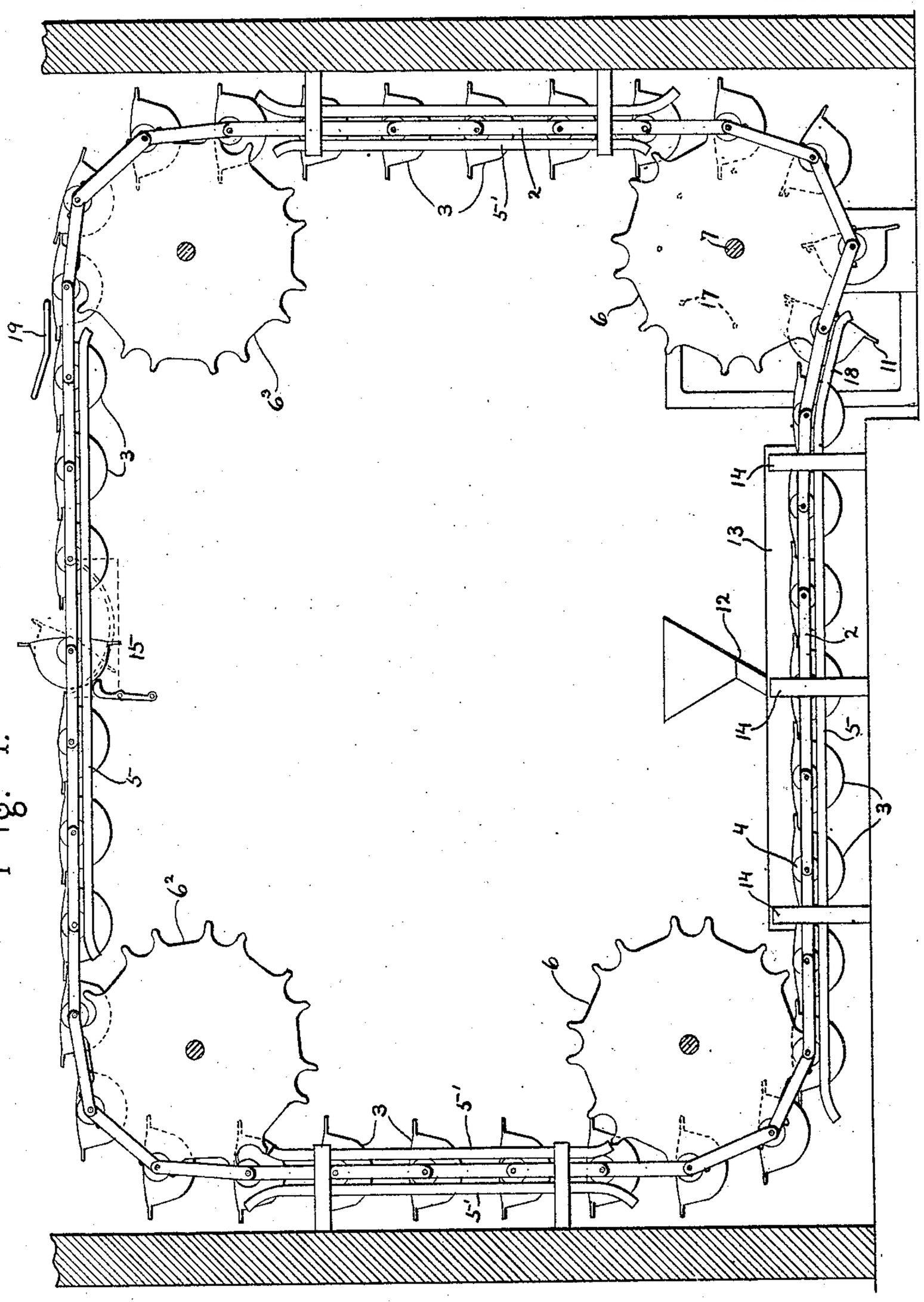


Fig. 1.

Witnesses

Stuart Hilder.
N. Curtis Lanmark

Inventor

Samuel F. Joor

By H. H. Bliss

his Attorney

No. 874,365. PATENTED DEC. 17, 1907.

S. F. JOOR.

CONVEYER.

APPLICATION FILED MAR. 8, 1906.

3 SHEETS—SHEET 2.

Fig. 2.

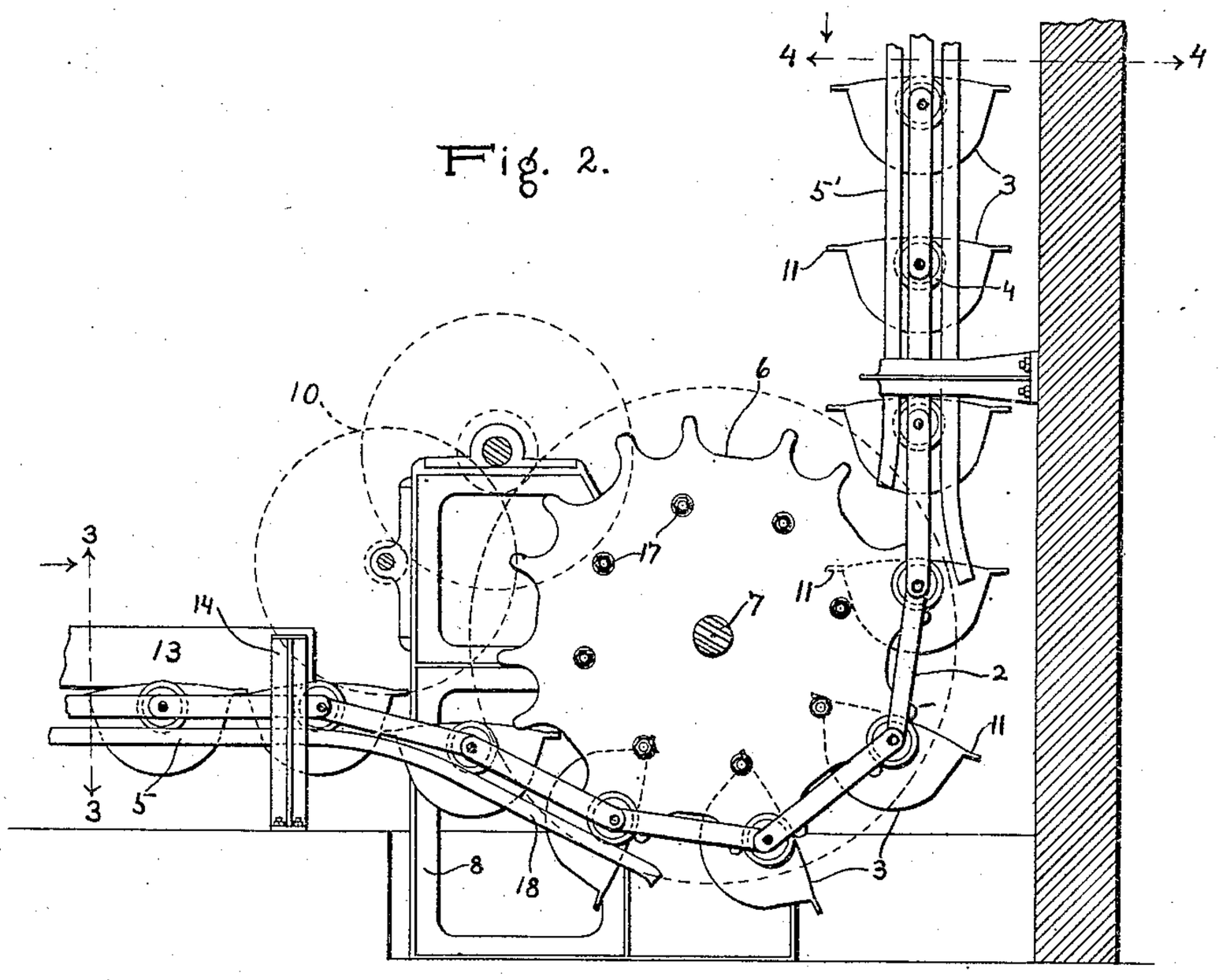
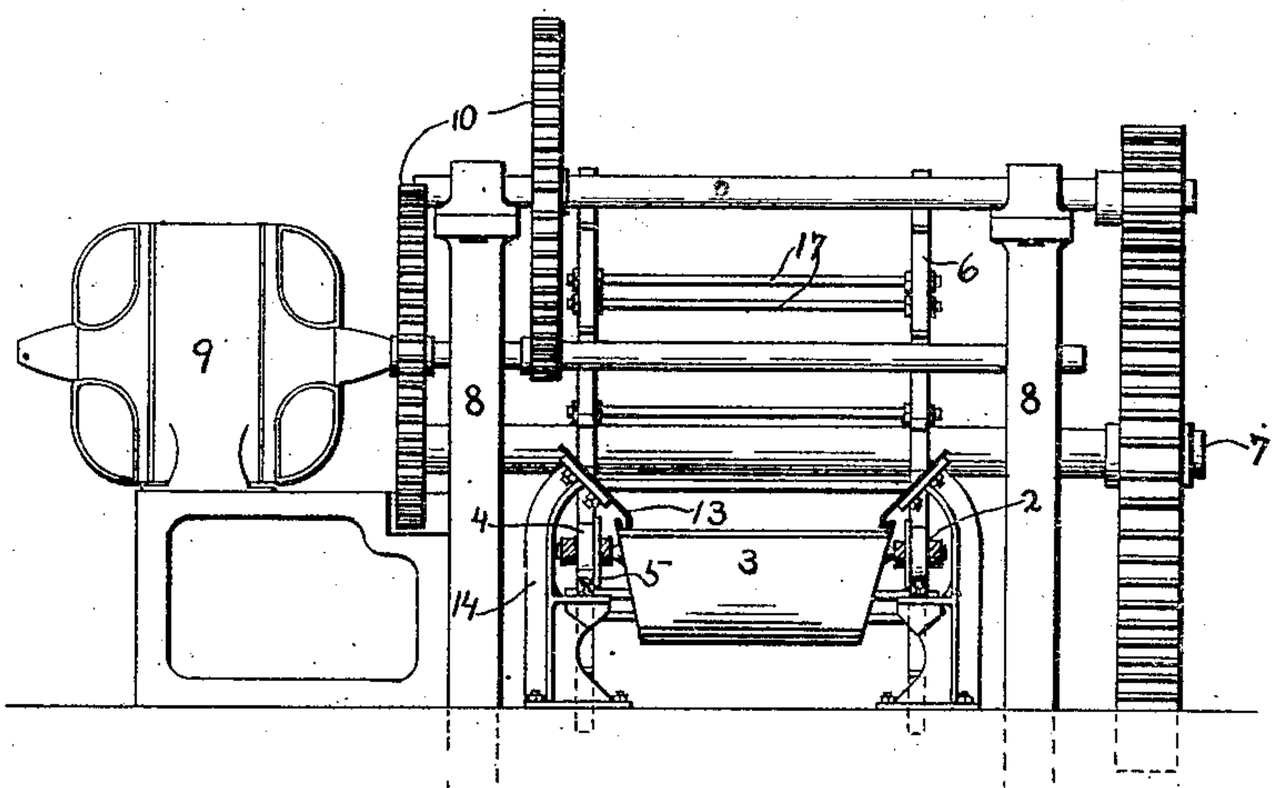


Fig. 3.



Witnesses

Stuart Hilder.
N. Curtis Lammond

Inventor

Samuel F. Joor

By

H. H. Bliss

His Attorney

No. 874,365. PATENTED DEC. 17, 1907.

S. F. JOOR.

CONVEYER.

APPLICATION FILED MAR. 8, 1906.

3 SHEETS—SHEET 3.

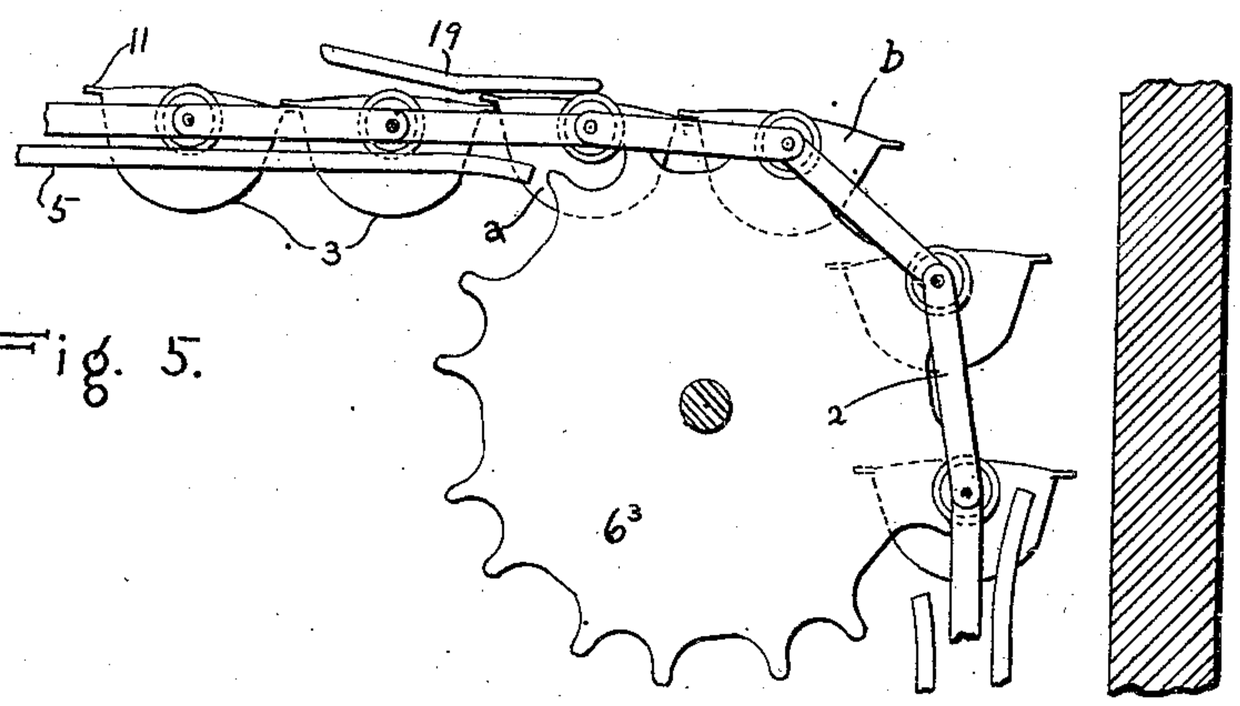


Fig. 5.

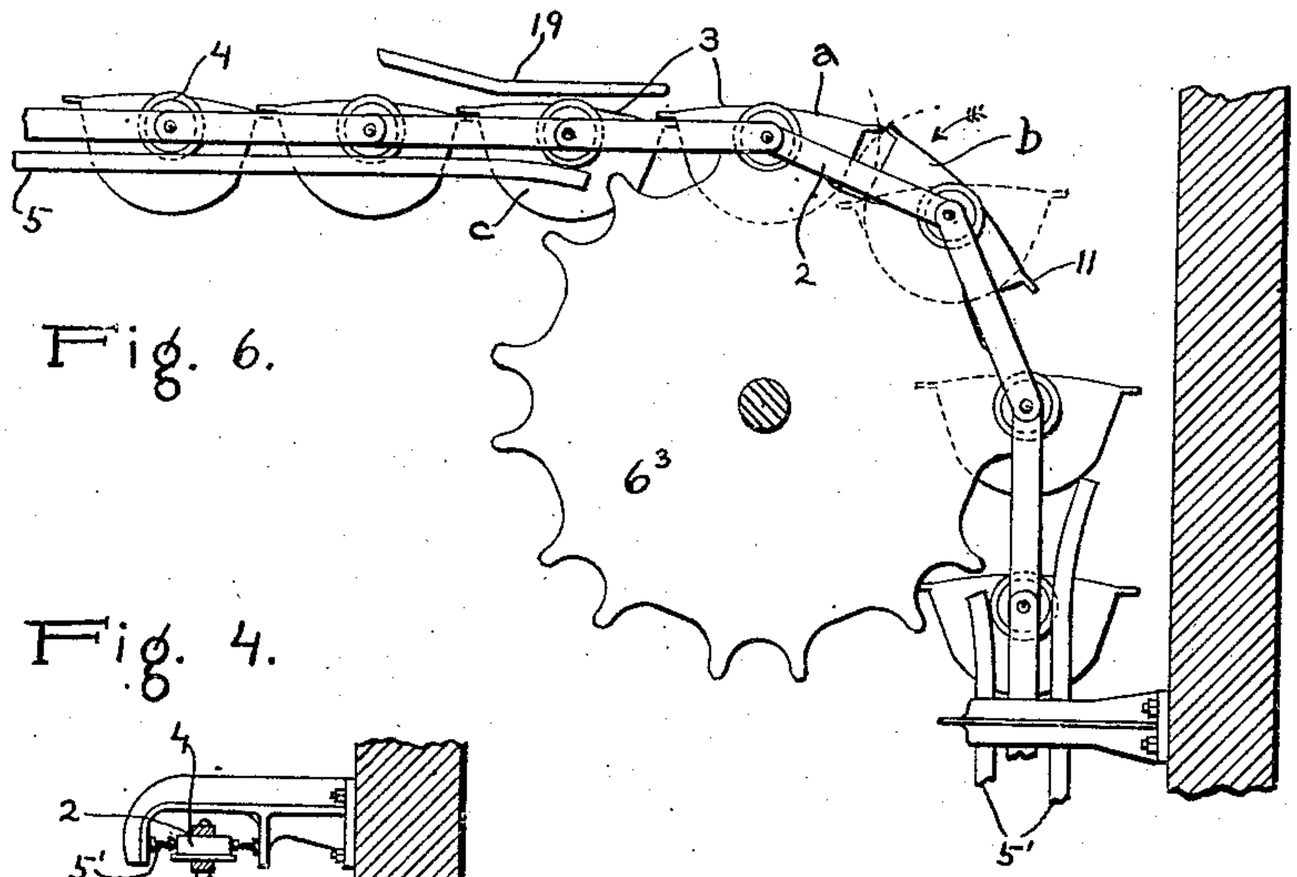
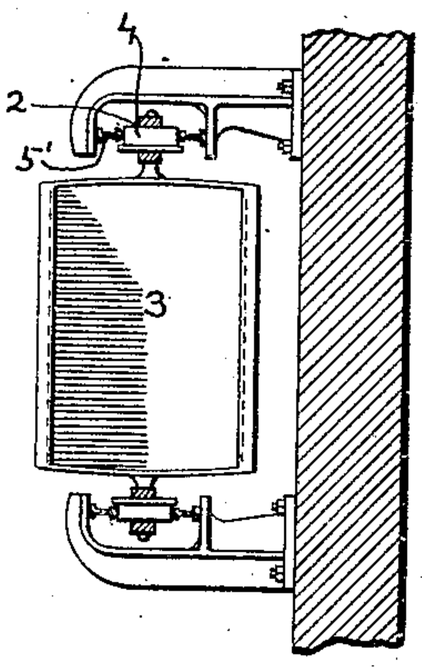


Fig. 6.

Fig. 4.

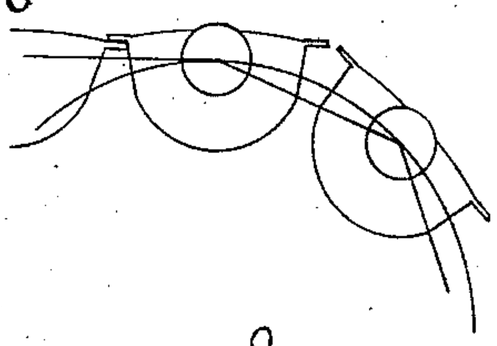


Witnesses

Stuart Hilder

N. Curtis Lammond

Fig. 7.



Inventor

Samuel F. Joor

By H. H. Bliss

his Attorney

UNITED STATES PATENT OFFICE.

SAMUEL F. JOOR, OF MORGAN PARK, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE JEFFREY MANUFACTURING COMPANY, A CORPORATION OF OHIO.

CONVEYER.

No. 874,365. Specification of Letters Patent. Patented Dec. 17, 1907.

Application filed March 8, 1906. Serial No. 304,846.

To all whom it may concern:

Be it known that I, SAMUEL F. JOOR, a citizen of the United States, residing at Morgan Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Conveyers, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to that class of conveyers in which a series of buckets or receptacles are pivotally supported by an endless chain or conveying element, devices commonly known in the art as pivoted bucket conveyers. The advantages of conveyers of this kind, which have great carrying capacity, are well recognized. It is a common practice to load the buckets or carriers on the lower horizontal run of the conveyer, then elevate them and finally cause them to discharge while moving along an upper substantially horizontal run, and many inventions have been made and suggested for enabling the loading of a conveyer thus constructed and arranged while in continuous motion. One expedient adopted is to provide the adjacent edges of the buckets with lips or projecting flanges adapted to overhang the edges of the next adjacent bucket or buckets in order to close the open spaces that would otherwise exist between the buckets and through which the material from a constantly delivering spout would pass were not some provision such as that referred to made to close these open spaces. Great difficulty has heretofore, however, been experienced in operating conveyers of this character, owing to the fact that the overhanging lips of the buckets tend to cause the buckets to interfere with each other as they pass from one run to another in the course of the circuit of the conveyer; and to prevent this interference complicated devices have been suggested and devised to tilt the buckets at various points in the course of their travel, cams, rails, tracks and other similar devices external to the conveyer having been used for this purpose. My invention differs from such earlier devices in that the means for preventing the interference of the buckets one with another as they change their direction or course, are contained entirely within the conveyer itself, thus enabling me to dispense with the external cams, tracks and the like, which have heretofore been required.

In the accompanying drawings, Figure 1 is a side view representing a conveyer embodying my improvements, many of the details of construction which do not relate to this present invention being omitted. Fig. 2 is a view drawn to a larger scale illustrating the means employed for causing the buckets to assume the proper relation to each other in passing from a descending vertical run to the lower horizontal run. Fig. 3 is a section taken on the line 3—3 of Fig. 2, a driving motor for the conveyer being illustrated. Fig. 4 is a sectional view taken on the line 4—4, of Fig. 2. Figs. 5 and 6 are side views illustrating parts of the apparatus at the place where the turn is made from the upper to the descending vertical run, Fig. 6 showing the parts in position a little in advance of those represented in Fig. 5. Fig. 7 is a diagram illustrating a hypothetical position of parts, to be described.

The conveyer comprises a pair of endless chains 2, 2, between which are pivotally supported the swinging buckets 3. These parts in their general features of construction may be of any usual or preferred type. The chains are preferably provided with rollers 4, adapted to run upon tracks 5, suitably arranged along the course of the conveyer. The tracks along the lower and upper horizontal runs support the chains, the buckets, and the loads which the latter may carry, while the tracks 5′ adjacent to the vertical runs of the conveyer are more for the purpose of guiding and preventing lateral swaying of the conveyer, for which purpose they may be arranged in pairs, one on each side of the path of the rollers 4. At the places where the conveyer changes its direction suitable guiding and supporting means are employed. I prefer for this purpose to use sprocket wheels 6, with which the chains of the conveyer are adapted to engage. To one set of such sprocket wheels the motor may be connected, as represented in Fig. 3, where the sprocket wheels that turn the conveyer from the downward moving vertical run to the lower horizontal run is shown. The two sprocket wheels 6, one for each chain of the conveyer, are mounted upon a shaft 7 supported by a suitable framework 8. A motor 9 is connected through a train of gearing, indicated at 10, with the shaft 7.

The buckets are provided, preferably at each edge, with outwardly extending lips or flanges 11, arranged to overlap, and thus

bridge or close the spaces between adjacent buckets when the conveyer is moved horizontally. The conveyer is arranged to be loaded on the lower horizontal run where one or more feed spouts 12 are arranged. Through these the material that is delivered to the conveyer buckets may flow continuously or so long as the conveyer is in operation, this being rendered feasible by reason of the overlapping edges of the buckets. Adjacent to where the feeding takes place, I prefer to arrange inclined stationary shields or guard plates 13, see Figs. 2 and 3, suitably supported by brackets 14, and arranged to overlie the side walls or edges of the buckets and thus direct the material to the latter, and at the same time to prevent spilling. The material delivered to the buckets along the lower run is conveyed to the upper horizontal run, where provision is made for discharging, an automatic bucket-tipping device of any suitable construction being located at 15.

It will be seen by reference to Figs. 1 and 2 that the rear edge of each bucket overlies the front edge of its neighbor next behind, so that when the buckets come to the turning wheels 6′, where the change from the lower horizontal to the upward moving vertical run takes place, the buckets separate easily and without interference. When they reach the turning wheels 6^2, and the change is made from the upward moving vertical to the upper horizontal run, the buckets naturally come into proper relations, the rear edge of the forward bucket overlying the front edge of its neighbor to the rear, this position being desirable in order to permit the easy tipping of the buckets without interference one with the other.

The passage of the bucket from the upper horizontal to the descending vertical run presents some difficulties, and my invention relates, in part, to means for accomplishing this change without the buckets unduly interfering with each other, or being tilted much out of their normal positions. On reaching the wheel 6^3 the buckets tend by gravity to maintain their horizontal position; but, as the forward end of one bucket supports the rear end or edge of the bucket in advance, the latter—the advance bucket—is not free to follow this tendency as it makes the turn. In consequence the buckets take a position approaching tangency to the curve of the wheel. But if the curve be sharp enough the chain link forms a chord of the curve which is shorter than the sum of the other two sides of the triangle formed by it and the tops of the two buckets that are tangent to the curve, and this causes a clearance or separation between the buckets to take place before the latter reach their tangent positions. This is represented by the hypothetical case represented in the diagram, Fig. 7. As gravity acts on the free or advance bucket this position never really occurs, because as soon as the bucket in advance is clear from the one to the rear it rights itself, coming to a horizontal position.

As the buckets swing freely on their axes, and it is desirable that only one bucket at a time should be tilted by reason of the chain taking the curve where the turn is made, I provide a stop or a holding means 19 arranged to prevent the tilting of the buckets as they come to the turn from the upper horizontal to the descending vertical run, and as the chain begins to make the turn. In Fig. 5 the bucket *a* is still on the horizontal run, though just at the end thereof, while the bucket *b* has begun to descend, following the turning wheel. As stated, the tendency of the bucket *b* is to remain horizontal, and in so doing its rear lip 11 presses down upon the forward lip of the bucket *a*. This would result in a tilting or inclination of the latter but for the fact that the guide or stop 19 prevents it, holding the bucket *a* in approximately horizontal position so long as it is in engagement therewith. In Fig. 6 the parts of the apparatus have advanced a little beyond what is shown in Fig. 5. Passing from the position represented in Fig. 5 to that in Fig. 6 the bucket *b* has followed the turning wheel and has been more and more forced out of a horizontal position, while the bucket *a* has been held substantially horizontal by the stop or guide 19. Just before the bucket *a* escapes from the guide the adjacent lips of the buckets *a*, *b* clear each other, and the forward bucket *b* immediately assumes its normal position, as indicated by the dotted lines in Fig. 6. At about the same instant the bucket *a* clears the stop or guide 19 and takes the place, in operation, just described for bucket *b;* the bucket *c*, in turn, coming under the guide and taking the position just occupied by bucket *a*.

It is important that the overlapping parts of the buckets should assume the positions indicated in Figs. 1 and 2 when moving along the lower run in order that they may separate without interference at the turning wheels 6′ and provision is therefore made to insure the buckets assuming the positions indicated in Fig. 2. The lapping of the edges of the buckets would be wrong if they were allowed to freely swing and take the positions they naturally would in moving from the down vertical to the lower horizontal run, that is to say, freely swinging buckets provided with overlapping lips along their adjacent edges if left to themselves would, in making the turn from the down-moving vertical to the lower horizontal run, come together on the latter run with the forward lip of a bucket to the rear overlying the edge or lip of the bucket next in ad-

vance, which is undesirable, as it would cause interference when the next turn is made and when the buckets are loaded. I have therefore devised means for causing the buckets on entering the lower horizontal run to assume the proper relations to each other and have made these means part of the conveyer itself.

17, 17 indicate cross-rods extending between the two sprocket wheels 6, 6, that are mounted upon the shaft 7. These rods are so disposed that they are engaged by the buckets as the latter pass the turning wheels 6, as clearly indicated in Fig. 2, where several positions of the buckets are shown. I prefer that only the lips 11 of the buckets should engage with the rods. As will be seen by reference to this Fig. 2, the engagement of the buckets with the rods causes the inner portions of the former, that is the portions toward the axis of the wheel 6, to be tilted upward and out of the way of the rear portions of the buckets next in advance as they leave the wheel 6 and enter upon the lower run. In order to insure that the front edge or lip of a bucket shall, as it disengages the rod 17 with which it was in engagement and comes to its normal horizontal position, swing below the edge or lip of the bucket in advance, and not overlap the same, I incline upward for a short distance the first part of the lower run, as indicated at 18. This insures that when the buckets come together on the lower horizontal run they shall assume the positions indicated in Fig. 2. It will thus be seen that by a very simple expedient I am enabled to cause the buckets to assume the proper relations to each other, and that I am enabled to dispense with all stationary cams, tracks, and the like for tipping the buckets in the course of their travel, the necessary movements being given to the buckets by the moving parts of the conveyer itself.

What I claim is:—

1. In an endless conveyer, the combination with the chains, the freely-swinging buckets pivoted therein, the edges of adjacent buckets being arranged to overlap, and the turning wheels with which the chains engage where the direction of movement of the conveyer changes, of means carried by such turning wheels for preventing the buckets from interfering with each other and shifting the lap of the edges thereof as they move from one run to another, substantially as set forth.

2. In an endless swinging bucket conveyer, the combination of chains, buckets pivotally supported therein and provided with overlapping edges, means for loading the buckets arranged along one horizontal run of the conveyer, means for discharging the buckets arranged along another horizontal run, means for changing the direction of the conveyer from one run to the next, and means movable in a direction substantially parallel with that of the conveyer as it changes from one run to the next with which the buckets engage, such means being arranged to prevent the buckets from interfering with each other, and changing or shifting the lap of the edges thereof as the buckets pass such means, substantially as set forth.

3. In an endless swinging bucket conveyer, the combination of endless chains, buckets pivotally supported therein and having overlapping edges, a device for turning or changing the direction of the conveyer where it passes from the descending vertical to the lower horizontal run, and means movable in a direction substantially parallel with that followed by the conveyer in passing the said turning device arranged to engage the buckets and separate them, whereby as they pass said turning device they do not interfere with each other, substantially as set forth.

In an endless swinging bucket conveyer, the combination of the endless chains, buckets pivotally supported therein and having overlapping edges, a track by which the conveyer is supported when moving along the lower horizontal run, the forward end of the track being inclined downward, a device for turning or changing the direction of the conveyer before it enters said lower horizontal run, and means movable in a path substantially parallel with that followed by the conveyer in passing the said turning device with which the buckets engage arranged to prevent them from interfering with each other before they engage with the inclined track portion of the lower horizontal run, substantially as set forth.

5. In a conveyer, the combination of endless chains, swinging buckets freely pivoted therein and having overlapping edges, a wheel with which the conveyer engages where it turns from one run to another, cross-bars 17 carried by the wheel and arranged to be engaged by the buckets as the conveyer moves past said wheel, substantially as set forth.

6. In a conveyer, the combination of endless chains, swinging buckets freely pivoted therein, a track for supporting the conveyer along the lower horizontal run thereof, a wheel for guiding the conveyer from the descending vertical to the lower horizontal run, the end of said track along the horizontal run nearest the said wheel being inclined upward, and bars 17 carried by the wheel with which the swinging buckets engage as they move past the wheel, said bars being arranged to prevent the buckets from interfering with each other as they pass and leave the wheel and being arranged also to shift the lap of the overhanging edges of the buckets, substantially as set forth.

7. In a conveyer, the combination of endless chains, swinging buckets freely pivoted

therein and having overlapping edges, means for changing the direction of the conveyer from one run thereof to another, and rotary means arranged adjacent to the point where the conveyer changes from the down-moving vertical to the lower horizontal run for preventing the buckets from interfering with each other and shifting the lap of the edges thereof, substantially as set forth.

8. In a conveyer, the combination with endless chains and means for driving them, of a series of buckets pivotally mounted in the chains, the buckets having overlapping lips or edges, and a guide or stop located near the turn from the upper horizontal to the vertical descending run arranged to be engaged by the rear edge of each bucket to prevent tilting thereof, and thereby cause the next preceding bucket to slidingly clear itself therefrom as it is tilted in making the turn from the said horizontal to the vertical run, substantially as set forth.

9. In an endless swinging bucket conveyer, the combination of chains, freely swinging buckets pivotally supported thereon and provided with overlapping edges, means for driving the conveyer, means for loading the conveyer while it is in motion, means for discharging the conveyer, a turning wheel with which the chains engage for changing the direction of the conveyer before it enters the lower horizontal run, and means adjacent to the said turning device and substantially concentric therewith with which the buckets engage arranged to prevent them from interfering with each other before they enter upon the lower horizontal run, substantially as set forth.

10. In an endless swinging bucket conveyer, the combination of a pair of chains, buckets supported by the chains and free to swing between them, the buckets having overlapping lips or edges, the conveyer having a lower horizontal run and the buckets while traveling along such run being free to swing upon their pivotal connections with the chains except for their engagement one with the other through the overlapping lips or edges, means for holding the conveyer while in motion arranged adjacent to the said lower horizontal run, a turning wheel for changing the direction of the conveyer as it approaches the said horizontal run, and means carried by the turning wheel for causing the lip of the bucket in advance to overlie the lip of the following bucket as it enters the horizontal run, substantially as set forth.

In testimony whereof I affix my signature, in presence of two witnesses.

SAMUEL F. JOOR.

Witnesses:
FLOYD S. YOUTSEY,
JAS. L. RIPPEY, Jr.