

No. 725,573.

PATENTED APR. 14, 1903.

A. L. LE GRAND.
BUCKET CONVEYER.

APPLICATION FILED MAY 8, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.

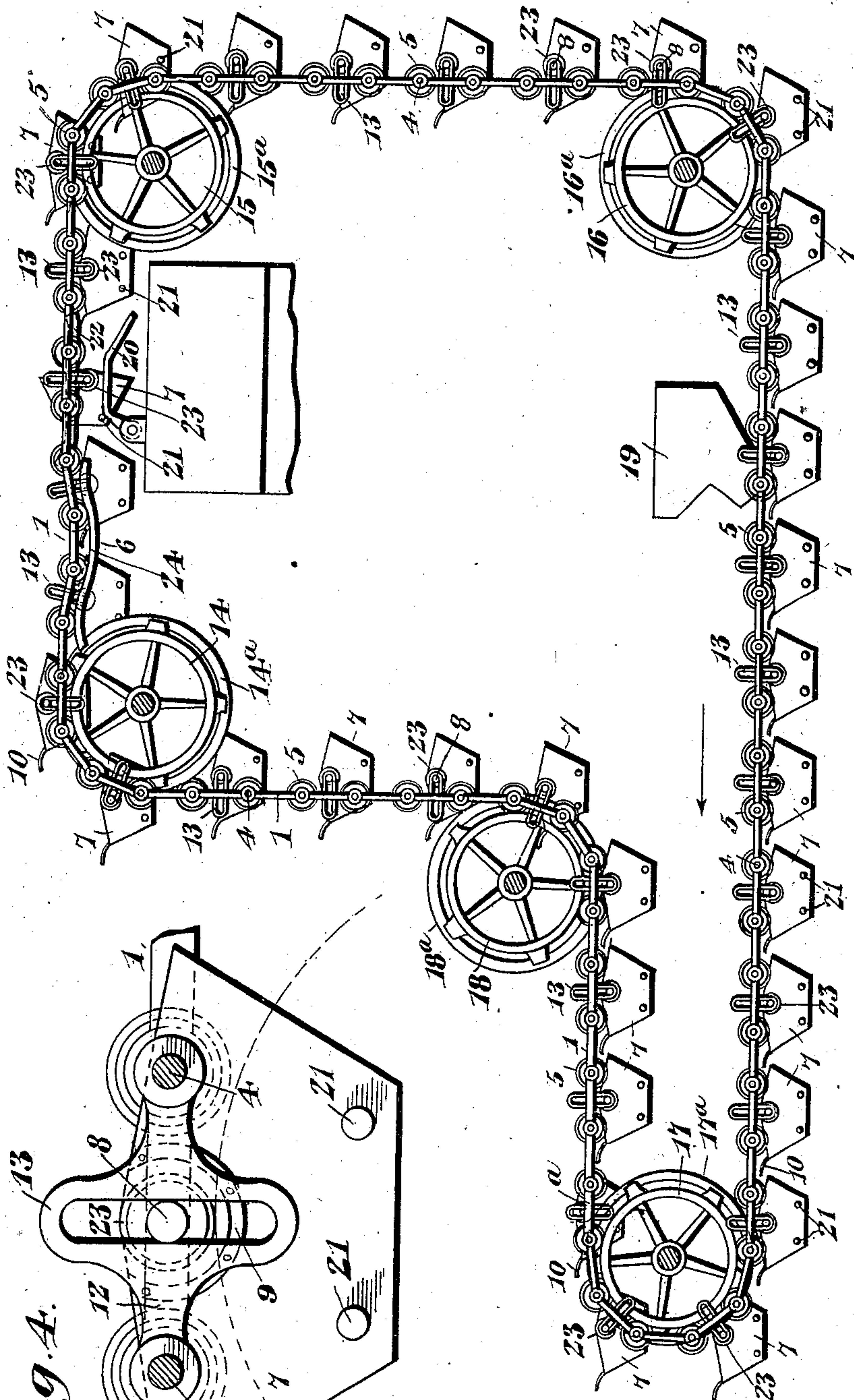
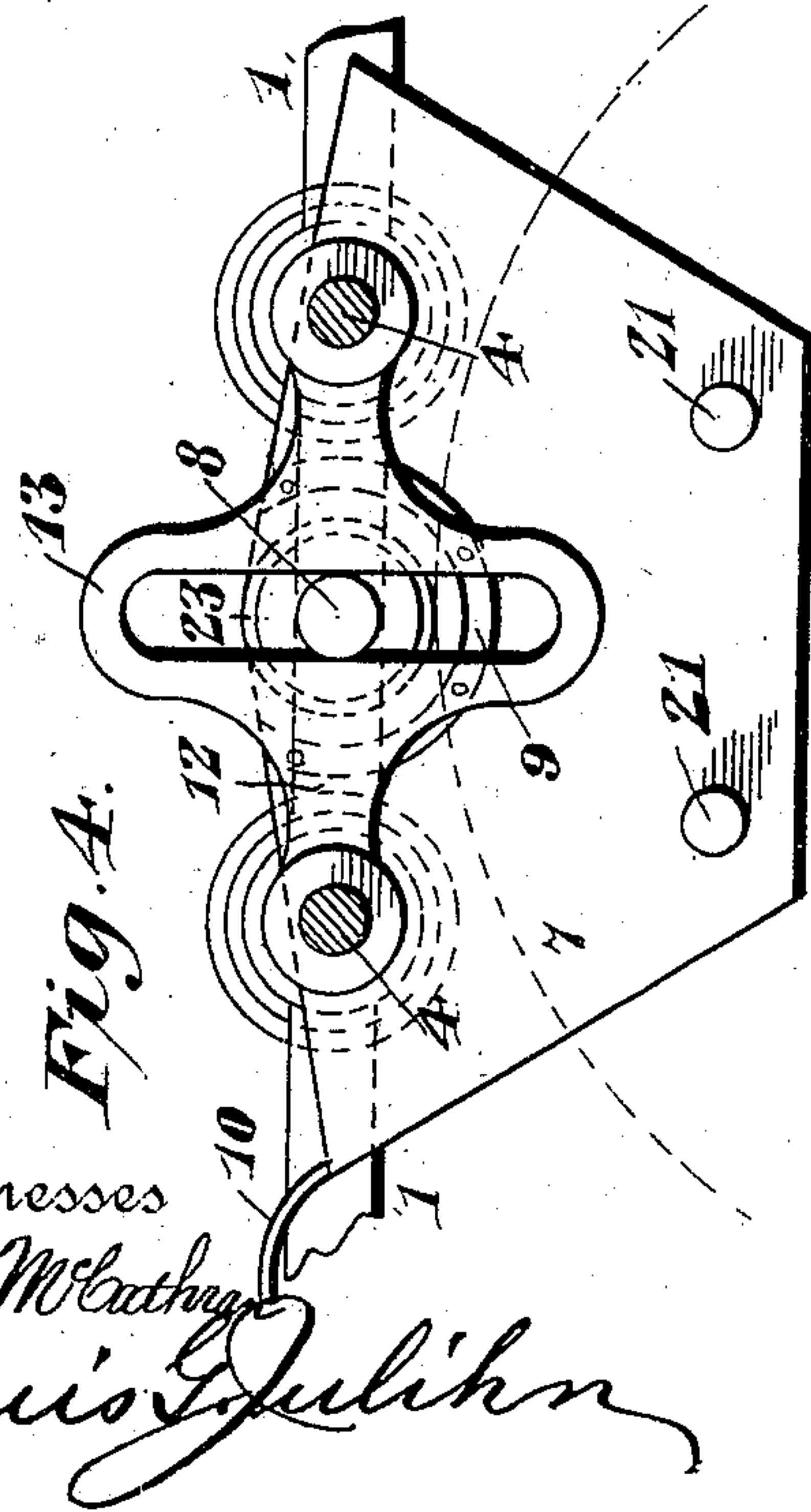


Fig. 4.



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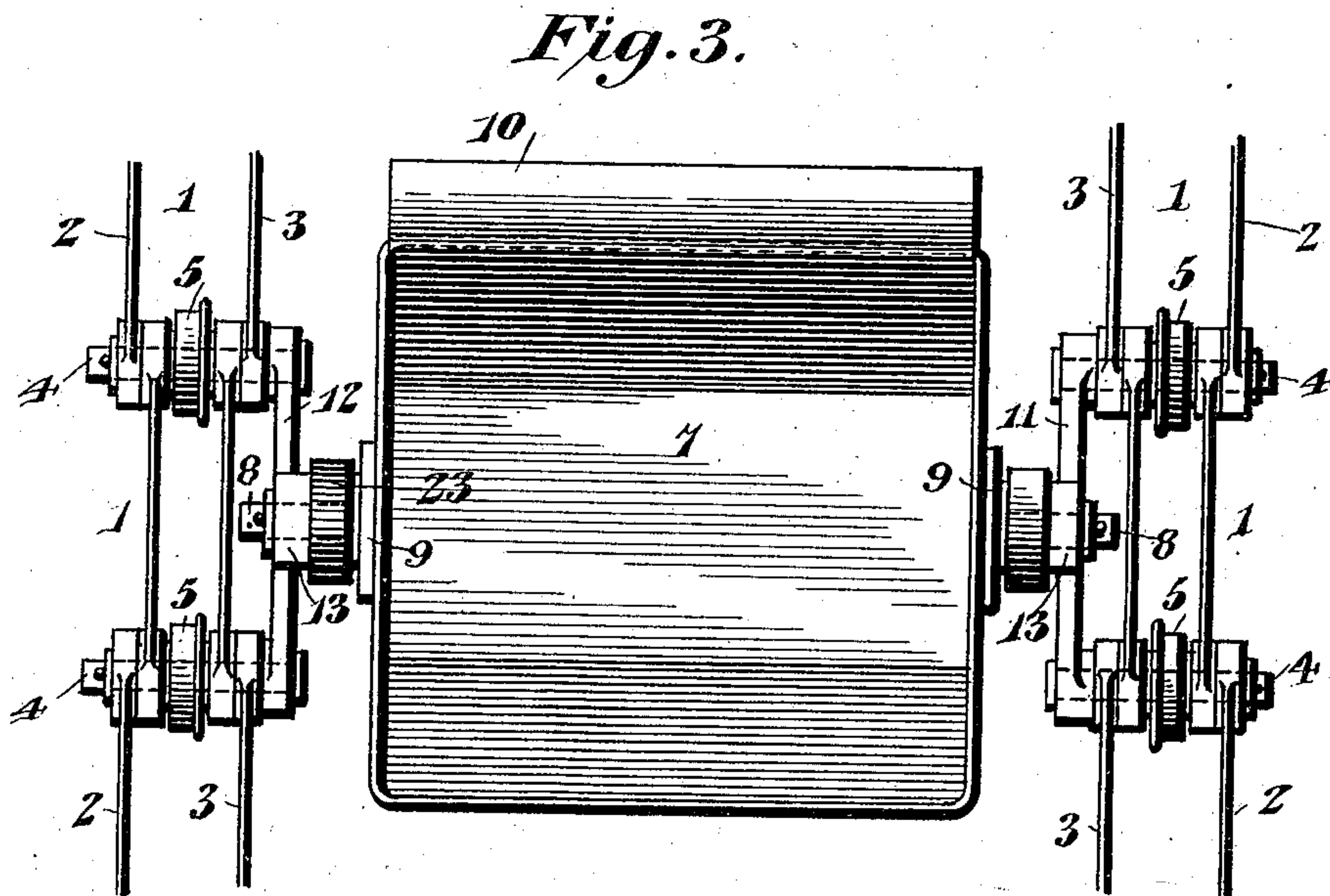
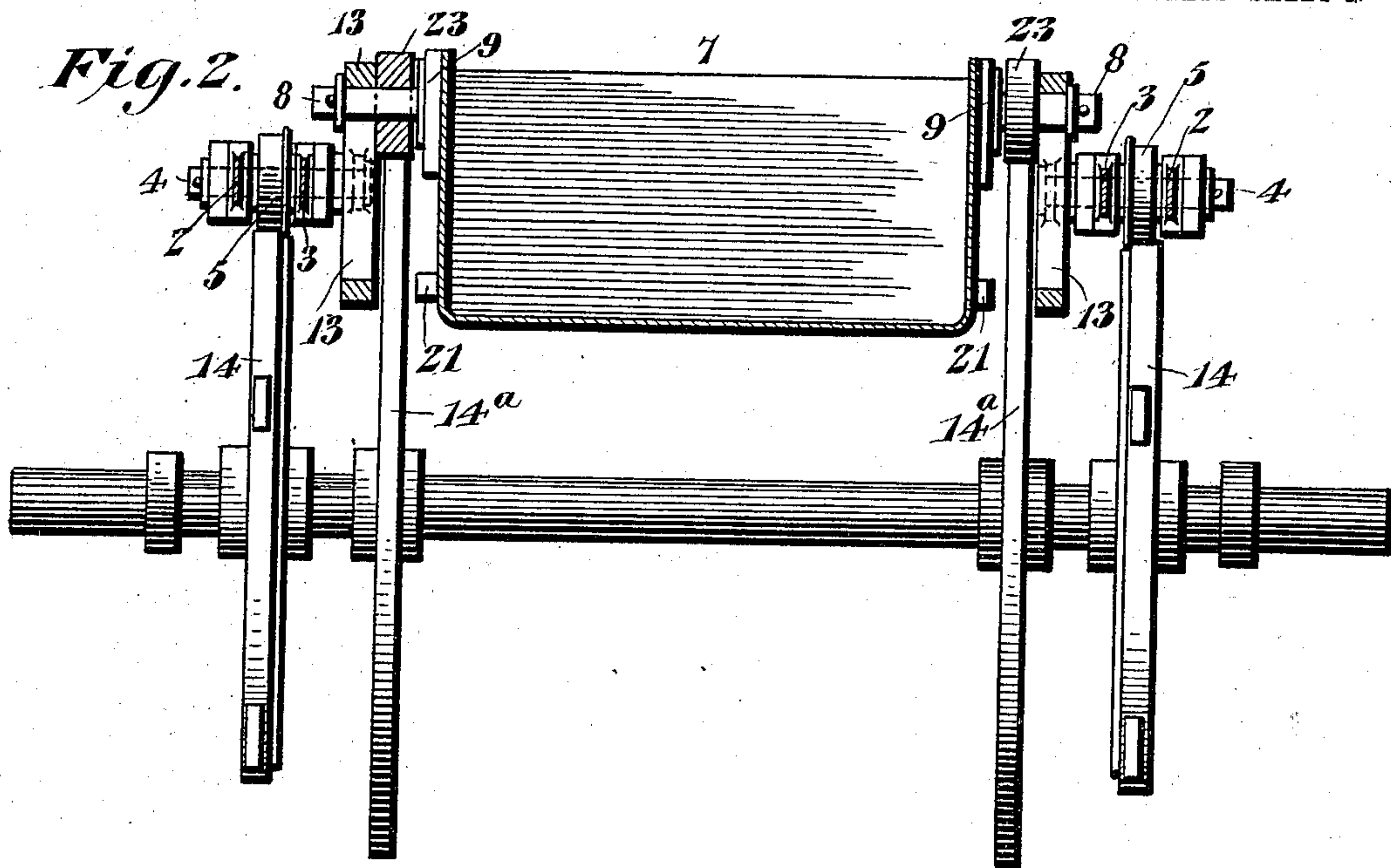
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 5.

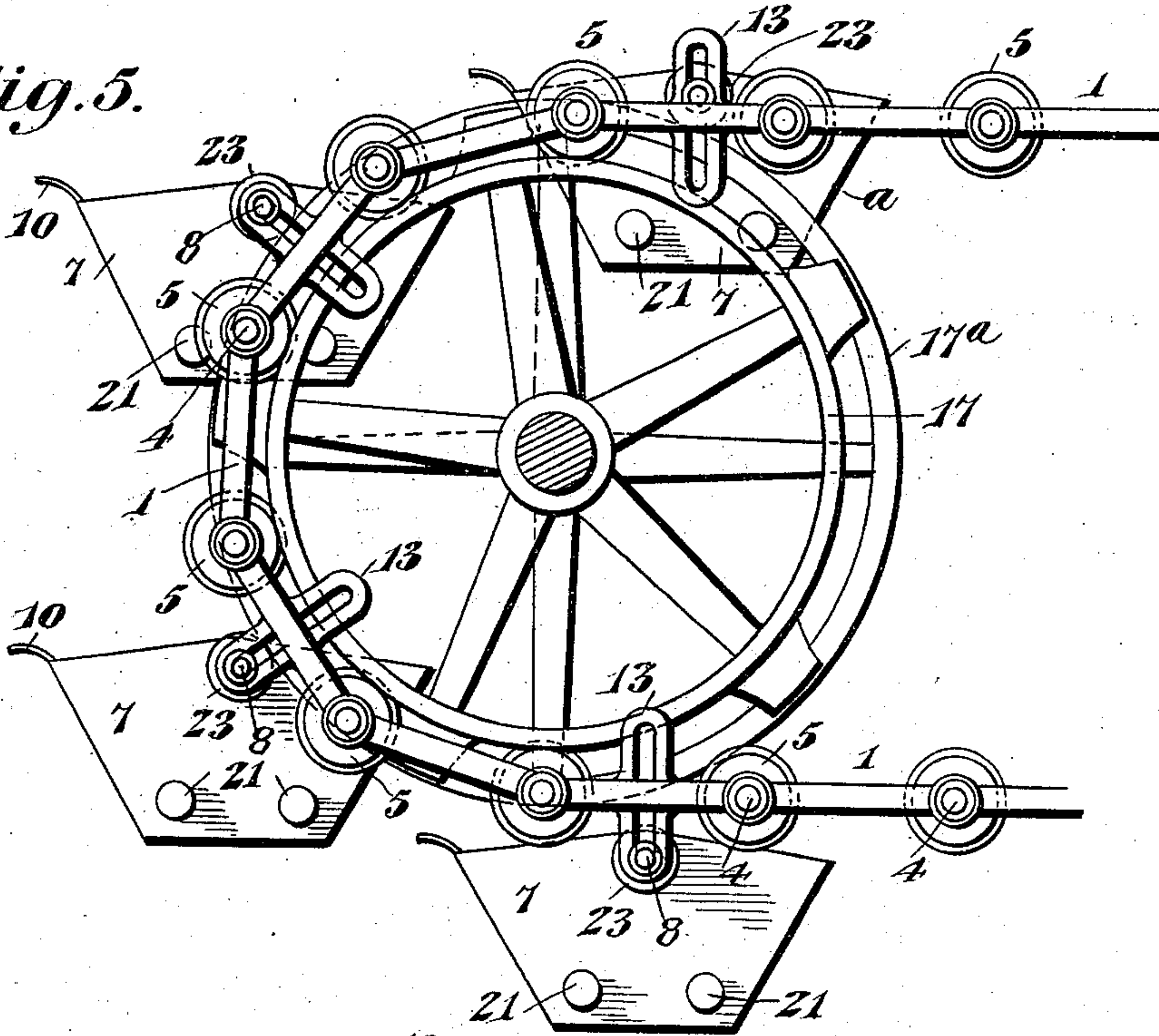


Fig. 6.

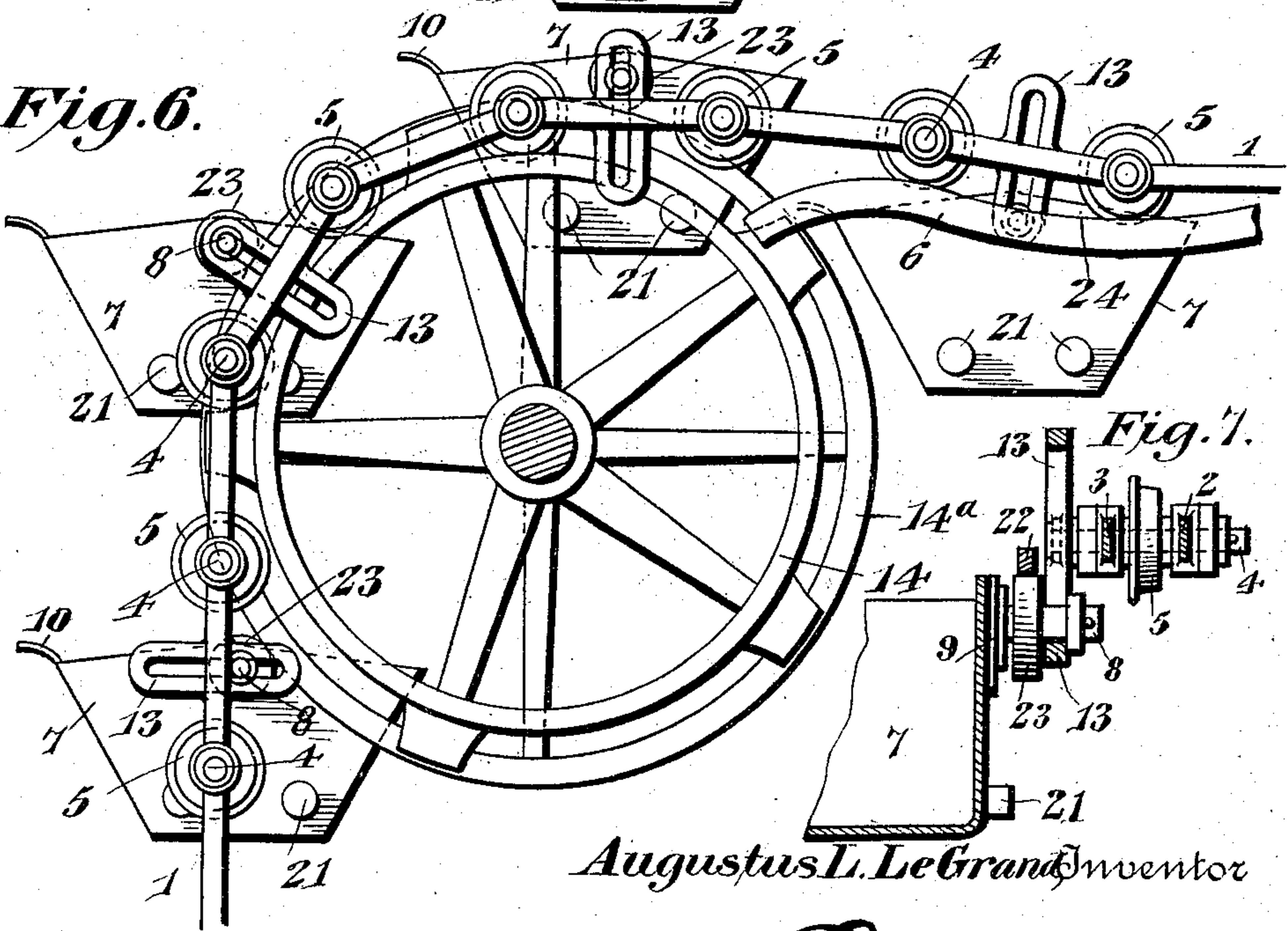
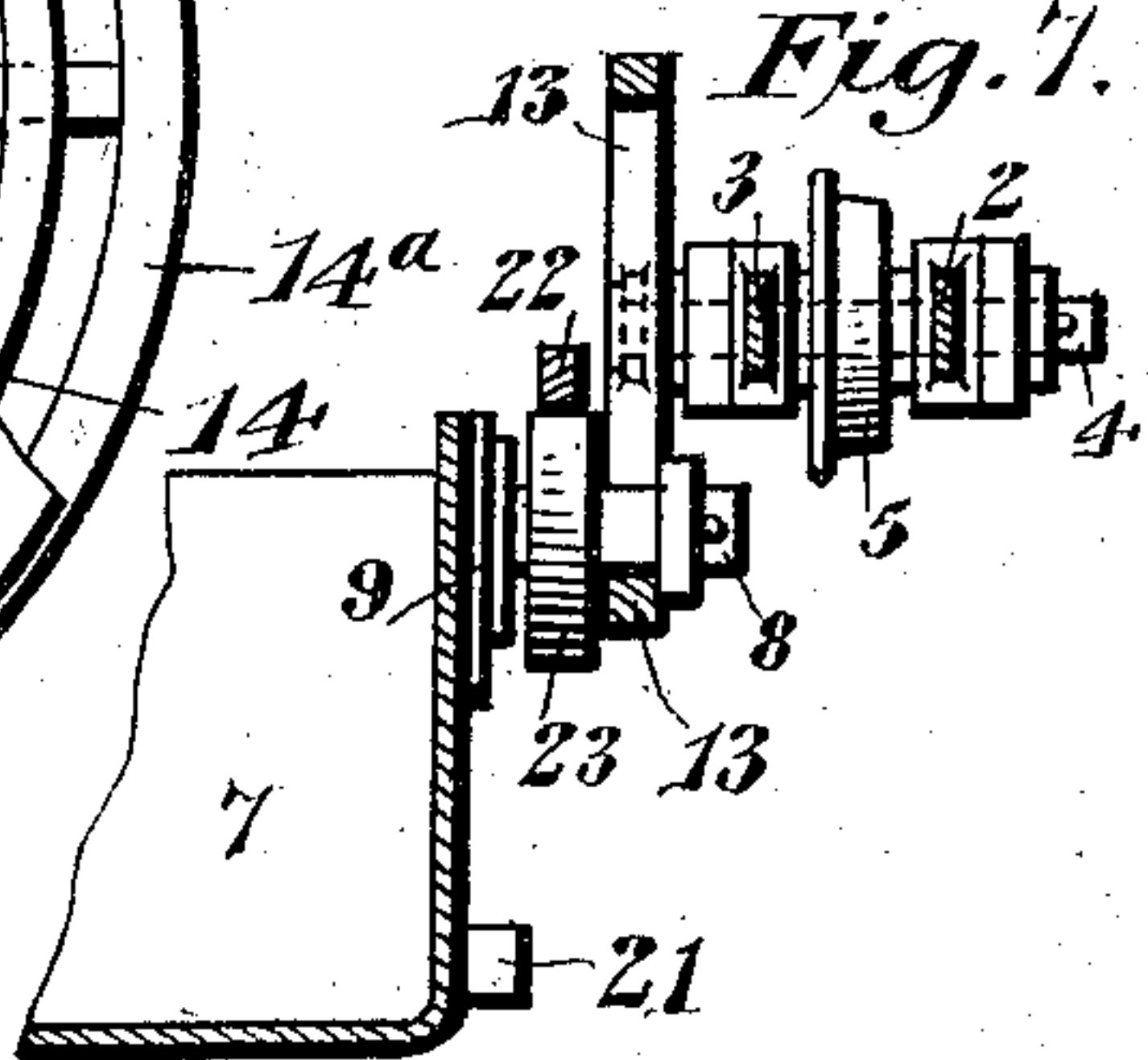


Fig. 7.



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UNITED STATES PATENT OFFICE.

AUGUSTUS L. LE GRAND, OF WEST PITTSTON, PENNSYLVANIA.

BUCKET CONVEYER.

SPECIFICATION forming part of Letters Patent No. 725,573, dated April 14, 1903.

Application filed May 8, 1902. Serial No. 106,485. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS L. LE GRAND, a citizen of the United States, residing at West Pittston, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Bucket Conveyor, of which the following is a specification.

My present invention relates to that class of bucket conveyers which comprehend a series of pivoted buckets having overlapping edges designed to prevent the waste of material by the gravitation thereof between the buckets during the loading of the conveyor.

The object of the invention is to provide means for preventing the buckets from interfering with each other when passing around curves connecting horizontal and vertical runs of the conveyor and to insure the proper overlapping relation of the contiguous edges of the buckets located in the horizontal runs.

It is well understood by those skilled in the art that the arrangement of conveyor-buckets in overlapping relation is ordinarily attended by the material interference of the buckets as the conveyor passes around the traction-wheels at the intersections of the vertical and horizontal conveyor-runs and that the overcoming of such interference has inspired the production of various forms of conveying mechanism of this general character. One of the most successful of these efforts comprehends the employment of a conveyor-chain the links of which are formed with terminal projections carrying the pivoted buckets, so that as the conveyor passes around the traction-wheels the bucket-carrying projections, disposed outwardly from the curved portion of the conveyor, will assume divergent angles with respect to each other, thereby separating the buckets and preventing their interference. This expedient may possibly be effective when the conveyor travels in a substantially rectangular course, so that the bucket-carrying projections are always extended outwardly from the traction-wheels arranged within the conveyor. It is obvious, however, that this form of conveyor is incapable of use when the opposite flexing of the chain is made necessary by the location of a traction-wheel at the outside of the conveyor—that is to say, the relative movement of the bucket-carrying projections which serves to

separate the buckets when the chain is flexed in one direction will serve to bring the buckets closer together when the chain is flexed in the opposite direction, with the result that the buckets will interfere and render the conveyor inoperative.

My invention, on the contrary, is directed to the production of a novel mounting for the buckets which will insure their proper clearance or non-interference irrespective of the direction in which the chain is flexed in passing around the traction-wheels located at the juncture of angularly-related runs of the conveyor, so that the conveying mechanism may be employed not only with the conveyor-chain moving in a substantially rectangular path, but also with the runs disposed in any and all directions which may be desirable for the conveyance of the material from one or more loading-stations to one or more points of deposit.

In the accompanying drawings, Figure 1 is a view of a complete conveying apparatus equipped in accordance with my invention. Fig. 2 is a sectional elevation showing the mounting of a bucket and the relation of the sprockets and traction-wheels to the conveyor-chain and bucket. Fig. 3 is a plan view of a bucket and its mounting. Fig. 4 is a detail elevation showing one of the slotted bucket-supports hung from a pair of chain-pintles and a bucket with one of its trunnions extended into the support. Fig. 5 is an elevation of a portion of the conveying apparatus, illustrating the manner in which the traction-wheels engage the trunnion-rollers to hold the trunnions at the outer side of a curve around which the buckets are passing and also showing the manner in which the traction-wheels prevent the premature gravitation of the trunnions as the buckets are passing from the curve to an upper horizontal conveyor-run; and Fig. 6 is a similar view of another portion of the apparatus, illustrating the manner in which the traction-wheels serve to positively shift the pivotal supports of the bucket from one side of the chain to the other. Fig. 7 is a detail sectional view showing a portion of a bucket, one of the bucket-supporting members, and one of the guard-rails.

Like numerals of reference are employed

to designate corresponding parts throughout the views.

The links of the conveyer-chain 1 are preferably composed, as usual, of a pair of parallel plates 2 and 3, connected to the plates of the adjacent link by transverselink-connectors or pintles 4, upon which latter are journaled between the ends of the link-plates the chain rollers or travelers 5, designed to travel upon the traction-rails 6, extending along one or more of the horizontal runs of the conveyer.

Between the conveyer-chains or the side sections of the conveyer-chain are disposed gravity-buckets 7, which may be of ordinary form and are provided with trunnions 8, extending in opposite directions from the ends of the bucket adjacent to its upper edge and secured to the bucket-walls by the plates 9, bolted or otherwise secured rigidly in position. The trunnions 8 constitute pivotal supports from which the buckets swing freely, so that notwithstanding the angular relation of the various conveyer-runs the buckets will always hang properly to prevent the spilling of their contents.

Each bucket is provided with a lip 10, which overlaps the adjacent edge of the next bucket when the buckets are passing along the horizontal runs of the conveyer. These lips prevent the material from escaping between the buckets, and their utilization necessitates that close contiguity of the buckets resulting ordinarily in the interference of the latter while passing around curves. In order to prevent the interference of buckets related in the manner specified during the passage of the conveyer around curves of any character whatever, my invention contemplates the provision of bucket-supporting brackets 11 and 12, movable with the conveyer-chains and located between the same.

Each of the brackets 11 and 12 is supported at its opposite ends by a pair of link-connectors or chain-pintles 4 4 (see Figs. 3 and 4) and at a point intermediate of its ends is formed with what may be termed a "bearing-link" 13, extending beyond the opposite sides of the chain and designed to afford elongated bearings for the pivotal supports or trunnions 8, which are laterally shiftable within the links. By the expression "extending beyond opposite sides of the chain," employed to define the disposition of the bearing-links 13, is meant such location of the bearing-links as will present their opposite ends above and below the horizontal runs of the chain. This disposition of these elongated bearings is designed to produce bucket-supporting arms extending beyond opposite sides of the chain and disposed radially with respect to the axis of a traction-wheel around which the conveyer is passing. It will therefore appear that, no matter in which direction the chain is flexed in passing around a traction-wheel, laterally-extending bucket-supporting members will be located at the outer side of the curve.

We have already seen that buckets swung from the ends of arms extending outwardly from the links passing around a traction-wheel will be separated and their interference prevented by reason of the angular relations assumed by the arms in consequence of the flexing of the chain. It will therefore appear that by extending the bearing-links 13 beyond both sides of the chain the pivotal supports or trunnions of the buckets may be shifted so as to bring them to the outer side of the chain, irrespective of the direction in which the latter is flexed, the result being that the buckets will be properly separated and prevented from interfering during the passage of the conveyer around traction-wheels located inside or outside of the chain. It should also be noted that while the buckets are each supported from a pair of pintles of each chain they are not supported directly from the chain-links, but, on the contrary, are provided with independent connections, which bring the weight of the bucket directly upon a plurality of pintles or link-connectors and locate the pivotal supports of the buckets in planes between the pintles and intermediate of the conveyer-chains. This structural arrangement is important, because I am thereby enabled to employ an ordinary conveyer-chain and the usual forms of conveyer-buckets in carrying out my invention without other special adaptation than the mere attachment of my novel supporting-brackets to the chains.

In Fig. 1 of the drawings I have shown a conveyer constructed in accordance with my invention and arranged as in use. The chains between which the buckets are swung are passed around the pairs of sprocket-wheels 14, 15, 16, 17, and 18, the sprockets 18 being located outside of the chains and the other sprockets inside thereof. The conveyer moves in the direction of the arrow, and the buckets are charged from a loading-chute 19, which in the present instance is disposed above the lower horizontal run.

Along the upper horizontal run are located the traction-rails 6 and one or more trip-arms 20, designed to be engaged by one or more trip-lugs 21, projecting from each bucket. These tripping devices are located at what may be known as the "dumping-station," and it will be noted that as each bucket is successively presented to the trip-arms said bucket will be tilted to permit the dumping of its contents. Inasmuch as the trunnions of the buckets are slidably mounted in the links and are located in the lower ends thereof when the tilting of the bucket is effected, it is desirable to provide guard-rails 22, disposed above the bucket-trunnions at the dumping-station to prevent said trunnions from rising in the links when the buckets are tripped.

It will be noted that the tendency of the buckets is to gravitate to the lower ends of the links and that in passing from one hori-

zontal run to another, as shown at the left of Fig. 1, the dropping of the buckets from the upper to the lower ends of the links might take place prematurely and with such suddenness as to result in the severe jarring of the bucket. I therefore provide means for positively retaining the trunnions at the outer ends of the links during their passage around curves and for compelling the gradual gravitation of the trunnions to the lower ends of the links as the bucket passes from a curve to a horizontal conveyer-run. These results are attained by the association of a pair of traction-wheels 14^a, 15^a, 16^a, 17^a, or 18^a with each pair of sprocket-wheels and located between the latter to engage antifrictional rollers 23, mounted upon each of the bucket-trunnions adjacent to the contiguous supporting-brackets. Each pair of sprocket-wheels and their complementary traction-wheels are mounted on the same shaft, and the traction-wheels are of sufficiently-greater diameter than the sprockets to compel the bucket-trunnions to remain at the outer ends of the bearing-links during the travel of the buckets around a curve from one conveyer-run to another. It will therefore appear that the pivotal supports of the buckets will always be located at the outer side of the curve no matter in which direction the chain is flexed, so that the buckets will always be separated to prevent their interference in passing around curves between different conveyer-runs.

The traction-wheels also constitute means for preventing the trunnions from dropping suddenly from the upper ends of the links to the lower ends thereof, since it is evident that as a bucket passes from the upper side of a curve to a horizontal conveyer-run the trunnion-rollers will remain in contact with the traction-wheels until the trunnions have reached the lower ends of the links. (See bucket *a*, Figs. 1 and 5.) As the buckets ascend from the traction-wheels 18^a to the wheels 14^a the trunnions will be located at the inner or right-hand ends of the horizontally-disposed bearing-links, and as the chain is oppositely flexed in passing around the wheels 18^a and 14^a it follows that in order to bring the bucket-trunnions to the outer side of the upper curve said trunnions must be shifted to the opposite ends of the links. In addition, therefore, to the functions heretofore ascribed to the traction-wheels they perform the function of positively shifting the pivotal supports of the buckets from one side of the chain to the other, so that the trunnions located at one side of the chain to bring them at the outer side of one curve will be automatically shifted to the opposite side of the chain to present them at the outer side of a curve disposed in the opposite direction. Thus the buckets will be properly supported and prevented from interfering during their passage around any and all curves which may be necessary to give proper direction to the

conveyer, and as soon as the buckets enter upon a horizontal conveyer-run they will assume a proper overlapping relation to prevent the escape of material between them. As an extra precaution, however, the traction-rails 6 are provided with slight dips or depressions 24 just beyond the traction-wheels 14^a, so as to absolutely insure the assumption of their proper positions by the buckets as they enter upon the upper horizontal conveyer-run.

It is thought that from the foregoing the construction and operation of the illustrated embodiment of my invention will be clearly apparent; but while the illustrated construction is thought at this time to be preferable, I wish to be distinctly understood as reserving to myself the right to effect such changes, modifications, and variations thereof as may be properly embraced within the scope of the protection prayed.

What I claim is—

1. The combination with a conveyer-chain, of a series of pivotally-supported buckets carried by the chain, and means for automatically increasing the separation of the bucket-supports by the flexing of the chain in either direction.
2. In a conveyer, the combination with a conveyer-chain, of a series of conveyer-buckets, and means for supporting the buckets at points at either side of the chain.
3. In a conveyer, the combination with a conveyer-chain, of pivotally-mounted conveyer-buckets, and means for disposing the pivots of the buckets at either side of the chain, to prevent interference of the buckets while passing around curves.
4. In a conveyer, the combination with a conveyer-chain, of a conveyer-bucket having pivotal connection with the chain, said connection being shiftable.
5. The combination with a conveyer-chain, of bucket-supporting means extending laterally beyond opposite sides of the chain, and a bucket carried by said supporting means.
6. The combination with a conveyer-chain, of bucket-supporting means movable with the chain, and a conveyer-bucket having pivotal connection with the supporting means, said connection being shiftable.
7. The combination with a conveyer-chain, of bucket-supporting means extending beyond opposite sides of the chain, and a conveyer-bucket having connection with the supporting means, said connection being shiftable to opposite sides of the chain.
8. The combination with a conveyer-chain, of a pivotally-mounted bucket, and means for sustaining the pivotal mounting of the bucket at either side of the chain.
9. The combination with a conveyer-chain, of a bucket having a pivotal support shiftable to either side of the chain without detachment therefrom.
10. The combination with a conveyer-chain, and bucket-supporting means located

at opposite sides of the chain, of a bucket having pivotal connection with the supporting means, said pivotal connection being shiftable upon the supporting means to locate it at either side of the chain.

11. The combination with a conveyer-chain, and a slotted bucket-supporting member movable with the chain, of a bucket having a trunnion shiftable within the slot of said member, constituting a support from which the bucket is swung.

12. The combination with a conveyer-chain, and a bucket-supporting member movable with the chain and having a slot disposed transverse to the chain and extended beyond the opposite sides thereof, of a bucket having a trunnion engaging the slot and shiftable lengthwise thereof to dispose the pivotal support of the bucket at either side of the chain.

13. In a conveying apparatus, the combination with a conveyer-chain, and a bucket having a supporting connection shiftable to opposite sides of the chain, of means for preventing premature shifting of said connection.

14. In a conveying apparatus, the combination with a conveyer-chain, and a bucket having pivotal connection therewith, of means for positively shifting said connection.

15. In a conveying apparatus, the combination with a conveyer-chain, of a bucket having a pivotal support shiftable to opposite sides of the chain, and means for positively shifting said support.

16. In a conveying apparatus, the combination with a conveyer-chain, of a bucket having a shiftable support, means for preventing the premature shifting of the support, and means for shifting the support positively.

17. In a conveying apparatus, the combination with a conveyer-chain, of a bucket having a pivotal support shiftable to opposite sides of the chain, means for preventing the premature shifting of the support, and means for shifting the support positively.

18. In a conveying apparatus, the combination with a conveyer-chain, and a slotted bucket-supporting member movable therewith, of a bucket having a trunnion shiftable within the slot of said member, and means for preventing the premature gravitation of the trunnion in said slot.

19. In a conveying apparatus, the combination with a conveyer-chain, and a slotted bucket-supporting member movable therewith, of a bucket having a trunnion shiftable within the slot of said member, and means for positively shifting the trunnion in said slot to transfer the pivotal support of the bucket from one side of the chain to the other.

20. In a conveying apparatus, the combination with a conveyer-chain, and a slotted bucket-supporting member movable therewith, of a bucket having a trunnion shiftable within the slot of said member, means for

preventing the premature gravitation of the trunnion in said slot, and means for positively shifting the trunnion in said slot to transfer the pivotal support of the bucket from one side of the chain to the other.

21. In a conveying apparatus, the combination with a conveyer-chain, and a series of pivotally-supported buckets, of sprocket-wheels disposed at the junctures of the conveyer-runs, the pivotal supports of the buckets being shiftable to present them at the side of the chain opposite the sprockets as the buckets pass around the curves.

22. In a conveying apparatus, the combination with a conveyer-chain provided with bucket-supporting means extending beyond the opposite sides of the chain, of a series of buckets pivotally supported by the bucket-supporting means, and sprockets located at the junctures of the runs of the chain, the pivotal supports of the buckets being shiftable upon the bucket-supporting means to present said pivotal supports at the sides of the chain opposite the sprockets as said buckets are passing around the curves.

23. In a conveying apparatus, the combination with a conveyer-chain, and sprockets located at the junctures of the runs thereof, of a series of buckets having pivotal supports shiftable to either side of the chain, and means for retaining said supports at the side of the chain opposite the sprockets during the passage of the buckets around curves.

24. In a conveying apparatus, the combination with a conveyer-chain, and sprockets located at the junctures of the runs thereof, of a series of conveyer-buckets having pivotal supports shiftable to opposite sides of the conveyer-chain, and means for shifting said supports from one side of the chain to the other to insure their location at the side of the chain opposite the sprockets during the passage of the buckets around curves.

25. In a conveying apparatus, the combination with a conveyer-chain, and sprockets, of conveyer-buckets having pivotal supports shiftable to opposite sides of the chain, and means for shifting said supports to the side of the chain opposite the sprockets, and for retaining the supports in such positions during the travel of the buckets around the curves.

26. In a conveying apparatus, the combination with a conveyer-chain, and sprockets, of slotted bucket-supports carried by the chain, buckets having trunnions engaging the slotted supports and shiftable to opposite sides of the chain, and wheels engaging said trunnions to insure their location at the side of the chain opposite the adjacent sprockets during the passage of the buckets around curves.

27. In a conveying apparatus, the combination with a conveyer-chain, and sprockets, of bucket-supporting members carried by the chain and having transversely-disposed slots extended beyond the opposite sides of the

chain, conveyer-buckets provided with trunnions engaging the slotted supports, rollers mounted on the trunnions, and wheels coaxial with the sprockets and engaging the rollers on the trunnions to retain the pivotal supports of the buckets at the side of the chain opposite the adjacent sprockets during the passage of the buckets around curves.

28. The combination with the conveyer-chains, of bucket-supports carried by the conveyer-chains independently of the links thereof, and buckets having pivotal connection with said supports at points intermediate of the ends of the links.

29. The combination with the conveyer-chains comprising the links and connecting-pintles, of bucket-supports each carried by a pair of said pintles, and a bucket having connection with each bucket-support at a point intermediate of the adjacent pintles.

30. The combination with the conveyer-chains comprising the links and pintles, of bucket-supporting members each of which is carried by a pair of pintles, a bucket, and trunnions projecting in opposite directions from the bucket and engaging the bucket-supporting members.

31. The combination with a conveyer-chain comprising the links and pintles, of bucket-supporting members each carried by the inner ends of a pair of pintles and having a transverse slot, and a conveyer-bucket having trunnions engaging the slots of the supporting members.

32. The combination with a conveyer-chain comprising the links and pintles, of bucket-supporting members each carried by the inner ends of a pair of pintles and having a transverse slot, a conveyer-bucket having trunnions engaging the slots of the supporting members, rollers mounted on the trun-

nions, sprocket-wheels engaging the chain, and traction-wheels engaging the rollers.

33. In a conveying apparatus, the combination with a conveyer-chain, of a bucket having a pivotal support shiftable with respect to the chain, means for tripping the bucket to dump the contents thereof, and means for preventing the shifting of the bucket-support during the dumping operation.

34. The combination with a conveyer-chain, of slotted bucket-supports carried thereby, a bucket having trunnions engaging the bucket-supports, means for tripping the bucket to dump the contents thereof, and a guard-rail disposed to prevent the trunnions from rising during the tripping of the bucket.

35. The combination with a conveyer-chain, of a series of buckets carried by the chain, and means for automatically increasing the separation of the buckets when the chain is flexed in either direction.

36. The combination with a conveyer-chain, of a series of pivotally-supported buckets carried by the chain, and means for automatically increasing the separation of the bucket-supports when the chain is flexed in either direction.

37. The combination with a conveyer-chain, of a bucket having a pivotal support movable in a direction transverse to the chain.

38. The combination with a conveyer-chain, of a bucket having a pivotal support automatically shiftable to opposite sides of the chain.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

AUGUSTUS L. LE GRAND.

Witnesses:

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ALEX MCDUGALL.