No. 630,805. Patented Aug. 8, 1899.

E. S. DECKER.

CONVEYING APPARATUS.

(Application filed Feb. 23, 1898.)

(No Model.) 2 Sheets—Sheet 1.

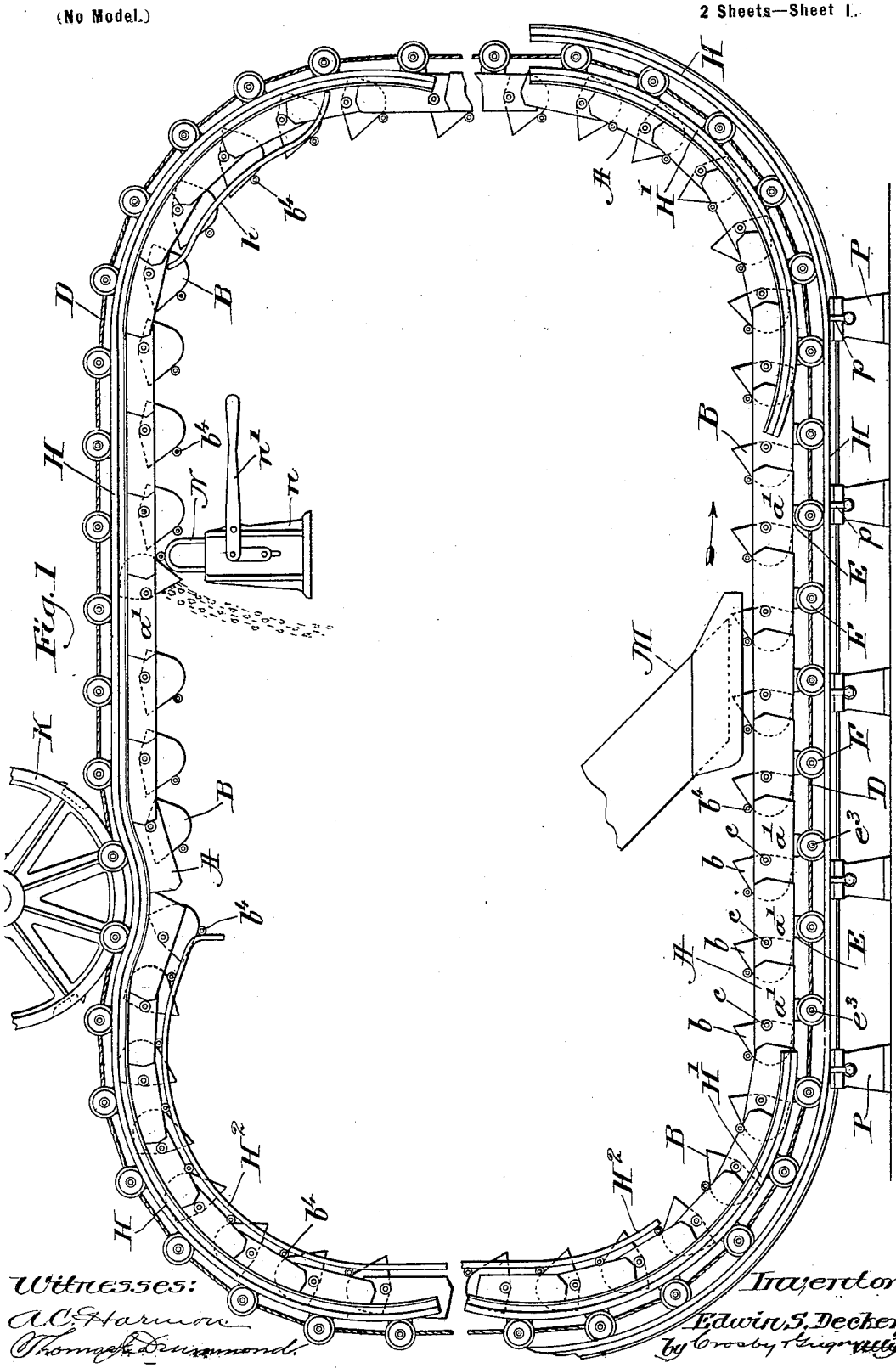


Fig. 1

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Fig. 3

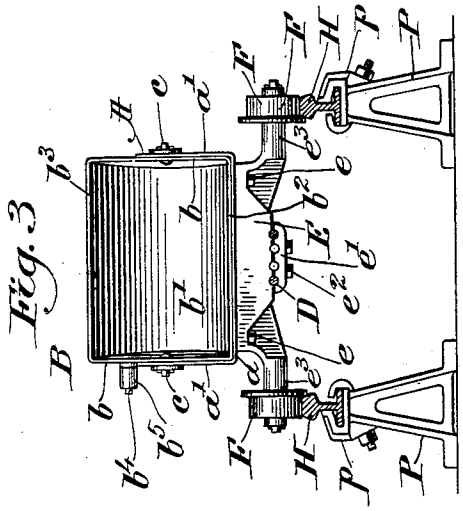


Fig. 5.

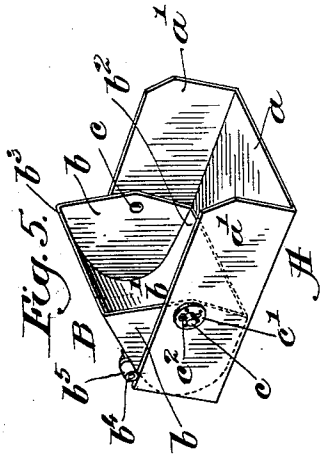


Fig. 2

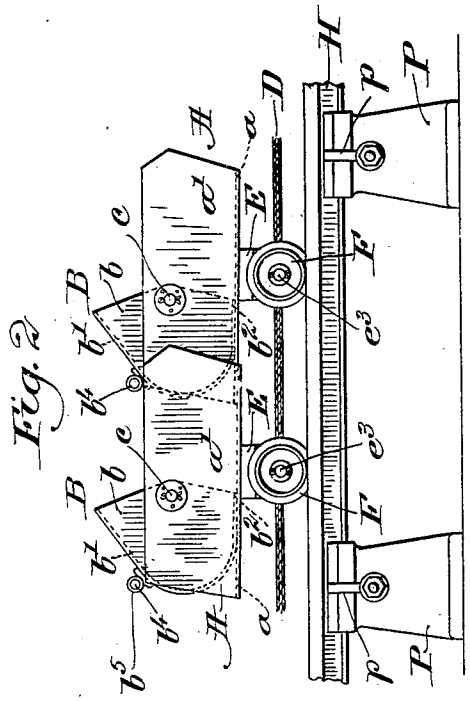
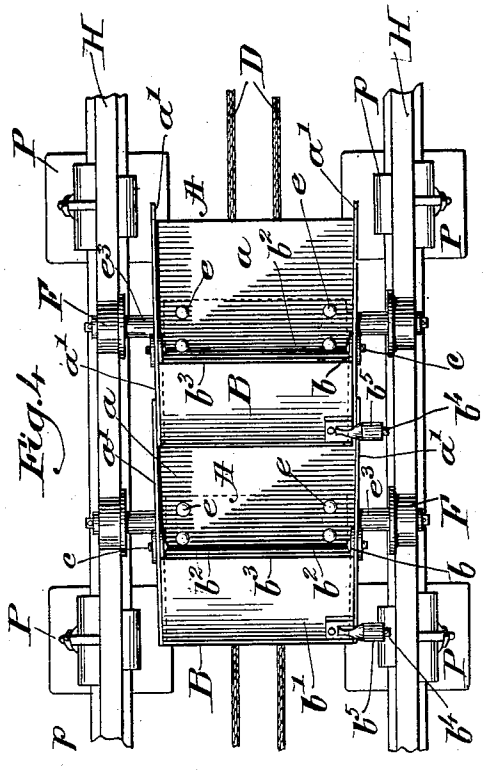


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWIN S. DECKER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE STEEL CABLE ENGINEERING COMPANY, OF MAINE.

CONVEYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 630,805, dated August 8, 1899.

Application filed February 23, 1898. Serial No. 671,259. (No model.)

To all whom it may concern:

Be it known that I, EDWIN S. DECKER, a subject of the Queen of Great Britain, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Conveying Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to conveying apparatus, and has for its object the production of a conveyer in which certain deficiencies of existing types shall be rectified, attention being paid more particularly to the provision for increased facility of loading and perfect retention of the load throughout the run up to the desired point of discharge, with greater adaptability for installation in diverse situations by reason of flexibility in structural arrangement and economy of the material necessary in construction.

Of existing conveyers the pan type offers the greatest advantages for loading, but is the least retentive, even when provided with partitions, discharge of the load following closely, for example, upon transition from an upright portion of the run to a horizontal portion, and but little relief has resulted from narrowing the mouth of the bucket to retain the load, necessitating the provision of wheels or track offsets, about which the pan is carried to effect discharge. On the other hand, conveyers in which reliance is had upon gravity-buckets exclusively to carry the load are of great utility so far as relates to their ability to retain the load both on tangent and curve. It has proved difficult, however, to provide for continuity of loading in conveyers of the gravity-bucket type, and accordingly in my novel conveyer I have devised an apparatus in which will be found elements of the pan type and also swinging members combined and related in such a manner as to vest this invention with all the advantages to which I have made reference above, while my invention has accomplished also an arrangement of parts and an application thereto of the cable principle of operation such that both in cost of construction and operation my novel apparatus constitutes the most economical type of conveyer yet presented.

The various features of my invention will be illustrated and described fully in the accompanying drawings and specification and set forth in the claims.

In the drawings, Figure 1 is a view in side elevation of a completed conveying apparatus in the construction of which my invention has been embodied. Fig. 2 is a similar view, on an enlarged scale, of a portion of the conveyer at the bottom of Fig. 1. Figs. 3 and 4 are views in front elevation and plan, respectively, of the conveyer-sections illustrated in Fig. 2; and Fig. 5 is a view in perspective of a single detached bucket and pan-section of the preferred type.

In the preferred embodiment of my invention selected for description and illustrated in the drawings a number of pan sections or elements A are shown assembled to form a continuous conveyer, the articulation of which may be and preferably is accomplished in a manner usual in the construction of conveyers of the pan type, in this instance the pans being illustrated as of a simple form, having each a bottom a, from which rise sides a', integral with the bottom or joined thereto in any suitable manner and arranged, respectively, to receive at their forward ends the rear end of the pan member immediately preceding in each case. Within the articulated pan conveying device formed thus is arranged to operate a series of swinging members B movable with the pan conveying device and so related thereto as to coöperate with the pan to receive and carry the load at portions of the run. I have illustrated this series of swinging members as composed in this instance of a well-known type of bucket with straight sides b, curved bottom b', divergent lips b^2 b^3, and wide-open mouth, and as a simple and convenient method of securing the coöperation of the pan conveying device and swinging members I have shown the latter as mounted pivotally directly in the sides of the pan conveying device, though I do not limit myself to such positive connection between the pan conveying device and swinging members nor to the contour and details of con-

struction of either illustrated and to be described hereinafter.

When connected positively, as above indicated, it will be found convenient when the full capacity of the conveyer is to be utilized to provide each pan-section with a swinging member, and I consider a favorable situation for the axial line of the pivotal connections *c* to lie between the center of gravity of each bucket and its mouth, preferably closely adjacent the latter, slightly to the rear of the middle of the pan-section and so far removed from the bottom of the pan as to permit the bucket to assume freely the position shown in Figs. 1 and 2 and best seen in the latter, where the inner edge or lip b^2 of the bucket lies snugly adjacent the bottom *a* of the pan-section. To promote stability in this position, I prefer to construct this lip of the bucket so that it will lie in substantial parallelism with the pan-bottom, avoiding thus any interspace for the lodgment of material, but leaving the bucket free to swing away from the pan-bottom, as will be described more fully later. This form of construction answers admirably to limit the range of movement of the bucket and hold its mouth in proper position to receive the load from the pan, but any construction suitable for this purpose may be adopted.

The form of the pivotal connection may be varied as desired and found suitable, *c* designating in this instance a headed pivot-pin passing through a reinforcing bearing-plate c' (see Fig. 5) on the pan side and provided with a cotter-pin c^2.

The connection of the articulated conveyer-sections and the operation of the conveyer as a whole may be accomplished by any suitable means, but I consider the use of an endless connecting or operating member consisting of a cable as offering great advantages along the line of flexibility in operation and adaptability to the varying requirements of diverse installations, so I have illustrated its application to my preferred form of structure and lay stress on the novel arrangement presented as an important feature of my invention.

The number of cables D used to form the operating member may be varied as desired and found suitable, and I have shown a pair parallel with the bottoms of the pan-sections, to which latter the connection with the cable may be made, as one convenient form of joining up the conveyer as a whole. Any suitable attachment E may be used, whether integral with the pan-section or other conveyer member or separate, as illustrated, and secured by suitable fastening means, as the bolts *e*, (see Fig. 3,) the attachment in this instance being secured to the cable by a clamping-block e' and fastening-bolts e^2 in well-known fashion, the attachment having also extensions e^3, integral, if desired and found convenient, to serve as journals for wheels or equivalent guiding means F, coöperating with tracks or the like directing or supporting devices H H', the contour and situation of which will be governed by the requirements of the installation.

The operating member D and guiding devices F may be arranged in any suitable relation, but preferably, as shown, in approximately the same plane in order to keep the line of draft near the region of support. So, also, some change may be made in the position of the conveyer members proper relatively to the operating member, though I prefer to mount them at some distance from the latter, since by so doing I secure ample clearance between the pan and cable, the need for which develops particularly in passing around curves.

Motive power may be derived from any suitable source (not shown) and communicated to the conveyer in any suitable manner, as by the driving-sprocket K engaging operatively with the attachments E in well-known fashion.

I will now proceed to describe the operation of my novel apparatus as illustrated in an installation where by the requirements of the situation loading is to be effected at a lower portion of the run and discharge at an upper portion, and for this reason the pan is turned inwardly to receive the load, although my invention, as will be readily understood, is by no means restricted to inward presentation of the pan and swinging members, since I am the first, so far as I am aware, to combine in a single conveyer pan and swinging elements coöperating to produce a unitary result. However, these elements may be presented to meet the exigencies of a particular installation. In operation, therefore, in the instance illustrated the load is delivered from a suitable device, as the hooded chute M, into the upturned pan A, in which the pivoted swinging members B rest, as shown in Fig. 2, with their lips b^2 down against the pan-bottoms *a* and their own bottoms turned rearwardly, the conveyer traveling in the direction of the arrow, Fig. 1. As the loaded portion of the pan begins to turn up the lower right-hand corner the load hitherto resting upon the pan-bottom begins to settle back and finds an easy entrance into the buckets B over their lips b^2 until, even before a true vertical shall have been reached, the load will have been transferred wholly to the buckets. The reverse curve at the upper right-hand corner of Fig. 1 finds the load, accordingly, in the buckets or swinging members B, ready upon the change of direction of the conveyer to assume under the force of gravity a normal depending position to retain the load, and this may continue up to the desired point of discharge, which discharge may be effected by turning the buckets sufficiently out of normal position by the use of any suitable device, as the adjustable cam N, provided with a support *n* and controlling-lever n'.

The buckets may and preferably will have

projections or lugs b^4, with friction-rollers b^5, preferably, (see Figs. 2 to 5,) to coöperate with the cam and facilitate tripping of the buckets for discharge, or any suitable bucket-tripping device may be provided, and, if desired, an additional guard-rail h at the upper right-hand curve may be provided to insure outward swing of the buckets as they round the curve, though the force of gravity will be sufficient normally to overcome any slight cramping between pan and bucket.

The buckets will preferably be arranged to approach the loading-point M always in the abnormal position illustrated in Fig. 1, and to effect this suitable positioning means may be provided, the rail H^2 serving this purpose in the instance illustrated, coöperating with the projections b^4 in a manner which will be understood readily from the drawings.

The advantages of operation presented by a conveyer of few parts and simple construction, affording absolute facility for continuous loading, and permitting perfect retention and control of the load up to the point of discharge will be obvious to those skilled in the art, and their existence in the apparatus disclosed herein will be perfectly apparent upon inspection of the drawings in connection with the specification.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a conveyer, the combination with a pan conveying device, of a coöperating series of gravity-buckets, substantially as described.

2. In a conveyer, the combination of pan and swinging members, coöperating to carry the load, substantially as described.

3. The combination in a conveyer, of a series of gravity-buckets, and a pan conveying device, movable together and to carry the whole load, each at a different part of the run, and means to enable transference of said load from one to the other, substantially as described.

4. In a conveyer, a pan conveying device, and a coöperating series of gravity-buckets, movable with, said pan conveying device, and means to enable transference of the load from said pan conveying device to said buckets, intermediate the points of loading and discharge of said conveyer, substantially as described.

5. A conveyer comprising a pan conveying device and a coöperating series of gravity-buckets, adapted and arranged respectively, the former to receive the load primarily and to transfer it to the latter, and the latter to receive from said pan the load and carry it to the point of discharge, substantially as described.

6. The combination in a conveyer, with a pan conveying device, of a series of gravity-buckets carried by said pan and coöperating therewith to carry the load, substantially as described.

7. The combination in a conveyer, with a pan conveying device, of a series of gravity-buckets mounted pivotally thereon, substantially as described.

8. The combination in a conveyer, with a pan conveying device, of a series of gravity-buckets supported pivotally within, and from the sides of, said pan conveying device, substantially as described.

9. Conveying apparatus comprising an endless connecting or operating member provided with, and to operate, a pan conveying device combined with a series of gravity-buckets, substantially as described.

10. Conveying apparatus comprising an endless cable provided with, and to operate, a pan conveying device combined with a series of gravity-buckets, substantially as described.

11. In a conveyer, a pan-section provided with a coöperating gravity-bucket, substantially as described.

12. In a conveyer, an articulated pan conveying device having a plurality of sections, combined with gravity-buckets, coöperating with said pan-sections.

13. In a conveyer, an articulated pan conveying device having a plurality of sections, combined with gravity-buckets, one for, and coöperating with, each of said sections.

14. A conveyer member comprising a pan-section, a gravity-bucket thereon rotatable about an axis near its mouth, said axis passing through the sides of said section at a region suitable to permit partial entry of said bucket therewithin, substantially as described.

15. In a conveyer, a pan conveying device, combined with a gravity-bucket, and means to cause presentation of said bucket in abnormal position for loading and discharge, substantially as described.

16. In a conveyer, a pan conveying device, combined with a gravity-bucket so related and arranged with respect to said pan as to present a lip adjacent the bottom of said pan to receive the load therefrom substantially as described.

17. A conveyer member comprising a pan-section combined with a gravity-bucket and having an attachment provided with guiding means, substantially as described.

18. Conveying apparatus, comprising combined pan and gravity-bucket members, an endless connecting or operating member, directing devices, attachments intermediate said members and operating member, and guiding means for said members, coöperating with said directing devices, substantially as described.

19. Conveying apparatus comprising combined pan and gravity-bucket members; an endless operating-cable; directing-rails; and attachments, intermediate said members and cable, and provided with guide-wheels coöperating with said rails, substantially as described.

20. A conveyer, comprising combined pan and gravity-bucket members; directing devices therefor; and means to insure freedom of said buckets to assume normal position upon change of direction of said conveyer, substantially as described.

21. Conveying apparatus; comprising loading means; a pan conveying device, presented to be loaded therefrom at a lower portion of its run; gravity-buckets movable with said pan and arranged with their mouths presented forwardly to receive the load shifting within said pan as it assumes an upright position, said buckets being free to assume a normal depending position as said pan doubles upon itself in passing to the upper horizontal portion of its run; and means to turn said buckets out of normal position to discharge the same, substantially as described.

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

EDWIN S. DECKER.

Witnesses:

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JOHN C. EDWARDS.