No. 630,801. Patented Aug. 8, 1899.

# E. S. DECKER.

## CONVEYING APPARATUS.

(Application filed Dec. 21, 1896. Renewed July 17, 1899.)

(No Model.) 2 Sheets—Sheet 1.

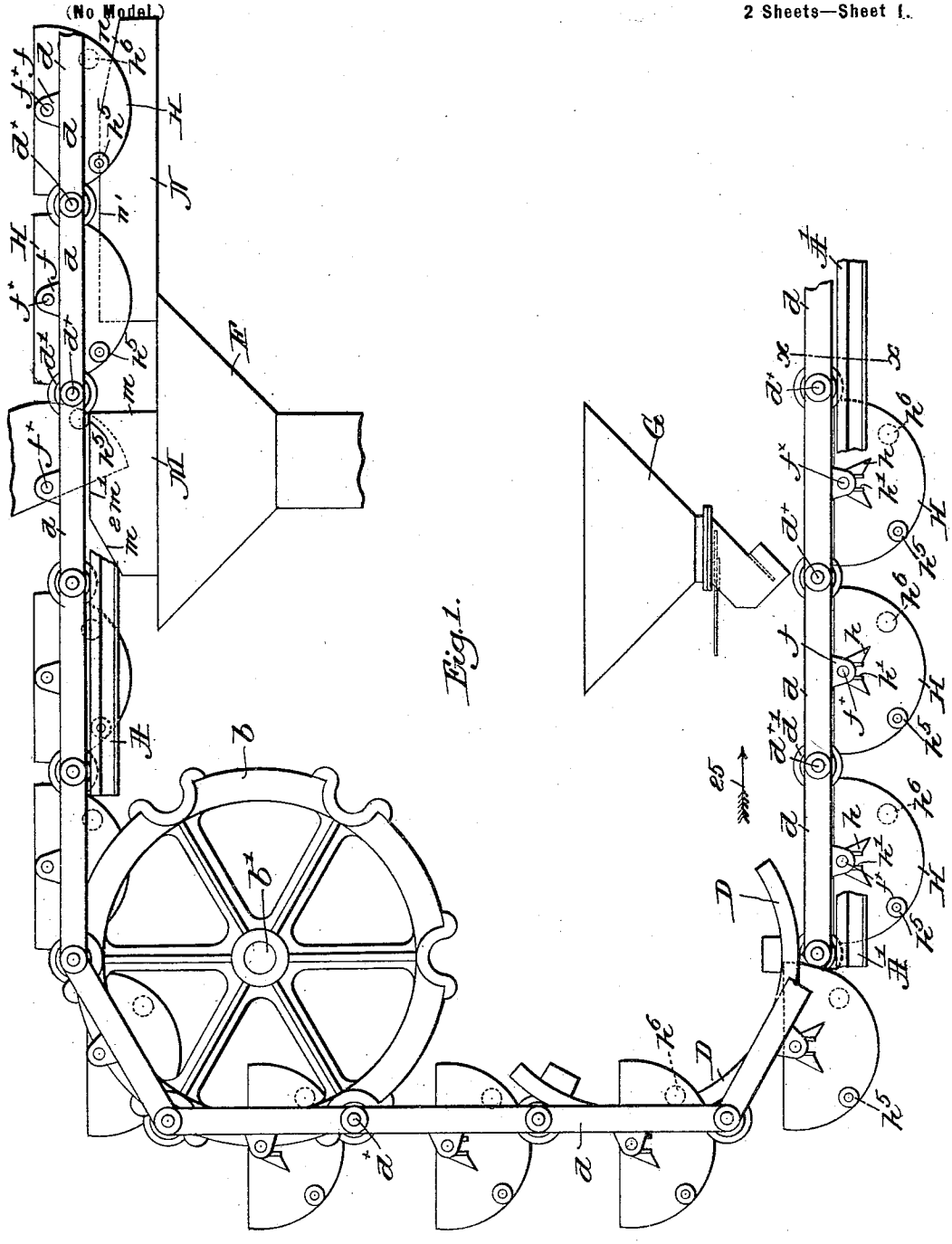


Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

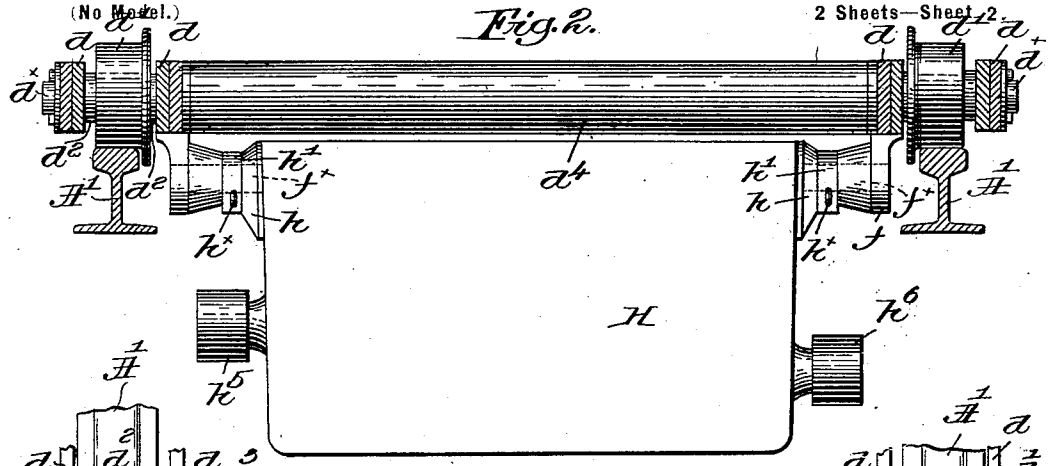


Fig. 3.

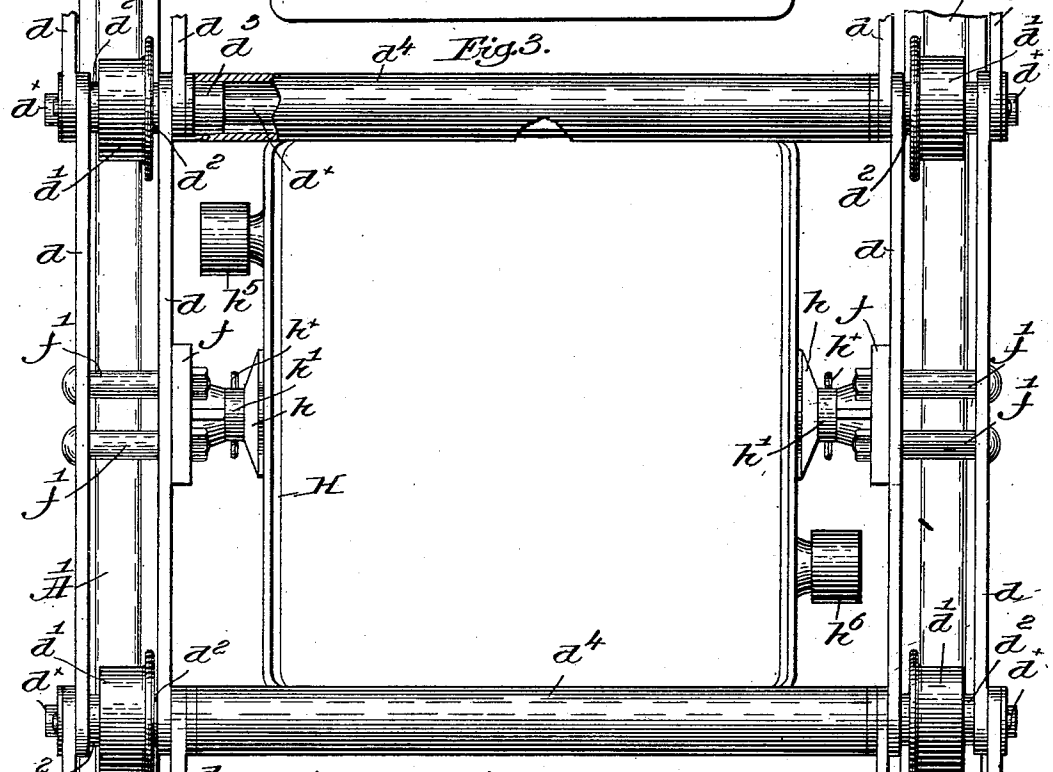
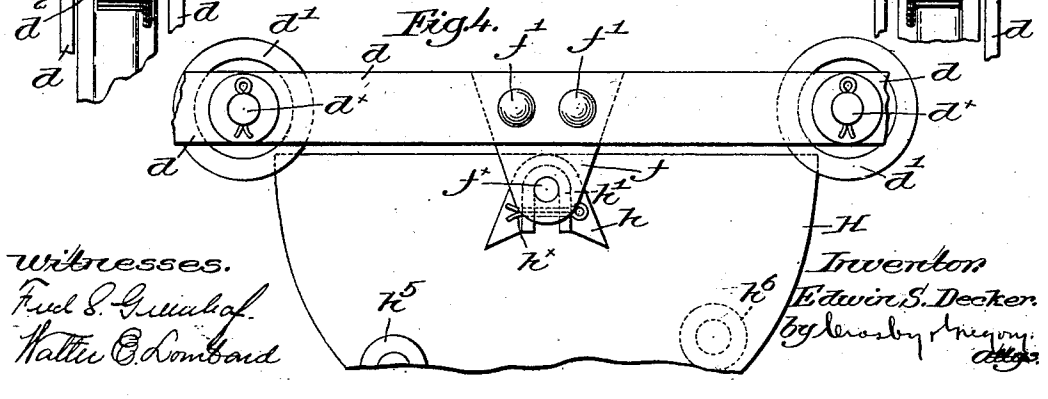


Fig. 4.



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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. 630,801, dated August 8, 1899.

Application filed December 21, 1896. Renewed July 17, 1899. Serial No. 724,139. (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, (for which Letters Patent have been granted in Great Britain, No. 4,189, dated February 16, 1897; in France, No. 264,167, dated February 18, 1897; in Germany, No. 95,513, dated February 20, 1897, and in Belgium, No. 126,455, dated February 19, 1897,) of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object the production of a novel and simple conveyer particularly adapted for use in connection with endless conveyers for handling grain, coal, and the like. The buckets are of the class termed "gravity-buckets," each pivotally mounted to swing about an axis substantially at right angles to the direction of travel of the bucket, and said buckets are maintained by gravity in load-retaining or upright position until positively tipped by suitable means for discharge.

In loading the moving buckets from a fixed point means must be provided to prevent the escape of material through the clearance-openings between adjacent buckets, and various devices have heretofore been constructed for such purpose.

My invention comprehends overlapping devices mounted on the bucket connections and overhanging the openings between two adjacent buckets, said devices being located out of alinement with the axes of the buckets or in different planes, whereby the adjacent buckets when they swing in rounding corners in the run or in unloading can freely pass by said overlapping devices.

Figure 1, in side elevation and partially broken out, shows a sufficient portion of a conveyer embodying my invention to be understood, the tracks or rails being partly omitted. Fig. 2 is an enlarged cross-sectional detail taken on the line $x\,x$, Fig. 1, looking to the left. Fig. 3 is also an enlarged top or plan view of the parts shown in Fig. 2, and Fig. 4 is an enlarged and partially-broken-away side elevation of a bracket and its supporting-frame.

In the present embodiment of my invention suitable tracks A A' form the upper and lower runs, a carrying or driving wheel $b$, preferably made as as a sprocket-wheel, being mounted on a suitable shaft $b'$ at the upper portion of each end, only one being herein shown. There are two such wheels at each end of the run, one for each of the two lines of sprocket-chains, the buckets being suspended between the chains and passing between the wheels.

I have herein shown the links $d$ arranged in parallel pairs, connected at their ends by rods or shafts $d^{\times}$, which extend across from one to the other line of sprocket-chains, the links and their connecting transverse pivot members constituting bucket-frames.

Each frame is preferably provided with four carrying-wheels $d'$, two at each side, flanged, as herein shown, and mounted on the pivot members $d^{\times}$ and held in place between the pairs of links $d$ by suitable collars or washers $d^2$, said wheels traveling upon the tracks or runs A A' and supporting the frames in transit. The said wheels, as herein shown, enter the gaps of the sprocket-wheels $b$ when passing around the latter.

Referring now to the construction which I have selected for illustration and description as one convenient embodiment of my improved overhanging form of overlapping device, as best shown in Fig. 3, the pivot members or shafts $d^{\times}$ are enlarged at $d^3$ inside of the lines of links to support hollow sleeves $d^4$, surrounding the shafts between the lines of the links and forming overlapping members, which overhang the spaces or openings between adjacent buckets when in loading position, as will more fully appear hereinafter.

By the construction described the shafts $d^{\times}$ may be made comparatively small in diameter, while the effective size of the overlap is readily attained by the sleeve of considerably greater diameter.

I have herein shown ears or hangers $f$ on the inner links of each pair and rigidly secured to them both by suitable bolts $f'$, said

ears or hangers extending beyond the plane of the frame and located midway between the pivotal connecting members $d^{\times}$.

Each hanger has projecting inwardly therefrom a hub or boss provided with a short stud $f^{\times}$, on which are loosely hung the buckets H, provided externally at each side, above the center of gravity, with brackets $h$, having outwardly-extended ∩-shaped bearings $h'$ to receive the studs $f^{\times}$, retained therein by suitable means, as cotter-pins $h^{\times}$, the faces of the bearings being held from undue lateral movement by the hub portions of the hangers $f$. The brackets are thus pivotally mounted in the frames to swing about axes substantially at right angles to the direction of travel, said axes being out of alinement with the pivotal connecting members $d^{\times}$.

The bottom and ends of each bucket are curved, preferably, in a circular arc having the stud $f^{\times}$ as its center and of such a radius that the bucket can freely pass by the overlapping device $d^4$ when the bucket swings on its axes on the turns in the run. This relative movement of the bucket and overlapping device without interference is made possible in the instance illustrated by locating the bucket-axis out of alinement with the pivot members $d^{\times}$ at each end of the frame, so that while the buckets are on the lower run the overlapping devices will overhang the openings between adjacent buckets, the bucket ends being quite close together; but the connected series of buckets will pass around the turns at the ends without obstruction.

It will be obvious that the requisite difference of alinement between the overhanging overlapping devices and the bucket-axes may be secured in other ways without departing from the spirit of my invention.

Referring to Fig. 1, I have shown a curved guide-rail D at the lower turn, two such guide-rails being located beneath a sprocket-wheel $b$ and inside the path of the connected series of buckets, the carrying-wheels $d'$ as they leave the downward run engaging and traveling around the guide-rails until said wheels pass onto the lower runs A', it being supposed that the direction of travel is indicated by arrows 25. It will be seen that while the links $d$ gradually change from horizontal to vertical position, or vice versa, the buckets retain their upright position, and in such change of position of the links the bucket ends will pass freely by the overlapping devices described.

To tip the buckets at the proper time, and thereby discharge their contents, I have provided herein a stand or trip M, Fig. 1, below the upper track or run A in the path of movement of a suitable projection or roller $h^5$ on one side of each bucket below and in advance of its pivot, said roll during the travel of the bucket engaging the vertical edge $m$ of the trip. This retards the onward movement of that part of the bucket, tipping it, so that by the time the roll $h^5$ rises from the edge $m$ to the horizontal or dwell portion $m'$ the bucket will be tipped sufficiently to discharge its contents. From the dwell the trip gradually slopes or inclines downward, as at $m^2$, permitting the bucket to resume its normal position by degrees and without undue shock.

A suitable hopper F receives the contents of the buckets as they are dumped one after another.

It sometimes happens that the bucket, from unequal loading, will tip enough to raise the roll $h^5$ above the trip M, and to prevent this I make use of a leveling device. (Shown also in Fig. 1.) Each bucket on its opposite side, back of and below its center and preferably somewhat above the roll $h^5$, is provided with a second roll $h^6$, which in the progress of the bucket travels up the inclined surface $n$ of the leveling device N and onto its horizontal surface $n'$. This latter surface is at such a height that it insures the depression of the tripping-roll $h^5$ coming into engagement with the trip along its edge $m$, and the surface $n'$ is of sufficient length to retain the bucket level until such engagement is effected.

By varying the length of the dwell $m'$ of the trip the length of time during which the buckets are in discharging position may be regulated as desired.

The buckets are fed or loaded continuously as they pass beneath the mouth of a suitable hopper G, Fig. 1, and at such time the overlapping devices not only cover the openings between adjacent buckets, but the convex surfaces of said devices direct the material to the buckets in front and rear thereof.

It will be noticed in Fig. 1 that while the links are reversed in position on the upper and lower runs the buckets will at all times hang freely suspended in retaining position except when positively tipped to discharge.

I have not herein claimed, broadly, a series of connected buckets provided with overlapping devices movably connected with the buckets to close the openings between adjacent buckets, as such construction is broadly claimed in another application, Serial No. 557,068, filed by me July 25, 1895.

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

1. In an apparatus of the class described, a bucket-frame provided at opposite sides with carrying-wheels, and bucket-supporting axes beyond the plane of said frame and substantially parallel to the axes of the carrying-wheels, and a bucket pivotally mounted on said axes, substantially as described.

2. In an apparatus of the class described, a series of pivotally-connected bucket-frames, carrying-wheels at opposite sides of each frame, bucket-supports mounted on said frames substantially at right angles to the line of travel of the buckets and beyond the pivotal connections of the frames, buckets

arranged in the respective frames to swing about said supports, and means to tip the moving buckets, substantially as described.

3. In an apparatus of the class described, a series of connected buckets arranged to swing on axes transverse to the line of travel of the buckets, combined with overlapping devices overhanging the openings between adjacent buckets when in loading position and supported above the axes of the buckets and independent of the latter by the connections therebetween, substantially as described.

4. In an apparatus of the class described, the combination with a plurality of frames pivotally connected at their ends, and bucket-supports on said frames and out of alinement with the pivotal connections of the frames, of buckets mounted to normally swing on said supports below said frames and at right angles to the line of travel, the pivotally-connected portions of the frames extending transversely above and closing the openings between adjacent buckets at such time, substantially as described.

5. In an apparatus of the class described, a series of buckets each pivoted transversely to the direction of its line of travel, the bottom and ends of said buckets being concentric to their axes, and convex overlapping devices overhanging the openings between adjacent buckets, said devices permitting movement of the buckets past them when tilted upon their axes, substantially as described.

6. In an apparatus of the class described, a series of connected buckets, and supporting-pivots therefor on the bucket connections, each bucket having a movement for discharging about said pivots, the latter being substantially transverse to the direction of travel of the buckets and out of alinement with the connections therebetween, substantially as described.

7. In an apparatus of the class described, a series of connected buckets having a discharging movement about pivots substantially transverse to the direction of travel of the buckets, said buckets being normally actuated by gravity and held thereby in retaining position, bucket-supporting pivots carried by the bucket connections, means to act upon the moving buckets and successively tip them upon their pivots for discharge, and overlapping devices mounted on the bucket connections to overhang the openings between adjacent buckets when in loading position, the bucket-pivots and overlapping devices occupying different planes, substantially as described.

8. In a conveyer, the combination with a plurality of bucket-frames comprising side members, and transversely-extended pivot connections at their ends, and bucket-supports on the side members parallel to said pivot connections, of buckets mounted to swing on said supports below the plane of the pivot connections when in loading position, the said connections at such time overlapping the openings between adjacent buckets and being movable relatively thereto, to enable the buckets to pass by said connections and remain upright when rounding curves in the run, substantially as described.

9. In a conveyer, the combination with a plurality of bucket-frames comprising side members, transversely-extended pivot members connecting the ends of the frames, and bucket-supports on said frames parallel to and out of alinement with said pivot members, of buckets pivotally mounted on said supports, and sleeves mounted on the said pivot members and overlapping the openings between adjacent buckets when the latter are in loading position, substantially as described.

10. In a conveyer, a series of connected buckets arranged on axes transverse to the line of travel of the buckets, and overlapping devices overhanging the openings between adjacent buckets when the latter are in loading position, said devices being at such times supported in a plane above the axes of the buckets by the bucket connections, combined with means to trip the buckets for discharge, and independent means to properly present the buckets to the tripping means, substantially as described.

11. In an apparatus of the class described, a series of bucket-frames, comprising side links and transverse pivot members, bucket-supports on the side links, and buckets arranged in said frames to swing on said supports about axes substantially at right angles to the line of travel of the buckets, and located beyond the planes of the respective frames, the transverse pivot members connecting the side links of adjacent frames and adapted to overhang the openings between adjacent buckets when the latter are in loading position, relative angular movement of a frame and its bucket permitting the latter to freely pass the transverse pivot members, substantially as described.

12. In an apparatus of the class described, a series of pivotally-connected buckets, bucket-supports on the connections and upon which the buckets are arranged to swing on axes transverse to the line of travel thereof, the axes of the buckets when in loading position being below the path of the bucket connections, whereby the intervening pivots overlap the openings between adjacent buckets, substantially as described.

13. In an apparatus of the class described, the combination with a plurality of side members, and transverse connecting-pivots at their ends, to form bucket-frames, of swinging buckets, and pivotal supports therefor mounted on said side members out of alinement with the connecting-pivots of the latter and transverse to the direction of travel of the buckets, substantially as described.

14. In an apparatus of the class described, a series of buckets, connections therebetween including transversely-extended intervening pivot members, and bucket-supports on the bucket connections, the buckets being arranged to swing on axes transverse to the line of travel and below the path of the bucket connections when in loading position, substantially as described.

15. The combination in an endless-chain pivoted bucket-conveyer, of links connected together, and buckets hung to said links at one side of the center line of the links, so that the point of suspension of each bucket will be below the said line in the lower run, and above the line in the upper run.

16. The combination in an endless-chain pivoted bucket-conveyer, of links having arms projecting at an angle to the body of the link, with buckets pivoted to said arms.

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

EDWIN S. DECKER.

Witnesses:
GEO. W. GREGORY,
JOHN COUPER EDWARDS.