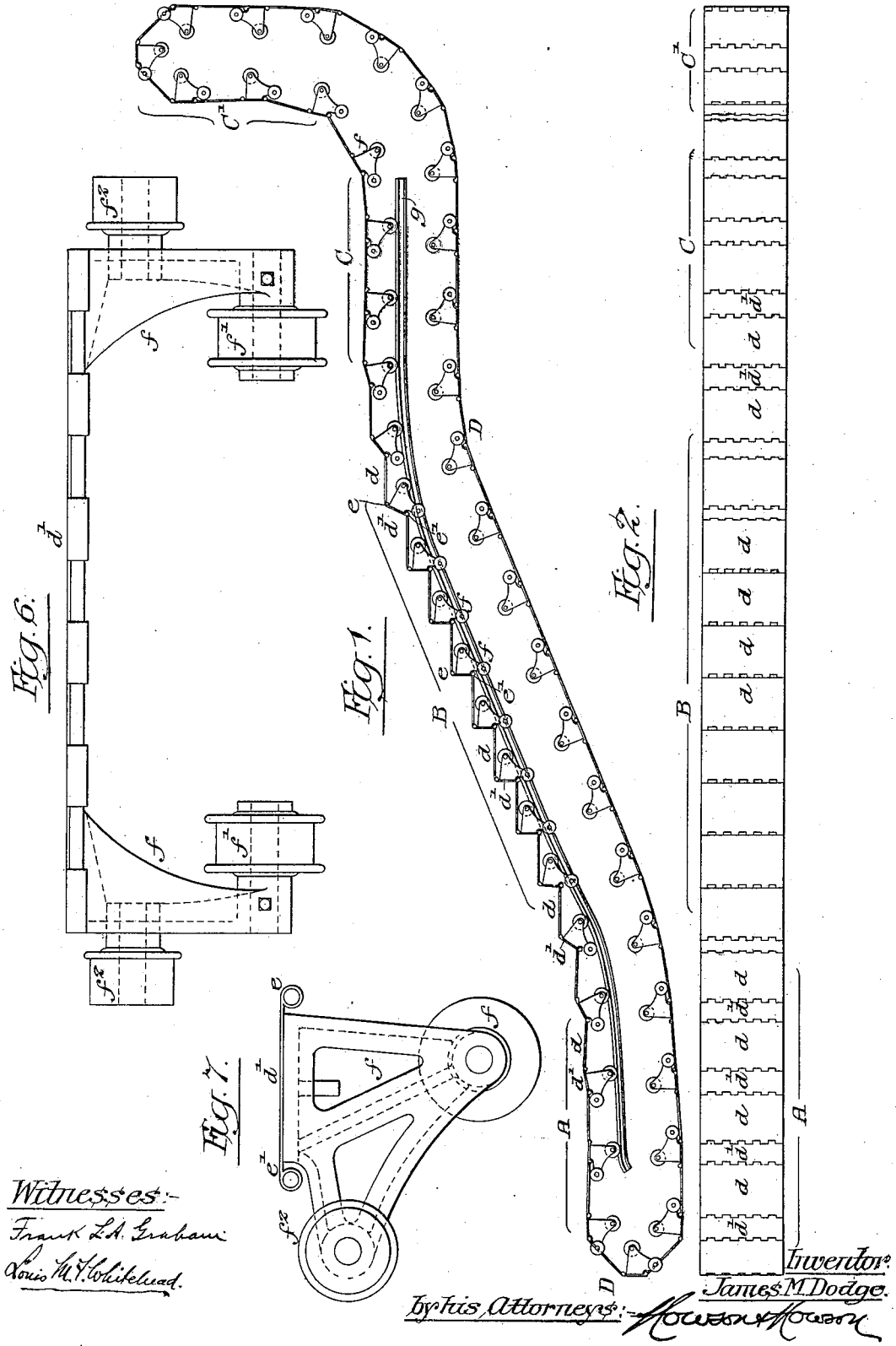
No. 651,241. Patented June 5, 1900.

J. M. DODGE.

ENDLESS BELT CONVEYER.

(Application filed Dec. 1, 1898.)

(No Model.) 7 Sheets—Sheet 1.



Witnesses:-
Frank L. A. Graham.
Louis M. Whitehead.

Inventor:
James M. Dodge.
By his Attorneys:-
Howson & Howson

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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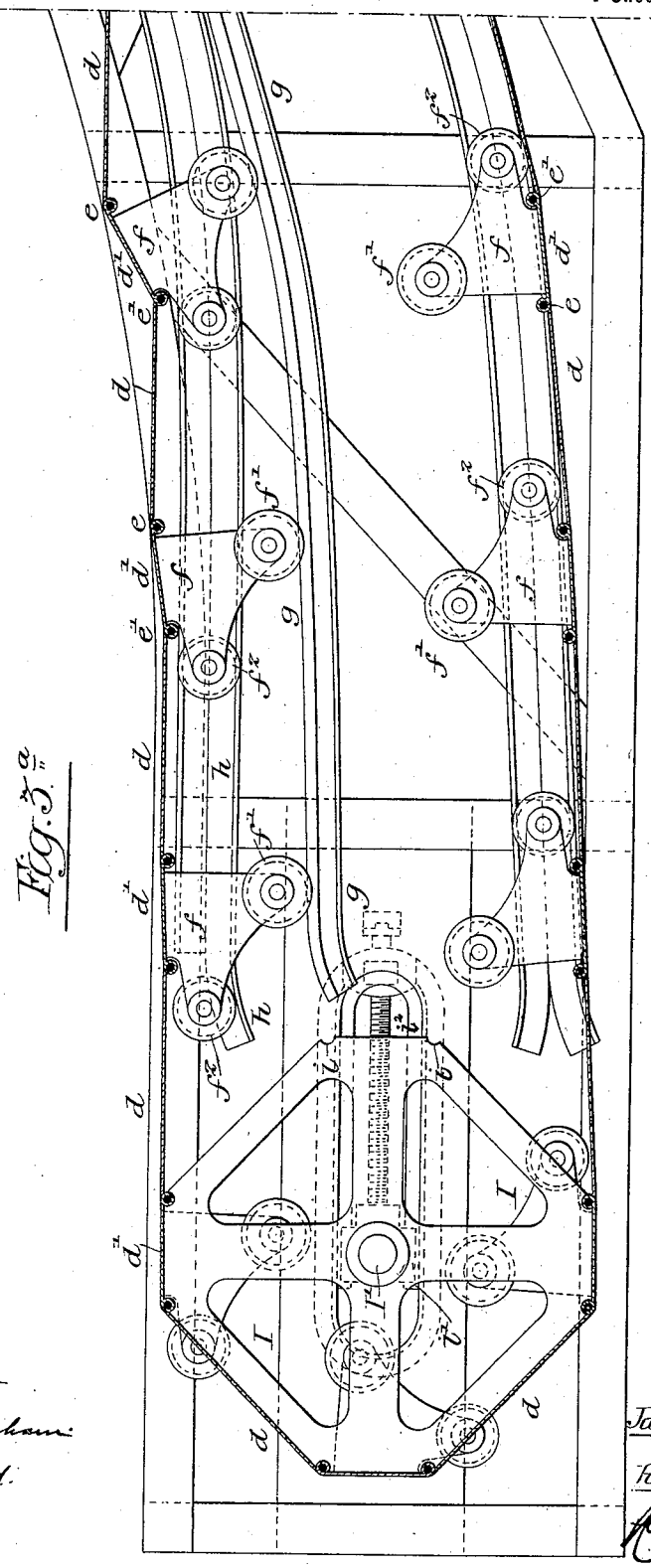


FIG. 3.

Witnesses:-
Frank L. A. Graham.
Louis M. F. Whitehead.

Inventor:
James M. Dodge
-by-
his Attorneys
Howson & Howson

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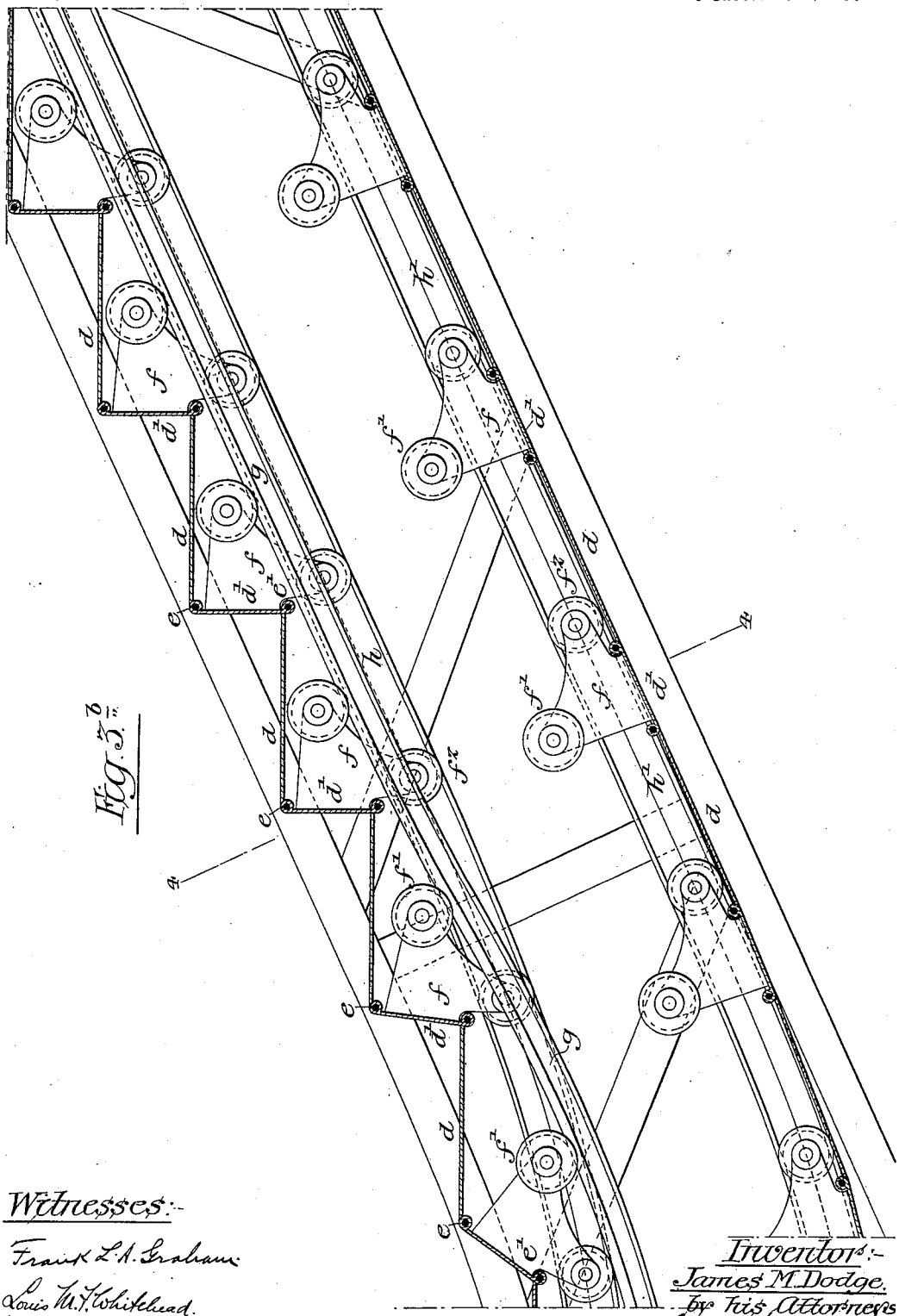


Fig. 3.

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Louis M. Whitehead.

Inventor:-
James M. Dodge.
by his Attorneys
Howson & Howson

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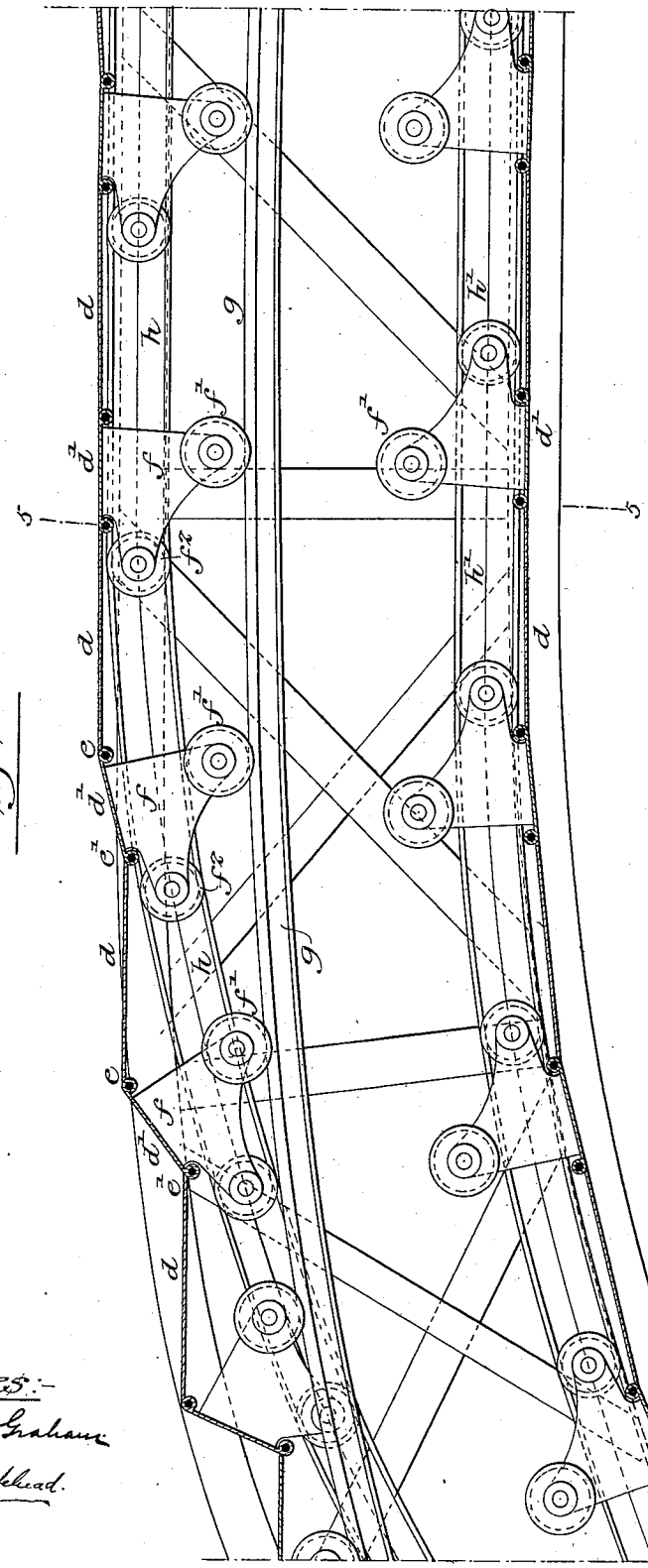


Fig. 3.

Witnesses:-
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Louis M. Whitehead.

Inventor:
James M. Dodge
- by -
his Attorneys
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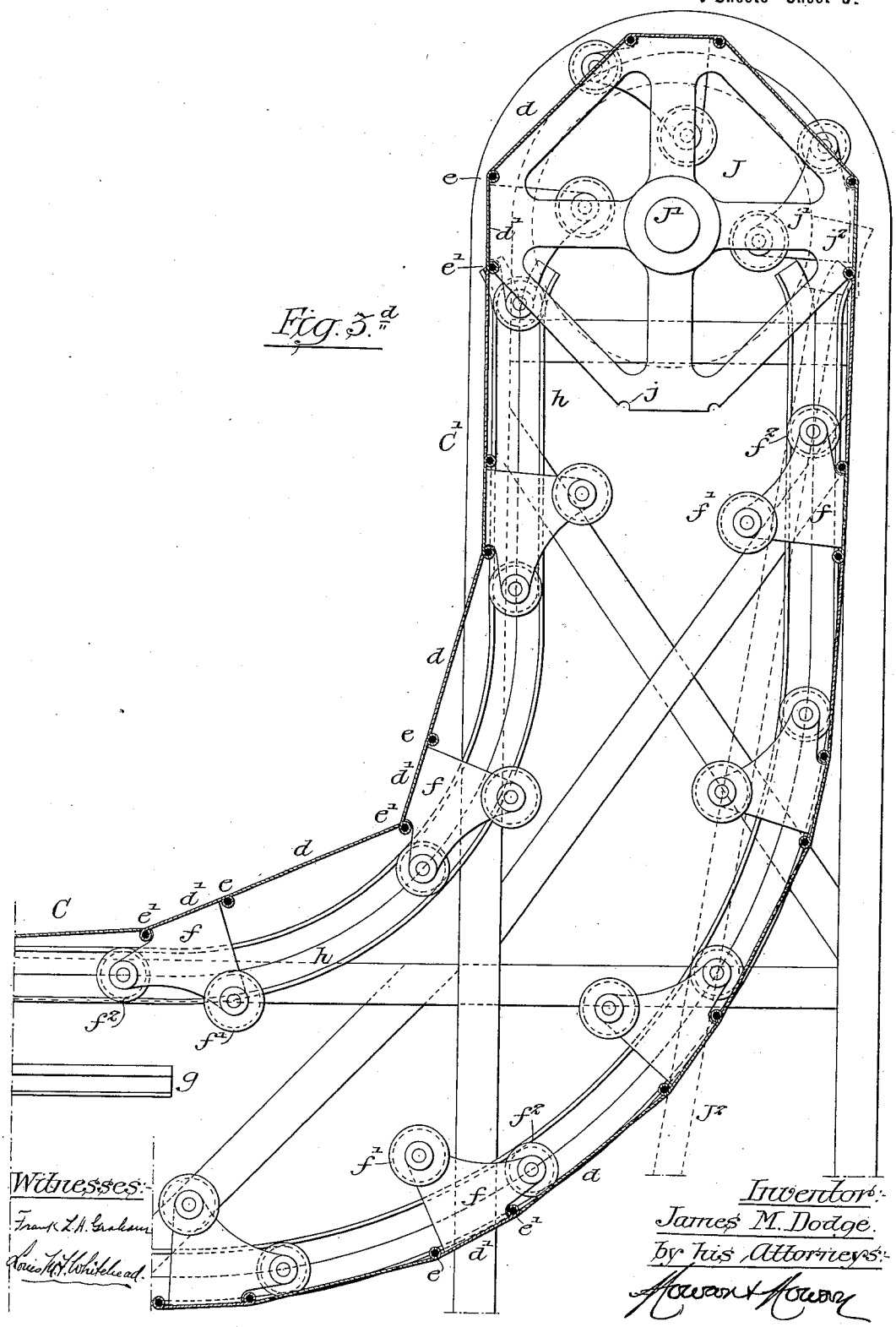
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(No Model.) 7 Sheets—Sheet 5.

Fig. 5.



Witnesses:
Frank L. A. Graham
Louis W. Whitehead.

Inventor:
James M. Dodge.
by his Attorneys:
Howson & Howson

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 4.

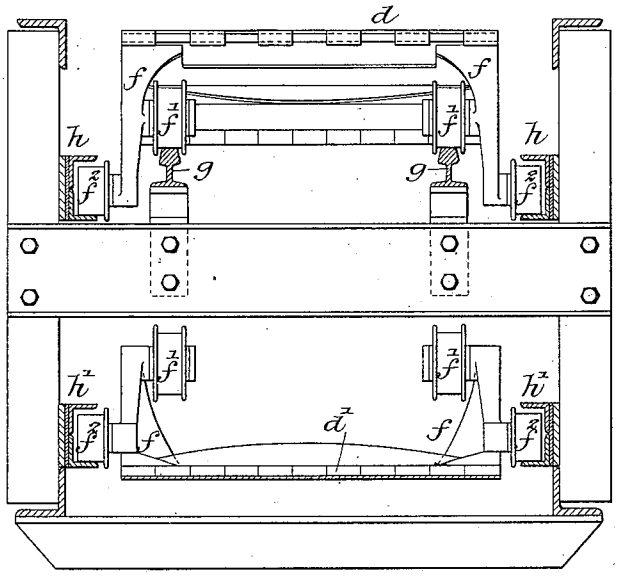
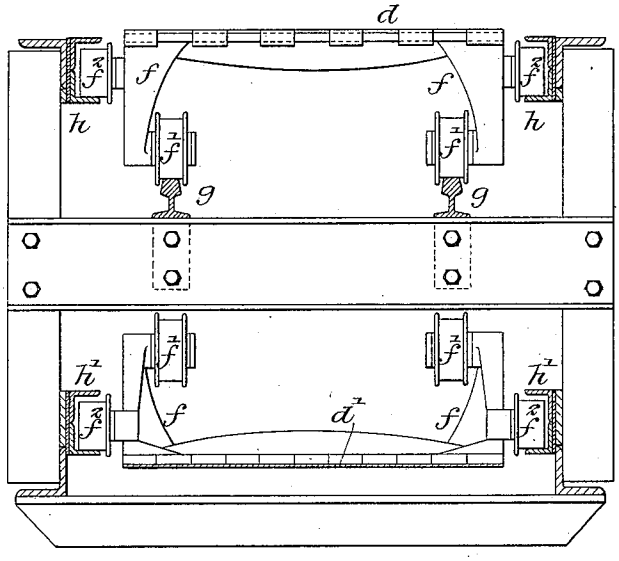


Fig. 5.



Witnesses:-

Frank L. A. Graham.

Louis W. Y. Whitehead.

Inventor:-

James M. Dodge.

by his Attorneys:-

Howson & Howson

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(No Model.) 7 Sheets—Sheet 7.

Fig. 8.

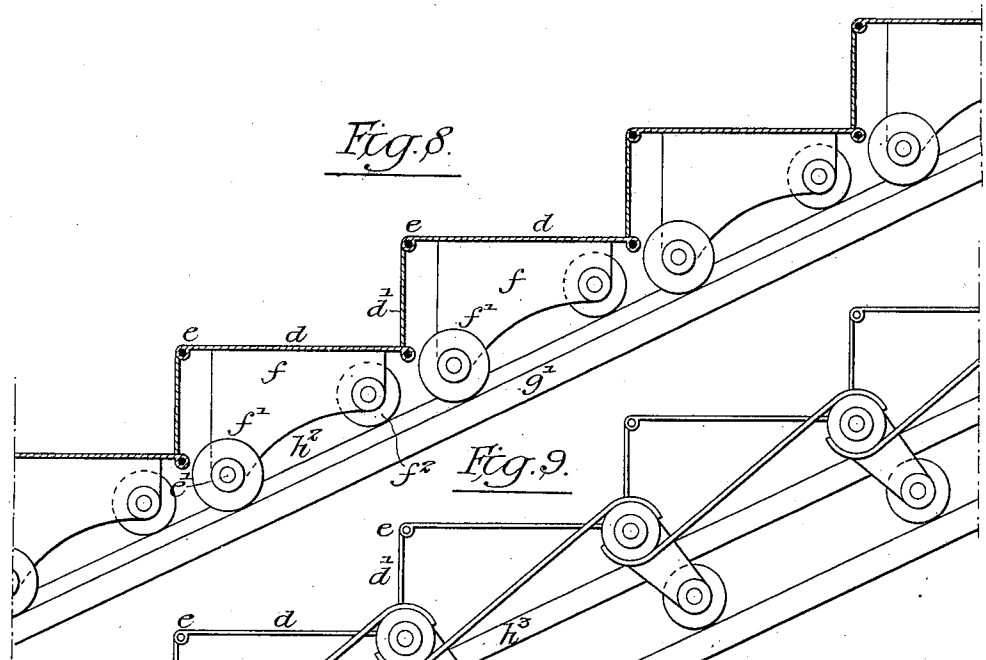


Fig. 9.

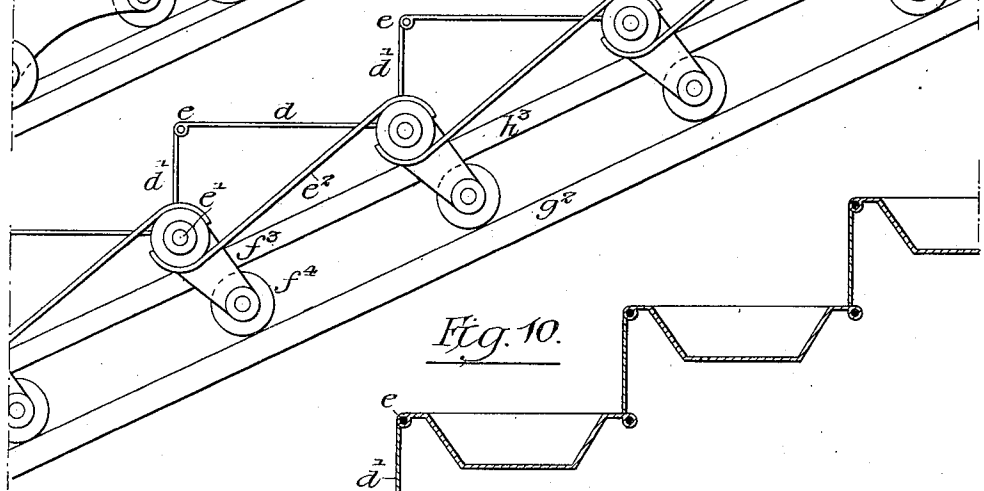


Fig. 10.

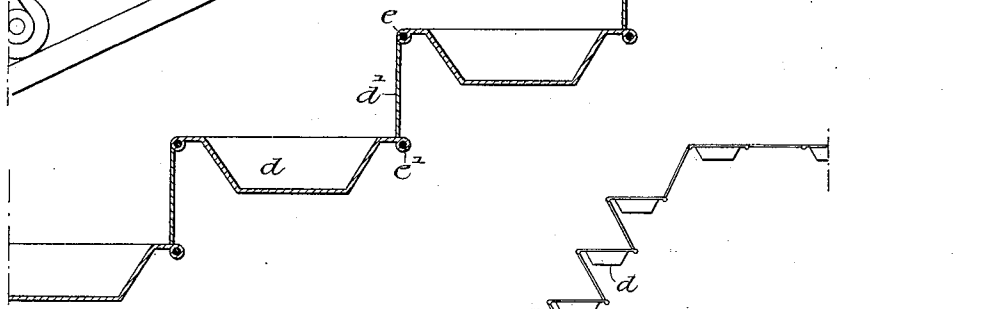


Fig. 11.

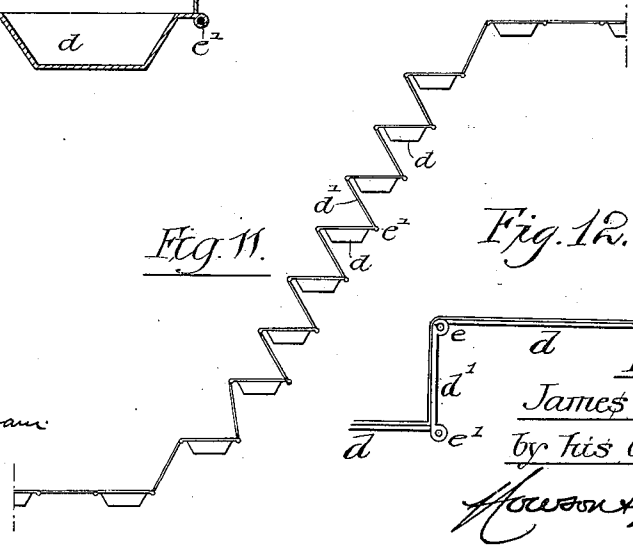


Fig. 12.

Witnesses:-

Frank L. A. Graham.

Louis M. F. Whitehead.

Inventor:-

James M. Dodge.

by his Attorneys:-

Howson & Howson

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES MAPES DODGE, OF PHILADELPHIA, PENNSYLVANIA.

ENDLESS-BELT CONVEYER.

SPECIFICATION forming part of Letters Patent No. 651,241, dated June 5, 1900.

Application filed December 1, 1898. Serial No. 698,012. (No model.)

To all whom it may concern:

Be it known that I, JAMES MAPES DODGE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Endless-Belt Conveyers, of which the following is a specification.

My invention relates to a traveling endless-belt conveyer especially adapted for use as a "moving stairway" for conveying and elevating passengers, but applicable also to the conveyance of goods.

The object of my invention is to so construct an elevating-conveyer of the endless-belt type that it will receive the passengers or freight while in an extended horizontal position and will carry the load up an incline upon horizontal carrying-sections formed by deflecting alternate sections of the belt, as fully described hereinafter.

In the accompanying drawings, Figure 1 is a view in diagram of my improved endless-belt conveyer in the form of a traveling stairway. Fig. 2 is a plan view of Fig. 1. Figs. 3^a, 3^b, 3^c, and 3^d are views, drawn to an enlarged scale, of successive portions of the stairway illustrated in Fig. 1. Fig. 4 is a transverse section on the line 4 4, Fig. 3^b. Fig. 5 is a transverse section on the line 5 5, Fig. 3^c. Fig. 6 is a side view of one of the sections. Fig. 7 is an end view of one of the sections. Figs. 8 and 9 are views of modifications of the invention. Fig. 10 is a view illustrating my improved conveyer as constructed for carrying granular material. Fig. 11 is a diagram illustrating the conveyer constructed so as to elevate materials at a steeper incline than that shown in Fig. 10, and Fig. 12 is a view of a portion of the conveyer with the surface covering.

In Figs. 1 to 7, inclusive, I have shown my conveyer as a single-flight traveling stairway. It will be understood that a number of flights may be formed by lengthening the conveyer or by using a separate conveyer for each flight.

In the drawings, Fig. 1, A is the bottom platform of the stairway. B is the step portion of the stairway. C is the upper platform, and C′ is an abutment at the end of the delivery-platform to prevent the passengers from being carried beyond the platform. This abutment is fully described in my Patent No. 598,772, dated February 8, 1898.

D is an endless belt made in the present instance of a series of sections d and d', hinged one to another at e and e', these sections being solid and forming a continuous band upon any portion of which a passenger can safely stand. The band is extended at the platforms A and C, so that both sections d and d' act as the floor of the platform, and a passenger can step upon the platform A with safety, as there are no intervening spaces. The belt can be flexed at intervals throughout its length, so as to form steps, of which the sections d are in this instance the treads, while the sections d' are turned out of the horizontal plane and form the risers. I prefer to make the sections d' of such a width that when they are turned out of the horizontal they will assume a vertical position, though this is not essential. For the purposes of this description I will hereinafter term the sections d the "tread-sections" and the sections d' the "riser-sections."

Any suitable hinge-joint may be used at the points e e', depending upon the character of the conveyer and whether the conveyer is to be used for passenger or freight traffic.

Secured to the riser-sections d' in the present instance are frames f, Figs. 6 and 7, on which are studs carrying wheels f' f^2, the wheels f^2 being on the outside of the frames and the wheels f' on the inside, as shown in Fig. 6. These wheels, as shown in the sectional views Figs. 4 and 5, are adapted to suitable guide-rails, the wheels f' running upon rails g g (which in the present instance are simple T-rails) and the wheels f' running in channel-rails h h and h' h'. The rails h are the guiding-rails for the conveyer and are horizontal in the portions A and C and at any suitable incline in the portion B of the stairway, so as to carry the conveyer at the angle desired. The rails g are so arranged in respect to the rails h that they will deflect the riser-sections so that they will gradually assume a vertical position on the portion B of the stairway and will assume a horizontal position on the portions A and C of the stairway.

It will be noticed that the rails g in the portions A and C are considerably below the rails h, while they gradually assume a position slightly above the lower portion of the

rails h in the portion B. If it is not necessary to bring the riser-sections at right angles to the tread-sections, the rails g need not be elevated as far as shown in the drawings, and if it is desired to carry the sections so that one tread will slightly overlap another then the rails g may be elevated above the rails h. In the return run of the conveyer the rails h' are used for guiding the wheels f^2 as the conveyer returns in its extended position.

At the lower end of the conveyer are wheels I, mounted on a shaft I', the wheels in the present instance being eight-sided and arranged to fit the sections d d' and recessed at i to receive the hinge-joints. The shaft I' is mounted in adjustable boxes i', controlled by set-screws i^2 and adapted to ways in the frame of the machine, so that on adjusting these screws the slack of the endless belt can be taken up.

At the upper end of the conveyer are the driving-wheels J, secured to a driven shaft J' and identical with the wheels I, being notched at j to receive the hinge-joints of the sections d d'. The shaft J' can be driven in any suitable manner—for instance, by a worm-wheel j', driven by a worm j^2 on a driven shaft J^2, as shown by dotted lines in Fig. 3^d; but it will be understood that any means of driving may be resorted to without departing from my invention.

It will be noticed that the rails g, h, and h' are discontinued near the ends of the conveyer, so that the sections will be free to accommodate themselves to the carrying-wheels I and J.

As shown in the drawings, the deflection of the riser-sections from the horizontal to the vertical and from the vertical to the horizontal is gradual, so that the passenger on mounting the platforms has ample time to adjust the feet upon the treads and free from the risers. Furthermore, the moment the riser is deflected the passenger will unconsciously move the foot or feet back, if on the riser, and will therefore be carried solely by a tread-section and will remain in this position until near the upper platform, being then free to step on any portion of the conveyer without liability of being tripped, as the riser-sections then form, with the tread-sections, a continuous floor.

It will be seen from the above description that the longitudinal dimension of the exposed surface of the conveyer is the same throughout the entire length of the conveyer—that is to say, it does not change in passing from the flat to the flexed portion, or vice versa—so that the surface can be carpeted or covered with any material that will permit flexing of the sections, as shown in Fig. 12.

In Fig. 8 I have shown the guiding-frames f, which carry the rollers f' f^2, as secured to the treads instead of to the risers and controlled, respectively, by rails g' and h^2.

In Fig. 9 I have shown a construction in which the frames are dispensed with and levers f^3, mounted on the pivots e' of the conveyer, are employed, these levers carrying rollers f^4, which are under the control of a rail g^2, a rail h^3 guiding the conveyer. Straps e^2, having resilient and normally-bent ends, extend from the lower portion of the hub of one lever f^3 to the upper portion of the hub of a preceding lever. As the conveyer is flexed, owing to the movement of the levers by the rail g^2, the pivot-points e' are closer together on the inclined portion B of the conveyer than on the portions A or C, the curved elastic ends of the straps flattening as the pivots e' move apart from each other and bending again as the pivots approach each other.

In Fig. 10 I have shown a construction in which the "tread-sections" of the conveyer are in the form of pans or buckets for carrying granular material. Material can be fed in a continuous stream to the conveyer when it is extended, as at A, so that both the tread-sections and the "riser-sections" can be loaded with material, and as the riser-section is turned so that the conveyer may ascend at the proper incline the material thereon will be automatically discharged onto the tread-section, so that by this means the conveyer can be passed rapidly under the feed-chute.

In some instances the angle at which the conveyer ascends may be increased, as shown in Fig. 11, by allowing one tread or carrying section to overlap another, in which case the riser-section is moved considerably past the vertical line.

My improved conveyer is comparatively cheap and can be flexed so as to form horizontal treads or carrying portions connected one to another by riser-sections and which when extended form a continuous floor or platform without change in the longitudinal dimension of the exposed surface.

While I prefer to use the rigid platform-sections and rigid riser-sections, it will be understood that the conveyer may be modified in many ways without departing from the main feature of my invention.

In some instances the covering for the sections may be made in a continuous strip without joints and of such a nature as to be readily flexed and yet have body enough to act as a carrier.

I claim as my invention—

1. In an elevating-conveyer having horizontal and inclined portions, a band constructed at all portions throughout its length for the support of the load, and means for causing flexure of the band at predetermined intervals throughout the length of the inclined portion, to form carrying-sections for the load, the carrying and return runs of the conveyer being disposed one above another, and the sections of the conveyer being so coupled that the longitudinal dimensions of the exposed surface will not be increased or lessened, by change in the direction of movement, so that

the surface of the conveyer can be carpeted, substantially as described.

2. The combination in an elevating-conveyer, having an inclined portion, of an endless band, consisting of a series of quadrangular sections forming treads and risers, and constructed at all portions throughout its length for the support of a load, said sections being hinged together so that they will be rigid as against lateral motion but free to be flexed so that the tread portions will form steps, substantially as described.

3. In an elevating-conveyer, the combination of an endless conveyer adapted to support a load throughout its length, said conveyer being made up of solid tread and riser sections, said sections being pivoted at their abutting edges so that they can be flexed in one direction only, being rigid laterally, with a covering or carpet secured to the sections of the conveyer and covering the joints between the treads and risers, substantially as described.

4. The combination in an elevating-conveyer, of an endless belt made up of a series of sections pivotally connected to each other, each alternate section having carriers, rails or ways on which the carriers travel and which keep the surfaces of all the sections in alinement on the horizontal run and keep the carrying-sections horizontal on the inclined run, substantially as described.

5. The combination in a moving stairway, of an endless chain of successive links forming a continuous surface, with tracks for supporting and guiding alternate links whereby the chain can form either a traveling horizontal platform or steps, substantially as described.

6. The combination in a moving stairway, of a series of tread-sections alternating with a series of riser-sections, the said sections being hinged together, a frame on each riser-section, two sets of wheels on each frame, and rails for the wheels, said rails being so adjusted in respect to each other that the riser-sections will be turned from a horizontal position to a vertical position on the inclined portion of the stairway, substantially as described.

7. In a traveling staircase, the combination of an endless band composed of wide and narrow cross-strips alternately arranged and hinged at their edges, the hinges constituting projections adapted to engage in notches properly spaced in the periphery of carrying-wheels, horizontal and inclined ways in which said band is adapted to travel, means for forming said band into a stairway upon the inclined way, and means for transferring the band into a traveling platform at the horizontal part of said way, substantially as described.

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

JAMES MAPES DODGE.

Witnesses:

WILL. A. BARR,

JOS. H. KLEIN.