

2 Sheets—Sheet 1.

CONVEYER CONTRIVANCE FOR HANDLING COAL.

Patented May 21 1889.

This technical drawing illustrates a mechanical system, likely a screw-driven bucket elevator or a similar lifting apparatus. The diagram is divided into two main sections: a vertical assembly on the left and a multi-level structural frame on the right.

**Vertical Assembly (Left):**

- A vertical shaft is shown, passing through a series of horizontal bars labeled *κ* (kappa) and *μ* (mu).
- A screw mechanism is attached to the shaft, with various components labeled *h*, *I*, *J*, *i*, *s*, *j*, and *l*.
- The shaft terminates in a bucket-like structure at the bottom, which is filled with a granular material. The bucket is labeled with *κ* and *μ*.
- Horizontal dashed lines labeled *γ* (gamma) and *κ* (kappa) indicate specific levels or heights.

**Structural Frame (Right):**

- The frame consists of several vertical supports and horizontal beams, labeled with *Α* (Alpha) and *Β* (Beta).
- A diagonal beam, labeled *g* and *Ε*, connects the vertical assembly to the frame.
- At the top of the frame, there is a pulley system with a rope or cable labeled *f* and *g*.
- Various other components are labeled, including *h*, *I*, *J*, *i*, *s*, *j*, *l*, *κ*, and *μ*.

The drawing is a detailed technical illustration, likely from a historical engineering or architectural manual, showing the mechanical components and structural elements of a lifting device.

ATTEST.

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(No Model.)

2 Sheets—Sheet 2.

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CONVEYER CONTRIVANCE FOR HANDLING COAL.

No. 403,742.

Patented May 21 1889.

FIG. 2.

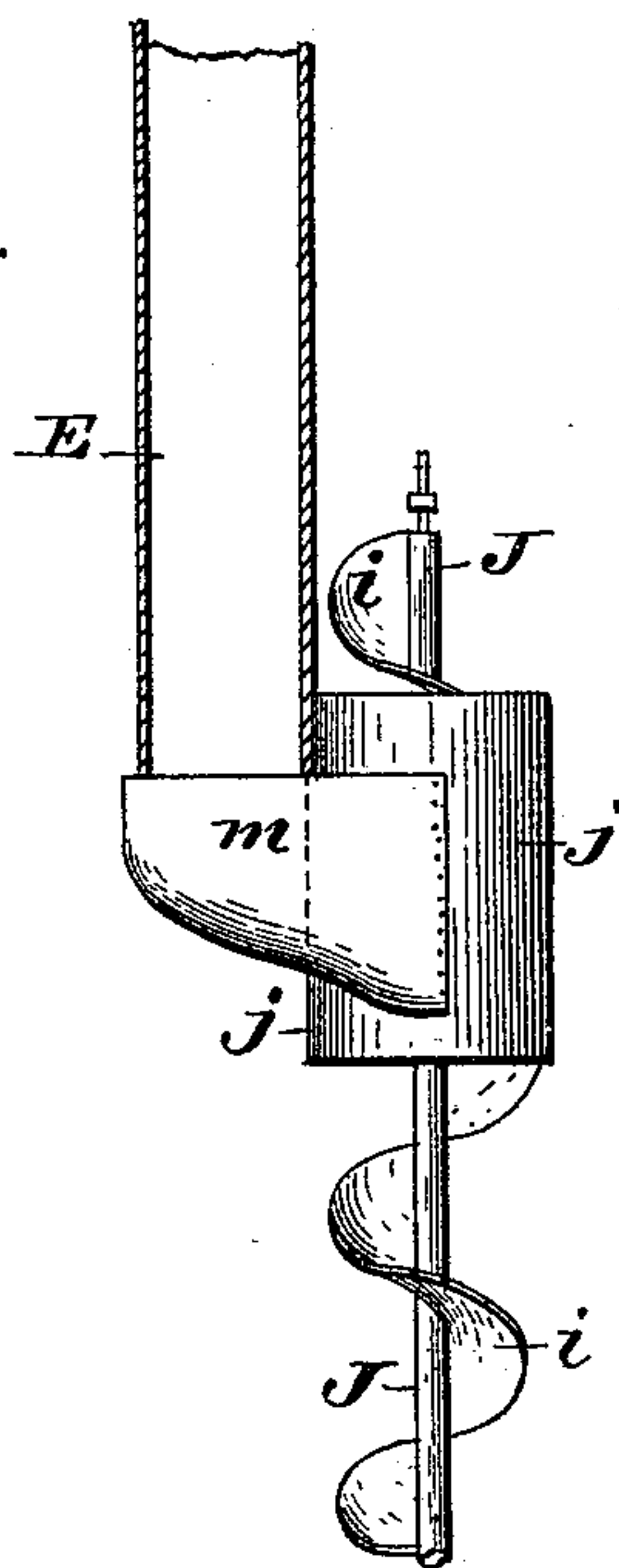


FIG. 4.

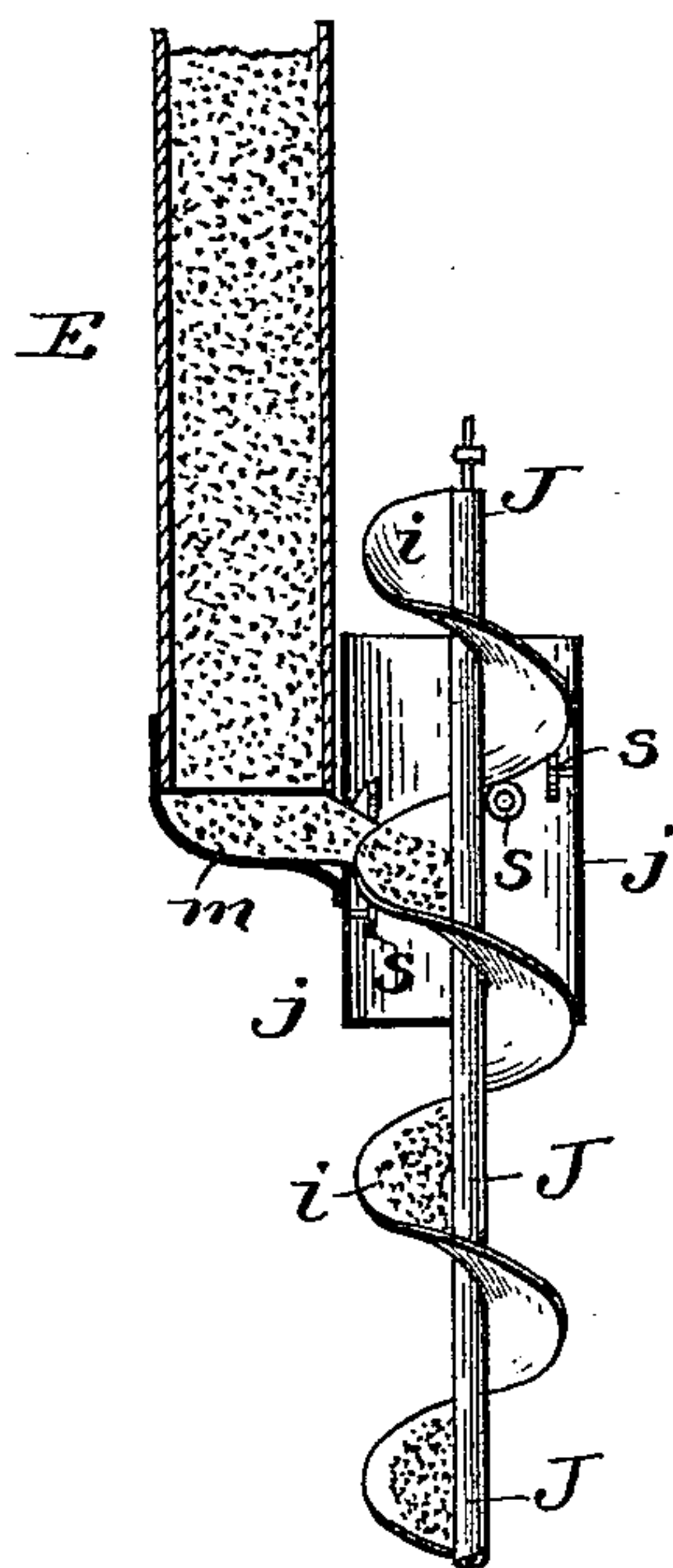
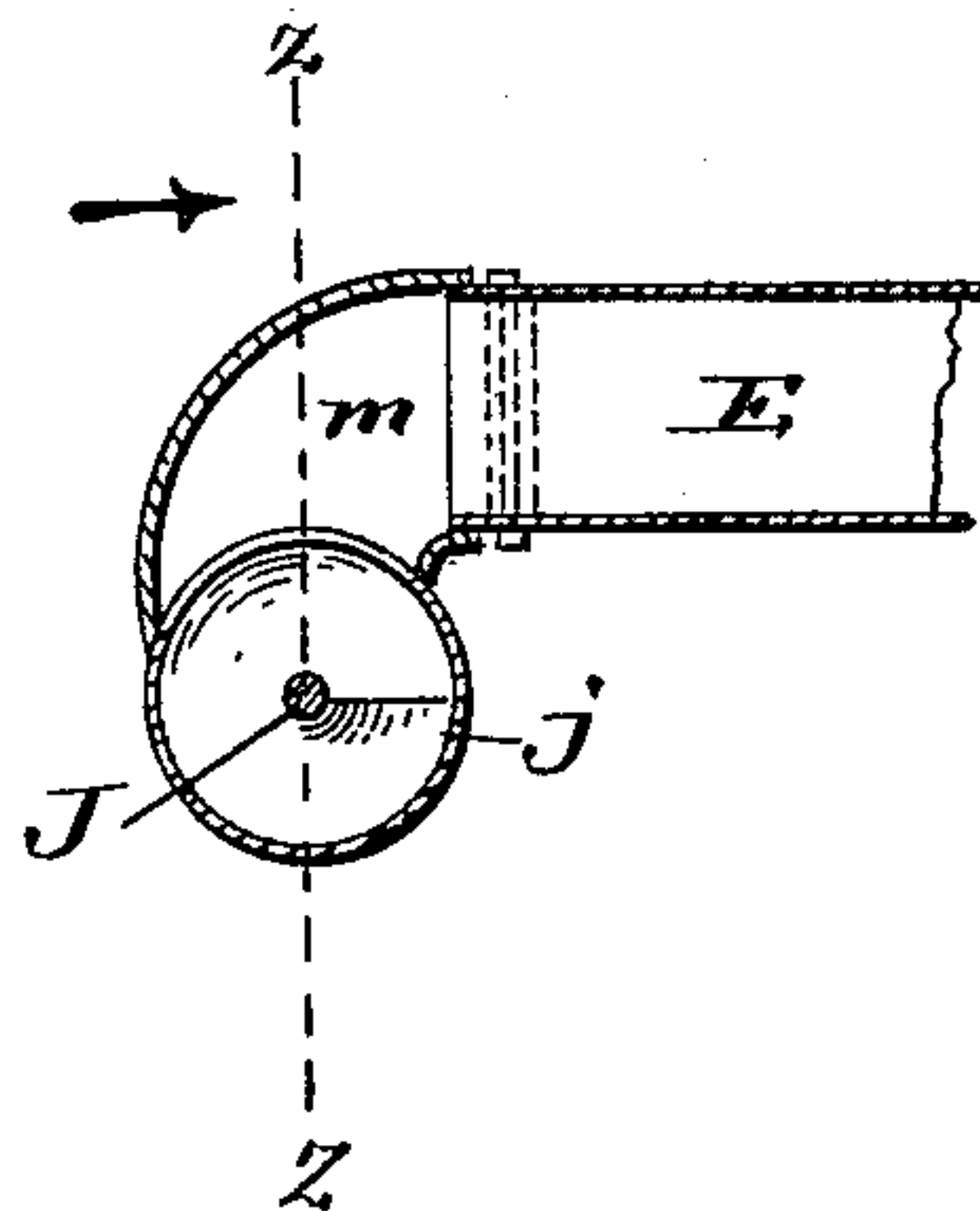


FIG. 3.



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## CONVEYER CONTRIVANCE FOR HANDLING COAL.

SPECIFICATION forming part of Letters Patent No. 403,742, dated May 21, 1889.

Application filed February 1, 1889. Serial No. 298,338. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES M. DODGE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a  
5 new and useful Improvement in Conveyer Contrivances for Handling Coal, &c.; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings,  
10 making part of this application.

My invention relates more particularly to that class of contrivances or apparatus for handling coal which is employed for the purpose of conveying the material from a higher  
15 to a lower elevation either for the purpose of forming a storage pile or heap on the ground, for filling bins, or for loading boats or other vehicles of transportation, and has for its main object to provide for use a contrivance for  
20 these purposes which shall be capable of handling the coal in its descent from a higher to a lower elevation without subjecting the material to any undue abrasion or concussive action liable to depreciate its value or marketable condition.  
25

Previous to my invention it has been proposed to use for the purpose of effecting the descent or downward flow of coal or other analogous material a spiral or helical chute or  
30 conveyer device, down which the coal might flow at a proper speed and from which it could be discharged at the lowermost end of such helical chute and accumulate in a pile around the latter without any injurious effect to the material in thus handling it; but  
35 in all such contrivances heretofore that I know of involving the use of such a spiral chute or downward conveyer such spiral device has been arranged and used in a permanent position and the coal allowed to pile up around the same.  
40

I propose to provide for use a contrivance involving the use of such spiral chute, but having the same arranged and operating in  
45 connection with other devices, so as to be capable of being adjusted during its operation and moved from one locality to another, as may be required by the circumstances under which the contrivance may have to be employed.  
50

To enable those skilled in the art to which my invention relates to make and use the

same, I will now proceed to more fully describe my improvements, referring by letters to the accompanying drawings, which form  
55 part of this specification, and in which I have shown my invention carried out in that form in which I have so far successfully practiced it, although it may be carried into effect under various modifications.  
60

In the drawings, Figure 1 is an elevation showing a portion of what is commonly known as a "gravity-pier" or "trestle-work" mounted on a dock at the river side, and having combined with it the necessary appli-  
65 ances for translating coal from the cars which bring it to said pier to the hold of a barge or vessel. Fig. 2 is a side view, on an enlarged scale, of a small portion only of the apparatus seen on a smaller scale in Fig. 1. Fig. 3  
70 is a top view of the parts seen at Fig. 2 and drawn on the same scale as said figure. Fig. 4 is a detail view on the same scale as that of Figs. 2 and 3, taken on a plane indicated by the section-line  $z z$ , Fig. 3, and looking in the  
75 direction indicated by the arrow in said figure.

In the several figures the same parts will be found always designated by the same letters of reference.  
80

A represents the frame-work of an ordinary gravity-pier, upon which are arranged the railroad-tracks  $b$  and  $c$ , on which the loaded and empty cars are traversed in a manner well understood by those familiar with the  
85 working of coal-trains on such piers. Said pier is supported in the case shown by the dock B, which, as shown, extends into the water in which may be the barges or vessels into which the coal is to be loaded, one of which  
90 barges is represented in the drawings at K.

Two water-levels are indicated in the drawings, respectively, by the lines  $x x$  and  $y y$ , for the purpose of illustrating that, as the vessel or boat K may be at different eleva-  
95 tions relatively to the dock and pier at different conditions of the tide, it is necessary to have the boat-loading chute or apparatus correspondingly adjusted to different elevations, according to the variations in the tide.  
100

C is the upper receiving end or hopper-like portion of the ordinary downwardly-inclined trough, D, into which hopper and trough the coal from the cars while loaded on



the upper track descends as discharged from said cars. Pivotaly connected with the lower end of the trough D, at the point *d*, is the upper end of an ordinary conveyer spout or trough, E, all of said parts being constructed and arranged together substantially after the well-known fashion of such contrivances as have heretofore been used to effect the conveyance of the coal from the cars on the upper track, *b*, into the hold of the barge or vessel K, in such manner, however, that the coal or material has been obliged to fall in a stream from the lowermost end of the ordinary feed-spout, E, into the hold of the vessel.

In my improved apparatus or contrivance I have combined with the lower end of the feed-spout E a receiving-nozzle piece, so to speak, *m*, the exit or discharge portion of which communicates with the interior of a short tube or cylindrical casing, *j*, to which said receiving nozzle or mouth piece *m* is securely fastened in substantially the manner shown. Within this cylindrical casing, and arranged so as to fit loosely therein and be capable of vertical movement therein, is located a portion of the helical chute or conveyer device, which, as shown, is composed simply of a central shaft or stem J and a screw-blade, *i*, which may be either made slightly dishing in cross-section of the blade or may be provided at its spiral perimeter with a flange projecting slightly upward. This helical chute is made adjustable vertically within the partially-surrounding cylindrical casing *j*, and in the case shown engages with said casing *j* through the medium of a series of spirally-arranged small anti-friction rollers, *s*, with which the lowermost surface of the helical blade *i* comes into contact, as shown. (See particularly Figs. 1 and 4.) Said helical chute is sustained or supported by means of a pendent chain, I, the lower end of which is engaged, through the medium of a hook and eye, with the upper end of the central shaft, J, of the helical chute, and the upper end of which is connected with the winding drum or arbor of an ordinary hoisting machine or tackle, H, the operating endless chain or band *h* of which depends, as clearly shown, to such an extent that its lowermost portion may be conveniently manipulated by an operative standing on the deck of the boat K. This chain-hoist H, from which the helical chute is thus suspended, is in turn suspended from the upper end of an obliquely-arranged and vibratory shear-frame, G, the base of which is properly supported, as shown, on the floor of the dock B, and the upper vibratory end of which is connected, by means of a block and tackle contrivance, *f*, with the upper end of the post or standard F of the gravity-pier, and suitably mounted on this post or vertical frame F is the winding-drum or windlass *e*, (provided with suitable means for its manipulation,) the function of which is to wind up the up-

per portion of a chain, *g*, the lower end of which is pivotaly connected at *l* with the lower end of the spout E, (for the purpose of lifting up said hinged spout out of the way,) and to also wind up the cable of the tackle-block contrivance *f* for the purpose of vibrating inwardly or toward the upper end of the gravity-pier the uppermost portion of the shear-frame G.

In the operation of a contrivance as so far shown and described the coal successively dumped from the several cars while on the track *b* enters, as usual, the hopper-like device C, and passes thence obliquely downward through the trough or chute D into the descending spout or conveyer-trough E, from the lower end of which (instead of flowing into the hold of the vessel in the usual manner) it enters the nozzle-like device or mouth-piece *m*, which, as before remarked, is in open communication with the interior of the tube or cylindrical casing *j*, and passes thence within said tubular casing onto the most adjacent portion of the upper surface of the helical blade *i* of the vertically-arranged spiral chute, this spiral chute having been previously arranged by lateral adjustment so as to be about in line with the middle of the vessel K widthwise, and having been adjusted vertically so as to have its lowermost end in comparatively close proximity to the bottom of the hold of the vessel, and also having been vertically adjusted with special reference to having a certain portion of the helical blade *i* in such relative position to the exit or discharge-opening through the cylindrical case *j* as to insure the passage of the material fed through the nozzle *m* directly onto the upper surface of such helical blade. The stream of material, as it descends through the spout E and nozzle *m*, enters within the tubular casing *j*, and, flowing onto the most adjacent portion of the helical blade *i*, descends spirally on said helical blade until it escapes from the lowermost portion thereof onto the bottom of the vessel, and, spreading by gravity and the mobility of the particles, heaps itself up within the hold of the vessel after the manner illustrated at Fig. 1, where M represents an initial pile of coal being accumulated in the hold of the ship. Either continuously or periodically, as the accumulation of coal at M continues, the helical chute is raised or elevated so as to extricate its lower end from the accumulating mass of material, and after the vessel shall have been completely filled or supplied said helical chute will of course have been elevated so as to have its lowermost end in the vicinity of the deck of the vessel, after which it may be still further raised, and is then swung inwardly or toward the gravity-pier both for the purpose of an entire clearance of the vessel and so as to be out of the way, while in a state of disuse, of other vessels which may be passing alongside of or coming up to the dock B. This shifting or translation of the helical



chute to thus get it out of the way is effected by winding up the block-and-tackle contrivance *f* by means of the windlass at *e* until the upper end of the shear-frame *G* shall have  
 5 been brought to a position nearly or quite vertical over its lower end, thus swinging the helical chute contrivance and its attachments laterally to a vertical position nearly or quite in line with the vertical position of the shear-  
 10 frame *G*.

Of course it will be understood that before swinging the helical chute laterally thus into the position just described it must have been sufficiently raised up by manipulating the  
 15 hand-chain *h* of the hoist-machine *H* to have the lowermost end of the depending spiral blade wholly clear the superstructure or floor of the dock *B*, and it will also be understood that in thus folding up, so to speak, the movable parts the spout *E* is turned on its piv-  
 20 otal connection at *d* so as to assume a nearly vertical position and be wholly out of the way, as well as the other parts of the contrivance.

By reason of having the helical blade *i* arranged in engagement with the spirally-arranged set of engaging or supporting anti-friction rollers *s* of the tubular case *j* the relative movements vertically of the spiral  
 25 blade *i* and casing *j* are controlled or regulated, so that some part of the upper portion of said spiral blade, in whatever position the spiral chute may be adjusted to, will always be in the proper relationship to the floor or  
 30 bottom of the feeding-nozzle *m* to assure the passage of the coal as it descends from the spout *E* onto the helical chute or conveyer without any material sudden fall of the coal from the nozzle *m* onto said helical blade.

Of course many modifications may be made  
 40 in the details of construction without departing from the spirit of the main feature or part of my invention, which consists, essentially, in a movable or vertically-adjustable helical chute in contradistinction to station-  
 45 ary devices of a spiral character, such as have been heretofore employed; and it will also be

understood that although I have shown my improved contrivance under those circumstances peculiar to the handling of coal in translating it from the cars to the hold of a  
 50 vessel, said contrivance may be (with such modifications as circumstances may require) employed for either storing coal in bins located at a lower elevation than that from which the supply of coal is to come or for  
 55 making storage piles under like circumstances upon the surface of the ground.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with any suitable supply or conveyer trough through which the descending stream of coal is designed to pass, of a spiral trough or helical chute, *J i*, which is vertically adjustable, substantially in the  
 60 manner and for the purposes set forth. 65

2. The combination, with any suitable supply-spout—such as seen at *E*—and an adjustable helical chute, of a tubular casing, *j*, surrounding a portion of the blade of said helical chute and formed or provided with a supply-nozzle, *m*, adapted to receive the material  
 70 from the discharge end of the supply-spout and feed it to the upper surface of the blade of said helical chute, substantially as hereinbefore set forth. 75

3. The combination, with a suspended and adjustable helical chute and the cylindrical housing or casing *j*, into which the supply of material is discharged, of means by which an engagement between the blade *i* of the chute  
 80 and said casing *j* is effected in such manner as to insure a given relationship of the upper surface of the blade *i* to the point or level at which the material is discharged or fed into said casing *j*, all substantially as and for  
 85 the purposes set forth.

In witness whereof I have hereunto set my hand this 30th day of January, 1889.

JAMES M. DODGE.

In presence of—

E. A. TURNER,

THOS. M. RICHARDS, Jr.