

No. 789,849.

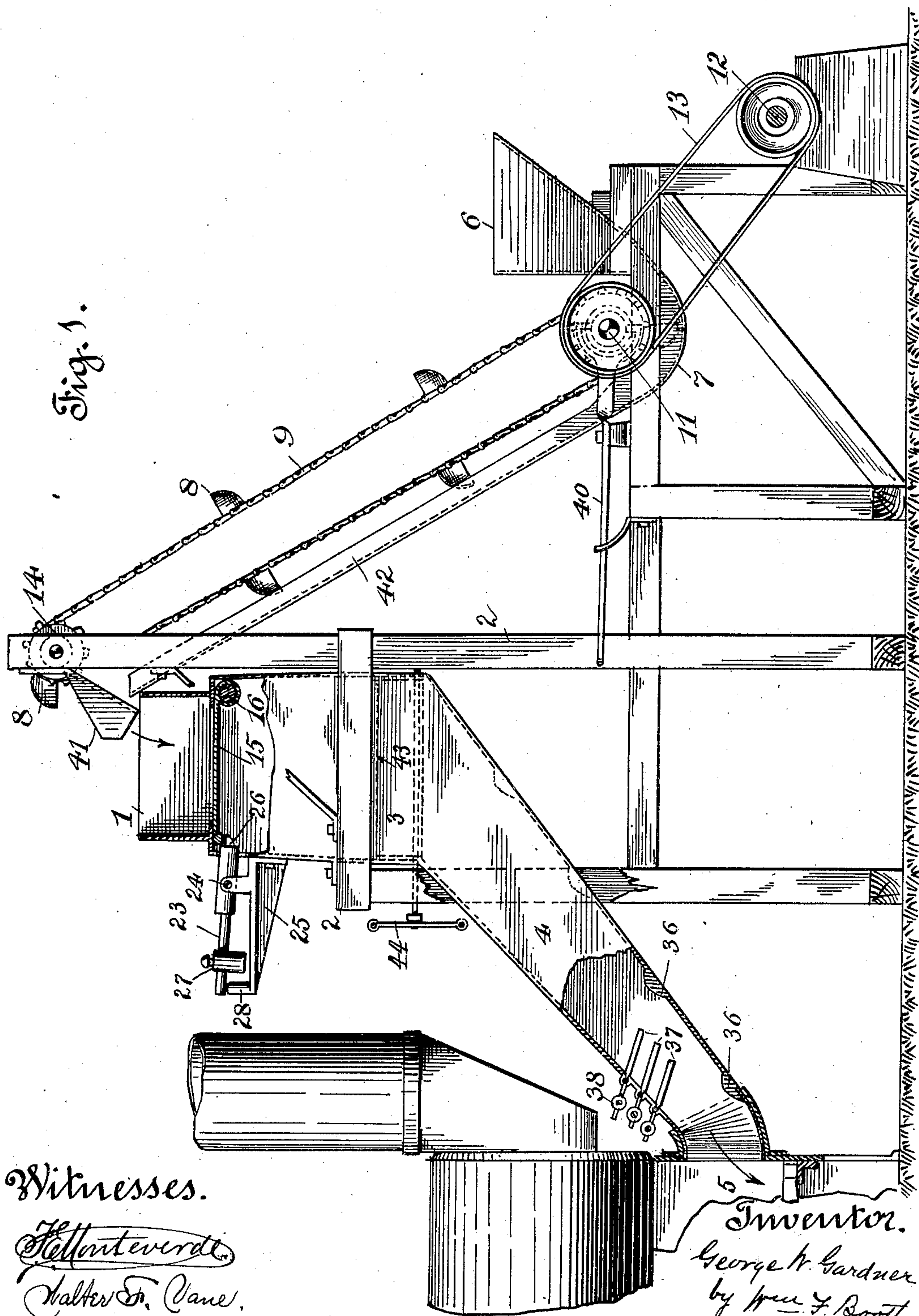
PATENTED MAY 16, 1905.

G. W. GARDNER.

## COAL FEEDER.

APPLICATION FILED MAY 2, 1904.

3 SHEETS—SHEET 1.



Witnesses.

Stoughton  
Walter E. Cane.

Inventor.

George W. Gardner  
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his Attorney

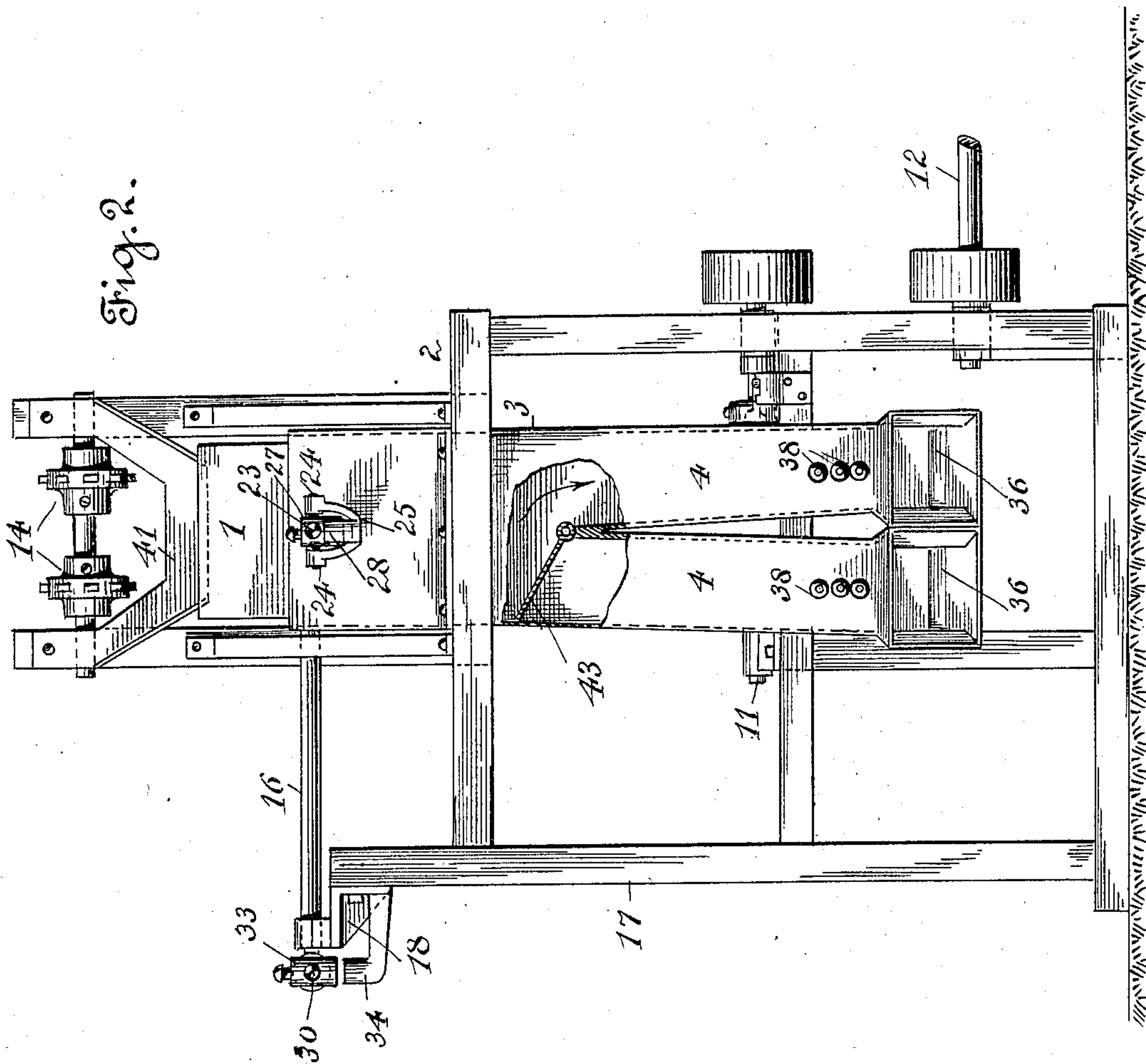
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G. W. GARDNER.  
COAL FEEDER.

APPLICATION FILED MAY 2, 1904.

3 SHEETS—SHEET 2.



Witnesses.

*W. H. Harten*  
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Inventor.

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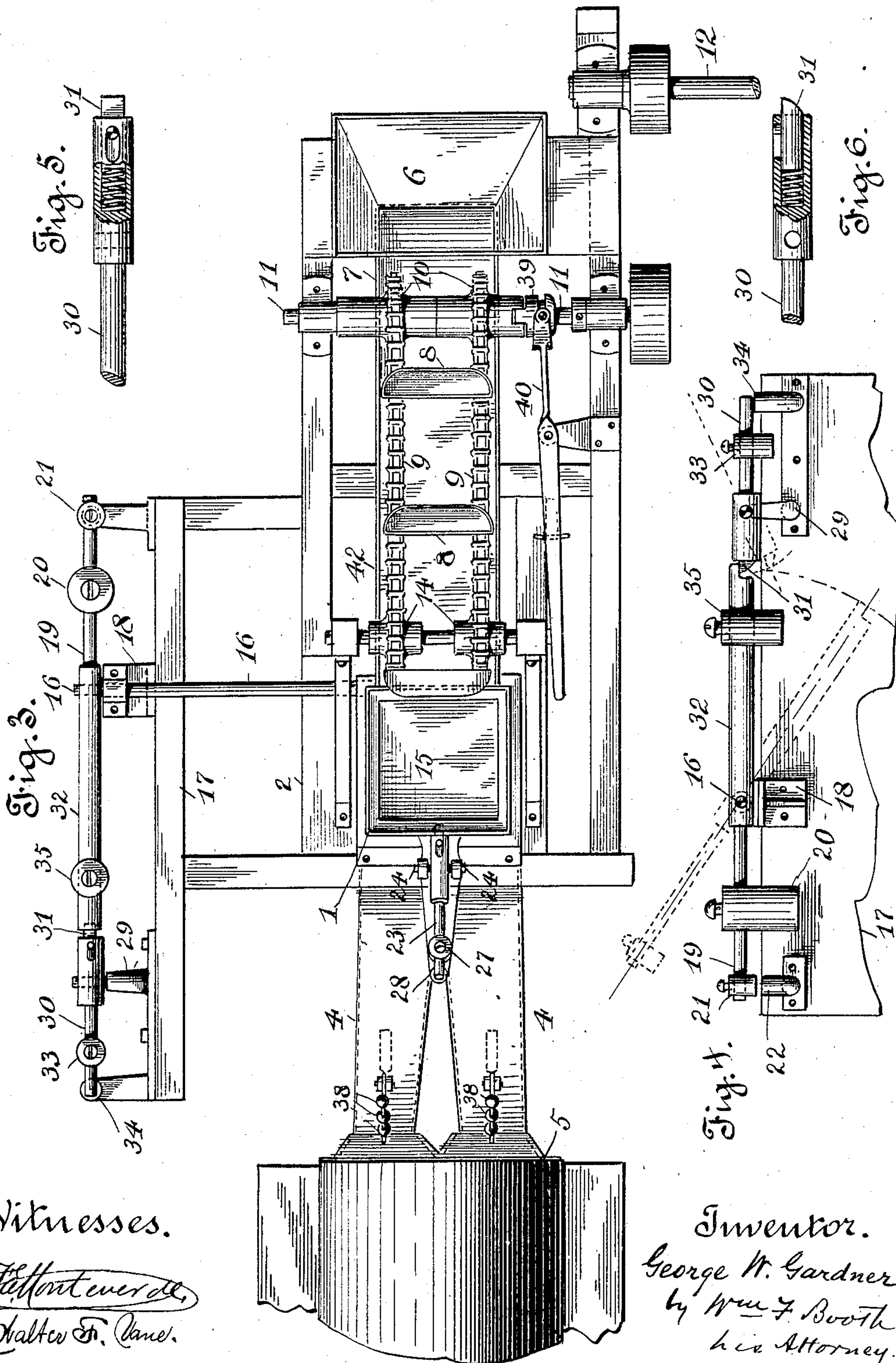
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G. W. GARDNER.  
COAL FEEDER.

APPLICATION FILED MAY 2, 1904.

3 SHEETS—SHEET 3.



Witnesses.

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# UNITED STATES PATENT OFFICE.

GEORGE W. GARDNER, OF SAN FRANCISCO, CALIFORNIA.

## COAL-FEEDER.

SPECIFICATION forming part of Letters Patent No. 789,849, dated May 16, 1905.

Application filed May 2, 1904. Serial No. 205,922.

*To all whom it may concern:*

Be it known that I, GEORGE W. GARDNER, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Coal-Feeders; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of feeders in which the material is elevated to a charge-hopper which is provided with a gate the operation of which is automatically controlled.

My invention, though applicable to the feeding of various materials, and especially fuel of one nature or another, is particularly intended and adapted for the feeding of coal to furnaces.

The general object of my invention is to provide a simple and efficient device for feeding the coal in stated charges the delivery of which is automatic, depending on the weight of the charge itself.

Other objects are to provide simple means for varying the size of the charge at will and to provide for its proper distributive delivery to the furnace.

To these ends my invention consists in the novel construction, arrangement, and combinations of parts, which I shall hereinafter fully describe by reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation of my device. Fig. 2 is an end elevation, partly broken, the elevator being omitted. Fig. 3 is a top plan, the directing-chute 41 being omitted. Fig. 4 is a detail of the gate-controlling devices. Fig. 5 is a broken top view of the spring-catch 31. Fig. 6 is a broken side view of same.

1 is the charge-hopper, supported by a suitable frame 2 at an elevation suitable to enable the charge to descend by gravity to its destination, as seen in Fig. 1. Below the charge-hopper is a delivery-casing 3, from which leads a delivery-chute 4, which may be single, or it may, as shown in Figs. 2 and 3, be divided into branches to distribute the charge more effectually to the furnace.

5 indicates the furnace, with the fire-box of which the delivery-chute 4 communicates.

6 is the general supply or feed hopper, Figs. 1 and 3. With the bottom of this communicates a trough 7, Fig. 1, through which pass the buckets 8 of the elevator 9. The elevator is mounted below upon sprockets 10 of the drive-shaft 11, which shaft is driven from the engine-shaft 12 by a belt 13. The upper end of the elevator is mounted on sprockets 14 so arranged relatively to the charge-hopper 1 that the buckets 8 are adapted to deliver their contents into said hopper.

From the description thus far given it will be seen that the coal supplied to the main hopper 6 and thence passing into trough 7 will be carried up by the buckets 8 and discharged into the charge-hopper 1, from which it will pass through the delivery-chute 4 to the furnace 5.

To divide the coal into charges, the hopper 1 is provided with a bottom gate 15, which is carried by a rock-shaft 16, mounted in one side of the hopper, and thence extending to a bearing-wall 17 and journaled in a suitable bracket 18, secured to said wall. Upon the extremity of the rock-shaft is secured a lever-arm 19, Figs. 3 and 4, upon which is mounted the main controlling-weight 20. This weight is adjustably mounted upon the arm 19, so that it can be moved closer to or farther from the pivotal center of the rock-shaft, thereby decreasing or increasing its leverage. A lug 21 on the free end of the lever-arm 19 is adapted to come in contact with a fixed stop 22, secured to the bearing-wall. The relative positions of these several parts is such that when the lug 21 is resting on the stop 22 the lever-arm 19 is horizontal, and the rock-shaft 16 is so turned that the bottom gate 15 is held up to close the hopper and carry the charge; but when the charge is heavy enough it will overcome the pressure due to the weight 20 and the weights 27 and 33 hereinafter mentioned and swing downwardly to open the hopper and deliver the charge. Thereupon the weight 20 will swing the gate 15 up again to a closed position ready to receive the incoming coal, which gradually increases to a second charge and a repetition of the operation. By moving the weight upon the lever-arm 19 the size of the coal charge may be varied as desired.



I have deemed it best, however, to impose further limitations and variations of this automatic delivery as follows: In order upon the return of the parts to a position of rest to hold them there with certainty and prevent any vibration, as well as to resist a force or pressure due merely to a sudden fall or impact of the coal or large pieces thereof upon the gate, I have for the first object a latch-bar 23, Fig. 1, pivoted at 24 in a bracket 25. The inner end of this bar is fitted with a beveled spring-controlled catch 26, which lies in the path of the free edge of the swinging gate 15 and is disposed in such manner as to yield before the uprising gate to allow its free edge to pass it and then to spring forward below said edge. Upon the latch-bar 23 is slidably mounted a weight 27, the effect of which is to hold the catch of said bar up, and thereby render the gate support, and to vary the degree of support according to the position of said weight on the latch-bar. A fixed stop 28 on the end of the bracket 25 serves to limit the swing of the latch-bar. It will now be seen that the weight of the coal charge in the hopper 1 must be sufficient not only to overcome the main controlling-weight 20, but also to overcome the weight 27, as well as the weight 33, to be hereinafter mentioned; but when this point is reached the gate 15 will swing downwardly, the latch-bar tilting to let it pass. Thereupon the bar will return to carry its spring-catch to operative position ready to engage the returning gate again. The second purpose is effected by an additional mechanism as follows: Pivoted to a bracket 29, Figs. 3 and 4, extending from the bearing-wall is a latch-bar 30, one end of which is provided with a bevel spring-catch 31 in position to engage the end of an arm 32, extending from the rock-shaft 16 in a direction opposite to the lever-arm 19. This engagement is similar in operation and effect to that of the catch of the latch-bar 23 heretofore described in that when the arm 32 rises under the returning weight 20 it will be engaged by the catch 31 and held against vibration. A slidable weight 33 on the latch-bar 30 regulates by its position the pressure of said bar in the performance of its function, and a fixed stop 34 serves to limit the movement of said bar. An additional regulation of the size of the charge is obtained by a slidable weight 35, mounted on the arm 32, which assists the gate in opening.

In order to properly check the fall of the coal charge through the delivery-chute, so that it will not descend into the furnace with violence or with momentum enough to injure the bridge-wall, but will be delivered in the place desired, I place the barriers or obstructions 36 in the floor of the chute, as seen in Fig. 1. These consist of blocks or pieces having preferably a curvilinear surface, which while sufficient to retard the flow or passage of the coal will not

offer too great obstruction. Supplementing these barriers I have what I term "breakers," which consist of flat paddle-like pieces 37, projecting through the roof of the chute and pivoted therein. Weights 38 hold them in position. The heavier pieces or lumps strike these in their fall, and their force is thereby broken, causing them to drop down into the mass again. The yielding of the pivotally-mounted breakers avoids injury to them.

In order to throw the feeder into or out of action, I have the lower sprockets 10 of the elevator mounted loosely upon the shaft 11 and adapted to be connected therewith at will by the sliding clutch 39, operated by the lever 40. (See Fig. 3.)

The coal from the elevator-buckets is directed into the charge-hopper by a guide-chute 41, Figs. 1 and 2, and any accidental overflow or surplus falls back through an opening in said chute (seen in Fig. 2) into a return-chute 42, Fig. 1, which directs it back into the trough 7, to be again raised by the elevator.

The operation of the feeder is as follows: The coal being elevated by the buckets 8 is delivered to the charge-hopper 1, the delivery-gate of which is closed and held by the pressure due to the three weights 20, 27, and 33, the positions of which define this pressure. When the charge is complete, according to the adjustment the gate drops and delivers it to the chute 4 in which, retarded and its force broken by the obstructions 36 and breakers 37, it descends to and is delivered into the furnace 5. As one charge drops the gate closes and latches again to receive the second charge, and so on.

The branches of the delivery-chute are controlled independently when desired by a deflecting-gate 43, (seen in Fig. 2,) which gate is operated by an exterior handle 44. (Shown in Fig. 1.)

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

1. In a coal-feeder, and in combination with a charge-hopper, and a means for delivering the coal thereto, a swinging gate for supporting the charge in and delivering it from said hopper, and the means for adjustably controlling said gate consisting of the rock-shaft, the lever-arm on one side thereof, the adjustable weight on the lever-arm, the lever-arm on the other side of said rock-shaft, the tiltable latch-bar having a spring-controlled catch engaging said last-named arm, and the adjustable weight on said latch-bar.

2. In a coal-feeder, and in combination with a charge-hopper, and a means for delivering the coal thereto, a swinging gate for supporting the charge in and delivering it from said hopper, the means for adjustably controlling said gate consisting of the rock-shaft, the lever-arm on one side thereof, the adjustable weight on the lever-arm, the lever-arm



on the other side of said rock-shaft, the tiltable latch-bar having a spring-controlled catch engaging said last-named arm, and the adjustable weight on said latch-bar, and the adjustable weight on the last-named arm of the rock-shaft.

3. In a coal-feeder, and in combination with a charge-hopper and means for delivering the coal thereto, a swinging gate for supporting the charge in and delivering it from said hopper, the means initially controlling said gate consisting of the rock-shaft, the lever-arm on said shaft, and the adjustable weight on the lever-arm, the means for directly engaging the gate consisting of the tiltable latch-bar having a spring-controlled catch engaging the gate, and an adjustable weight, and means for further controlling the gate consisting of the second lever-arm on the rock-shaft, a tiltable latch-bar having a catch engaging said arm, and the adjustable weight on the latch-bar.

4. In a coal-feeder, and in combination with

a charge-hopper and means for delivering the coal thereto, a swinging gate for supporting the charge in and delivering it from said hopper, the means initially controlling said gate consisting of the rock-shaft, the lever-arm on said shaft, and the adjustable weight on the lever-arm, the means for directly engaging the gate consisting of the tiltable latch-bar having a spring-controlled catch engaging the gate, and an adjustable weight, the means for further controlling the gate, consisting of the second lever-arm on the rock-shaft, a tiltable latch-bar, having a catch engaging said arm, and the adjustable weight on the latch-bar, and an adjustable weight on the said second arm of the rock-shaft.

In witness whereof I have hereunto set my hand.

GEORGE W. GARDNER.

Witnesses:

WALTER F. VANE,  
D. B. RICHARDS.