

No. 689,444.

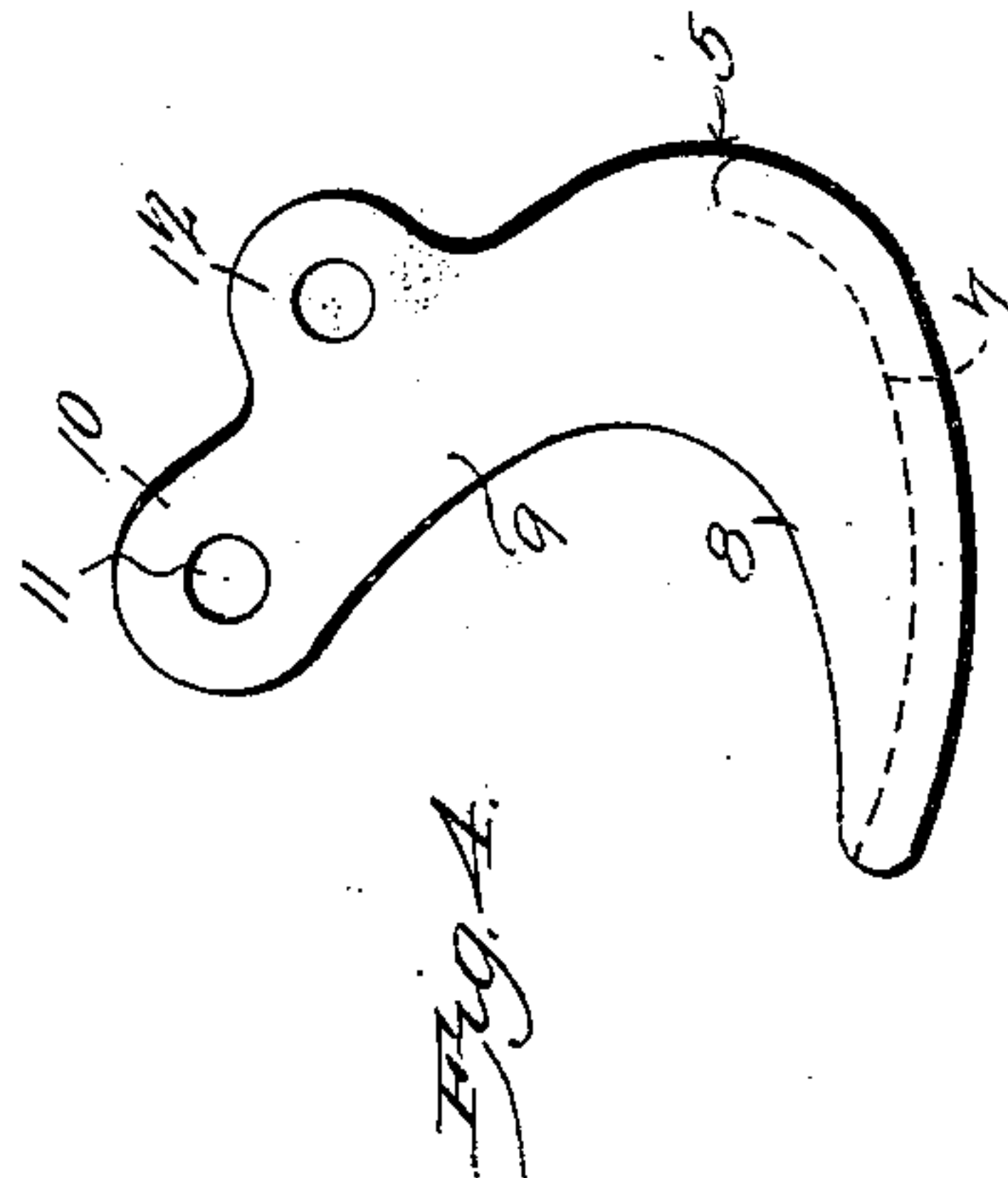
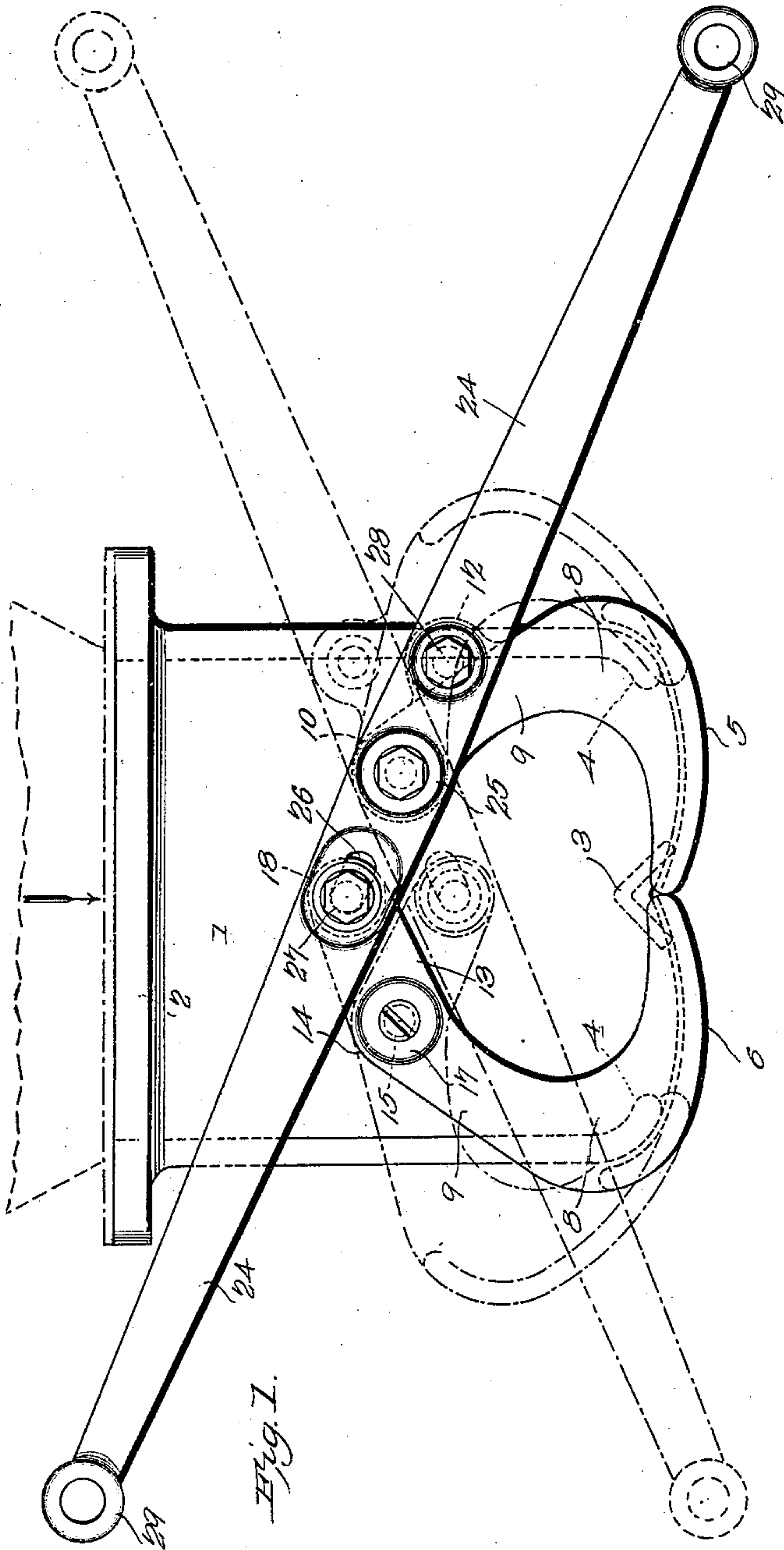
Patented Dec. 24, 1901.

E. T. WILLIAMS.
DOUBLE DOOR HOPPER GATE.

(Application filed Sept. 11, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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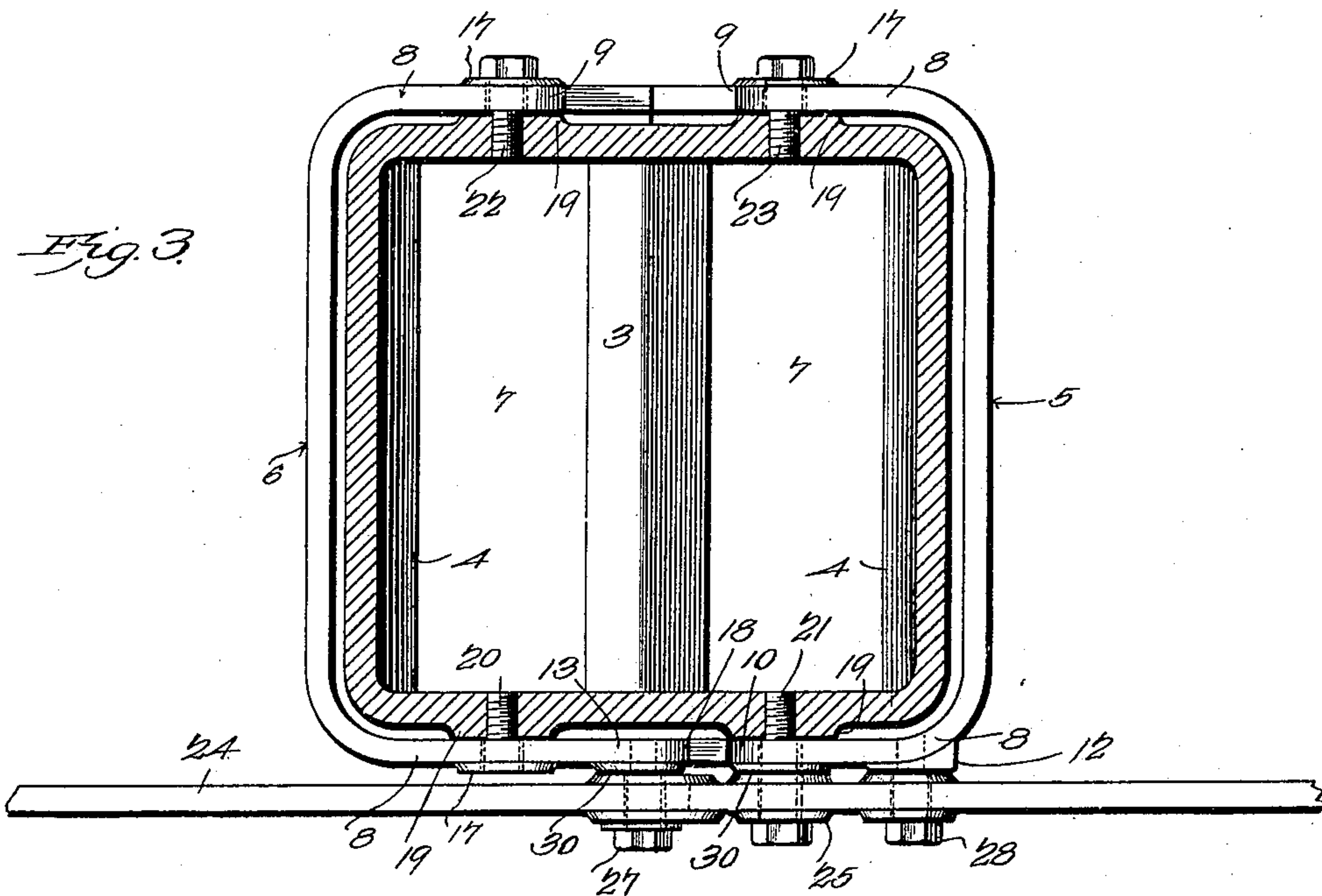
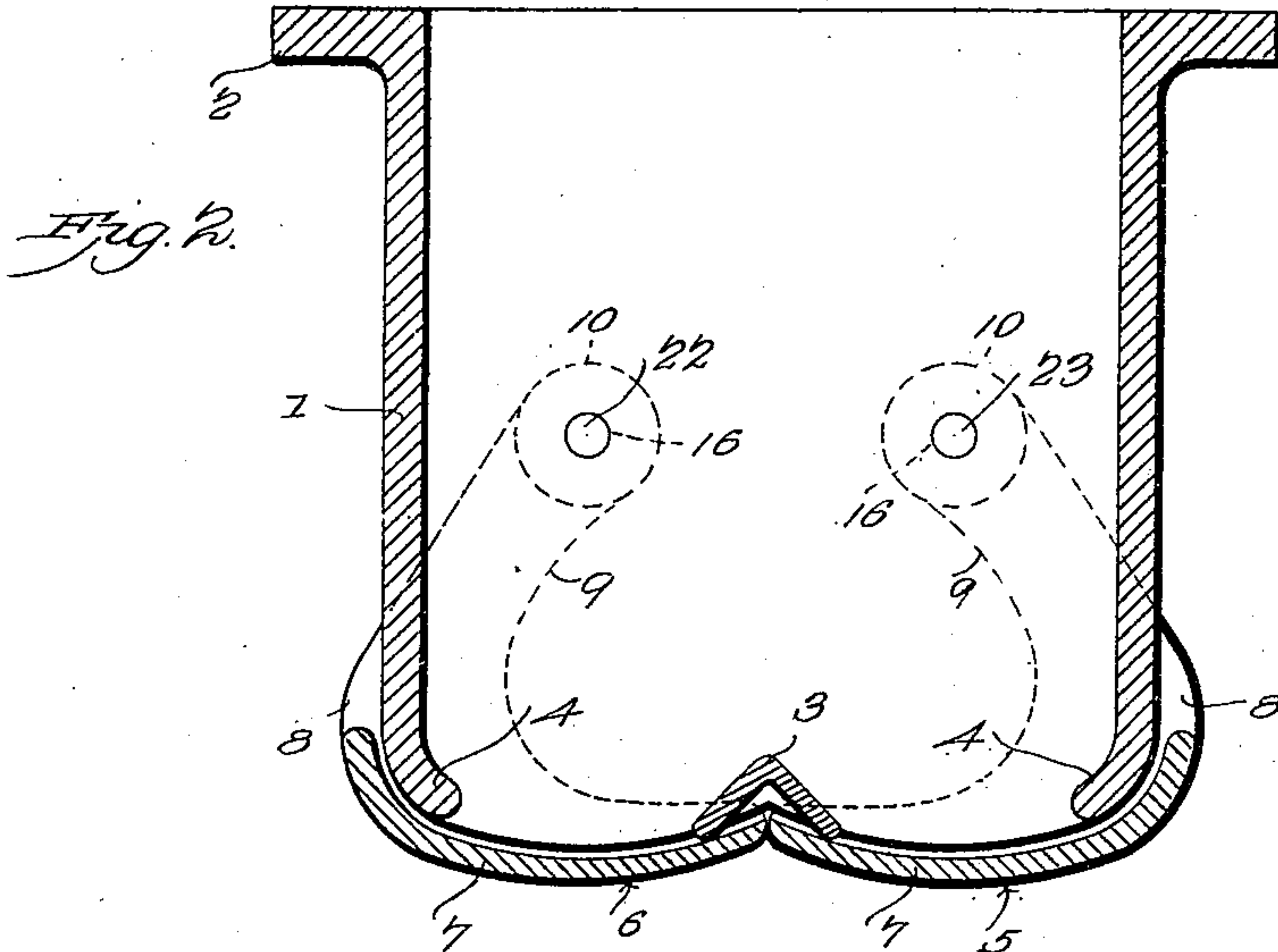
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UNITED STATES PATENT OFFICE.

EDWARD THOMPSON WILLIAMS, OF NEW YORK, N. Y.

DOUBLE-DOOR-HOPPER GATE.

SPECIFICATION forming part of Letters Patent No. 689,444, dated December 24, 1901.

Application filed September 11, 1901. Serial No. 75,050. (No model.)

To all whom it may concern:

Be it known that I, EDWARD THOMPSON WILLIAMS, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented a new and useful Double-Door-Hopper Gate, of which the following is a specification.

This invention relates to a double-door-hopper gate designed for general usage, but particularly adapted to be applied to coal-chutes in electric light and power stations and for other purposes or wherever a chute may be used; and the aim and purpose of the same is to positively operate the gate portions of the device, to open and close the latter by a downward pull exerted on the opposite extremities of a lever attached to the gates without the interposition of connecting-links or other fragile parts, and to provide for a quick action by the gates without lost motion, thereby reducing the number of parts usually employed in devices of this class and rendering the operation of the gates in either direction to open or close the same easy and also efficient in performing the work for which they are intended.

The invention consists in the construction and arrangement of the several parts, which will be more fully hereinafter described and claimed.

In the drawings, Figure 1 is an end elevation of a box or hopper, showing the improved gate mechanism applied thereto. Fig. 2 is a transverse vertical section of the box or hopper and gates. Fig. 3 is a horizontal section taken through the box or hopper above the plane of the operating mechanism for the gates. Fig. 4 is a detail side elevation of one of the doors or gates.

Similar numerals of reference are employed to indicate corresponding parts in the several views.

The numeral 1 designates a metallic box or hopper open at the top and bottom and provided at the upper end with a flanged or other construction 2 for readily attaching it to chutes or the like. The top of the box may be of any desired shape; but the lower portion should be rectangular in form. In the bottom of the box or hopper 1 and extending from front to rear is a permanent

bridge 3, which is centrally disposed and parallel to the axis of the gate or door mechanism, which will be hereinafter set forth, and is also over the joint formed by the inner edges of the gates or doors when closed. This bridge may be of any desirable form, but preferably consists of an angle-iron section, with the apex of the angle turned upwardly and the sides formed forty-five degrees to the vertical. The lower terminals 4 of the sides of the box or hopper are slightly curved inwardly and are parallel to the axis of the gate or door mechanism to form a support from which the material passing through the box or hopper, especially coal, would tend to arch and relieve the gates or doors of much of the weight that would otherwise bear directly upon them.

The mechanism controlling the opening and closing of the lower end of the box or hopper includes a pair of hinged gates or doors 5 and 6 of approximately similar construction and dimensions, with the particular exceptions which will be hereinafter noted. Each of the gates below its point of attachment either to the box or hopper or the operating mechanism is precisely similar in construction to the other and includes a curved bottom 7 and opposite end flanges or webs 8, that are adapted to close over the lower portions of the opposite ends of the box or hopper 1. The lower edges of the front and rear ends of the box or hopper and the bottoms 7 of the gates or doors 5 and 6 are similarly curved to give the gates a clearance in their closing and opening movements, the upper surfaces of the bottoms 7 being normally slightly below the lower edges of the front and rear sides of the box or hopper, as clearly shown by Fig. 2. The gates or doors also have inwardly-extending arms 9 at opposite ends, which continue regularly from the flanges or webs 8, and the gate 5 has the upper ends 10 of its arms formed as fulcrum-eyes 11, and on the outer edge of the front arm of said gate 5, below the plane of the fulcrum-eye thereof, is an intermediate fulcrum projection 12. Continuing from one of the arms 9 of the gate 6 is a fulcrum extension 13, which is at a less angle than the said arm, and at the elbow 14 between the upper terminal of the arm and extension a

fulcrum-eye 15 is formed. The opposite arm 9 of the gate or door 6 has a fulcrum-eye 16 at the upper terminal thereof similar to the eyes 11 of the arms 9 of the gate or door 5.

5 At the points where the fulcrum-eyes on the two sets of arms are located and also at the upper terminal of the extension 13 enlargements 17 are formed to strengthen the parts in view of the apertures formed in the eyes, 10 the upper terminal of the extension 13 also being in the form of an eye 18. On the front and rear ends of the box or hopper 1, at an intermediate point and on opposite sides of the vertical central line therethrough, bosses 15 19 are formed to give a stable bearing for fulcrum-screws 20, 21, 22, and 23, which are respectively passed through the eyes 15 and 11 of the front arm of the gates 6 and 5 and also through the fulcrum-eyes of the rear arms of 20 the said gates. The fulcrum screw or bolt 21 is made longer than the remaining screws, for a purpose which will presently be set forth; but it will be understood that said fulcrum-screws serve as the pivots on which the 25 gates swing in their opening and closing movements, and through the medium of simple mechanism, which will now be explained, connections and trip mechanism for the gates are entirely dispensed with, and so far as the 30 actual pivotal action of each gate is concerned it is entirely independent of the other gate. The location of the gate-pivots is in such relation to the center of gravity of the loaded gates that the weight of material upon the 35 gates tends to maintain them in closed position.

The means employed for opening and closing the gates is in the form of a lever 24, which has a central fulcrum-eye 25, engaged 40 by the fulcrum screw or bolt 21, and by this means the single bolt or fulcrum-screw is made to serve a like function for both the lever and the front arm 9 of the gate 5. Close to the fulcrum-eye 25 and at the left thereof 45 the lever 24 is formed with a slot 26, which extends longitudinally of the said lever and therethrough, and through the fulcrum-eye 18 of the extension 13 a fulcrum screw or bolt 27 is passed, the slot 26 giving a slight play to 50 the lever 24 to overcome any tendency toward a deadlock of the gates and to insure a positive opening and closing movement of the latter. On the right side of the fulcrum-eye 25 the lever is connected by a fulcrum screw 55 or bolt 28 to the intermediate fulcrum projection 12 on the front arm 9 of the gate 5. The opposite ends of the lever 24 are formed with eyes 29, to which suitable pull-ropes, chains, or cables are adapted to be attached, 60 and the arrangement of the parts is such that when one end of the lever is elevated the opposite end is lowered, and in the present instance when the gates or doors are closed the left extremity of the lever will be elevated 65 and the right extremity of the same will be in a lowered position.

By pulling down the left end of the lever

24 to fully open the gates or doors the parts will change in position from that shown in full lines in Fig. 1 when the gates or doors 70 are closed to that shown by dotted lines when the gates are fully open, and the bottom of the box or hopper 1 will be cleared. When the gates are opened, the right extremity of the lever will be elevated, and to close the gates 75 a direct downward pull of the extremity on the lever will result in the operation desired. Thus it will be seen that in operating the lever 24 to open and close the gates a downward pull is applied to the opposite extremities of 80 said lever in both instances. In the operation of the lever the gates will move outwardly or inwardly simultaneously and equally, which is due to the fact that the provision of the extension 13 and the fulcrum projection 12 in 85 such position in relation to each other and to the fulcrum of the lever, the latter fulcrum being eccentric in relation to the end of the box or hopper, that the downward pull on the lever either to open or close the gates 90 will result in an instant or immediate transmission of the movement of the lever to the gates through the fulcrum projection 12 and extension 13. This mode of attaching the lever is materially in advance, from 95 a mechanical standpoint, of the link mechanisms ordinarily employed on account of the absence of lost motion, and, further, because the said extra parts are not in the way of the direct-applied power of the lever generated 100 by the operation thereof. It will be seen that the gate 5 is caused to swing or move around the fulcrum for the lever 24, and at the time the gate 5 starts to move inwardly or outwardly the gate 6 is prevented from being 105 sluggish in the least and immediately has a like motion imparted thereto through the medium of the extension connected to the lever, as explained, and continuing rigidly from the front arm 9 of the said gate 6. It will be seen 110 that the fulcrum-eyes of the arms 9, extension 13, and projection 12 are surrounded on the sides adjacent to the lever by bearing-lugs 30, so as to cause the lever to stand outwardly therefrom without binding thereon, and thus 115 do away with the necessity for separate connecting-links. Another reason for the accuracy in simultaneous operation of the gates is that the fulcrum connection between the extension 13 and the lever 24, as heretofore 120 explained, is above the fulcrums for the gates when the latter are closed and below the said fulcrums when the gates are opened, and hence the power applied to the lever in either the opening or closing operation of the gates 125 will be forcefully imparted to the extension 13 and to the gate 6 and directly to the arm 9 at the front of the gate 5.

In some instances it may be desired to hold the gates normally open, and this position 130 can readily be obtained by attaching a weight to the extremity of the lever, which is operated in the present instance to open the gates. This is an obvious expedient and will be read-

ily understood by those skilled in the art. By such an arrangement the improved device can be made to operate to shut off at intervals a continuous flow of material through the box or hopper 1. The improved construction has a wide range of application, and in view of its durability and simplicity, as well as its positive operation and certainty of action, it will prove a useful acquisition to devices for regulating and controlling the feed of materials of various kinds conducted through chutes or other analogous conduits. Though the preferred and simplified form of the improved device is shown in the accompanying drawings and particularly referred to in the foregoing description, it will be understood that changes in the form, size, proportions, and minor details may be resorted to without departing from the principle of the invention.

Having thus described the invention, what is claimed as new is—

1. In a mechanism of the class set forth, the combination of a box or hopper, hinged gates cooperating with the lower portion thereof and having an outward and inward movement to respectively open and close the same, and an operating-lever directly connected to portions of said gates and actuated by a downward pull at opposite extremities to open and close the gates.

2. A device having hinged gates, and a lever directly connected to portions of the gates and operated by a downward pull exerted on opposite extremities to respectively open and close said gates.

3. In a mechanism of the class set forth, the combination of a box or hopper having a lower open end with the lower terminals of the sides curved inwardly to arch the contents thereof and also provided with a central permanent bridge, outwardly and inwardly opening and closing gates cooperating with said end of the box or hopper, and a lever directly attached to portions of the said gates and actuated to open and close the gates by a downward pull exerted on opposite extremities.

4. In a mechanism of the class set forth, the combination of a box or hopper having a lower open end, gates movably applied to the box or hopper to open and close the said lower open end thereof, and a lever directly attached to said gates and fulcrumed on one end of the box, the fulcrum for the lever serving also as the fulcrum for one of the gates.

5. In a mechanism of the class set forth, the combination of a box or hopper having an

open bottom, gates cooperating with the said bottom to open and close the same and provided with inwardly-extending arms, and an operating-lever directly attached to portions of said arms, the fulcrum for the lever serving also as a fulcrum for one of the gates.

6. In a mechanism of the class set forth, the combination of a box or hopper open at the bottom, a pair of gates cooperating with the open bottom of the box or hopper and having inwardly-projecting arms fulcrumed on opposite ends of the hopper, the one arm of one gate being provided with an extension and the adjacent arm of the other gate with a projection, and a lever fulcrumed on one end of the box or hopper and having a slot adjacent to its fulcrum with connecting means therein for said extension, the lever on the opposite side of its fulcrum being attached to said projection and the fulcrum of the lever serving also as the fulcrum for one of the gates.

7. In a mechanism of the class set forth, the combination of a box or hopper open at the bottom and top, hinged gates cooperating with the open bottom of the box or hopper and having projecting devices at one end, and an operating-lever fulcrumed eccentrically in relation to one end of the box or hopper and connected to said projecting devices.

8. In a mechanism of the class set forth, the combination of a box or hopper having an open top and bottom, gates cooperating with the said open bottom of the box or hopper, and a lever fulcrumed on one end of the box and directly connected to portions of the gates on opposite sides of its fulcrum, the connection for one portion of one gate being slidable in relation to the lever.

9. In a mechanism of the class set forth, the combination of a box or hopper having an open top and bottom with bosses on the outer sides of the opposite ends, a pair of gates cooperating with the open bottom of the box or hopper and having projecting members fulcrumed on the said bosses, and a lever fulcrumed on the one end of the box by the fulcrum of one of the gates also directly attached to the said gates.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

EDWARD THOMPSON WILLIAMS.

Witnesses:

EDWARD B. STOTT,
JOHN THOMSON.