No. 887,085. PATENTED MAY 12, 1908.

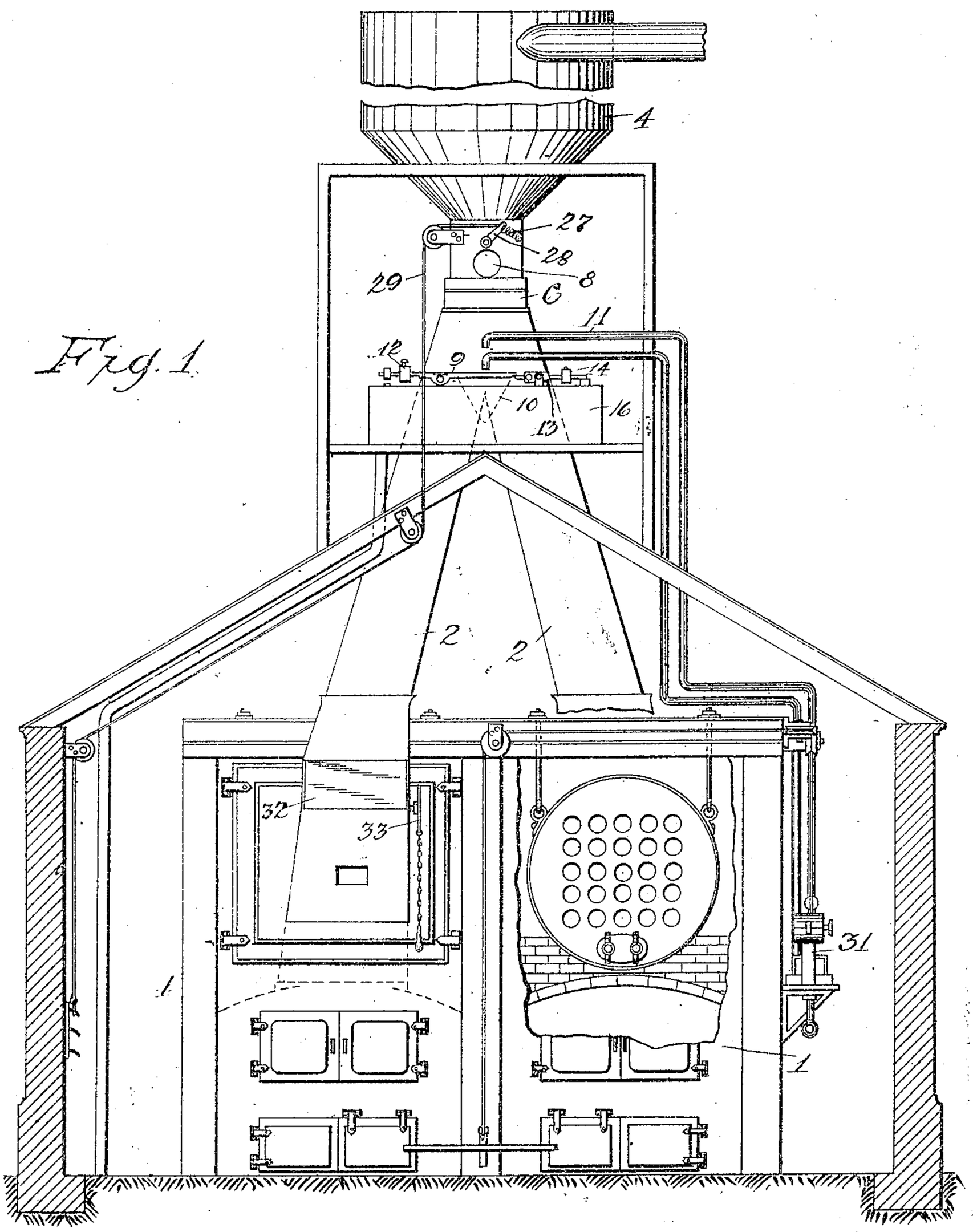
G. W. GARDNER.

FURNACE FUEL FEEDER.

APPLICATION FILED MAR. 22, 1906.

5 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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ATTORNEYS.

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5 SHEETS—SHEET 2.

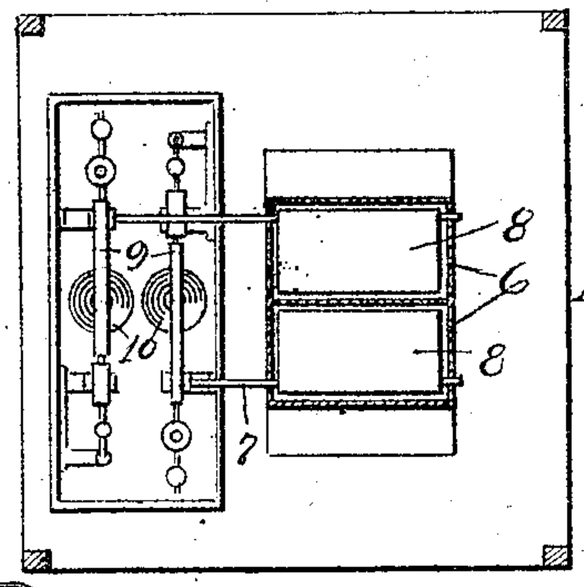

Fig. 3.

Fig. 2

WITNESSES:

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5 SHEETS—SHEET 3.

Fig. 5.

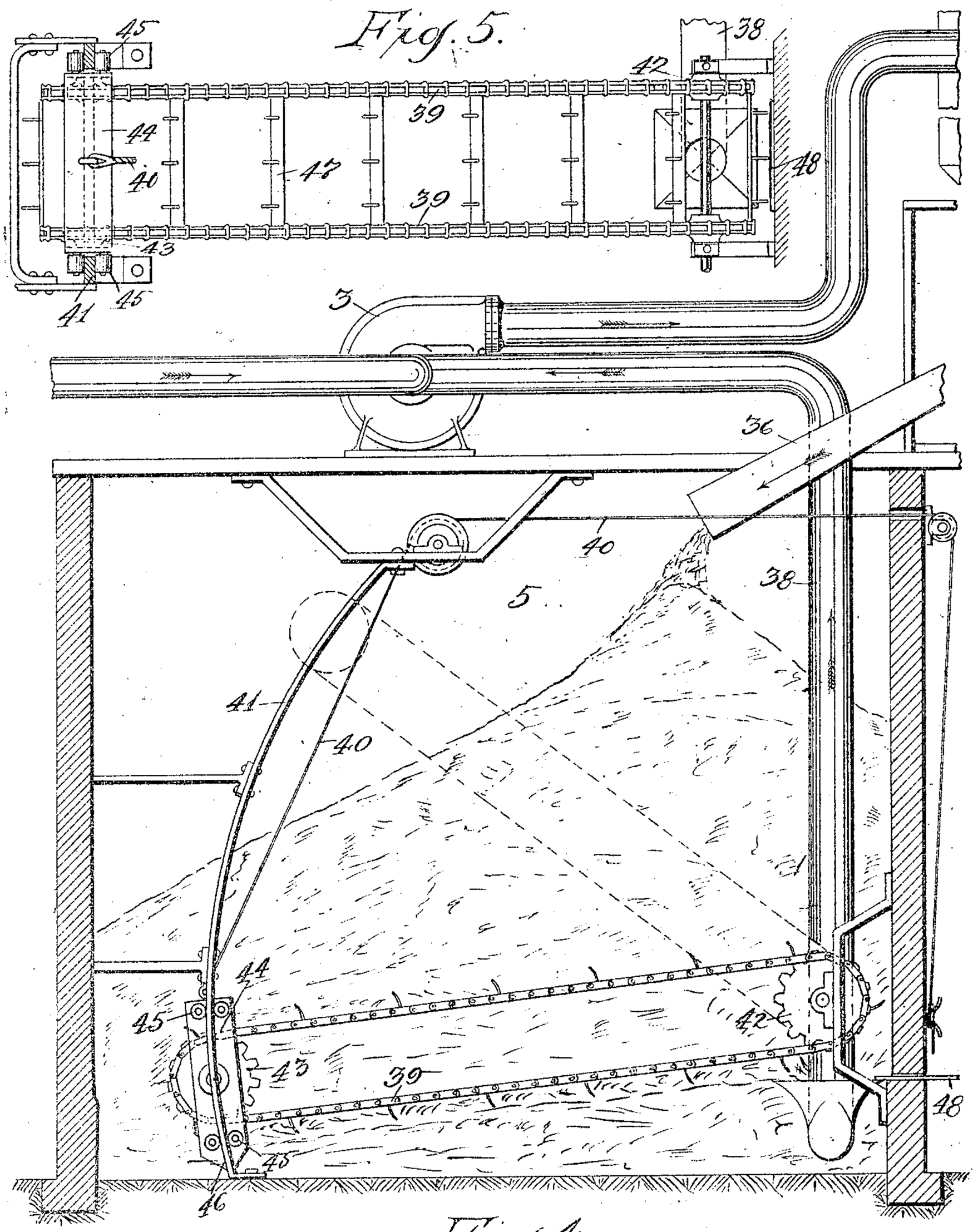

Fig. 4.

WITNESSES:

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5 SHEETS—SHEET 4.

Fig. 6.

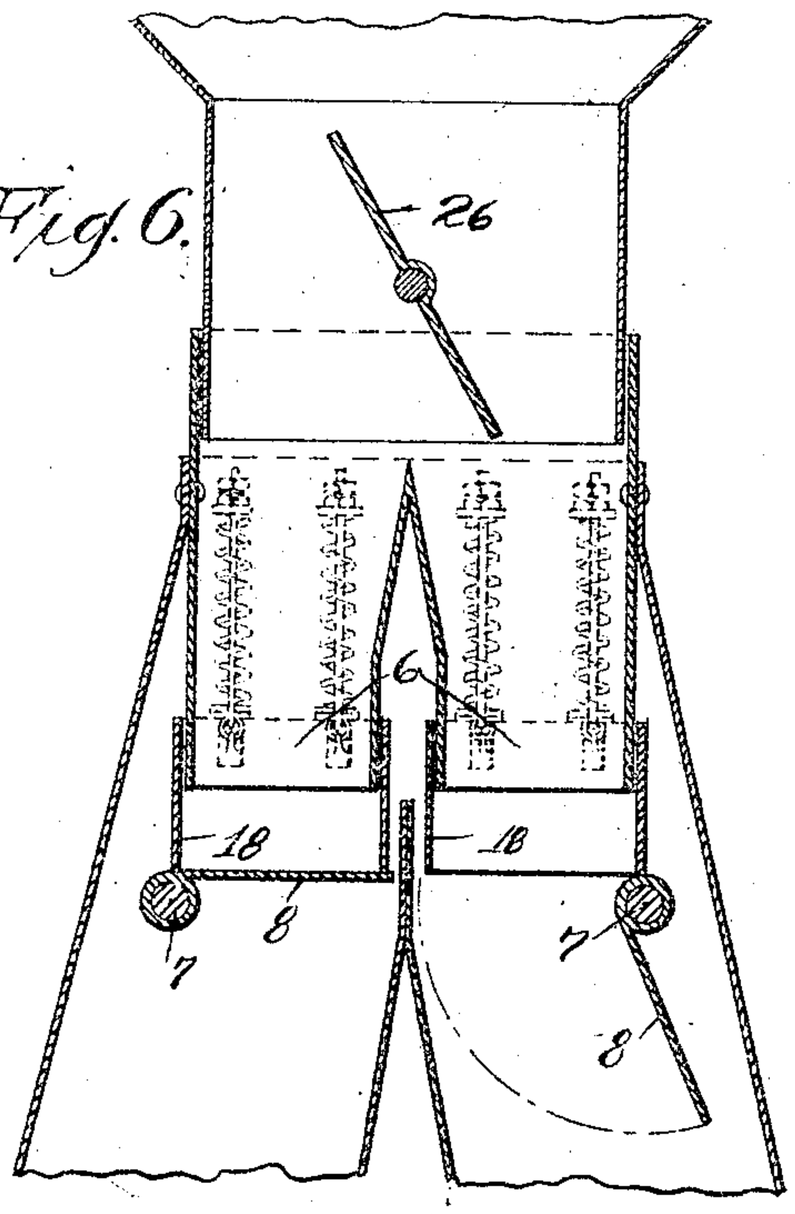


Fig. 7.

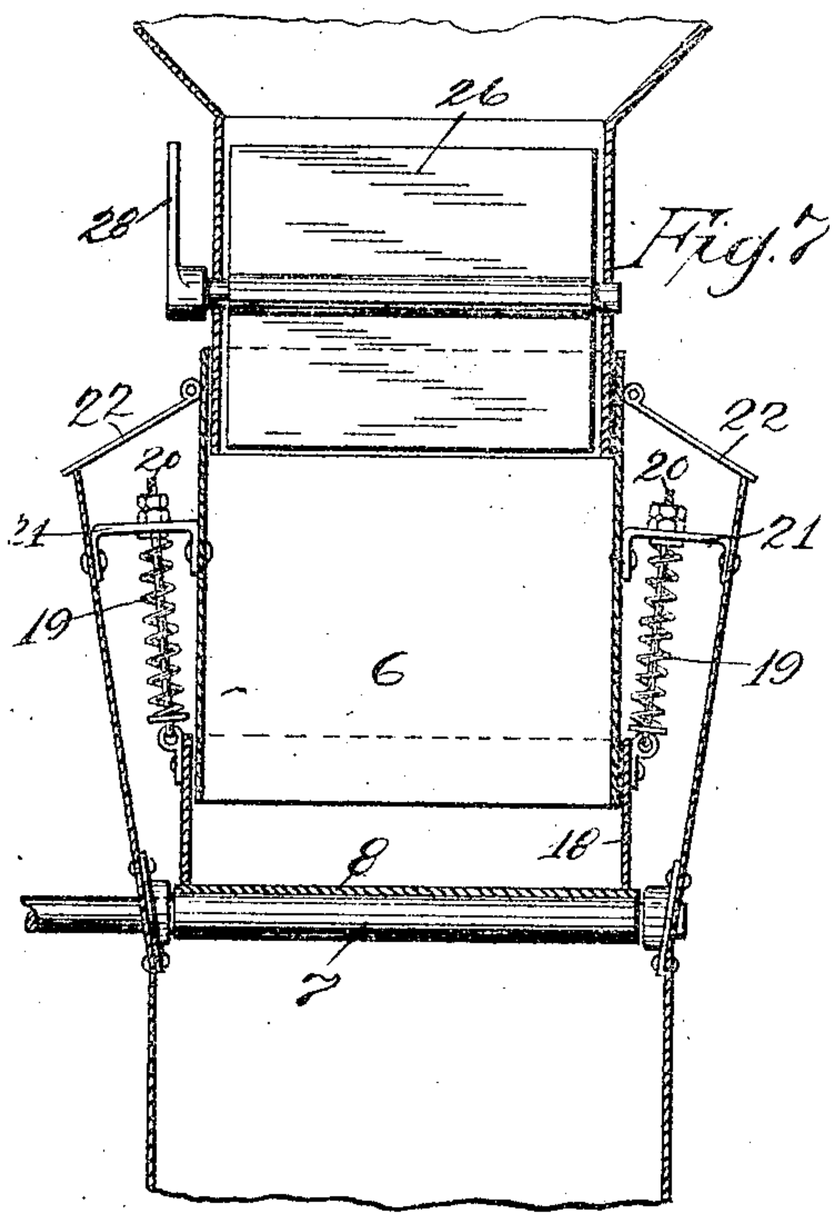


Fig. 9.

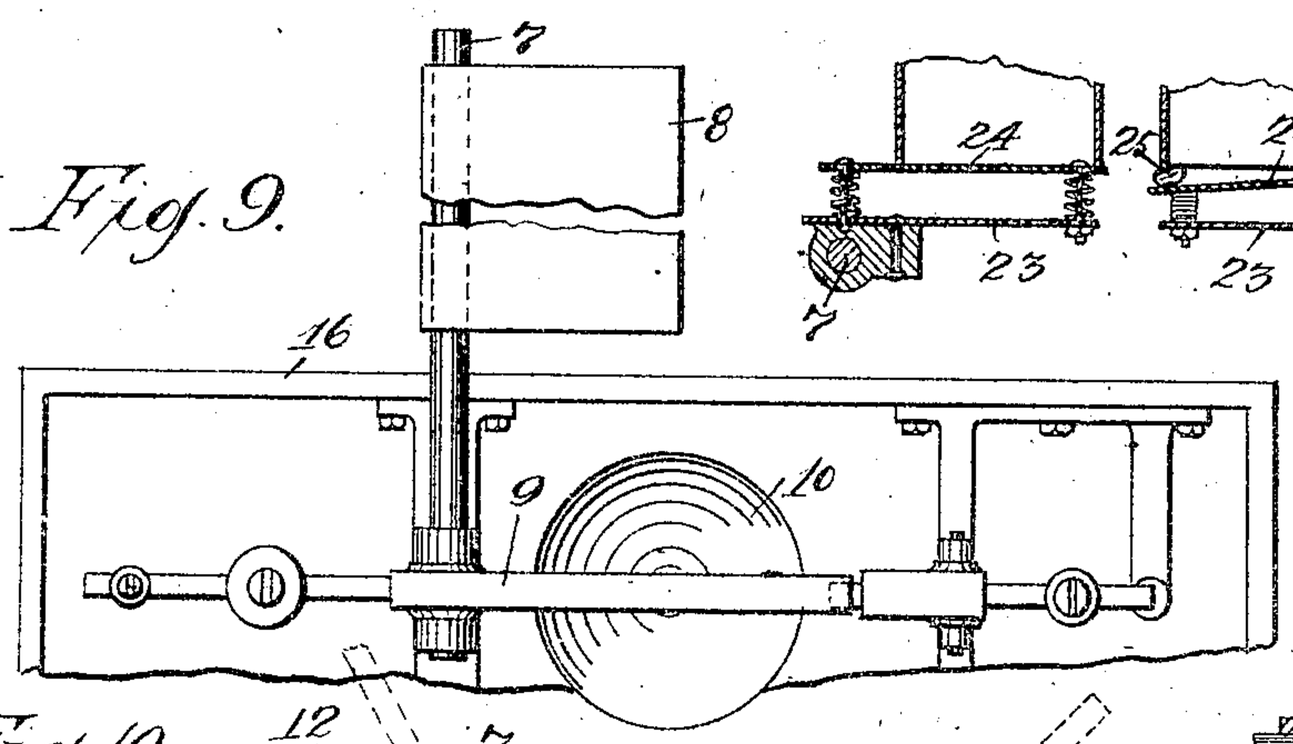


Fig. 8.

Fig. 11.

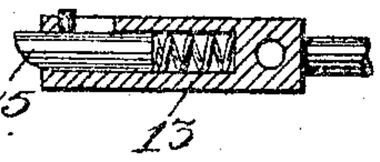
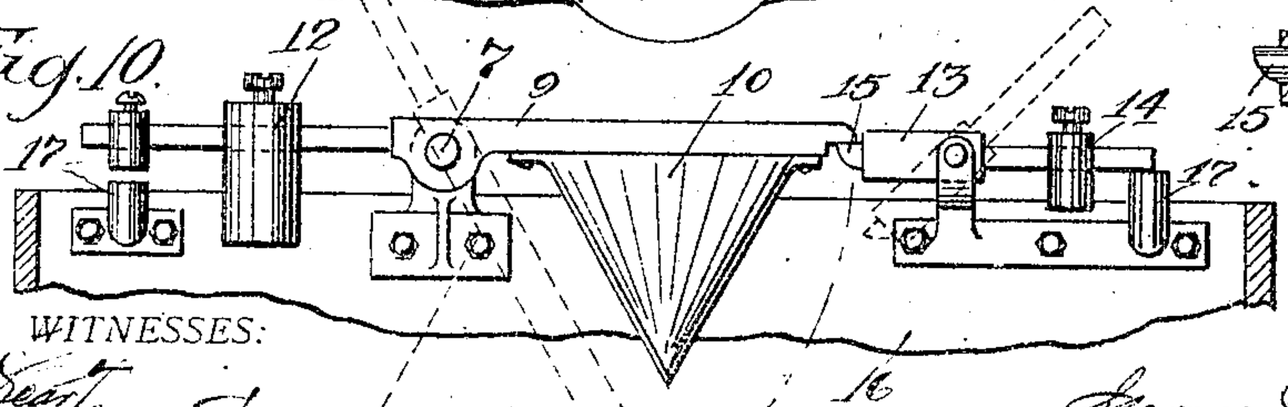


Fig. 10.



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APPLICATION FILED MAR. 22, 1906.

5 SHEETS—SHEET 5.

Fig. 12.

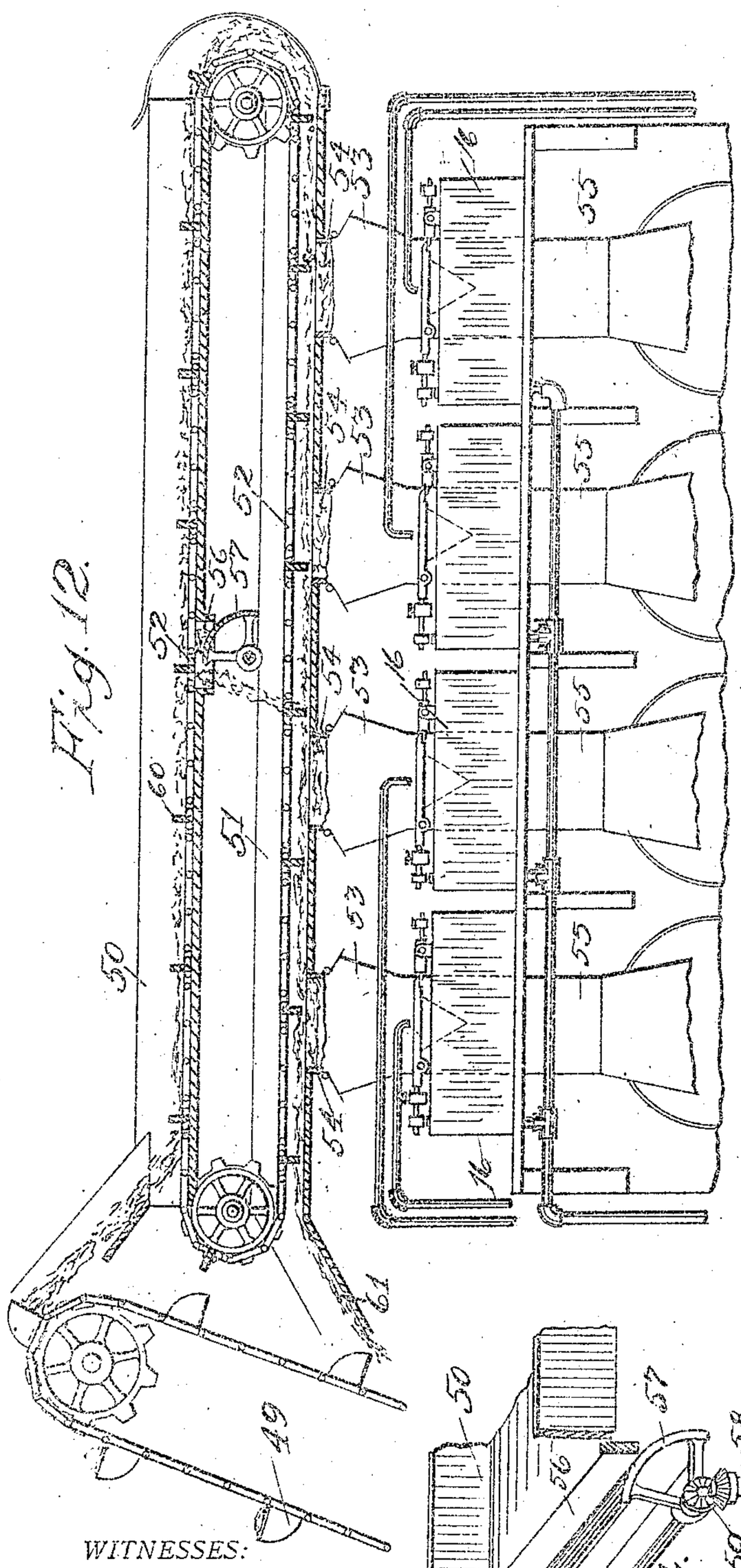

Fig. 13.

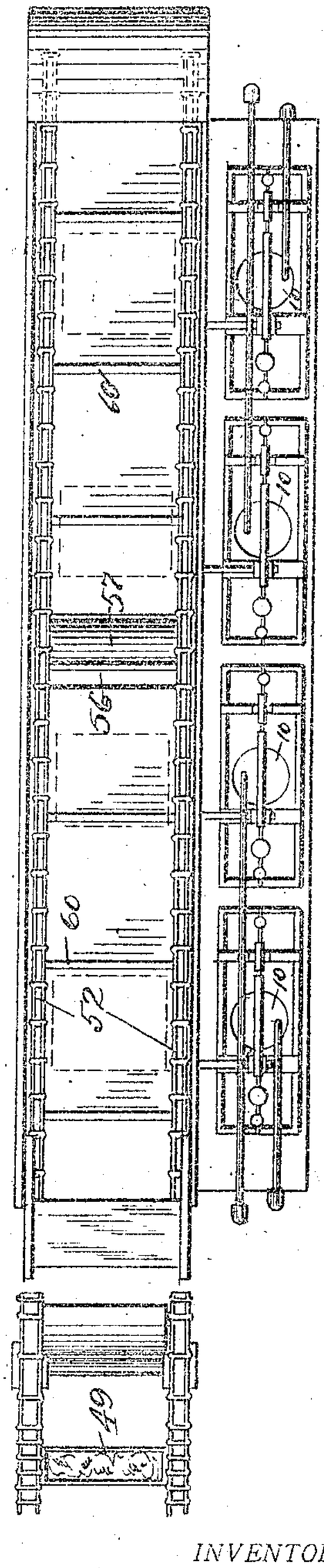

Fig. 14.

WITNESSES:

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ATTORNEYS.

UNITED STATES PATENT OFFICE.

GEORGE W. GARDNER, OF SAN FRANCISCO, CALIFORNIA.

FURNACE FUEL-FEEDER.

No. 887,085. Specification of Letters Patent. Patented May 12, 1908.

Application filed March 22, 1906. Serial No. 307,476.

To all whom it may concern:

Be it known that I, GEORGE W. GARDNER, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Furnace Fuel-Feeders, of which the following is a specification.

My invention relates to automatic furnace feeders in which refuse, such as shavings, dust, etc., from a planing mill, is collected and finally fed to the furnace and consumed. In devices of this character means must be provided for collecting the material from the different parts, preferably by means of the ordinary fan mechanism, and depositing it directly in the furnace through suitable mechanism, or depositing it in a bin or receptacle, and from there passing it through said mechanism into the furnace. The means for accomplishing this is preferably automatic and additional means are provided for controlling it as desired.

The invention is shown in the accompanying drawings in which;

Figure 1 is a front elevation, partly broken, showing my automatic feeder in connection with two furnaces. Fig. 2 is a partly broken side elevation of the same: Fig. 3 is a horizontal section on the line 3—3 of Fig. 2, showing the feeders in plan view. Fig. 4 is a vertical section through the shaving bin. Fig. 5 is a plan view of the conveyer shown in Fig. 4. Fig. 6 is a vertical section through the charging chambers. Fig. 7 is a vertical section of the same at right angles to the section of Fig. 6. Fig. 8 is a modified form of closure for the charging chamber. Fig. 9 is a plan view of the timing device or regulator. Fig. 10 is a side elevation of the same. Fig. 11 is a detail view of the latch. Fig. 12 is a side elevation, partly in section, showing a conveyer for feeding a number of furnaces. Fig. 13 is a plan view of the same. Fig. 14 is a perspective view of the segmental shutter.

Referring more particularly to the drawings 1, 1, indicate two furnaces of any description, each supplied with fuel through a chute 2, which in turn receives the fuel from the source of supply, as the machinery of a planing mill. The fuel, as the shavings and other refuse in such places, is usually collected from the different machines by means of an ordinary suction fan or blower 3, and after being passed through a separator 4, is delivered directly to the furnace through the chute 2, or, when there is a surplus, deposited in a bin or receptacle 5.

Located below the separator are two feeders or charge chambers 6, which receive and retain the fuel until it is required for the furnace when each chamber is emptied independently of the other, and the fuel passes down its respective chute into the furnace where it is consumed and furnishes power for running the plant. As the feeders or chambers are duplicates of each other, as also are the chutes, boilers etc., a description of one will be applicable to both.

Journaled across the chute at the bottom of the charge chamber is a shaft 7 which is provided upon its inner end with a gate 8, preferably in the form of a vane or wing, which is adapted to be moved toward and from the bottom to close or open it, and the outer end of the shaft is provided with an arm 9 upon which is secured a receptacle, as a cup or bucket 10, which is preferably conical or funnel shaped and adapted to be filled with water, from any suitable source of supply through a pipe 11. A counterweight 12 is adjustably secured to the arm 9, and controls the time of discharge of the cup, and thereby, of the opening of the charge chamber. The free end of the arm 9 is normally held against swinging downward to empty the cup by means of a yielding trip which comprises a pivoted arm 13 which has a counterbalance 14 on one end and a spring pressed latch 15 at the other. As the cup is gradually filled with water, the supply of which can be controlled by the engineer, or automatically, or both, it gradually over balances its own counterweight 12 and the counterweight 14 of the trip until finally the trip is tilted and the free end of the arm 9 is released which permits the cup to swing downward and discharge its contents, preferably into a box 16 from whence it is discharged and preferably used as feed-water for the boiler. The counterweights immediately return the two arms to their normal position, the free end of the arm 12 pressing back the latch 15 as it passes the end of arm 13, and being locked thereby after it has passed, until the parts are again tripped by the weight of water. Stops 17 may be arranged under the rear ends of the arms to stop them after their adjacent ends have passed each other, the one for the arm 9

being shorter than the other to permit the arm to pass a short distance above the arm 13 to insure the projection of the latch 15 before the arm 9 reverses its movement.

As there is a constant stream of material being delivered from the separator there is a liability of some of it being caught between the gate 8 and the bottom of the charge chamber. It is necessary to provide means whereby such an occurrence will not prevent the movement of the gate into its normal plane which would prevent the return and locking of the cup for the reception of water. This is accomplished by providing yielding mechanism in the closing of the charge chamber, preferably by introducing a movable member between the main portion of the chamber and the gate proper. This is preferably done by making the chamber as a two-part or divided chamber, with the lower member 18 telescopically connected with the main portion and adapted to be held in its projected or lowest position by coil springs 19 which encircle rods 20 and engage with the lower portion at one end and bear against cross pieces 21 at the other. The cross pieces extend from the sides of the charge chamber to the sides of the upper end of the chute, which is flared at that point, and hold the latter at such a distance from the chamber as to form a housing for the springs, which housing is closed by a hinged lid 22.

In the other form of closure, the gate is formed double with parts 23 and 24 yieldingly separated by springs 25. The lower part or gate proper, as 23, is secured to the shaft 7 and the part 24 is adapted to engage with the bottom of the charge chamber. In either form if a block or knot should happen to be caught between the gate and the extension or the lower end of the chamber and the gate, as shown at 25 in Fig. 8, the springs will yield and thereby permit the gate proper to assume its normal position, although a space would be temporarily formed at the bottom of the charging chamber. But when the gate would be swung down the next time, the obstruction would be carried out with the charge and the parts would then return to their normal positions when the gate was again closed.

When two charge chambers are used, as in the present instance, a gate or deflector 26 is mounted above them and preferably normally held as far to one side as it will go by a spring 27 which engages with an arm 28 secured to one end of the gate shaft. A cord 29 extends from the arm down to the engine room where it is fastened upon retainers, as pins or hooks 30, for holding the gate in any desired position. When the cord is drawn down the arm will be moved against the tension of the spring and when it is released the spring will draw the arm and gate back into their former positions, thereby enabling the engineer at all times to control the supply of fuel to the charge chambers as needed by the boilers.

In addition to the positive control of the supply of water by the engineer to regulate the emptying of the charge chambers, an automatic regulator 31 of any desired form may be used which is controlled by the steam from the boiler, but I prefer to use the form shown in my application, Serial No. 307477, filed Mar. 22, 1906.

To prevent the possibility of back firing through the chutes, as by an explosion of gas in the furnace after the mill has been closed down for the night, a valve 32 is preferably located in the chute at a suitable distance above its entry into the furnace. A double rocker arm 33 is secured to the valve shaft for opening and closing the valve and a lock, as a spring 34, is arranged to engage with the free edge of the valve and hold it in its closed position, or when it is standing across the chute. A lever 35 is connected with the spring whereby the valve can be released ready to be swung up, as shown in full lines in Fig. 2 from across the chute.

When there is an excess of fuel over what is required to keep up the necessary power the surplus is discharged from the separator through a chute 36 into the bin or other receptacle 5, where it is stored until needed, as when there is less shavings and other refuse being made by the mill than is required to keep up the power. A pipe or conduit 38 leads from the bottom of the bin to the blower 3 through which the fuel is returned to the separator and from there passed through the charge chambers and chutes to the furnaces as heretofore described.

With such light material as shavings it is very difficult to cause them to pass to the mouth of the conduit 38, owing to the liability of their "arching" or binding against each other so as not to fall, and especially when damp. To overcome this difficulty I prefer to provide the bin with a conveyer, as a chain carrier 39, which is pivotally mounted at one end near the mouth of the conduit 38, while its free end is adapted to be moved vertically within the bin by means of a cord 40 and a curved track 41. The chain runs over sprocket wheels, one of which, as 42, is driven from any suitable source of power, not shown, and the other one 43, is mounted in a frame 44 that is guided upon the track by wheels or rollers 45. The lower end of the frame is preferably pointed as shown at 46 to more readily pass through the mass of shavings when the conveyer is being lowered by slacking up on the cord 40.

The chain is preferably provided with spiked slats 47 which engage with the shavings on top and break them loose from the mass when it is being raised and which drags them to the mouth of the conduit when the

conveyer is being lowered, or rests upon a mass of shavings. A slide or cut off 48 is provided for closing the entrance to the conduit and preventing the entrance of air or shavings to the blower from the bin when the fuel is being taken from the machines in the mill.

Instead of feeding the fuel to the charge chambers as above described it can be first fed directly to a bin or chamber and then removed from there, as by a bucket conveyer 49, and discharged into a trough 50, from whence it is carried into a lower trough 51 by a slatted belt or conveyer 52. The lower trough connects directly with charge chambers 53 through openings 54, from whence the fuel is discharged into the respective chutes 55 and passes into the furnaces as heretofore described. To prevent too much of the fuel passing through the opening 54 nearest the farther end of the belt 52, an opening 56 is formed in the upper trough, preferably substantially midway its length, through which the fuel may be permitted to pass into the lower trough, and then be carried by the lower turn or portion of the belt to the openings 54 that are farthest from the outer end of said trough. The opening 56 is adapted to be controlled by any suitable mechanism, a segmental shutter 57 being preferably operated by the fireman or attendant through a shaft 58 and bevel gearing 59. The slats 60 of the chain are of such a width as to engage with the bottom of the upper trough with one edge and carry the fuel in one direction and to engage with the bottom of the lower trough with the other edge and carry it in the other direction. In case there is a surplus of fuel it is discharged from the inner end of the lower trough through a chute 61 back into the bin from whence it is subsequently carried by the elevator 49, and fed to the furnaces.

When using my improved feeder, the operation is substantially automatic and uniform, varying only as the demand for steam varies with the work being done, and only requiring occasional attention from the one in charge, as when changing the adjustment if the variation in power becomes excessive or abnormal, or when the shavings must be loosened up in the bin or controlled in their passage through the troughs. The space in front of the furnaces can be kept perfectly clean, thereby avoiding the liability of fire from that source, and one person can easily attend to a few or to a greater number of furnaces with equally satisfactory results in either case.

What I claim is—

1. In a furnace fuel feeder, a charge chamber, a gate therefor, a movable member between the gate and the bottom of the chamber, and springs for engaging with said member and holding it in its lowest position.

2. In a furnace fuel feeder, a two-part charge chamber, one of which parts projects below the other at all times and forms a movable extension thereof, springs for engaging with said part and holding it downward, and a gate for engaging with said part and closing the chamber.

3. In a furnace feeder, a two-part charge chamber, one of which parts telescopes upon the lower end of the other and projects below the same at all times, springs at the ends of the upper part for engaging with the lower part and forcing it downward, rods for the springs, and a gate for engaging with the lower part and closing the chamber.

4. In a furnace feeder, a two-part charge chamber, the upper part being provided with a housing and the lower part having its upper edge within the housing and projecting below the lower part, springs in the housing and engaging with the lower part, and a gate for engaging with the lower part and closing the chamber.

5. In a furnace feeder, a plurality of chutes, a separate charge chamber above each chute and in communication with it, a movable closure for each charge-chamber whereby it is adapted to retain and to discharge charges of fuel, a fuel supply passage and a swinging gate in said passage above the charge chambers.

6. In a furnace fuel feeder, a pair of charge chambers, a gate above the same, means for adjusting the gate to control the delivery of fuel to said chambers, independent closures for the respective chambers, and independent means for actuating said closures in opposite directions, whereby charges of fuel are retained in said chambers and discharged from said chambers.

7. In a furnace feeder, a conduit, means for feeding fuel thereto comprising a pivoted conveyer, a vertical track for supporting the free end of the conveyer, and means for moving said end on the track.

8. In a furnace feeder, a conduit, means for feeding fuel thereto comprising a pivoted conveyer, a curved track, a frame on the track for supporting one end of the conveyer, and a cord for moving the frame on the track.

9. In a furnace feeder, a bin, means for feeding fuel thereto, a blower, conduits leading to and from the blower, one of which communicates with the bin, a valve at the bin for closing said conduit, a pivoted conveyer in the bin, and means for moving the free end of the conveyer vertically.

10. In a furnace feeder, a plurality of chutes, charge chambers therefor, and adjustable means for controlling the delivery of fuel to said chutes, said means comprising two troughs, one above the other and having openings therein, a shutter for the opening in the upper trough, and a chain for moving the material in said trough.

11. In a furnace feeder, a plurality of chutes, charge chambers therefor, two troughs, one above the other and having openings therein, a segmental shutter for the opening in the upper trough, and a slatted chain in said troughs, the lower edges of the slats being adapted to engage with the bottom of the upper trough and move the fuel forward and the upper edges being adapted to engage with the bottom of the lower trough and move the fuel in the reverse direction from that in which it is moved in the upper trough.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 12th day of March 1906.

GEORGE W. GARDNER.

Witnesses:
F. M. BARTEL,
W. S. BOYD.