

No. 662,770.

Patented Nov. 27, 1900.

P. L. CROWE.
FUEL FEEDING HOPPER.

(Application filed Apr. 5, 1900.)

(No Model.)

Fig. 1.

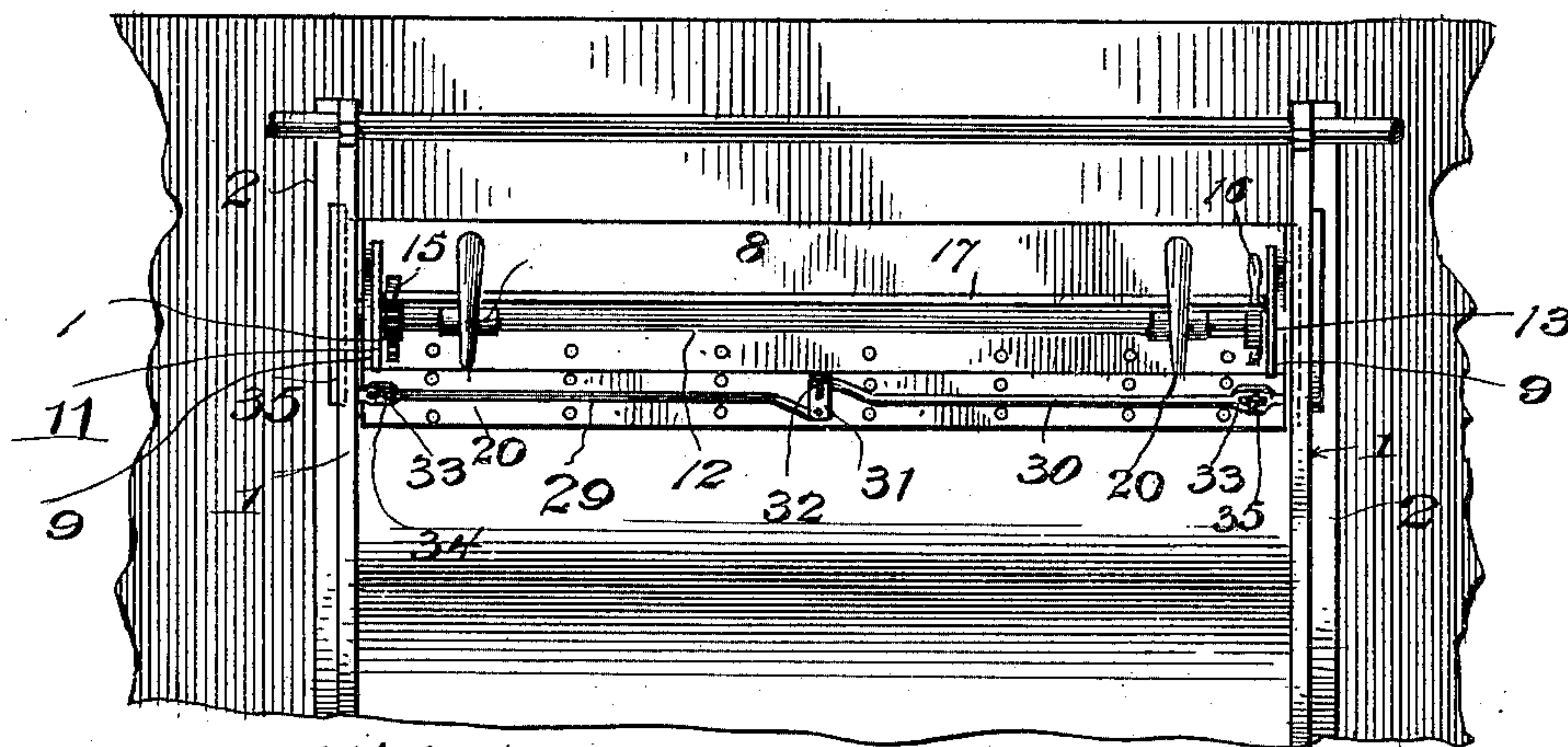


Fig. 2.

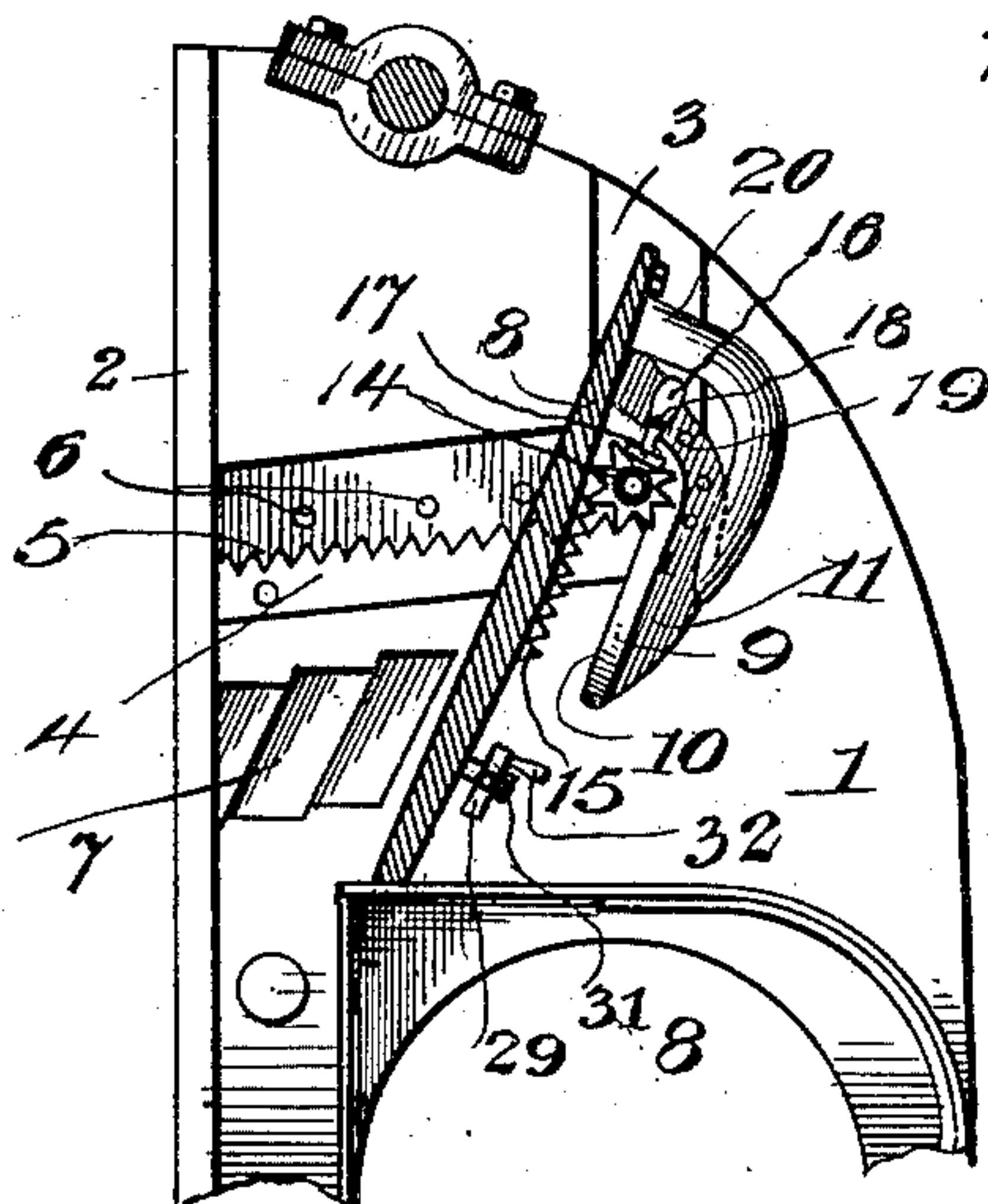


Fig. 3.

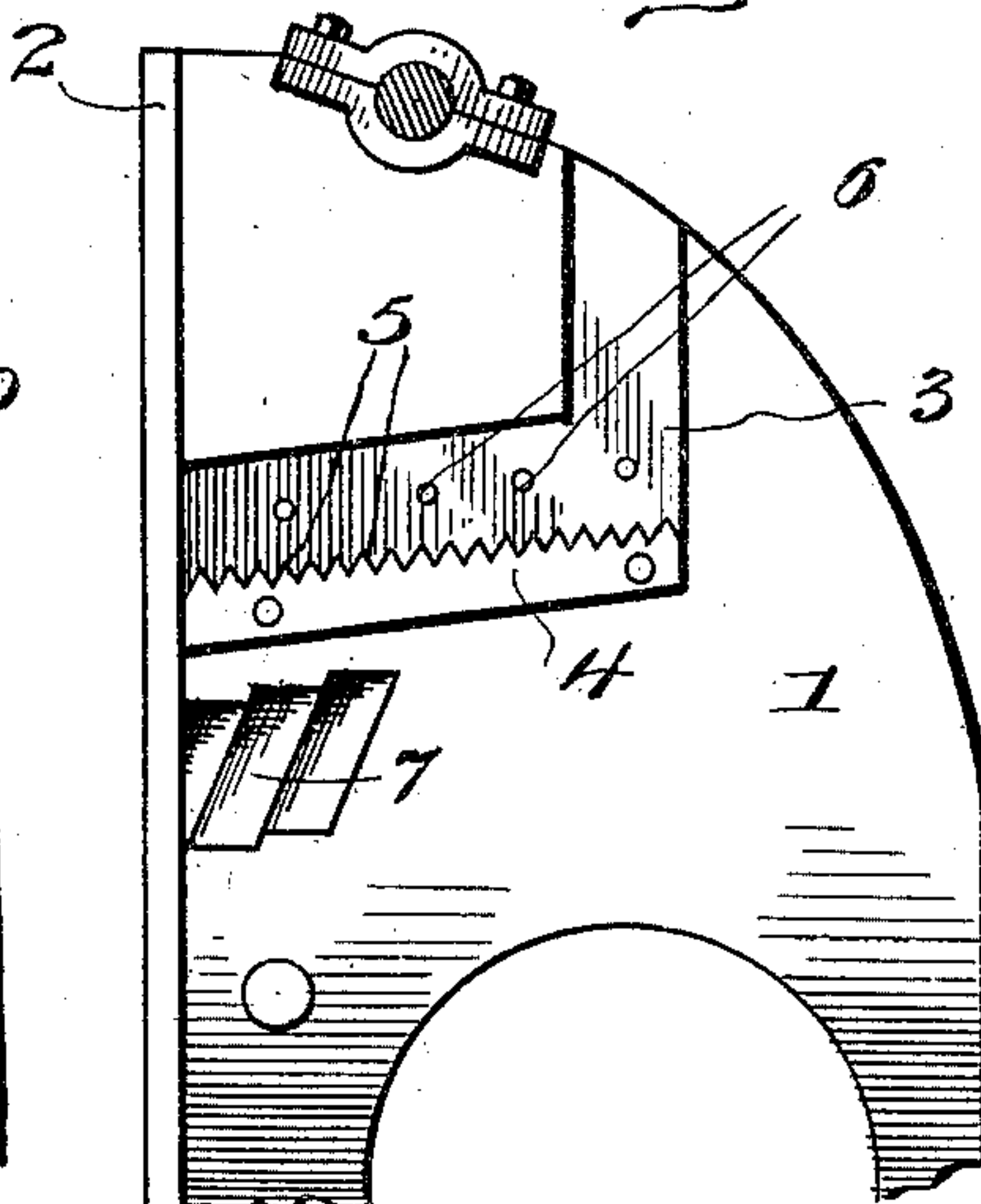
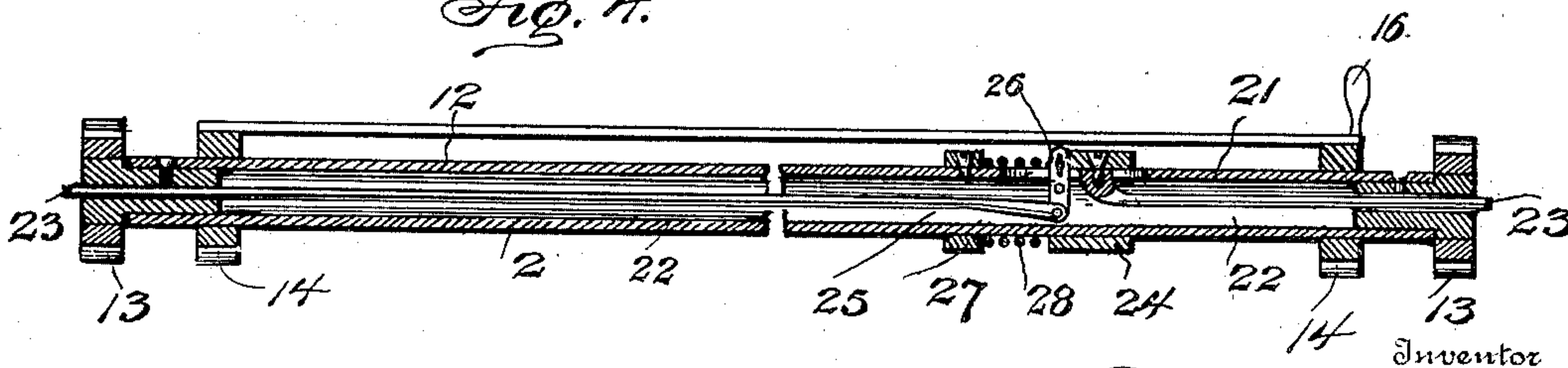


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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FUEL-FEEDING HOPPER.

SPECIFICATION forming part of Letters Patent No. 662,770, dated November 27, 1900.

Application filed April 5, 1900. Serial No. 11,700. (No model.)

To all whom it may concern:

Be it known that I, PAUL L. CROWE, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Fuel-Feeding Hoppers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in fuel-feeding hoppers for furnaces; and it consists in a hopper having end plates and provided with an adjustable front plate adapted to be arranged between the end plates and means for regulating the angle at which the plate stands, as well as the height thereof, to control the amount of fuel delivered by the hopper.

It also consists in certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and specifically claimed.

In the accompanying drawings, Figure 1 represents a front elevation of a fuel-feeding hopper constructed in accordance with my invention. Fig. 2 represents a vertical transverse section through the same. Fig. 3 represents an elevation of a portion of one of the end plates looking at the same from the inside. Fig. 4 represents an enlarged detail sectional view through a portion of the locking and operating mechanism upon the adjustable hopper front plate.

In furnaces employing automatic stoking means and in which fuel-feeding hoppers are employed for maintaining a constant supply of fuel to be delivered to the grate of a furnace it is desirable to construct one or more of the walls of said hopper so that it may be adjusted to increase or diminish the capacity of the hopper or to regulate the size of the outlet thereof. My improved hopper may be applied to furnaces of different styles and is preferably arranged immediately in front of the fuel-entrance opening in the front plate of a furnace. In constructing a hopper of this kind I secure to the front plate of the furnace forwardly-extending end plates, as 1 1, which stand, preferably, at right angles to the front plate and may be secured thereto

in any suitable manner—as, for instance, by means of flanges 2 2, turned at right angles to the plates 1, so as to lie flat against the furnace front plate. The end plates 1 1 are provided on their inner surfaces with angular grooves or recessed portions, as at 3 3, the said recesses being approximately vertical for a portion of their length and approximately horizontal for the remainder of their length, the approximately horizontal portion extending rearwardly to the furnace-front.

A rack, as 4, is arranged along the lower edge of each of the grooves 3, having rack-teeth 5 formed along its upper edge. The recess 3 in each plate is also provided with a series of apertures 6, located at suitable intervals therein for a purpose which will be hereinafter described. Below the recesses 3 the end plates 1 are provided with a series of indentations or depressions, as 7 7, which are adapted to be engaged by locking means on the front plate of the hopper. The means for adjusting the capacity of the hopper and regulating the feed consists principally in a front plate, as 8, which is made of sufficient length to reach from one end plate to the other. This front plate 8 is provided near each end with forwardly and downwardly extending hook-shaped projections, as 9 9, which form between themselves and the plate 8 elongated downwardly-opening slots, as 10, extending parallel with the face of the plate. These projections are strengthened by forwardly-extending ribs or flanges 11, standing at right angles to the plate 8. The hooked projections 9 are intended to receive a tubular shaft, as 12, which extends across the front of the plate 8 from one end thereof to the other, its ends preferably extending slightly beyond the ends of the plate and having rigidly secured thereto pinions 13 13. The pinions 13 may be formed with laterally-projecting hubs, which are inserted in the ends of the tubular shaft 12 and are secured therein by set-screws, as shown in Fig. 4 of the drawings. These pinions 13 13 mesh with the teeth of the racks 4 4 in the recesses 3, and when the shaft 12, carrying the same, is rotated the pinions will travel back and forth upon the said racks for adjusting the position of the plate 8.

Loosely mounted upon the hollow shaft 12,

near each end thereof, but preferably just inside the hooked projections 9, are pinions 14 14, adapted to engage short racks 15 15, vertically arranged upon the front face of the plate 8. One of said pinions 14 is provided with an operating-handle 16, which is secured to the said pinion or formed integral therewith. By turning the handle 16 the pinion 14 at that end of the hopper may be also turned, and this pinion, through the agency of a connecting-bar 17, extending therefrom to the other pinion 14, will turn the same correspondingly. Thus the pinions at each end of the rod 12 will be moved simultaneously and will actuate the racks 15, with which they mesh, so as to adjust the plate 8 edgewise in a vertical direction. The handle 16 is preferably provided with an aperture 18, which may be made to register with any one of a number of apertures 19, formed in the adjacent hooked projection 9. The handle may be locked in its adjusted position, thus positively holding the plate in a higher or lower position. The plate 8 may also be provided with forwardly and downwardly extending hooked projections 20, which are for use as handles when it is desired to take hold of the plate to turn it up or down or to draw it forward or push it back. In order to lock the upper edge of the plate in its different adjusted positions, I preferably arrange two draw-bars, as 21 and 22, within the hollow shaft 12, the ends of the said draw-bars either constituting in themselves or carrying locking-bolts adapted to engage the apertures 6 6, formed in the recesses 3 3 of the end plates 1 1. The inner end of the draw-bar 21 is secured to a collar 24, loosely mounted on the tubular shaft 12. The inner end of the draw-bar 22 is pivotally secured to a lever 26, which is fulcrumed in the shaft 12 and projects through a slot 25 in the wall of the tubular shaft. By moving the collar back and forth the draw-bars may be reciprocated in the hollow shaft 12. The ends of said draw-bars pass through apertures 23 in the pinions 13 at the ends of the tubular shaft 12 and may thus be brought into and out of engagement with the apertures 6, as found desirable. In order to hold the said rods or draw-bars normally in their outer or locked positions, I contemplate securing a fixed collar, as 27, upon the shaft 12 and interposing between the same and the sliding collar 24 a spiral spring 28. This spring will always tend to force the collar 24 away from the collar 27, and thereby force the draw-bars apart and hold the rods in their outer position. In order to lock the lower edge of the plate 8 in different positions, I provide the same with reciprocating bolts 29 and 30, which engage at their inner ends a pivoted lever 31, the said lever being preferably pivoted near its central point. One end of said lever 31 may be provided with an operating-handle 32, by which it can be moved back and forth. The outer ends of the bolts 29 and 30 are prefer-

ably beveled to engage the recesses or depressions 7 7 in the end plates 1 1. Near the outer ends of the bolts 29 and 30 enlarged portions, as 33 33, are formed, having slots 34 therein, which engage and slide upon pins or projections, as 35, secured to the front of the plate 8. These pins 35 will serve to hold the ends of the bolts in position and yet guide them in their reciprocating motion. It will be observed that the recesses or depressions 7 are elongated sufficiently to make the proper allowance for the vertical adjustment of the plate 8. When the bolts 29 and 30 are retracted, the plate 8 may be rocked upon the shaft 12 by means of the handle 20 and brought to a horizontal position, if desired, so that access can be had to the interior of the furnace either for cleaning the grate or making any necessary repairs or running the furnace by hand.

The plate 8 is preferably provided with a number of outwardly-flaring funnel-shaped holes to admit air and to keep the plate cool. This is especially useful when the plate is employed as a fire-door. After all the fuel has been used from the hopper the fire may be banked, if desired, and the plate 8 may be pushed up so as to close the fuel-opening leading into the furnace, thus taking the place of an ordinary fire-door. The plate may be locked in this position by means of the draw-bars 21 and 22 engaging the apertures 6. The plate 8 will thus be seen to be capable of a threefold function, it being possible to use it as an adjustable-front hopper to regulate the feed of the fuel or to turn it down in a horizontal position and use it as the floor of the hopper or to push it up snugly against the furnace-front and utilize it as a fire-door.

In operation, having determined the depth of fuel which it is desired to feed upon the grate and the desired vertical and horizontal diameter of the passage-port of the fuel-hopper formed by the said plate and the housing, together with the front wall of the furnace and the grate, and the locking means being out of engagement, I draw said plate, suspended on its pipe and pinion-rollers, away from or push it toward the face of said furnace-wall until it is at the desired distance from the said wall. I then lock the pipe and plate in that position by the means described heretofore. I then adjust the vertical position of the plate by means of the lever and loose pinion, locking the plate at the proper elevation by passing the pin through the pinion, lever, and flange of the hooked projection 9. In adjusting said plate due allowance should be made for the fact that, as the plate is normally inclined, the act of adjusting the same vertically will also effect a slight horizontal movement toward or away from the furnace front wall. Said hopper-plate being properly adjusted and locked in position, fuel is fed into the hopper, and the movement of the fuel from the hopper may be begun as it discharges upon the grate of the furnace. A

hopper of this kind is well adapted for use in connection with a furnace employing a chain-connected traveling grate, as the movement of the grate continually draws a supply of fuel from the lower end of the hopper. Said hopper may be at any time quickly emptied by drawing forward, raising, and half revolving said plate or by entirely withdrawing said plate from between the end plates. When fires are banked for the time being, the plate 8 is pushed to the front wall, closing the door to prevent unnecessary draft and radiation of heat to the exterior.

Having thus described my invention, what is claimed, and desired to be secured by Letters Patent, is—

1. A feed-hopper for furnaces, comprising end plates having guide depressions or grooves formed therein, the said plates also having recesses or depressions formed below said grooves, and a front plate having means for engaging the said grooves and the said recesses, whereby it may be adjusted to different heights and at different angles.

2. A hopper for furnaces, comprising end plates and an adjustable front plate, the end plates being provided with angular depressions or grooves, racks mounted in said grooves, and means upon the said front plate for engaging the said racks, whereby the front plate may be adjusted, to a greater or less distance from the front of the furnace.

3. A fuel-hopper for furnaces, comprising end plates having grooves formed therein which are arranged approximately upon a right angle, racks mounted in the said grooves, a front plate mounted between the end plates, a shaft extending along the front of the said plate, depending hook-shaped projections upon the plate adapted to overhang the said shaft, gear-wheels upon the ends of said shaft for engaging the said racks, and means for locking the plate in its different adjusted positions, substantially as described.

4. A feed-hopper for furnaces, comprising end plates extending at right angles from the furnace-front, an adjustable front plate between the said end plates, a hollow shaft extending along the front of the said plate and having pinions at its ends engaging racks in guide-grooves formed in the end plates, hooked projections upon the plate overhanging the said shaft, loose pinions mounted upon the shaft near the ends thereof, racks upon the said plate engaging the said loose pinions, and means for turning the pinions, whereby the plate may be raised or lowered edgewise, substantially as described.

5. A fuel-feed hopper for furnaces comprising in its construction stationary end plates, an adjustable front plate arranged between them, a hollow shaft extending along the front of the said plate and adapted to engage at its ends guide grooves or depressions formed upon the inner surfaces of the end plates, bolts or latches secured upon the said plate near the lower end thereof for holding the

plate at different angles, the said latches engaging elongated recesses in the end plate, substantially as described.

6. In a fuel-feeding hopper for furnaces, the combination of end plates having angular grooves or depressions, and elongated recesses, a front plate mounted between the end plates, means for adjusting the position of the front plate in the angular grooves, and means for adjusting the lower edge of the said plate opposite different elongated recesses to vary the angle of the plate, substantially as described.

7. In a fuel-feeding hopper for furnaces, the combination with end plates having guiding depressions or grooves formed therein, of an adjustable front plate mounted between them and carrying a hollow shaft, rigid pinions mounted upon the ends of said shaft for engaging racks in the guide-grooves of said end plates, loose pinions near the ends of the said shaft, a bar connecting the said loose pinions so that they will operate simultaneously, a handle upon one loose pinion for rotating the same, means for locking the said handle in different positions, draw-bars mounted in the said hollow shaft, and means for reciprocating them to lock the front plate in different positions in the guide-grooves, substantially as described.

8. In a fuel-feeding hopper for furnaces, the combination of end plates having guide-grooves and racks formed therein, an adjustable front plate mounted between the same, hook-like projections formed upon the front of said plate one of the said projections having a series of apertures formed therein, a hollow shaft for holding the said plate in position, the hook projections overhanging said shaft and guiding said plate in its movement with respect to the same, loose pinions upon the shaft, a bar connecting the same, a handle upon one of said pinions for rotating it, said handle having an aperture formed therein, a pin for adjusting the handle and holding it in place, the said pin engaging one of the apertures in the hooked projection on the front plate, and handles upon the said plate for moving it upon the said hollow shaft, substantially as described.

9. A fuel-feeding hopper for furnaces, comprising end plates having guide-grooves formed therein, racks constructed within said grooves, a series of apertures being formed in the said grooves, an adjustable plate mounted between said end plates and forming the front wall of the hopper, a hollow shaft extending along the front of the hopper for supporting the same in position, fixed pinions upon the ends of the said shaft, draw-bars mounted interiorly of the shaft adapted to engage the apertures in the guide-grooves, a lever moving one of the said draw-bars and having one end projecting through a slot in the hollow shaft, a loose collar secured to the draw-bar and connected with the said lever, and spring-actuated means for engaging

the collar and holding the draw-bars normally in their outer position, substantially as described.

10. In a fuel-feeding hopper for furnaces, 5 the combination of end plates having guiding-grooves and racks therein, the said plates also having a series of elongated recesses below said groove, an adjustable front plate arranged between the end plates, means for 10 raising and lowering the said plate, and means for tipping the lower edge thereof and holding the same in its adjusted position, comprising reciprocating rods secured to the said plate and adapted at their ends to engage the 15 elongated recesses in the end plates, a lever connected with the said rods and pivoted to the said plates for moving them back and forth, a handle upon the said lever, the elongated depressions permitting the plate to be 20 adjusted vertically without interfering with the locking-rods, substantially as described.

11. In a fuel-feeding hopper for furnaces, the combination with end plates having guiding-grooves therein, the said grooves being 25 provided with apertures, of an adjustable plate adapted to be arranged in different positions between the end plates, locking means on said plate for engaging the apertures in the guiding-grooves, the construction 30 being such that the plate may be tipped

horizontally to form a hopper-floor or may be arranged at an incline to regulate the flow of the feed, the said plate being also provided with a series of cooling-apertures, whereby 35 when it is forced up against the furnace-front it may be employed as a fire-door, substantially as described.

12. A hopper comprising a fixed rear wall provided with a discharging-port; forwardly- 40 extending end plates fixed to said rear wall, said end plates having guide grooves or channels formed in their opposing faces; racks within said grooves at the lower edges thereof; a series of elongated recesses below said 45 grooves, an adjustable front plate arranged between said end plates, means engaging said front plate and said elongated recesses for adjustably holding the lower portion of said front plate in a predetermined position; 50 means for raising and lowering said plate and adjustably locking the same in a predetermined position, and handles upon said front plate, substantially as described.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

PAUL L. CROWE.

Witnesses:

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JAMES DEVER.