



No. 689,579.

Patented Dec. 24, 1901.

G. S. EMERICK.

APPARATUS FOR FEEDING FINE FUEL INTO FURNACES.

(Application filed Apr. 23, 1901.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 4.

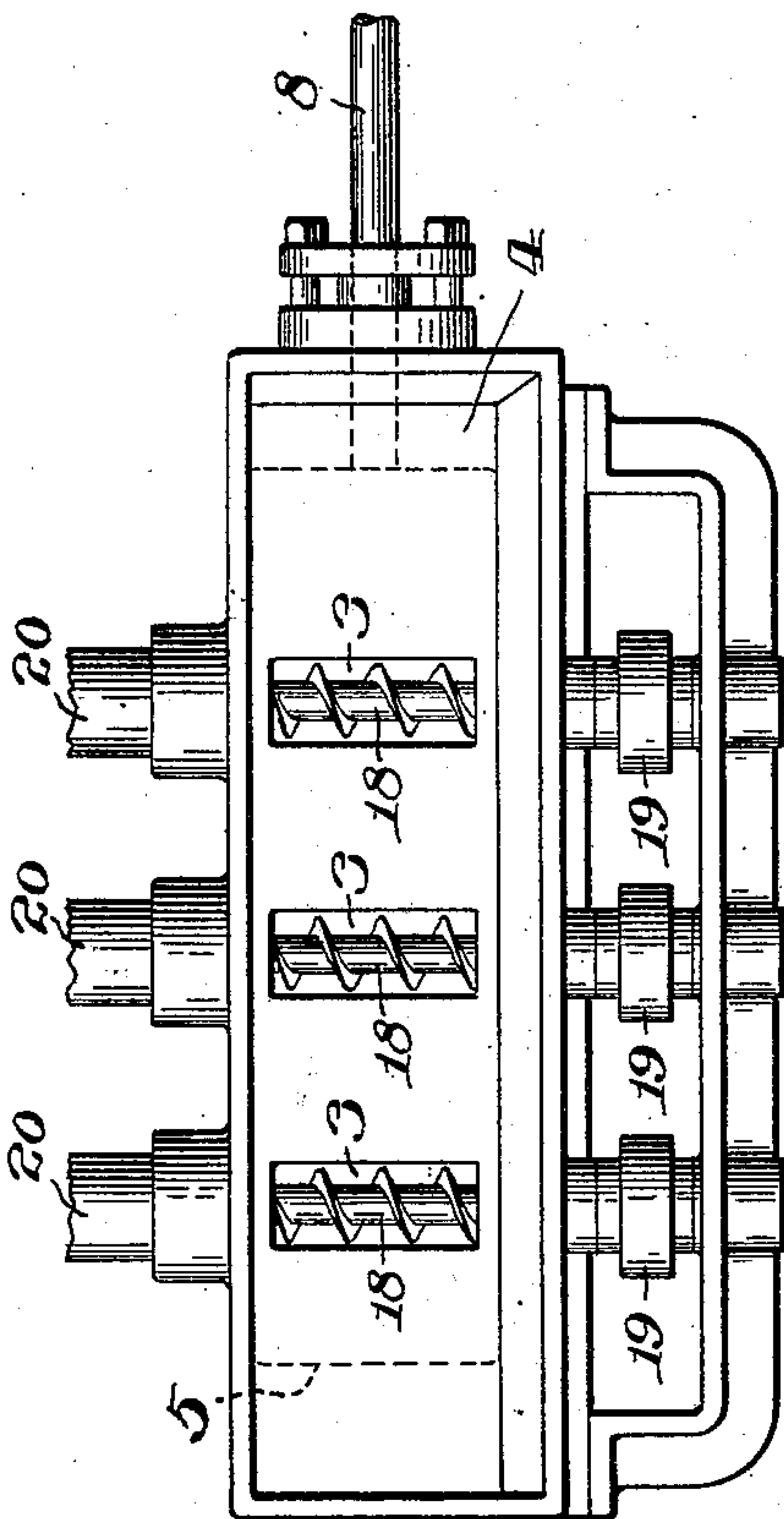


Fig. 3.

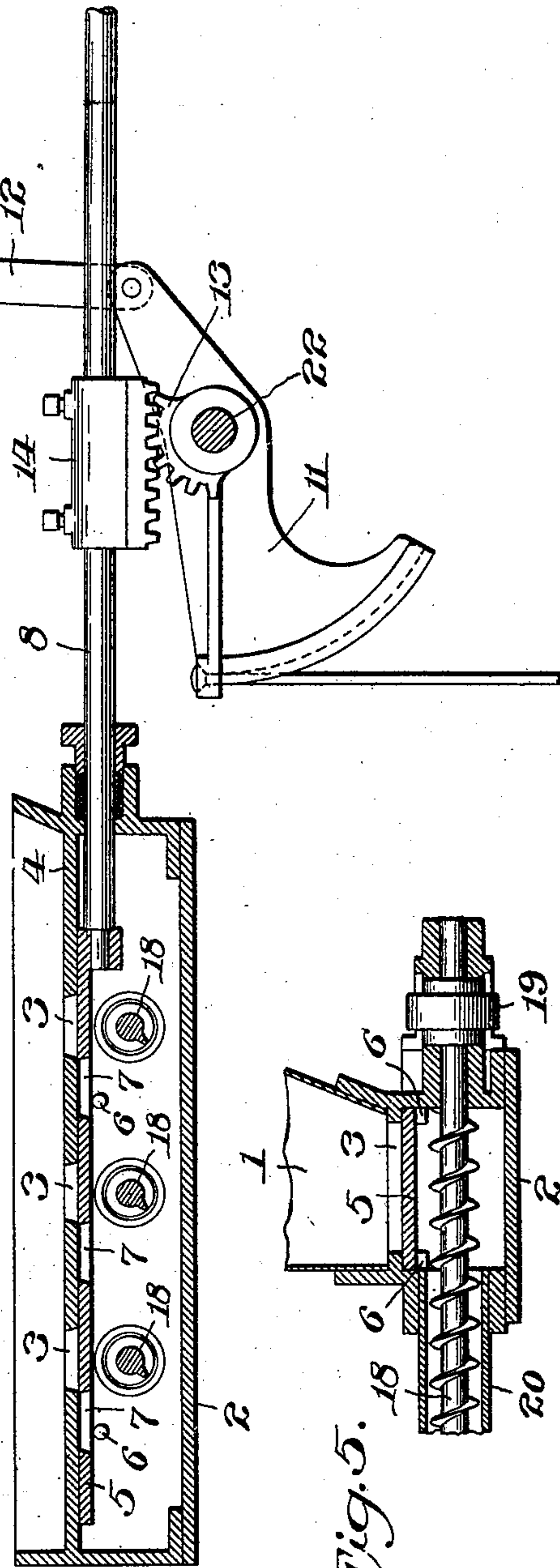
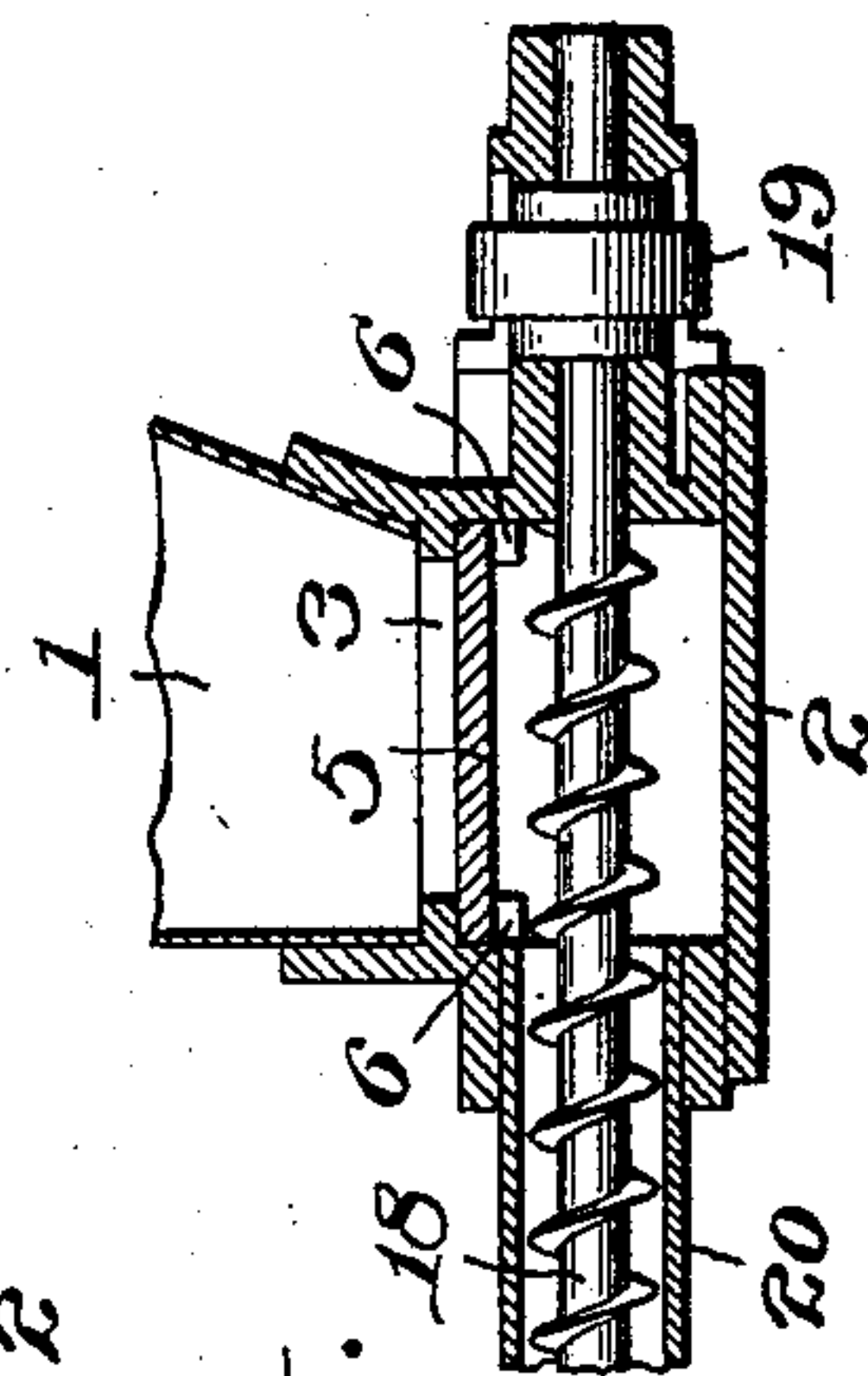


Fig. 5.



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GEORGE S. EMERICK, OF PHILADELPHIA, PENNSYLVANIA.

## APPARATUS FOR FEEDING FINE FUEL INTO FURNACES.

SPECIFICATION forming part of Letters Patent No. 689,579, dated December 24, 1901.

Application filed April 23, 1901. Serial No. 57,111. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE S. EMERICK, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Apparatus for Feeding Fine Fuel into Furnaces, of which the following is a specification.

My invention relates to that class of apparatus for feeding fine or pulverized fuel wherein the rate of feed is automatically controlled by the pressure of steam in the boiler; and the object of my improvement is to provide a means whereby such automatically-controlled feed shall maintain a relatively uniform furnace temperature and steam-pressure. I attain this object by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a general view, in rear elevation, of the fuel-magazines and of the means for automatic control of the fuel-feed therefrom. Fig. 2 is a view in side elevation of the apparatus shown in Fig. 1. Fig. 3 is a view in detail of the means for automatic control of the fuel-feed, including a sectional view of the floor of one magazine, the discharge-chamber beneath, the worms located in the latter, and the communicating ports between the magazine and discharge-chamber. Fig. 4 is a view in plan of the floor of one of the magazines as seen when viewing the same from above and showing the means for conveying the fuel from the discharge-chamber located below the magazine-floor into the fuel-discharge pipes, and Fig. 5 is a side sectional view of the same.

In Figs. 1 and 2 the magazines 1 are designed to be of any suitable form for the storage of fine fuel. Each magazine communicates by means of ports in the floor thereof with a discharge-chamber 2, located beneath. The rod 8 is connected at each end with a slide, which governs said ports, as hereinafter more fully explained. The single-acting steam-cylinder 9 is supported vertically between the magazines by any suitable means, such as the straps 21, and power is supplied thereto by the pipe 17. The end of the piston-rod 10 in said steam-cylinder is connected to one end of the sector 11 by the pivoted strap 12. The sector 11 is mounted upon the hori-

zontal shaft 22, adapted to rotate in bearings in the frame 23. Said sector carries the geared segment 13, which engages the geared collar 14, mounted upon the shaft 8. To the opposite end of the sector 11 is attached the counterweight 15.

In Fig. 3 are shown the ports 3 in the floor 4 of the left-hand magazine, Fig. 1. Against the under side of each magazine-floor is arranged the slide 5, supported by and sliding upon the pins 6 and furnished with the ports 7, adapted to coincide with the ports 3.

In Fig. 4 the worms 18 are mounted in each of the discharge-chambers 2 and are actuated by the pulleys 19, as further shown in Fig. 5. The rotation of the worms 18 conveys the fuel from the discharge-chambers 2 into the fuel-discharge pipes 20.

The operation of my apparatus is as follows: The magazines 1, Fig. 1, being filled with fuel suitably pulverized or reduced, it passes by gravity through the ports 3 and 7 into the discharge-chambers 2, Fig. 3. Thence it is conveyed by the worms 18 into the fuel-discharge pipes 20, whence it may be blown into the furnace by any suitable means, such as the injection into said fuel-discharge pipes of a blast of air or steam.

Automatic control over the rate of fuel feed is obtained as follows: In Fig. 3 the relation between the ports 3 in the floors of the magazines and the ports 7 in the slides 5 is such that a movement of the rod 8 from left to right simultaneously opens communication between each magazine and its discharge-chamber, the fuel then passing freely from the former into the latter. If, however, the movement of the rod 8 from left to right is continued after the ports 3 and 7 have been thus brought into coincidence, it is apparent that a gradual closure of the ports will take place, and their coincidence can only be once more effected by a reverse movement of the rod 8—namely, from right to left. We will suppose that it is desired to maintain in the boiler the furnace of which is fed by my apparatus a steam-pressure of one hundred pounds. The discharge of fuel into the furnace may be initiated by removing the counterweight 15 and slightly opening the ports. As the steam-pressure rises it is transmitted through the pipe 17 to the steam-cylinder 9,



pushing down the piston-rod 10, and thereby rotating the sector 11, to which the piston-rod is connected. The geared segment upon said sector coacts with the geared collar 14 to further move the rod 8 from left to right, thus opening the ports more and more and increasing the fuel feed as the steam-pressure rises. When the pressure has reached the desired maximum, the counterweight 15 may be so adjusted as to balance the downward thrust of the piston-rod 10, arresting the further movement of the rod 8. The size and number of the ports should be such that the maximum steam-pressure desired may be attained when they are fully opened. If the pressure should now rise above the maximum, the transmitted increase of pressure upon the piston-rod 10 would overbalance the counterweight 15 and the sector would be slightly rotated, causing a further movement of the rod 8 from left to right; but since the ports were coincident at the maximum this further movement tends to slightly close them, thus diminishing to that extent the fuel feed into the furnace. As the diminished fuel-supply reduces the steam-pressure the counterweight coming into play carries the rod 8 from right to left, once more bringing the ports into more or less complete coincidence. A further collateral regulation of the rate of fuel feed may be obtained by varying the rate of rotation of the worms 18, by which the fuel is conveyed from the discharge-chambers into the fuel-discharge pipes.

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

1. In combination in an apparatus for feeding fine fuel, a magazine furnished with a plurality of ports, a slide furnished with a plurality of ports adapted to control the ports of said magazine, a shaft actuating said slide, a geared collar mounted upon said shaft, a sector carrying a geared segment adapted to engage said collar, a power-operated cylinder, the piston-rod of which is adapted to actuate one end of said sector, and means for weighting the other end of said sector, substantially as described.

2. In combination in an apparatus for feeding fine fuel, a magazine furnished with a plurality of ports, a discharge-chamber, a slide furnished with a plurality of ports adapted

to control the passage of fuel into said discharge-chamber, a shaft actuating said slide, a geared collar mounted upon said shaft, a sector carrying a geared segment adapted to engage the gears of said collar, a power-operated cylinder the piston-rod of which is attached to one end of said sector, and means for weighting the other end of said sector, substantially as described.

3. In combination in an apparatus for feeding fine fuel, a magazine for the storage of said fuel the floor of which is furnished with a plurality of ports, a discharge-chamber located beneath said magazine-floor, a plurality of fuel-discharge pipes communicating with said discharge-chamber, a slide furnished with a plurality of ports adapted to control the passage of fuel from said magazine into said discharge-chamber, a shaft actuating said slide, a geared collar mounted upon said shaft, a sector carrying a geared segment adapted to engage the gears of said collar, a power-operated cylinder the piston-rod of which is attached to one end of said sector, and means for weighting the other end of said sector, substantially as described.

4. In combination in an apparatus for feeding fine fuel, a magazine for storage of said fuel having a plurality of ports in the floor thereof, a discharge-chamber located below said magazine-floor, a plurality of fuel-discharge pipes communicating with said discharge-chamber, a plurality of worms adapted to convey said fuel from said discharge-chamber into said fuel-discharge pipes, a slide furnished with a plurality of ports adapted to control the passage of fuel from said magazine into said discharge-chamber, a shaft actuating said slide, a geared collar mounted upon said shaft, a sector carrying a geared segment adapted to engage the gears of said collar, a power-operated cylinder the piston-rod of which is adapted to actuate one end of said sector, and means for weighting the other end of said sector, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE S. EMERICK.

Witnesses:

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CHAS. B. BRUNNER.