

(No Model.)

J. G. McAULEY.
FUEL FEEDING APPARATUS.

No. 441,689.

Patented Dec. 2, 1890.

Fig. 1.

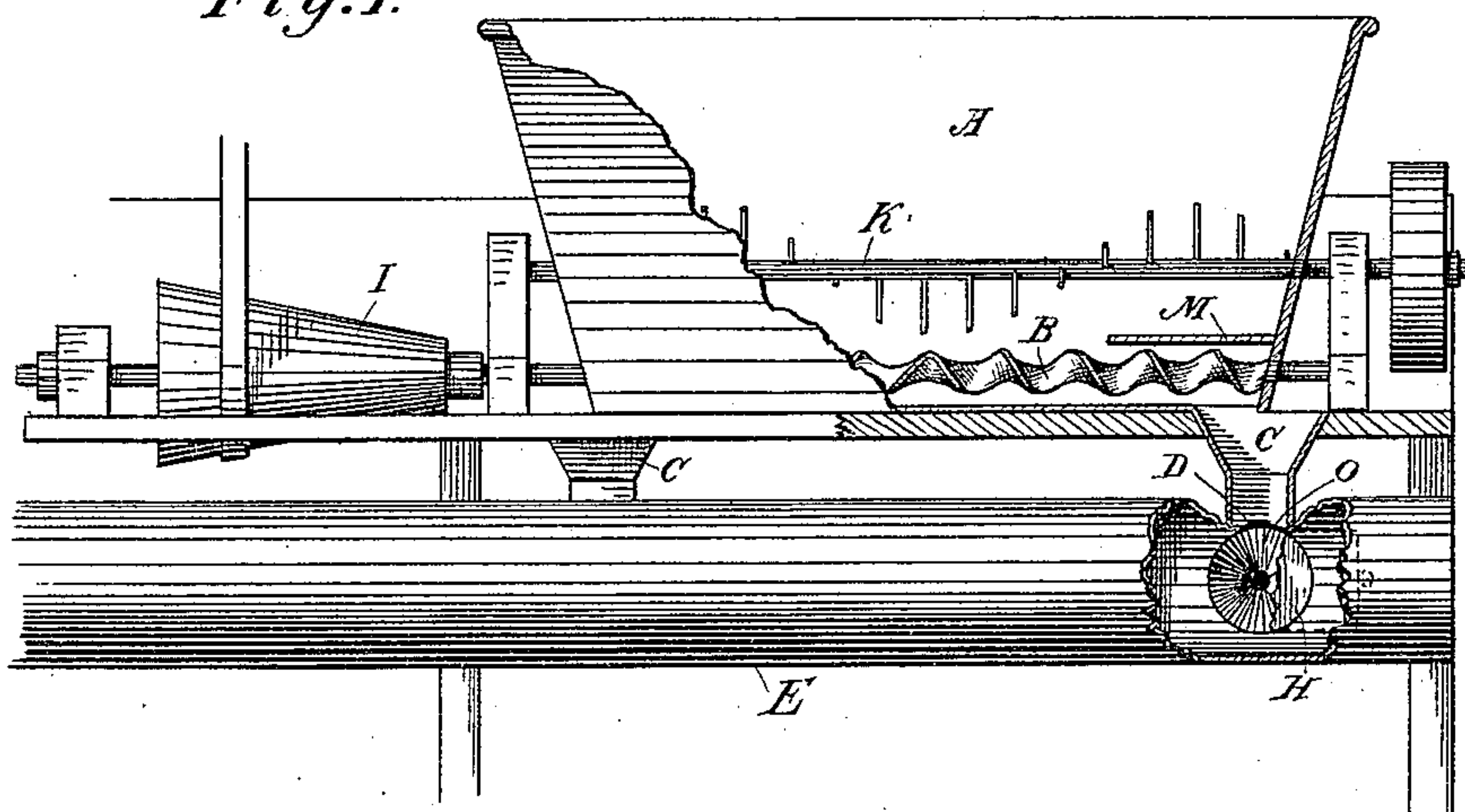
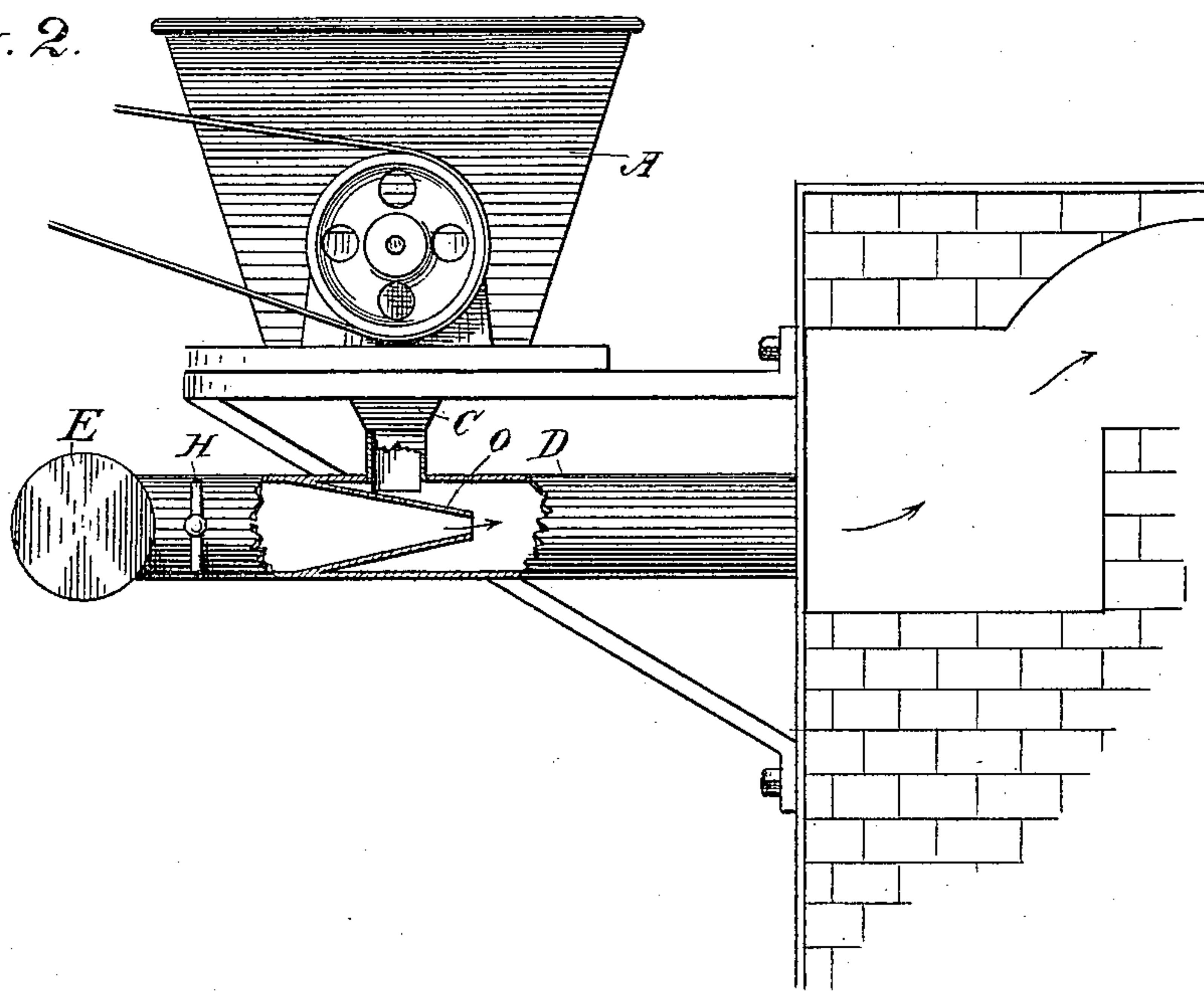


Fig. 2.



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UNITED STATES PATENT OFFICE.

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FUEL-FEEDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 441,689, dated December 2, 1890.

Application filed February 10, 1887. Renewed October 8, 1887. Again renewed May 3, 1890. Serial No. 350,515. (No model.)

To all whom it may concern:

Be it known that I, JOHN G. MCAULEY, of the city and county of New York, State of New York, have invented an Improvement in Fuel-Feeding Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements in apparatus for feeding fuel to furnaces, either used for smelting or other purposes, requiring an intense and equal heat, and it is an improvement upon a patent issued to me September 27, 1881, No. 247,570.

It consists in the arrangement of a feeding or injecting apparatus which is designed to consume the granulated, pulverized, or other fuel, and in certain details of construction.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a longitudinal vertical section of my feeder looking toward the furnace. Fig. 2 is a side view of the furnace and end view of the feeder.

A is a hopper, into which the pulverized or powdered fuel is fed after having been crushed or pulverized by a suitable apparatus, and from this hopper it is discharged through pipes or passages C into the feed-pipe D, which also receives a blast of air by which the pulverized fuel is injected into the furnace or fire-place, where it is ignited.

B is a worm or screw, which serves to feed the pulverized fuel along the hopper to the point where the discharge-pipe C leads out of it, and by this device the feed is intended to be kept constant. This screw is driven by a cone or tapering pulley I, fixed upon its shaft, where it extends outward through the side of the hopper, and the rate of speed is determined by the position of the belt upon the cone, whether upon the larger or smaller portion, the counter-shaft carrying a similar cone, over which the belt passes in the usual manner.

I have found considerable difficulty when the fuel was moist and inclined to adhere together from the fact that it would not fall down upon the screw so as to be fed along regularly, and in my present invention I have shown an agitator K, which consists of a series of arms projecting radially from a shaft, which extends through the hopper a short

distance above the screw B and preferably parallel with it. The radial arms projecting from the shaft are arranged around it so as to form a spiral, or simply at intervals, in any suitable manner, and as the shaft and arms are rotated they will agitate and stir up the material, thus preventing its becoming caked in masses, which cannot be readily fed or moved along by the feed-screw. By this arrangement I am enabled to render the feed more uniform and regular than with the apparatus when constructed without this device, as shown in my former patent.

As the discharge-openings C are within the sides of the hopper, the material could fall through when the apparatus was not working, and thus clog the passages, and in order to prevent this I have fixed above the screw or the shaft at these points the overhanging shelves M, which prevent the coal from falling out through these openings when the apparatus is not running, it being desirable to have a blast of air passing through the pipes D when any of the pulverized fuel is falling into them, so that it will be at once carried forward into the furnace.

Regulating-gates H are employed to control the supply of air, which is received through the main E from the blast-fan, so that perfect combustion may always be secured.

The nozzle by which the air-blast is delivered is contracted at O and extends just beyond the vertical fuel-supply pipes C, so as to prevent any upward blast through these pipes, and this construction causes the pulverized fuel to be drawn a short distance by suction, and thereafter driven into the furnace by the blast mixed with sufficient air for combustion.

I am aware of a fuel-feeding apparatus employing a hopper having a horizontal shaft provided with arms or screw-gears working in opposite directions from the center, whereby the fuel is carried to funnels beneath each end of the hopper, the uniformity of the feed being determined by a series of agitators mounted upon a horizontal shaft extending through the hopper.

The overhanging shelves M, I consider a most important element in my invention.

The forms of apparatus for feeding pulverized fuel heretofore designed may be divided

into two general classes, as follows: In one class the screw feeds the stuff out through a tube. The disadvantage developed in practice with this construction has been that the stuff soon clogged in that part of the screw within the tube. It revolved with the screw instead of being fed along lengthwise of the tube. This of course stopped the operation of the machine. In the other class a hole is placed in the bottom of the hopper. There the stuff is fed down by its gravity whether the screw is turning or not. Consequently when the apparatus is stopped and the air-blast turned off the stuff continues to dribble down into the air-pipes, and they will be found completely choked up the next time it is desired to use the apparatus. The use of the overhanging shelves M as placed by me avoids both these difficulties and renders the feed equable and easily graduated. The shelf is extended far enough so that the pulverized fuel lying under it in a sloping bank, whose inclination is determined by the angle of repose of the material being used, does not quite reach the edge of the discharge-pipe C. Thus there is no feeding from the unaided action of gravitation when the screw or any other equivalent form of conveyer used is not moving; but still the stuff lies there in a light, unpacked, non-caking mass, and the moment the feed is put on the fuel is pushed over the edge of the orifice of the discharge-pipe C at a regular rate, and the portion thus removed is as regularly supplied by gravitation from the quantity stored in the hopper above. It will thus be seen that the combination of elements, including the hopper, the overhanging shelf, and the discharge-pipe, are always exerting their function of checking any dribbling of stuff out of the hopper by the unaided action of gravitation. This function is continually in play whether the screw is turning or at rest. In fact it would continue should the screw be entirely removed.

I have chosen to illustrate and describe a screw form of conveyer as constituting my preferred construction of apparatus; but it is evident that any equivalent conveyer or means of pushing the stuff lodged beneath the shaft M over the orifice of the discharge-pipe C could be used, and I do not wish to be limited to the screw form alone.

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

1. The hopper or fuel-receiver and the rotary feed-screw by which it is delivered into the fuel and air pipes, in combination with the extensions or shelves overhanging the screw and extending over the discharge-openings, substantially as and for the purpose herein described.

2. An improved fuel feeding and injecting device consisting of the combination of a hopper or receptacle, a screw conveyer within said hopper, an agitator or stirrer above said conveyer, vertical fuel-discharge pipes C, a blast apparatus, and air-pipes having contracted nozzles extending beyond said pipes C into the furnace, substantially as herein described.

3. In the hopper of a fuel-feeding device, a shelf in the form of a horizontal plane overhanging the discharge-orifice, underneath which shelf the fuel in the hopper is driven by a suitable conveyer, substantially as described.

4. In a fuel-feeding device, the combination of a hopper, a discharge-orifice in the hopper, a shelf in the form of a horizontal plane overhanging said discharge-orifice, and a conveyer, substantially such as described, beneath the overhanging shelf.

In witness whereof I have hereunto set my hand.

JOHN G. MCAULEY.

Witnesses:

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H. C. LEE.