

R. HODSON.

APPARATUS FOR BURNING SAW-DUST, CHIPS, &c.

No. 177,509.

Patented May 16, 1876.

FIG. 1.

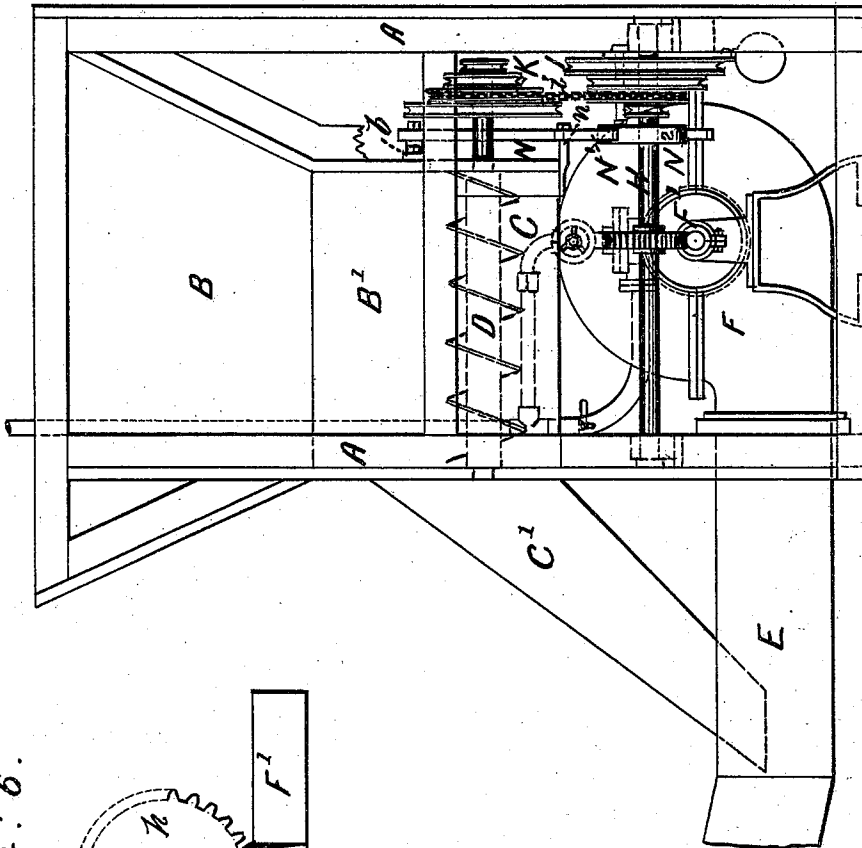
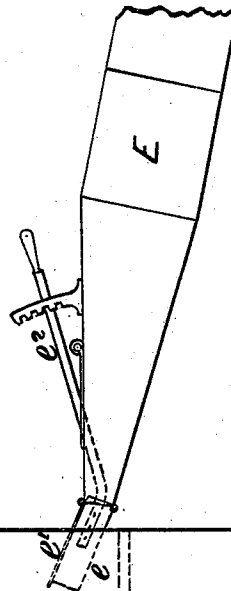
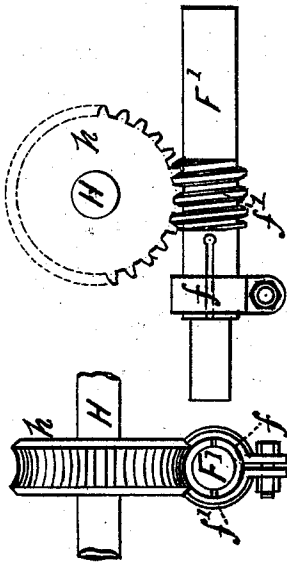


FIG. 6.



Witnesses

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FIG. 2.

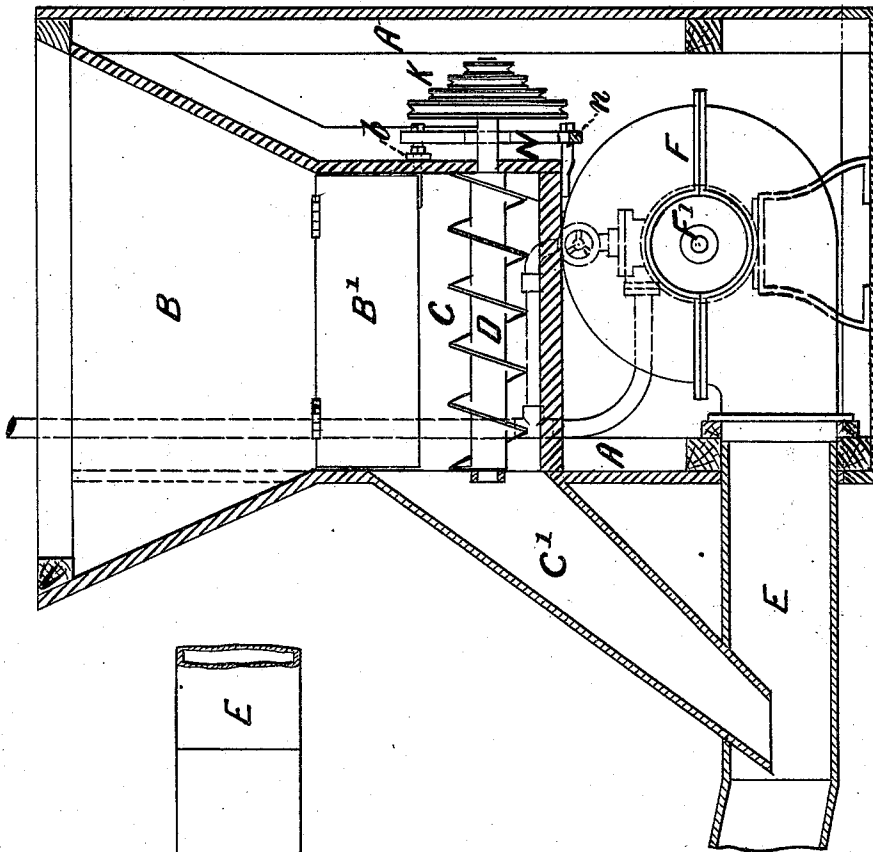
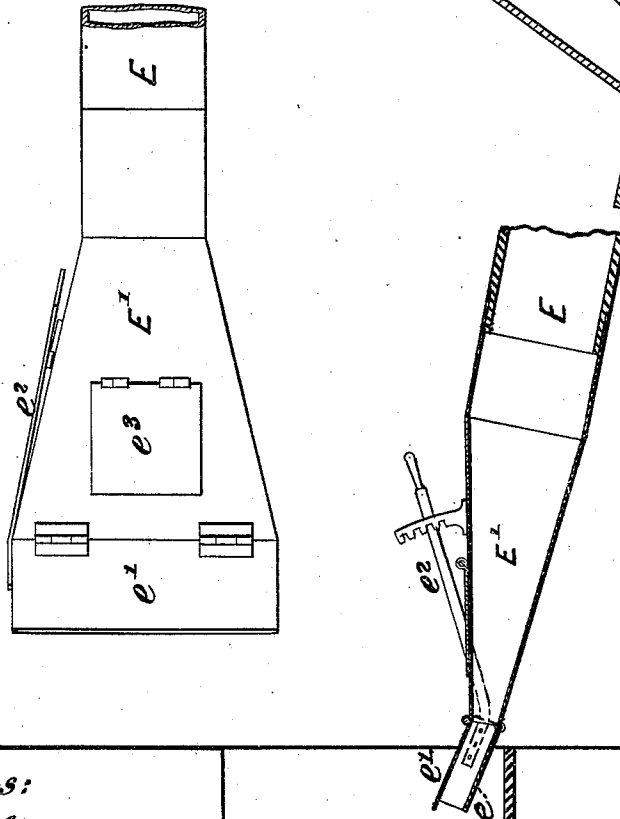


FIG. 3.



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FIG. 4.

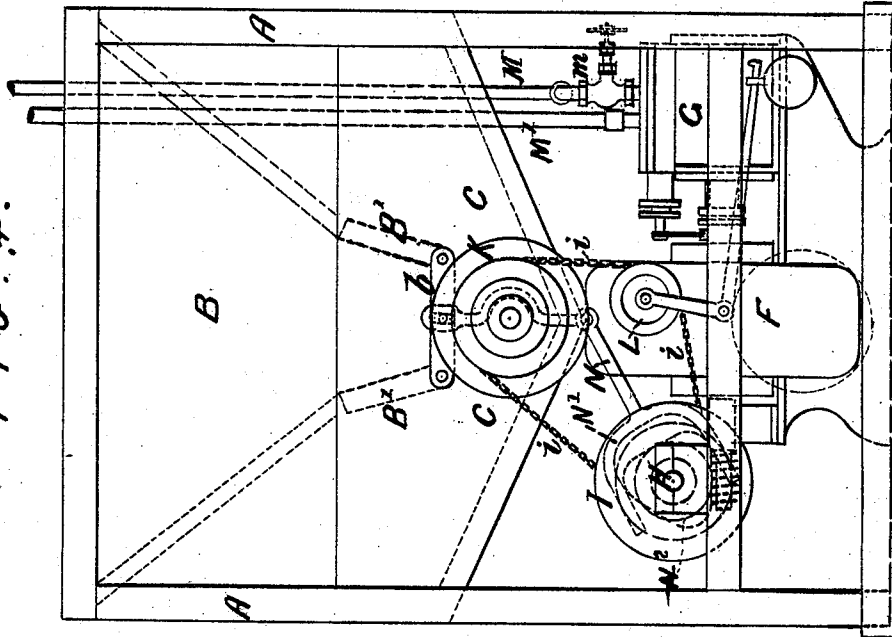
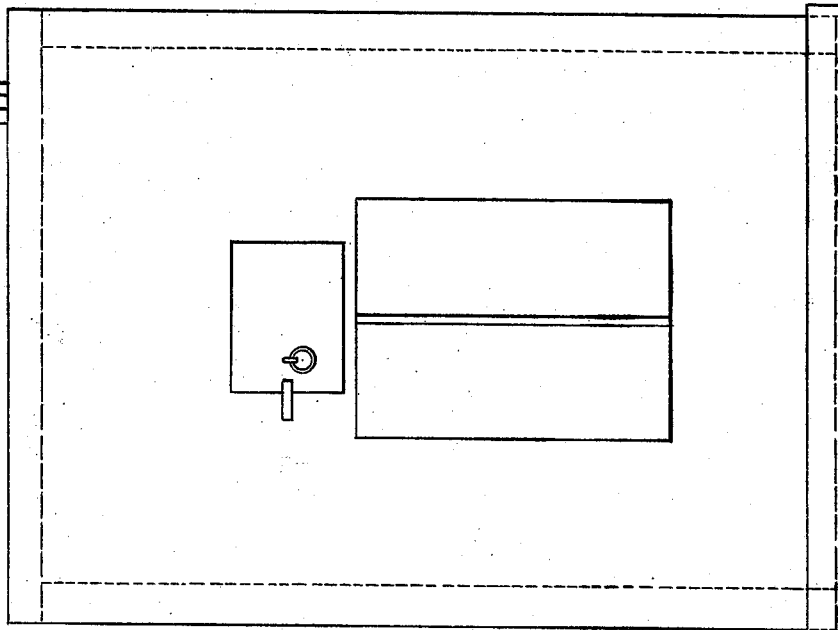


FIG. 5.



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IMPROVEMENT IN APPARATUS FOR BURNING SAWDUST, CHIPS, &c.

Specification forming part of Letters Patent No. 177,509, dated May 16, 1876; application filed April 11, 1876.

To all whom it may concern:

Be it known that I, RICHARD HODSON, of the Thames Iron Works Company, (limited,) Blackwall, in the county of Middlesex, England, have invented certain Improvements in Apparatus for Burning Sawdust, Chips, Shavings, and other combustible substances, of which the following is a specification:

The object of this invention is so to arrange apparatus for burning sawdust and wood chips as fuel, that the supply of the same to the furnace in which it is to be consumed shall be completely under the control of the attendant, and shall be mingled with an amount of air for supporting combustion proportionate to the quantity and quality of the fuel discharged into the furnace.

Figure 1 of the drawings shows the apparatus in side elevation as applied to a furnace, the feed-trunk being broken to contract the length of the figure. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a partial plan view of the mouth or delivery end of the feed-trunk. Fig. 4 is an elevation of the driving end of the apparatus. Fig. 5 is an end view of the case in which the apparatus is inclosed, and Figs. 6 and 7 are detached views of portions of the gearing.

Within a rectangular framing, A, is mounted a fixed hopper, B, for receiving the sawdust and chips to be used as fuel. The sides of this hopper terminate in hinged pieces B', for the purpose to be hereafter explained. Immediately below this hopper, and communicating therewith, is a chamber, C, for receiving the fuel from the hopper, and in it is mounted horizontally a propelling screw, D, for discharging the fuel continuously into a chute, O', which enters a feed-trunk, E. This feed-trunk is connected to the case of a fan or blower, F, which fan is carried by an axle, F'. This blower discharges a blast of air into the trunk for the purpose of carrying forward the fuel as it descends from the chute to the mouth or discharge end of the trunk, from which it passes in the form of a cloud or shower into the fire-chamber of the boiler to be heated. The axle F' of the fan constitutes the main driving-shaft of the apparatus, and it receives its motion from a rotary engine, G, Fig. 4, of any approved construction, the fan-axle being,

preferably, an extension of the axle of the rotating drum of the engine. The motion of this fan or blower axle F' is transmitted to the axle of the propelling-screw in such manner as to permit of the relative adjustment of their speeds to suit the supply of air to that of the fuel. The gearing is also so arranged that should any stoppage occur in the delivery-passages, the motion of the gearing will be arrested. Secured to the axle F' by a friction clip-piece, *f*, (see Figs. 6 and 7,) is a worm, *f'*, which gears into a worm-wheel, *h*, on a counter-shaft, H, and serves to transmit the motion of the fan-shaft to the propelling-screw. When, therefore, any obstruction to the rotation of the propelling-screw occurs, the motion of the counter-shaft will be arrested, and the worm continuing to rotate, will, by reason of its gearing into the worm-wheel *h*, be caused to slip endwise on its axle until it works out of gear. On the obstruction being removed the worm *f'* is thrown into gear with the worm-wheel *h*, and the action of the apparatus will proceed as before.

The counter-shaft H has its bearings in the frame A A, and keyed to one end of this counter-shaft H is a differential pulley, I, for receiving a chain, *i*, that passes to and drives a similar pulley, K, keyed on the axle of the propelling-screw D. To allow of this chain being shifted on the pulleys it is held at tension by a weighted pulley, L, the tipping of which out of action leaves the chain free to be shifted to a greater or less diameter of the pulleys, in order to insure the proper relation between the amount of fuel and of air-blast supplied to the furnace. This will vary according to the quality of fuel being consumed, and the intensity of fire required to be maintained will be determined by the speed at which the apparatus is driven. In order to bring the apparatus completely under the control of the attendant, a supply cock or valve, *m*, is fitted within his reach to the pipe M, which supplies steam to the engine G. By turning this valve the supply of steam to the engine is readily increased or diminished, and thus the supply of fuel and air may be raised to the maximum or completely cut off. M' is the pipe for leading off the escape steam. The hinged pieces B' of the hopper are connected together by a

link, *b*, and a pin projecting from the side of this link enters the slotted end of a cranked rock-lever, *N*, having its fulcrum at *n*. This crank-lever terminates in a fork, *N'*, which embraces a cam, *N''*, on the counter-shaft *H*. The rotation, therefore, of this shaft causes the cam to rock the crank-lever and thereby vibrate the hinged pieces *B'*. By this means the sawdust falling from the hopper will, in case it should have any tendency, through dampness or otherwise, to cake, be caused to deliver freely into the chamber *C*, whence it will be discharged, as before explained, into the feed-trunk *E*. The mouth *E'* of the feed-trunk is made tapering, both vertically and horizontally, as shown clearly at Figs. 2 and 3, the contraction vertically of the mouth being compensated for by its expansion laterally. The object of this arrangement is to spread the fuel, mingled with the air-blast, so that the same may be delivered in the form of a broad shallow stream into the combustion-chamber, where it will diffuse itself in the form of a cloud, and on ignition become an atmosphere of fire. In order to regulate the direction of this stream, the mouth is provided with hinged lips *e e'*, which are capable of being inclined upward or downward to any desired extent. The lower lip carries side pieces, upon which rests the hinged upper lip. To one of these side pieces a hand-lever, *e''*, is attached, and by its means the inclination of the hinged lips is adjusted. The adjustment may be secured by means of a spring-catch, or equivalent contrivance, taking into a segment-bar affixed to the feed-trunk. It will be convenient to fit the mouth of the trunk with a hinged cover, as at *e'''*, Fig. 3, to facilitate the removal of any obstruction in the mouth.

The casing which incloses the apparatus is provided with doors, (see Fig. 5,) to give access to the gearing for the purpose of adjusting the relative speeds of the propelling-screw and fan.

In applying this apparatus to the heating of a furnace a fire is first to be lighted in any convenient manner on the fire-bars, and the sawdust and chips, as they enter the fire-chamber from the feed-trunk, will become instantly ignited and consumed while in a state of suspension, and the whole of the interior of the furnace will quickly become one mass of fire. Thus no residuum will be left either on the bars or in the furnace-flues.

Having now explained the nature of my invention and the manner of carrying the same into effect, I wish it to be understood that I claim—

1. The combination, in a fuel-feeding apparatus, of the hopper *B B'*, chamber *C*, propelling-screw *D*, chute *C'*, feed-trunk *E*, fan or blower *F*, motive-power engine *G*, and steam supply-cock *m*, arranged as described, so as to enable the attendant to supply fuel, mingled with a blast of air, at any desired rate to a furnace.

2. The arrangement of gearing *f' h*, differential chain-pulleys *I* and *K*, and chain *i*, for transmitting motion from the shaft of the engine *G* to the propelling-screw *D*, so as to allow of the speed of the propelling-screw being readily adjusted relatively to the speed of the fan or blower, and of the action of the apparatus being arrested automatically should the feed-passages become choked.

3. The tapering mouth *E'* of the feed-trunk *E*, constructed with hinged adjustable lips *e e'*, substantially in the manner and for the purpose above described.

Dated the 7th day of March, 1876.

RICHARD HODSON.

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