2 Sheets--Sheet 1.

J. R. KING.

Furnace for Burning Straw.

No. 165,169. Patented July 6, 1875.

Fig. 1.

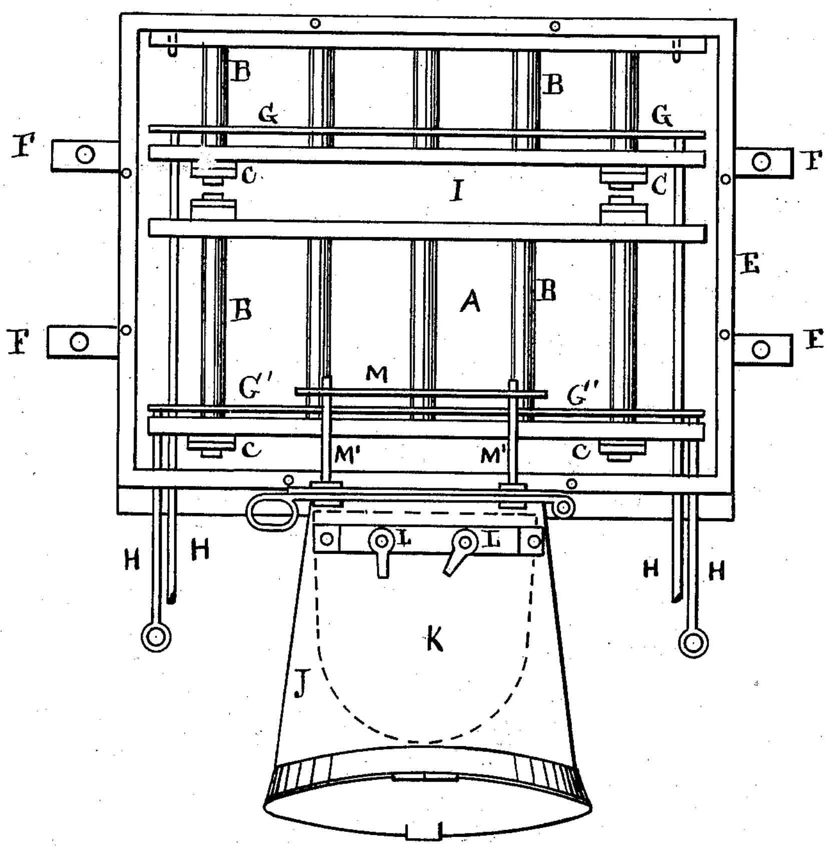
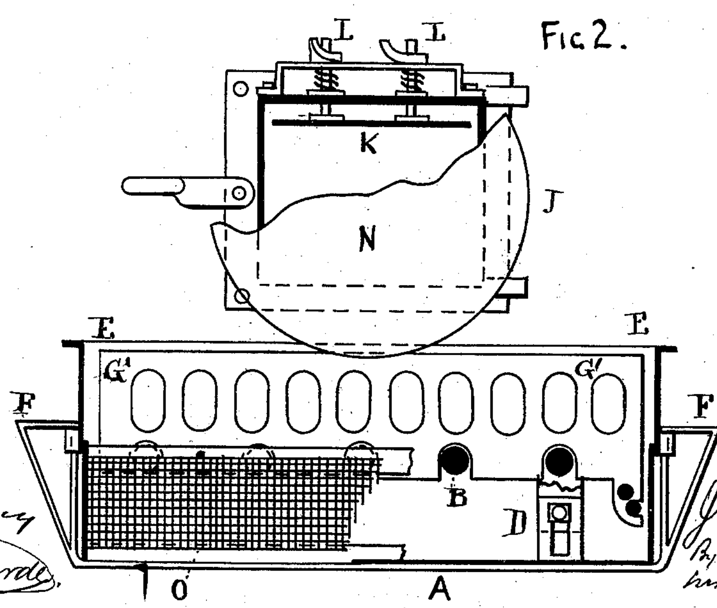


Fig. 2.



WITNESSES

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2 Sheets--Sheet 2.

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Furnace for Burning Straw.

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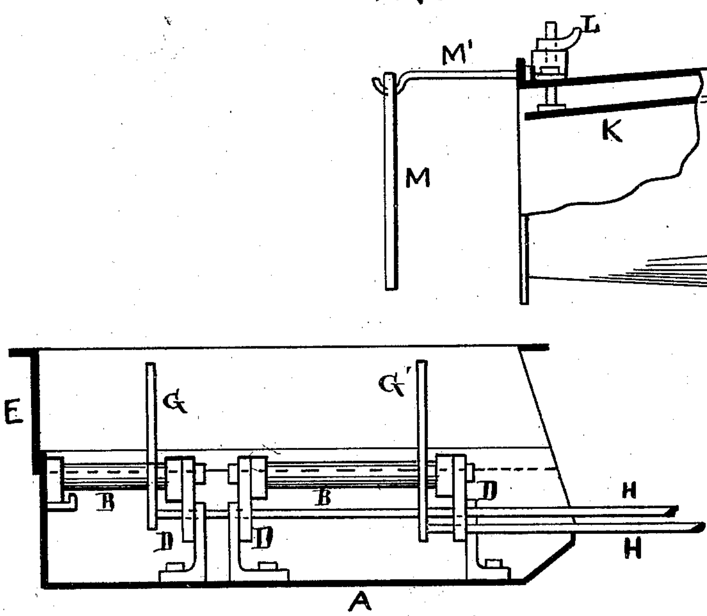
Fig 3.



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UNITED STATES PATENT OFFICE.

JAMES R. KING, OF MODESTO, CALIFORNIA.

IMPROVEMENT IN FURNACES FOR BURNING STRAW.

Specification forming part of Letters Patent No. **165,169**, dated July 6, 1875; application filed November 30, 1874.

To all whom it may concern:

Be it known that I, JAMES R. KING, of Modesto, in the county of Stanislaus and State of California, have invented an Improved Device for Burning Straw in Steam-Boiler Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the letters marked thereon.

My invention consists in a novel construction of the fire-box or furnace and grate-bars by which both, or either, can be raised or lowered, so as to regulate the draft by contracting or expanding the fire-chamber; also, to the novel construction and operation of a series of rakes, operating on the grate-bars so as to keep and place the straw in the desired position and promote combustion. It also relates to a novel hood or attachment to the furnace-door, through which the straw is fed to the furnace, and its quantity regulated.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 represents a plan; Fig. 2, a front elevation, partly broken away; Fig. 3, a side sectional elevation, Sheet 2.

It should here be observed that in burning straw for steam purposes great difficulty has been experienced in preventing the ends of the flues of the boiler from becoming coated over with a scale, or a charred and sticky product of the half-consumed straw, and in regulating the draft of the furnace, and keeping the grate-bars in such a condition that all of the straw which is fed to the furnace shall be consumed and not bank against the ends of the flues, in which position it remains in a semi-consumed state, interrupting or retarding the combustion of the new straw to be fed to the machine, all of which it is believed is remedied in the use of my invention.

In Sheet 1 of the drawings, A is an ash-pan or bottom of a furnace, in which is placed the grate-bars B, which consist of two sets in this connection, the rear set being nearer the bridge-wall, and constructed of less width than that of the front set. These bars are constructed of round iron, and are held to the cross-bars by bolts and nuts C, so that they can be easily renewed when destroyed by the flames. At each corner of these bars is attached an extension-leg, D, so that the front portions of the bars can be raised or lowered, or the whole series adjusted to the desired height or inclination. The pan is also constructed so as to be raised or lowered on the frame E, which is stationary, by means of hand-screws operating in the brackets F. In order to keep the grates clear of cinders, and regulate the position of the straw which is being consumed, I employ the perforated rakes G G′, set edgewise. These rakes are caused to move on the grate-bars by means of the handles H H, which extend outside of the furnace to the front. By this means the position of the burning straw is changed from time to time with little agitation, and the cinders shoved or drawn over into the ash-pan through the open space I between the two series of bars by pushing gradually back the rake G′, and complete combustion is had without stirring up the mass, and causing it to rise with the draft of the furnace and be carried back in a half-consumed state against the bridge-wall and flues of the furnace and boiler. A hood, J, is attached to the ordinary door-hole of the furnace, and is intended to take the place of the ordinary door. It consists of a bonnet-shaped funnel, and is provided with an apron or flap, K, which can be raised or lowered, by means of the set-screw L, so as to contract or enlarge the opening to the furnace, and hold the straw more compact, and prevent it from being drawn so rapidly into the furnace by the great draft, which is so liable to be created in employing so light a substance for fuel. As a further preventive to the slighter portion being carried to the bridge-wall of the furnace, a swinging perforated flap or plate, M, is loosely connected to the arms M′ M′, which are fixed to the inner end of the bonnet, as shown. This extends over the front end of the first series of bars, and, when the straw is crowded through the feed-bonnet, the lower edge of the flap will be carried inward at an incline and retard or bar the further ingress of the loose particles at the top. This plate, however, need only to be used when short fire-boxes are employed. The straw to be consumed is fed through the bonnet, which is always kept filled, especially the

mouth, or that portion next to the furnace, so that when feeding the quantity is pushed forward as necessity requires. A cap or cover, N, is attached to the front end of the hood to close the entrance, and perforated screens O O are placed in front of the hearth of the fire-box to prevent ignition of the loose straw, which may become detached in feeding.

These screens may be substituted for plain or close plates or screens when moving the machine from place to place, or when the working of the engine for the day ceases.

It should here be observed that in applying my device to most engines now constructed it will be necessary to lengthen the smoke-pipe and enlarge the bottom of the smoke-stack in the form of an inverted cone, and also lower the exhaust-pipe, so that it will be surrounded by the flame from the furnace, and superheat the steam in its exit from the siphon into the stack.

In case the flues of the boiler become obstructed, I employ steam from the boiler, which is directed into the smoke-stack and superheated in a separate pipe from the one above described, and directed through the flues.

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

1. The combination of the grates B and B′, provided with the open space I between them, substantially as set forth and specified.

2. The combination of the grates B and B′, having the open space I, with the ash-pan made adjustable by means of the extension-legs D D, substantially as set forth and specified.

3. The grates B and B′ when provided with the open space I, in combination with the rakes G G′, arranged to operate substantially as described.

4. The hood or bonnet feeding device, with its compressing-plate K, in combination with means for enlarging the entrance, consisting of the screws L L, substantially as set forth and specified.

5. In combination with the hood J on the furnace and its adjustable flap K, constructed as set forth, the swinging plate M, suspended from the arms M′ M′ within the furnace, for the purpose of controlling and regulating the supply of straw, as described and specified.

6. The perforated screens O O, in combination with the extension ash-pan A, substantially as and for the purpose specified.

In witness whereof I have hereunto set my hand and seal.

JAMES R. KING. [L. S.]

Witnesses:
C. W. M. SMITH,
PHILIP MAHLER.