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J. HEAD & T. C. BROWN.

Devices for Burning Straw in Steam-Boiler Furnaces.

No. 148,822. Patented March 24, 1874.

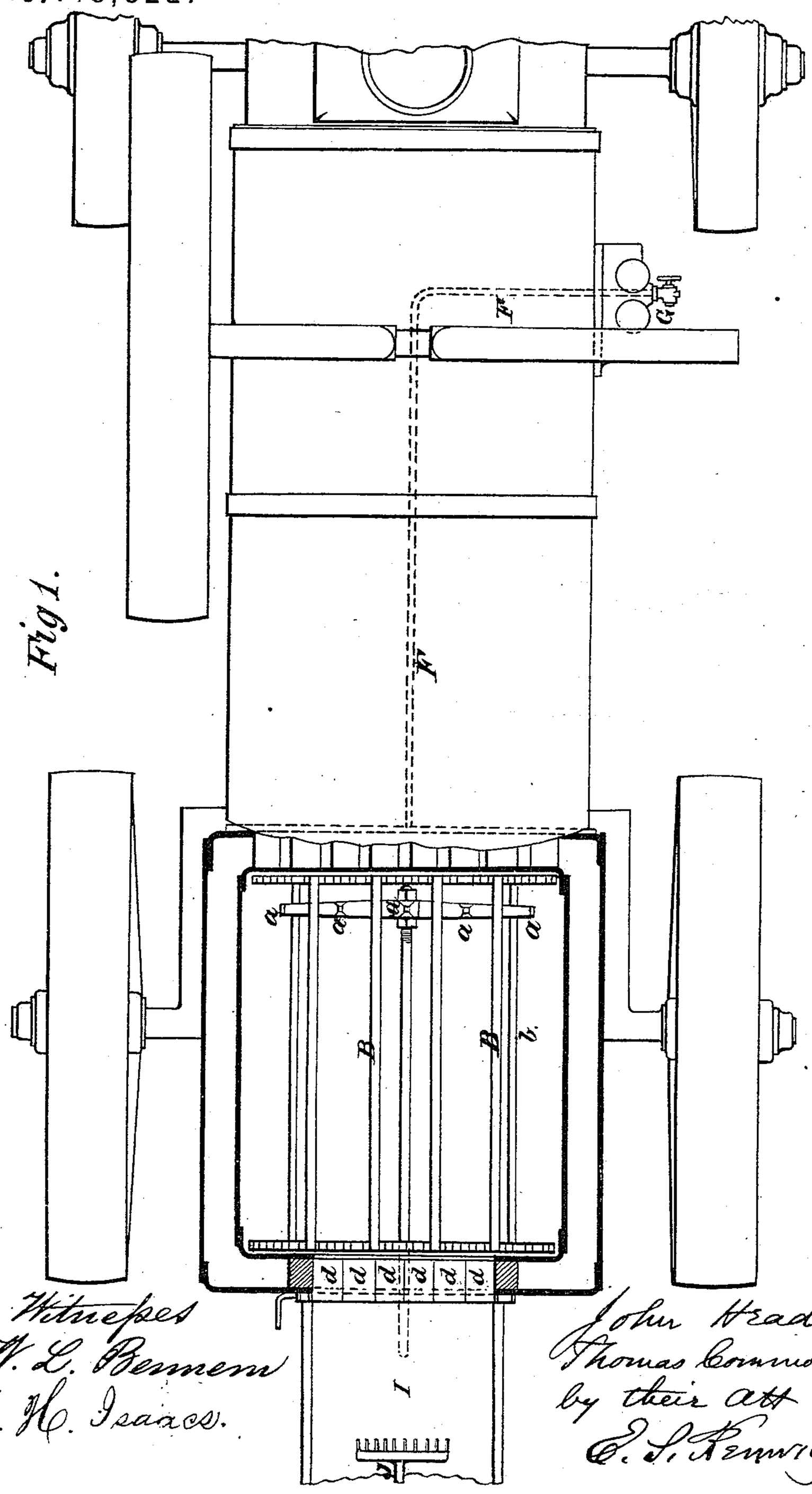

Fig 1.

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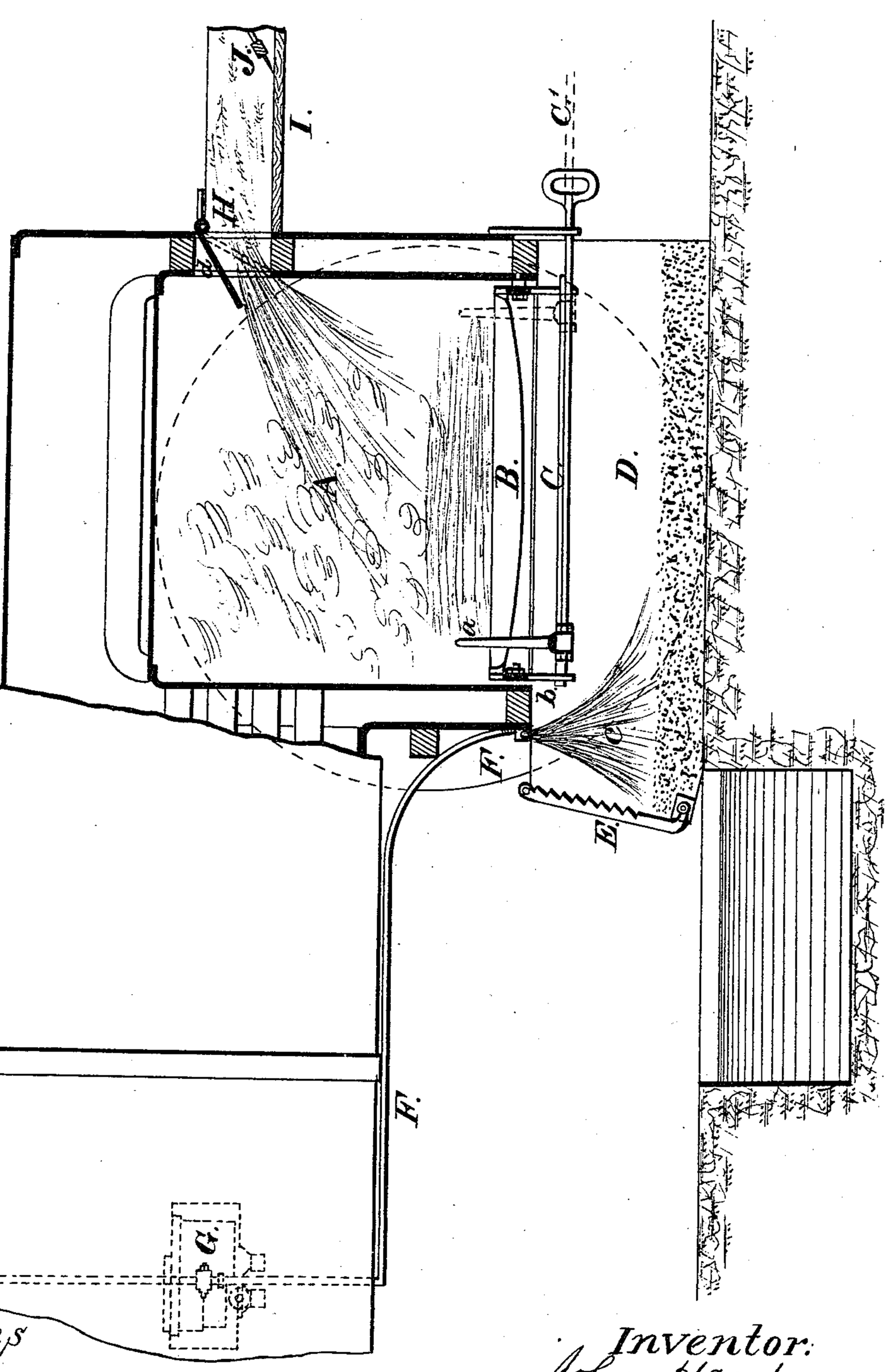
Fig 2.



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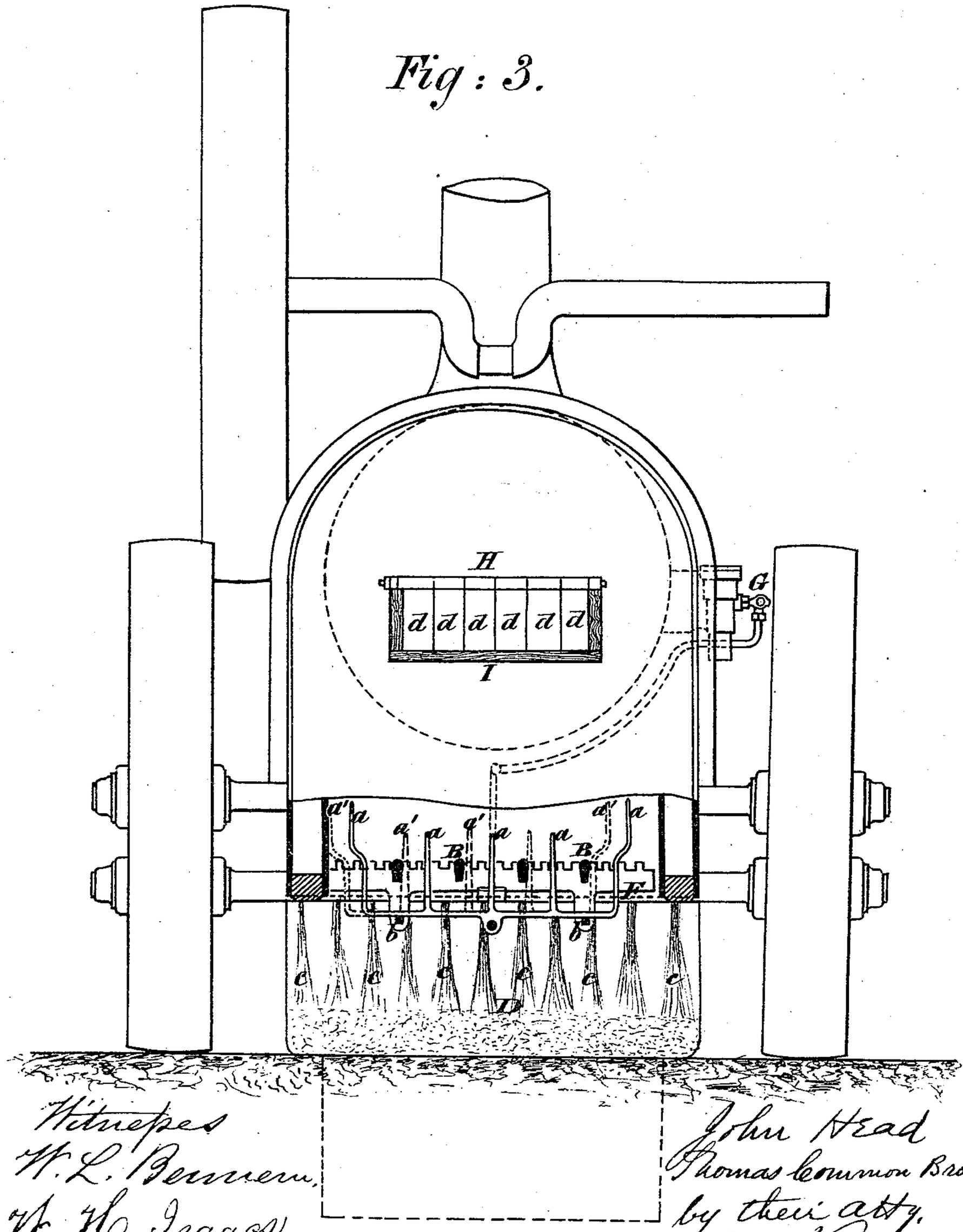
J. HEAD & T. C. BROWN.

Devices for Burning Straw in Steam-Boiler Furnaces.

No. 148,822. Patented March 24, 1874.

Fig : 3.



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UNITED STATES PATENT OFFICE.

JOHN HEAD AND THOMAS C. BROWN, OF IPSWICH, ENGLAND; SAID BROWN ASSIGNOR TO SAID HEAD.

IMPROVEMENT IN DEVICES FOR BURNING STRAW IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **148,822**, dated March 24, 1874; application filed September 5, 1873.

To all whom it may concern:

Be it known that we, JOHN HEAD and THOMAS COMMON BROWN, both of Ipswich, in the county of Suffolk, England, engineers, subjects of the Queen of Great Britain, have invented or discovered new and useful Improvements in Apparatus for Burning Straw and Grasses in Steam-Boiler Furnaces; and we, the said JOHN HEAD and THOMAS COMMON BROWN, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

This invention has for its object improvements in apparatus applicable to portable and other steam-engines to facilitate the burning of straw, grasses, and the like, as fuel for making steam. For this purpose we construct the furnace with the bars wider apart than usual, and in the spaces between the bars we cause the teeth of a rake to be moved by hand or otherwise, in such manner that all accumulation of slag formed by the silica of the straw, or other similar fuel, shall be thereby broken up, and the passages for the admission of the air kept free. We give a lateral, as well as a longitudinal, motion to the teeth of the rake, so that the sides of the fire-bars and fire-box can be thereby scraped clean.

In some cases we employ an endless chain of rakes, the teeth of which project between the fire-bars, and we cause the rakes to move backward and forward automatically, or to be moved by hand when required.

Beneath the fire-bars we fix a deep ash-pan, with an opening on one side for raking the ashes out, and for the admission of the air; and in order to prevent the danger which might arise from particles of glowing ash being blown about by the wind when being raked out of the ash-pan, we fix across the opening of the ash-pan a pipe with a number of small holes, and connect the pipe with the ordinary feed-pump of the engine, so that the attendant can cause a sufficient quantity of water to be thrown onto the glowing ash to quench it before raking it out of the ash-pan. The pipe may, if preferred, be connected with a reservoir, and so be used independently of the feed-pump, at pleasure. The feed-mouth of the furnace is fitted with an inclined trough to receive the straw or other similar fuel, and across the opening into the fire-box are placed a number of self-acting air-valves, which open as the straw is pushed in by forks or other hand instruments, adapt themselves to the varying thickness of the layer of straw at different portions of its width, and close up themselves as soon as the feeding stops.

We sometimes use an exhaust-fan or blower in connection with the smoke-box and chimney, to draw off the smoke and hasten the production of steam.

In order that our said invention may be most fully understood and readily carried into effect, we will proceed to describe the drawings hereunto annexed.

Figure 1 is a plan, Fig. 2 is a side view, and Fig. 3 an end view, all partly in section, of a portable engine adapted to burn straw and grasses.

A is the fire-box. B B are the fire-bars. C is a rake, the teeth *a a* of which project upward through the spaces between the fire-bars. The head of the rake rests upon the supporting-bars *b b*, and the handle projects through the ash-pan, within convenient reach of the attendant.

In clearing the spaces between the bars, the attendant draws the handle out to the position C′, and he moves it backward and forward, and may also give a lateral movement to the rake, as shown by the dotted positions of the teeth *a′a′*, Fig. 3, so as to cause the teeth *a a* to scrape the sides of the fire-bars and fire-box. The backward and forward movement of the rake is continued until the air-spaces are cleared. D is the ash-pan. E is the opening for raking out the ashes and for the admission of the air. (It may be at either side of the engine, as preferred.) F is the pipe connected with the feed-pump, or with a reservoir, for throwing jets of water *c c* upon the glowing ashes. G is a cock on the pipe, by which the attendant regulates the supply of water. H is the feed-mouth of the furnace. *d d* are self-acting air-valves, which close the opening of the feed-mouth, and are constructed to rise and descend independently of each

other, so that each valve adapts itself to the thickness of the part of the layer of straw upon which it acts, and the access of air at the feed-mouth is prevented very thoroughly, notwithstanding the irregularities in the thickness of the layer of straw at different parts of its breadth. I is a trough for the reception of the straw. J is a convenient instrument for pushing the straw past the air-valves *d d* into the furnace A. On withdrawing the instrument J the valves close of themselves, and the draft of air through the furnace goes on uninterruptedly.

The methods we use of automatically feeding the fuel into the fire-box in place of feeding by hand are such as, for instance, that for which Letters Patent have been applied for by William Westlake, administrator to Casimir Schemioth, concurrently with this application, or other suitable contrivances; but we make no claim to such mechanical feeding apparatus.

When the fuel to be burned is damp, or requires a larger supply of air to promote its combustion than the natural draft would give, we employ a fan or blower, applied to the smoke-box or chimney in such manner as either to draw the air into the fire-box through the opening E of the ash-pan by exhaust, or to force a strong current of air up the chimney. In either case the fan or blower is constructed to be driven by hand when first getting up steam, and to be driven by the engine at pleasure when sufficient steam is formed.

Having now described our invention, we would have it understood that we claim—

1. The combination, substantially as before set forth, of the fire-box, the fire-bars, the rake, and the supporting-bars below the fire-bars, so that the rake may be moved longitudinally and laterally to the fire-bars.

2. The combination, substantially as before set forth, of the fire-box, the feed-mouth, and the series of self-acting air-valves for the said feed-mouth.

JOHN HEAD.
T. C. BROWN.

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HY. SIDNEY,
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