

(No Model.)

2 Sheets—Sheet 1.

J. H. MEISSNER.  
FURNACE GRATE.

No. 529,286.

Patented Nov. 13, 1894.

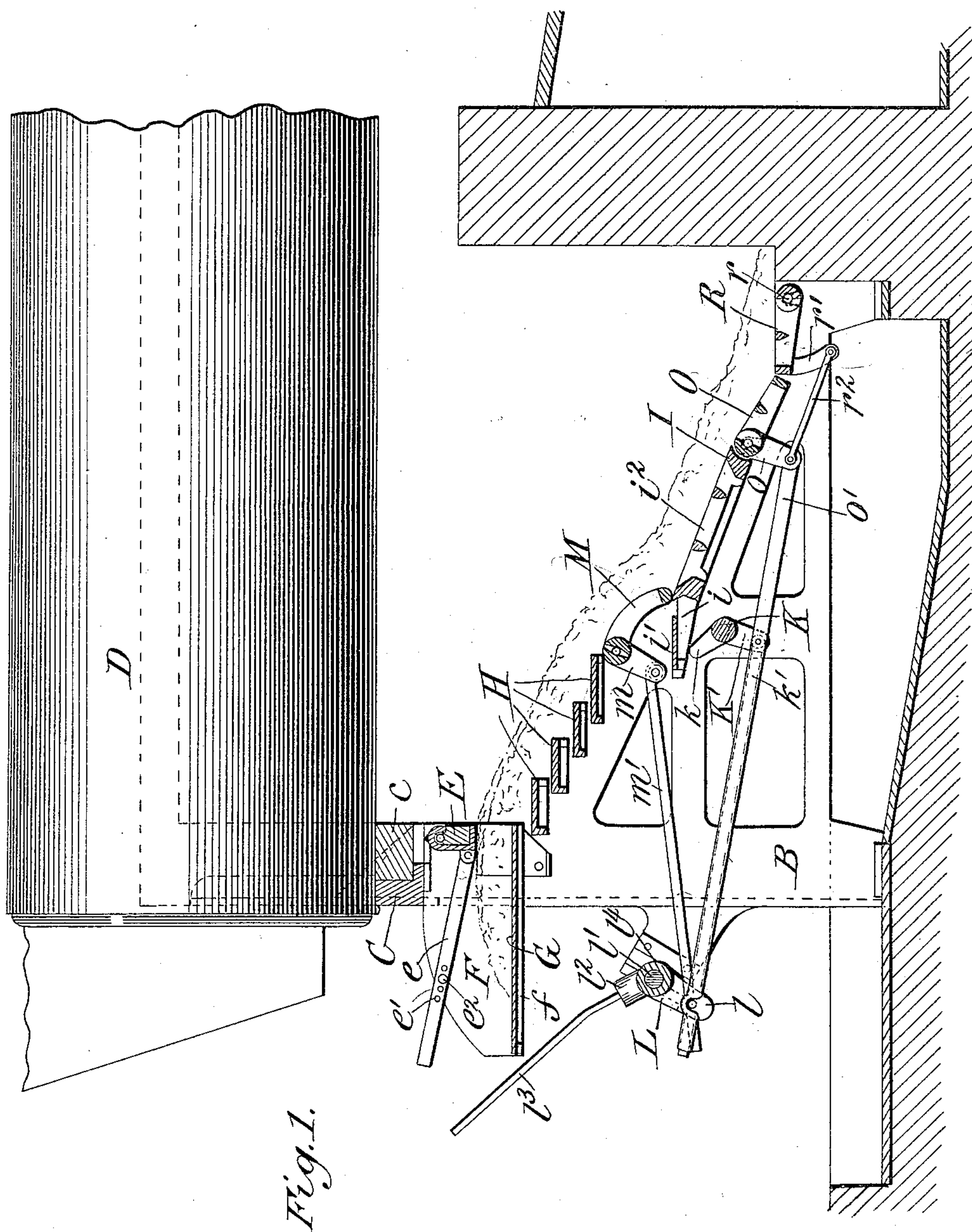


Fig. 1.

*Attest:*

*F. H. Schott*

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*Inventor:*

Inventor:  
Julius W. Meissner  
by "Max Gergu"  
his attorney.

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2 Sheets—Sheet 2.

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Fig. 2.

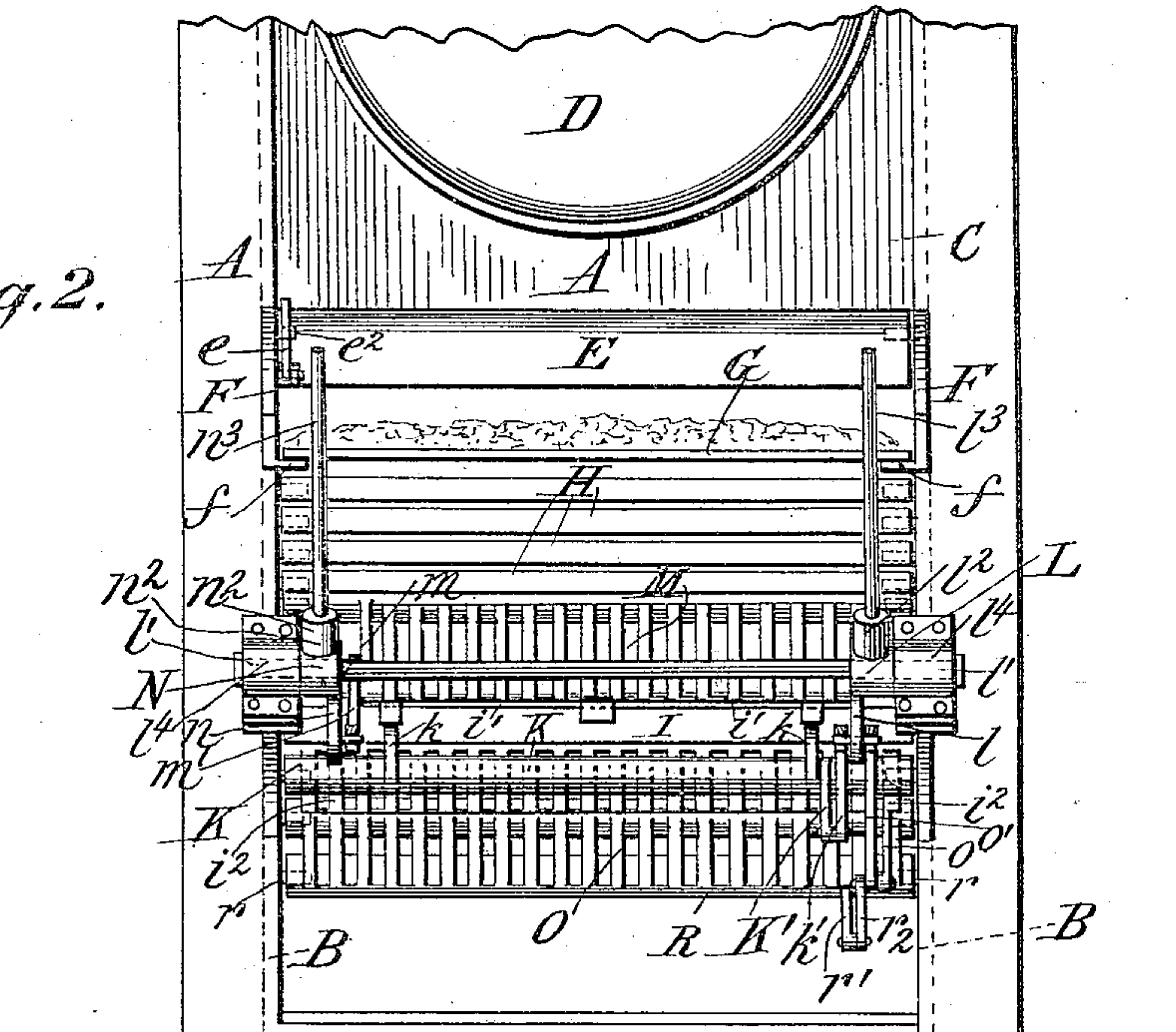
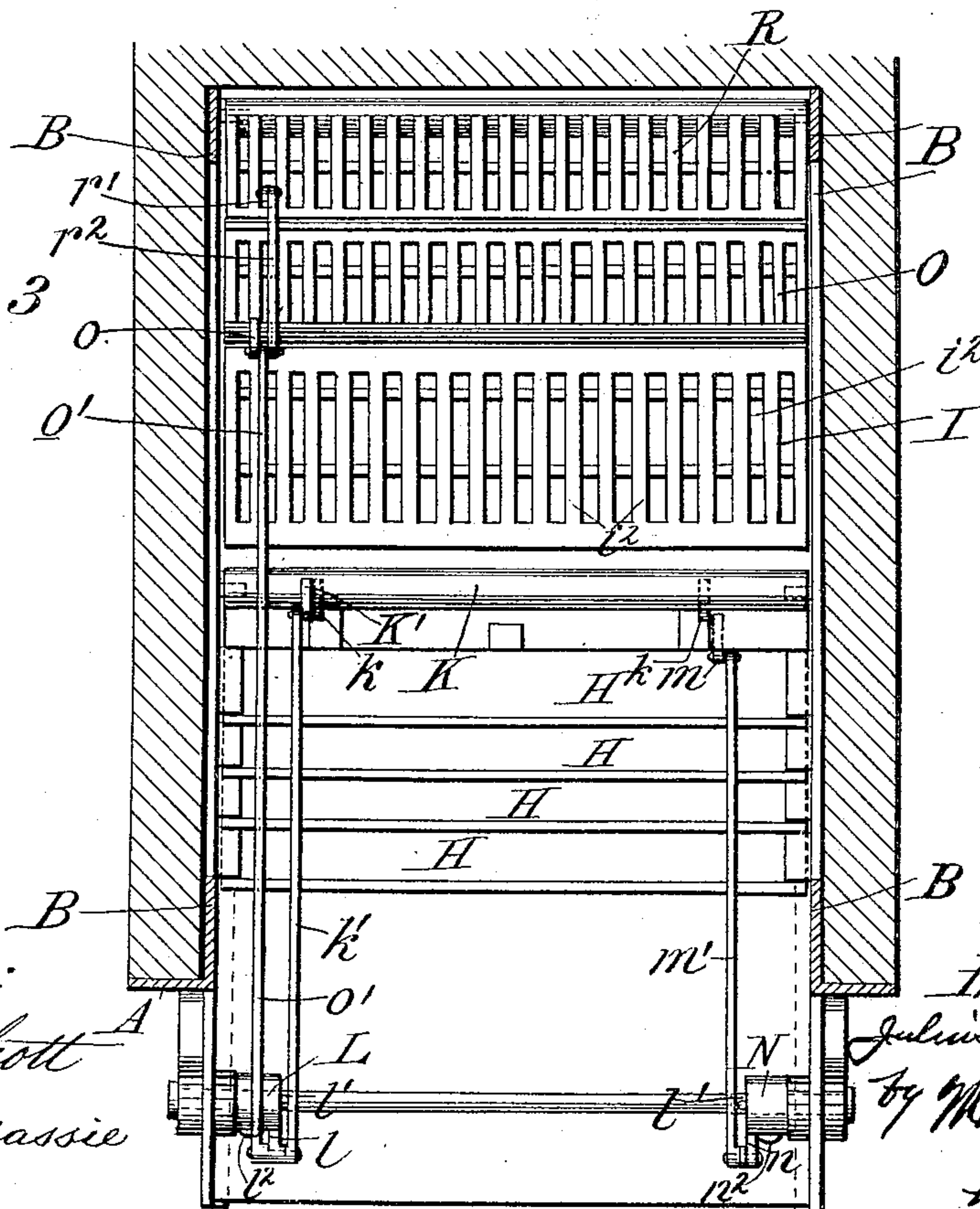


Fig. 3



Attest:

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# UNITED STATES PATENT OFFICE.

JULIUS H. MEISSNER, OF PITTSBURG, PENNSYLVANIA.

## FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 529,286, dated November 13, 1894.

Application filed February 6, 1891. Serial No. 380,548. (No model.)

*To all whom it may concern:*

Be it known that I, JULIUS H. MEISSNER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Furnace-Grates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in furnace-grates.

The object of my invention, broadly stated, is to produce a furnace in which the fire may be cleaned or stoked, without danger of extinguishing it.

A further object of my invention is to make a furnace that can be ordinarily fired by hand, or can be stoked mechanically, if desired, and which can use successfully any kind of coal as fuel.

My invention consists in such features, details and combinations of parts as will first be described in connection with the accompanying drawings and then particularly pointed out in the claims.

In the drawings—Figure 1 is a longitudinal vertical section, partly in elevation, of a boiler furnace embodying my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a bottom plan view of the same.

Referring to the drawings, A is a boiler front.

B are side frames, and C is a transverse cross-beam protected from the action of the heat, by means of refractory material, c, this cross-beam being carried by the side frames, and supporting the boiler front, and, if desired, the front end of the boiler, D.

Below the cross-beam, C, and substantially in a line beneath its inner face, is pivoted a swinging door, E, which may be adjusted to any desired position, by means of a rod, e, provided with a series of holes, e', into any one of which may be inserted a pin, e'', held in a projection, F, forming part of the side frame, by which construction the door, E, may be either secured in any position or released so as to swing freely. At a suitable distance below the swinging door is a dead plate, G, carried by lugs, f, formed integral with the

projection, F. The space between the top of the dead plate and the bottom of the upper cross-beam is for the insertion of fresh fuel, which may be shoveled by hand on to the top of the plate, G, and forced into the furnace beneath the door, E, or may be supplied to the said plate, G, by any suitable stoking device.

The swinging door, E, being hung beneath the inner face of the cross-beam, C, allows the air to have access to the under side of the cross-beam and to the outer side of the door, E, thereby keeping said cross-beam and door cool, and thus preventing them from being burned out. Moreover, the inward swinging of the door permits coal of varying sizes to be fed into the furnace, the door closing automatically by its own weight, to cut off the influx of air which might, otherwise, take place, and, which, if allowed to enter at this point, would tend to cool the under side of the boiler and spoil the draft of air through the incandescent fuel on the fire-beds.

Beneath the plate, G, and jutting successively farther into the furnace chamber is a series of flat plates or bars, H, arranged in steps, so as to form an upper fire-bed, these plates being supported on the side frames, the slope or incline of this fire-bed being preferably about thirty-three degrees. At a short distance below the upper fire-bed is located a lower fire-bed, in this case, consisting of an inclined grate-frame, I, having a forward projecting portion, i, carrying a movable shelf, i', and resting on rockers or arms, k, of a rock-bar, K, which rests on pins inserted in the side frames, and is provided with a downward-extending arm, K', attached, by means of a coupling rod, k', to one arm, l, of a bell-crank, L, fulcrumed on a shaft, l', and provided with a socket, l'', in which is inserted a hand-lever, l'', the shaft, l', being mounted in boxes, l'', attached to the side frames.

In the grate-frame, I, is located a series of grate-bars, i'', in such a manner as to be readily removed and replaced, when desired. The lower end of the grate-frame is supported by two pins, carried by the side-frames. The lower fire-bed has, preferably, a less incline than the upper fire-bed, and is arranged with its front end substantially beneath the rear or inner end of the upper fire-bed.



Between the upper and lower fire-beds, and beneath the inner bearer of the upper or first fire-bed, is placed an inward-swinging grated door, M, which is preferably slotted or perforated for the admission of air. This grated door rests, at its upper end, on two pins cast on the side frames and is provided with an arm, *m*, by which it may be rotated, when desired, this arm being connected, by a rod, *m'*, to one arm, *n*, of a bell-crank lever, N, fulcrumed on the shaft, *l'*, and provided with a socket, *n<sup>2</sup>*, in which is inserted a hand-lever, *n<sup>3</sup>*. The normal position of the door, M, is such that it carries but little, if any, weight of fuel, being more nearly vertical than the fire-beds and adapted, when opened, to sweep the fuel inward and upward.

On the inner side of the lower fire-bed is located an upward-swinging grate, O, which projects toward a downward swinging trap-grate, R, being provided with an arm, *o*, attached, by a coupling rod, *o'*, to the arm, *l*, of the bell-crank, L, previously referred to. The grate, R, is pivoted at *r*, and provided with a downward-extending arm or segment, *r'*, which is connected, to the arm, *o*, by means of a link, *r<sup>2</sup>*.

It will be observed from the drawings, that the bell-crank, L, operates two coupling rods, *k'*, and *o'*, one coupling rod being arranged on each side of the end, *l*, of said bell-crank lever, and both coupling rods being removably attached to the lever, by which arrangement the grates, I, O and R, may be operated simultaneously, or the grate, I, may be operated independent of the other two.

The operation of my device, briefly stated, is as follows: The fire is kindled on the grates in the usual way, allowing it to burn well all over the bars. When it needs fresh fuel, the coal is shoveled onto the plate, G, from whence it is pushed beneath the swinging door, E, into the furnace. When enough coal has been supplied, the opening under the swinging door is closed with fuel. The inward movement of the fresh coal causes it to act on the burning fuel on the terraced grates, thereby working the latter downward toward the lower fire-bed and onto the lower clinker grates, O and R. To break up the fire on the lower fire-bed, I, and remove any clinkers there, the door, M, is raised by drawing on the hand-lever, *n<sup>3</sup>*, whereupon a slice-bar may be inserted, and the fire stirred and cleaned, as desired. As the door, M, is raised, it sweeps the fuel inward and upward, and holds back the fire on the upper fire-bed, thus allowing plenty of room for the manipulation of the fire on the lower fire-bed. By rotating the rock-bar, K, by the lever at the front, the lower fire-bed may be lowered, thereby increasing the space between itself and the upper fire-bed. This gives still more room for cleaning the fire, and is a great advantage in burning hard coal, owing to the fact that the clinkers must be drawn forward from the grate, I, instead of being allowed to work

down onto the grates, O and R, as will be fully understood by those skilled in the art. When the fire-bed, I, is in its normal position, the movable shelf, *i'*, is drawn forward on the projecting portion, *i*, in order to keep it out of the heat of the furnace. Before raising the grated door, M, the operator pushes the movable shelf, *i*, rearward, in order that, when the said door is raised, the fuel will be caught by the shelf, instead of falling into the ash-pit. The clinker grates, O and R, are simultaneously actuated from the front, by means of the links and levers previously described, the grate, R, swinging downward to permit the ashes and clinkers to fall into the ash-pit, while the grate, O, swings upward, thereby retaining the incandescent fuel on the fire-bed, I. On replacing the various parts in their normal position, the fuel from the upper fire-bed may be again fed downward onto the lower fire-bed and onto the clinker grates, while fresh fuel may be supplied to the upper fire-bed, as before. In this way, a steady heat is maintained in the furnace and the fires are readily cleaned. It will be observed that the fire-beds in my construction are terraced or stepped, with an interval of space between them, this space being occupied by a door or grating, which swings upward and inward, whereby the fire is held up onto the fire-bed above the door during the time such door is raised, thus allowing that part of the fire below the raised door, to be stirred and cleaned, thus maintaining a good draft through the grates. Moreover, while I have shown but two fire-beds, it is to be understood that, if desired, a greater number of fire-beds may be employed, arranged one below the other, a door closing the interval between adjacent fire-beds. Furthermore, attention is called to the fact that the normal position of the door when closed, is such that its angle of slope is greater than that of the fire-beds, so that but little, if any, weight of fuel is retained on the door, thus enabling it to be raised and swung back readily with small power.

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

1. In a furnace, the combination, with an upper fire-bed and a lower fire-bed having its forward end substantially in a vertical plane beneath the rear end of the upper fire-bed, of an upward-swinging door normally closing the gap between the fire-beds, substantially as set forth.

2. In a furnace, the combination, with an upper sloping fire-bed and a lower sloping fire-bed arranged so as to leave a gap between them, of an upward-swinging door normally closing the interval between the fire-beds hinged at its upper end and sloping at an angle greater than that of the fire-beds, substantially as set forth.

3. In a furnace, the combination, with an upper and a lower fire-bed, the latter being



provided at its forward end with a projecting portion which extends beneath the rear end of the upper fire-bed, of a shelf mounted on said projecting portion, and an inward-swinging door hinged beneath the rear end of the upper fire-bed and arranged to close the gap between the fire-beds, substantially as set forth.

4. In a furnace, the combination, with an upper fire-bed and a lower fire-bed having its forward end substantially in a vertical plane beneath the rear end of the upper fire-bed, the said lower fire-bed being movable up and down, of a door normally closing the gap between the fire-beds, a rock-bar provided with a rocker engaging the lower fire-bed near its front end, and means for rotating the rock-bar, whereby the said lower fire-bed may be lowered, substantially as set forth.

5. In a furnace, the combination, with a sloping fire-bed, of an upward-swinging grate and a downward-swinging grate, the upward-swinging grate being pivoted at the foot of the fire-bed and normally projecting toward the downward-swinging grate, the latter grate being pivoted at its rear end, and means for operating both grates, substantially as set forth.

6. In a furnace, the combination, with a sloping fire-bed, of an upward-swinging grate provided with a downward-extending crank-arm, a downward-swinging grate pivoted at its rear end, and having a downward-extending arm at its front end, a coupling rod attached to the downward-extending crank-arm and extending to the front of the furnace, a lever at the front of the furnace to which the coupling rod is attached, and a link connect-

ing the crank-arm to the downward-extending arm of the downward-swinging grate, substantially as set forth.

7. In a furnace, the combination, with a sloping fire-bed pivoted at its rear end, of a rock-bar provided with a rocker on which the front end of the fire-bed rests, a crank arm attached to the rock-bar, an upward-swinging grate at the rear of the fire-bed and provided with a downward-extending arm, a coupling rod attached to the said arm, a coupling rod attached to the arm of the rock-bar, and a lever to which both coupling rods are removably attached, substantially as set forth.

8. In a furnace, the combination, with a sloping fire-bed pivoted at its rear end, of a rock-bar provided with a rocker on which the front end of the fire-bed rests, a crank arm attached to the rock-bar, an upward-swinging grate at the rear of the fire-bed and provided with a downward-extending arm, a downward-swinging grate in the rear of the upward-swinging grate and provided with an arm, a link connecting the arm of the downward-swinging grate with the arm of the upward-swinging grate, a coupling rod attached to arm of the latter grate, a coupling rod attached to the arm of the rock-bar, and a lever to which both coupling rods are removably attached, substantially as set forth.

In testimony that I claim the foregoing I hereunto affix my signature this 20th day of January, A. D. 1891.

JULIUS H. MEISSNER. [L. S.]

In presence of—

CHARLES LARGE,  
M. E. HARRISON.