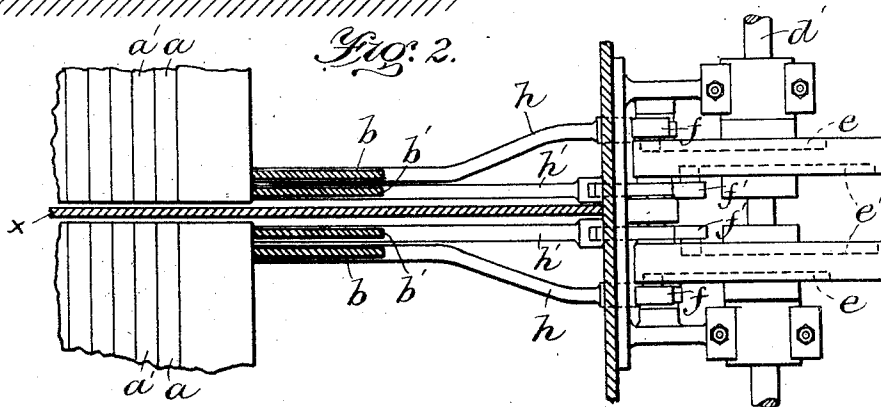
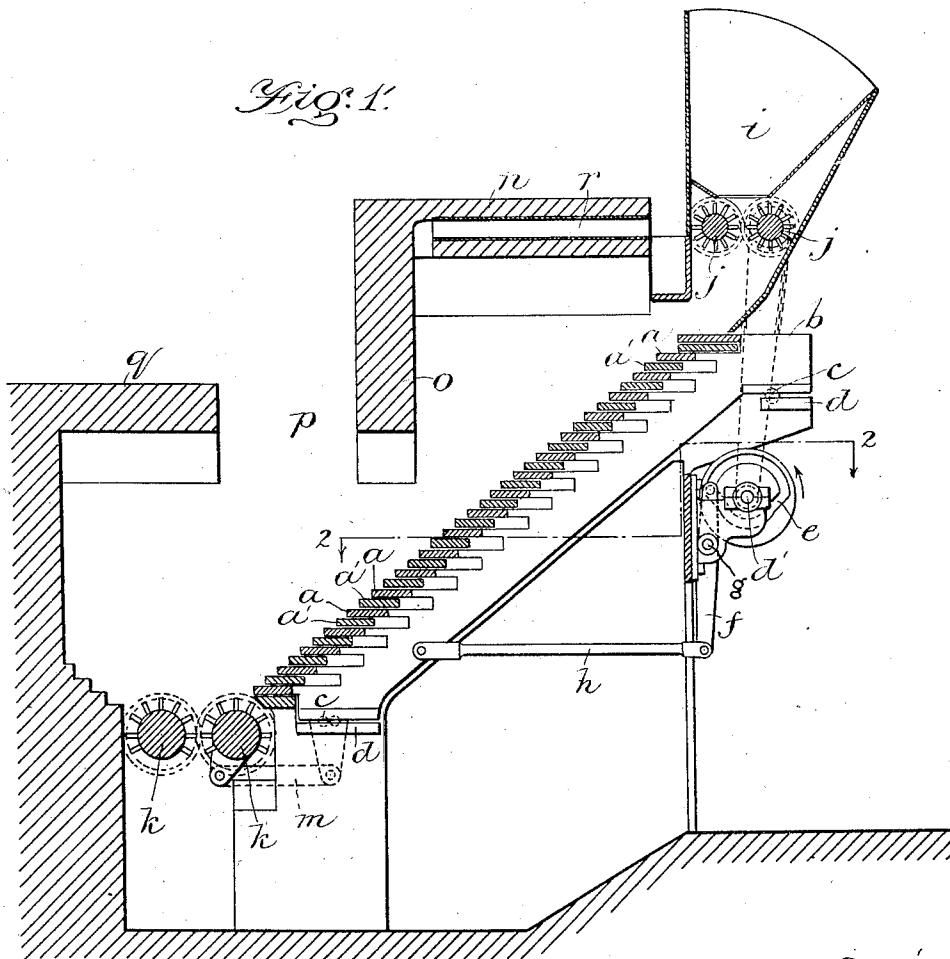


PATENTED OCT. 9, 1906.

4 SHEETS—SHEET 1.



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PATENTED OCT. 9, 1906.

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MECHANICAL STOKER.
APPLICATION FILED MAR. 20, 1905.

4 SHEETS—SHEET 2.

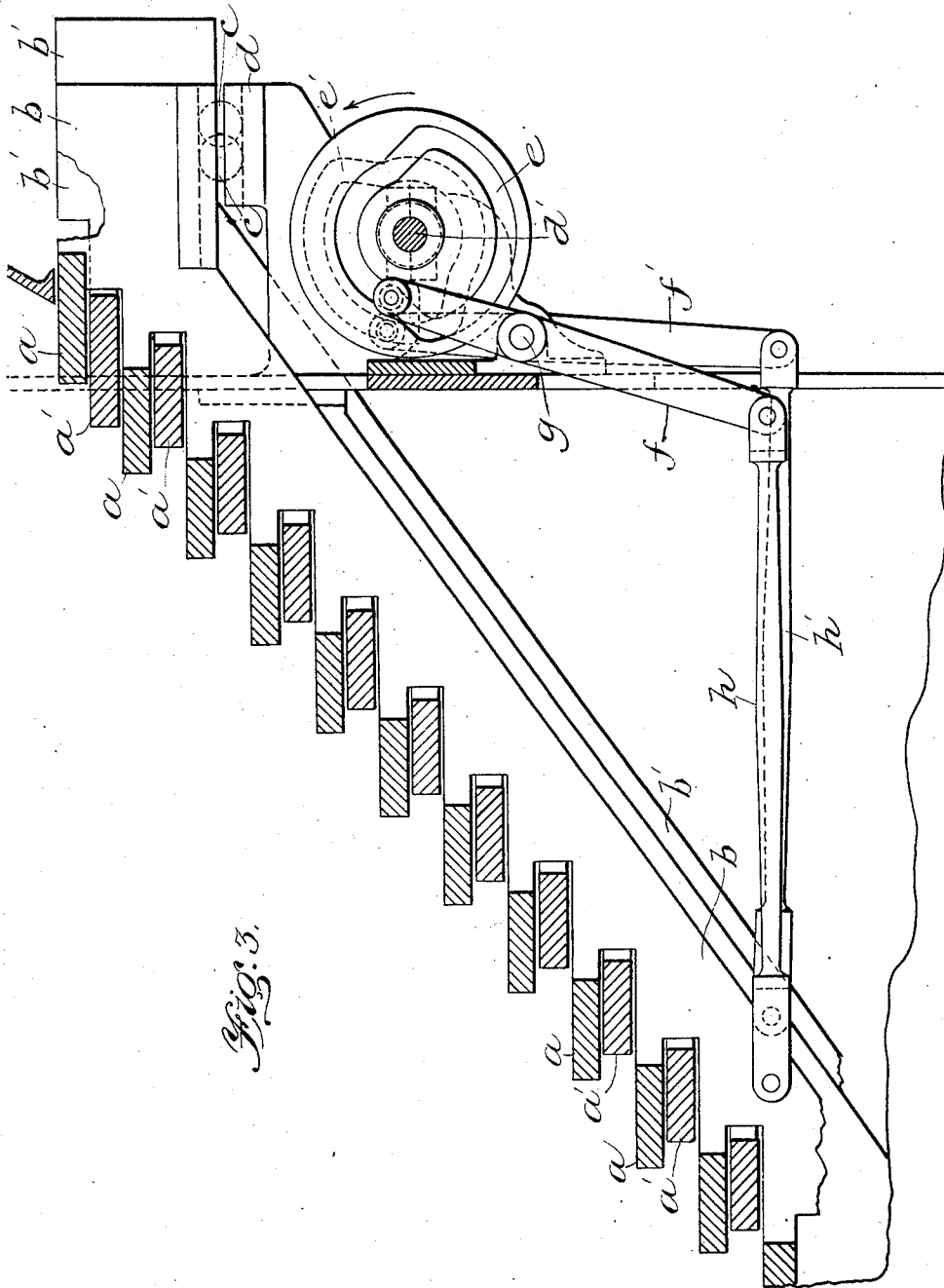


Fig. 3.

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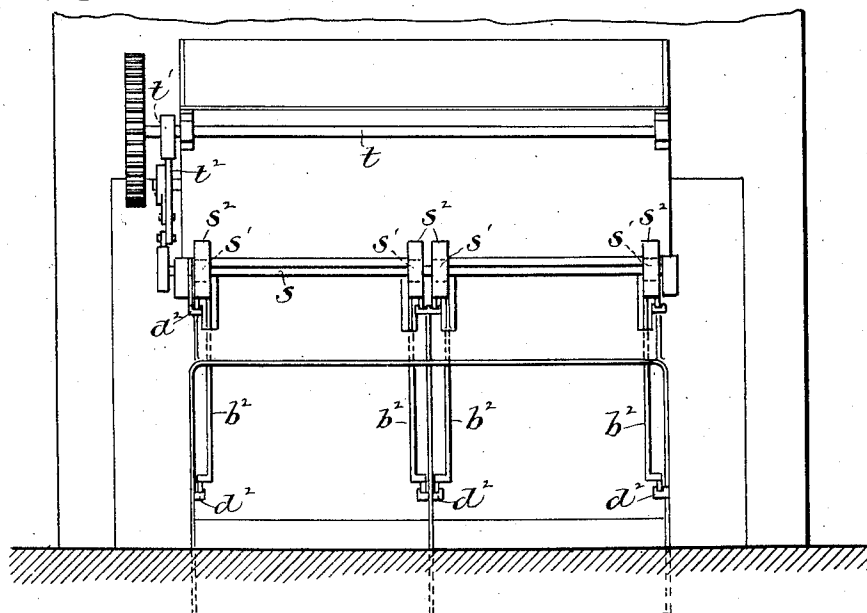
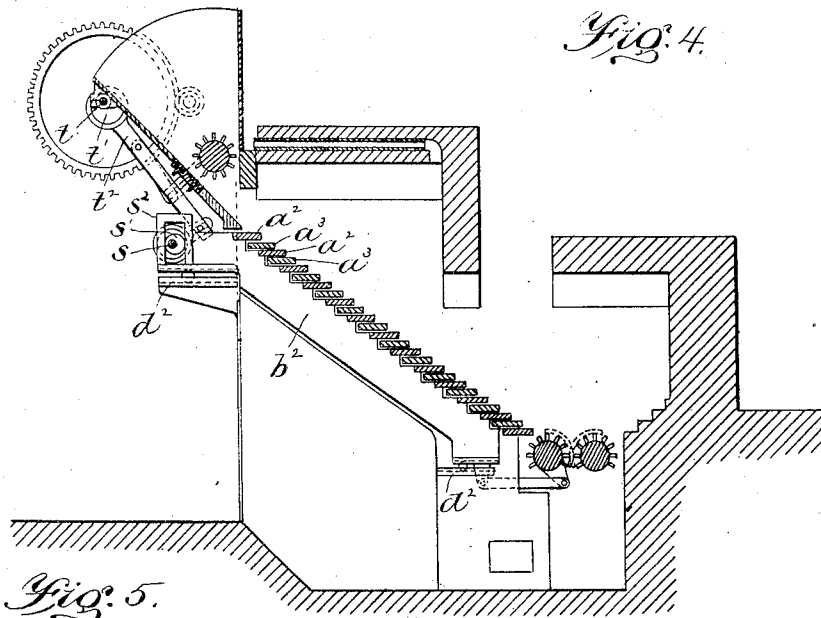
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4 SHEETS—SHEET 4.

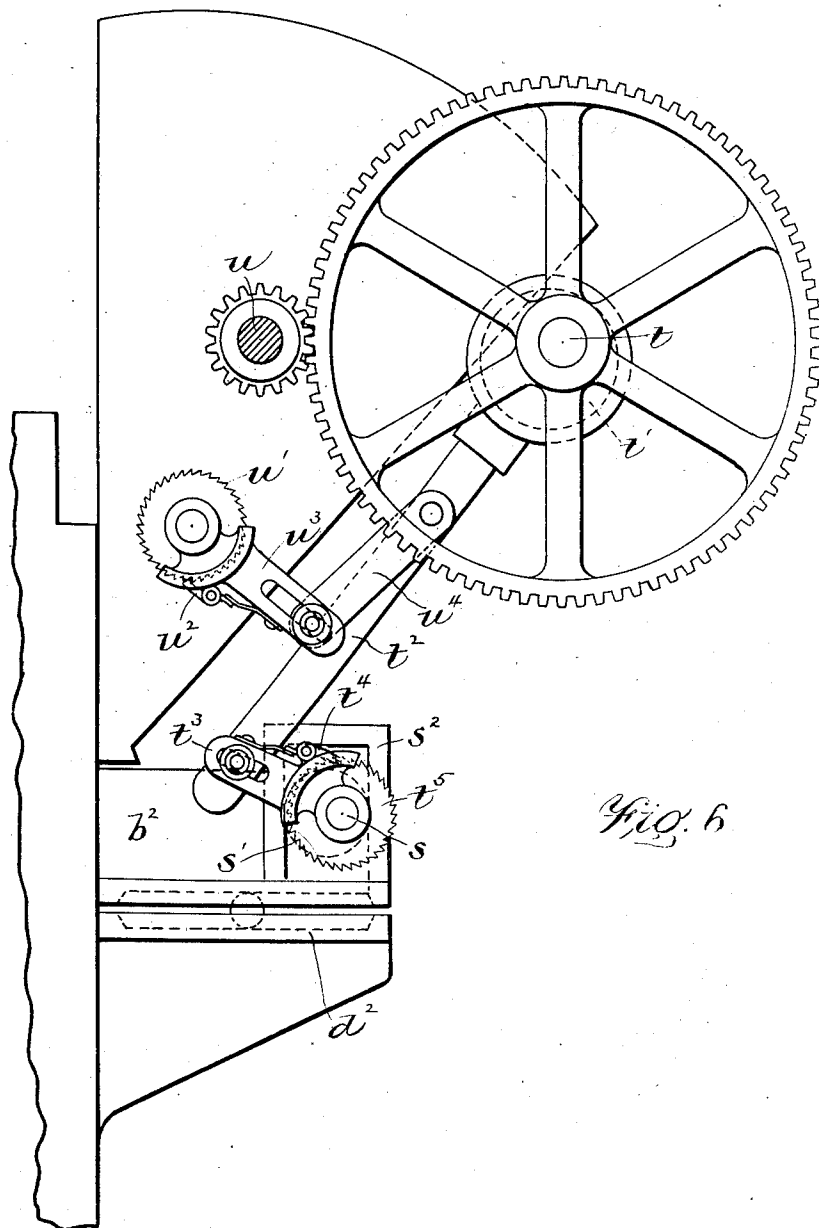


Fig. 6

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UNITED STATES PATENT OFFICE.

SAM W. SIMONDS, OF SOMERVILLE, MASSACHUSETTS.

MECHANICAL STOKER.

No. 833,091.

Specification of Letters Patent.

Patented Oct. 9, 1906.

Application filed March 20, 1905. Serial No. 250,899.

To all whom it may concern:

Be it known that I, SAM W. SIMONDS, of Somerville, in the county of Middlesex, and State of Massachusetts, have invented certain new and useful Improvements in Mechanical Stokers, of which the following is a specification.

This invention relates to mechanical stokers of the type in which an inclined grate is employed along which the fuel is caused to progress from the higher to the lower end of the grate.

The invention has for its object to increase the durability of the grate-bars by such an arrangement as will enable the bars or a portion of them to be intermittently withdrawn from contact with burning fuel, and thus cooled sufficiently to prevent rapid deterioration of the bars by the action of heat.

The invention also has for its object to provide certain incidental improvements, all as hereinafter described and claimed.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a vertical sectional view of a furnace provided with a mechanical stoker embodying my invention, the lines which would indicate the supporting connections of some of the bars being omitted to avoid confusion, certain parts at the right of the figure being shown in elevation. Fig. 2 represents a section on line 2 2 of Fig. 1, showing the adjacent parts of a double furnace-box construction. Fig. 3 represents an enlargement of a portion of Fig. 1, showing the grate-bars in different positions. Fig. 4 represents a vertical section showing a different embodiment of my invention, the lines which would indicate the supporting connections of some of the bars being omitted to avoid confusion. Fig. 5 represents a front elevation of the apparatus shown in Fig. 4. Fig. 6 represents an end elevation of a portion of the apparatus shown in Figs. 4 and 5.

The same reference characters indicate the same parts in all the figures.

Referring to Figs. 1, 2, and 3, *a* and *a'* represent two series of horizontal grate-bars, the top and bottom sides of which are substantially parallel with each other, said bars being arranged to form an inclined series of steps. The bars *a* are attached to inclined supports or beams *b*, while the bars *a'* are attached to similar inclined supports or beams *b'*. The said supports *b* and *b'* are movable

horizontally, each support being supported by antifriction rollers or balls *c*, resting on fixed horizontal tracks or guides *d*. Mechanism is employed for moving the supports *b* and *b'* simultaneously in opposite directions, so that when the supports *b* and the bars *a* thereon are moving in one direction the supports *b'* and the bars *a'* are moving in the opposite direction. Each series of bars is therefore alternately projected and retracted, so that their outer edges are alternately exposed to contact with the burning fuel and withdrawn from such contact. While the bars are out of contact with the fuel their temperature is sufficiently decreased to prevent undue deterioration or burning out of their acting portion. The described motion of the bars causes the fuel to travel progressively down the incline. The bars are moved at a relatively slow rate by suitable mechanism, which, as here shown, includes a horizontal shaft *d'*, to which a slow rotary movement is imparted, cams *e e'*, formed in disks or cam-bodies affixed to the shaft *d'*, levers *f* and *f'*, fulcrumed at *g* and having trundle-rolls engaged with the cams *e e'*, and rods *h h'*, connecting the levers *f f'* with the supports *b b'*. The described mechanism is organized to move the supports *b b'* simultaneously in opposite directions, so that each series of grate-bars is alternately projected beyond and retracted from the intermediate bars. The bars are in such close proximity to each other that there are no openings of sufficient width to permit lumps of fuel to lodge between the bars. The crevices between the bars are, however, of sufficient size to admit an ample supply of air to support combustion. *i* represents a hopper which delivers coal to the upper end of the inclined grate. *j j* represent feeding and reducing rolls adapted to insure a uniform delivery of fuel from the hopper to the upper end of the grate and to reduce any lumps which are too large, the said rolls being rotated by suitable means, including connections between one of the rolls and the shaft *d'* and connections between the two rolls, causing their simultaneous rotation in opposite directions. *k k* represent cinder crushing and removing rolls located at the lower end of the grate, these rolls being provided with crushing teeth or projections and rocked in their bearings by links *m*, connecting an arm on one of the rolls with an arm on one of the grate-bar supports, the

two rolls being geared together or otherwise connected so that the rocking motion imparted to one is transmitted to the other. n represents a brick arch located over the upper portion of the grate, and o represents a vertical wall at one end of the arch, said wall forming one side of a throat p , the other side of which is formed by the end of a brick arch q at one end of the fire-box. Air is admitted under the arch n through one or more conduits r to insure combustion of the smoke and gases under the arch, the products of combustion from the entire fire-box passing through the throat p .

In Fig. 4 I show an inclined grate composed of two series of bars a^2 a^3 , the bars a^2 alternating with the bars a^3 and the whole forming an inclined series of steps. The bars a^2 are reciprocated horizontally, the said bars being mounted on inclined supports b^2 , which are movable on tracks or guides d^2 d^2 . The bars a^3 are fixed instead of being horizontally movable, so that their forward edges are continuously in contact with the burning fuel. The movable bars a^2 are alternately projected and retracted, so that they are intermittently cooled.

The mechanism for reciprocating the supports b^2 and bars a^2 (shown in Figs. 4, 5, and 6) comprises a shaft s , journaled in fixed bearings, eccentrics s' , affixed to said shaft and engaging yokes s^2 , affixed to the supports b^2 . The shaft s and its eccentrics are rotated step by step by the following means: t represents a shaft journaled in fixed bearings and geared to a driving-shaft u . To the shaft t is affixed an eccentric t' , the strap of which is connected by a rod t^2 with a slotted arm t^3 , adapted to oscillate on the shaft s . The arm t^3 carries a pawl t^4 , which engages a ratchet t^5 , affixed to the shaft s . The rotation of the shaft t imparts a slow reciprocating movement to the rod t^2 , which in turn imparts an oscillatory movement to the arm t^3 and pawl t^4 , causing a step-by-step rotation of the shaft s and eccentric s' , the latter reciprocating the supports b^2 . u represents a feeding device in the fuel-hopper, formed as a toothed roll. This roll is rotated step by step by means of a ratchet u' , affixed to its shaft, a pawl u^2 , engaging said ratchet and mounted on an oscillatory arm u^3 , and a link u^4 , connecting the arm u^3 with the rod t^2 . A dividing-wall between two furnaces is represented at x .

It will be seen that in each of the above-described embodiments of my invention there is an inclined series of grate-bars, the outer edges of which are intermittently protected by being retracted behind another series of grate-bars. In the construction shown in Figs. 1 and 3 each series of grate-bars is intermittently protected by the other, while in the construction shown in Fig. 4 only one series of bars is thus protected.

1 claim—

1. An inclined grate comprising two series of substantially horizontal bars arranged to form an inclined series of steps, and means for withdrawing a portion of said steps out of contact with the fuel at intervals for cooling purposes.

2. An inclined grate comprising two series of substantially horizontal bars arranged to form an inclined series of steps, and means for changing the relative positions of the bars to bring them alternately into and out of contact with the fuel.

3. An inclined grate comprising two series of substantially horizontal bars arranged to form an inclined series of steps, and means for reciprocating the two series of bars simultaneously in opposite directions to move them alternately into and out of contact with the fuel.

4. An inclined grate comprising two series of substantially horizontal bars arranged to form an inclined series of steps, inclined supports for said bars, substantially horizontal tracks or guides for said supports, and means for reciprocating the supports to bring said grate-bars alternately into and out of contact with the fuel.

5. An inclined grate comprising two series of substantially horizontal bars, inclined supports holding said bars in inclined series of steps, the bars of one series alternating with those of the other series, horizontal tracks or guides for said supports, a rotary driving-shaft, and connections between said shaft and the grate-bar supports, for moving said supports and grate-bars simultaneously in opposite directions to bring said grate-bars alternately into and out of contact with the fuel.

6. An inclined grate comprising two series of substantially horizontal bars arranged to form an inclined series of steps, a fuel-hopper above the grate, a feeding device in said hopper, operating means for moving said bars into and out of contact with the fuel, and connections between the feeding device and said operating means.

7. An inclined grate comprising two series of substantially horizontal bars arranged to form an inclined series of steps, operating means for moving said bars into and out of contact with the fuel, clearing means at the lower end of the grate, and operative connections between the clearing means and the bar-operating means.

8. In a grate, the combination of two sets of grate-bars, each set adapted to support substantially the entire fuel-bed out of contact with the other set, and means for causing said sets to support said fuel-bed alternately, whereby the set not in contact with the fuel-bed is permitted to cool.

9. In a grate, the combination of two sets of grate-bars, each set adapted to support

substantially the entire fuel-bed out of contact with the other set, the bars of one set arranged alternately with respect to the bars of the other set, and means for causing said
5 sets to support said fuel-bed alternately, whereby the set not in contact with the fuel-bed is permitted to cool.

In testimony whereof I have affixed my signature in presence of two witnesses.

SAM W. SIMONDS.

Witnesses:

DENNIS COUGHLIN,
CHARLES H. HARRIMAN