

No. 838,679.

PATENTED DEC. 18, 1906.

A. BOX.
FURNACE.

APPLICATION FILED MAY 20, 1905.

3 SHEETS—SHEET 1.

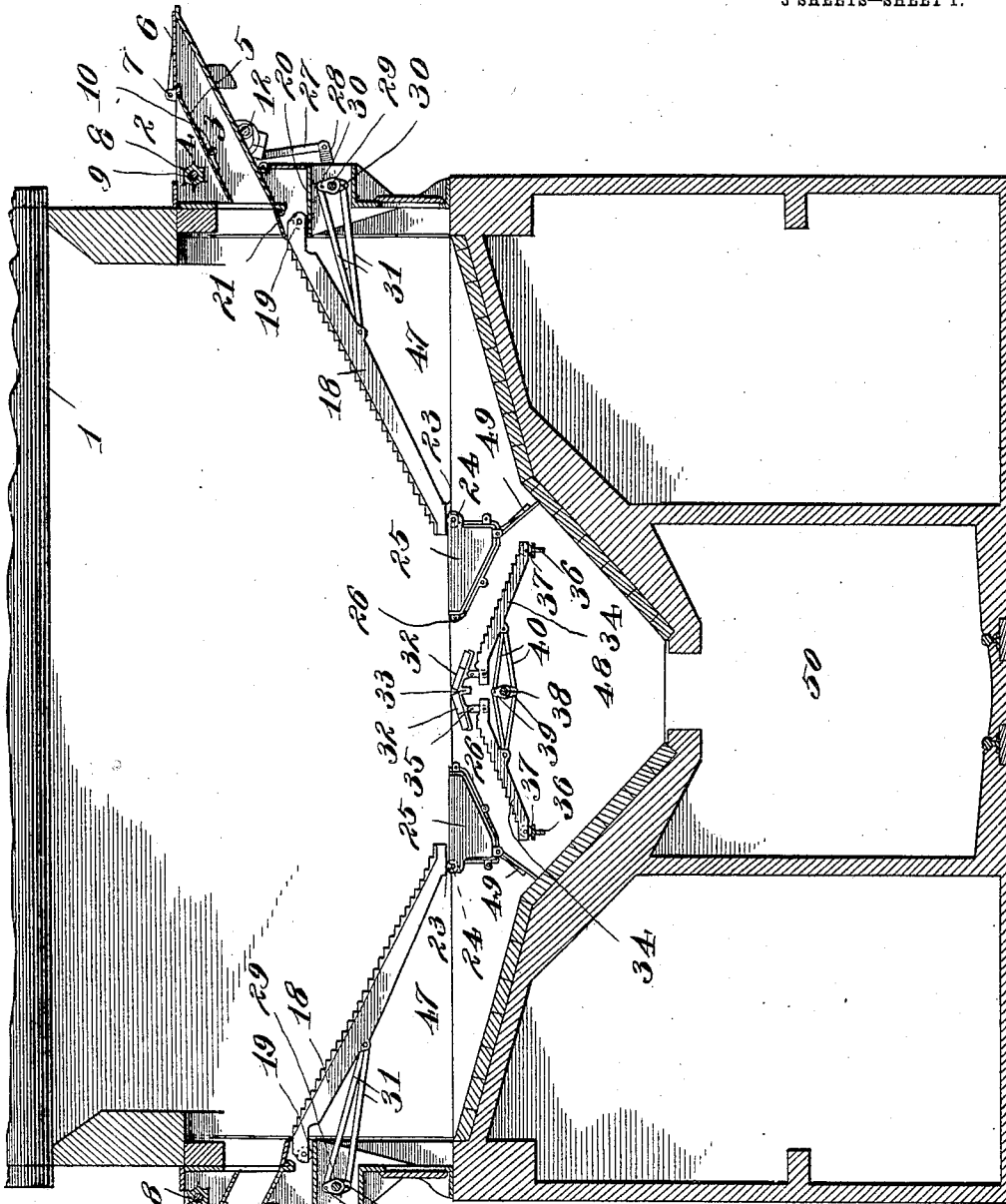


Fig. 1.
Witnesses
O. H. Pauberschmidt
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Inventor:
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By Knight Bros
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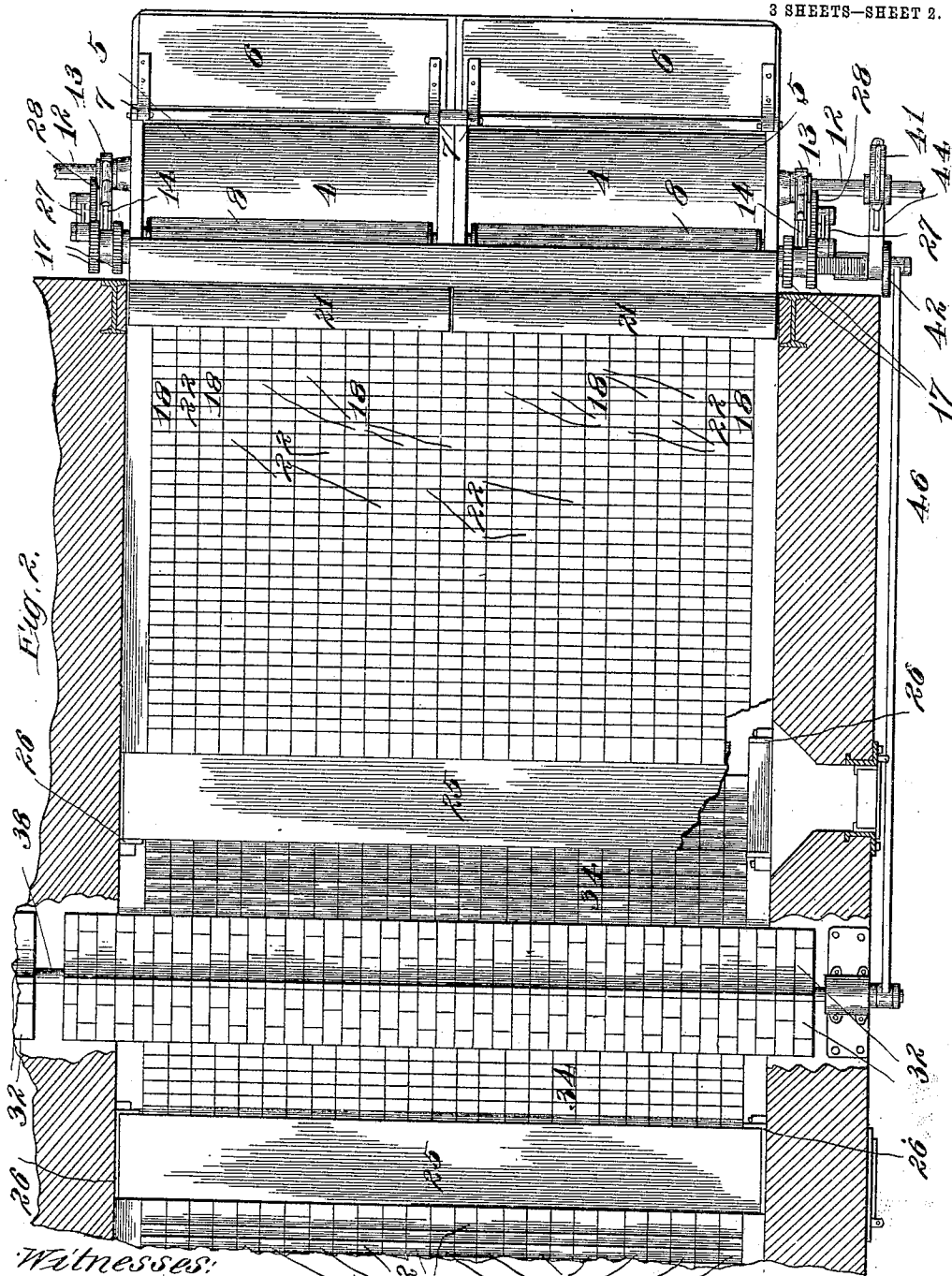
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3 SHEETS—SHEET 2.



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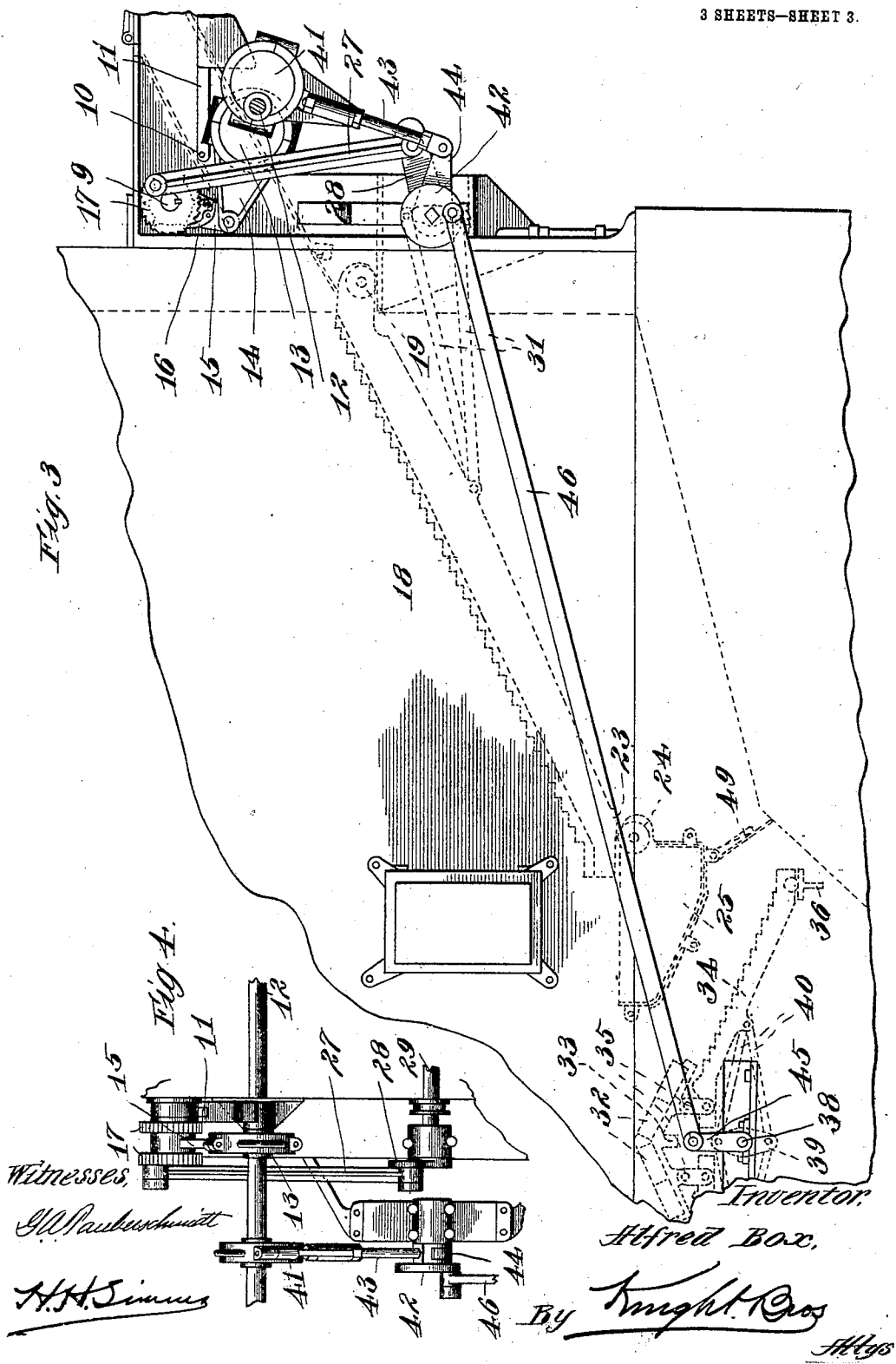
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

ALFRED BOX, OF PHILADELPHIA, PENNSYLVANIA.

FURNACE.

No. 888,679.

Specification of Letters Patent.

Patented Dec. 18, 1906.

Application filed May 20, 1905. Serial No. 261,379.

To all whom it may concern:

Be it known that I, ALFRED BOX, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

This invention relates to furnaces; and it has for its object to provide an improved means for preventing the entrance of air at the rear end of an inclined grate.

Other and further objects will appear in the following description and will be more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a vertical section of one embodiment of my invention. Fig. 2 is a horizontal section of a portion of a furnace embodying my invention. Fig. 3 is a detail view showing a side view of the operating mechanism, and Fig. 4 is a detail view showing a front view of a portion of the operating mechanism.

I have illustrated one of a bank of boilers which are preferably fed from both ends, indicating one of the boilers supported in a horizontal position. Located at each end of each boiler is a pair of hoppers 2, each divided into two compartments 3 and 4 by a wall 5. The lower compartment 3 is closed by a cover 6, hinged at 7, and is employed for feeding by hand, for pushing the coal down on the grate-bars when the fires are banked, so that the fires will not creep up in the hoppers, and for a sight-opening to ascertain the condition of the fire. The upper compartment 4 is employed for the mechanical feed and has mounted therein a feed-wheel 8, the shaft 9 of which is common to all hoppers on one side of the bank of boilers. The wall or partition 5 is pivoted intermediate its ends by means of a shaft 10 and is held by a weighted arm 11, Figs. 3 and 4, secured to the shaft 10 in its normal position until an excess of coal passes beneath the feed-wheel 8, when the inner end of the wall yields to prevent a breaking of the parts of the feed mechanism.

The construction of the feed-hopper is not herein claimed, as it forms the subject-matter of a divisional application filed by me November 4, 1905.

The feed-wheels 8 are operated from a single line-shaft 12 at each end of the boiler, journaled on the under sides of the hopper and connected to the feed-wheel shaft 9

through the means of a number of eccentrics 13, each turning in one of the pitmen 14, which are connected to the free end of an arm 15. Each arm 15 is journaled at its other end on the feed-wheel shaft and carries a spring-pressed pawl 16 for engagement with a toothed wheel 17, keyed to the feed-wheel shaft. This mechanism serves to transmit motion from a single line-shaft to all the feed-wheels 8 on one side of the bank of boilers.

Within the furnace is mounted at each end of the boiler a series of grate-bars, every alternate one 18 of which is movable to reciprocate and each series being inclined and alining at its upper end with the bottom wall of a hopper at one end of the boiler. The upper ends of the movable or reciprocating grate-bars 18 are provided with antifriction-rollers 19 and work on ledges 20 beneath the hopper, the ledges and the ends of the grate-bars being covered by dead-plates 21. The lower ends of the movable or reciprocating grate-bars are beveled at 23, the beveled portions sliding on rollers 24, carried by a water-back 25, which is removably supported in brackets 26 on each side of the furnace. The stationary grate-bars 22 rest upon the water-back 25 at their lower ends and upon the ledges 20 at their upper ends.

The movable grate-bars are operated from the line-shaft 12 by means of pitmen 27, each of which is eccentrically connected at its upper end to a toothed wheel 17 and is pivotally connected at its lower end to the free end of an arm 28, keyed to an oscillatory shaft 29, journaled in the framework which carries the hopper and other mechanism. The shaft 29 has a pair of oppositely-disposed ribs 30, and a series of rods 31 connects these ribs with the movable grate-bars, every alternate rod being connected to the same rib or adjacent rods being connected to opposite ribs.

Located at the rear end of each inclined grate and in the ash discharge or space between the two water-backs 25 is a pair of oppositely-inclined supplemental grates. Each supplemental grate is disposed below the lower rear end of the main grate and in an inclined position opposite to the incline of its main grate. This holds a large body of ashes beyond each water-back, and thereby prevents air entering up under the boiler and cooling the same, which is the case when the ashes are dropped by opening a door. Fur-

ther, this arrangement prevents the parts of the furnaces at this point burning out, due to excessive heat.

In the embodiment shown the invention comprises two oppositely-inclined series of fire-bricks 32, supported on a frame 33, spaced apart from the water-backs 25. Grate-bars 34 have their upper ends swingingly supported beneath the fire-bricks 32 by means of links 35 and their lower ends slidably mounted on a bar 36 beneath the water-backs, rollers 37 serving to reduce the friction between the bar 36 and the supplemental grate-bars.

The reciprocating bars of both supplemental grates are operated from a single shaft 38, which is provided with a pair of oppositely-disposed ribs 39. Links 40 connect adjacent grate-bars of each grate with opposite ribs 39, so that upon the oscillation of shaft 38 the adjacent grate-bars are reciprocated in opposite directions.

The oscillatory shaft 38 receives motion from one of the line-shafts 12 through the medium of an eccentric 41, which is connected to an oscillatory disk 42 through the medium of link 43 and an arm 44. The oscillatory disk 42 is connected to a crank 45 on shaft 38 by means of a pitman 46.

Below the main grates are located inclined ash-pits 47, which receive the ashes dropping between the grate-bars. These ash-pits lead to a common ash-hopper 48, which is closed to the ash-pits 47 by doors 49. The ash-hopper 48 discharges into an ash-cellar 50.

After the fire has started coal is mechanically fed from the compartment 4 into the furnace from either end thereof. As the coal is consumed some of it is carried to the rear of its main grate by mechanism driven from the line-shaft, and these ashes on leaving the main grate drop upon one of the supplemental grates and bank up, preventing the entrance of air at this point. The supplemental grates are likewise reciprocated or shaken from the line-shaft to cause the ash to drop into the ash-hopper 48, from whence it drops into the ash-cellar 50.

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

1. The combination with the main inclined

grate, of a frame at the rear end of the grate, links depending from the frame, and reciprocating grate-bars inclined in a direction opposite to the inclination of the main grate and having their upper ends below the frame and suspended by the links.

2. The combination with the main inclined grate, of a water-back upon which the rear and lower end of the grate is supported, a frame arranged in the rear of the water-back, inclined fire-bricks covering the frame, links depending from the frame, and inclined reciprocating grate-bars suspended at their upper ends by the links.

3. The combination with a shaft, of an inclined main grate formed of a plurality of inclined grate-bars receiving motion from said shaft, and a supplemental grate inclined in a direction opposite to the inclination of the main grate and formed of a plurality of reciprocating grate-bars connected to the shaft to receive motion therefrom.

4. The combination of a pair of main grates inclined downwardly toward each other, and a pair of supplemental grates, each receiving ashes from a main grate and inclined in a direction opposite to the inclination of the main grate from which it receives its ashes.

5. The combination with the boiler, of a pair of main grates inclined downwardly toward each other and one arranged at each end of the boiler, a shaft for operating each inclined main grate, a pair of oppositely-inclined supplemental grates each receiving ashes from a main grate and inclined in a direction opposite to the inclination of the main grate from which it receives its ashes, a shaft from which both of the supplemental grates receive motion, and connection between said shaft and one of the shafts by which the main grates are operated.

6. The combination with the main inclined grate, of an inclined grate receiving ashes from the main grate, an ash-pit below the main grate, an ash-pit for the supplemental grate, and a door separating said pits.

ALFRED BOX.

In presence of—

E. W. PAYNE,
H. M. GILLY.