(No Model.)

# G. CLAYDON.

## AUTOMATIC STOKING APPARATUS FOR STEAM BOILERS.

No. 590,410. Patented Sept. 21, 1897.

*Fig. 1.*

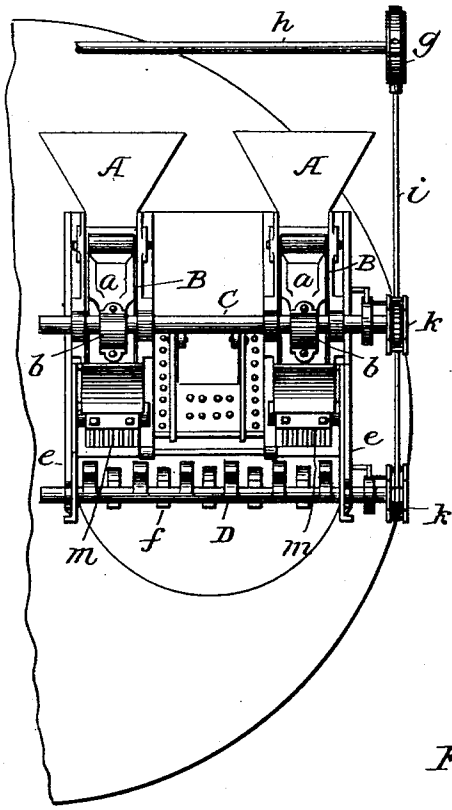



*Fig. 2.*

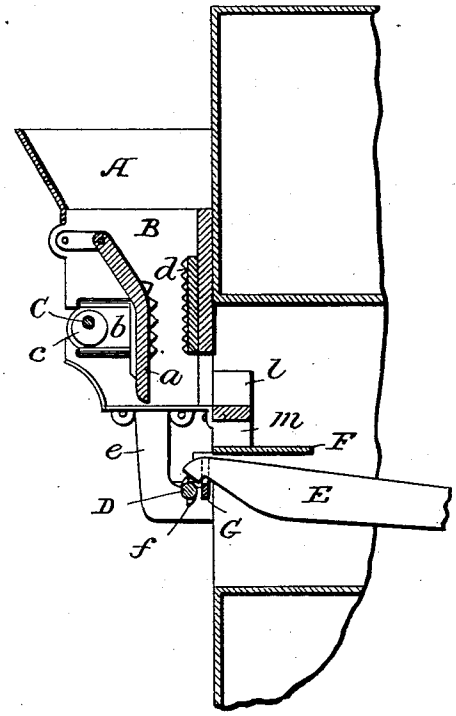
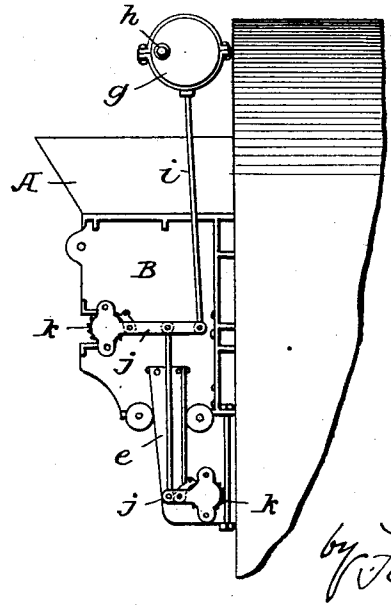



*Fig. 3.*




Witnesses

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# UNITED STATES PATENT OFFICE.

GEORGE CLAYDON, OF ADDINGTON, NEW ZEALAND.

## AUTOMATIC STOKING APPARATUS FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 590,410, dated September 21, 1897.

Application filed October 1, 1896. Serial No. 607,556. (No model.) Patented in New Zealand June 13, 1895, No. 7,681; in Victoria August 5, 1895, No. 12,378; in New South Wales August 7, 1895, No. 5,957, and in Queensland August 8, 1895, No. 3,074.

*To all whom it may concern:*

Be it known that I, GEORGE CLAYDON, a subject of the Queen of Great Britain and Ireland, residing at Addington, Canterbury, in the Colony of New Zealand, have invented certain new and useful Improvements in Automatic Stoking, Smoke-Consuming, and Fuel-Economizing Apparatus to be Attached to Steam-Boilers, (for some portion of which Letters Patent in my own name have been granted in Victoria, No. 12,378, bearing date August 5, 1895, and jointly with Henry Wood in New South Wales, No. 5,957, bearing date August 7, 1895; in Queensland, No. 3,074, bearing date August 8, 1895, and in New Zealand, No. 7,681, bearing date June 13, 1895,) of which the following is a specification.

This invention relates to certain new and useful improvements in apparatus to be attached to steam-boilers for automatically feeding and stoking the furnace in such manner as to insure the consumption of smoke and economize fuel. By the use of the invention the fuel is so fed that it is immediately retorted and becomes "coked" as soon as it is deposited on the deck-plate, a gentle motion being imparted to the fire-bars, causing them to rise and fall alternately at one end and also to move backward and forward and thereby maintaining the fuel in a loose and free condition and insuring perfect combustion.

Briefly stated, the invention consists in means whereby the fuel is thoroughly crushed as it is fed to the furnace.

It consists, further, in means for automatically elevating and lowering the ends of the grate-bars and in devices for regulating the extent of such movement; and, finally, it consists in the novel construction, arrangement, and combination of the parts hereinafter more fully described.

In the accompanying drawings, forming a part of this specification, and in which like letters of reference indicate corresponding parts, Figure 1 is a front elevation of a boiler with two furnaces, showing my improved apparatus attached in front of one of the furnaces. Fig. 2 is a longitudinal sectional view of the front end of a boiler with the invention attached thereto. Fig. 3 is a side elevation of the invention.

Referring more particularly to the drawings, A designates the feed-hoppers, and B the trunks, in each of which is contained suitable means for crushing and feeding the fuel. This means, as shown, consists of a ribbed or toothed crushing-plate *a*, fitted and pivotally hung to the sides and constituting the front of the trunk. The crushing-plate is provided with a knuckle-joint, but it may be constructed and arranged to work in slots in the sides of the trunk, and the front of said plate is provided with a bearing *b*, adapted to be engaged by an eccentric *c*, fixed upon a shaft C, journaled upon the trunk, the action of which eccentric imparts both a vertical and lateral reciprocating movement to the movable crushing-plate—that is to say, the said plate will be moved downward and inward toward the stationary crushing-plate and then outward and upward.

Secured at the back of each trunk in position to coöperate with the movable crushing-plate is a stationary crushing-plate *d*, provided with a ribbed or toothed surface. The discharge-opening of the trunk is in its side opposite the lower end of the movable crushing-plate, and consequently any material in the bottom of the trunk when the said plate moves laterally inward is pushed through the discharge-opening into the furnace.

A tappet-shaft D is mounted in bearings of the brackets *e*, and the tappets *f* of this shaft are adapted to engage and lift the front ends of the fire-bars. This elevation of the bars may take place simultaneously, depending of course upon the arrangement of the tappets upon their shaft, but I prefer to arrange them to lift the bars or groups of the bars successively. The fire-bars may be arranged and their ends supported in any desired manner.

Various means may be employed for operating the shafts C and D, that shown comprising an eccentric *g*, mounted upon a shaft *h* and connected by means of rods *i* to levers *j*, mounted loosely upon the shafts C and D,

and each provided with pawls adapted to engage with ratchets fixedly mounted upon the said shafts.

Supported contiguous to the discharge end of the trunk B is a deck-plate F, provided on its upper face with cheek-pieces *l*, consisting of a series of separated bars which extend across the discharge of the trunk and form a grating. The cheek-pieces are provided intermediate their length with a diaphragm registering with the bottom of the trunk, and the openings *m* below this diaphragm communicate with the exterior of the furnace and convey air to the fuel as it is discharged from the trunk and falls over the diaphragm onto the deck-plate proper, where it is immediately retorted and becomes coked as it falls upon the fire-bars, thereby insuring perfect and speedy combustion.

The front ends of the fire-bars are supported upon a bar G, adjustable in slots of the frame, and the purpose of such bar is to adjust the ends of the fire-bars relative to the tappets of the tappet-shaft, whereby the extent to which said fire-bars are lifted is regulated.

Without limiting myself to the exact construction and arrangement of the parts shown, what I claim is—

1. In an automatic feed apparatus for furnaces, the combination with a furnace provided with fire-bars, of a receptacle communicating with the furnace through a discharge-opening in its side at a point above the fire-bars, a stationary crushing-plate within the receptacle, a movable crushing-plate likewise contained within the receptacle, said plate being arranged opposite the discharge-opening and stationary plate, and means for reciprocating the movable plate vertically and laterally toward the discharge-opening, substantially as described.

2. In an automatic stoking apparatus for furnaces, the combination with the fire-bars, means for elevating and lowering one end of said bars, and adjustable devices for regulating the extent of such movement, substantially as described.

3. In an automatic feed apparatus for furnaces, the combination with a furnace provided with fire-bars, of a receptacle communicating with the furnace through a discharge-opening in its side at a point above the fire-bars, a stationary crushing-plate within the receptacle, a movable crushing-plate likewise contained in the receptacle, said plate being arranged opposite the discharge-opening and stationary plate, and means for moving the movable plate toward the stationary plate, and discharge-opening, substantially as described.

4. In an automatic stoking apparatus, the combination with a furnace, of the fire-bars mounted therein, an adjustable support for one end of said bars, and devices operating to elevate and lower said ends, substantially as described.

In witness whereof I have hereto set my hand in the presence of two subscribing witnesses.

GEORGE CLAYDON.

Witnesses:
A. H. HART,
GEORGE HART.