

(No Model.)

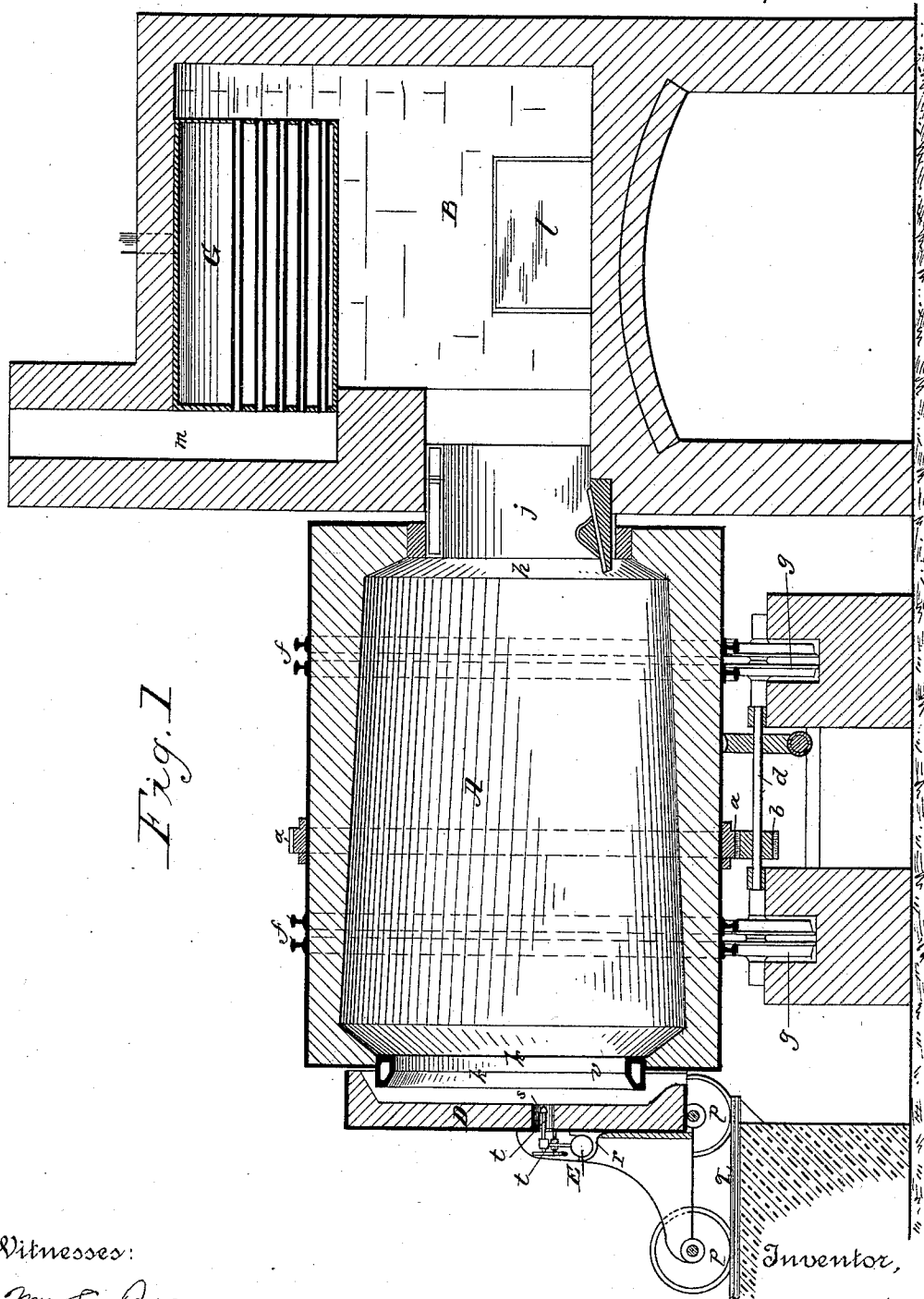
2 Sheets—Sheet 1.

J. H. BULLARD.

FURNACE FOR RECOVERING SODA.

No. 391,735.

Patented Oct. 23, 1888.



Witnesses:

Wm. S. Bellows
C. W. Chamberlain.

Inventor,
James H. Bullard,
By his Attorneys, *Chapin & Co.*

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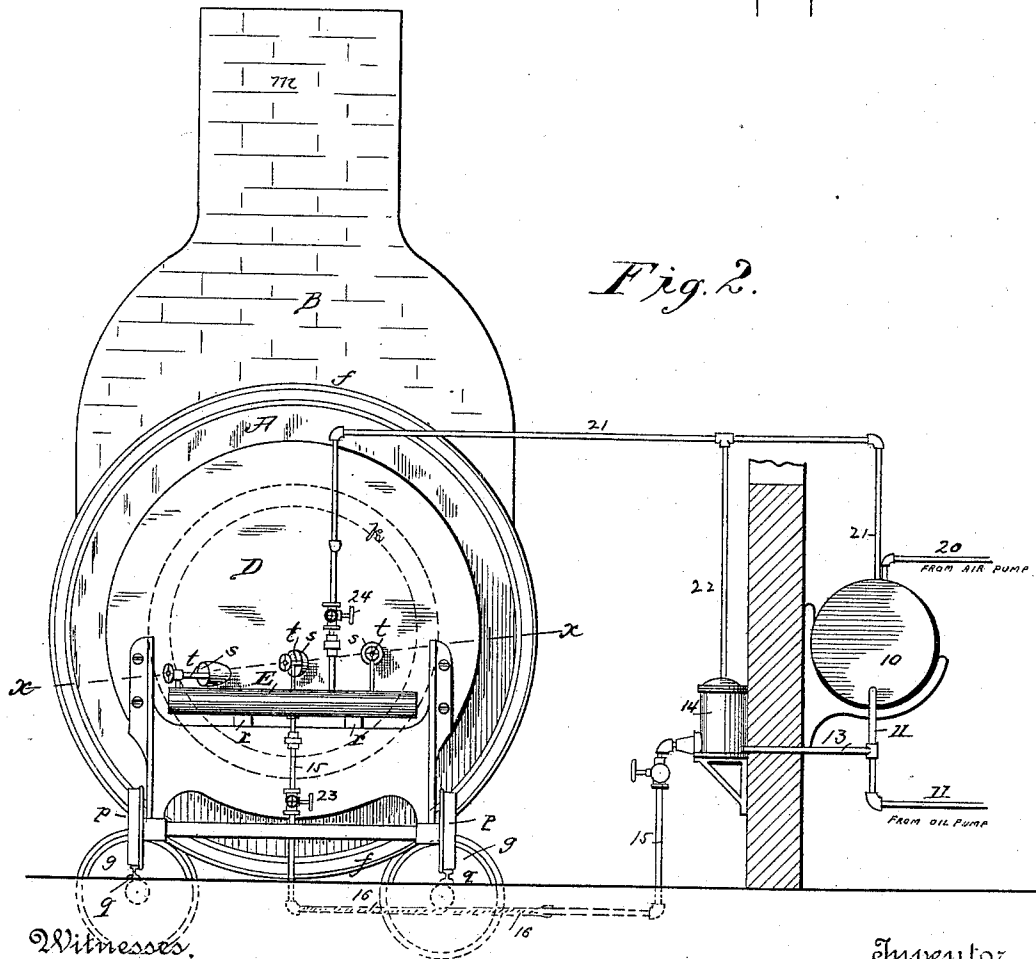
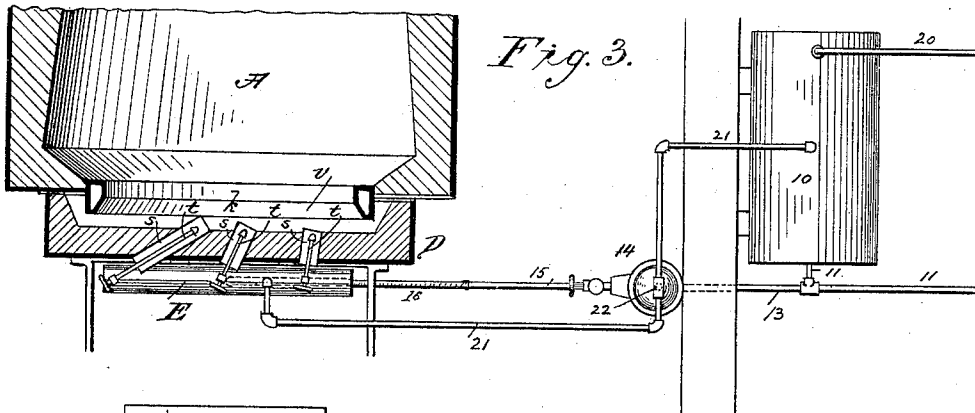
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UNITED STATES PATENT OFFICE.

JAMES H. BULLARD, OF SPRINGFIELD, MASSACHUSETTS.

FURNACE FOR RECOVERING SODA.

SPECIFICATION forming part of Letters Patent No. 391,735, dated October 23, 1888.

Application filed March 7, 1888. Serial No. 266,418. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. BULLARD, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Furnaces for Reclaiming Caustic Soda, of which the following is a specification.

As well known in various arts quantities of caustic soda are employed—as, for instance, in the digestion and disintegration of wood and other fiber in the production of pulp—the said caustic soda, after having accomplished the desired result, still retaining its strength in a large degree, and which, when drawn off from the more or less disintegrated fiber, is intermixed with considerable proportions of foreign matter that have been extracted from the fiber; and for the expulsion of the said foreign properties combined with the caustic soda, as heretofore practiced, suitable quantities thereof have been placed within a tubular rotatable furnace, at the one open end of which the open end of a separable and removable fire-box communicates the products of combustion of the coal or wood that is burned therein passing from said fire-box to and through said rotatable furnace, securing a refining of the caustic soda by incineration.

The object of the present invention is to provide at the open end of the rotating reclaiming-furnace an apparatus for the burning of hydrocarbons, which will enable a dispensation of the before-mentioned removable fire-box, and which will be of greater efficiency, securing more intense heat, and a most effective and direct disposition of same within the furnace for its greatest possible incinerative action; and the invention consists in the construction and combination of various parts of the apparatus, all substantially as will hereinafter more fully appear, and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a central longitudinal vertical section through the apparatus. Fig. 2 is a front elevation thereof; and Fig. 3 is a partial horizontal section on line *xx*, Fig. 2.

In the drawings, A represents the inciner-

ating-furnace, which is of cylindrical form, suitably supported for rotation, which is secured by the engagement with its attached circular rack *a* of a pinion, *b*, on the worm-driven shaft *d*, the said cylindrical furnace being provided on its periphery with the circular rails or tracks *f*, which bear on and are guided and supported by the rollers *g*. The said cylindrical furnace has openings *h k* at its ends, the former being in communication with a flue or opening, *j*, of a chamber, B, having a door, *l*, and a discharge flue or chimney, *m*, said chamber otherwise being closed.

D represents a circular or disk wall of a size to cover the end opening, *k*, of the cylindrical furnace A, mounted on trucks or rollers *p*, which roll on suitable tracks or ways, *q*, in lines at right angles to the end of the said furnace A, whereby the said end wall, D, may be moved toward and away from the open end thereof.

Supported on brackets *r*, or otherwise, of the outer side of said movable wall D is a burner-tank, E, which consists of a hollow cylinder having connected therewith one or more hydrocarbon-burners, *t*, one end of which extend into openings *s* through the said wall, and the opposite end thereof communicates with an air-space and with hydrocarbon contained in said tanks in the manner substantially as shown and described in my application for a patent filed December 1, 1887, Serial No. 256,588, and in Letters Patent granted to me dated July 5, 1887, No. 365,789. A regulated and constant supply of hydrocarbon is furnished to said burner-tank, whereby it is kept partially filled while the said burner is in operation through a pipe from a suitable oil-supply.

In practice oil is pumped from a suitable supply through a pipe, 11, into a drum or tank, as shown at 10, and with said oil-pipe 11, at a portion thereof below the drum 10, a pipe, 13, communicates, extending therefrom to a governor, 14, and from said governor, through pipe-connections 15, communication is had to and with the said burner-tank E, a suitable intermediate portion of said connection, as indicated at 16, being flexible. Air in certain quantities and under suitable pressure is also forced from and by a suitable air-pump or compressor through a pipe, 20, into the said tank 10, from and out of which tank a pipe,

21, extends to and connects with the upper side of the burner-tank E, and extending from an intermediate portion of said pipe 21 there is a pipe-connection, 22, leading to the governor 14. Shut-off cocks 23 and 24 are provided in the oil and air-pipe connections in advance of the burner-tank E.

Under the arrangement of the oil and air pipe connections and of the drum 10 and governor 14, as indicated, an equilibrium of the oil and air pressure is secured in the burner-tank E, whereby the height of the oil therein may be uniformly maintained at a suitable height.

As shown in the present instance, three of the burners *t* are employed, each extending substantially horizontally through the apertures *s*; but the series are arranged in an oblique plane, as indicated by the line *xx*; or, in other words, one burner at the left of the intermediate one being lower and the other burner at the right thereof being higher than such intermediate burner, and said horizontally-arranged burners *t*, as to their length, are preferably arranged or directed in angular lines to one side of the rotating furnace A, as shown in Figs. 2 and 3. By this arrangement the products of combustion of the hydrocarbon from the burners *t* are directed in independent lines to adjacent points at one side of the center of rotation of the furnace A coincident with its inner periphery, at which the greater body of the contained mass of caustic soda, &c., is disposed under the rotation of said furnace, insuring the quickest possible consumption of the foreign elements therein, leaving the practically pure and refined caustic soda in the furnace to be discharged or removed therefrom in any desirable manner.

In the process of reclaiming the caustic soda from the liquid and impurities with which the same is in suspension when withdrawn from the fiber digester or disintegrator, it is subjected to an evaporating or distilling treatment by the employment of steam in connection therewith, whereby it is deprived in a large degree of its watery elements and rendered into a molasses-like consistency. The said partially-evaporated caustic-soda solution is then directed through a suitable conduit into the chamber B in the rear of the rotating furnace through the door *l* of said chamber. Said solution flows slowly and continuously, and enters the end *h* of the rotatable furnace A during its rotation, and, adhering to the inner wall thereof, is brought under the action of the products of combustion of the hydrocarbon, directed as described, whereby all remaining liquid in the mass is quickly evaporated therefrom and all gums and woody substances contained therein are consumed. The calcined caustic soda-ash, purified, as described, by the action of the heat in the furnace, drops from the walls thereof to its lowest side and passes over the forward lip, *v*, and drops thence below the

furnace, there being a passage constantly open between the outer edge of said lip *v* and the adjoining inner side of the movable wall D to permit the calcined soda to drop from the furnace, as set forth. As shown in Fig. 1, the flange of said movable wall D, below said lip *v*, is removed from the end of the furnace to permit the soda to drop from the latter, as described.

The intensity and volume of the heat from the burners *t* ordinarily is so active and continued that it still retains itself in a high degree after having passed through the rear opening, *h*, of the furnace, and in the present apparatus this surplus heat is utilized by being directed about and through the flues of a boiler, G, which is located in the chamber B between the opening *j* and the chimney-opening *m* thereof, whereby sufficient steam is generated to effect the evaporating portion of the hereinbefore-mentioned process.

What I claim as my invention is—

1. In an apparatus for recovering caustic soda, the combination, with a rotatable cylindrical furnace having at its rear end an opening for the introduction of a continuous supply of caustic soda and for the exit of products of combustion, of a wall arranged across the front end of said furnace, between which and the adjoining end thereof is a passage for the escape of soda, said wall being mounted on suitable ways, whereby it is moved toward and from the end of the furnace and provided with one or more apertures and one or more hydrocarbon-burners disposed opposite said apertures, substantially as set forth.

2. The combination, with a rotatable cylindrical furnace having a heat-inlet opening at one end and an outlet-flue, of a wall disposed across said heat-inlet opening mounted on suitable guides or ways, whereby it may be moved toward and away from said opening and provided with two or more apertures, *s*, and the tank E, and two or more burners, *t*, each arranged at an angle to the inner side wall of the said rotatable furnace, and suitable conduits for conveying oil and air to said burner-tank, substantially as and for the purpose described.

3. The combination, with a rotatable cylindrical furnace having a heat-inlet opening at one end and an outlet-flue, of a wall disposed across said heat-inlet opening mounted on suitable guides or ways, whereby it may be moved toward and away from said opening, and provided with two or more apertures, *s*, and the tank E, and two or more burners, *t*, arranged at varying heights on said wall, and each arranged at an angle to the inner side wall of the said rotatable furnace, and suitable conduits for conveying oil and air to said burner-tank, substantially as and for the purpose described.

4. The combination, with a rotatable cylindrical furnace, A, having heat inlet and outlet openings *k* and *h* through its opposite ends, of

a wall disposed at right angles to said heat-inlet opening mounted on suitable guides or ways, whereby it may be moved toward and away from said heat-inlet opening *k*, and provided with one or more apertures, *s*, the tank *E*, one or more burners, *t*, and suitable conduits for conveying oil and air to said burner-tank, and a chamber, *B*, having a flue, *j*, in communication with the furnace outlet-opening *h*, and a chimney, *m*, and a boiler located in said chamber *B*, between said flue *j* and said chimney, substantially as and for the purpose described.

5. In an apparatus for recovering caustic soda, the combination, with the rotatable cylindrical furnace *A*, having the end openings, *k h*, of a wall disposed across said opening *k*, mounted on suitable guides or ways, whereby it may be moved toward and away from said opening and provided with a series of suitably-disposed apertures, *s s*, and the tank *E*, and a series of burners, *t t*, arranged at varying heights on said wall, and each arranged at

an angle to the inner side wall of the said rotatable furnace, a tank or drum, *10*, and a governor, *14*, a pipe, *11*, leading from a pump or pressure supply to said drum *10*, having the branch *13*, extending therefrom to said governor, and the pipe-connection *15*, extending from an air-pump or pressure-supply to said drum *10*, a pipe, *21*, extending therefrom to said burner-tank *E*, having intermediate of its length a branch pipe, *22*, extending therefrom to said governor, said oil and air conduit-pipes having the shut-off cocks *23* and *24* in advance of said burner-tank, the chamber *B*, having a flue, *j*, in communication with said furnace-opening *h*, and the chimney-opening *m*, and the boiler *G*, located in said chamber *B*, between said flue *j* and said chimney-opening, all substantially as described, and for the purposes set forth.

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Witnesses:

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