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APPARATUS FOR UTILIZING HEAT FROM HOT SLAG.

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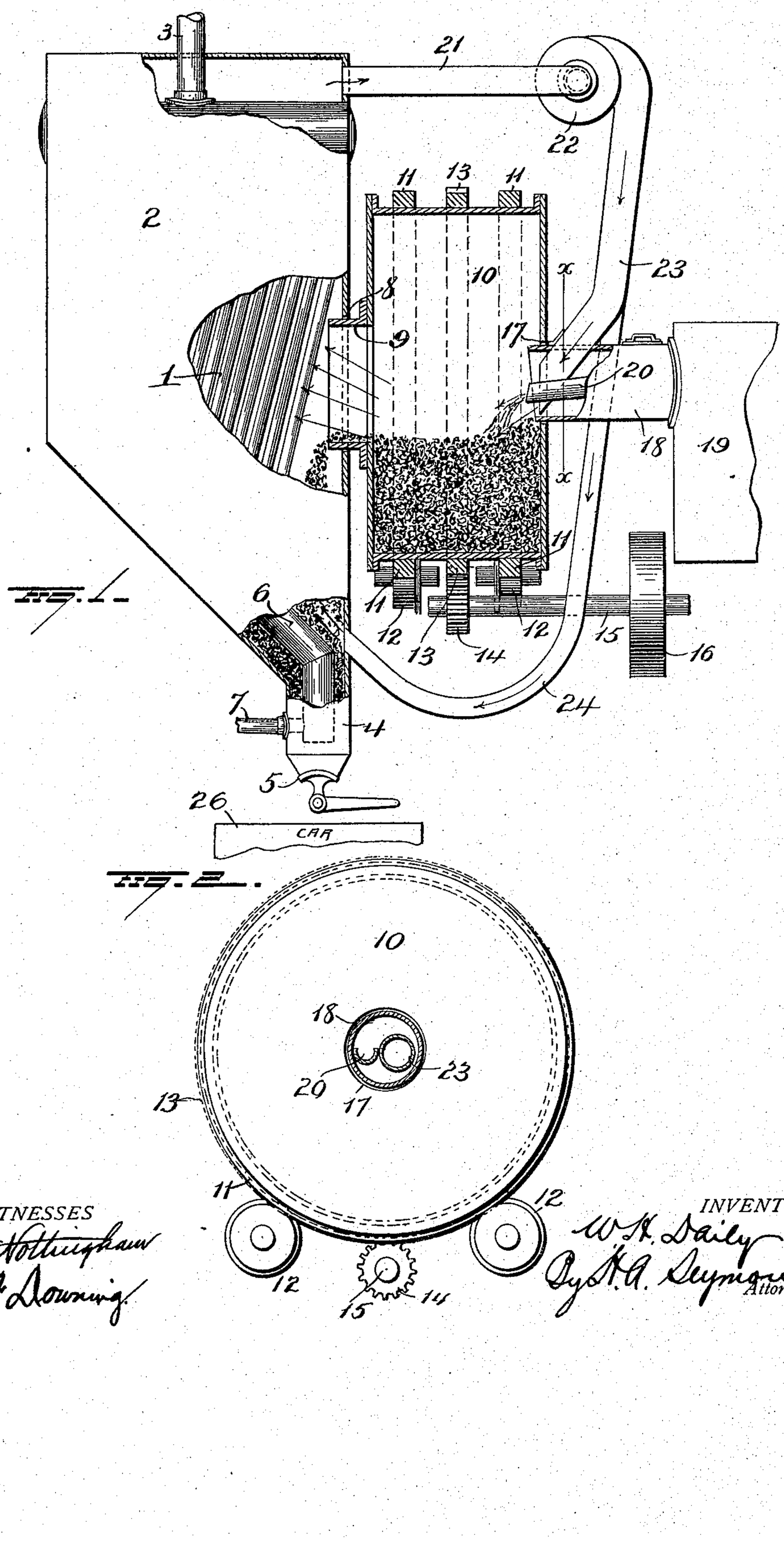

Fig. 1.

Fig. 2.

WITNESSES

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APPARATUS FOR UTILIZING HEAT FROM HOT SLAG.

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Application filed November 7, 1914. Serial No. 870,814.

To all whom it may concern:

Be it known that I, WILLIAM H. DAILY, a citizen of the United States, and resident of Tucson, in the county of Pima and State of Arizona, have invented certain new and useful Improvements in Apparatus for Utilizing Heat from Hot Slag; 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 appertains to make and use the same.

This invention relates to improvements in apparatus for generating steam from hot slag, one object of the invention being to provide simple and efficient means for utilizing the heat of hot slag for the generation of steam without bringing the slag into contact with the boiler water.

A further object is to provide means which will facilitate and simplify the handling, solidifying and crushing of the slag, and at the same time utilize the heat of the slag to generate steam in a boiler.

A further object is to provide an apparatus in which ground or crushed slag shall be utilized to chill and solidify any incoming molten slag and to so construct the apparatus that an air blast shall be caused to absorb the heat and act as a conducting means for the same to a steam boiler.

With these and other objects in view, the invention consists in certain novel features of construction and combinations of parts as hereinafter set forth and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation partly in section, illustrating an embodiment of my invention, and Fig. 2 is a sectional view on the line *x*—*x* of Fig. 1.

1 represents a water-tube boiler inclosed within a housing 2 which forms an air chamber enveloping the boiler. The top of the housing 2 is made with a suitable hole for the accommodation of steam outlet pipe 3, and lower portion of said housing is contracted to form a hopper 4, the lower end of which latter is normally closed by a gate 5. The feed water pipe 6 for the boiler depends into the hopper portion 4 of the housing and receives water from any convenient source through a feed-water supply pipe 7.

In one side, the boiler housing 2 is made with an opening 8, through which a ring 9 on a revolving drum 10, projects for a purpose hereinafter more fully explained. The drum 10 is provided with peripheral flanges 11 for the accommodation of rollers 12 on which the drum is mounted to rotate. The drum is also provided with an annular or peripheral gear rack 13, to which motion is imparted by a gear 14 for rotating said drum. This gear may be secured to a shaft 15 provided with a pulley 16 to receive motion from any suitable source.

The outer wall of the revoluble drum 10 is made with an opening 17, into which a tube 18 projects, the other end of said tube being secured to a scuttle indicated at 19, or other suitable source of molten slag. The tube 18 serves as a housing for spout or chute 20, by means of which the molten slag is discharged into the revoluble drum 10.

An air pipe 21 communicates at one end with the upper portion of the air chamber formed by the boiler housing 2, and at its other end, said pipe communicates with the intake of a blower 22. A pipe 23 communicates at one end with the outlet of the blower and, after projecting through the wall of the tube or housing 18, discharges into the drum over the surface of the slag therein. A branch 24 from the air pipe 23 communicates with the lower or hopper portion of the boiler casing so as to discharge air through the slag which falls thereinto from the revoluble drum.

Before starting the operation of the apparatus, the revoluble drum will first be supplied with a quantity of chilled, crushed slag. Motion will then be imparted to the drum to rotate it and at the same time molten slag will be discharged from the spout 20 onto the crushed slag in the drum. During the rotation of the drum, the slag therein will be overturned upon itself and the incoming molten slag will become mixed with the crushed chilled slag. The mixing of the molten slag with the crushed slag will cause the chilling of said molten slag and the constant agitation of the slag during the rotation will operate to cause the crushing of the incoming slag as it congeals. By thus causing the congealing and crushing of the molten slag by its mixture and agitation with the previously chilled and crushed slag, the molten slag will be prevented from coming in contact with the body of the mill until it shall have become congealed. As the quantity of chilled slag accumulates in the drum, it will fall through the ring 9 and drop into the lower portion

of the boiler housing 2, where it will be allowed to accumulate sufficiently to envelop the feed water pipe 6 of the boiler. As the air is discharged from the pipe 23, over the hot slag in the drum, and in proximity to the stream of incoming molten slag, it will absorb heat from the slag (thus assisting in chilling the latter) and then flow through the ring 9 into the boiler housing and among the tubes of the boiler, thereby heating the water in said tubes for the generation of steam. Thus it will be seen that an air current is employed as the medium by which the heat of the slag is conveyed or imparted to the boiler to accomplish the generation of steam. The air entering the lower portion of the boiler housing by way of the pipe 24, will also absorb heat from the slag which has fallen into said lower portion of the housing and then flow upwardly through the housing and among the tubes of the boiler. The hot slag around the feed water pipe 6 will also assist in heating the feed water. The air need not be discharged from the apparatus, but the same air may be passed continuously in contact with the hot slag and through the boiler housing in contact with the tubes of the boiler. The congealed and crushed slag may be discharged from time to time from the hopper portion 4 of the housing into a slag car 26 which may be run under the same.

Various changes might be made in the details of my invention without departing from the spirit thereof or limiting its scope, and hence I do not wish to restrict myself to the precise details herein set forth.

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

1. The combination of a boiler, a housing for the same, and a revoluble drum having a constantly open discharge outlet leading to said housing and a constantly open inlet through which slag may be continuously fed into said drum.

2. The combination with a boiler and a housing inclosing the same, of a revoluble drum communicating with said housing, means for discharging molten slag into said drum, and means for forcing air through the drum in contact with the slag and into said housing.

3. The combination with a boiler, of a housing inclosing the same, a revoluble drum communicating with the housing, means for discharging molten slag into said drum, means for conducting air under pressure from said housing into and through said drum in contact with the slag therein and into said housing.

4. The combination with a boiler and a housing inclosing the same, of a revoluble drum communicating with said housing and adapted to discharge thereinto, of means for discharging molten slag into said drum, means for forcing air through the drum in contact with the slag therein and into said housing, and means for discharging air into the lower portion of the housing in contact with slag discharged thereinto from said drum.

5. The combination with a boiler, of means for agitating molten slag with chilled slag, whereby the molten slag is chilled and crushed, and means for passing air in contact with the agitated slag and then in contact with the boiler.

6. The combination with a boiler and a housing inclosing the same, of a revoluble drum located adjacent to one side of the boiler housing and communicating with the space within the same, means for discharging molten slag into the drum while the latter is in motion, whereby chilled slag in the drum will chill and crush the molten slag, and means for forcing air through the drum in contact with the slag and into said boiler housing.

7. The combination of a boiler a housing for the same and a revoluble drum having a constantly open slag outlet in communication with said housing, a constantly open inlet through which hot slag may be supplied to the drum and means for supplying air to the drum over the slag therein.

8. The combination with means for utilizing heated air, of means for agitating molten slag with solid material, whereby said molten slag is chilled and crushed, means for passing air in contact with said agitated slag, and means for conducting the resultant heated air to the means for utilizing it.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM H. DAILY.

Witnesses:
JOHN H. MARTIN,
WM. ROBERTS.