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R. BAGGALEY.

SLAG HEATED BOILER.

APPLICATION FILED FEB. 14, 1903.

NO MODEL.

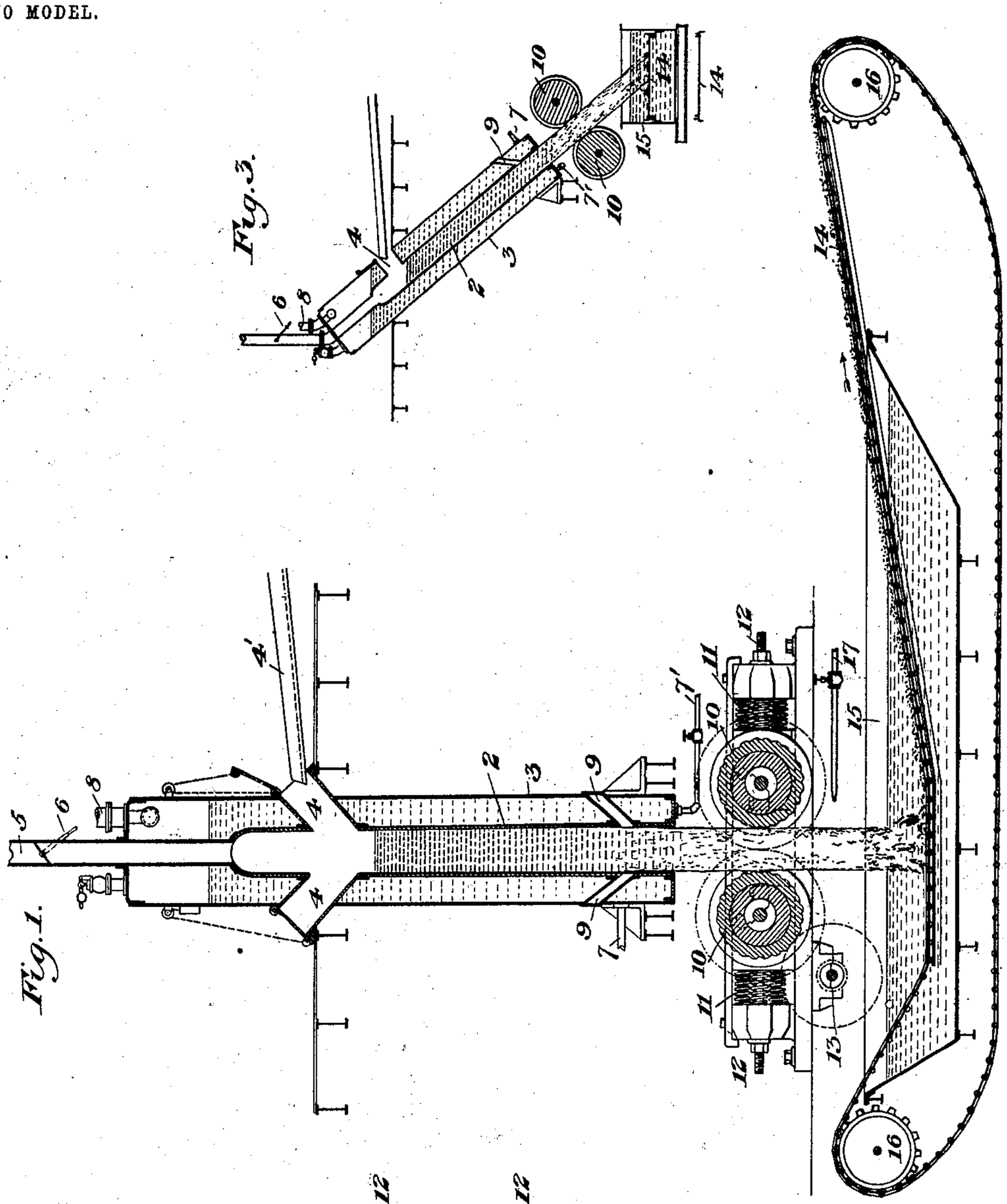

Fig. 1.

Fig. 3.

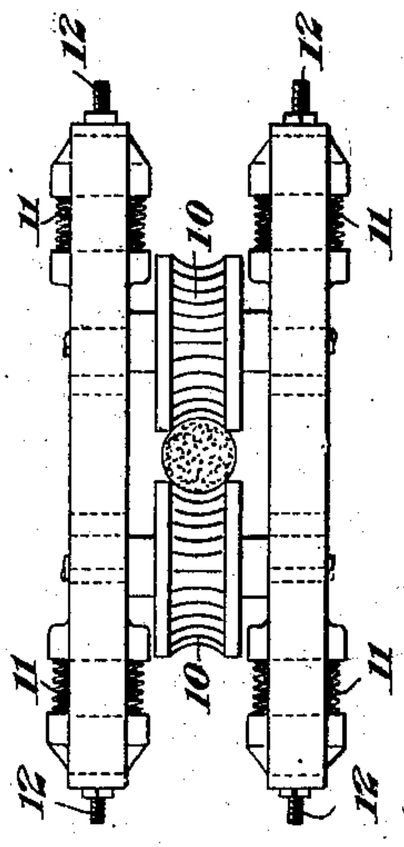

Fig. 2.

WITNESSES

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No. 746,239. Patented December 8, 1903.

UNITED STATES PATENT OFFICE.

RALPH BAGGALEY, OF PITTSBURG, PENNSYLVANIA.

SLAG-HEATED BOILER.

SPECIFICATION forming part of Letters Patent No. 746,239, dated December 8, 1903.

Application filed February 14, 1903. Serial No. 143,388. (No model.)

To all whom it may concern:

Be it known that I, RALPH BAGGALEY, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Slag-Heated Boiler, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 shows in vertical section a boiler constructed in accordance with my invention. Fig. 2 is a plan view of the roller mechanism which receives the column of slag discharged from the boiler. Fig. 3 is a vertical section, on a smaller scale, showing a modification in which the boiler is set in an inclined position.

The object of my present invention is to provide means for the easy and economical removal and discharge of the slag column of a slag-heated boiler; and it consists in a boiler provided with rollers by which the column or columns of slag from the boiler are supported and delivered in columnar form at the desired rate of speed; and it consists, further, in the combination, with such rollers, of a water tank or vessel into which the slag is delivered and by which it is disintegrated.

Within the scope of my invention as broadly claimed the tank or vessel may be substituted by a pipe or pipes adapted to discharge water upon the column of slag below the rollers. By these means I overcome the difficulties to which slag-heated boilers are subject and render it simple, economical to operate, and very efficient.

The boiler proper preferably has inner and outer shells 2 3, the inner shell or tube 2 flaring somewhat downwardly, so as to discharge the slag more readily.

4 4 are slag-inlet openings which extend into the inner shell at the upper part of the boiler and are adapted to receive molten slag either from a ladle or more directly from a furnace through a spout 4′, which connects the furnace with the opening or openings 4. The openings 4 are below the water-level of the boiler, and above them the inner shell 2 is preferably provided with an upward extension 5, having a damper 6 and adapted to permit the escape of gases from the slag. The boiler has the usual water-inlet pipe 7, a drain-pipe 7′, and a steam-eduction pipe 8. At the lower portion of the shell I preferably provide openings 9, which are upwardly inclined and serve as poke-holes.

The inner shell 2 is open at its lower end, and below it, in line therewith, are corrugated rollers 10 10, the bearings of which are provided with springs 11, by which the rollers are forced yieldingly toward each other, the pressure being regulated by screws 12 12. Either or both of these rollers may be driven from any suitable motor by gearing 13. Below the rollers 10 is a conveyer 14, consisting, preferably, of an endless belt which travels through a water-tank 15 and around sprockets 16, or I may use in place of or as supplemental to the water-tank 15 a pipe or pipes 17, adapted to discharge water upon the slag column below the rollers.

In using the boiler it is filled with water to the desired water-level. The lower end of the inner shell or tube 2 is temporarily closed by any suitable valve or plugging device and preferably by charging cold slag into the openings 4. The molten slag is then fed to the boiler through these openings and forms in the shell 2 a column of slag, which in cooling gives up its heat to the shell, and thus to the water within the boiler. To discharge this slag column from the boiler, the lower end of the shell 2 is opened and the column of slag descends by gravity and is engaged by the rollers and is supported and drawn thereby from the boiler in columnar form either continuously at a slow and regulated speed or intermittently, as may be desired. As the lower end of the solidified slag column is fed down below the rollers it enters the water in the tank 15, and being still hot it is disintegrated thereby and the fragments are carried off by the conveyer 14 and delivered into a car or other suitable place of discharge, or the slag column may be disintegrated by directing upon it a stream of water from the pipe 17, where running water or water under pressure is available. The speed of the rollers should be regulated so as to deliver the slag column into the tank while still hot enough to be disintegrated by the chilling effect of the water.

The rollers afford means by which the slag column can be delivered from the boiler at the proper rate, and the operation of the boiler is thus easily controlled.

The power required to operate the slag-discharging device is reduced to a minimum, because ordinarily it amounts only to the regulation of the speed. The weight of the column of slag in itself furnishes a continuous power to propel the rollers. Should the slag run high in silicate of lime or in silica, and thus be the equivalent of obsidian instead of silicate of iron, I have found that it has a tendency to cool on the outside of the column in one or more concentric layers, in which event the column of slag may show a tendency to stick or bind in the tube or tubes. In such case the rollers actuated with moderate power will exert a gentle pull on the column of slag, and thus remove it without injury to the tube. Furthermore, the risk of injury to the tube incident to any crushing or cutting mechanism located at the end of the tube is by this simple attachment entirely eliminated.

Where the boiler is constructed to produce a slag column of large diameter, the weight of the column is such that the driving-engine may be dispensed with and a suitable friction-brake for regulating the speed of the rollers substituted for it.

In Fig. 3 I show a modification of my invention in which the boiler is in an inclined position, and in this case there are preferably a feed-opening 4 and a poke-hole 9 at one side only of the boiler structure.

Within the scope of my invention as defined in the claims the boiler may have more than one slug-tube 2, and the construction may be otherwise modified, since

What I claim is—

1. A slag-heated boiler having a slag tube or tubes provided with an opening for the reception of molten slag, and a second opening for discharging the solidified column of slag, and means for delivering the same in columnar form and for bringing water into contact with the solidified slag column; substantially as described.

2. A slag-heated boiler having a slag tube or tubes, and mechanism below the same for regulating the withdrawing of the slag therefrom in columnar form; substantially as described.

3. A slag-heated boiler having a slag tube or tubes, and means below the same adapted to move in the direction of length of the slag column for supporting and delivering the same in columnar form; substantially as described.

4. A slag-heated boiler having a slag tube or tubes, and means below the same operating at a regulated speed and adapted to move in the direction of length of the slag column for supporting and delivering the same in columnar form; substantially as described.

5. A slag-heated boiler having a slag tube or tubes and roller mechanism below the tubes for receiving and controlling the withdrawal of the slag from the tube or tubes and delivering the same in columnar form; substantially as described.

6. A slag-heated boiler having a slag tube or tubes, and roller mechanism below the same for receiving the slag column, said roller mechanism being yieldingly backed; substantially as described.

7. A slag-heated boiler having a slag tube or tubes, and means below the same adapted to move in the direction of length of the slag column and to control the withdrawal of the slag in columnar form, and means for bringing water into contact with the solidified slag column; substantially as described.

8. A slag-heated boiler having a slag tube or tubes, and means below the same adapted to move in the direction of length of the slag column and to control the withdrawal of the slag in columnar form, means for bringing water into contact with the solidified slag column, and a conveyer for receiving the disintegrated slag; substantially as described.

9. A slag-heated boiler having a slag tube or tubes, and roller mechanism situate below the same and adapted to receive the slag therefrom and to deliver it in columnar form, said roller mechanism being power-driven; substantially as described.

10. A slag-heated boiler having a slag tube or tubes, roller mechanism situate below the same and adapted to receive the slag therefrom and to deliver it in columnar form, and means for regulating the speed of the roller mechanism; substantially as described.

In testimony whereof I have hereunto set my hand.

RALPH BAGGALEY.

Witnesses:
E. W. LINDQUIST,
THOMAS W. BAKEWELL.