(No Model.)

F. WETTON.

COOLER FOR BONE BLACK REVIVIFYING KILNS.

No. 255,828. Patented Apr. 4, 1882.

Fig. 1.

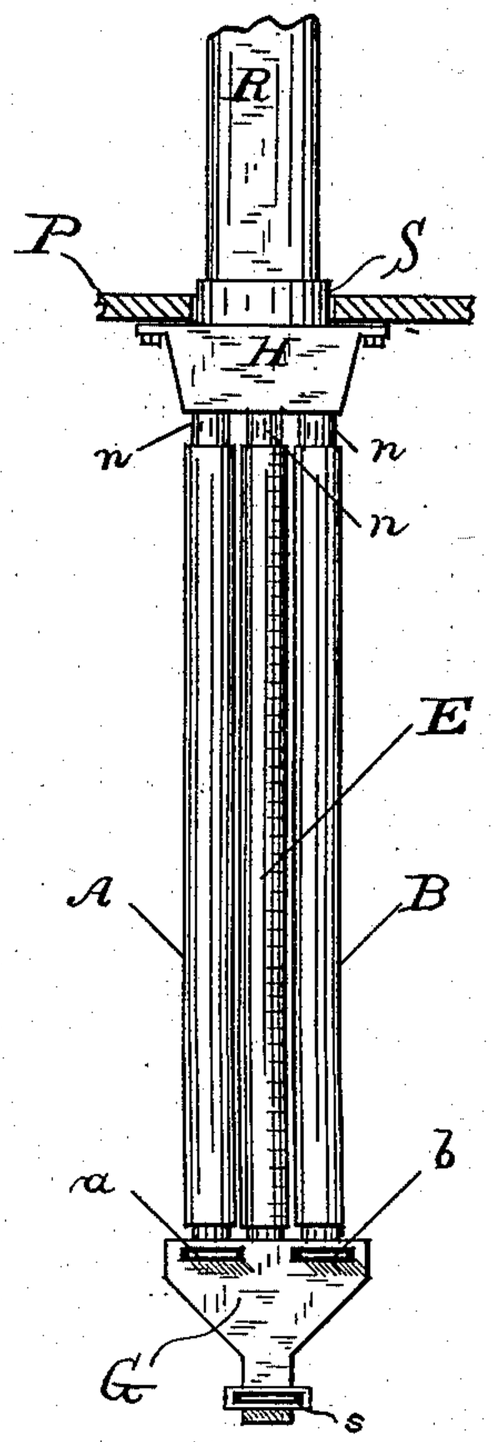


Fig. 2.

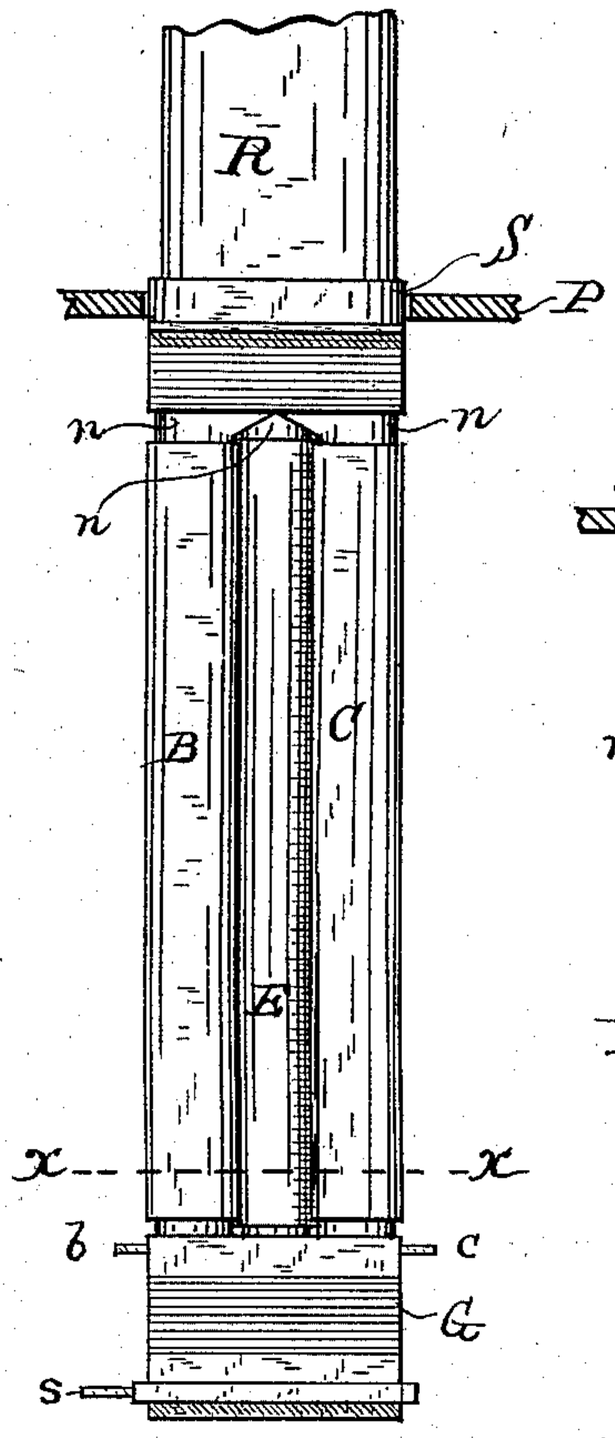
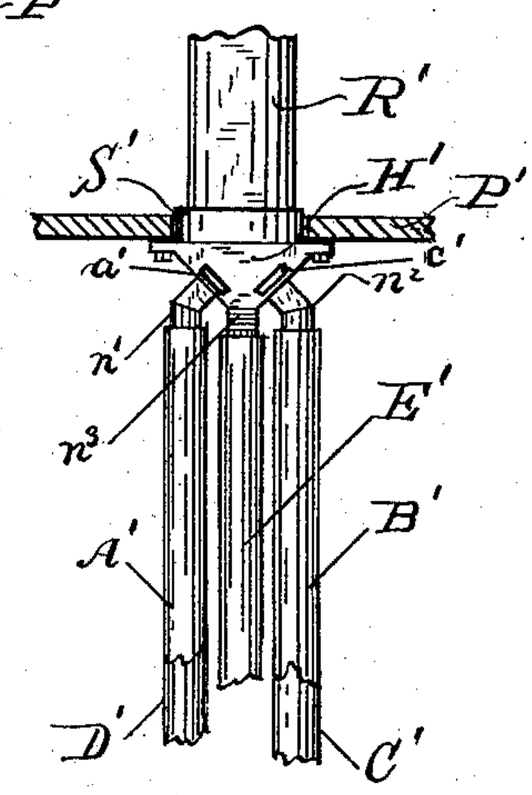


Fig. 4



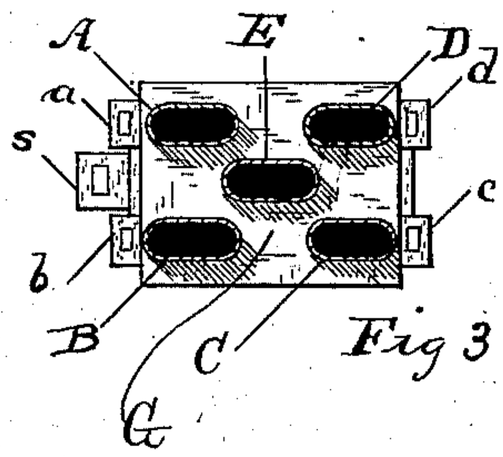
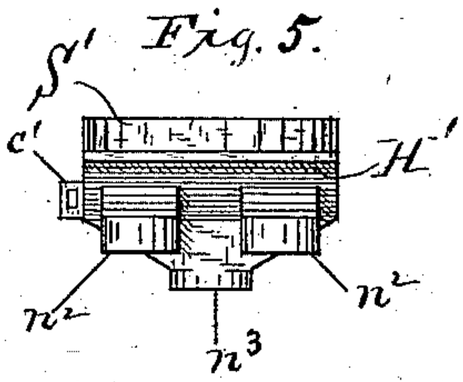


Fig 3

Fig. 5.



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COOLER FOR BONE-BLACK-REVIVIFYING KILNS.

SPECIFICATION forming part of Letters Patent No. 255,828, dated April 4, 1882.

Application filed February 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS WETTON, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Coolers for Bone-Black-Revivifying Kilns Used in Sugar-Refineries, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to the vertical cooling-tube suspended below the fire-chamber of a bone-black-revivifying kiln and exposed to a circulation of air, into which the hot black flows from the retorts contained within the fire-chamber of the kiln, and from the lower extremity of which is drawn the black more or less cooled by its passage through the tubes, and of about the proper temperature for use in the decolorization of sugar solutions.

It frequently occurs in warm weather that the black is not sufficiently cooled by these cooling-tubes in the time during which it remains in them, and it has to be further cooled by other cooling apparatus before being used for the decolorization of sugar liquors, and in cold weather it often happens that in its passage through the cooling-tubes it becomes reduced below the proper temperature for use and has to be heated to the proper temperature in special apparatus.

The object of my invention is to obviate this difficulty, and consequently the necessity of using special cooling or heating apparatus, and to effect the cooling of the black to the proper temperature alike in hot weather and in cold by means of the cooling-tubes themselves.

My invention consists in having the cooler for each retort in the kiln constructed of or consist in a number of vertical tubes, all communicating with the lower end of the retort, and all, or else with one exception, provided with slides, by which they may be closed or opened at will, or with devices answering the same purpose, so that the hot black from the retort may be caused to pass through all of the pipes, or through but one or any intermediate number of them, and the cooling effect of the system on the black be varied accordingly at will.

In the drawings is shown apparatus embodying my invention, Figure 1 being an elevation of my improved cooler and of a portion of the retort with which it is connected; Fig. 2, a side view of Fig. 1; Fig. 3, a section of Fig. 2 along the broken line *x x*, and Figs. 4 and 5 views of a modification of my invention.

In Figs. 1 and 2, P is the bottom plate of the fire or heating chamber of a kiln. R is a retort located above the plate in the said fire-chamber, whose lower extremity extends into a sleeve or socket, S, which extends through the plate P into the close and practically air-tight box H, bolted to the under side of the plate or otherwise supported in position. From the bottom of this box project five nipples, *n n*, &c., which receive the upper extremities of five cooling-tubes, A, B, C, D, and E, the lower ends of which embrace nipples opening below into the receiving-box G.

The communication of the four tubes A, B, C, and D with the box G may be opened at will by means of the slides *a b c d*, extending through the end walls of the box and operating in a manner so generally understood as to need no further description. The sides of the receiving-box G converge downward to form the discharge F, which may be opened and closed by the slide *s*, or, as is sometimes the case, the slide *s* may be replaced by an automatic drawing and measuring apparatus, by which at certain periods the black is drawn off in measured quantities.

The operation of this cooling apparatus is as follows: The hot black from the retort R flows into the box H, and thence into the five cooling-tubes A, B, C, D, and E, the communication of one of which—viz., E—with the receiving-box G is always open, while that of each of the other tubes may or may not be, according as the slides *a*, *b*, *c*, and *d* have been set. If the said slides are all pulled out, all five of the tubes are in open communication with the receiving-box G, and the black from the retort will flow through all of the tubes on its way to the receiving-box, and will remain in the cooling-tubes for a length of time depending upon the rapidity with which the black is drawn from the box G, and the cooling effects of the tubes will be a certain amount. If the slides are all pushed in, as shown in Fig. 3, and the tubes A, B, C, and D closed thereby, the black

in passing from the retort will only flow through the single cooling-tube E, and at a rate five times as great as when all of the tubes are open, and with a very much less cooling effect on the black.

By pulling out one or more of the slides, and thereby opening one or more of the tubes, varied cooling effects may be had intermediate between the extremes indicated above.

In proportioning the parts of the apparatus it is intended that the tubes shall be of such length, size, and number that when all are open the cooling effect on the black will be sufficient to lower the temperature of the same to the desired degree in the warmest weather likely to be experienced, and such that when but a single tube is open the black will be kept warm enough in the coldest weather, and that by opening one or more of the tubes, as required, the black may be kept at the proper temperature, whatever may be the state of the weather.

By having the tube E also provided with a slide the drawings of the black from the cooler may be done as follows: When the cooling effect of but one tube is required the drawings, which are made at regular intervals, are all made from one pipe. If the cooling effect of more than one tube is required, the drawings of the black are made in turn from each of that number of tubes. Thus, if the cooling effect of four of the tubes is needed, the drawings are made in succession from each of four of the tubes, the fifth tube, or the remainder of the tubes, should there be more than five in the battery, not being drawn from at all.

In Figs. 4 and 5 is shown an arrangement of my improved cooler slightly different from that shown in Figs. 1 to 3, inclusive. In this modification the slides by which the various tubes are opened and closed are located in the upper box, H′, which is also differently constructed from the box H. (Shown in Figs. 1 and 2.) In the box H′, of which a side view is shown in Fig. 5, the sides converge more rapidly than in the case of the box H, Fig. 1, and they approach so nearly to each other that the bottom of the box is only wide enough to receive the nipple n^3 of the central tube, E′, to which nipple the bottom of the box inclines from both ends, as shown in Fig. 5. The nipples n' n^2 for the four other tubes, A′ B′ C′ D′, open into the box through the sides of the same, two on each side, the nipple for each having a bend or elbow in it, so that the cooling-tubes may be vertical. The communication of the tubes A′ D′ with the box H may be opened or closed by the slide a', which projects through the end of the box toward one side, the one slide answering for both tubes. When pulled out but half-way the tube D is alone opened. When pulled out to the full extent both tubes, A and D, are opened. The slide c' performs the same function for the nipples of the tubes B′ C′.

The advantages of the arrangement shown in Figs. 4 and 5 are that the box contains no corners in which the black may lodge and remain; but with the slides arranged in the upper box there is a danger of air finding entrance into the box and among the hot black, and a consequent burning of some of the latter. An advantageous arrangement of the parts would be to have the upper box constructed of the shape of the box H′, with the nipples for the tubes opening into it through the sides, as shown in Figs. 4 and 5, but with the slides for opening and closing the cooling-tubes located at the lower extremities of the same, as illustrated in Figs. 1 to 3, inclusive. With this disposition of the parts there would be no difficulty in making the upper box perfectly air-tight, which is to be desired.

In the arrangement of my improved cooling apparatus and the retorts of a kiln with relation to each other one cooler may receive the black from one retort or from one or more retorts, in the latter case the cooler being made proportionately larger and with a greater number of cooling-tubes. In the latter arrangement, while the cooling-surface of the tubes required would be no less than in the former, the number of boxes H and G would be fewer and the apparatus simplified to that extent.

Having described my invention, I claim as mine and desire to secure to myself by Letters Patent of the United States—

The combination, with the socket or box into which a retort of a bone-black-revivifying kiln delivers, of a series of tubes communicating with the said socket or box and adapted to receive the hot black from the same and to conduct it away, the said tubes being each, or all of them but one, provided with a suitable opening and closing device, by which one or more of the tubes may be closed to the passage of the black and the cooling effects of the system be varied as desired, substantially as specified.

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Witnesses:
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