March 17, 1925. 1,529,808

R. D. PIKE ET AL

REGENERATIVE CLINKER COOLER

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Fig. 1.

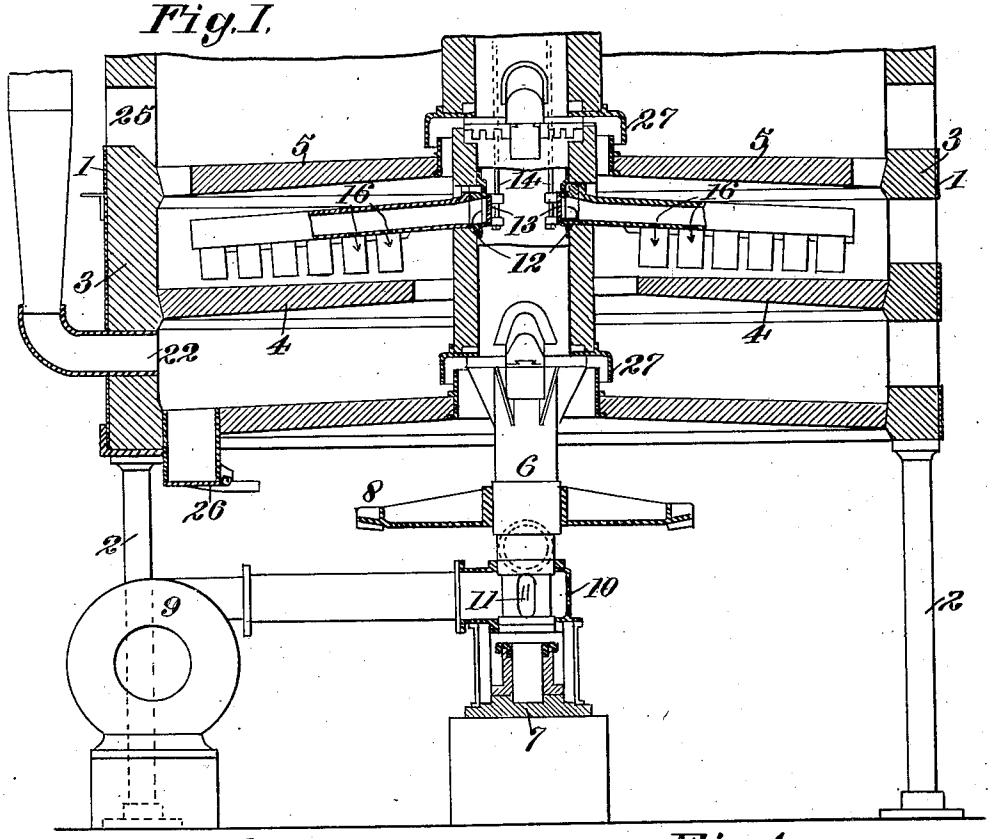


Fig. 3.

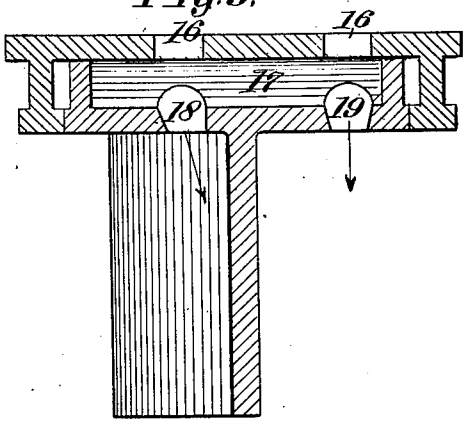
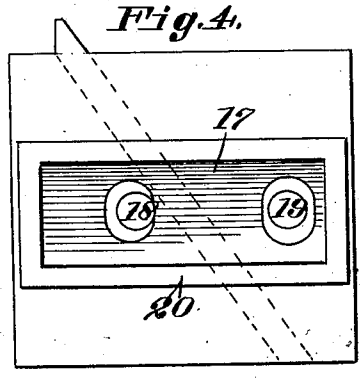


Fig. 4.



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Fig. 2.

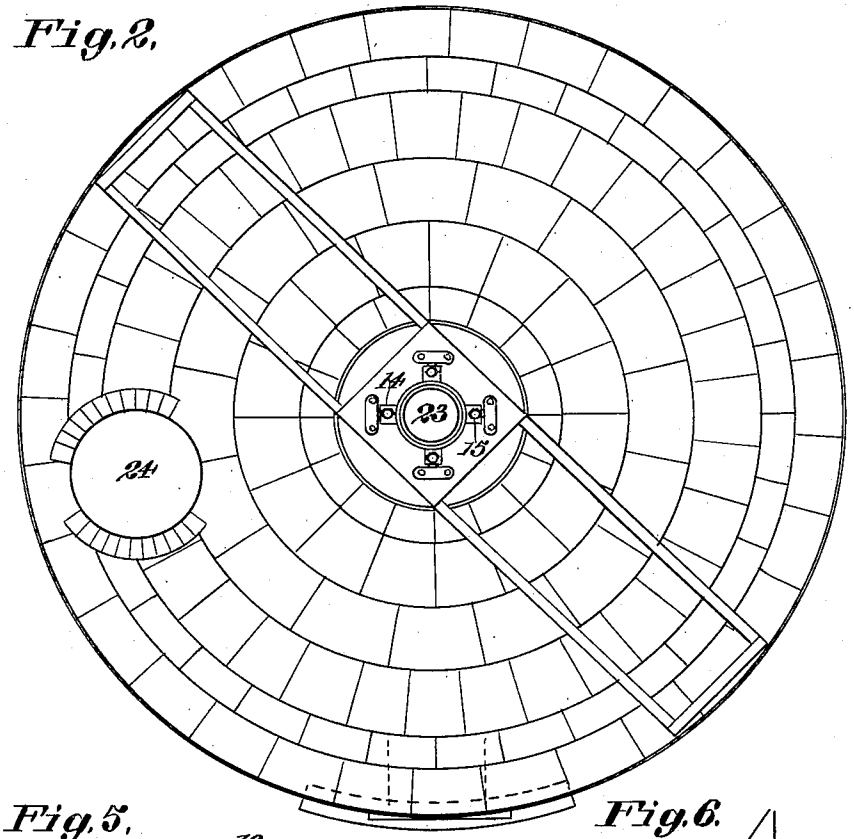


Fig. 5.

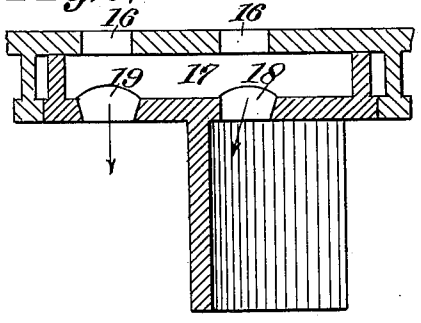


Fig. 6.

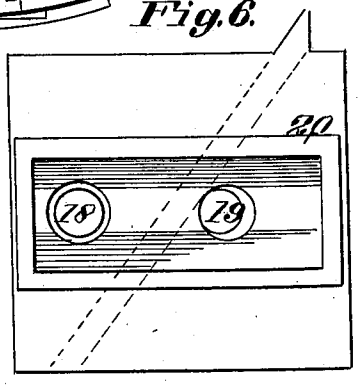
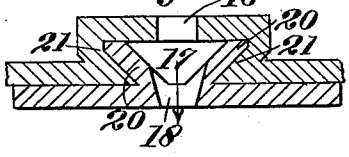


Fig. 7.



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UNITED STATES PATENT OFFICE.

ROBERT D. PIKE, OF SAN MATEO, AND DUDLEY BAIRD, OF BERKELEY, CALIFORNIA.

REGENERATIVE CLINKER COOLER.

Application filed July 1, 1924. Serial No. 723,506.

To all whom it may concern:

Be it known that we, ROBERT D. PIKE and DUDLEY BAIRD, citizens of the United States, residing, the said PIKE at San Mateo, in the county of San Mateo and State of California, and the said BAIRD at Berkeley, county of Alameda, State of California, have invented certain new and useful Improvements in Regenerative Clinker Coolers, of which the following is a specification.

Our present invention relates to an improvement in apparatus for cooling clinker whereby improved means are provided for transferring heat from the clinker to the cooling air, at the same time, using a minimum quantity of the latter which in turn is raised to an elevated temperature and rendered highly efficient for use as secondary air.

In this invention holes are provided in the bottom of the rabble arms through which relatively cold air is blown under pressure. Two of these holes are preferably provided for each rabble tooth; one hole directs air against the metal of the tooth at the rear thereof, effecting cooling and preservation of the same, and the other hole directs air directly upon the clinker in advance of the tooth. In this design, the teeth are preferably made of a non-oxidizing alloy of the iron chromium or nickel iron chromium series and the jet of cold air which is directed upon the metal of the tooth keeps the temperature of the metal within safe limits, i. e., below 1832 degrees F. in spite of a considerably higher temperature of the clinker on the uppermost hearth of the cooler.

Means are also provided for independently regulating the flow of air to each of the rabble arms in the cooler.

With the above mentioned and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings and set forth in the appended claims; it being understood that various changes in the form, proportion, size and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Referring to the drawings illustrating one embodiment of our invention—

Fig. 1 is a longitudinal vertical section of the assembled cooler.

Fig. 2 is a plan view of same.

Fig. 3 is a vertical section along the axis of the rabble arm through an out pushing tooth.

Fig. 4 is a plan view of same.

Fig. 5 is a vertical section along the axis of the rabble arm through an in pushing tooth.

Fig. 6 is a plan view of same.

Fig. 7 is a partial cross section of a rabble tooth and the rabble arm on a plane bisecting one of the air holes in both tooth and rabble arm.

In the drawings, wherein like characters of reference designate corresponding parts, 1 is the vertical stationary steel shell of the cooler, resting on the several supports 2. The shell 1 is lined with refractory lining 3; the usual in hearths 4 and out hearths 5 are provided and constructed of refractory material. The hollow rotating central column 6 rests on step bearing 7 and is rotated by driving mechanism 8. Fan 9 blows air under pressure into the annular opening 10 which surrounds the lower extremity of the central column 6, and the air enters into the central column through the opening 11, and passing upwardly goes into each of the several rabble arms through opening 12. The area of these openings 12 is regulated by dampers 13, which are supported by rods 14, which pass upwardly through the top of the central column and are secured as to elevation by the nuts 15. The air inside the rabble arms passes out through a plurality of openings 16, and then into a pocket 17, formed inside the knob of each rabble tooth, and bounded on the upper surface by the lower face of the rabble arm. The air then passes outwardly and downwardly through the two holes 18 and 19, in the top plate of each rabble tooth. Hole 18 is so disposed and the wall thereof inclined as to direct the air upon the metal of the tooth on the side away from the direction of movement of the clinker and having the lesser contact with the latter; hole 19 is so disposed as to direct the air in a vertical jet upon the clinker which piles up in front of the tooth in the direction of motion of the clinker.

A usual method is employed for securing the rabble teeth to the rabble arm, the knob 20 sliding in the bottom slot 21 of the rabble arm. Exact alignment between the holes 16 and 18 and 19 is not necessary because

the air, when once delivered into a pocket 17, follows the easiest path to travel through the holes 18 and 19, only a portion leaking through the joints between the knob 20 and the metal 21 of the rabble arm.

An auxiliary portion of cooling air can, if desired, be admitted through the opening 22 over the lowermost hearth. An auxiliary vent 23 is provided at the upper end of the central column for wasting cooling air to the outside if desired.

In the preferred form, the major portion of the preheated air from the cooler leaves through the opening 24, in the roof, and a minor portion through the opening 25, through which the heated clinker enters, but the relative magnitude of these two portions can be adjusted at will.

The hot clinker enters through the opening 25, and is rabbled over the hearth in the usual manner, becoming cooled meanwhile and is finally discharged through the balanced gate discharge 26. The usual rotating seals 27 are provided where required.

The described apparatus for cooling clinker provides a more efficient means than at present known for transferring heat from clinker or other hot solid material to air or other gas and simultaneously heating the latter to a high temperature. This is accomplished because while the path of the clinker through the apparatus is arrested thus providing the necessary element of time for effecting passage of heat from the inside of the lump to the surface thereof the clinker is continuously stirred and turned over, and relatively cold air is all the while blown in jets of high velocity upon those portions of the clinker mass which are being stirred; and at the same time, the metal of the rabble teeth is preserved from overheating by blowing a portion of the air upon exposed parts of the metal so as to rapidly abstract heat therefrom.

We claim:—

1. In combination with a rabble arm provided with an air passage, a rabble tooth carried thereby and depending therefrom, the body of the tooth provided with a plurality of air passages communicating with the passages in said arm, one of said passages adapted for directing air against one wall of the tooth and the other for directing air onto the clinker.

2. In combination with a rabble arm provided with an air passage, a plurality of rabble teeth detachably carried by and depending therefrom, each of said teeth provided with a downwardly depending portion arranged obliquely to the axis of the arm, and each tooth provided with a pair of air passages communicating with the passage in the arm, one passage being arranged to direct an air stream onto the rear face of the depending portion and the other passage adapted for directing air onto the clinker immediately in advance of the face of the depending portion.

In testimony whereof we have signed our names to this specification.

ROBERT D. PIKE.
DUDLEY BAIRD.