

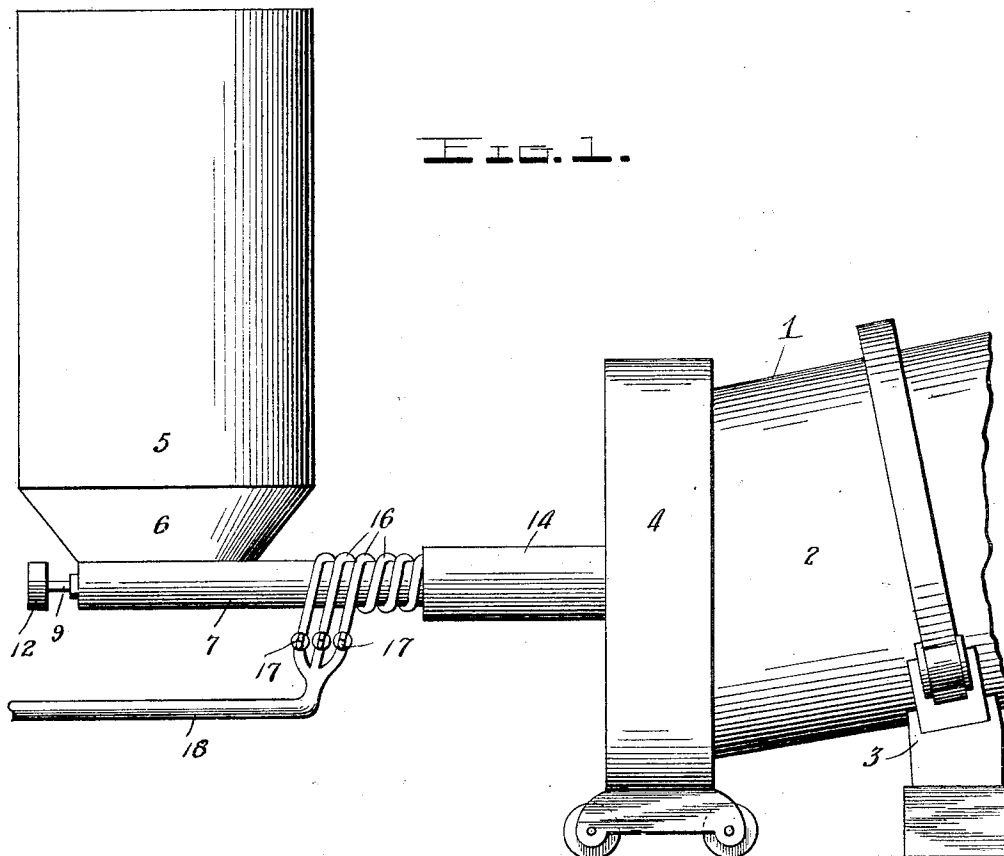
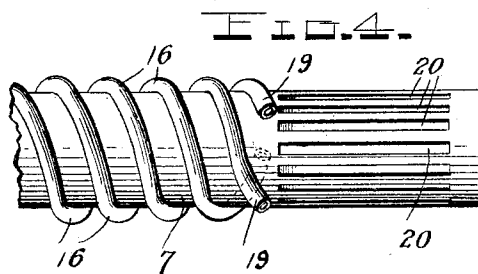
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PATENTED SEPT. 8, 1908.

J. H. O'DONNELL & H. McCLAFFERTY.
COAL BURNER FOR CEMENT KILNS.

APPLICATION FILED OCT. 1, 1907.

2 SHEETS—SHEET 1.



Witnesses

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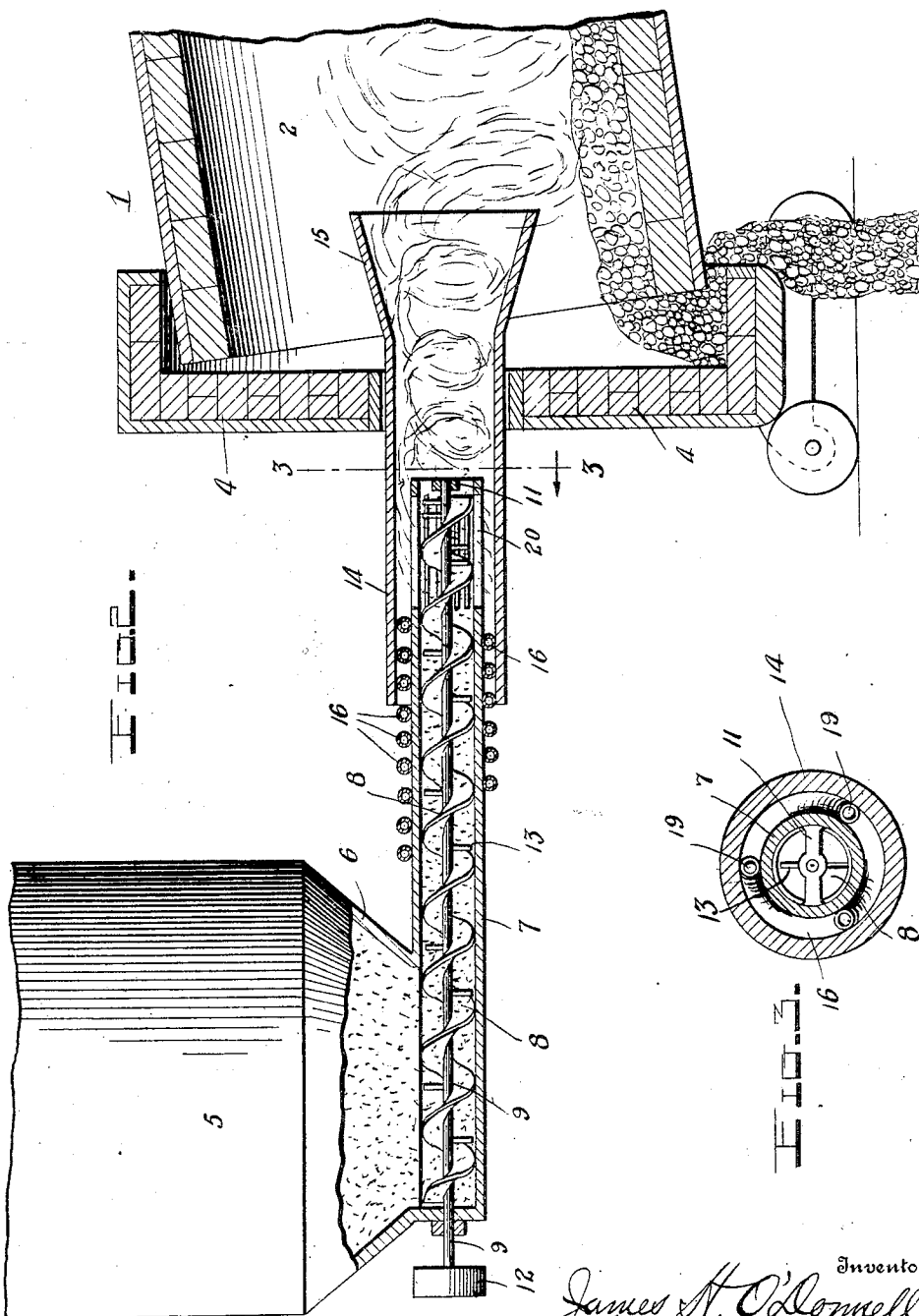
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UNITED STATES PATENT OFFICE.

JAMES H. O'DONNELL AND HUGH McCLAFFERTY, OF LITZENBERG, PENNSYLVANIA.

COAL-BURNER FOR CEMENT-KILNS.

No. 898,131.

Specification of Letters Patent.

Patented Sept. 8, 1908.

Application filed October 1, 1907. Serial No. 395,438.

To all whom it may concern:

Be it known that we, JAMES H. O'DONNELL and HUGH McCLAFFERTY, citizens of the United States, residing at Litzenberg, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in Coal-Burners for Cement-Kilns, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to improvements in kilns for burning Portland cement and more particularly to soft coal burners for such kilns.

The object of our invention is to provide a coal burner of this character which will be economical, reliable and durable, and at the same time comparatively inexpensive.

With the above and other objects in view, the invention consists of the novel features of construction and the combination and arrangement of parts hereinafter described and claimed, and illustrated in the accompanying drawings in which

Figure 1 is a side elevation of a portion of a cement kiln showing the application of our improved soft coal burner thereto; Fig. 2 is a vertical longitudinal section through a portion of a kiln, the burner and a portion of the feed hopper; Fig. 3 is a detail section taken on the plane indicated by the line 3—3 in Fig. 2; and Fig. 4 is a detail view showing the outlet end of the coal feed tube and the arrangement of the air blast pipes.

In the drawings 1 denotes a portion of discharge end of a cement kiln which consists of a cylindrical body 2 arranged in an inclined position and mounted for rotation in suitable roller bearings 3. The lower or discharge end of the kiln body 2 is closed by a relatively stationary head 4 which is movable toward and from said end of the kiln as shown. Both the body and head of the kiln are preferably constructed of an outer casing or shell of steel or other metal and a lining of fire brick so that the kiln will be exceedingly durable, but it will be understood that it may be of any other suitable form and construction.

Our improved soft coal burner for the kiln 1 comprises a coal hopper or receptacle 5 of any suitable size and shape and preferably formed with a tapered or funnel shaped bottom 6 from which projects a horizontal feed tube 7. Arranged within the latter is a force feed device 8 preferably in the form of a

spiral conveyer consisting of a shaft 9 carrying a spiral blade. The shaft 9 is journaled at one end in a bearing at the closed end of the tube 7 and at its other end in a cross bar or spider 11 arranged in the open outer end of said tube. The shaft 9 may be driven in any suitable manner but as shown a band wheel or pulley 12 is provided upon its extended outer end. For the purpose of agitating the soft pulverized coal and preventing it from packing and forming into lumps, agitator pins 13 are arranged upon the conveyer shaft 9 at suitable intervals as shown. The outer end of the feed tube 7 projects into one end of a mixing tube 14 which latter projects through and is arranged in the head 4 of the kiln and has its other or inner end formed with a flared or funnel shaped enlargement 15. The interior diameter of the mixing tube 14 is greater than the exterior diameter of the feed tube 7 and arranged between said tubes are one or more air blast pipes 16 which are so arranged as to create a spiral blast or current of pulverized coal and air through the mixing tube 14 and the body of the kiln.

While any number of the air pipes 16 may be employed we preferably use three and coil them around the tube 7 as shown in the drawings. Each of the pipes 16 is provided with a suitable blast regulating valve 17 and is connected to a main air feed pipe 18 as seen in Fig. 1. The opposite or open ends of the air blast pipes 16 form nozzles 19 which are arranged at equidistant points and in spiral relation around the feed tube 7 adjacent to its outer portion in which latter are formed longitudinal slots or openings 20 for the discharge of the coal. The slots 20 are preferably arranged in an annular series and extend longitudinally as shown, but it will be understood that they may be of other size and shape and may be arranged spirally or in any other suitable manner. The mixing tube 14 may be mounted for rotation if desired but we preferably arrange it stationary and make the opening in the head 4 through which it passes of sufficient size to permit said head to slide back and forth upon it.

From the foregoing description taken in connection with the accompanying drawings it is thought that the construction, operation and advantages of the invention will be readily understood. It will be noted that owing to the arrangement of the conveyer beneath the body of pulverized soft coal in the hopper, there will be a continuous feed of

the coal through the feed tube 7 and that owing to the pins upon the shaft of the conveyer the coal will be prevented from lumping. The provision of the slots 20 at the outlet end of the feed tube and the arrangement of the air blast nozzles 19, causes a perfect mixture of coal and air and produces a strong spiral blast which becomes ignited as it leaves the funnel shaped end 15 of the mixing tube. This blast as it enters the kiln becomes a mass of flame and continues to have a rolling motion throughout the length of the kiln so that the cement passing through the body 2 will be effectively burned. By regulating the valve 17 and controlling the speed of the conveyer 8 the proper amount of coal and air will be fed to the mixing tube and a perfect mixture of the two will be had before they enter the kiln. The spiral current or blast not only insures the thorough mixing of the coal and air so that perfect combustion ensues, but also causes the flames to be directed downwardly so as to properly burn the cement. The kiln body 2 is rotated in the usual manner and its direction of rotation is preferably the same as that of the spiral blast within the same.

While we have shown and described the preferred embodiment of our invention it will be understood that we do not wish to be limited to the precise showing herein set forth and that various changes in the form, proportion and minor details may be resorted to without departing from the spirit or sacrificing any of the advantages of our invention.

Having thus described our invention what we claim is:

1. In a burner of the character described, a mixing tube, a feed tube projecting into the mixing tube and formed with an annular series of longitudinal slots, said feed tube being of less size than the mixing tube to provide a space between them, means within said space for directing a blast of air diagonally over the slots in the feed tube and spirally within the mixing tube and means for

feeding fuel through the feed tube to said slots, substantially as set forth.

2. In a burner of the character described, a mixing tube, a feed tube projecting into the mixing tube and formed with an annular series of longitudinal slots, said feed tube being of less size than the mixing tube to provide a space between them, a conveyer within the feed tube for feeding fuel through the same to said slots, and a plurality of angularly arranged air blast pipes in the space between said tubes for directing blasts of air diagonally across the slots in the feed tube and spirally within the mixing tube, substantially as set forth.

3. A burner of the character described comprising a mixing tube, feed tube projecting into one end of the same and formed with an annular series of slots, a conveyer within the feed tube and air blast pipes coiled about the feed tube and having their discharge ends terminating adjacent to the slots in the feed tube and adapted to create a spiral blast through the mixing tube.

4. A burner of the character described comprising a mixing tube having a flared discharge end, a fuel hopper, a feed tube arranged in the bottom of the hopper and having one end projecting into the mixing tube and formed with slots or openings, a spiral conveyer arranged within the feed tube, agitator pins upon the shaft of said conveyer, and a valve controlled air blast pipe coiled about the feed tube and having its discharge end or nozzle terminating adjacent to the slotted portion of said feed tube, substantially as set forth.

In testimony whereof we hereunto affix our signature in the presence of two witnesses.

JAMES H. O'DONNELL.
HUGH McCLAFFERTY.

Witnesses:

JOS. A. SATTELE,
PATRICK F. O'DONNELL.