

No. 806,530.

PATENTED DEC. 5, 1905.

C. J. DUNCAN.
SAND DRIER.

APPLICATION FILED SEPT. 6, 1905.

2 SHEETS—SHEET 1.

Fig. 2.

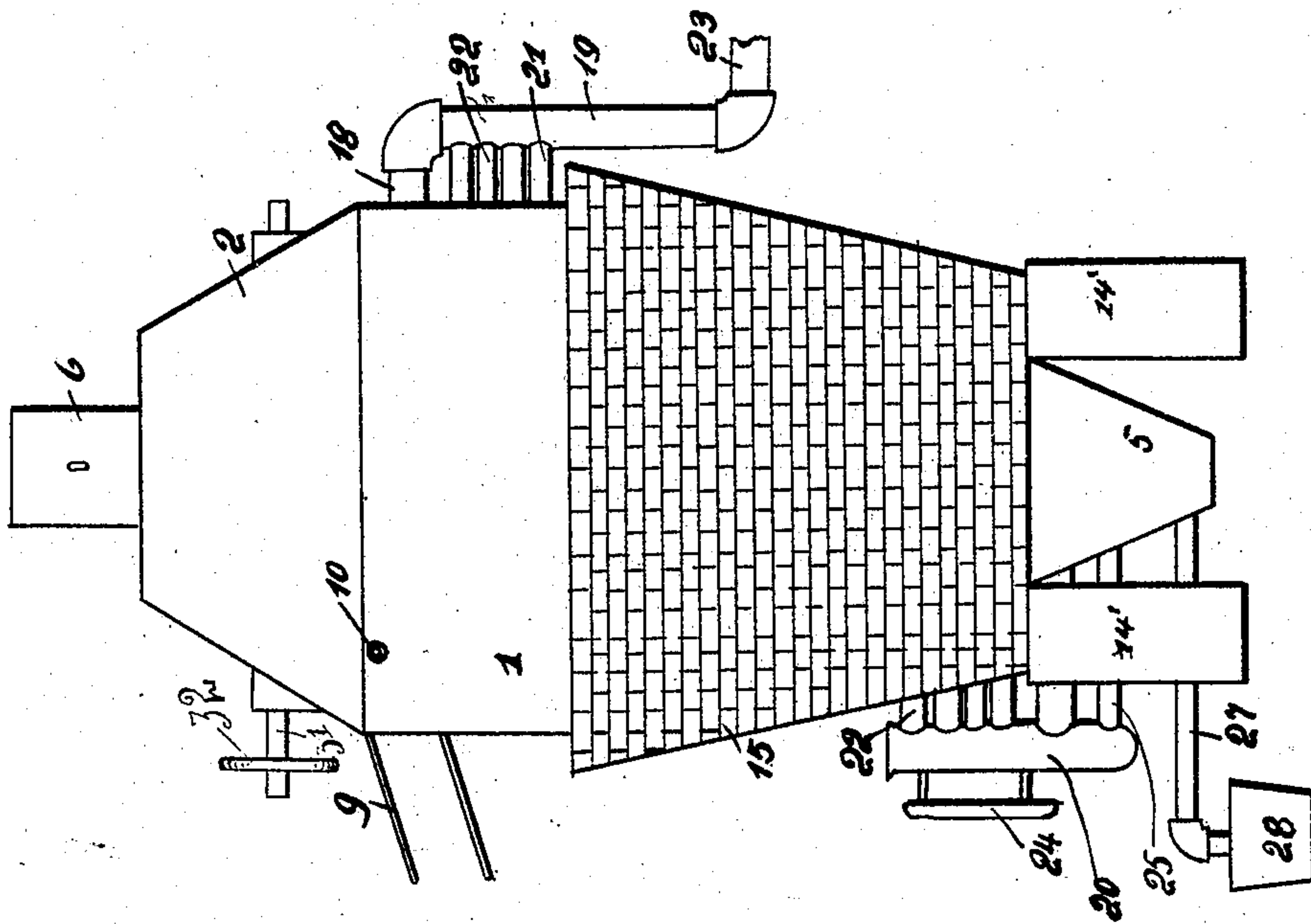
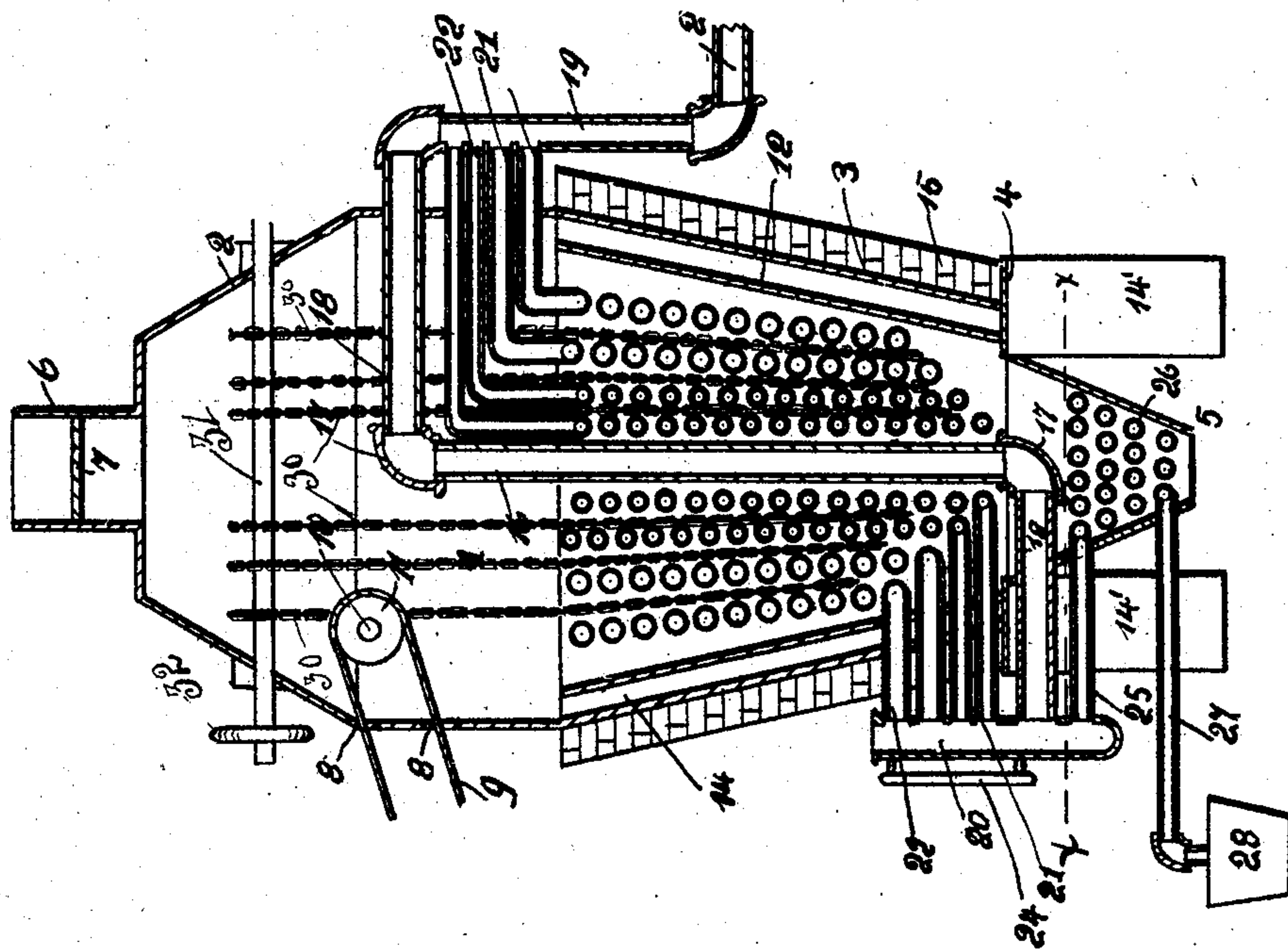


Fig. 1.



Witnesses:
R. H. Butler
E. E. Potter,

Inventor:
C. J. Duncan.
By A. C. Clevett & Co.
Attorneys.

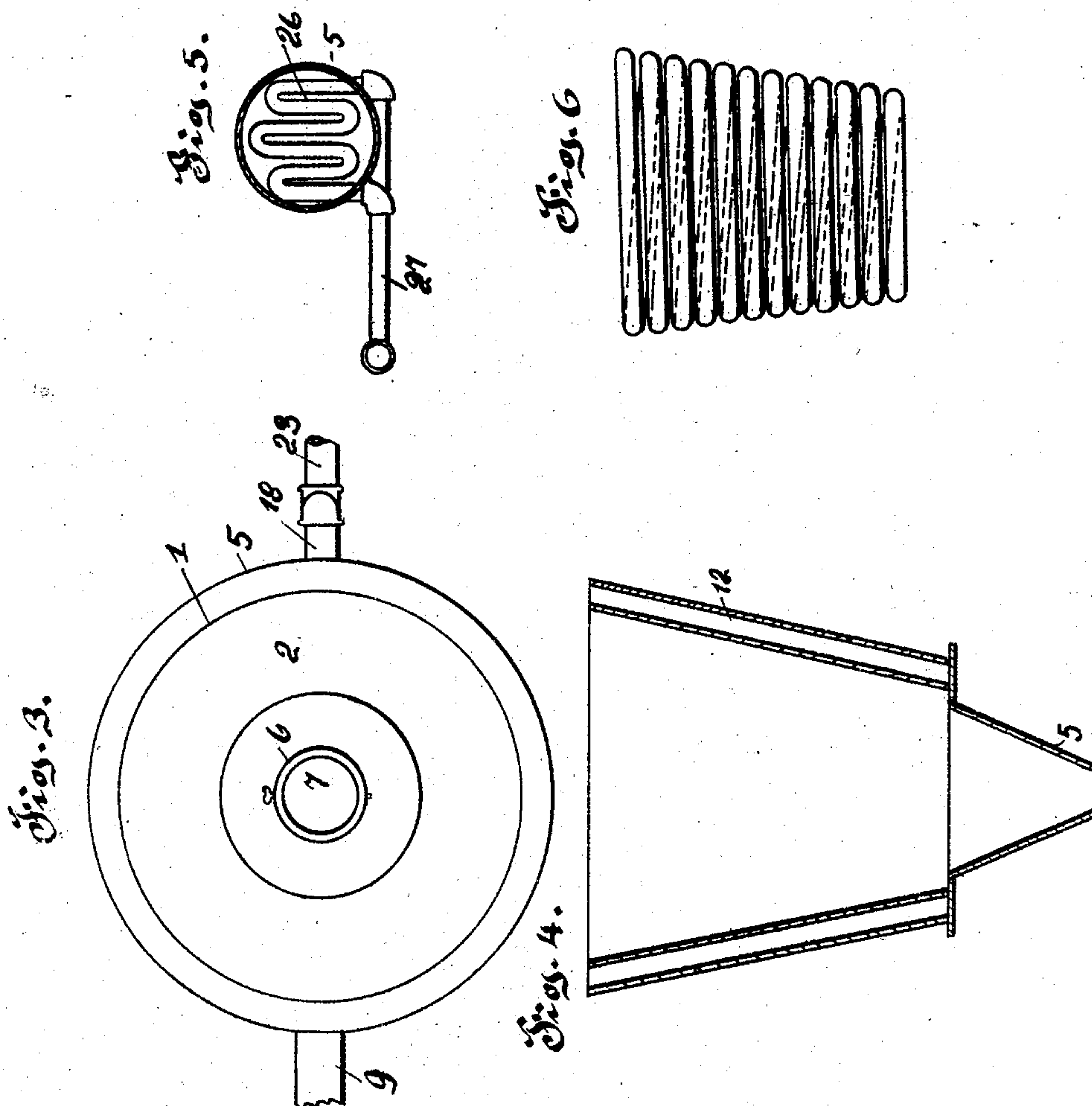
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2 SHEETS—SHEET 2.



Witnesses.
R. M. Butler,
E. E. Patten,

Inventor.
C. J. Duncan.

By *H. C. Everett & Co.*
Attorneys.

UNITED STATES PATENT OFFICE.

CLARK J. DUNCAN, OF WINDBER, PENNSYLVANIA.

SAND-DRIER.

No. 806,530.

Specification of Letters Patent.

Patented Dec. 5, 1905.

Application filed September 6, 1905. Serial No. 277,200.

To all whom it may concern:

Be it known that I, CLARK J. DUNCAN, a citizen of the United States of America, residing at Windber, in the county of Somerset and State of Pennsylvania, have invented certain new and useful Improvements in Sand-Driers, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in ovens and heaters designed for drying sand, particularly silica-sand.

15 To this end the invention aims to provide an oven comprising positive and reliable means for effecting a perfect heating and drying of sand fed to my improved oven. In this connection the invention is primarily intended for use in connection with my improved sand cleaning and drying machine, an application upon the same being filed in the United States Patent Office January 18, 1905, Serial No. 241,637; but it is obvious that the oven or heater can be readily used independently of
25 said machine.

With the above and other objects in view, which will more readily appear as the nature of the invention is better understood, the invention consists in the novel construction, combination, and arrangement of parts which will be hereinafter more fully described, illustrated, and claimed.

35 The essential features of the present invention involved in carrying the objects above specified into effect present a line of division required in the above-mentioned application.

In the accompanying drawings the preferred embodiments are shown; but they necessarily are susceptible to structural changes without departing from the spirit and scope of the invention.

40 Figure 1 is a vertical sectional view of my improved oven or heater. Fig. 2 is a side elevation of my improved oven or heater. Fig. 3 is a top plan view of the same. Fig. 4 is a vertical sectional view of the inner lining or casing of my improved heater. Fig. 5 is a horizontal sectional view taken on the line *xx* of Fig. 1, and Fig. 6 is a side elevation view of the coils of tubing employed in connection with my improved oven or heater.

Like numerals of reference designate corresponding parts throughout the several views of the drawings.

55 The construction embodied in the present application consists of an annular casing 1,

having a top 2 of frusto-conical shape and a bottom 3 of frusto-conical shape, which rests upon a base-plate 4, carrying a central depending tapering spout 5. The top 2 of the casing is provided with an upwardly-extending flue 6, having a damper 7 pivoted therein, adapted to be manually operated. The sides of the casing 1 are provided with slots 8 8, through which an endless conveyer 9 is adapted to pass to convey the sand to be heated and dried within the oven. The casing 1 is provided with an interior transversely-arranged shaft 10, upon which is journaled a pulley 11, over which the endless conveyer 9 is adapted to operate. The casing 1 is provided with an inner shell 12, conforming substantially in contour to the bottom 3 of the casing, said inner shell providing an annular compartment 14.

75 The casing just described is supported upon a suitable foundation, such as stone or concrete blocks 14' 14', and the sides of the bottom 3 of the casing are incased in a brick casing 15 or the like infusible material adapted to hold the heat within the oven.

Mounted centrally within the casing 1 and extending vertically therein is a steam-pipe 16, the ends of which are connected by elbows 17 17 and transversely-disposed pipes 18 18 to stand-pipes 19 and 20. The stand-pipes 19 and 20 are arranged outside of the oven, and they are connected together by a plurality of tubes 21 21 and 22 22. These tubes are of different diameters and are arranged within the bottom of the casing to form a plurality of convolutions, the outermost convolution of tubing being illustrated in Fig. 6 of the drawings. The innermost convolutions or coils of tubing are formed of the tubing having the smallest diameter, while the tubing having a larger diameter is arranged around the first-named tubing. The stand-pipe 19 is connected by a pipe 23 to a suitable steam-supply, and the top of the stand-pipe 20 may be provided with a suitable exhaust-pipe. The stand-pipe 20 carries a water-gage 24, and its lower end is provided with a pipe 25, connected with tubing 26, arranged within the depending tapering spout 5 of the casing. The tubing 26 is preferably constructed in layers within the spout, and the lowermost layer of tubing terminates in a pipe 27, communicating with a suitable receptacle 28, serving functionally as a water-trap.

110 In operation the sand to be heated and dried is fed to the interior of the casing by the con-

veyer 9 and is deposited upon the tops of the coils of tubing 21 and 22, the sand gradually percolating between said coils until it is precipitated upon the tubing 26. The sand gradually passes between the tubing 26 and may be deposited into a suitable receptacle or conveyer constructed beneath my improved heater or oven. The steam entering the stand-pipe 19 passes through the various convolutions of tubing until it reaches the stand-pipe 20. From the stand-pipe 20 the steam passes through the pipe 25 to the tubing 26, and during its passage I have found that a quantity of the steam condenses. The condensation of the steam creates water, which is adapted to pass through the pipe 25 to the receptacle or water-trap 28.

In connection with the heater I employ novel means for agitating the sand and preventing it from caking or becoming clogged between the coils of tubing. To accomplish this, I employ a plurality of chains 30, which are suspended between the coils of tubing from a revoluble shaft 31, mounted transversely within the top of the heater. The shaft 31 is provided with a suitable handle or wheel 32, whereby the shaft can be rotated to raise and lower the chains 30 to thoroughly agitate the sand passing through the heater or oven.

From the foregoing description it will be observed that I have provided novel and available means for quickly and thoroughly drying sand, said operation being continuous during the operation of the oven or heater. The percolation of the sand between the coils or convolutions of tubing is adapted to bring the small particles or grains of sand into contact with the heating-surface of the coils or convolutions of tubing, consequently thoroughly drying all particles of sand before it is ejected from the spout of the heater.

The oven or heater may be employed for drying various grades of sand, and for this reason I do not care to confine the use of the same to silica-sand.

What I claim, and desire to secure by Letters Patent, is—

1. In an oven of the character described, the combination with a suitable conveyer, of a casing, said casing having a bottom of substantially frustrated conical shape and top, infusible material surrounding the bottom of said casing, an inner shell mounted in the bottom of said casing, coils of tubing supported within said inner shell, said coils having common stand-pipes, one of said stand-pipes communicating with a suitable supply of steam, a tapering spout carried by the bottom of said casing, tubing supported within said spout, a water-trap, and pipes establishing communication between one of said stand-pipes, said tubing and said water-trap, substantially as described.

2. In an oven of the character described, the

combination with a suitable conveyer, of a casing adapted to receive sand from said conveyer, a flue carried by said casing, an inner shell arranged within said casing, infusible material surrounding a portion of said casing, coils of tubing arranged within said inner shell, said coils having common stand-pipes, one of said stand-pipes adapted to be connected to a suitable supply of steam, a tapering spout carried by said casing, tubing arranged in said spout, a water-trap, a pipe establishing communication between one of said stand-pipes, said tubing and said water-trap, substantially as described.

3. An oven of the character described consisting of a casing, a plurality of concentric coils of tubing arranged within said casing, said coils having common stand-pipes, one of said stand-pipes being connected to a suitable supply of steam, a water-trap, tubes establishing communication between the other of said stand-pipes and said water-trap, substantially as described.

4. An oven of the character described consisting of a casing covered with infusible material, said casing having a suitable inlet, a spout carried by said casing, tubing arranged within said casing, and connected with a suitable supply of steam, a water-trap, and condensing-pipes connecting said tubing and said water-trap extending across the exit-passage of the casing, substantially as described.

5. An oven of the character described consisting of a casing, an inner shell mounted within said casing, coils of tubing arranged within said inner shell and connected with a suitable supply of steam, a water-trap, and means to convey condensed steam from said coils of tubing across the exit-passage of the casing to said water-trap.

6. An oven of the character described consisting of a casing having an outlet, said casing having an inlet, a plurality of concentric coils of tubing arranged within said casing and connected with a suitable supply of steam, means to remove the condensed steam from said coils of tubing, substantially as described.

7. A sand-drier consisting of a casing having an inlet and an outlet, a plurality of concentric coils of tubing arranged within said casing and connected with a suitable supply of steam, and means to remove the condensed steam from said coils of tubing.

8. A heater consisting of a casing, an inner shell mounted within said casing, infusible material surrounding said casing, coils of tubing arranged within said inner shell and connected with a suitable supply of steam, and means to remove the condensed steam from said coils of tubing.

9. An oven of the character described consisting of a casing covered with infusible material, said casing having a suitable inlet, a spout carried by said casing, tubing arranged within said casing, and connected with a suit-

able supply of steam, a water-trap, and means to convey steam from said casing to said water-trap, means to agitate material passing through said oven.

5. 10. A heater for sand consisting of a casing, an inner shell mounted within said casing, coils of tubing arranged in said inner shell, and connected with a suitable supply of steam, means to agitate the sand entering said

heater, substantially as and for the purpose is set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

CLARK J. DUNCAN.

Witnesses:

H. C. EVERT,

MARGUERITE WHITE.