T. & F. COLEMAN.

APPARATUS FOR DRYING OR HEATING MATERIAL.

APPLICATION FILED DEC. 31, 1913.

1,189,062.

Patented June 27, 1916.

2 SHEETS—SHEET 1.

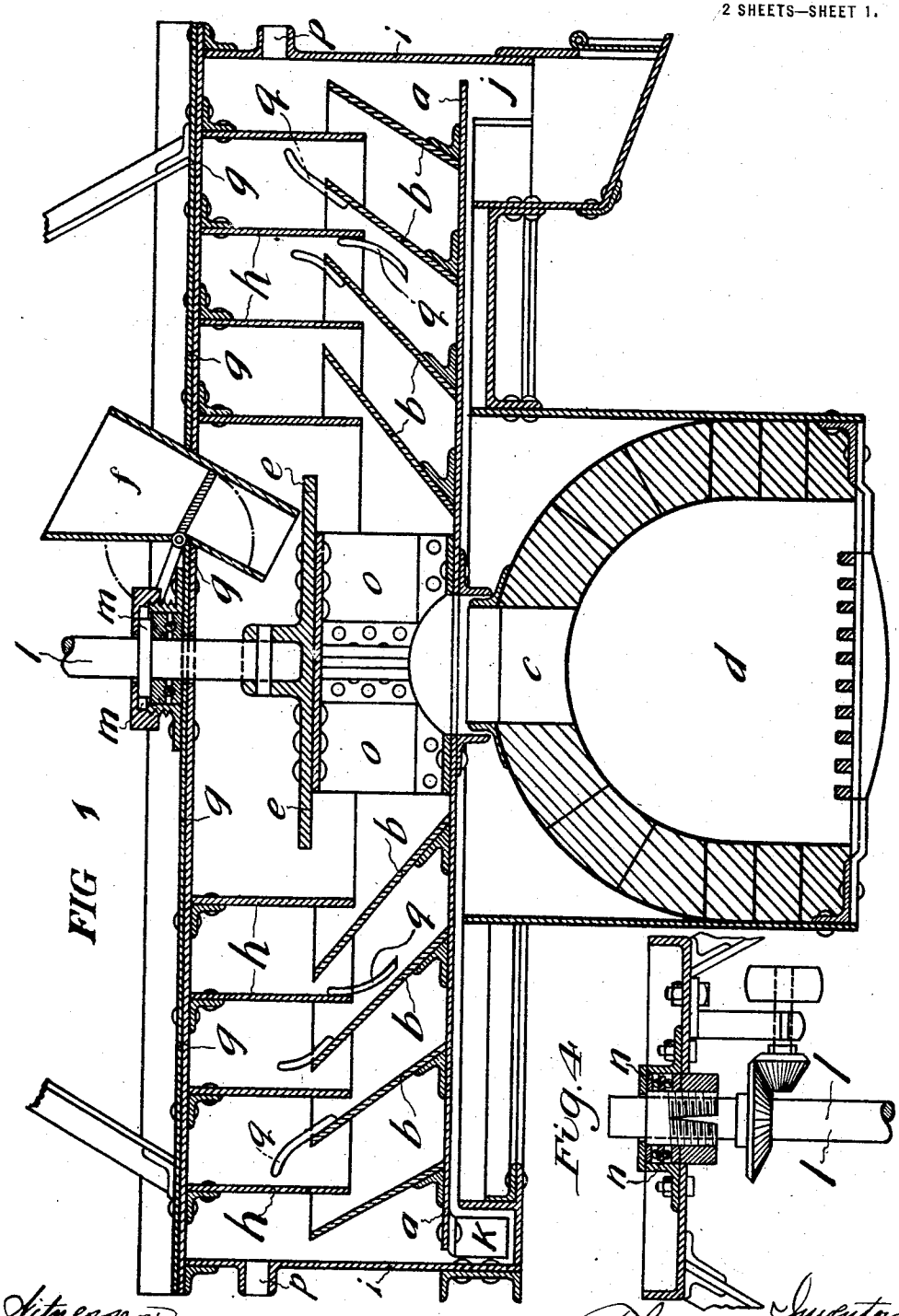


FIG 1

Fig. 4

Witnesses:
H. A. Helling
Benj. R. Woodward

Inventors:
Thomas Coleman
and Frank Coleman
by B. Singer, Atty.

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

FIG 2

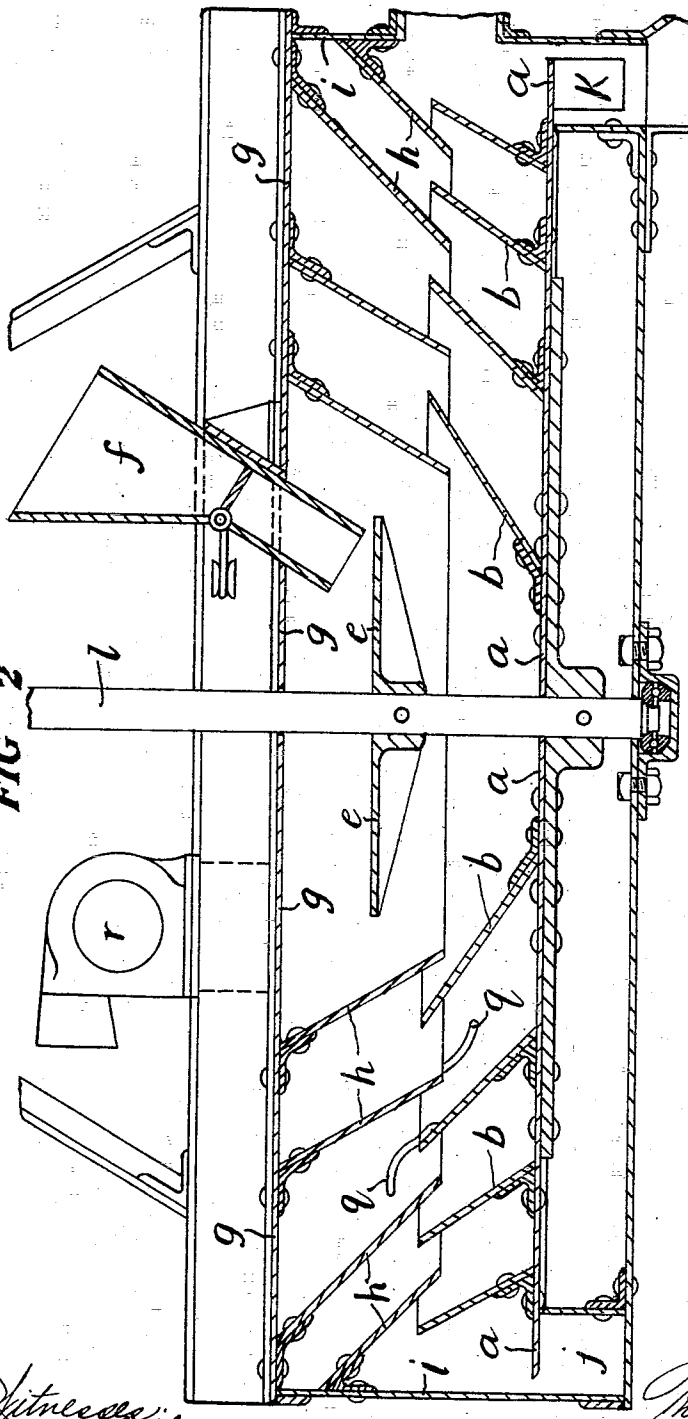
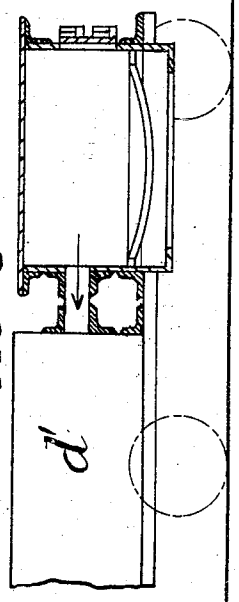


FIG 3



Witnesses:
M. A. Hoffing
Bert B. Wheelwright

Inventors:
Thomas Coleman
and Frank Coleman
by P. Singer Atty.

UNITED STATES PATENT OFFICE.

THOMAS COLEMAN AND FRANK COLEMAN, OF DERBY, ENGLAND.

APPARATUS FOR DRYING OR HEATING MATERIAL.

1,189,062. Specification of Letters Patent. Patented June 27, 1916.

Application filed December 31, 1913. Serial No. 809,631.

To all whom it may concern:

Be it known that we, THOMAS COLEMAN and FRANK COLEMAN, citizens of Great Britain, residing at Alfreton Road, Derby, county of Derby, England, manufacturers, have invented certain new and useful Improvements in Apparatus for Drying or Heating Material; and we do hereby declare the following to be a full, clear, and exact description of the same.

This invention comprises improvements in the method and means for drying and heating sand, grit or other materials.

In drying many materials it is a common practice to arrange for the material to advance more or less slowly through a drying chamber in which it is exposed to hot gases arising from a grate or to heated air. With material of a finely divided nature such as sand, it is very difficult to drive out the moisture as the particles pack so tightly together and although means for turning the material over and changing its position are known frequently such means have not so far been efficient unless the material remains under treatment for a long time, and to permit this in an apparatus in which the material is regularly progressing necessitates a relatively large apparatus for the bulk of material treated.

In our invention centrifugal force is utilized to cause the breaking up of the material so that all the small particles are exposed to the drying and heating action of the hot gases or air.

The method employed enables us to use much smaller apparatus having regard to the bulk of material treated in a given time.

The method comprises submitting the material to the action of a rotating member in a heating or drying chamber and under the action of centrifugal force the material is thrown against a fixed surface or surfaces and broken up in its component particles, being suitably collected and delivered at an outlet or outlets.

On the drawings: Figure 1 is a sectional view of the apparatus. Fig. 2 is a similar view showing a modification of the means for heating the chamber. Fig. 3 is a diagrammatic view showing the method of heating the apparatus shown at Fig. 2. Fig. 4 is a section view of the top bearing for the drive shaft, and also showing a bevel gear drive.

The apparatus shown on these drawings is more particularly intended for treating sand, small chippings of stone and the like but from this embodiment the application of the method to other materials will be apparent.

In the apparatus shown at Fig. 1 we arrange a plate or disk *a* for being rotated at suitable speeds and arrange one or more, preferably several annular outwardly inclined plates *b* thereon forming portions of inverted cones, the angle of which will be suited to the nature of the materials being treated. The center of the plate or disk *a* has an aperture or apertures *c* to admit hot gases from a furnace *d* or other heating provision arranged beneath the plate and a central disk *e* is arranged above this aperture *c* and receives the sand or like material from a suitable hopper or feeding device *f*. This central disk *e* is secured to, and rotates with the main rotating disk or plate *e*.

Above the rotating disk or plate *a*, at a suitable distance is a fixed plate *g* with a series of rings or plates *h* depending from it and arranged so that they depend into the spaces between the upper parts of the inverted cones *b* on the rotating plate *a*. The fixed plate is secured to a surrounding casing *i* which incloses the apparatus and forms a heating chamber.

Around the outer edge of the rotating plate *a* a collecting trough *j* is arranged secured to the casing *i* and preferably projecting portions or wings *k* on the rotating plate *a* sweep round in this trough to carry the material around to the outlet opening or openings formed in the bottom of the trough. At such openings suitable collecting bins may be arranged.

The rotating plate may be supported by a pendant shaft *l* arranged in suitable bearings such as *m n* supported from the fixed plate.

It is preferable that the central disk *e* should be secured to the end of the shaft *l* and protect the same from the hot gases rising from the furnace. The main plate *a* may be connected to the disk *e* by such means as the cross plates *o* shown which permit the passage of the hot gases into the chamber. Suitable outlets for the escape of the gases and moisture are provided such as at *p*.

In use, as the plate *a* is rotated the sand or other material is fed in and drops into the disk *e*, being rapidly thrown off under

the influence of centrifugal force, and whirled against the surrounding fixed plate, which breaks it up and the particles fall into the first cone or ring of the plate *a*. The material rapidly climbs up this incline and is thrown against the second fixed plate, and so on according to the number of rotating cones or rings and fixed plates provided. Finally the material is collected in the trough *j* and is swept around by the wings *k* to the outlet opening or openings and to the collecting bin.

The action of the apparatus is exceedingly rapid, material put in being delivered at the outlet quite dry and heated to a considerable degree such as 350 to 500° Fah. in a few seconds. Consequently it is possible to deal with a considerable quantity of material in a relatively short time.

With a machine of the type shown a speed of 95 revolutions per minute gave very satisfactory results.

It is preferred that the inclination of the plates *b* forming the cones of the rotating plate *a* should becomes steeper toward the exterior of the casing; the angles shown on the drawing appear satisfactory in use.

As shown at Fig. 2 the plates *h* of the fixed plate *g* may be inclined and the inclination of these may vary, the outer plates being less steep than those nearer the center. The object of such inclined fixed plates is so that when the material impinges against a plate and breaks up it is scattered over the surface of the plate, which is very hot, and the particles roll down the hot plate into the next cone instead of falling away from the plate as they may do with vertical plates.

We may provide fingers or scrapers on the plates such as at *q* to prevent very wet material from caking on any of the plates.

In either example we may use a fan or blower for forcing or drawing air or gases through the apparatus. In Fig. 2 a suction fan *r* is shown for this purpose.

Instead of arranging the furnace below the apparatus as at Fig. 1, the gases may be led in through the outer casing *i* as at Fig. 2. Fig. 3 shows a portable arrangement of the apparatus with the furnace *d'* external to the apparatus. Instead of a grate an air heater may be used and the heated air may be drawn or forced into the apparatus.

What we claim then is:

1. An apparatus for treating road making material comprising in combination, a casing, a substantially horizontal rotatable plate mounted within said casing and having a series of baffle plates thereon, fixed baffle plates arranged to coöperate with said first mentioned baffles, and means for circulating heated gas through said casing, said casing having at least two apertures therein for admitting and discharging said gas and one of said apertures being adjacent the vertical axis of said plate.

2. An apparatus for treating road making material comprising in combination, a casing, a substantially horizontal rotatable plate mounted within said casing and having a series of baffle plates thereon, fixed baffle plates arranged to coöperate with said first mentioned baffles, and means for circulating heated gas through said casing, said casing having at least two apertures therein for admitting and discharging said gas and one of said apertures being adjacent the vertical axis of said plate, said fixed baffles depending from the top of the casing and being in contact therewith along their entire lengths so as to prevent passages of gas above the fixed baffles.

3. An apparatus for treating road making material comprising in combination, a casing, a substantially horizontal plate mounted to rotate in said casing and having baffles thereon, fixed baffles carried by said casing above said plate and arranged to cooperate with said first mentioned baffles, and means for circulating heated gas through said casing, said casing, revolving plate and baffles being so arranged that the entire volume of gas passes between the lower ends of said fixed baffles and said plates.

4. The combination in an apparatus for drying or heating material, of an annular inclosed casing having an inlet at one side thereof and an outlet near the center thereof, a suction fan adapted to withdraw the air from said casing through said outlet, an annular rotary plate centrally mounted in said casing, a vertical rotatable shaft adapted to rotate said annular rotary plate, a disk secured to said vertical shaft above said plate, a hopper adapted to feed onto said disk, a series of annular plates projecting upwardly from said annular rotary plate, said upwardly projecting plates each meeting the said annular rotary plate at different angles, a series of fixed plates depending from the top of said casing and inwardly inclined, said plates projecting into the spaces between the upwardly projecting annular plates and each depending plate lying at a greater angle to the top of said casing than the next succeeding one as they project toward the center, means adapted to rotate said annular rotary plate, means adapted to remove the material from said casing, and means adapted to supply heat to said casing.

5. An apparatus for treating road making material comprising in combination, a casing, a substantially horizontal plate mounted to rotate in said casing and having baffles thereon, fixed baffles carried by said casing above said plate and arranged to cooperate with said first mentioned baffles, and means for circulating heated gas through

said casing, said casing, revolving plate and baffles being so arranged that the entire volume of gas passes between the lower ends of said fixed baffles and the said plates, all of said baffles having an outward inclination from the axis of the revolving plate, the angles of the baffles on the revolving plate being successively smaller as they approach the outer edge of the plate, and the angles of the fixed baffles being successively greater as they are farther removed from the axis.

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS COLEMAN.
FRANK COLEMAN.

Witnesses:
GEO. R. EDDOWES,
W. H. BLOCKRIDGE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."