C. J. LEYES.

APPARATUS FOR TREATING CERTAIN MINERAL OR CHEMICAL PRODUCTS.

APPLICATION FILED FEB. 20, 1917.

1,270,307.

Patented June 25, 1918.

2 SHEETS—SHEET 1.

FIG. 1.

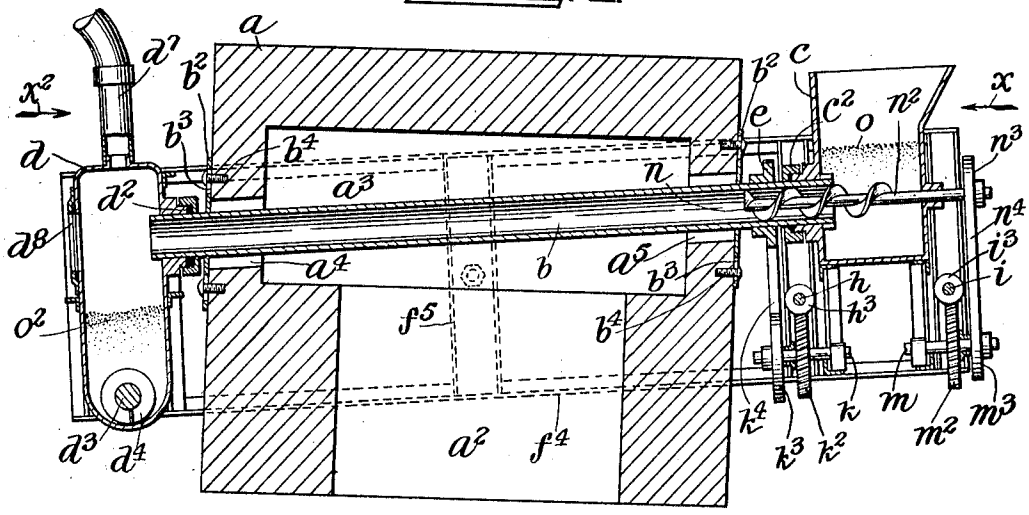
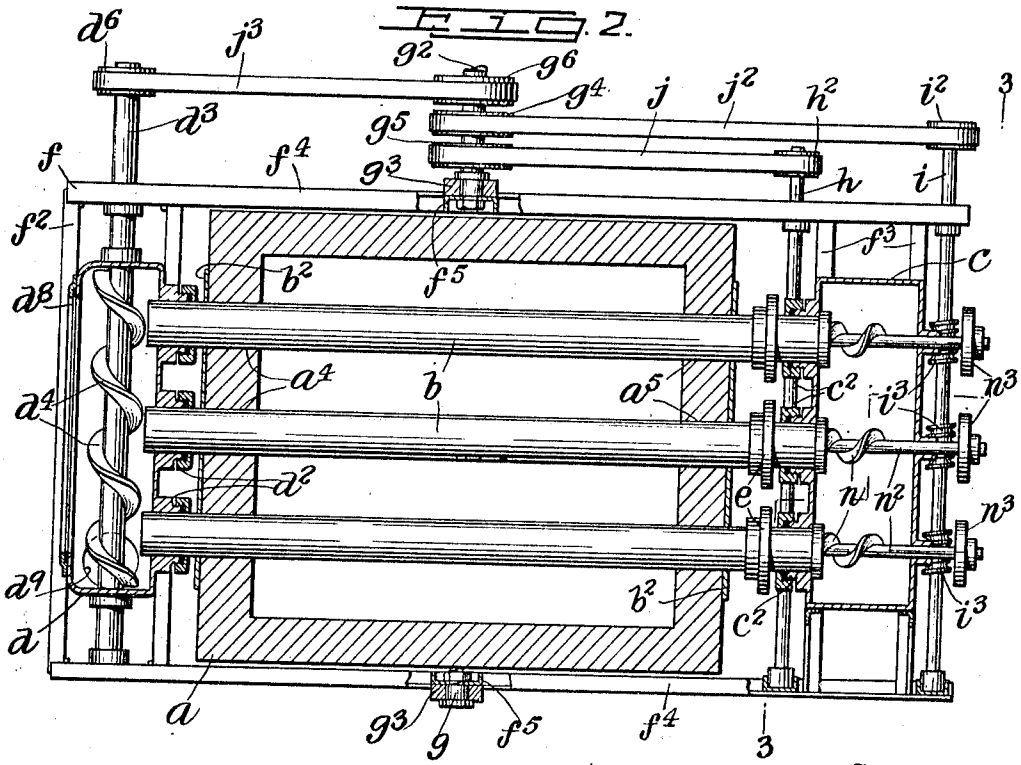


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 3.

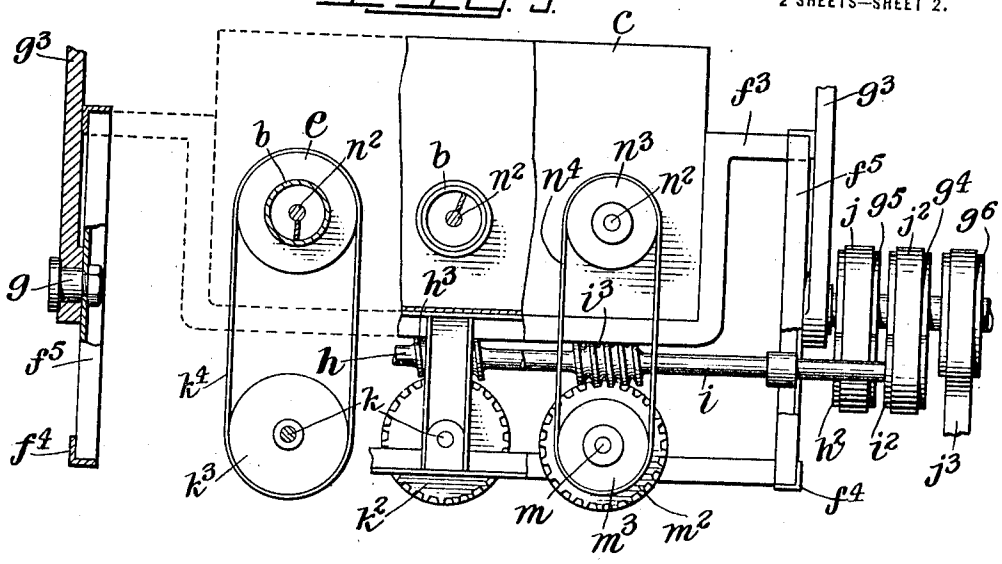
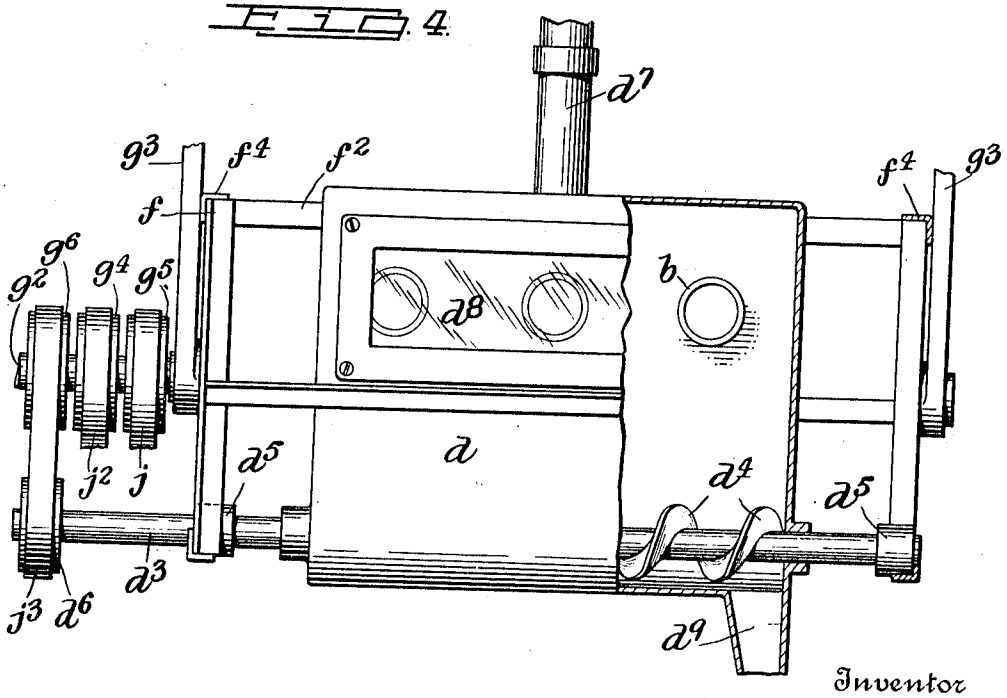


FIG. 4.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TREATING CERTAIN MINERAL OR CHEMICAL PRODUCTS.

1,270,307. Specification of Letters Patent. Patented June 25, 1918.

Application filed February 20, 1917. Serial No. 149,840.

To all whom it may concern:

Be it known that I, CHARLES J. LEYES, a citizen of the United States, and residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Treating Certain Mineral or Chemical Products, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to the treatment of certain mineral or chemical products in order to produce certain other products, such for instance, as the treatment of barium sulfate and coal to produce carbon monoxid gas and barium sulfid; or the treatment of strontium sulfate and coal in order to produce carbon monoxid gas and strontium sulfid; and the object of the invention is to provide an improved apparatus or machine whereby the specified operations, and others similar thereto, may be carried out in a more efficient, economical and practical manner than has heretofore been possible; and with this and other objects in view the invention consists in an apparatus of the class specified, constructed and operating as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:—

Figure 1 is a sectional side view of an apparatus involving my invention;

Fig. 2 a sectional plan view thereof;

Fig. 3 an end view looking in the direction of the arrow x of Fig. 1 with part of the construction in section, the section being on the line 3—3 of Fig. 2; and,

Fig. 4 an end view looking in the direction of the arrow x^2 of Fig. 1 with part of the construction broken away.

In the practice of my invention, I provide a furnace a which may be constructed in any desired way and of any preferred material, and in the bottom of which is a fire-box or chamber a^2, and in the top portion of which is a furnace chamber a^3 in communication with the fire-box or chamber as clearly shown in Fig. 1, and in the opposite side walls of the furnace chamber a^3 are apertures a^4 and a^5, the apertures a^5 which are in the right side wall of the furnace chamber being higher than the apertures a^4 in the left side of said chamber, in the construction shown, and passed through the apertures a^4 and a^5, three of which are shown, are conveyer tubes b and the vertical dimensions of the apertures a^4 and a^5 are of greater dimensions than the diameters of the conveyer tubes b, whereby said conveyer tubes may be tilted and the inclination thereof increased or decreased as may be desired. and mounted on said conveyer tubes on the outer faces of the side walls of the furnace chamber in which the apertures a^4 and a^5 are formed, are plates b^2 by which said apertures a^4 and a^5 are closed, and these plates are provided with vertically arranged slots b^3 through which screws b^4 or other securing devices are passed to hold said plates in position, and by means of this construction the said plates are made vertically movable with the conveyer tubes.

The conveyer tubes b communicate at their higher ends with a supply hopper c and at their lower ends with a receiver box or casing d, and said supply hopper and receiver box are provided with stuffing boxes c^2 and d^2, and the said conveyer tubes are also provided at their higher ends, in the construction shown, and inwardly of the supply hopper c with belt pulleys e.

The supply hopper c and the receiver box d are mounted in a frame f which, in the construction shown, is oblong and rectangular in form and comprises end members f^2 and f^3 and parallel side members f^4 connected centrally by vertical side members f^5, and connected with the parts f^5 of the frame f and at one side of said frame is a stub shaft g and at the other side thereof a driven shaft g^2, and mounted on the shafts g and g^2 are suspenders g^3 by which the frame f may be suspended from any suitable support, not shown.

The receiver box d is provided at one end with a discharge spout d^2, and passing through the bottom of said receiver box is a conveyer shaft d^3 provided within said

box with the usual spiral conveyer d^4, and said shaft is provided with bearings d^5 in the bottom side members f^4 of the frame f, and one end thereof projects at one side of said frame and is provided with a pulley d^6.

Mounted in the end portion of the frame f in which the supply hopper c is mounted and at the opposite sides of said hopper are drive shafts h and i, and these shafts are provided at one end with pulleys h^2 and i^2, and the driven shaft g^2 is provided with pulleys g^4 and g^5, and mounted on the pulleys h^2 and g^5 is a belt j, and mounted on the pulleys i^2 and g^4 is a belt j^2, and the driven shaft g^2 is also provided with a pulley g^6, and the pulley d^6 on the conveyer shaft d^3 is geared in connection with the pulley g^6 by a belt j^3.

The shafts h and i are provided with worms h^3 and i^3, and mounted below said shafts and transversely thereof and at the opposite sides of the supply hopper c are shafts k and m on which are mounted worm gears k^2 and m^2 which mesh with the worms h^3 and i^3, and the shafts k, three of which are employed, are provided with pulleys k^3 geared in connection with the pulleys e on the conveyer tubes b by belts k^4, and the shafts m are provided with pulleys m^3.

In the higher ends of the conveyer tubes b are placed conveyer screws or spirals n having shafts n^2 which pass through the supply hopper c and are provided at their outer ends with pulleys n^3, and the pulleys n^3 and m^3 on the shafts m are geared in connection by belts n^4.

The conveyer d^3—d^4 is mounted in the bottom of the receiver box d and the top of said box is provided with a discharge pipe d^7, and said receiver box is also provided in the outer side thereof with a transparent window or panel device d^8 through which the contents, or the interior of said receiver box may be observed by the operator.

With the construction hereinbefore described power is applied, in the operation of the apparatus, to the shafts h and i, in any desired manner, and by means of the gearing connecting said shafts with the conveyer tubes b, said tubes are rotated as will be readily understood, and in this operation the conveyers n—n^2 are also rotated as is also the conveyer d^3—d^4, and the operation will be readily understood from the foregoing description when taken in connection with the accompanying drawing and the following statement thereof.

Suppose it be desired to treat barium sulfate and coal to produce carbon monoxid gas and barium sulfid, the process of operation will be as follows:—

The barium sulfate and coal in a finely divided powdered, or granulated form, are deposited in the supply hopper c and said hopper is filled with said material, as indicated at o in Fig. 1 to a point above the ends of the conveyer tubes b that communicate with said hopper, and during the operation of the apparatus, this amount of material is maintained in said hopper to exclude the air from said conveyer tubes. The heat is then applied in the furnace chamber a^3 by means of a gas burner, oil burner, or by any other suitable means located in the fire chamber a^2, and the temperature of said furnace chamber is raised to a point approximately 1800° F., and this operation forces the air, to a large extent, out of the conveyer tubes b and out of the receiver box d through the pipe d^7 and the discharge spout d^2 of said box, after which the mechanical parts of the apparatus are put in operation and the material in the supply hopper c is fed through the conveyer tubes b and discharged into the receiver box d. In this operation, carbon monoxid gas and barium sulfid are formed, and said products are separated by gravity in the receiver box d, and the barium sulfid collects in the bottom of the receiver box as shown at o^2 in Fig. 1, while the carbon monoxid gas passes off through the pipe d^7 and is received in any suitable receptacle provided therefor, and from which it may be taken and used for any desired purpose.

At the beginning of this operation, the pipe d^7 is left open as is also the discharge spout d^2 and a small amount of the carbon monoxid gas and barium sulfid may be lost until the air is fully expelled from the conveyer tubes b and the receiver box d and at the end of this time, or when the apparatus is fully in operation, the process will be, as above described, and will be continuous as will be readily understood.

My invention is not limited to the method of excluding or discharging the air from the conveyer tubes b and receiver box d by the operation of the apparatus itself, as herein described, and other or mechanical means may be provided for accomplishing this result as desired.

From the foregoing description, it will be seen that the frame f with the movable or operating parts of the apparatus mounted therein, or in connection therewith, may be tilted at any time so as to increase or decrease the angle of inclination of the conveyer tubes b, and thus increase or decrease the rapidity of the movement of the material through said tubes, and my invention is also not limited to the mounting of the frame f in connection with a stationary furnace, as the entire apparatus, including the furnace may be mounted to tilt in a vertical plane, if desired, and various other changes in and modifications of the construction herein shown and described may be made, within the scope of the appended claims, without

departing from the spirit of my invention or sacrificing its advantages, and while I have described the method of procedure in treating barium sulfate and coal to form carbon monoxid gas and barium sulfid, and have also stated that the same process may be followed in treating strontium sulfate and coal to form carbon monoxid gas and strontium sulfid, my invention is not limited to the treatment of said material for such purpose and other materials may be treated in a similar manner for a similar purpose, as will be readily understood; and in the treatment of the barium sulfate and coal, as herein described, to produce carbon monoxid gas and barium sulfid, the proportionate parts of the barium sulfate and coal employed are in the proportion of 233 pounds of the former to 50 pounds of the latter, these being the proper molecular proportions in order to produce the desired results, and this rule must be followed in the treatment of any other material.

It will also be understood that the operation of passing the material through the conveyer tubes b, in the operation of the apparatus as herein described, is effected largely by gravity and the rotation of said conveyer tubes, the conveyers n—n^2 serving principally to start or initiate the passage of material through said tubes, and in the accompanying drawing the conveyers n—n^2 are shown as passing only to a small extent into the conveyer tubes, but my invention is also not limited to this paticular construction.

I have also shown and described herein three of the conveyer tubes b and the necessary mechanical arrangement in connection therewith, but it will be understood that my invention is not limited to any particular number of said tubes, any desired number of which may be employed, and the conveyer may consist of a single tube, if desired, in which case the other mechanical parts would be limited to correspond therewith, and in the appended claims the term or terms "conveyer" or "conveyer tube" when used in the singular must be understood as meaning or including one or more of said conveyers or conveyer tubes.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an apparatus of the class described, a heater, a conveyer passing through said heater, a frame mounted in connection with said heater and provided in its opposite end portions with a supply hopper and a receiver box with which said conveyer communicates, one end of said frame being higher than the other and said frame being adapted to be tilted in a vertical plane, independent of the heater, and said conveyer consisting of tube or tubes having conveyer screws mounted in the end portions thereof that communicate with the supply hopper and movable with said frame.

2. In an apparatus of the class described, a furnace, the opposite sides of which are provided with apertures, conveyer tubes passing through said apertures and adapted to be tilted vertically therein, a frame mounted in connection with said heater and provided in its opposite end portions with a supply hopper and a receiver box with which said conveyer tubes communicate, said frame and conveyer tube being vertically movable independent of said heater, and means for passing finely divided material deposited in said supply hopper into said conveyer tubes.

3. In an apparatus of the class described, a furnace provided in its opposite side walls with apertures one of which is higher than the other, a frame mounted in connection with said furnace and adapted to be tilted in a vertical plane independent thereof, said frame being provided in its opposite end portions with a supply hopper and a receiver box, and conveyer tubes passing through said furnace and through said apertures and communicating with said hopper and said receiver box and vertically movable with said frame.

4. In an apparatus of the class described, a furnace provided in its opposite side walls with apertures one of which is higher than the other, a frame mounted in connection with said furnace and adapted to be tilted in a vertical plane, said frame being provided in its opposite end portions with a supply hopper and a receiver box, conveyer tubes passing through said furnace and through said apertures and communicating with said hopper and said receiver box, and means for passing finely divided material deposited in said hopper into said conveyer tubes.

5. In an apparatus of the class described, a furnace provided in its opposite side walls with apertures one of which is higher than the other, a frame mounted in connection with said furnace and adapted to be tilted in a vertical plane, independent of the furnace, said frame being provided in its opposite end portions with a supply hopper and a receiver box and adapted to be tilted with said frame, conveyer tubes passing through said furnace and through said apertures and communicating with said hopper and said receiver box, means for passing finely divided material deposited in said hopper into said conveyer tubes, and means for rotating said conveyer tubes.

6. In an apparatus of the class described, a furnace provided in its opposite side walls with apertures, a frame pivoted in connection with said furnace and adapted to be tilted in a vertical plane independent there-

of, said frame being provided in its opposite end portions with a supply hopper and a receiver box, and conveyer tubes passing through said furnace and communicating with said hopper and said receiver box and movable vertically with said frame, and means for rotating said conveyer tubes.

7. In an apparatus of the class described, a heater, a frame pivoted in connection with said heater and movable in a vertical plane independent thereof and provided in its opposite end portions with a supply hopper and a receiver box, and a conveyer passing through said hopper and connected with the end portions of said frame and communicating with the supply hopper and receiver box and vertically movable with said frame independent of the heater.

8. In an apparatus of the class described, a heater, a frame pivoted in connection with said heater and movable in a vertical plane and provided in its opposite end portions with a supply hopper and a receiver box, a conveyer passing through said heater and connected with the end portions of said frame, and communicating with the supply hopper and receiver box, said frame and said conveyer tube being vertically movable independent of the heater, and means connected with said frame and with said conveyer for rotating the latter.

9. In an apparatus of the class described, a heater, a frame mounted in connection with said heater, one of said parts, the frame or the heater, being vertically movable with reference to the other, said frame being also provided at its opposite ends with a supply hopper and a receiver box, a conveyer passing through said heater and communicating with said hopper and said receiver box, and means connected with said frame and with said hopper for rotating said conveyer.

In testimony that I claim the foregoing as my invention I have signed my name in presence of the subscribing witnesses this 16th day of February 1917.

CHARLES J. LEYES.

Witnesses:
C. E. MULREANY,
H. E. THOMPSON.

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