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APPARATUS FOR DRYING, CHARRING, AND OTHERWISE TREATING LOOSE MATERIAL

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Fig. 1

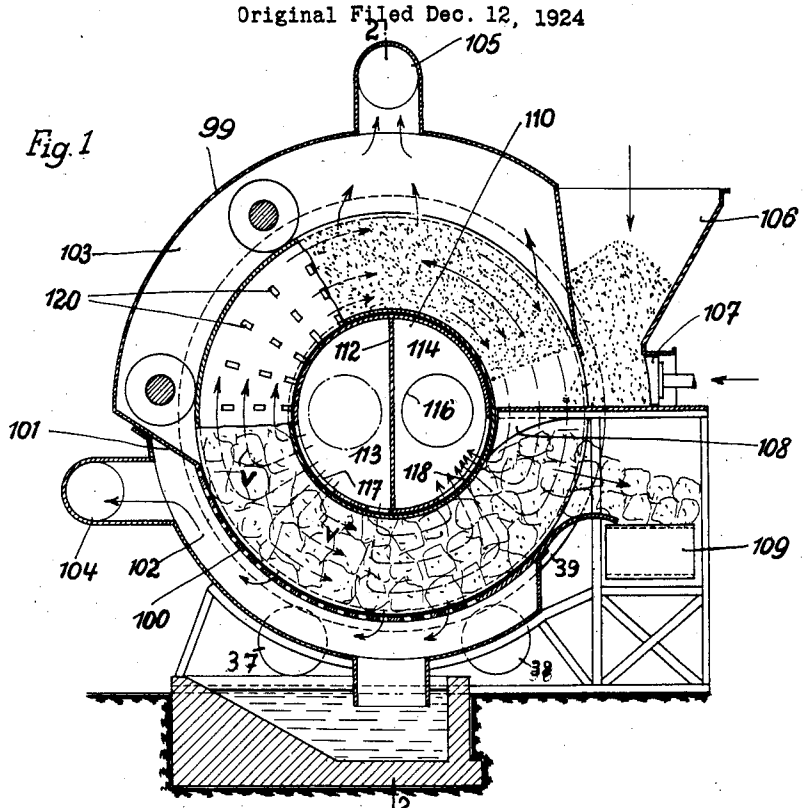
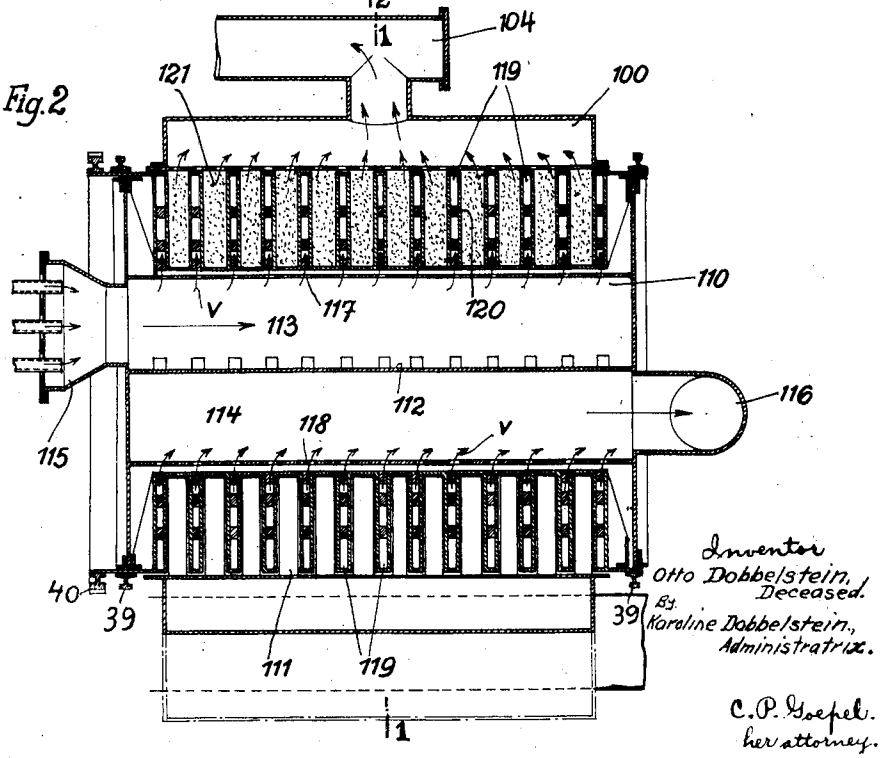


Fig. 2



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APPARATUS FOR DRYING, CHARRING, AND OTHERWISE TREATING LOOSE MATERIAL.

Original application filed December 12, 1924, Serial No. 755,373, and in Germany December 18, 1923. Divided and this application filed December 6, 1926. Serial No. 152,946.

The invention relates to improvements in an apparatus for drying, charring and otherwise treating loose material such as ore, coal, bituminous slate, argile, and the like, and is a division of the application filed December 12, 1924—Serial No. 755,373.

The object of the invention is to provide an apparatus of this character by means of which a large mass of material may be uniformally and rapidly heated and from which there will be no dust during its operation.

Another object of the invention is to provide an apparatus of this character in which the material is more rapidly and thoroughly heated and at the same time provide means whereby all of the parts are readily accessible.

A further object of the invention is to provide a simple, cheap and effective apparatus of this character having certain details of structure and combination of parts hereinafter more fully set forth.

In the accompanying drawings:—

Figure 1 is a side elevation partly in section of the improved apparatus.

Figure 2 is a longitudinal sectional view taken on the line 2—2 of Figure 1.

Referring now to the drawings, the casing 99 is constructed similar to the one shown in Figures 7 and 8 in the application heretofore referred to, and it comprises a perforated cylindrical wall 100, surrounded by a circumferential passage divided by the partition 101, forming the two chambers 102 and 103 communicating respectively with the discharge pipes 104 and 105. At one side of the casing is a funnel shaped feed hopper 106 having a charging plunger 107 adapted to force the material to be treated into the rotary drum as will be hereinafter more fully set forth. Arranged below the plunger 107 is a scraper 108 and adapted to divert the material from the drum outwardly to a suitable conveying means shown in a diagrammatical way at 109.

The rotary drum 111 is mounted within the casing and has its outer ends extending beyond the casing and provided with circular rails 39 which rest upon two or more rollers 37 and 38 at each end. These rollers support the drum so that it can revolve within the casing. One end of the drum also has a gear 40 encircling it and this gear may receive motion from a pinion to turn the drum.

The heating medium is supplied through a pipe 110 disposed axially within the drum 111, and it is divided by a vertical partition 112 into two sectional passages 113 and 114 communicating respectively with tubular members 115 and 116 for the intake and delivery of the heating gas. The pipe 110 is provided with two series of apertures 117 and 118, made respectively in the left and right hand sections of the wall of the pipe 110 and adapted to establish communication respectively between the sectional passages 113 and 114 and the parts of the chambers 119 of the rotary drum moving through the left and right hand parts of the casing 100. Therefore, the heating gas flows from the sectional passage 113 through the apertures 117 into the chambers 119, where it is divided into two branches flowing in opposite directions through the chambers 119 and towards the apertures 118 and through the same into the sectional passage 114, from whence it is delivered to the pipe 116, the flow of the gas being indicated by arrows *v*. As appears from Fig. 1, the apertures 117 and 118 are not necessarily made at diametrically opposite parts of the wall of the pipe 110. By disposing the same close to each other it is possible to cause the major part of the gas to flow through one part of the chambers 119 in order to have increased heating effect. In the construction shown in the figures the main part of the gas flows through the bottom part of the the chambers 119. Preferably baffle members 120 are provided within the chambers 119 for properly distributing the gas within the said chambers. Further, the apertures 117 and 118 may be made with different area. The matter to be heated is filled into the circumferential chambers 121.

As will be understood from the foregoing description, the chambers 119 and 121 are formed by means of transverse partitions which are mounted within the drum 111 and are fixed inside of same so that they will rotate with the drum.

Having thus fully described the invention what is claimed is:—

1. An apparatus of the character described comprising a rotary drum divided into annular chambers located one behind the other in the direction of the axis of the drum and alternately open at the outer and inner cir-

cumferences, the chambers open at the outer circumference adapted to be charged with the material to be treated and to be discharged at a different point, an axial pipe disposed within the drum and divided longitudinally by a partition forming chambers in said pipe, said chambers having openings for the gases used to treat the material, and a gas supply for one of the chambers formed in the pipe and a discharge for the other chamber.

2. An apparatus of the character described comprising a rotary drum divided into annular chambers located one behind the other in the direction of the axis of the drum and alternately open at the inner and outer circumferences, the chambers open at the outer circumference adapted to be charged with material to be treated at one point and the material to be treated discharged at another point, an axial pipe disposed within the drum and formed a circumferentially spaced parts with two series of openings registering with said chambers open at their inner circumference, and a partition dividing said pipe longitudinally between said two series of openings whereby the gas passes from the pipe to the chambers and back into the pipe on the opposite side of the partition.

3. An apparatus of the character described comprising a rotary drum divided into annular chambers one behind the other in the direction of the axis of the drum and alternately open at the inner and outer circumferences, the chamber open at the outer circumference adapted to be charged with material to be treated and to be discharged therefrom at a different point of rotation of the drum, an axial pipe disposed within the drum and divided longitudinally by a partition and having two series of openings one on each side of the partition registering with said chambers opened at their inner circumference, and means for admitting the heating medium to the pipe on one side of the partition and discharging it from the same on the other side of the partition.

4. An apparatus of the class described, comprising a rotary drum divided into annular chambers located one behind the other in the direction of the axis of the drum and alternately open at the inner and outer circumferences, the chambers open at the outer circumference being adapted to be charged with the matter to be heated and to discharge the same at different parts of the circumference of the apparatus, an axial pipe disposed within the axial passage provided internally of said chambers and formed at circumferentially spaced parts with two series of openings registering with said chambers open at their inner circumferences, a partition dividing said pipe into parallel sectional passages each communicating with one of said series of openings, means to admit a heating medium to one of said sectional passages and to withdraw the same through the other one of said sectional passages, and means to charge and discharge said chambers open at the outer circumference.

5. An apparatus of the class described, comprising a rotary drum divided into annular chambers located one behind the other in the direction of the axis of the drum and alternately open at the inner and outer circumferences, the chambers open at the outer circumference being adapted to be charged with the matter to be heated and to discharge the same at different parts of the circumference of the apparatus, an axial pipe disposed within the axial passage provided internally of said chambers and formed at circumferentially spaced parts with two series of openings registering with said chambers open at their inner circumferences, a partition dividing said pipe into parallel sectional passages each communicating with one of said series of openings, means to admit a heating medium to one of said sectional passages, baffle members within said chambers open at their inner circumferences, and means to charge and discharge said chambers open at the outer circumference.

6. An apparatus of the class described, comprising a rotary drum divided into annular chambers located one behind the other in the direction of the axis of the drum and alternately open at the inner and outer circumferences, the chambers open at the outer circumference being adapted to be charged with the matter to be heated and to discharge the same at different parts of the circumference of the apparatus, an axial pipe disposed within the axial passage provided internally of said chambers and formed at circumferentially spaced parts with two series of openings registering with said chambers open at their inner circumferences, the openings of each series having different area in the different portions of the pipe, a partition dividing said pipe into parallel sectional passages each communicating with one of said series of openings, means to admit a heating medium to one of said sectional passages and to withdraw the same through the other one of said sectional passages, and means to charge and discharge said chambers open at the outer circumference.

7. An apparatus of the class described, comprising a rotary drum divided into annular chambers located one behind the other in the direction of the axis of the drum and alternately open at the inner and outer circumferences, the chambers open at the outer circumference being adapted to be charged with the matter to be heated and to discharge the same at different parts of the circumference of the apparatus, an axial pipe disposed within the axial passage provided internally of said chambers and formed at circumferen-

tially spaced parts with two series of openings registering with said chambers open at their inner circumferences, the transverse circumferential extent of said series of openings being less than the semicircle of the pipe, a partition dividing said pipe into a pair of parallel sectional passages each communicating with one of said series of openings, means to admit a heating medium to one of said sectional passages and to withdraw the same through the other one of said sectional passages, and means to charge and discharge said chambers open at the outer circumferences.

8. An apparatus of the character described comprising a rotary drum divided into annular chambers located one behind the other in the direction of the axis of the drum, and alternately open at the inner and outer circumferences, the chambers open at the inner circumference adapted to be charged with material to be treated, and to be discharged at a different point, means within the axis of the drum for supplying gas to the other chambers, for heating the material to be treated, and means within the axis of the drum for discharging the gases from the other chambers.

9. An apparatus of the character described comprising a rotary drum divided into annular chambers located one behind the other in the direction of the axis of the drum, and alternately open at the inner and outer circumferences, the chambers open at the inner circumference adapted to be charged with the material to be treated and to be discharged at a different point, an axial pipe disposed within the drum, and having a gas supply for supplying gas to the chambers charged with the material to be treated, and a second pipe adapted to receive the discharge of the gas from the chambers between the charged chambers.

10. An apparatus of the class described, comprising a rotary drum divided into circumferential chambers designed to be charged alternately with matter to be heated and to be traversed by a heating medium, means for charging the chambers to receive the matter to be heated at one point and to discharge same at another point and means for enabling the heating medium to be circulated through the other chambers, said means comprising parallel passages adjacent to axis of the drum, each of said passages communicating with the chambers to be traversed by the heating medium, one of said passages connecting with the source of the heating medium and the other providing an exit therefor.

11. An apparatus of the class described, comprising a rotary drum containing fixed transverse partitions rotatable with the drum so that the drum is thus divided into circumferential chambers alternately designed to be charged with the matter to be heated and to be traversed by a heating medium, the chambers for the matter to be heated being open at the circumference of the drum and the chambers for the heating medium being open adjacent the axis of the drum, means to circulate a heating medium through said chambers for the heating medium, means for charging said chambers for the matter to be heated, stationary scraping members circumferentially spaced from said charging means and passed into said chambers for the matter to be heated for removing the matter therefrom, and means for supporting the drum in such position that the contents in each of the chambers for the matter to be heated will be carried from a relatively high point to a relatively low point in each revolution of the drum.

12. An apparatus of the class described, comprising a rotary drum containing fixed transverse partitions rotatable with the drum so that the drum is thus divided into circumferential chambers alternately designed to be charged with the matter to be heated and to be traversed by a heating medium, the chambers for the matter to be heated being open at the circumference of the drum and the chambers for the heating medium being open adjacent the axis of the drum, means to circulate a heating medium through said chambers for the heating medium, a reciprocating plunger for charging said chambers for the matter to be heated, stationary scraping members circumferentially spaced from said charging plunger and passed into said chambers for the matter to be heated for removing the matter therefrom, and means for supporting the drum in such position that the contents in each of the chambers for the matter to be heated will be carried from a relatively high point to a relatively low point in each revolution of the drum.

13. An apparatus of the class described, comprising a rotary drum divided into circumferential chambers alternately designed to be charged with the matter to be heated and to be traversed by a heating medium, means to circulate a heating medium through said chambers for the heating medium, said chambers for the matter to be heated being adapted to receive and deliver the charge at different parts of the circumference of the apparatus, and a casing surrounding said drum and circumferentially divided into separate chambers for separately collecting the gas or vapor developed from said matter.

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