May 26, 1931. J. E. GREENAWALT 1,806,899

DUST COLLECTOR MECHANISM FOR SINTERING MACHINES

Filed April 30, 1929 2 Sheets-Sheet 1

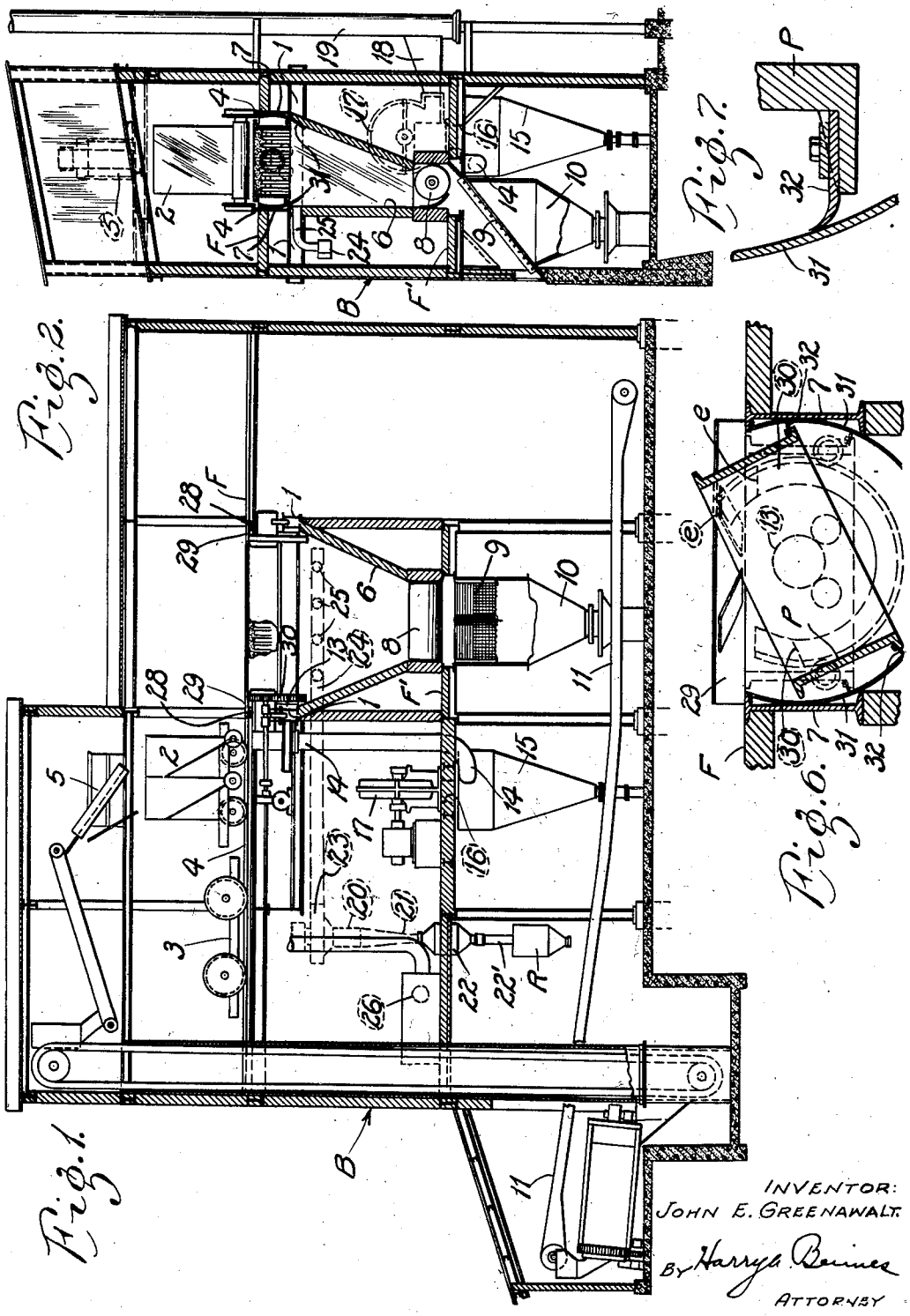


Fig. 1.

Fig. 2.

Fig. 6.

Fig. 7.

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DUST COLLECTOR MECHANISM FOR SINTERING MACHINES

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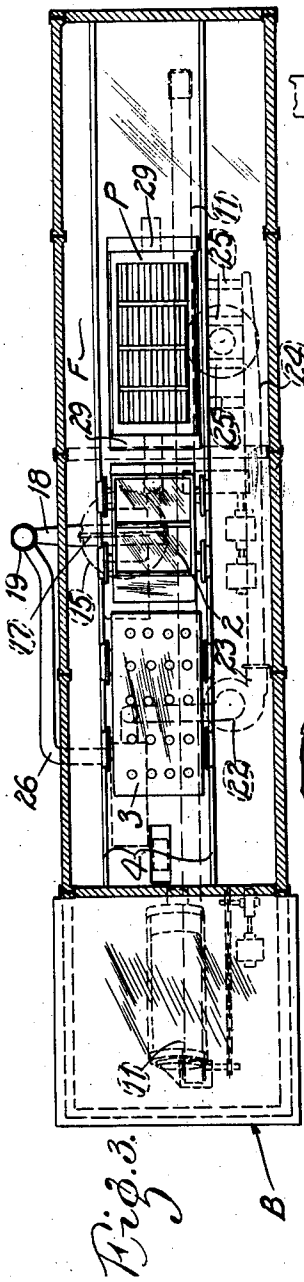


Fig. 3.

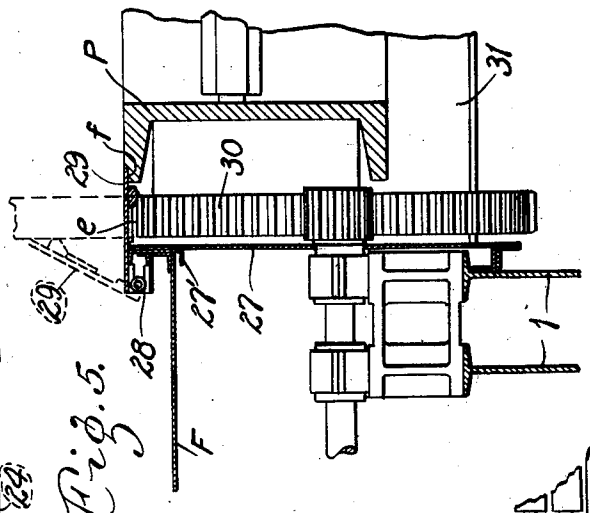


Fig. 5.

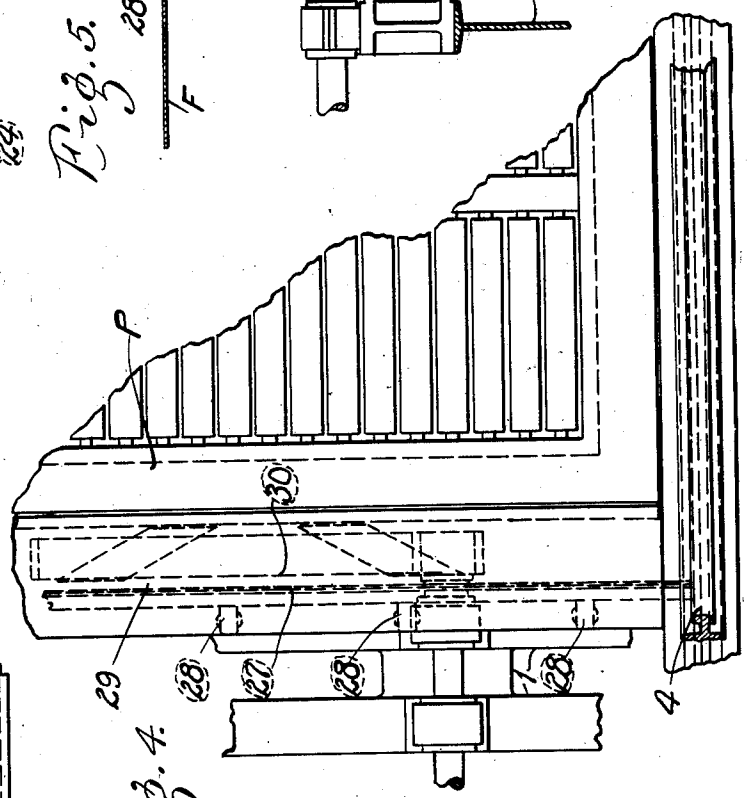


Fig. 4.

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Patented May 26, 1931 1,806,899

UNITED STATES PATENT OFFICE

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DUST COLLECTOR MECHANISM FOR SINTERING MACHINES

Application filed April 30, 1929. Serial No. 359,373.

My invention has relation to improvements in dust collector mechanism for sintering machines and is particularly adapted to sintering machines of the intermittent type, and it consists of the novel features of construction and arrangement more fully set forth in the specification and pointed out in the claims.

Owing to the large quantity of sinter treated at one time in the intermittent type of sintering apparatus, considerable dust is raised when the sintering pan is dumped, and it is the object of the present invention to provide suitable dust collecting mechanism, together with sealing means for the sintering pan to prevent the escape of the dust into the atmosphere, either directly from the sinter receiving hopper or from the exhaust stack of the fan. The essential features of the invention whereby this object is accomplished are the provision of a closed chamber or sealed hopper for receiving the sinter; a feeder at the bottom of the closed chamber for gradually removing the sintered material; an exhaust fan for drawing a large volume of air through the closed chamber and at the same time conveying the dust therein to a suitable collector.

Another important object of the invention is cooling the freshly made sinter by air (the same air for collecting the dust effecting the cooling) instead of by the usual water spray. The manner in which the essential features pointed out accomplish these objects will be better apparent from a detailed description of the invention in connection with the accompanying drawings in which:

Figure 1 is a longitudinal section through a sintering plant, showing the sintering apparatus more or less in side elevational outline except for the sinter receiving hopper, which is shown in section; Fig. 2 is a vertical cross section through the plant showing the sintering mechanism in end elevation except for the sinter receiving hopper which is shown in section; Fig. 3 is a top plan of the sintering mechanism, the walls of the enclosing building being shown in section; Fig. 4 is an enlarged plan view of one corner of the sintering pan, showing the sealing plate for closing the opening at the end of the pan; Fig. 5 is a cross sectional detail taken on the lines 5—5 of Fig. 4; Fig. 6 is an enlarged cross section through the sintering pan showing the sealing means at the sides of the pan; and Fig. 7 is a further enlarged sectional detail of the sealing wiper and plate with which it co-operates.

Referring to the drawings, B represents the building for housing the sintering mechanism, said building being of steel and concrete construction including suitable beams 1, 1 on which the sintering pan P is rotatably mounted so that its upper edge is approximately on the level of the charging floor F, according to established practice. The charge car 2 and ignition hood 3 operate on a suitable track 4 on the floor F for effecting the operations of charging and igniting. Above the at rest position of the charge car is a screen 5 from which the raw material is fed into the charge car, and to the left of this screen is the usual conveying mechanism which need not be described.

A sinter receiving hopper 6 in the shape of a closed chamber is disposed below the sintering pan P, the upper edge of said hopper being connected with supporting beams 1, 1 and floor members 7, 7 which are spaced from the sides of the sintering pan to provide clearance for rotation. A feeder and crusher 8 is mounted on floor F′ next below the floor F and closes the bottom of the sintering receiving hopper 6, this bottom being otherwise open to admit the influx of atmospheric air. After the sinter is crushed, it is fed by the crusher 8 onto a screen 9 over which the finished sinter passes into a railway car (not shown), and through which screen the fine material known as "return fines" is discharged into a hopper 10. From the hopper 10 the re-

turn fines are fed into a conveyor 11, which conveys them to the mixer where they are commingled with the raw unsintered material.

One of the hollow trunnions 13 of the pan P has a pipe 14 connected to it, said pipe then being connected to the dust collector 15 mounted beneath the floor F'. The outlet 16 from the dust collector is connected with the intake of the sintering fan 17, and the outlet of the sintering fan is connected by a short pipe 18 to a stack 19 through which the exhaust air is discharged after having had the dust separated from it. A second fan 20 for ventilating the sinter hopper 6 and cooling the hot sinter therein is mounted on the floor F' and has its intake connected by a pipe 21 to the outlet of a dust collector 22 from which it discharges through pipe 22' to receiver R. The intake 23 of the dust collector is connected by a main 24 to the top of the sinter hopper 6 by a series of branch pipes 25, 25 etc. The exhaust from the fan 20 is connected to stack 19 by a pipe 26. The fans 17 and 20 are driven independently of each other by individual motors or other driving mechanism. There is also suitable driving mechanism rotating the sintering pan P, but as this is well understood and forms no part of the present invention, it requires no specific description.

Plates 27, 27 are fixed to the upper edge of the hopper 6 and extend upwardly and around trunnions 13, 13', and are fixed to channels 27', 27' at the level of floor F. A hinge 28 is fixed to channel 27' and carries a flap gate which extends toward the pan P and rests on its upper flange *f*, thus closing off the space between the side of the pan and the plate 27. When the pan is rotated, the upper edge *e* of gear 30 will lift the flap gate (as shown in Figs. 5 and 6) and hold the gate up during the movement of the pan. When the pan has again been brought to its at rest position, the gate 29 will drop back onto the flange *f* of the pan. Obviously, the specific means herein described for sealing the space between the pan and the walls of the pan opening may be modified; in fact, I have employed other sealing devices in practice which are equally effective with that herein shown. I therefore do not wish to be restricted to the specific sealing means illustrated in the drawings.

There are also arcuate plates 31, 31 fixed to floor members 7, 7, the arc of curvature of these plates being described about the rotation center of the sintering pan and a sealing wiper 32 is affixed to the lower edge of each side of the pan, the outer edge of the flange terminating in wiping contact with the plate 31, wiper 32 thus sealing the spaces between the sintering pan and the plates 31, not only while the pan is at rest, but also during its rotation.

The operation of my improved dust collector mechanism may be described as follows: We will assume that the sintering pan P has been charged with the material that is to be sintered and that this material has undergone treatment for a sufficient time to be completely sintered. It is then discharged from the pan P by causing said pan to be inverted, which dumps the sinter on the hopper 6. At this time the fan 17 which provides the draft for supporting combustion during the sintering, is idle. The fan 20, however, is in operation and causes a large volume of air to be drawn into the bottom of the hopper 6, past the crusher 8. Of course, this air will pass through whatever sinter is in the hopper and will effect a cooling thereof, at the same time carrying off the dust that has been created by the falling of the sinter into the hopper. The air, after passing through the hopper 6, enters the branch pipes 25 leading from the top of the hopper and passes into the main 24 carrying the sinter dust with it to the dust collector 22. Here the dust is separated from the rapidly moving air and discharges through pipe 22 to the dust receiver R. The air outlet from the collector 22, as we have seen, leads to the intake of the fan 20 from which the exhaust air is forced through pipe 26 into stack 19.

The dust that is created within the hopper 6 cannot escape from the top of the hopper 6 owing to the flap gates 29, 29 and sealing members 32, 32 and it is therefore confined within the hopper 6 until it can be carried away by the draft created through the hopper by the fan 20. Obviously, no dust can escape from the bottom of the hopper as the influx of the air carries it upwardly through the hopper. Practically no dust will arise from the discharge of the sinter onto the screen 9 as the quantity of sinter passing to the screen is controlled by the feeding action of the crusher 8. It will thus be seen that all the dust created by the discharge of the sinter from the pan is confined and positively prevented from escaping into the atmosphere.

While theoretically an absolute seal at the clearance spaces would be desirable, but as a matter of fact no such absolute seal is necessary in practice. The flow of air through the hopper under the influence of the fan would prevent any objectionable escape of dust through the clearance spaces that are provided for satisfactory operation.

Having described my invention, I claim:

1. In combination with a rotatable sintering pan, a sinter receiving hopper thereunder, means for sealing the adjacent edges of the pan and the hopper from the atmospheric air, said sealing means comprising hinged gates at the ends of the hopper adapted to rest on the ends of the pan, and means for causing a blast of air to traverse the hopper.

2. In combination with a rotatable sintering pan, a sinter receiving hopper thereunder, means for sealing the adjacent edges of the pan and the hopper from the atmospheric air, said sealing means comprising hinged gates at the ends of the hopper adapted to rest on the pan and cooperating wiping elements at the sides of the pan and the hopper, and means for causing a blast of air to traverse the hopper.

In testimony whereof I hereunto affix my signature.

JOHN E. GREENAWALT.