Nov. 22, 1932. J. E. GREENAWALT 1,888,458

METHOD OF CONSTITUTING A CHARGE FOR SINTERING

Filed April 27, 1931

Fig. 1.

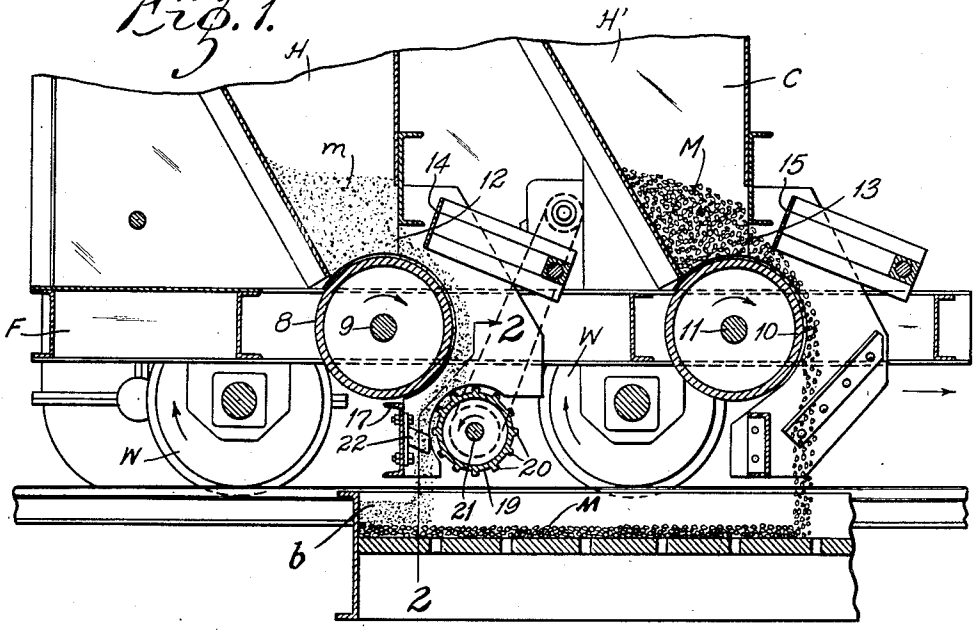
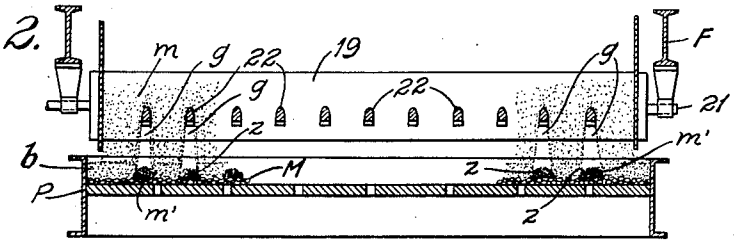


Fig. 2.



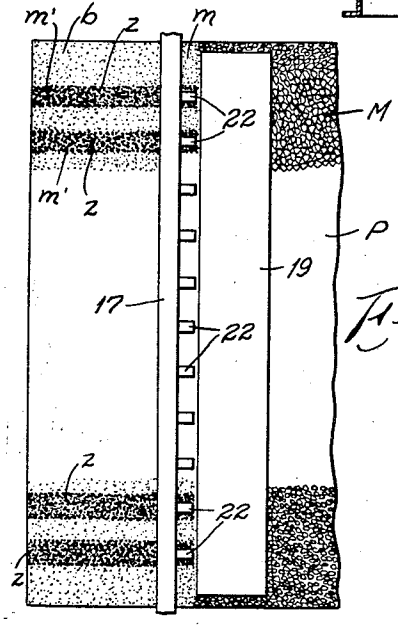


Fig. 3.

INVENTOR:
JOHN E. GREENAWALT.

BY Harry L. Reiner
ATTORNEY.

Patented Nov. 22, 1932 1,888,458

UNITED STATES PATENT OFFICE

JOHN E. GREENAWALT, OF NEW YORK, N. Y.

METHOD OF CONSTITUTING A CHARGE FOR SINTERING

Application filed April 27, 1931. Serial No. 533,148.

My invention has relation to improvements in methods of constituting a charge of material to be sintered and it consists in the novel features of construction more fully set forth in the specification and pointed out in the claims.

This application is directed to the method that is practiced by means of the charge car forming the subject-matter of a separate application for patent and filed April 27, 1931, under Serial No. 533,149. Although the charge car described in such application is ideally adapted for constituting a charge of material for sintering according to this invention, it is possible to constitute the charge in other ways and I do not wish to be restricted to the use of this particular charge car, which is illustrated in the drawing of this application.

It is well known among metallurgists that the sintering of fine ores, flue dust and similar materials for the purpose of obtaining an agglomerate better adapted for subsequent treatment produces the best results when the charge is so constituted that ignition over the entire surface of the charge is complete and subsequent sintering thorough throughout the charge. While such thorough sintering is an object to be desired, it is not always economical, as the time consumed in obtaining a practically 100% sinter does not always justify this result. Particular considerations have to be taken into account, and in sintering as now practiced, a charge is often dumped before the sintering operation is complete, which results in the production of considerable "fines" and unsintered material which have to be returned for retreatment.

I have discovered that the speed of the sintering operation can be speeded up considerably if the charge is so constituted as to produce throughout the layer of material to be sintered a plurality of zones in which the material comprises particles of larger size than that of the balance of the layer. It is a known fact among sintering men that a charge made up of coarse particles or a spot in the charge composed of coarse particles sinters more rapidly than a charge made up of finer particles because of the more rapid progress of the air therethrough. If these spots, or zones that offer less resistance to the air passage are promiscuously distributed throughout the charge, they would be detrimental to the charge, as they would result in uneven sintering. That is, certain spots in the charge would sinter through from top to bottom before the balance of the charge would be completely sintered. However, I have discovered that if these spots, or zones having a greater permeability for air are properly distributed throughout the charge they produce advantages, instead of disadvantages, in that the length of time consumed to sinter a charge is greatly decreased. The manner in which the zones of greater air permeability increase the speed of sintering will be more apparent hereinafter. Other advantages inherent in my improved method will also be better apparent from a detailed description of the invention in connection with the accompanying drawing, in which:

Figure 1 is a sectional view of a charge car adapted to feed the finely crushed material into a holder for sintering; Fig. 2 is a section taken on the line 2—2 of Fig. 1 showing the parts more or less in outline and stripped of unnecessary details; Fig. 3 is a top plan of a fragment of the holder with a charge therein and those parts of the charge car responsible for the formation of zones in the charge being indicated in outline.

Referring to the drawing, C represents my improved charge car comprising a truck frame F which carries a hopper H for the finely divided material *m* that is to be sintered, and a hopper H′ for the material M that is to serve as a bed on which the material *m* is disposed. The frame F is carried on wheels W, W driven by means of a motor (not shown).

The mechanism for feeding the material *m*, M from hoppers H and H′ is similar to that employed in the charge car described in the pending application of Thomas M. Alexovits, Serial No. 359,372, and comprises a feed roll 8 mounted below the open bottom of hopper H on shaft 9 and a feed roll 10 mounted below the open bottom of hopper H′ on shaft 11. Hoppers H and H′ also have

discharge orifices 12 and 13, the flow of material through which is controlled by gates 14 and 15 respectively. The operation of these gates is similar to that of the construction described in the application aforesaid, and is not illustrated or described in detail. A breaker roll 19, the surface of which is covered with a plurality of bosses 20, is mounted on the shaft 21 below and slightly forward of the feed roll 8 so as to receive the material *m* after it passes over said feed roll, and a series of fingers 22 are secured to channel 17 in uniformly spaced relation and project toward and in close proximity to the periphery of the breaker roll 19. These fingers 22 extend along the channel 17 for a distance equal to the width of the breaker roll 19 and will intercept the stream of material as it flows from the breaker roll. The breaker roll 19 is rotated toward the fingers 22 and serves to separate cohering particles and loosen the material falling upon it from feed roll 8.

The manner in which the material is discharged into the sintering pan P may be understood by referring to Figs. 1 and 2 which shows the material *m* falling from the breaker roll 19 in a wide stream extending from end to end of said roll. The fingers 22 are shown in front of said roll where they intercept the material stream and produce gaps *g* therein from one side of the stream to the other. Therefore, no material will fall directly into the sintering pan P where these gaps are. However, the coarser particles of material in the stream will roll over into the gaps from the deposits immediately adjacent to the gaps according to the laws of rolling friction. Thus, when the pan is charged with a bed of the desired thickness, this bed *b* of material will contain regularly spaced zones *z* of coarser material and, of course, greater porosity.

The zones *z* made up of the coarser particles *m'* are more porous than the balance of the bed *b*, hence the air will travel downwardly through the charge more rapidly in these zones. The more rapid passage of the air through the zones causes more rapid downward travel of the zone of combustion and more rapid sintering through the zones. As the combustion through the zones progresses more rapidly than the combustion between the zones, ignition of the masses between the zones will be effected by the incandescent particles in these zones and propagate the combustion laterally. Thus, with a series of zones *z* distributed throughout the charge the sintering action proceeds not only downwardly from the surface of the charge but also laterally from the zones *z*, and is, of course, much more rapid and complete than when ignition and sintering proceeds downwardly only.

I do not wish to restrict myself to the apparatus shown or the specific manner of obtaining these zones *z*. The invention contemplates broadly the provision of a charge having zones *z* distributed through it, substantially from the top side to the bottom side thereof.

In the claims the pervious support may be either the sintering pan grate or a layer of coarser sinterable material over the grate. Both methods are practiced.

Having described my invention, I claim:

1. The method of constituting a charge of material to be sintered, which comprises so depositing and incidentally sorting a layer of said material in finely divided condition on a pervious support as to group portions of the coarser particles of the charge into zones extending from side to side of the layer.

2. The method of constituting a charge of material to be sintered, which comprises so depositing and incidentally sorting a layer of said material in finely divided condition on a pervious support as to group portions of the coarser particles of the charge into zones uniformly distributed in transverse horizontal arrangement throughout the layer.

3. The method of constituting a charge of material to be sintered, which comprises so depositing and incidentally sorting a layer of said material in finely divided condition on a pervious support, as to effect a separation of coarse particles from the mass of material and distributing the coarse particles in zones, each extending vertically throughout the layer.

4. The method of constituting a charge of material to be sintered, which comprises feeding said material as a stream of comminuted particles of non-uniform size onto a pervious support, causing said particles to arrange themselves as a layer having zones composed of particles of the larger sizes, and said zones each extending vertically through the layer.

5. The method of constituting a charge of material to be sintered, which comprises feeding said material as a stream of comminuted particles of non-uniform size onto a pervious support, causing said particles to arrange themselves as a layer having zones composed of particles of the larger sizes, said zones extending vertically through and from side to side of the layer.

6. The method of constituting a charge of material to be sintered which comprises feeding said material as a stream of comminuted particles above a pervious support, and causing said stream to be divided into a plurality of streams before the material reaches the support whereupon the particles arrange themselves into a plurality of zones differing in the size of the particles.

In testimony whereof I hereunto affix my signature.

JOHN E. GREENAWALT.