

Oct. 15, 1946.

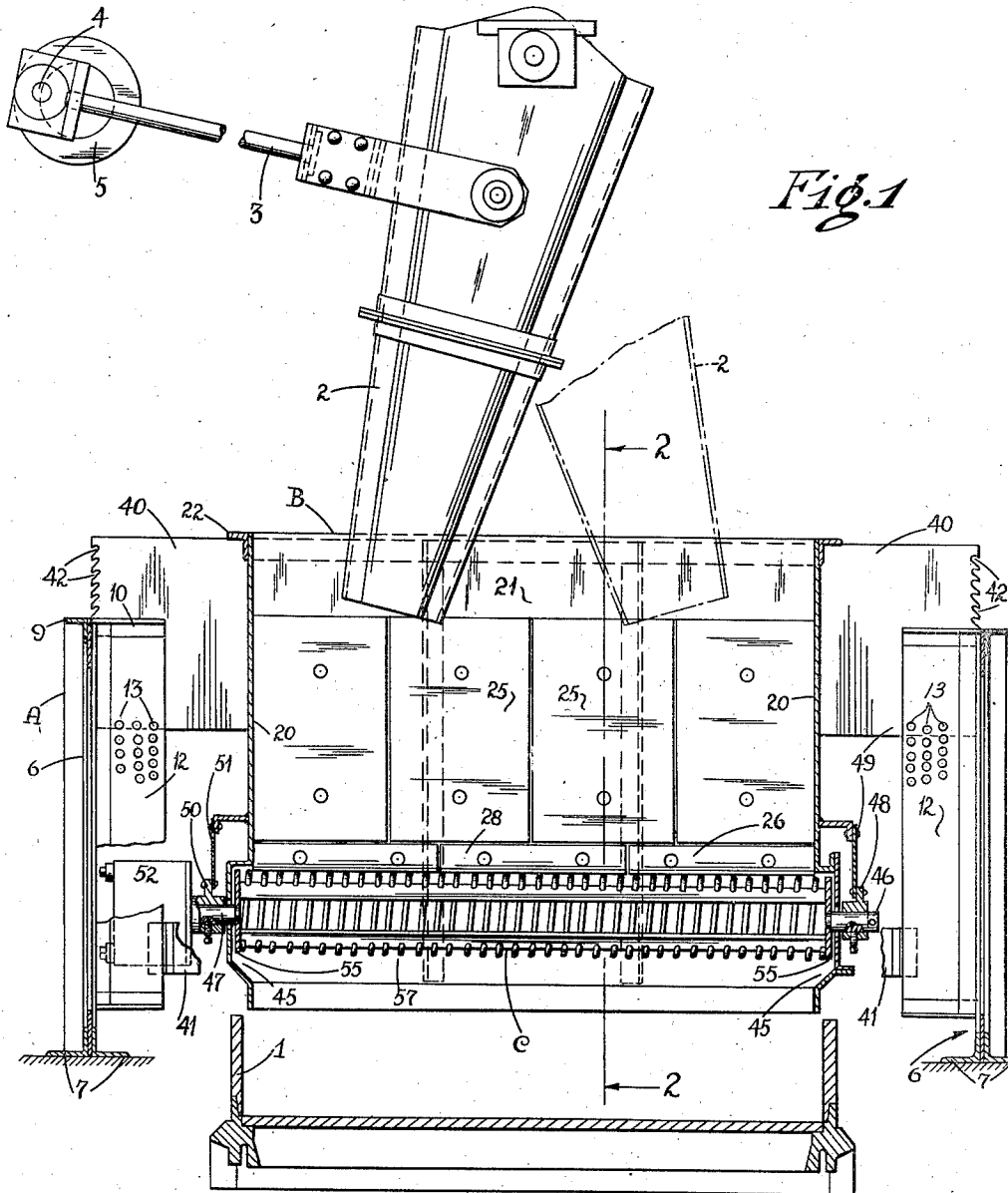
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FEEDING METHOD AND APPARATUS

Filed March 21, 1945

2 Sheets-Sheet 1



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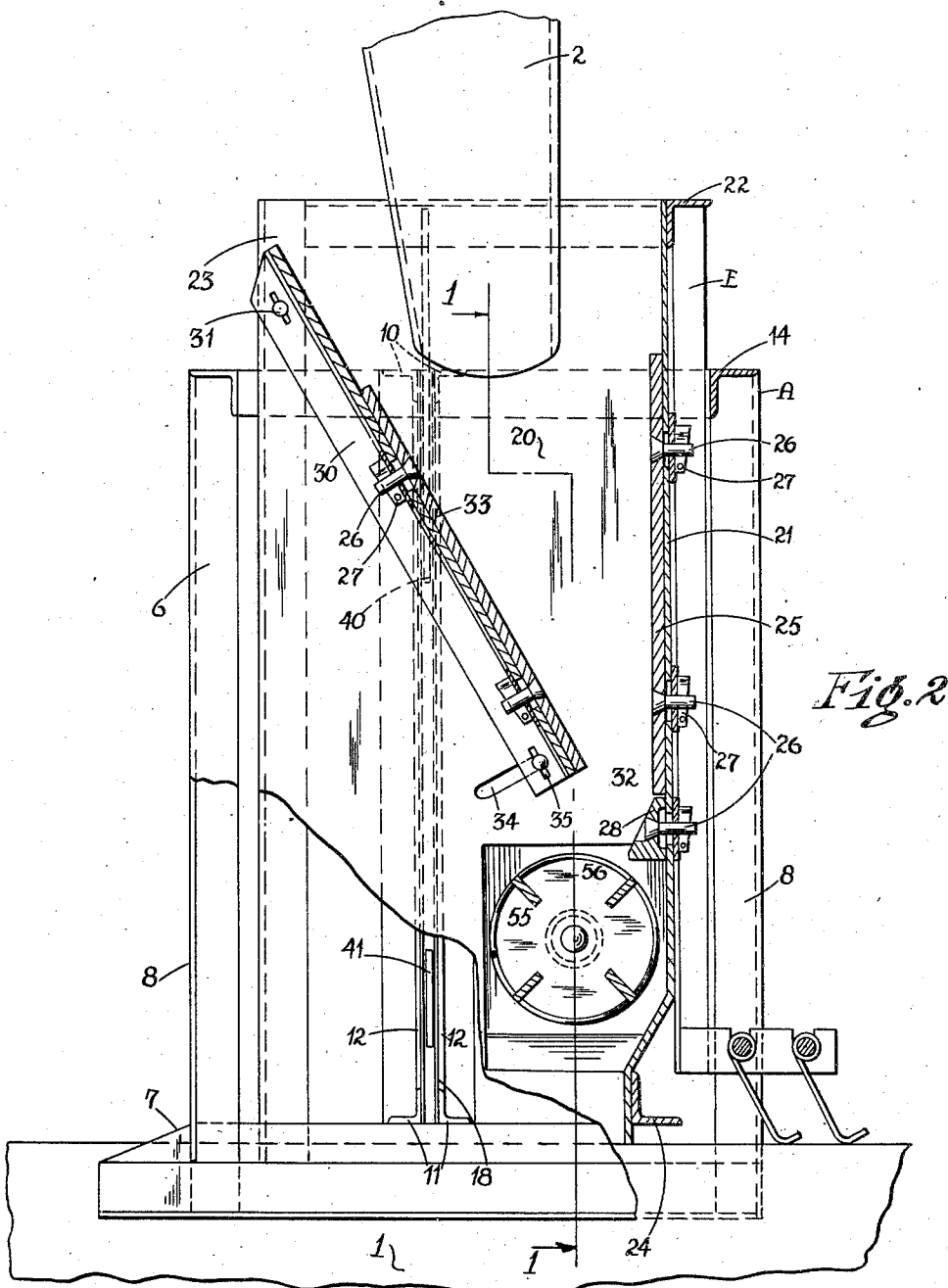
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UNITED STATES PATENT OFFICE

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FEEDING METHOD AND APPARATUS

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Application March 21, 1945, Serial No. 583,977

10 Claims. (Cl. 266—21)

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The present invention relates generally to the sintering art and more particularly to a new method of, and new means for, feeding a sinterable mixture to a sintering machine.

Sinterable materials comprising ores, concentrates, flue dust, coal or coke and the like are commonly mixed and fed onto the pallets of a sintering machine by being discharged from a downwardly extending spout which swings back and forth across and some distance above the pallets. The mixture discharged from the spout is deflected toward a vertical wall which tends to separate the larger particles from the finer particles and the thus separated material falls some distance onto the pallets. There are certain disadvantages inherent in and resulting from this feeding procedure. The segregated, fine particles build up to a considerable height on the pallet due partly to the fact that the distance thru which they fall tends to pack them together and partly to the fact that the angle of repose of the fine particles in this packed condition is quite steep. The coarser materials do not build up to such a height above the pallet because they do not pack together to such an extent and because their angle of repose is not so steep. As a result of the segregation of the materials according to particle size, the packing of the finer materials and the greater depth of the pile of fine materials, the charge on the pallet is non-uniform, particularly as regards the flow of gases therethru and the combustion of combustible materials therein. Where the materials are fine and packed, the spaces therein thru which gases can pass are smaller than where the materials are coarser or are not packed to such an extent. As a result, the flow of gases thru the charge on the pallet is not uniform, the combustion is slower at some places than others, the capacity of the machine is not fully utilized, and the sinter is not as uniform in quality or of as high a grade as it could be.

The present invention avoids the actions above enumerated, as well as their results, and makes it possible to flow gases thru the charge on the pallet with substantial uniformity and without localized retardation, to utilize the machine capacity to a greater extent and to produce sinter which is substantially uniform in quality and of a higher grade than has heretofore been consistently and commercially possible.

The present invention is predicated on the idea of remixing and fluffing a sinterable mixture after it leaves the distributing spout and just before it reaches the pallet.

The present invention will be better understood

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by those skilled in the art from the following description and the drawings which accompany and form a part of this specification and in which,

Fig. 1 is a vertical, sectional view taken on line 1—1 of Fig. 2, that is, transversely of a sintering machine, and showing, fragmentarily, parts of a sintering machine, pallet and feeding spout; and,

Fig. 2 is a vertical, sectional view taken on line 2—2 of Fig. 1, that is, longitudinally of the sintering machine.

In Figs. 1 and 2 is shown a pallet 1, fragmentarily, and the swinging feed spout 2 of a conventional sintering machine. The pallets 1 are provided with wheels (not shown) which roll along a track beneath spout 2 and the spout is pivoted at its upper end where it is in communication with a hopper (not shown) and is swung back and forth across pallet 1 by any suitable means, for example, the rod 3 and an eccentric pin 4 carried by a rotating shaft 5. Due to the considerable distance between the lower end of spout 2 and the top of pallet 1, and the permissible angular movement of the spout, a mixture of sinterable material may be spread all the way across the pallet.

Two vertical walls 6 are supported on the frame of the sintering machine near opposite ends of the pallets. As is better shown in Fig. 2, each of these walls is composed of angle irons. Each wall consists of two angles 7 attached to and extending lengthwise of the machine frame, and vertical angles 8 attached to angles 7 and connected at their upper ends by an angle iron 9. Each wall also includes pairs of horizontal angles 10 and 11 and housing-positioning plates 12 secured therebetween. These plates 12 project a short distance toward each other from the opposite walls 6 and are provided with holes 13 for a purpose presently to appear. The two walls 6 are connected together by angle 14 at their forward upper ends and constitute a fixed frame A to cooperate with the adjustable housing generally indicated at B.

This housing B is positioned in frame A and comprises side walls 20 and a front end wall 21, these walls being connected together and reinforced by an angle iron 22 extending along each side wall and across the end wall. The rear vertical edges of side walls 20 are stiffened and reinforced by vertical angles 23 and the lower end of front wall 21 is reinforced and stiffened by angle 24. This housing A extends vertically from just above the top of pallets 1 to some distance above the lower end of spout 2 and is considerably wider lengthwise of the machine than spout

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An abutment wall 25 is adjustably attached to the inner side of front wall 21 of the housing, as by means of bolts 26 which extend thru elongated openings in wall 21 and are fitted with wedges 27. By loosening the wedges in bolts 26, abutment wall 25 may be adjusted up or down, relative to the front wall 21 of housing B. At the lower edge of wall 25, a reflector 28 is adjustably attached to front wall 21. Conveniently, bolts 26 and wedges 27, as just described, may be employed as securing means. A deflector wall 30 is pivotally attached at its upper end, as at 31, to the rear angles 23 of the housing. This wall is inclined downwardly toward abutment wall 25 and at its lower end defines with that wall a narrow passage 32 thru which the sinterable mixture discharged from spout 2 may pass. The top surface of wall 30 is preferably protected by a wear plate 33 which may be adjustably attached thereto, as by bolts 28 and wedges 27. At its lower end, wall 30 is provided with bolts which pass thru arcuate slots 34 in side walls 20 of the housing and wing nuts 35 on said bolts serve to secure the wall 30 in any desired adjusted position within the limits of slots 34.

Upper and lower plates 40 and 41 extend outwardly at right angles from the housing side walls 20 and into the vertical spaces between plates 12 on frame A. Bolts may be inserted thru holes 13 of plates 12 just beneath the lower edges of upper plates 40 to maintain housing B at any desired elevation. Upper plates 40 have notches 42 in their end edges. Levers may be inserted in these notches 42 and fulcrumed on angles 9. By means of such levers housing B may be lifted or lowered relative to frame A. Plates 40 and 41 serve to guide housing B in its vertical movements and also to maintain the housing in vertical position at all times.

Near their lower ends side walls 20 of housing B are deformed outwardly to provide inner recesses 45 and are provided with openings thru which shafts 46 and 47 project. Shaft 46 is attached to a sleeve 48 which is suspended by flexible member 49 which is capable of permitting endwise reciprocating movement of the shaft and sleeve. Shaft 47 is attached to sleeve 50 which is supported by flexible member 51 which, like member 49, is capable of permitting endwise movement of the sleeve. Sleeve 50 is attached to and supports a vibrator 52 which may be of any conventional form capable of causing endwise reciprocating movement of sleeve 50 and shaft 47. Shafts 46 and 47 are attached to disks 55 which are disposed within the recesses 45. These disks 55 are connected together by a plurality of members 56. These members, as shown, are thin, narrow, plates arranged radially of disks 55 and spaced approximately 90 degrees apart. Rods or other shapes may obviously be used instead of the illustrated plates. Member 57 is coiled spirally about members 56 and extends from one disk 55 to the other disk. A wire or a small rod may be used as member 57. The convolutions of member 57 are spaced a short distance apart, which distance is preferably slightly greater than the greatest dimension of the largest particles in the sinterable mixture. An iron rod about $\frac{1}{2}$ " in diameter with the convolutions spaced apart about one inch has been found to be satisfactory for one inch maximum size material.

Members 46 to 57 inclusive constitute what may be termed a mixing and fluffing unit, which is

designated generally by C. This unit is disposed beneath passage 32 between abutment wall 25 and deflecting wall 30 and only a short distance, possibly a foot or so, above the top surface of pallets 1. It will be understood that while the part of the unit C beneath passage 32 is shown as being circular in transverse cross-section, and while such shape is preferred, it may obviously have different cross-sectional shapes.

The operation of the above described apparatus is substantially as follows: When a sinterable mixture is to be discharged from a hopper thru spout 2 onto pallets 1, the vibrator 52 is actuated and spout 2 is reciprocated back and forth across pallet 1. The gate in the hopper is opened and the sinterable material is discharged downwardly from spout 2. This material strikes against wear plate 33 on inclined wall 30 and is deflected thereby toward the opposed side of abutment wall 25 and falls thru the passage 32. The reflector 16 will direct this falling material rearwardly and onto the mixing and fluffing unit C. When the sinterable materials come into contact with this unit, some of those materials will pass between the turns of member 57 at the top of the unit but will contact with the turns of that member at the bottom of the unit. Other particles will strike the top turns but miss the bottom turns of member 57 and substantially all the material will be agitated and remixed before it is delivered onto pallets 1. Furthermore, since air may and does pass freely up thru and around unit C, the combustible materials will be fluffed and aerated and there will be little or no tendency for packing of the materials on the pallet. The distance from the bottom of unit C to the top of the pallets 1 is so short that substantially no packing could take place due to the falling of the material thru that distance and the presence of air in and beneath unit C tends to fluff the particles and decrease even further the tendency to packing. If any of the material has packed together above unit C it will be broken up by that unit.

In this manner the sinterable materials are remixed, thereby overcoming any segregation which may have occurred previously and are fluffed and deposited on the pallets in light, fluffy form. Gases may readily and uniformly pass thru such fluffed up material and as a result combustion will be substantially uniform and will progress rapidly with increased output from the machine and the production of sinter of improved uniformity and quality.

Having thus described my invention so that others skilled in the art will be able to understand and practice the same, I state that what I desire to secure by Letters Patent is defined in what is claimed.

What is claimed is:

1. The method of feeding a sinterable mixture to a sintering machine pallet which comprises the steps of discharging a stream of such material downwardly toward and back and forth above the pallet, deflecting the falling material angularly toward the side of a vertical abutment, and mixing and fluffing the material below the abutment and just above the pallet.

2. The method of feeding a sinterable mixture to a sintering machine pallet which comprises the steps of discharging a stream of such material downwardly toward and back and forth above the pallet, deflecting the falling material angularly toward the side of a vertical abutment, passing the material from said abutment thru a narrow, segregation preventing passage, and mixing and

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fluffing the material below said passage and just above the pallet.

3. The method of feeding a sinterable mixture to a sintering machine pallet which comprises the steps of discharging a stream of such material downwardly toward and back and forth above the pallet, deflecting the falling material angularly and passing it thru a narrow passage, and mixing and fluffing the material below said passage and just above the pallet.

4. In a sintering machine including a pallet and a depending spout above and swingable across said pallet, the combination of a wall below said spout and inclined downwardly, a vertical wall spaced apart from the lower end of said inclined wall to define therebetween a narrow passage for sinterable material, a reflector at the lower edge of said vertical wall, and endwise vibrating, mixing and fluffing means disposed below said passage and above said pallet for mixing and fluffing sinterable materials passing thru said passage.

5. In a sintering machine including a pallet and a depending spout above and swingable across said pallet, the combination of a wall below said spout and inclined downwardly, a vertical wall spaced apart from the lower end of said inclined wall to define therebetween a narrow passage for sinterable material, and endwise vibrating, mixing and fluffing means disposed below said passage and above said pallet for mixing and fluffing sinterable materials passing thru said passage.

6. In a sintering machine including a pallet and a depending spout above and swingable across said pallet, the combination of a vertically adjustable housing extending from adjacent the lower end of the spout to adjacent the said pallet, said housing including a wall below said spout and inclined downwardly, a vertical wall spaced apart from the lower end of said inclined wall to define therebetween a narrow passage for sinterable material, a reflector at the lower edge of said vertical wall, and endwise reciprocable mixing and fluffing means disposed below said passage and reflector and above said pallet.

7. In a sintering machine including a pallet

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and a depending spout above and swingable across said pallet, the combination of a vertically adjustable housing extending from adjacent the lower end of the spout to adjacent the said pallet, said housing including a wall below said spout and inclined downwardly, a vertical wall spaced apart from the lower end of said inclined wall to define therebetween a narrow passage for sinterable material, and endwise reciprocable mixing and fluffing means disposed below said passage and above said pallet.

8. A feeder for a sintering machine comprising a housing including a vertical abutment wall, a reflector at the bottom edge thereof, side walls, and an inclined rear wall extending downwardly toward said abutment wall and defining therewith a narrow passage for sinterable material to pass down thru, and a mixing and fluffing unit beneath said reflector and passage, said unit comprising a skeleton framework, a member surrounding and supporting said framework and defining passages therethru for sinterable material, and means for vibrating said unit endwise.

9. A feeder for a sintering machine comprising a housing including a vertical abutment wall, side walls, and an inclined rear wall extending downwardly toward said abutment wall and defining therewith a narrow passage for sinterable material to pass down thru, and a mixing and fluffing unit beneath said passage, said unit comprising a skeleton framework, a member surrounding and supporting said framework and defining passages therethru for sinterable material, and means for vibrating said unit endwise.

10. A feeder for a sintering machine comprising a housing including a vertical abutment wall, side walls, and an inclined rear wall extending downwardly toward said abutment wall and defining therewith a narrow passage for sinterable material to pass down thru, and a mixing and fluffing unit beneath said passage, said unit comprising a skeleton framework, a member coiled around said framework with the convolutions spaced apart by distances slightly greater than the maximum size of pieces of said material, and means for vibrating said unit endwise.

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