April 11, 1944. W. S. McALEER 2,346,176

SEGREGATING HEAT-DRIER AND METHOD

Filed June 18, 1940 3 Sheets-Sheet 1

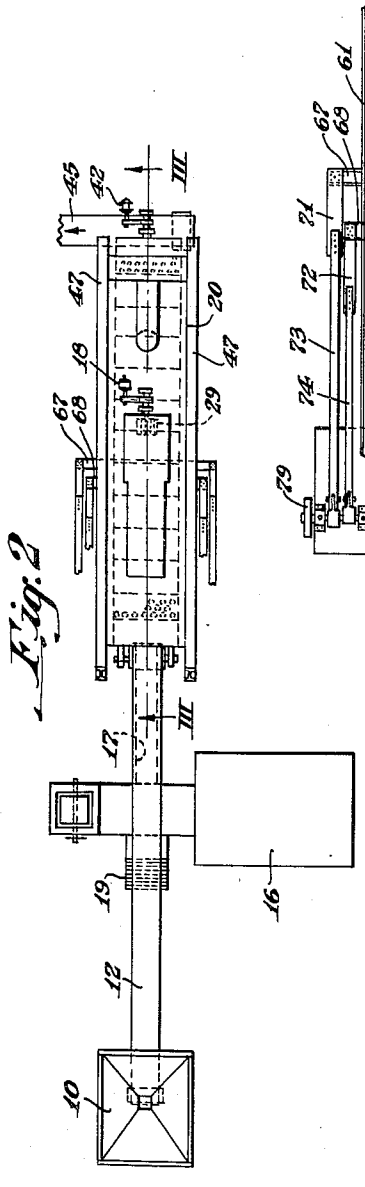


Fig. 2

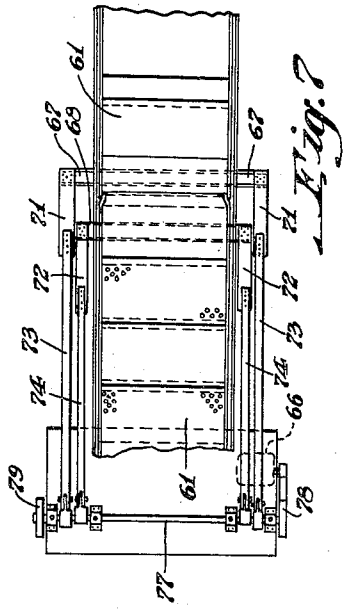


Fig. 3

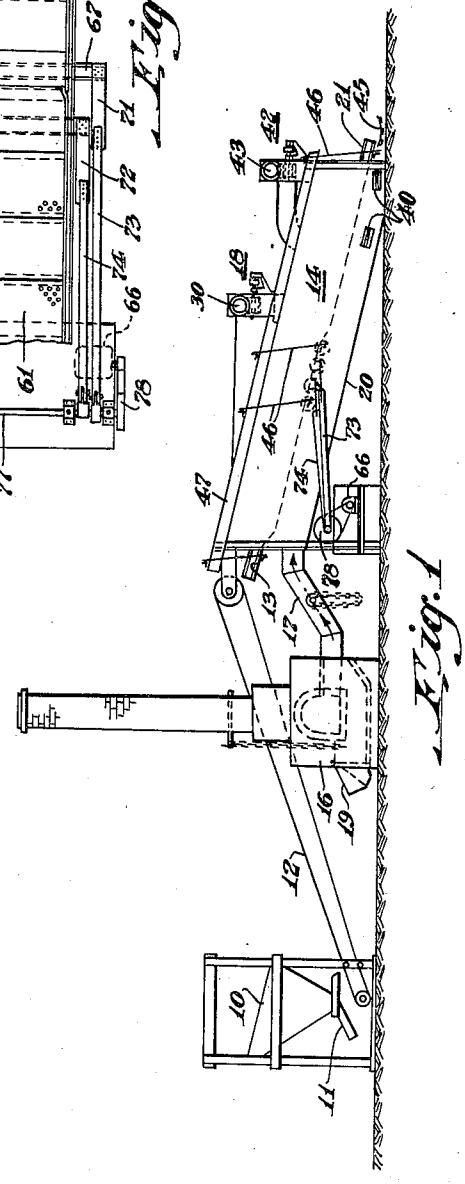


Fig. 1

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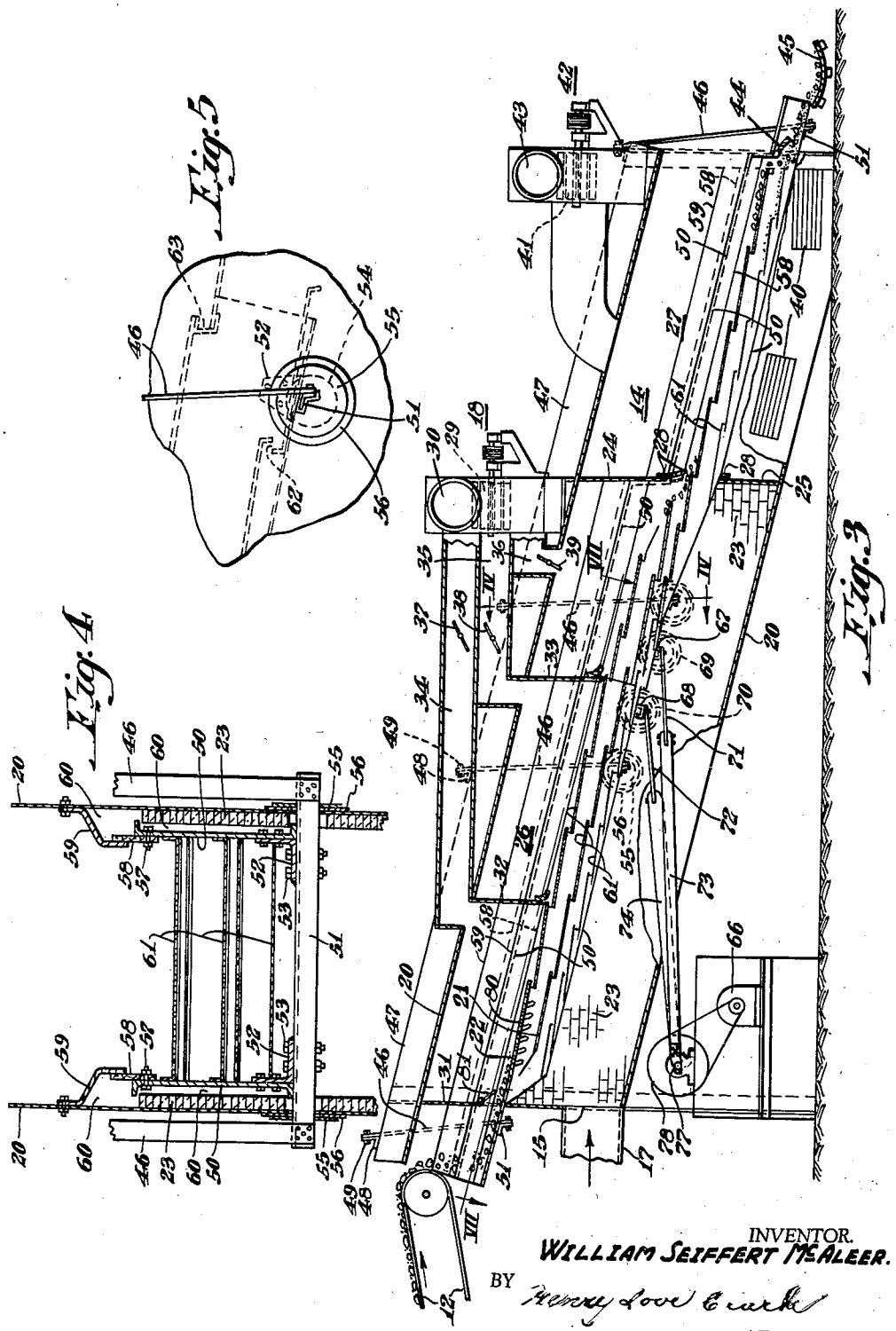


Fig. 3

Fig. 5

Fig. 4

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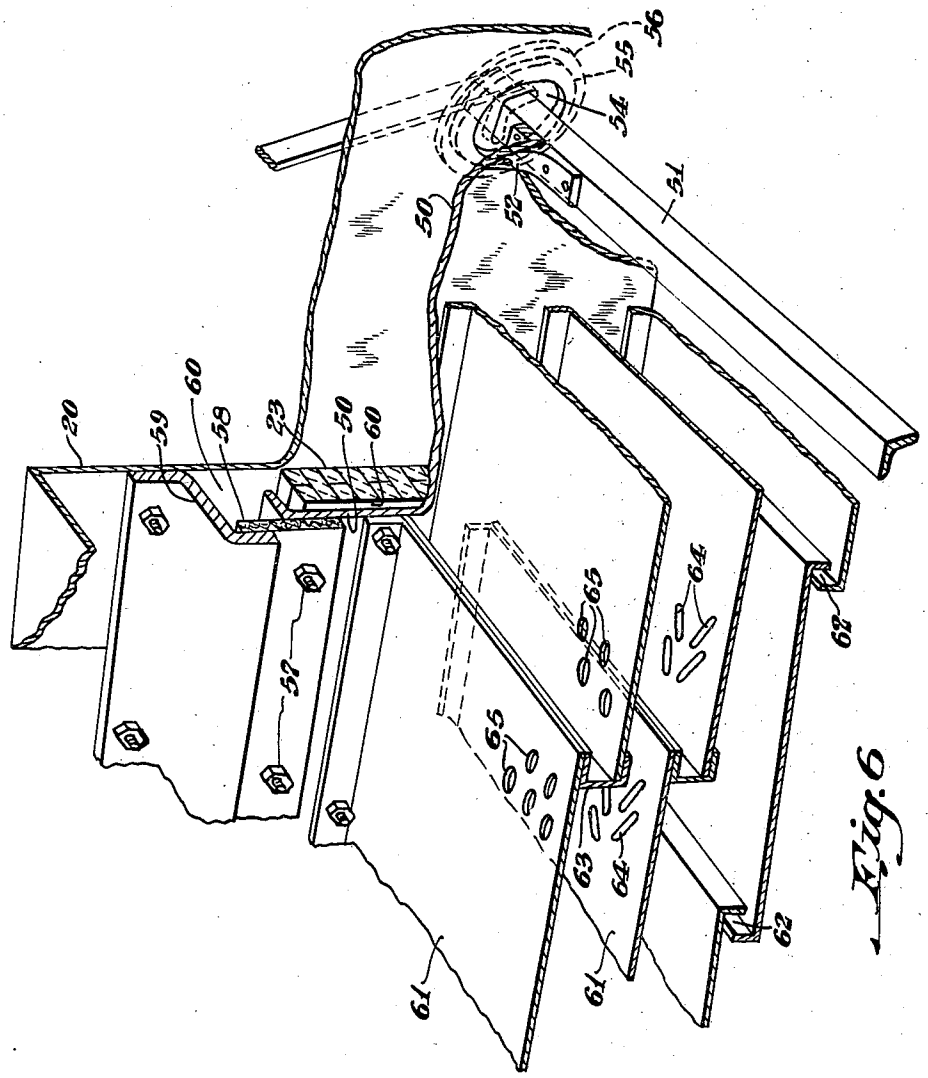


Fig. 6

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SEGREGATING HEAT DRIER AND METHOD

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Application June 18, 1940, Serial No. 341,108

12 Claims. (Cl. 34—33)

The present invention comprehends improvements in apparatus and method for drying wet granular materials with currents of drying gases and more especially relates to improvements in the drying of mixed sizes of wet coal.

In the drying of such wet coals for example as those discharged from coal washeries, it is common practice to flow them over perforate surfaces arranged to permit the passage of currents of drying gases through the moving mass. In consequence of the movement of the coal pieces comprising a drying layer there is a well-marked tendency for the finer sizes to migrate toward the bottom thereof and there collect into clingy aggregations that adhere to and accumulate in the perforations of the supporting surface thus decreasing their effective areas and retarding or checking circulation of the drying gases through the mass of the to-be-dried layer. Flowing of the drying gases downwardly through such moving layer of wet coal serves further to decrease its penetrability to said gases because of the resulting tendency of the latter to press and pack the pieces of coal together and to force them into the said perforations. This combination of circumstances can give rise to conditions so aggravated that the lower part of a coal layer comprising mixed sizes can be discharged from a perforate surface still quite wet while its upper part is overheated even to the point of ignition.

A principal object of the present improvement is to provide apparatus and method whereby the above-mentioned disadvantages and difficulties in drying more especially wet coals of mixed sizes are simply and effectively circumvented and a relatively uniform drying of the different sizes thereof by currents of drying gases can be assured.

A further object of invention is to furnish practical method and apparatus for drying moving layers of wet coals comprising mixed sizes in such manner that those smaller particles which retain the highest percentages of moisture and have a tendency to segregate in the lower part of a moving layer can be speedily dried and removed therefrom, thereby promoting an opening-up of the interstices between residual larger sizes of coal and providing for increasingly easy penetration of the drying layer by the drying gases.

A further object of invention is to provide apparatus and method whereby in drying coals of mixed sizes fractions thereof having successively decreasing moisture content are automatically brought into contact with currents of the drying gases having decreasing moisture-evaporating capacity.

A further object of invention is the supplying of apparatus that is adapted to employ the natural tendency of the hot drying gases to rise through the to-be-dried material and is also disposed to maintain uniform distribution of said material over the surfaces supporting it so as to negate an inclination of the rising gases to form channels through said material.

The invention has for further objects such other improvements and such other operative advantages or results as may be found to obtain in the processes or apparatus hereinafter described or claimed.

The unitary apparatus of the present improvement for drying such granular materials as masses of wet coal of mixed sizes includes a plurality of vibratory decks disposed the one above the other and each comprising a series of inclined plates arranged in echelon, the upper of said decks having perforations adapted to form passageways for the drying gases and to permit a preferred amount of screening of the drying material, whereas the lowest deck is formed of overlapping but imperforate plates also arranged in echelon with vertically-disposed openings between them. This lowest deck is thus adapted to retain on its upper surface all the finest sizes of coal delivered to it from any screening deck thereabove. All the decks comprising the apparatus of invention are preferably mounted for vibration as a unit inside an enveloping hood, the said unit being supplied with an improved self-sealing device that allows it to move independently of the hood and also forces the currents of drying gas to flow ad seriatim from one deck to the next.

A novel feature of the present improvement includes flowing the drying gases upwardly through said deck-unit from deck to deck thereof. By means of this feature, it is the lower portions of coal layers moving over the individual decks that are first brought into contact with the upwardly-moving drying gases. This has the effect of speedily eliminating moisture from those fractions of the to-be-dried material which are adjacent the deck-perforations and consequently provides for rapid removal from the drying aggregate those smaller sizes which normally tend to segregate adjacent to or in the deck-perforations and impede and under some conditions actually block proper passage therethrough of the drying gases.

In the accompanying drawings forming a part

of this specification and showing for purposes of exemplification a preferred apparatus and method in which the invention may be embodied and practiced but without limiting the claimed invention specifically to such illustrative instance or instances:

Fig. 1 is a vertical elevational view of apparatus embodying features of the present improvement in heat-driers for unsized materials and also showing a furnace for heating the drying gases and conveyor means for delivering the materials to be treated according to the present invention;

Fig. 2 shows a plan view of Fig. 1;

Fig. 3 shows an enlarged vertical section taken longitudinally of the heat-drier along the line III—III of Fig. 2;

Fig. 4 is an enlarged section taken along the line IV—IV of Fig. 3;

Fig. 5 is a side elevational view showing details of the hangers from which depend the deck-unit as well as the moveable seals for closing those openings of the drier-housing through which extend the channels supporting the deck-units from beneath;

Fig. 6 is an enlarged perspective showing in detail the arrangement of the drying decks of the present improvement and also the sealing means between said decks and the stationary housing enveloping them; and

Fig. 7 is a view taken substantially along the line VII—VII of Fig. 3, parts broken away, and showing the apparatus for actuating the drying decks of the present improvement.

The same characters of reference designate the same parts in each of the views of the drawings.

Referring now to the drawings and more particularly to Figs. 1 and 2, the unsized wet material such as washed coal, or the like, contained in hopper-bottomed receptacle **10** is delivered by means of valved spout **11** onto the continuous conveyor-belt **12** and by it transported upwardly to inlet **13** of the improved drier apparatus **14**. Adjacently beneath said material's inlet **13** is opening **15** through which the drying medium that, in this instance, comprises hot combustion-products resulting from the burning of any preferred fuel in furnace **16**, is delivered into the drier apparatus from conduit **17** under the influence of exhauster-fan **29** which is also employable to draw air for the combustion reaction through the fuel bed of said furnace. By means of louvers **19** a preferred quantity of colder outside air can be admitted into the combustion-products coming from the furnace thereby to regulate their temperature as they enter the drying apparatus. If preferred, the movement of said louvers **19** can be automatically controlled in response to the requirements of a thermostat positioned in conduit **17** to regulate the temperature of those drying gases induced to enter the drier by said exhauster-fan.

The unitary improved drier apparatus **14** of the present invention, as shown in considerable detail in Figs. 3 to 6 inclusive, comprises an enveloping and stationary housing **20** for the independently but simultaneously vibratory lower and upper deck-units, respectively **21**, **22**, of which each contains a plurality of superposed decks. The housing **20** is lined with refractory material, in this instance bricks **23**, from the bottom thereof upwards to a point adjacent the improved sealing device, which will be hereinafter described, between said deck-units and said housing; i. e., those surfaces of housing **20** over which the hottest drying gases may flow before passing upwardly through the drying decks are provided with a protective covering. It is of course understood that any insulating material other than bricks and which is appropriate for the purpose may be employed for protecting the metal of the housing from being warped by the hot combustion-products employed for drying.

The space of the interior of said housing **20** is operatively divided by means of the upper and the lower partition walls, respectively **24**, **25**, into separate compartments **26**, **27**, that are communicably connected in so far as there is concerned a flow of the material being dried, but are substantially isolated from each other in respect of the gases circulated through them. The lower and the upper edges of said partition walls, **24**, **25**, are formed of strips of a pliable and refractory material **28**, for example asbestos brake-lining, that will yield to the movement of the flowing material or of the deck-members but will maintain in substantial separation the gases within the two said compartments.

In the present embodiment of the invention the upper **26** of said housing compartments is arranged solely for the drying of the wet unsized material, that is flowed therethrough, by means of hot combustion-products that are introduced from conduit **17** and are drawn upwardly through the plurality of vibratory decks by suction-fan **29** operated by driving element **18**, the cooled moist gases being discharged from the apparatus through outlet **30**.

In the said upper compartment **26** of the improved drier, the space above the deck-units is subdivided by vertical division-walls **31**, **32**, **33**, extending transversely of the apparatus housing, into a plurality of separate sections that are communicably connected by passageways located beneath the lower edge of said walls, the said passageways being controlled by means of some such device as strips of asbestos cloth, or the like, that depend from said walls' lower edges and are adapted to permit the to-be-dried material to flow therebeneath but limits the transfer between said sections of hot drying gases entering them.

By means of the upper, middle, and lower ducts respectively **34**, **35**, **36**, that are located above the apparatus housing **20**, the corresponding sections of the drying compartment **26** are communicably connected individually with suction-fan **29**, the effective cross-sections of said ducts being individually regulable by the damper-valves **37**, **38**, **39**, whereby any preferred distribution of the hot drying gases introduced into the lower part of compartment **26** from conduit **17**, is regulable to effect a greater or lesser degree of drying in the individual sections by respectively increasing or decreasing the forced draft created through them severally by the exhauster-fan. For example, if the to-be-dried material has a high moisture content and a large proportion of fines and is in consequence relatively impermeable to gaseous penetration, thus making it desirable to increase that proportion of the drying gases flowed through the upper compartment-sections, this result can be effected by turning damper-valves **37**, **38**, to a more nearly open position and simultaneously moving damper **39** toward a closed position.

The lower compartment **27** of the drier is, in the embodiment shown in the drawings, adapted for use as a cooling section wherein the hot, dried material flowed thereinto from compartment **26** beneath the yieldable sealing means **28**

is brought into contact with cooling currents of air drawn thereinto through regulable louvers 40 by suction-fan 41 driven by driving element 42, said cooling air after it has passed upwardly through the compartment being discharged through the discharge opening 43 therefor whereas the dried and cooled material is passed from the apparatus beneath the yieldable sealing means 44 onto conveyor 45 for conveyance to a preferred delivery.

Within the above-described housing 20 of the improved drier there are the deck-units 21, 22, which depend by means of a plurality of suspension-straps or hangers 46 from channel-beams 47 that extend longitudinally of said housing outside and above the upper surface thereof. The hangers 46 are each rigidly supported at their upper ends to said channel-beams by thereto attached angles 48 to which said hangers are secured by bolts 49. The hangers are adapted to yield transversely so that the deck members can be vibrated backward and forward within the housing.

The lower and upper deck-units 21, 22, are each formed from a spaced pair of rigid and imperforate side-walls 50 which are supported in a vertical position at their lower edges by means of a pair of transversely-extending angle-bars 51 to which they are secured by angle-clips 52 and bolts 53 in the manner clearly illustrated in Fig. 4. Those deck-supporting angles 51 adjacent the upper and the lower ends respectively of deck-members 21, 22, are of sufficient length to extend crosswise of the drier-housing and through aligned openings 54 in opposite walls thereof. To that portion of said angles 51 protruding beyond the drier-housing are rigidly affixed the lower ends of the deck-supporting hangers 46 which may be formed of wood or of spring-metal as preferred. Those angles 51 at the opposite ends of said deck-members are outside the drier-housing and consequently require no special provision for sealing.

Openings 54 in the walls of the drier-housing are fashioned sufficiently large to permit a preferred amplitude of vibration of the deck-units without having angle-bars 51 strike against the housing walls. Reference more particularly to Figs. 4, 5, shows the novel means whereby the said openings 54 are sealed without interfering with the vibratory movement of the deck-units while at the same time preventing important leakage of cold air into the drier-housing from the outside. This novel sealing means comprises for each such opening a flat metallic plate 55 having a perforation therethrough whose profile adapts it to be slid lengthwise along the outer end of angle-bar 51 into slideable contact with the vertical wall of the housing, the said plate having a surface adequate to cover the adjacent opening of the housing during its full amplitude of vibration with said angle-bar. The cover-plate may be held in position by any preferred means such as a spot-weld or a set screw which will permit easy adjustment of the contact between it and the exterior of the housing. It has been found expedient to insert between said housing and plate a layer 56 of some such material as asbestos brake-lining which improves the seal and reduces the friction therebetween.

Extending along the upper edge of each side-wall 50 of the deck-units 21, 22, and affixed thereto by means of bolts 57, is a strip 58 of somewhat pliable heat-resisting material such as asbestos brake-lining. It has been found in practice that a material of such type which is about 6 inches wide and 3/8 inch thick is suitable for the purpose. Affixed to the inner side-walls of housing 20 by means of bolts and extending therealong are seal-plates 59 that are adapted to co-act with the strips 58 to seal the spaces 60, between the stationary drier-housing and the side-walls of the vibratory deck-units, so that drying gases cannot pass to the suction-fans without first passing through the decks comprising each deck-unit. This novel sealing device not only allows complete freedom of movement of the deck-units in respect of their housing but is also advantageously self-sealing; that is, said seal-plates and asbestos strips are disposed in a fashion to take advantage of the difference in the static pressure of the gases on opposite sides of deck-walls 50 when the drier apparatus is in operation, the said pressure in space 60 being greater than that of the gases flowing between the drying decks tends to press the pliable strip 58 against the adjacent surface of plate 59, thereby closing said space to gaseous flow but at the same time offering substantially no resistance to freedom of vibration of the deck-units.

The deck-units 21, 22, each comprises a plurality of individual decks 61 that are inclined to the horizontal and extend in substantially parallel tiers, the one above the other. The individual decks of said deck-units are themselves formed of a series of plates disposed in echelon, the separate plates of the lower deck of each said unit being imperforate with a Z-like profile, and so assembled that the lower edge of each overlaps the upper edge of a successive plate, thereby forming a series of slit-like openings 62, as clearly shown in Fig. 6, that extend crosswise of the lower surface of each deck-unit and are adapted to permit the passage of currents of drying or cooling gases upwardly therethrough and also to act as baffles to prevent escape of the drying material therefrom. In consequence of their configuration, the said slits 62 also tend to provide the upwardly flowing gases with a turbulent flow that actively agitates the drying material as it progresses downwardly from plate to plate.

As is also clearly evident from Fig. 6, the upper deck or decks of said deck-units are formed of a series of plates that are also arranged in echelon but are joined together by means of channel-bars 63 which form a barrier to the passage of drying gases, the passageways for this purpose being provided by perforations of the plates themselves which in the illustrated intermediate deck are of a herring-bone pattern 64 whereas the perforations of the top deck are staggered rows of circular bores 65.

In the illustrated embodiment of the invention, the lower and the upper deck-units are arranged for simultaneous vibration in opposite directions within the stationary housing. They are in addition so disposed that their corresponding decks form inclined and in general substantially straight-line flow-paths for the drying material. For their actuation the both said deck-units 21, 22, are connected respectively at their upper and lower ends with driving motor 66. For this purpose, there are correspondingly affixed to their lower parts, channel-bars 67, 68, which extend transversely thereof and protrude through registered openings in opposite walls of the apparatus housing, said openings being provided with seal-plates 69, 70, that are formed and operate similarly to those seals previously described for those

channel-bars 51 whereby the deck-members depend from hangers 46. The actuating channels 67, 68, have each rigidly affixed thereto at each end preferably a short hickory board, respectively 71, 72, that at its opposite end is removably attached to a connecting arm 73, 74, of ash, the said wooden members serving to absorb shock of vibration of the deck-units and to protect the driving assembly from undue jarring; the wooden connecting-arms are themselves connected individually by means of a bearing with crank-shaft 77 of which the individual cranks are so arranged that in the shaft's rotation the said deck-units are alternately moved simultaneously away from and toward each other. Drive-shaft 77 of the driving assembly is rotated by motor 66 operating through a belt and a pulley 78 attached to one end thereof, as shown in Fig. 7, and is provided at the opposite end with a balancing flywheel 79.

In the operation of the apparatus of invention, wet and unsized material delivered to conveyor 12 from hopper 10 is carried upward by the former to inlet 13 of the drier apparatus and is discharged therefrom onto the upper end of upper deck-unit 22 which is being vibrated rapidly to and fro by motor 66, the wet inflowing material being evenly distributed over the surface of the uppermost imperforate plate 80 of said deck-member as it moves downward beneath seal-curtain 81 that depends from the end division-wall 31. The lower surface of said plate 80 may be formed if preferred with irregularities such, for example, as the fin-like projections thereon illustrated in Fig. 3, thereby the more rapidly to conduct heat to the wet material from the drying gases circulating therebeneath under the influence of exhauster-fan, 29, thus to give to the wettest fine-grained components thereof, which tend rapidly to descend through the mass of the material in consequence of the vibratory movement and to segregate adjacent the upper surface of said plate, a preliminary heating which reduces the tendency of said components to collect in the perforations of the subsequent plates and facilitates more rapid removal of moisture from them when they later come into direct contact with the currents of drying gases.

On the imperforate plate 80, the to-be-dried material is thus subjected to a sort of preliminary stratification in which the average particle sizes increase from the bottom to the top of the moving layer. After the somewhat stratified material is moved off plate 80, it cascades over the following series of perforated plates of the upper deck coming the while into direct contact with drying gases that are flowing upwardly through the different decks by way of slots 62 and perforations, 64, 65, and during this cascading the finer-grained sizes are being continuously concentrated in the lower layers of the moving mass where they are the first components to meet said drying gases, and as their water content and clingingness are decreased in consequence of evaporation of moisture they drop through the perforations of the top deck onto the intermediate deck where further drying takes place until eventually at least some of the smaller-sized components pass to the lowest imperforate deck by which they are carried along to the outlet of the drying compartment 26 at seal-curtain 28. During their passage from the upper to the lower decks, the finer-grained components of the inlet material, which generally contain the higher proportions of moisture and wherein the moisture content may vary from about 22 per cent in the zero-48 mesh material to about 8 per cent in the ¼"-48 mesh constituent whereas the sizes thereabove may contain ordinarily from 1 percent to 7 per cent water, tend thus to be continuously segregated and subjected to drying gases of increasing temperature and water-evaporating capacity. The present improved drier, which is more especially adapted for handling materials comprising mixed sizes, thus manifestly operates to promote continuous separation of the inflowing material into strata or layers of greater uniformity of particle size which facilitates penetration of the treated material by the drying gases because of the progressive opening-up of interstices between the individual particles. By thus automatically operating to bring wettest and most clingy components of the to-be-dried material first into contact with the drying gases and by preferentially flowing them progressively to zones of increasing drying capacity, the apparatus of invention is adapted to obviate troublesome stoppages of those deck-perforations whereby the drying gases effect contact with the to-be-dried material and, in consequence, importantly to reduce the resistance to gaseous flow through the apparatus which in turn is reflected in reduced power consumption, a more rapid drying rate, and less tendency to overheat any portion of the to-be-dried material or of the apparatus itself. Moreover, flowing of the drying gases upwardly through the moving layers tends to fluff them and to increase their penetrability rather than to pack them against the deck surfaces as obtains when the drying gases are flowed in the opposite direction.

At the lower end of drying compartment 26, the hot and dried materials discharged from the separate decks of the upper deck-unit 22, are flowed together and pass under curtain-seal 28 into cooling compartment 27 to cascade downwardly over the perforate upper deck where they are brought into contact with an upwardly flowing current of air drawn therethrough by exhauster-fan 41. Such of the dried fine-grained material as passes through the perforations of the upper-deck falls onto the imperforate plates of the lower deck and is conveyed to the apparatus outlet at curtain-seal 44 where the cooled and dried materials from both said decks are mixed before their discharge onto conveyor 45 to be transported to storage.

In the improved drier apparatus, the lower decks of both the drying and cooling compartments serve a plurality of purposes. They are of some effect in furthering the drying of the separated fine-grained material and also assist in uniformly distributing the drying and also the cooling gases through all parts of their apparatus-compartments and in addition prevent said dried fines escaping from the deck-members and their accumulation in the lower parts of the stationary housing.

By suitable control of the two exhauster-fans, 29, 41, it is possible to maintain substantially uniform pressures in both the drying and the cooling compartments so that transfer of gases therebetween is negligible.

It will be obvious to those skilled in the art that the cooling section of the illustrated apparatus may be omitted if preferred and also that those components of the main body of the treated material separated therefrom on the lower decks of the deck-members can be individually collected

at the outlet of the apparatus without departing from the spirit of the present improvement.

The invention as hereinabove set forth is embodied in particular form and manner but may be variously embodied within the scope of the claims hereinafter made.

I claim:

1. Apparatus for drying wet coal or other mineral material comprising: a plurality of inclined longitudinally vibratory decks arranged one above the other, each deck comprising a series of drying plates arranged in echelon for movement of material thereon off of the end of each plate onto the next in the same deck, when the decks are vibrated to and fro, for flow of the material to be dried along the upper surfaces of the respective plates from the upper to the lower ends of the respective decks; a stationary drier housing enveloping said decks; means for vibrating the decks longitudinally to and fro; means for feeding the material to be dried onto the uppermost deck at its upper inclined end; means for discharging the dried material from the housing at the lower ends of the inclined decks; means for supplying hot drying gases to the housing below the lowermost deck; and means for offtake of the drying gases from the housing above the uppermost deck; and in which the plates of the upper of said decks comprise plates with perforations in their bottoms for diffusion of drying gases from below the same upwardly from the bottom through the material to be dried on the same but of a size to screen out from the bottom of the material to be dried on the plates, for flow down to the plates on the deck next below, the smaller sizes of material being dried thereon while preventing passage through the perforations of the larger sizes for flow along the plates to the next plate in the same deck; and in which the plates of the lower of said decks are so arranged in relation to the plates of the deck above that the screenings from the plates above drop directly onto the plates below; and in which the plates of the lowermost deck are constituted of non-screening bottoms to avoid screening, and are associated with each other so as to confine material thereon from passing beneath the same, and are provided with passages constructed for flow of the hot drying gas from below the plates over their surfaces to the lower surfaces of and perforations in the bottoms of the plates of the upper of said decks while preventing escape through the passages of material on the lowermost deck.

2. Apparatus as claimed in claim 1, and which includes a gas tight seal between the sides of the housing and the decks, said seals comprising a side wall for the decks, a stationary strip secured to the housing side wall and overlying the top of the side wall of the decks, and an element interposed between said stationary strip and the side wall of the deck, overlapping the former and movable with the latter, and adapted to respond to the difference of gas pressures existant above and below the decks to be thereby pressed into engagement with the stationary strip on the housing side wall.

3. In apparatus adapted for drying wet coal or other mineral materials comprising mixed sizes thereof, the combination of: a stationary housing; partition means within the housing dividing it into end to end drying and cooling compartments; superposed inclined drying decks arranged for longitudinal movement to and fro within said housing-compartments; means for moving the decks to and fro; means for feeding the material to be dried onto the top deck; means for discharging the dried material from the housing; an upper of said decks comprising plates in echelon having perforations through which currents of drying gases can flow into contact with wet material flowed thereover during movement of said deck and through which also at least smaller sizes of said material's mixed sizes can pass to a lower deck that comprises a series of plates so arranged in echelon that the lower edge of each plate is spaced from and overlaps the upper edge of its adjacent lower plate, thereby forming slots adapted for the passage of drying gases without substantial loss of being-dried material as it cascades from plate to plate; the plates in echelon being so arranged that the material moves off the end of an upper plate onto a lower plate in the same deck in its travel to the discharge end of the housing; means for causing drying gases to flow upwardly through the slots and perforations in the decks of said drying-compartment; and means for flowing cooling gases upwardly through the slots and perforations in the decks of said cooling-compartment.

4. In apparatus adapted for drying wet coal or other mineral materials comprising mixed sizes thereof, the combination of: a stationary housing; superposed inclined drying decks arranged for longitudinal movement to and fro within said housing; means for moving the decks to and fro; means for feeding the material to be dried onto the top deck; means for discharging the dried material from the housing; an upper of said decks having perforations adapted to screen from and to deliver to a lower deck smaller sizes of said material's mixed sizes while flowing drying gases upwardly therethrough, and a lower of said decks being adapted to receive and convey through said housing and without substantial loss the said smaller sizes screened from said upper deck and being further adapted to permit upwardly flowing current of drying gases to flow successively through the said upper and lower decks; the elements of said decks being so arranged that the material moves along the decks in its travel to the discharge end of the housing; a plurality of duct means provided with individual regulating devices and arranged communicably to connect different portions of the housing-space above said superposed decks with draft-inducing means, whereby individually to regulate the flow of drying gases passed through divers portions of said superposed decks; and means for delivering drying gases into said stationary housing below said decks.

5. In apparatus adapted for drying wet coal or other mineral materials comprising mixed sizes thereof, the combination of: a stationary housing; a plurality of superposed inclined drying decks having openings in the bottoms thereof whereby drying gases are flowable successively therethrough, said decks being arranged for longitudinal movement to and fro within said housing; a supporting member attached to said decks extending transversely of said housing and through an opening in its walls; means for imparting the aforesaid to and fro movement to said decks through said supporting member; and means for sealing said opening and comprising a plate-like member that has a cross-section greater than said opening and is adapted for support by and also for adjustment lengthwise

of said deck-supporting member at its outer end into sliding contact with the walls of said housing.

6. In apparatus adapted for drying wet coal or other mineral materials comprising mixed sizes thereof, the combination of: a stationary housing; a drying deck arranged for longitudinal movement to and fro within said housing; a supporting member attached to said deck extending transversely of said housing and through an opening in its walls; means for imparting the aforesaid to and fro movement to the deck through said supporting member, and means for sealing said opening and comprising a plate-like member that has a cross-section greater than said opening and is adapted for support by and also for adjustment lengthwise of said supporting member at its outer end into sliding contact with the walls of said housing.

7. In the drying of wet solid mineral materials comprising mixed sizes thereof, the improvement comprising: feeding the material of mixed sizes onto the uppermost screen of a plurality of inclined perforate screens arranged in superposed relation so that the lower of the screens receives particles dropping through the upper of the superposed screens, and vibrating the screens to progressively and selectively drop out the smaller-sized particles from the agglomeration on the respective screens, thereby to open-up interstices between the larger-sizes of material and so improve their accessibility to a current of drying gas; conveying the residual larger-sized material along the respective screens, and circulating a current of hot drying gas upwardly through the superposed inclined screens in series so that the so separated smaller-sized particles in dropping out pass to a lower level in the drying-gas current where the same is at a higher temperature; thus tending preferentially to advance smaller-sized components of the original mixture of sizes and which normally contain the highest proportion of moisture, towards levels of higher temperature and consequently greater moisture-evaporating capacity of the current of drying gas than that through which the so separated larger-sized components pass.

8. In the drying of wet solid mineral materials comprising mixed sizes thereof, the improvement comprising: feeding the material of mixed sizes onto the uppermost screen of a plurality of inclined perforate screens arranged in superposed relation so that the lower of the screens receives particles dropping through the upper of the superposed screens, and vibrating the screens to progressively and selectively drop out the smaller-sized particles from the agglomeration on the respective screens, thereby to open-up interstices between the larger-sizes of material and so to improve their accessibility to a drying gas; conveying the residual larger-sized material along the respective screens, and circulating hot drying gas upwardly through the superposed inclined screens in series so that the so separated smaller-sized particles in dropping out pass progressively to lower levels of increasing temperature in the upwardly-flowing drying gas, thereby preferentially advancing those smaller sized components of the original mixture of sizes containing the highest proportion of moisture toward levels of higher temperature and consequently greater moisture-evaporating capacity of drying gas than that through which the so separated larger-sized components pass.

9. In apparatus adapted for drying wet materials comprising mixed sizes thereof, the combination of: a stationary housing; a drying deck arranged for longitudinal movement to and fro within and independently of said housing; a supporting member attached to said deck and extending transversely of said housing through an opening in its walls; means for actuating said deck from outside said housing, said actuating means comprising a driven member connected with said supporting member outside the walls of the stationary housing to actuate it to and fro; means for circulating drying gas within the housing, and sealing means for the opening in said housing-wall for the supporting member, said sealing means comprising for said supporting member a cap member that is of greater area than the cross-section of its associated wall-opening and is adapted for support by and also for adjustment along said supporting member into sliding contact with the housing-wall, so that during movement of said supporting member said opening is always covered by said cap member.

10. In apparatus adapted for drying wet materials comprising mixed sizes thereof, the combination of: a stationary housing; a drying deck arranged for longitudinal movement to and fro within and independently of said housing; supporting and actuating means for said drying deck, said means comprising a member connected with said deck and extending through an opening in a wall of the stationary housing; means for circulating drying gas within the housing, and sealing means for said opening, said sealing means comprising a cap member that is of greater area than the cross-sectional area of said opening and is adapted for support by and also for adjustment along the said member of the supporting and actuating means into sliding contact with the housing-wall, so that said opening is always covered by said cap member during movement of the supporting and actuating means.

11. A process as claimed in claim 7, and in which the material fed to the uppermost screen comprises wet coal.

12. A process as claimed in claim 8, and in which the material fed to the uppermost screen comprises wet coal.

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