Jan. 24, 1939. H. A. ADAMS 2,144,671

DRY CONCENTRATOR

Filed March 2, 1936 5 Sheets-Sheet 1

Fig. 1.

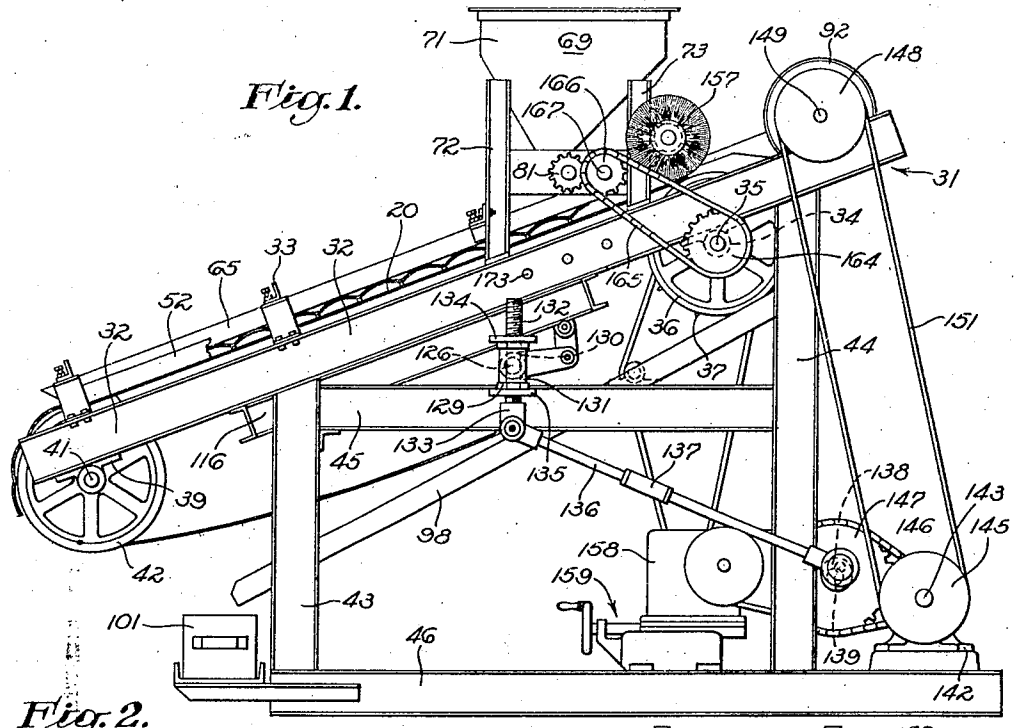
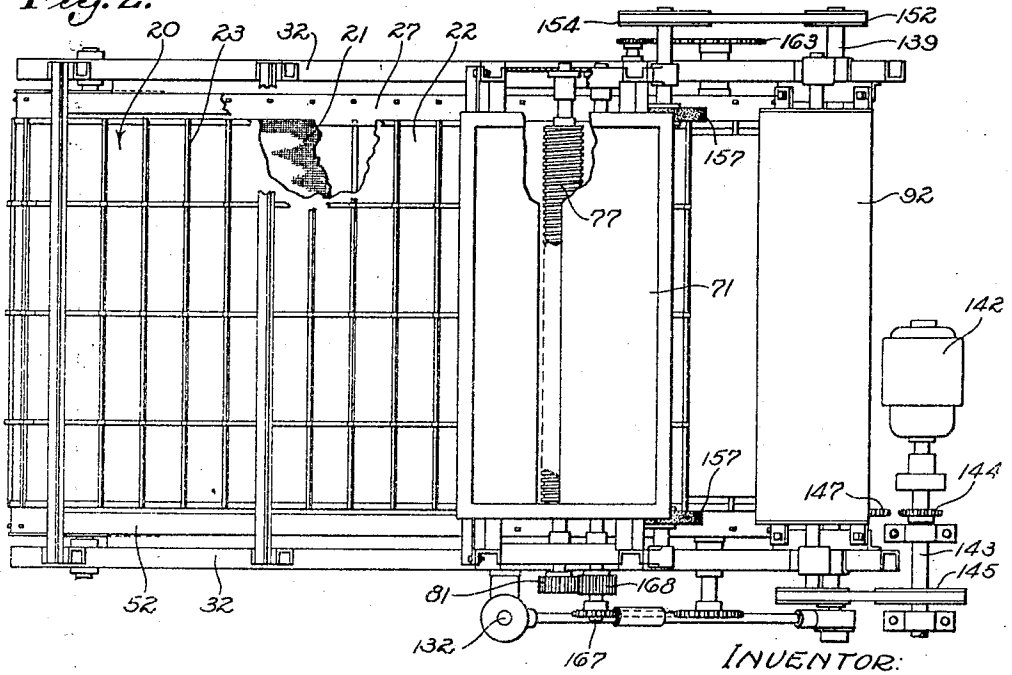


Fig. 2.



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CLASSIFYING, SEPARATING,
& ASSORTING SOLIDS
02

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Jan. 24, 1939. H. A. ADAMS 2,144,671

DRY CONCENTRATOR

Filed March 2, 1936 5 Sheets-Sheet 2

Fig. 3.

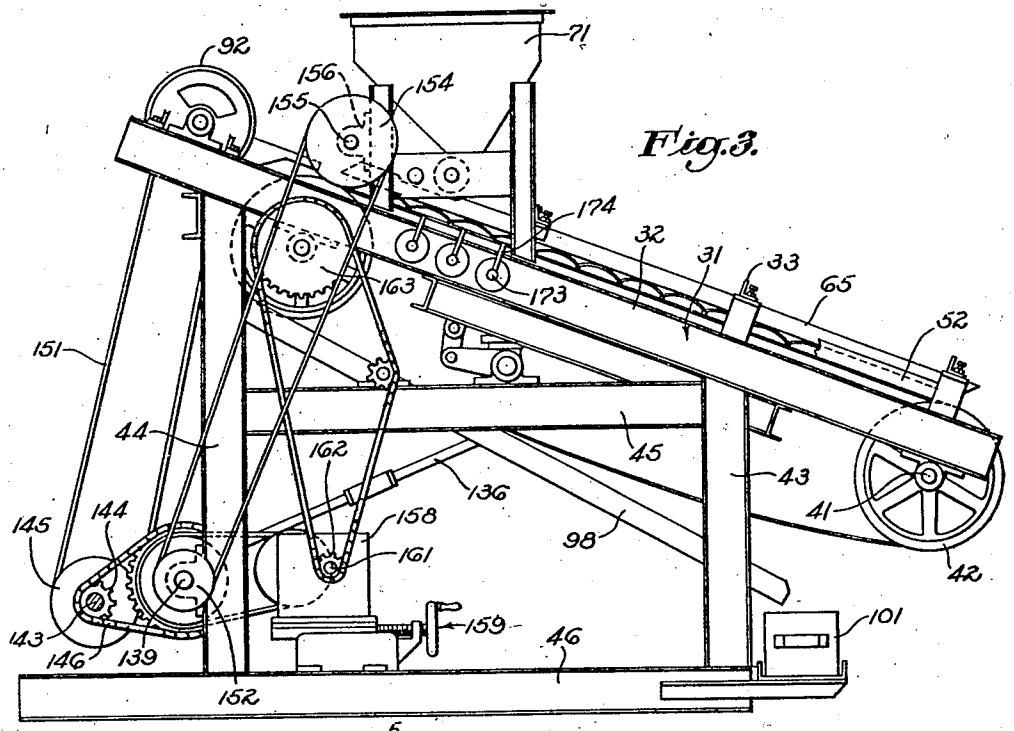
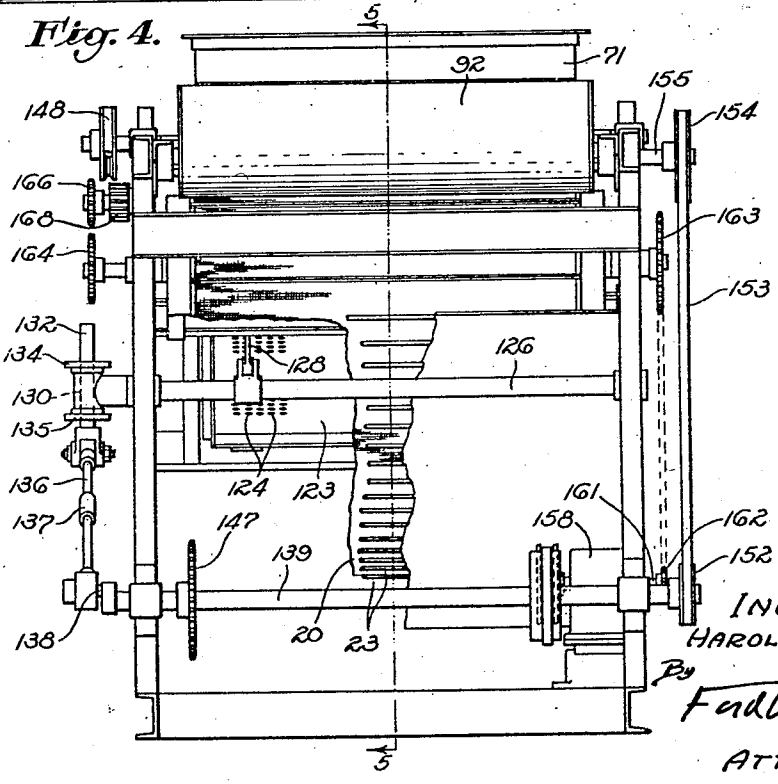


Fig. 4.



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DRY CONCENTRATOR

Filed March 2, 1936 5 Sheets-Sheet 3

Fig. 6.

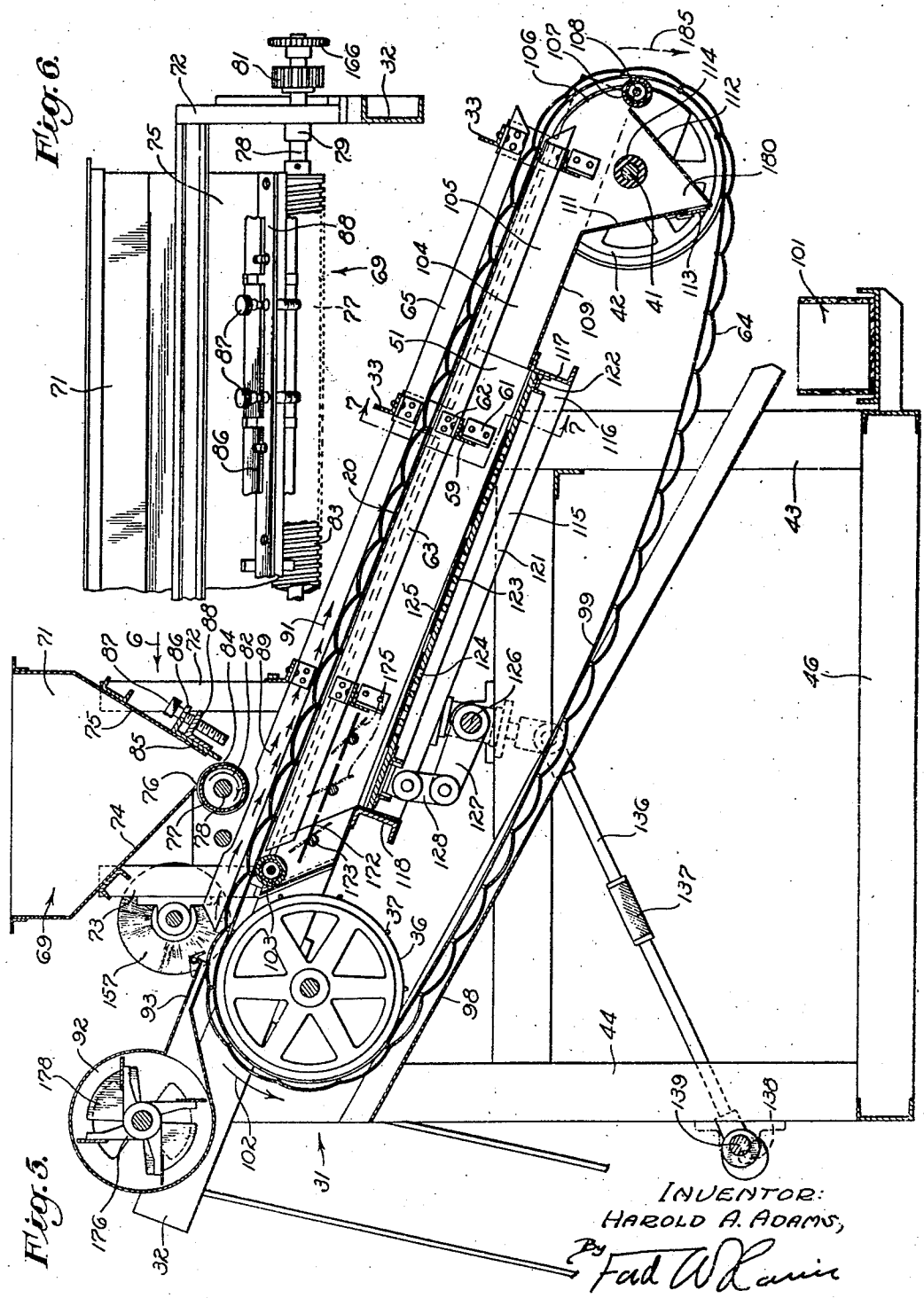


Fig. 5.

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, CLASSIFYING, SEPARATING,
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Jan. 24, 1939. H. A. ADAMS 2,144,671

DRY CONCENTRATOR

Filed March 2, 1936 5 Sheets-Sheet 4

Fig. 8.

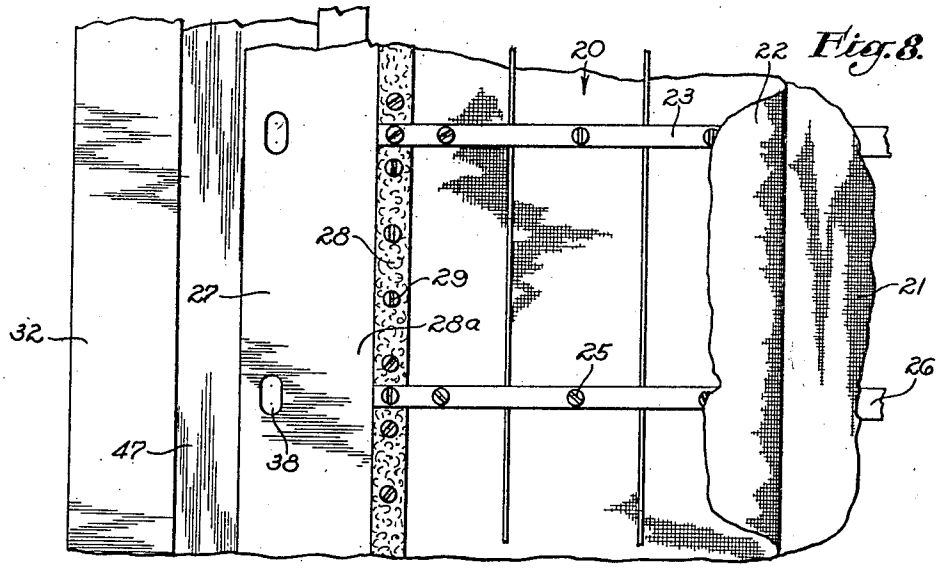
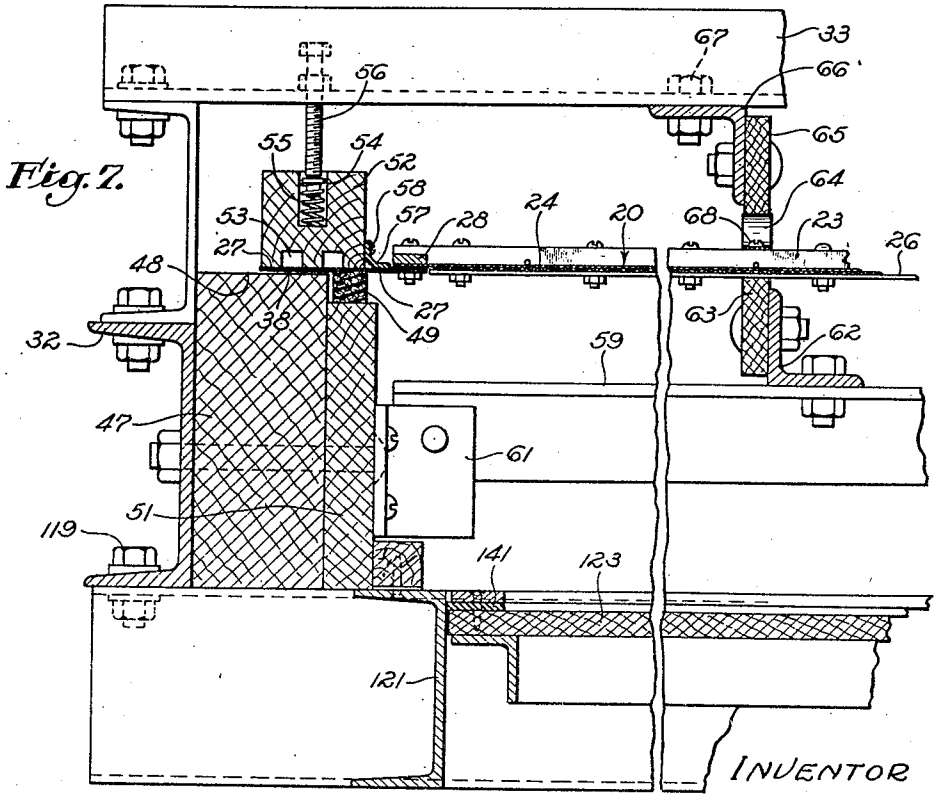


Fig. 7.



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02

Cross Reference

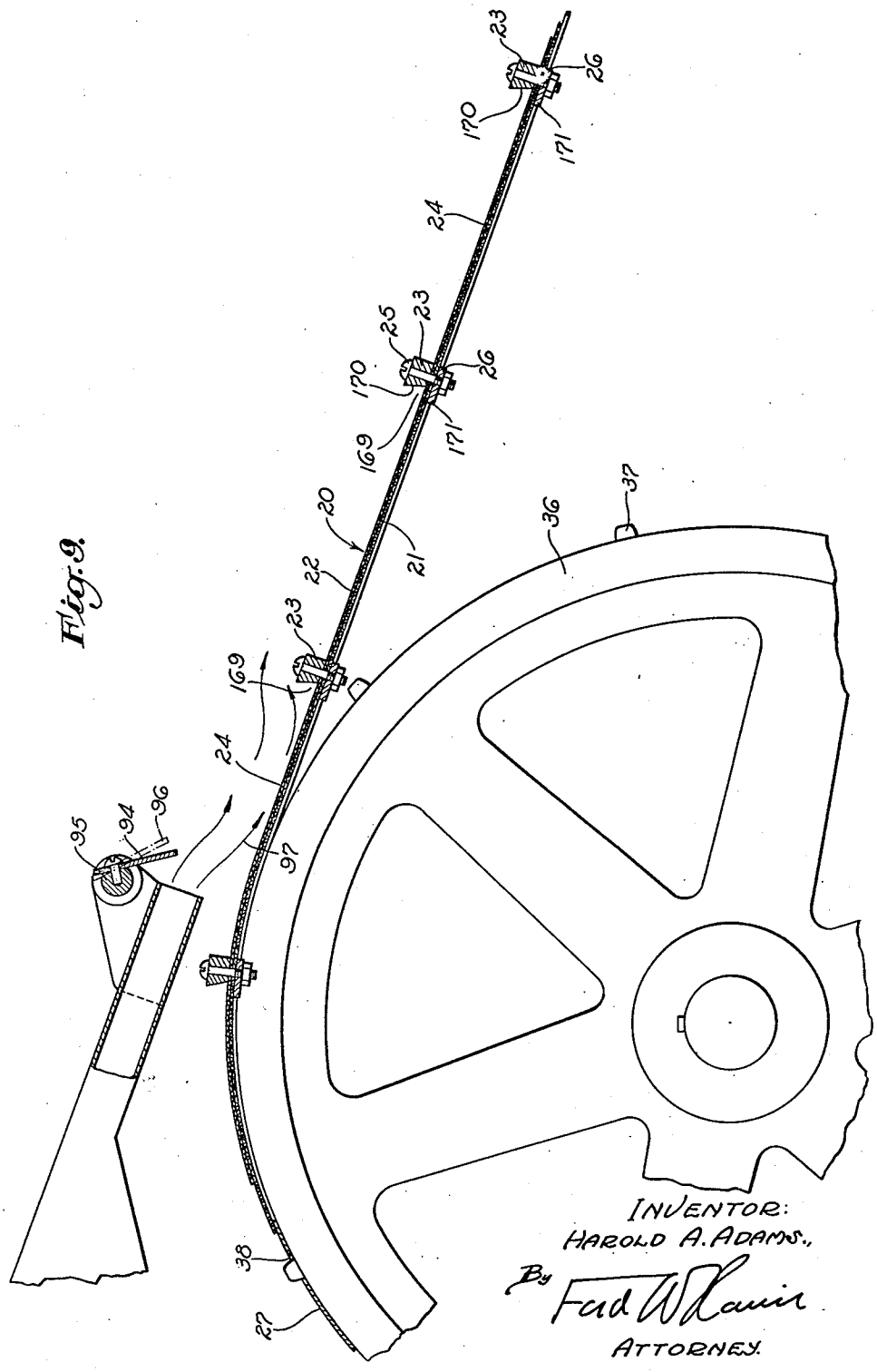
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Jan. 24, 1939. H. A. ADAMS 2,144,671

DRY CONCENTRATOR

Filed March 2, 1936 5 Sheets-Sheet 5

Fig. 9.



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Patented Jan. 24, 1939 2,144,671

UNITED STATES PATENT OFFICE

2,144,671

DRY CONCENTRATOR

Harold A. Adams, Bakersfield, Calif.

Application March 2, 1936, Serial No. 66,623

6 Claims. (Cl. 209—470)

My invention relates to the art of separating granular or pulverized material, and has its greatest utility in the concentration of ores so as to remove the valuable constituents from the remaining mass of materials forming a body of ore.

The use of ore concentrators is extensive, and devices for ore concentration have been devised for handling the ore in wet form and also in dry form. Wet concentrators have been developed to a high state of efficiency, but it is believed that the dry concentrators now obtainable have relatively low efficiency. There are many deposits of valuable minerals in locations where water is extremely scarce or unobtainable at a cost warranting its use in wet concentration. It is an object of my invention to provide a dry concentrator which may be used under the conditions above set forth, owing to the fact that it does not require a wet ore mixture in its operation, and which is of such high efficiency and simplicity that it may be profitably employed.

It is an object of the invention to provide a dry concentrator which may be operated at low cost, and which, due to its low loss of valuable materials, is especially suited for use on ores of low value. This does not mean, however, that the concentrator may not be advantageously used for concentration of high value ores, for the high efficiency of the device is maintained regardless of the assay of the ore.

It is an object of the invention to provide a dry concentrator which may be satisfactorily used on ores ground to larger size than is ordinarily maintained in concentrating practices.

It is an object of the invention to provide a concentrator which will deliver a concentrate having a minimum of waste materials therein.

It is an object of the invention to provide a concentrator having a wall member so formed that air may pass therethrough, this wall member being in the form of a loop or continuous belt, and being supported so that it may pass continuously through an upwardly sloping path of movement. In a concentrator of this character, the invention has for additional objects to provide a perforate wall construction on which the concentration functions may be performed, this wall being of novel form and contributing directly to the valuable results obtained; to provide a simple and effective means for forming concentrate receptacles or pockets on the upper face of the wall member, such concentrate receptacles or pockets having a simple guard means associated therewith; to provide a novel and controllable means for feeding the ore to the concentrator wherein a blast of air is employed to distribute the ore particles rearwardly across the face of the wall member; to provide a simple means for controlling the aforesaid blast of air so that, in addition to its previously stated valuable utility, the blast of air or portions thereof will clean the upper surface of the wall member, thereby removing fine waste materials; to provide a simple means for causing a breathing of air through the wall member; to provide a means for controlling the vertical movement of the wall member during the operation of concentration; to provide an efficient feeder for feeding the granulated or pulverized ore to the concentrator, wherein a roll member having a spiral groove is employed; and to provide means whereby the feeding of the concentrate, the velocity of the wall member, and the breathing action of air through the wall member may be independently controlled or regulated in accordance with the characteristics of the ore being treated so as to at all times maintain a high efficiency in the operation of the concentrator.

Further objects and advantages of the invention will be brought out in the following part of the specification.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is a right-hand side view of a preferred embodiment of my invention.

Fig. 2 is a partly sectioned plan view corresponding to Fig. 1.

Fig. 3 is a left-hand side view of the device.

Fig. 4 is a partly sectioned rear end view of the device.

Fig. 5 is an enlarged section on a plane represented by the line 5—5 of Fig. 4.

Fig. 6 is a fragmentary section taken as indicated by the arrow 6 of Fig. 5.

Fig. 7 is an enlarged fragmentary section taken as indicated by the line 7—7 of Fig. 5.

Fig. 8 is an enlarged fragmentary plan view corresponding to Fig. 7.

Fig. 9 is an enlarged fragmentary sectional view clearly showing the construction of the wall member and the manner in which concentrate pockets are formed along the edges of the riffle bars.

In the preferred form of the invention shown, I provide a wall member 20 which is made in the form of a continuous loop or belt, so that a portion thereof may be continuously moved through a sloping path during the operation of the concentrator. This wall member, as shown in Fig. 9, comprises a perforate supporting member 21 con-

sisting of a wire mesh screen, and a layer of finely woven fabric 22, such fabric being preferably airplane linen. The fabric 22 lies on the upper or outer surface of the screen 21 and is secured thereto by means of laterally directed riffle bars 23 which are spaced apart in substantially the manner shown so that areas 24 of the fabric 22 are left exposed between the riffle bars 23.

The riffle bars 23 are secured in place by means of small bolts 25 which pass through openings in the bars 23, the fabric 22, and the screen 21, and also pass through guard strips 26 which rest against the under face of the screen 21. The bolts 25 are spaced relatively close together and are tightened just sufficiently to secure the fabric 22 without causing the same to pucker. As best shown in Figs. 7 and 8, edge strips 27, of ribbon steel, are secured to the edges of the screen 21 in such a manner that the edges of the screen 21 overlap the edges of the strips 27. Side walls or guards for the areas 24 are formed by strips 28 of leather or other flexible material, these strips being secured in place by means of screws 29. The edge strips 27 reinforce the edges of the wall member 20, and the bars 23 and the guard strips 26 provide the wall member 20 with lateral stiffness.

To support the wall member 20 in operative position, I provide a sloping member 31 which is essentially a frame comprised of side bars or channels 32 held in spaced relation by cross bars 33 which are preferably structural angles. The side bars 32 slope upwardly, and near the upper ends thereof bearings 34, which are secured to the under edges of the side bars 32, support a shaft 35 carrying a pair of sprockets 36 having teeth 37 for engaging sprocket holes 38 in the edge strips 27 of the wall member 20. Near the lower ends of the side bars 32, bearing members 39, secured to the under faces of the side bars 32, support a shaft 41 which carries a pair of idler wheels 42. The wall member 20 in its continuous belt-like form is run over the sprocket wheels 36 and the idlers 42 which are laterally spaced so as to engage the ribbon steel edge strips 27 of the wall member 20. Each of the side bars 32 is supported by front and rear posts 43 and 44, which may be connected by reinforcing channels 45 and may have their lower ends connecting to channels 46 forming footings for the concentrator.

As best shown in Figs. 7 and 8, the upper part of the wall member 20, between the sprocket wheels 36 and the idlers 42, has its edges supported on strips 47 which may be formed of wood and which provide shoulders 48 on which the outer edge portions of the edge strips 27 may slide. Sealing strips 49 of suitable yieldable material, such as rubber or rubberized fabric, are supported adjacent and within the shoulders 48 by means of strips 51 which are secured to the inner faces of the strips 47. Hold-down strips 52 are mounted so as to yieldably force the edge strips 27 downwardly against the shoulders 48 and against the sealing means 49. Such hold-down strips 52 may be made of hard wood with longitudinal grooves 53 formed in the lower faces thereof, with a view to reducing the area of engagement with the upper faces of the strips 27. The hold-down strips 52 have openings 54 in the upper faces thereof in which springs 55 are retained. Adjusting screws 56 threaded through the cross bars 33 have their lower ends projecting into the upper ends of the openings 54 so as to bear downwardly against the springs 55. To prevent granular or pulverized materials from working under the hold-down strips 52, guard strips, or sealing strips 57, of flexible material, such as leather or rubber, are secured to the inner faces of the members 52 by means of screws 58, and in such position these sealing strips 57 engage the upper faces of the edge strips 27 adjacent the outer edges of the guard members 26.

Under the cross bars 33 and below the upper portion of the wall member 20, lateral supporting bars 59 are extended between the strips 51, these bars 59 being held by clips 61, as best shown in Fig. 7. By means of longitudinal angles 62 which are bolted to the lateral members 59, lower supporting strips 63 are secured in such position that the guard strips 26 of the wall member 20 will ride thereon as the wall member 20 moves from the idlers 42 to the sprocket wheels 36. These strips 63 are relatively rigid so that downward movement of the wall member 20 is substantially prevented. The wall member 20 is held resiliently downwardly against the strips 63 by means of arched leaf springs 64 which engage the lower edges of intermediate hold-down strips 65 which are secured above the wall member 20 in longitudinal relation to the frame member 31 by means of longitudinal angles 66 which are bolted to the cross members 33, as indicated at 67. The ends of the arched leaf springs 64 are secured to the upper faces of the riffle bars 23 by means of screws 68 disposed intermediate the bolts 25 by which the bars 23 are held in place.

I provide a feeder 69 for feeding granulated or pulverized materials to the upper face of the wall member 20, this feeder 69 including a hopper 71 of a length corresponding substantially to the width of the exposed fabric 22. This hopper 71 may be supported on legs 72 and 73 which are connected to the side bars 32. As shown in Fig. 5, the hopper 71 has downwardly converging side walls 74 and 75 disposed so as to form an opening 76 between the lower ends thereof, this opening 76 being substantially closed, or nearly so, by a feed roll 77 secured to an axle 78 supported by bearings 79 and having a gear 81 thereon through which the shaft 78 and the feed roll 77 may be rotated in the direction indicated by an arrow 82 in Fig. 5. The feed roll 77 has a spiral groove 83 running from end to end thereof, which spiral groove, as the surface of the roll 77 exposed in the opening 76 of the hopper moves downwardly, tends to move the material in the extreme lower part of the hopper 71 laterally, thereby straightening any elongated or sliver-like particles so that they may pass downwardly through the small discharge space 84 formed between the periphery of the roll 77 and adjustable plates 85 which are supported at the lower edge of the wall 75. These plates or gate members 85 have the upper edges 86 thereof bent forwardly so that they may be engaged by adjusting screws 87 which are threaded through a supporting member 88 consisting preferably of a structural angle secured to the wall 75 in spaced relation so that the gate members 85 may slide in the space between the wall 75 and the member 88 under control of the adjusting screws 87 so as to control the width of the feed opening 84.

The invention also provides a means for producing a blast of air traveling downwardly under the feeder 69, as indicated by arrows 89 in Fig. 5, this blast of air being so proportioned relative to the character of the materials being fed from the hopper 71 that the materials will be dis-

charged or conveyed along the plane parallel to the upper face of the wall member 20 as indicated in general by arrows 91. Accordingly, the ore is not dropped directly from the hopper 69 in the surface of the wall member 20, but is spread downwardly therealong in the form of a veil or heavily charged moving atmosphere from which the particles of ore drop onto the upper surface of the wall member 20. This characteristic manner of feeding the ore particles to the wall member 20 I consider of supreme importance in conjunction with other features herein disclosed, in producing improved results in concentration. I have found that at times I have obtained an efficiency of concentration of 97% and have conducted numerous runs in which the efficiency has been 93%. By efficiency of concentration I mean the actual quantity of valuable constituents removed from the ore as compared with the entire quantity of valuable constituents in the ore, as determined by assaying the ore.

The means for producing the blast of air referred to in the preceding paragraph is in the form of a blower 92 which is secured to the upper ends of the side members 32 and has a discharge mouth 93 which is nearly as wide as the wall member 20 and is of relatively small vertical dimension. The discharge end of the member 93 is disposed near the upper surface of the wall member 20 and above or leftwardly of the feeder 69. The air blast producing means, or blower 92, is provided with a controllable means for creating a flow of air downwardly against the upper face of the wall member 20 after such wall member has passed upwardly under the feeder 69. As best shown in Fig. 9, this control means consists of a plate or vane 94 mounted on a lateral shaft 95 so that it may be swung downwardly from the dotted line position thereof indicated at 96 to such position, as indicated by full lines, that it will cause a downward deflection of air, as indicated by an arrow 97, against the upper face of the fabric 22 so as to remove light waste materials from the surface of the fabric, to prevent such waste materials from being carried on over into the concentrate receiver which consists of a sloping wall 98, Fig. 5, disposed below the lower extension 99 of the wall member 20, and a removable receptacle 101 disposed at the lower end of the wall member 98 so that the concentrates may collect therein. The sprocket wheels 36 turn in the direction of arrows 102 during the operation of the concentrator. As the wall member 20 passes over the sprockets 36 in the direction indicated by the arrows 102, the concentrates drop from the wall member 20 onto the sloping wall 98 and subsequently move down this wall 98 to the receptacle 101.

In conjunction with the parts previously described, I provide a means for producing a breathing of air through that portion of the wall member 20 which is traveling upwardly from the idler wheels 42 to a roller 103 disposed near the sprocket wheels 36, as best shown in Fig. 5. A chamber 104 is produced adjacent the under face of the foregoing part of the wall member 20. The sides of this chamber 104 are formed by the strips 51 and by metal walls 105 which extend downwardly from the strips 51, as best shown in Fig. 5. These walls 105 fit close to the idler wheels 42, and the lower ends of the upper edges of the plates or walls 105 are curved as indicated at 106. Between the lower ends of the walls 105, a roller 107 is supported on a shaft 108, this roller 107 engaging the inner face of the wall member 20 in a plane substantially horizontal with the axis of the shaft 41 carrying the idler wheels 42. Between the lower edges of the metal walls 105, metal walls 109, 111, and 112 are extended. The walls 111 and 112 are disposed in V-shaped arrangement so as to pass around the shaft 41, and at the lower edge of the wall 111 a door 113 may be provided through which collected materials may be periodically withdrawn. To permit leakage of air outwardly from the chamber 104 along the shaft 41, a tube 114 is placed around the shaft 41, this tube extending from one wall 105 to the other.

At the upper edge of the wall 109 of the chamber 104, a bellows means 115 is situated, this bellows means including a rectangular frame 116 comprised of lateral channels 117 and 118 secured by means of bolts 119 to the side members 32, and longitudinal channel members 121. By hinges 122 connected to the lateral member 117, a plate 123 is secured within the frame 116. The plate 123 has air openings 124 therethrough equipped with flap valves 125 which are secured to the upper face of the plate 123. Means are provided for vertically swinging the plate 123 so as to produce a periodic upward pumping of air into the chamber 104, a portion of this air passing through the wall member 20 and assisting in the concentrating action, as will be hereinafter described. The operating means for the plate 123 includes a laterally extending shaft 126 having levers 127 fixed thereon, these levers being connected to the upper end of the plate 123 by means of links 128. For rocking the shaft 126, so as to in turn swing the levers 127, an adjustable crank or lever 129 is fixed on the rightward end of the shaft 126, as shown in Fig. 1. This member 129 includes a body 131 which is connected to the end of the shaft and has a lateral opening 130 for a screw 132 provided with a clevis 133 or other suitable pivot means at its lower end. This screw 132 may be raised or lowered by turning flat nuts 134 and 135 which are threaded on the screw 132 so as to engage the ends of the body 131. By means of a connecting rod 136 containing a turn buckle 137, the clevis 133 of the screw 132 is connected with an eccentric 138 mounted on the rightward end of a shaft 139 supported across the rear of the post 44. As best shown in Fig. 7, the edges of the bellows plate 123 are provided with projecting rubber strips 141 which engage the inner faces of the channels 118 and 121 and form sealing means for limiting the leakage of air around the edges of the plate 123 during the operation thereof. To drive the concentrator, a motor 142 is shown in Fig. 2 adjacent the rear end of the concentrator, this motor 142 being connected to a short jack shaft 143 carrying a drive sprocket 144 and a pulley 145. The sprocket 144 drives the shaft 139 through a chain 146 which extends over a sprocket 147 which is fixed to the shaft 139. The pulley 145 is connected with a pulley 148 on the shaft 149 of the blower 92 by a belt 151. This direct connection with the motor results in driving the blower 92 at relatively high speed. On the leftward end of the shaft 139 is a pulley 152 which is connected by means of a belt 153 with a pulley 154 mounted on a laterally extending shaft 155 carried by bearing members 156 which are mounted on the legs 73 of the feeder 69. Brushes 157 of circular form are secured to the shaft 155 in positions to engage the upper faces of the guard strips 28 and the inner edges 28a of the metal-edged strips 27, to

brush downwardly therefrom any accumulations of waste materials, so that these materials, adhering to the edges of the wall member 20, will not be carried over the top of the closed path followed by the member 20.

A variable-speed transmission 158, having an adjusting means 159, is mounted so that its power output shaft 161 will support a sprocket 162 in alignment with a sprocket 163 fixed to the leftward end of the shaft 35 carrying the sprocket wheels 36. On the rightward end of the shaft 35 a sprocket 164 is mounted, and from this sprocket 164 a chain 165, as shown in Fig. 1, is carried over a sprocket 166 mounted on an idler shaft 167 disposed adjacent the shaft 78 of the feed roll 77 so that a gear 168, Fig. 2, keyed to the shaft 167 will engage the gear 81 mounted on the rightward end of the shaft 78.

In the operation of the concentrator, the ground ore is fed downwardly from the hopper 71 into the air stream indicated by the arrows 89. The ore particles are carried downwardly through a path, such as indicated by the arrows 91, and tend to settle toward the upper face of the wall member 20. At the same time, the bellows plate 123 is swinging vertically on the hinge means 122. When the plate 123 moves upwardly, the flap valves 125 thereof are closed, and air is forced upwardly through the screen 21 and the pores of the fabric 22. Accordingly, at this time there is an upward movement of air from the pores of the fabric 22 which tends to resist settling of particles which are being carried downwardly by the flow of air indicated by the arrows 89 and 91. When the bellows plate 123 moves downwardly, the flap valves 125 open and allow air to enter the chamber 104. The result of this is that there is a very slight suction exerted on the under face of the wall member 20, and accordingly at this time there is essentially no vertical movement of air above the upper surface of the wall member 20. Accordingly, while the bellows plate 123 is moving downwardly, there exists a period of time during which particles of ore above the wall member 20 tend to settle toward the upper surface of the wall member 20. The result of this breathing action is that the lighter particles constituting the ore fed to the concentrator pass down the upper surface of the wall member 20 and are discharged from the lower end thereof as indicated by the arrow 185 of Fig. 5. During the breathing action of air through the wall member 20 and during the feeding of ore thereto, as previously described, the upper or used portion of the wall member 20 is moved at a controlled rate of speed in upward direction due to the driving action of the sprocket wheels 36.

The heavy ore particles, such as metals and chemical compounds of these metals, settle to the surface of the fabric 22. The breathing action is controlled in magnitude, and sometimes in velocity or periodicity, to accomplish the settling of the heavy particles onto the upper surface of the wall member 20 and to cause the light, unwanted ore particles to move down the upper face of the wall member 20 and to be finally discharged therefrom, as indicated by the arrow 185. The heavy ore particles, after they have settled to the surface of the fabric 22, are caused by the breathing action to move downwardly on the surface of the fabric 22 into ore receptacles or pockets 169 formed in the upper faces or forward edges of the riffle bars 23, as shown in Fig. 9. The riffle bars 23 are undercut, as shown at 170, so as to produce the concentrate pockets 169, and these concentrate pockets 169 are guarded against breathing of air through the wall member 20 by the edges 171 of the guard strips 26 which project, as shown in Fig. 9, so as to lie under, and project slightly beyond the pockets 169. There is more or less of a small vertical movement of the wall member 20 and the fabric 22 due to the action of the air movement produced by the reciprocation of the bellows plate 123. This vertical movement or vibration of the wall member 22 is effectually restrained in part by the upper and lower guides formed in part by the upper and lower bars 65 and 63 which, as previously described, extend longitudinally or in the direction of movement of the upper extension of the wall member 20 which passes over the chamber 104.

The invention provides means for controlling the breathing action through selected parts of the wall member 20. For example, under the feeder 69 the velocity of the air blast, and the turbulence thereof, are relatively strong; therefore, below the wall member 20 at this point laterally elongated butterfly valves 172 are mounted on lateral shafts 173, as shown in Fig. 5. As shown in Fig. 3, the extending leftward ends of the shafts 173 are provided with handles 174 whereby the shafts 173 may be rotated so as to swing the valve members or baffles 172 into such positions as indicated by dotted lines 175 in Fig. 5. After the wall member passes the roller 103, there is no further breathing action through the wall member 20, and the upper surface of the fabric 22 at this point is essentially quiescent. As previously described relative to Fig. 9, the control plate 94 is adjusted so that air from the blower will be deflected downwardly onto the upper face of the wall member 20 to remove light waste materials therefrom. The strength of the air blast delivered by the blower 92 might be controlled by varying the velocity of the impeller 176 thereof, but the simplest manner of producing the desired control of the air blast is through the provision of inlet gates 178 for controlling the entrance of air into the blower 92. In the concentrator disclosed, I believe that the ability to obtain high efficiency under different conditions of operation is due to the relative adjustability of the different functions of the apparatus. For example, the feeding of ore particles, the blast of air for producing the distribution of ore particles across the upper face of the wall member 20, the velocity of the wall member, and the breathing action produced by the bellows plate 123 may be individually controlled with relation to each other, with the result that the desired ore constituents are collected in the pockets 169 of the riffle bars 23, and the waste materials are discharged from the lower end of the device. The concentrates are discharged from the wall member as it travels from the sprocket wheels 36 to the guide wheels 42. It is found that extremely fine metal particles may enter the pores of the fabric 22. Some of these particles pass through the pores of the fabric 22 during the breathing action exerted when the wall member is above the chamber 104, such particles passing into the chamber 104 and finally being carried down into the collecting pocket 180 formed between the walls 111 and 112. Other of the minor particles held in the pores of the fabric 22 are released during the movement of the wall member 20 across the sloping plate or wall 98.

I claim as my invention:

1. In a concentractor of the character described, the combination of: a wall member adapted to be moved upwardly through a sloping path of movement, said wall member being formed in a continuous loop and comprising a screen having metal strips secured to the edges thereof, a layer of fine mesh fabric on the upper face of said screen, and lateral riffle bars secured to the upper face of said fabric in longitudinally spaced relation; supporting means for said wall member comprising a sloping frame having shoulders on which said edge strips of said wall member may slide; means for moving said wall member upwardly on said frame; edge holding means disposed above said shoulders and resiliently pressing said metal strips against said shoulders; sealing members operative between the inner edges of said edge holding means and said metal strips; a feeder for materials to be treated, disposed near the upper end of said sloping frame and above said wall member; means for driving said feeder; means for applying impulses of air to the lower face of said wall member of such strength that air will pass through said wall member; guide means carried by said sloping frame in positions above and below the intermediate parts of said wall member disposed between said shoulders of said sloping frame and limiting the vertical movement of said parts of said wall member; and means disposed at the upper end of said sloping frame for producing a downward blast of air under said feeder and downwardly relative to the upper face of said wall member.

2. In a concentrator of the character described, the combination of: a wall member adapted to be moved upwardly through a sloping path of movement, said wall member being formed in a continuous loop and comprising a screen having metal strips secured to the edges thereof, a layer of fine mesh fabric on the upper face of said screen, and lateral riffle bars secured to the upper face of said fabric in longitudinally spaced relation; supporting means for said wall member comprising a sloping frame having shoulders on which said edge strips of said wall member may slide; means for moving said wall member upwardly on said frame; edge holding means disposed above said shoulders and resiliently pressing said metal strips against said shoulders; a feeder for materials to be treated, disposed near the upper end of said sloping frame and above said wall member; means for driving said feeder; means for applying impulses of air to the lower face of said wall member of such strength that air will pass through said wall member; and guide means carried by said sloping frame in positions above and below the intermediate parts of said wall member disposed between said shoulders of said sloping frame and limiting the vertical movement of said parts of said wall member.

3. In a concentrator of the character described, the combination of: a wall member adapted to be moved upwardly through a sloping path of movement, said wall member being formed in a continuous loop and comprising a screen having metal strips secured to the edges thereof, a layer of fine mesh fabric on the upper face of said screen, and lateral riffle bars secured to the upper face of said fabric in longitudinally spaced relation; supporting means for said wall member comprising a sloping frame having shoulders on which said edge strips of said wall member may slide; means for moving said wall member upwardly on said frame; edge holding means disposed above said shoulders and resiliently pressing said metal strips against said shoulders; a feeder for materials to be treated, disposed near the upper end of said sloping frame and above said wall member; means for driving said feeder; means for applying impulses of air to the lower face of said wall member of such strength that air will pass through said wall member; lower guides carried by said sloping frame between said shoulders thereof, said guides being relatively rigid and preventing downward movement of the intermediate parts of said riffle bars; and upper guide means resiliently applied to the upper part of said wall member between said shoulders of said sloping frame for forcing said wall member toward said lower guides.

4. In a concentrator of the character described, the combination of: a wall member adapted to be moved upwardly through a sloping path of movement, said wall member being formed in a continuous loop and comprising a screen having metal strips secured to the edges thereof, a layer of fine mesh fabric on the upper face of said screen, and lateral riffle bars secured to the upper face of said fabric in longitudinally spaced relation; supporting means for said wall member comprising a sloping frame having shoulders on which said edge strips of said wall member may slide; means for moving said wall member upwardly on said frame; edge holding means disposed above said shoulders and resiliently pressing said metal strips against said shoulders; a feeder for materials to be treated, disposed near the upper end of said sloping frame and above said wall member; means for driving said feeder; means for applying impulses of air to the lower face of said wall member of such strength that air will pass through said wall member; lower guides carried by said sloping frame between said shoulders thereof, said guides being relatively rigid and preventing downward movement of the intermediate parts of said riffle bars; hold-down means spaced above said guides in spaced relation to the upper face of said wall member; and spring members operative between said hold-down means and said wall member to hold said wall member downwardly against said guides.

5. In a concentrator of the character described, the combination of: a wall member adapted to be moved upwardly through a sloping path of movement, said wall member being formed in a continuous loop and comprising a screen having metal strips secured to the edges thereof, a layer of fine mesh fabric on the upper face of said screen, and lateral riffle bars secured to the upper face of said fabric in longitudinally spaced relation; supporting means for said wall member comprising a sloping frame having shoulders on which said edge strips of said wall member may slide; means for moving said wall member upwardly on said frame; edge holding means disposed above said shoulders and resiliently pressing said metal strips against said shoulders; a feeder for materials to be treated, disposed near the upper end of said sloping frame and above said wall member; means for driving said feeder; means for applying impulses of air to the lower face of said wall member of such strength that air will pass through said wall member; lower guides carried by said sloping frame between said shoulders thereof, said guides being relatively rigid and preventing downward movement of the intermediate parts of said riffle bars; hold-down means spaced above said guides in spaced relation to the upper face of said wall member; and upwardly arched leaf spring members having the

ends thereof connected to said riffle bars, said spring members engaging said hold-down means and operating to force said wall member downwardly against said guides.

6. In a concentrator of the character described, the combination of: a wall member adapted to be moved upwardly through a sloping path of movement, said wall member being formed in a continuous loop and comprising a screen having metal strips secured to the edges thereof, a layer of fine mesh fabric on the upper face of said screen, and lateral riffle bars secured to the upper face of said fabric in longitudinally spaced relation; supporting means for said wall member comprising a sloping frame having shoulders on which said edge strips of said wall member may slide; means for moving said wall member upwardly on said frame; edge holding means disposed above said shoulders and resiliently pressing said metal strips against said shoulders; sealing members operative between the inner edges of said edge holding means and said metal strips; a feeder for materials to be treated, disposed near the upper end of said sloping frame and above said wall member; means for driving said feeder; means for applying impulses of air to the lower face of said wall member of such strength that air will pass through said wall member; means disposed at the upper end of said sloping frame for producing a downward blast of air under said feeder and downwardly relative to the upper face of said wall member; and an adjustable deflector member associated with said last named means for directing air downwardly against the upper face of said wall member at a point above said feeder.

HAROLD A. ADAMS.