Aug. 4, 1931. K. DAVIS 1,817,296

METHOD AND MECHANISM FOR SEPARATING INTERMIXED DIVIDED MATERIALS

Filed March 30, 1923 4 Sheets-Sheet 1

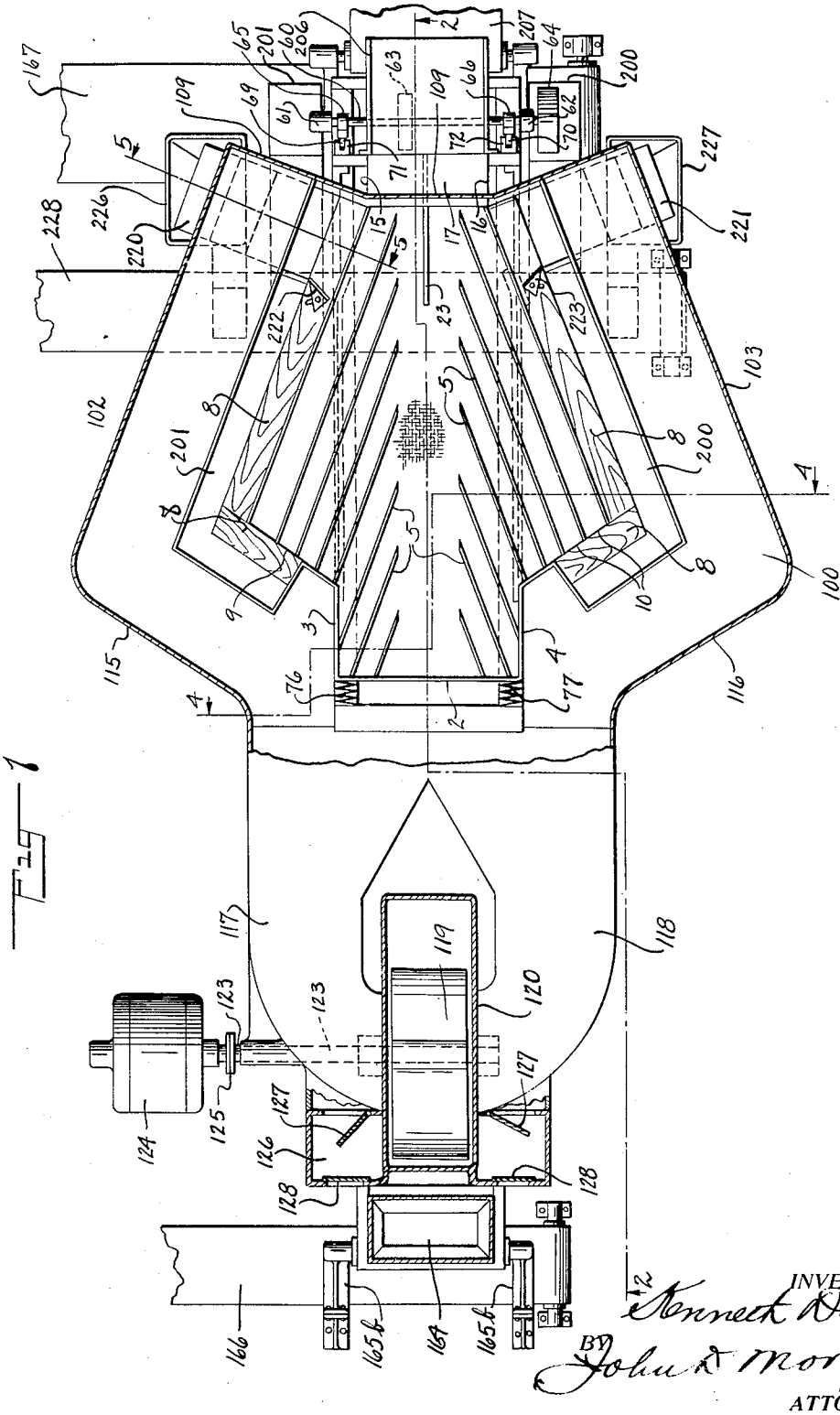


Fig. 1

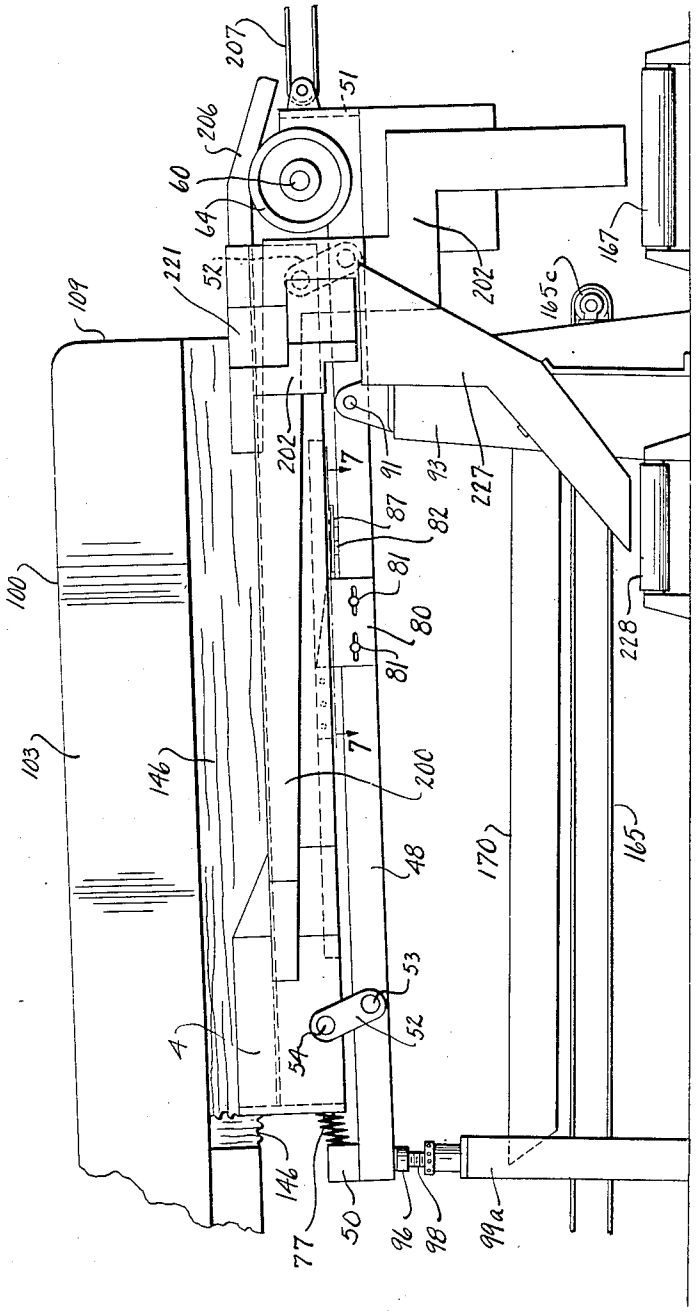
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Fig. 3



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Fig 4

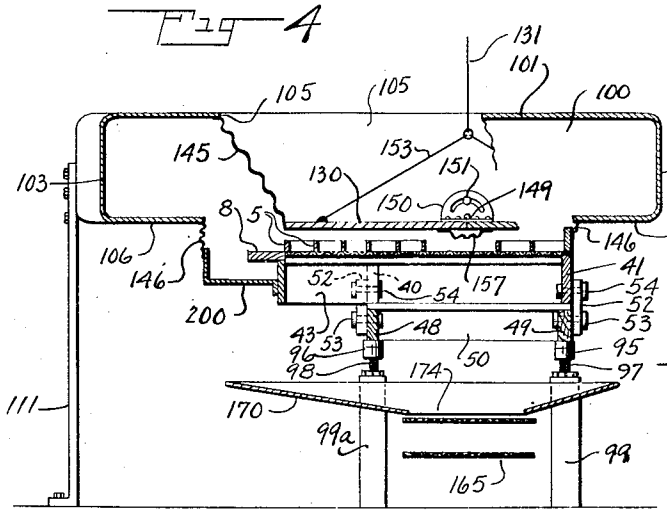


Fig 6

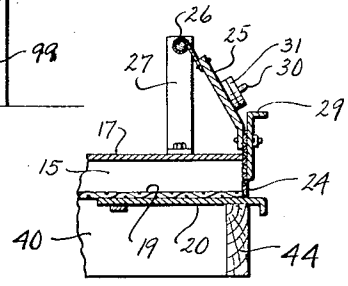


Fig 5

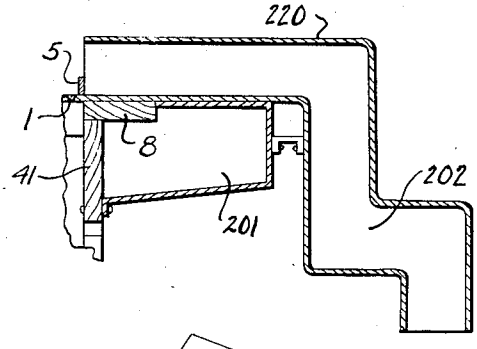


Fig 7

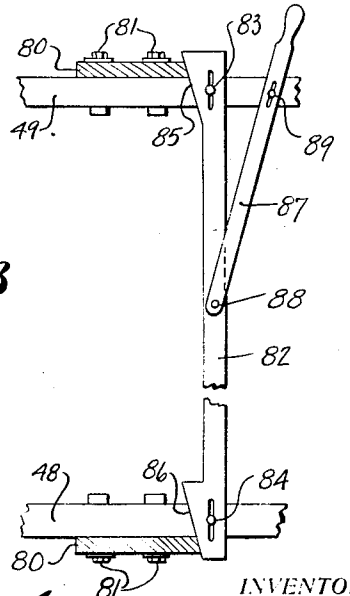
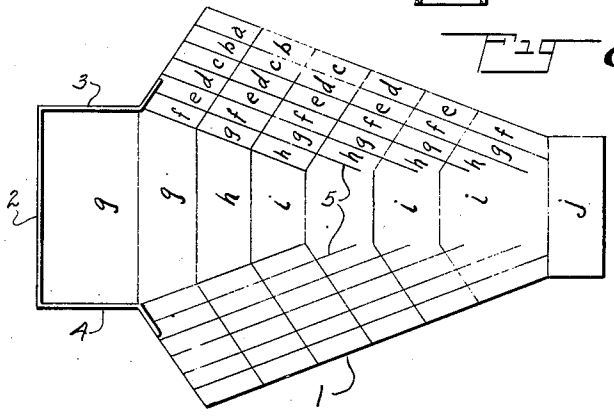


Fig 8



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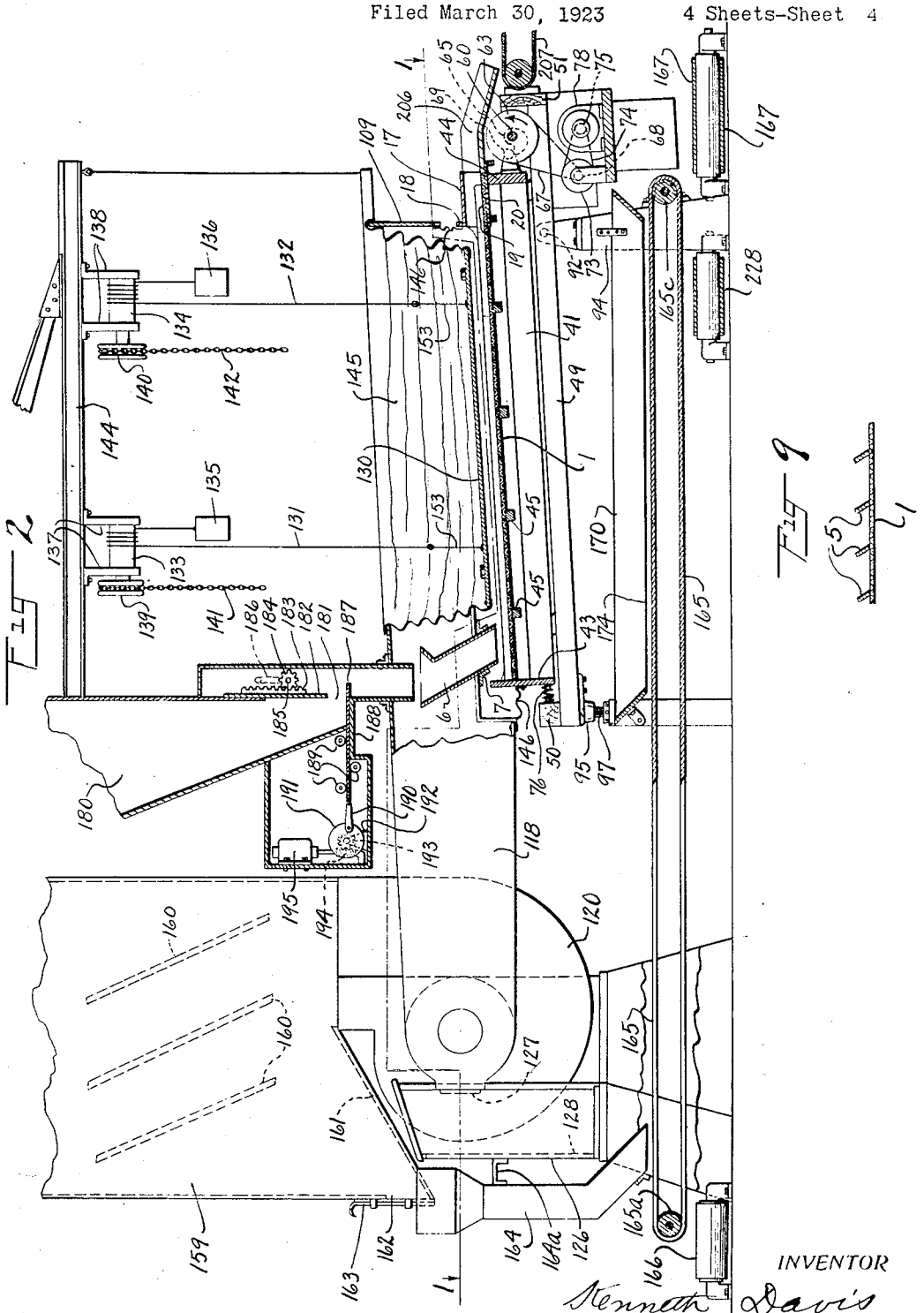


Fig 2

Fig 9

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Patented Aug. 4, 1931

1,817,296

UNITED STATES PATENT OFFICE

KENNETH DAVIS, OF ST. BENEDICT, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PEALE-DAVIS COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE

METHOD AND MECHANISM FOR SEPARATING INTERMIXED DIVIDED MATERIALS

Application filed March 30, 1923. Serial No. 628,321.

The invention relates to a process and mechanism for separating intermixed divided materials of different specific gravities, and more especially to such a process and mechanism effecting the separation by the concurrent action of air pressure and mechanical motion combined in a novel and unusually efficient manner.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is a top plan of the left-hand end, and a horizontal section of the right-hand end of a machine embodying the invention, and is taken substantially on line 1—1 of Fig. 2;

Fig. 2 is a side elevation of the left-hand end and a central, longitudinal, vertical section of the right-hand end of the machine, and is taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary side elevation, on an enlarged scale, of the right-hand end of Figs. 1 and 2;

Fig. 4 is a transverse, vertical section taken substantially on line 4—4 of Fig. 1.

Fig. 5 is a fragmentary, vertical section, on an enlarged scale, taken on line 5—5 of Fig. 1;

Fig. 6 is a fragmentary, central vertical longitudinal section, on an enlarged scale, showing a modified form for the discharge effecting and regulating devices for the heavier material, corresponding to mechanism shown at the central, right-hand end part of Fig. 2;

Fig. 7 is a fragmentary, detail plan, of the impact and vibration regulating means and is taken substantially on line 7—7 of Fig. 3;

Fig. 8 is a diagrammatic plan showing the preferred air-pressure or current variation in different parts of the separating table; and

Fig. 9 is a fragmentary, vertical section, showing one form of separating partitions.

The process and mechanism of the invention are directed to effecting a thorough, rapid, facile and efficient separation of intermixed, divided materials of different specific gravities, and the separate delivery of the separated materials; and in certain aspects of the invention it is especially directed to the separation of coal from the intermingled rock and "bone" or "bony" (a material of very high ash content and consequent low heating properties) as they come from the mine.

The term "divided" will be understood as applying very generally to materials in relatively small parts or particles, or of small size, as contrasted with material with relatively large bulk or in relatively large masses or pieces, and the term will apply to granular, broken, pulverulent or otherwise divided materials in so far as the invention is applicable thereto. The intermixture of coal, rock and bony already referred to is an example of such divided and intermixed materials.

The present invention is also directed to effecting such a thorough, rapid, facile and otherwise efficient separation of the intermixed materials without requiring the usual very slow, laborious and costly preliminary "sizing" of the intermixed materials, such for instance as the "run of the mine" mixture of coal, rock and bony.

The usual "sizing" consists in screening or otherwise separating the materials, while still intermixed, to practically uniform size, within a range of from half-an-inch down by close graduations to one-thirtieth of an inch or less, and even much smaller sizes, preliminary to separating in the usual practice in separating or cleaning coal, the sizing is effected within these very small ranges of size, thus involving very extensive, tedious and expensive preliminary work thereon.

The present invention, on the other hand, will rapidly, thoroughly, easily and efficaciously separate the intermixed materials including a very wide range of sizes. In practice, I have found that a table will take care of all sizes from two-and-one-half inches down to the minimum, but it will be understood that this is merely a statement of present practical experience, and is in no wise restrictive of the invention. The main fact is that the machines of this invention dispense entirely or practically entirely with the costly, time-consuming and otherwise objectionable operation of "sizing".

The present preferred embodiment of the invention comprises, as its general features, a flat separating table or bed, of air pervious material, preferably widening from the rear end forwardly to a median portion thereof, and again narrowing from such median portion toward the forward end. The table is also inclined, preferably forwardly and upwardly, and the intermixed materials are fed thereonto at the rear end.

The table is provided with a plurality of separating partitions, resting upon the top thereof and extending upwardly therefrom, and also extending from the sides or edges thereof inwardly and forwardly. They are preferably parallel, and also vertically inclined backwardly. The inner ends of the partitions stop short of the central part of the table, leaving an unobstructed passage along the central part of the table to the forward end for the passage of the separated heavier material.

The table is acted upon mechanically, having a vibratory, or short reciprocatory, regulable motion imparted thereto longitudinally thereof. The motion is preferably quick forwardly and upwardly, terminating in a sharp impact, and relatively slow backwardly and downwardly.

The air current is preferably drawn upwardly through the bed of intermixed material on the bed, stratifying and thereby separating it. The intensity of the air current or blast is varied in the different parts of the table, also the direction thereof relatively to the stratifying material, and consequently the action on the material is further controlled to effect the best separating action. This includes not only the separating action but also the impulsion or propulsion of the separated material to the place or places of discharge.

The intermixed materials fed onto the bed are subjected to the actions described, and are stratified and thereby separated, and the lighter material is discharged over the sides of the separating table, and the heavier material from the forward end thereof.

In general, the intermixed materials are almost immediately approximately stratified as soon as fed to the table, and the heavier material rests upon and passes down the center of the table to discharge at the forward end. The air pressure and the mechanical action and stresses drive the partially or entirely floated lighter material in a general lateral direction to discharge over the sides of the table, the remainder of the separating action taking place during the movements just described.

Further features of the invention, both structural and functional, will be primarily set forth hereinafter in connection with the following detailed description, but it will be understood that the foregoing general description and the following detailed description are exemplary and explanatory, but are not restrictive of the invention.

Referring now in detail to the present preferred embodiment of the invention, means are provided for supporting, maintaining and operating upon a bed of the intermixed but stratifying and stratified, and consequently separating and separated, materials, and so far as concerns many features of the invention this support or table for the bed of materials may be of different kinds or designs. As embodied, this support or table so far as its immediate structure and principle of operation is concerned is generally the same as, or similar to, my copending application Ser. No. 612,455, filed January 13, 1923.

As herein embodied, the support comprises a flat table 1 of foraminate or otherwise air-pervious material, upon which the bed of intermixed materials rests. This table 1 is preferably upwardly and forwardly inclined, and is moved or actuated both by means and in a manner to be later described.

The intermixed materials which are to be operated upon are fed onto the rear end of the table 1, and this end is smaller, preferably, than the intermediate parts, and is also of rectangular shape, being provided with an upwardly-projecting rear wall 2 and side walls 3 and 4. Right above this receiving part of the table 1 is shown a chute 6, supported by a bracket 7 on the stationary, air-chamber structure. Chute 6 delivers the intermixed material to the table at a rate which is regulated to maintain the bed of materials upon the table in proper quantity and condition for the best result in separating. The mechanism for so feeding the materials to the hopper is later described.

Forwardly of this receiving part, the table is expanded or extended laterally at both sides, and also preferably in the forwardly and outwardly extending directions. The widest part, as embodied, is approximately one-third of the distance from the rear, but these distances and proportions are obviously subject to change as may be found desirable or more efficient with different materials and under different conditions. From this point

the area or width of the table is contracted from both sides inwardly and forwardly toward the front end, at which the heavier separating material is discharged as will be later described.

Means are provided upon the table, which participate in, and cooperate with other instrumentalities (later described), in effecting the gradual separation of the intermixed materials. As embodied, a plurality of separating partitions 5 are provided, which are relatively long and narrow strips of wood, metal, or other suitable material, extending from the exterior edges of the table at either side and disposed inwardly and forwardly toward the central part of the table. The separating partitions 5 terminate short of the center of the table so as to provide a clear passageway centrally and forwardly along the table for the passage or travel of the heavier or heaviest separated material.

These partitions 5 are spaced apart, and are preferably parallelly arranged, and also are inclined upwardly and backwardly, as shown in Fig. 9, but may be perpendicular to the table, if desired, as shown in Fig. 4. The outside ends of these separating partitions, which are located at the rear end of the table, abut against the end wall 2 and side walls 3 and 4. At the wider parts of the table the rear ends of the separating partitions are open at the edge of the table, as shown at 9 and 10.

The lighter or lightest material separated out of the intermixture is delivered over the side edges of the table, as will be later more fully described, and in connection with this delivery, a horizontally-disposed shelf or plate 8 extends outwardly from and about the edges of the table 1, at either side thereof. These shelves serve to support and maintain a mass of the lighter material, such as the coal, thereby maintaining the bed of material of a desired thickness to the outer edge of the separating table proper, the coal or other material dropping from the plates 8 into delivery chutes.

The air-pervious material may vary, and wire gauze, woven wire, perforated plates or other materials may be employed. In accordance with one feature of the invention the intensity of the air currents is varied in the different parts of the table or support 1; that is, the table may be considered as divided into zones of different degrees of air perviousness, although in practice the changes may be gradual or graduated to any degree desired. In Fig. 8, the table 1 is shown divided into a plurality of zones, subject to the qualifications already set forth, and these zones are marked by the letters *a* to *j* in different degrees of increasing air-perviousness, that is, *a* represents the weakest air current and *j* represents the strongest. The present preferred arrangement is that the air currents shall gradually increase forwardly and inwardly, although this may be varied as desired or found most efficient.

The forward end of the table is provided with means for permitting the discharge of the rock or other heavier or heaviest material which has been separated out from the intermixture, and for performing a final separating action or function upon the materials so as to turn back any small residual or remnant of the lighter material, so that it may pass out over the side of the table and not be lost in the heavier material.

As embodied, the forward end of the table is somewhat wider than the passageway between the inner ends of the separating partitions 5. This discharge end comprises a passageway having air-pervious or non-pervious sides and top, with the air-pervious bottom. As embodied, it comprises side walls 15 and 16, and a top 17 connecting with the side walls, and also an upwardly-extending wall 18 with its bottom edge connecting with the rearmost or inner edge of the top 17, as will be seen from Fig. 1. The bottom 19 preferably consists of the air-pervious material of the table 1, but is preferably provided with means for regulating the air action, and for this purpose a slide 20 is provided beneath the floor 19, and is slidable to and fro to shut off the air action in the discharge passage to any desired extent. Preferably also a vertically-disposed longitudinally-extending partition 23 is provided centrally of the table and in front of the discharge passage.

In Fig. 6 a modified form is shown having means for controlling the ingress of air through the discharge passage. As embodied, it comprises an end gate 24 for the discharge opening, the gate being carried on the bottom part of a plate 25, which plate is pivotally mounted on a rod 26 extending across the structure, and supported in standards 27. Means for regulating the flow of air through the passage, and also for regulating an opening and closing of the gate with reference to the air pressure on one side and the pressure of the stream of rock on the other side are provided. For these purposes, the gate 24 is made of air-pervious material and is provided with a slide 29, adapted to shut off or regulate the passage of the air through the gate to any desired degree. Also a pin 30 is mounted in the plate 25 to receive weights 31, to vary and regulate the pressure of material within the passage at which the gate will open. Also, if desired, the structure at the discharge orifice may be the same as is shown and described in my co-pending application Ser. No. 612,455, already referred to.

Means are provided for imparting vibratory or reciprocatory movement of short amplitude to the separating mechanism already

described, and preferably therewith to impart a sharp impact thereto at the end of the travel or reciprocation of the mechanism. As embodied, the table 1 and the cooperating separating devices are mounted on a frame having side reaches 40 and 41 and end reaches 43 and 44. This frame may be styled for convenience the reciprocating frame. Cross strips 45 are preferably provided as supports under the table 1 and the separating partitions 5.

The reciprocating frame is suitably supported above and by a variably inclinable but otherwise stationary, that is, a non-reciprocating frame. This latter frame consists of side reaches 48 and 49 and end reaches 50 and 51. In the embodied form of supporting means for the reciprocating frame, four links 52 are pivotally supported on pins 53, which are fixed in the non-reciprocating frame, approximately adjacent to the four corners thereof. These links are pivotally connected at 54, respectively, to the reciprocating frame, and are inclined and otherwise adapted to give the desired motion, already described, to the table 1 and the cooperating separating mechanism. This motion consists preferably of a relatively sharp and quick upward and forward movement of the table 1 and cooperating parts, terminating in a sharp impact, and a backward and downward movement which is relatively slow.

The embodied form of actuating means comprises a shaft 60, journaled at 61 and 62 on the non-reciprocating frame, and having a driving pulley 63 fixed thereon, and also preferably having a fly-wheel 64 fixed on one end thereof. Shaft 60 is rotated by a belt 67, running over pulley 63 and over a small pulley 68. Fixed on the same shaft with pulley 68 is a large pulley 73, over which runs a belt 74, which also runs over a small pulley 75 on the shaft of a motor 78.

Fixed on shaft 60 to rotate therewith are two cams 65 and 66. Cooperating with these cams, respectively, are two friction rolls 69 and 70, mounted respectively in brackets 71 and 72, fixed on the forward reach 44 of the reciprocating frame.

At the rear end, a pair of springs 76 and 77 are in compression between the rear cross reach 43 of the reciprocating frame and the corresponding cross reach 50 of the non-reciprocating frame. Thus with the links 52 properly inclined, the reciprocating frame and the separating mechanism carried thereby will have a slow downward and backward movement as the cam rollers ride along the rise of their respective cams 65 or 66, at which time the springs 76 and 77 are placed under increased compression. As the cam rollers ride off the high parts of the cams, the coil springs will slam the table forwardly and upwardly with a sharp, quick action.

Stop mechanism is provided by the invention for imparting the impact to the separating mechanism at the end of this forward movement, and it is also arranged to prevent the cam rollers striking against the low parts of the respective cams. As embodied, stop plates 80 are adjustably mounted, respectively, on the outside of the cross reaches 48 and 49 of the non-reciprocating frame by means of bolt-and-slot connections 81.

Means are provided to insure absolutely just or symmetrical positioning of these stops, and as embodied, there is provided a bar 82, extending across and slidably mounted on the top of the frame-pieces 48 and 49, by means of bolt-and-slot connections 83 and 84. The bar has beveled faces 85 and 86 against which the stop plates 80 are to be pressed before the bolts 81 are screwed home to hold the plates in position. Actuating means for the bar 82 are preferably provided, and as embodied, a handle 87 is pivoted at 88 to the central part of the bar, and has a bolt-and-slot connection 89 on the top of the frame member 49. The stops 80 cooperate with lugs or stops 90 fastened on the lower part of the reciprocating frame. Thus the amplitude of the movement of the reciprocating frame is nicely and symmetrically adjustable.

In the embodied form of means for variably inclining the separating mechanism, the non-vibratable frame near its forward end is pivotally supported at either side, at 91 and 92, respectively, on supports 94. At the rear end, this frame has socketed plates 95 and 96 at either side, resting on jack screws 97 and 98, respectively, which are supported in turn on pillars 99 and 99ª. By turning the jackscrews, the inclination of the table and cooperating separating means may be varied to secure the most efficient work with the particular materials being separated.

Means are provided by the invention for directing and regulating and otherwise controlling the action of the air currents upon the bed of materials being stratified and separated. As embodied, also, the air is drawn upwardly, or from beneath, through the bed of materials. This gives not only a more favorable air current action but also lightens the vibrating parts of the mechanism.

In the embodied form of the foregoing mechanism, a casing 100 of sheet metal or other suitable material is constructed in the form of a chamber above and overhanging the separating mechanism and the coal delivery chutes. This chamber has a top 101, with a large central opening 105 over the separating table 1 for purposes later to be described. The air suction chamber has side walls 102 and 103, and inwardly extending and approximately horizontal bottom walls or parts 106 with a central opening over the table. The chamber preferably is wider or extends outwardly at either side over the separating

table. At its forward end the air suction chamber has a front wall 109, which is connected by a flexible canvas strip 146 with the top edge of plate 18 to make an air-tight closure at the front end of the table. Suitable legs or other supports 111 are provided for the air chambers.

In the present embodiment, toward the rear of the table, this overhanging air-suction chamber has its walls inwardly converging, as shown at 115 and 116 conforming generally to the shape of the separating table.

In the embodied form of communication to the suction fan, the air chamber casing is bifurcated at the rear end, as shown at 117 and 118, to form two passages or conduits for the air currents into the suction ports of a fan 119, housed in a casing 120. This fan may be of any desired or suitable form. The shaft 123 of the fan projects from the casing and is driven from a motor 124 and is preferably connected thereto by a flange coupling, or other suitable coupling 125.

Means are provided for affording access to the fan while running, for oiling or other purpose. Accordingly, the back end of the casing 120 is formed into a chamber 126, having inner doors 127 into the suction chamber, and having external doors 128. An attendant can enter chamber 126, through a door 128, and then close the door 128 and open the door 127 to have access to the fan mechanism without disturbing the operation of the air system.

Means are provided, cooperating in part with the instrumentalities already described, for regulating and controlling the action and direction of action of the air currents on the bed of stratifying and separating material. As embodied, a plate 130, preferably substantially horizontally disposed, is located within the opening 105 in the top of the air chamber, and extends over the opening in the bottom of the air chamber, and thus over the greater part of the area of the separating table. This plate is supported by a pair of cords or cables 131 and 132, which are wound respectively on drums 133 and 134 and have their other ends, respectively, connected to suspended weights 135 and 136. These cables are preferably slidably connected to cords or cables 153, as later described. The drums are journaled in brackets 137 and 138, respectively, carried by the frame 144. The drums are provided at the ends of their shafts with pulleys 139 and 140, having actuating chains 141 and 142.

The plate 130 has flexible, air-tight connections 145, as by a strip or piece of canvas, or other air-tight material, all about its edges with the edges of the top plate 101 of the air suction chamber, as best appears from Figs. 2 and 4. The plate 130 thus may be raised and lowered relatively to the bed of materials on the table 1 without disturbing the air-tight connections. There are also flexible air-tight connections 146 between the bottom edges of the floor parts 106 and 106 of the air chamber and the corresponding edges of the separating table and the delivery chutes, and other parts, as best appears from Fig. 4.

Not only may the plate 130 be vertically positioned relatively to the separating table and its bed of materials, but it may be inclined in variable directions or degrees, and for this purpose the plate is centrally longitudinally divided into two parts, connected together by hinges 149. This joint will have a flexible air-tight cover 157. At the ends of these two parts of the plate, each part is provided with a plate 150 contacting with a similar plate on the other part, and having an arcuate bolt-and-slot connection 151 whereby the two halves may be inclined relatively to, and also differently from, each other.

The entire plate 130 may be inclined transversely in one direction or the other by slipping the cords 131 or 132 along the cords 153, which may be done by having a ring or thimble connection between them. Thus the air currents are drawn substantially vertically through the lower part of the bed of material, being directed largely by the separating partitions, thereby floating the lighter material upwardly through the heavier material, and the air currents are regulably directed or deflected transversely, mostly sidewise and rearwardly, to expedite the travel of the separated and floated lighter material to the place of discharge.

Means are provided by the invention also for collecting the dust and smaller particles which are borne away in the air currents, and for this purpose, as embodied, the suction fan 119 discharges into a chamber 159, which is much larger than the discharge opening of the fan, whereby the velocity of the air current is greatly decreased and sufficiently so that the dust will settle therefrom. There are preferably provided also in the chamber 159 baffle-plates 160, which likewise tend to separate and deject the dust and lighter particles afloat in the air stream.

At the rear lower end of the chamber 159, the floor thereof is inclined rearwardly and downwardly, as shown at 161 in Fig. 2, and this lower end of the chamber is provided with a discharge opening 162, having a slide door 163. This empties into a chute 164, supported by a bracket 164^a, and which discharges onto a belt conveyor 165 running beneath the machine and running over pulleys 165^a and 165^c. Pulley 165^a is supported on a bracket 165^b. This belt discharges at one end onto a conveyor belt 166 and at the other end onto a conveyor belt 167, dependent upon the direction of travel of the belt 165. Means are also provided for collecting whatever dust or small particles may fall downwardly from the table 1 and for this purpose a collecting mem-

ber 170 is carried by the supports 99 and 99a. This device has flaring sides and is open at the bottom as is shown at 174 over the belt 165.

The embodied form of means for feeding on the intermixed materials onto the table 1 to be separated comprises feed-regulating devices such that the bed of materials upon the table may be maintained in the quantity and conditions desired, that is, the material is fed on substantially at the rate of the separating capacity of the machine. As so embodied, a hopper 180 has its rear and side walls inwardly and downwardly inclined and terminates at its bottom in a feed opening 181. The size of this opening is regulated by a slide 182, having thereon straight racks 183, with which mesh pinions 184 on a shaft 185. Shaft 185 is provided on the exterior of the casing with a crank 186.

At the bottom of the hopper is a reciprocable slide 187, supported on the bottom plate 188 and running between rollers 189. The slide 187 is connected by a link 190 to a crank disk 191, the shaft of which is mounted on a bearing 192. Fixed on this shaft is a worm wheel 193, with which meshes a worm 194 on the shaft of a motor 195. The hopper discharges into the chute 6, already described.

Means are provided for carrying away the separated materials as they are delivered from the mechanism. As embodied, chutes 200 and 201 are provided (Figs. 1, 3 and 4) about the edges of the separating table to receive the coal or other lighter material, and these chutes are forwardly and downwardly inclined sufficiently so that the material is fed therealong at a desired speed by the vibratory motion of the table.

Means are provided for preventing air suction losses through the chutes, and for this purpose they are provided with angular elbow portions 202, which hold a pile of material serving as an air lock, while at the same time the material is continually passing on, but this arrangement prevents air suction inwardly through the chute. The chutes 200 and 201 discharge onto a conveyor belt 167. The discharge orifice for the rock or other heavier material at the forward end of the machine is provided with a chute 206 which discharges onto a belt 207.

Means may be provided for separating a material of intermediate specific gravity from the lighter and heavier material, if desired. An example of this, is the separation of "bony" from the coal and rock. As embodied, such means are provided for taking off or delivering the "bony". Two chutes 220 and 221 are shown for receiving the discharge from the forward ends of the sides of the separating table, and dividing or deflecting plates 222 and 223 may be movably mounted on the plates 8 to determine the line of separation between the coal and "bony". These chutes also will be provided with the elbow portion 202 acting as an air seal to maintain the suction through the bed at full strength. Chutes 220 and 221 empty, respectively, into chutes 226 and 227, which in turn discharge onto a conveyor 228.

The manner of operation of the mechanism will be understood from the previous description, but may be summarized as follows:—

The intermixed materials to be separated are fed onto the rear or left-hand end of the separating bed or table from the chute 6 or other supply device, and are there immediately subjected to the stratifying action; and the rate of feed of the intermixed materials will be such as to maintain the bed in the desired condition, that is, it will be approximately at the same rate as the separating or cleaning capacity of the bed. This can be regulated by setting the gate 182.

In practice, with certain kinds and conditions of material, the bed of materials at this end is preferably of a depth of four or five inches, although it will be understood that this is in no wise restrictive of the invention, but merely represents the best conditions with a certain mixture of soft coal and rock. The whole bed has a sharp and quick upward and forward movement of relatively small amplitude, terminating in a sharp impact, and this is followed by a relatively slow downward return movement.

These movements are effected by the cam 162 and the manner of mounting the separating bed, together with the associated and cooperating parts. During the ride of the rollers 69 and 70 over the rise of the corresponding cams 65 and 66, the bed is forced slowly backwardly against the springs 76 and 77, but when the rollers slip from the high points of their cams, the springs slam the separating table forward until the stops 80 impact sharply against the stop members 85 and 86. It will be understood that this motion is repeated very rapidly, and the result flowing from this motion and the inertia of the material is one of the factors or agencies operating to quickly, efficiently, and economically separate the intermixed materials. By changing the position or inclination of the arms or links 52 this motion can be varied in different ways as will be apparent.

As the materials from the feeding devices settle upon the rear end of the separating bed, the separating or stratifying action (as previously stated) begins at once, the lighter intermixed material being floated or impelled upwardly while the heavier material sinks downwardly and rests upon the bed. The heavier material by reason of its resting upon the bed is mechanically impelled forwardly with much force along the table, due to its inertia, and is restrained or deflected inwardly toward the center of the bed continuously or repeatedly during its forward movement by the separating partitions 5. This is most

positively and completely true as to the larger pieces of the heavier material. The smaller pieces of such heavy material are likely not to be so quickly separated from the larger pieces of the lighter material or materials, this separation usually occurring farther along the table.

As the materials progress forwardly along the table, the thickness of the bed increases, due to various causes, among these being the upward inclination of the bed, the restriction of the area thereof in the forward part and in the forward direction, increase in the height of the separating or deflecting partitions, the impact or slam at the end of the forward movement of the bed, and some crowding action of the fed-on coal, together with possibly other causes.

Because of these reasons and conditions, and through the air action upon the lighter material (later more fully described), that material is floated or buoyed upwardly, and at the same time is impelled outwardly or transversely along the top or upper part of the bed of material. This is due to the air action, already referred to, and also partly to the increase in width of the rearward part of the table and the contraction in width of the forward part thereof. The lighter separated material is finally spilled out totally separated over the side plates 8. The plates or shelves 8 operate to preserve a proper thickness of the bed of material over the exterior or edge portions of the air-pervious separating table. The location and operation of the various delivery chutes, and their acting as air locks have already been fully described.

The air is drawn upwardly through the bed, the air currents or the current of air being then drawn through the air chamber and through the fan, and the current is then retarded and is operated on by the baffles to separate and deject the dust and fine particles of material therefrom. The first action of the air current is upwardly through the bed and operates to stratify and thereby separate the material. At this time and point the air currents have a buoyant tendency and action upon the lighter material and combined with the motion and impact of the support 1, works the pieces of lighter material to the top of the bed.

At the same time there is more or less of a buoyant effect exerted on the smaller pieces of the heavier material, and the separation of these smaller pieces of heavier material from the heavier pieces of the lighter material will be gradual, whereas the heavier pieces of the heavier material sink immediately upon the bed while the smaller pieces of the lighter material rise immediately to the upper part of the bed.

As the material progresses forwardly along the bed it will be successively acted upon by the successive separating partitions. At each one of these partitions the upwardly directed air currents will float the lighter material over the partition, while the heavier material will be retained behind the partition, and by the motion of the table will be gradually moved toward the front and center of the machine and pass into the centrally forwardly moving stream of the heavier material resting upon the bed. The process of separation will thus be continued at each of the separating partitions until finally the lighter and heavier material will be completely separated.

The pieces of rock, or other heavier material, even the smallest, will finally be left behind one of the separating partitions. It will then, by reason of its weight, and being now separated from, and being beneath, the stratum of coal or other lighter material, be impelled inwardly and forwardly by the separating partitions or walls and by the motion of the table into the stream of rock or other heavier material flowing down the central part of the table. This stream of separated rock will finally be discharged from the forward end of the table.

In actual practice, when the mechanism is properly adjusted or tuned, the coal will be floated as a layer or stratum on the air, and will leave a thin vacant space between the bottom of this stratum and the top of the stream of rock flowing along upon the table.

The air current as it passes upwardly into the stratum of coal or other lighter material, and above the tops of the separating partitions, is deflected in or toward a horizontal direction, and also laterally or sidewise outwardly, while its intensity of force is maintained; and gives a strong impulsion to the stratum of lighter material outwardly over the edges of the table, and greatly expedites the discharging action and thus the separating capacity of the table. The adjustment or variation in position of the plate 130, toward and away from the bed of materials, and also angularly either longitudinally or transversely, gives very complete control of the action of the air current on the lighter material.

In many of its aspects the action of the present separating mechanism is the same or similar to that of the mechanism shown and described in my copending application Serial Number 612,455, filed Jan. 13, 1923. As for instance, the action at the forward end of the table may be very similar to that in my said copending application, and this may also be true of various parts of the mechanism.

It will be understood that the invention is not necessarily limited or restricted by the statement of theory of operation set forth, but such statement is the result of observation of the practical operation of the mechanism and the present conclusion drawn therefrom.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A mechanism for separating intermixed divided materials of different specific gravities, including in combination an air pervious table which is widened laterally between the feed and discharge ends thereof, diagonally extending partitions converging in the direction of flow of materials along the table, for guiding the lighter and heavier materials in different lateral directions to different places of discharge, means for longitudinally vibrating the table, and means operating from above the table to draw air currents upwardly therethrough.

2. A mechanism for separating intermixed divided materials of different specific gravities including in combination a support for a bed of stratifying material, means for feeding the intermixed materials to the support to maintain the bed of materials thereon, and means for drawing the air upwardly through the lower part of the bed of material and deflecting it in a direction transverse to the direction of flow of the heavy material, for causing the lighter material to flow in a direction transverse to the direction of flow of the heavy material.

3. A mechanism for separating intermixed divided materials of different specific gravities including in combination a support for a bed of stratifying material, means for feeding the intermixed materials to the support to maintain the bed of materials thereon, and means for drawing the air upwardly through the lower part of the bed of material and deflecting it in a direction transverse to the direction of flow of the heavy material, for causing the lighter material to flow in a direction transverse to the direction of flow of the heavy material, and means for regulating the transverse action of the air current.

4. A mechanism for separating intermixed divided materials of different specific gravities including in combination a support for a bed of stratifying material, means for feeding the intermixed materials to the support to maintain the bed of materials thereon, means for drawing the air upwardly through the lower part of the bed of material and deflecting it in a direction transverse to the direction of flow of the heavy material, for causing the lighter material to flow in a direction transverse to the direction of flow of the heavy material, and means for independently regulating the upward and transverse action of the air current.

5. A mechanism for separating intermixed divided materials of different specific gravities including in combination a support for a bed of stratifying materials, means for feeding the intermixed materials to the support to maintain the bed of materials thereon, partitions on the table converging in the direction of flow of the materials, means operating from above the bed to draw a current of air therethrough, and means for imparting an impact to said bed of materials.

6. A mechanism for separating intermixed divided materials of different specific gravities including in combination a support for a bed of stratifying materials, the support being widened laterally between the feed and discharge ends thereof, means for feeding the intermixed materials to the support to maintain the bed of materials thereon, partitions on the table converging in the direction of flow of the materials, means operating from above the bed to draw a current of air therethrough, and means for moving said bed of materials and imparting an impact thereto.

7. A mechanism for separating intermixed divided materials of different specific gravities including in combination a support for a bed of stratifying materials, the support being widened laterally between the feed and discharge ends thereof, means for feeding the intermixed materials to the support to maintain the bed of materials thereon, means operating from above the bed to draw a current of air therethrough, partitions extending diagonally with respect to the direction of travel of the materials, and means for reciprocating said bed of materials substantially longitudinally thereof.

8. A mechanism for separating intermixed divided materials of different specific gravities including in combination a support for a bed of stratifying materials, inclined upwardly from the feed end to the discharge end thereof, means for feeding the intermixed materials to the support to maintain the bed of materials thereon, means operating from above the bed to draw a current of air therethrough, and means for reciprocating said bed of materials substantially longitudinally thereof, said movement terminating in an impact.

9. A mechanism for separating intermixed divided materials of different specific gravities including in combination a support for a bed of stratifying materials, partitions extending diagonally with respect to the direction of travel of the materials, means for feeding the intermixed materials to the support to maintain the bed of materials thereon, means for drawing the air upwardly through the lower part of the bed of materials and transversely through the upper part of the bed of materials, and means for imparting an impact to said bed of materials.

10. A mechanism for separating inter-

mixed divided materials of different specific gravities including in combination a support for a bed of stratifying materials, partitions extending diagonally with respect to the direction of travel of the materials, means for feeding the intermixed materials to the support to maintain the bed of materials thereon, means for drawing the air upwardly through the lower part of the bed of materials and transversely through the upper part of the bed of materials, and means for reciprocating said bed of materials substantially longitudinally thereof.

11. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, and means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving in transverse directions, said means comprising a support for the bed of materials having diagonally extending partitions thereon and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material toward the place of delivery.

12. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving in transverse lateral directions, said means comprising a support for the bed of materials and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material toward the place of delivery, and means for reciprocating the bed substantially in the direction of travel of the heavier material.

13. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving laterally in transverse directions, said means comprising a support for the bed of materials and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material, means for reciprocating the bed substantially longitudinally of itself, and means for effecting an impact at the forward end of said reciprocatory movement.

14. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above, and means for advancing a separated heavier material along the bottom and lengthwise of the bed to a place of delivery at the end thereof, and for advancing a lighter separated material thereabove and transversely thereto to a place of delivery, said means comprising devices for creating an air current upwardly through the bottom part of the bed, and then deflecting it to travel substantially in the direction of travel of said lighter separated material to its place of delivery.

15. A mechanism for separating intermixed divided materials of different specific gravities including in combination supporting means for maintaining a bed of materials, the supporting means being widened laterally between the feed and discharge ends, and being longitudinally, upwardly inclined toward the discharge end, means for stratifying and separating the component materials with a heavier material below and a lighter material above including devices for passing lifting and loosening air currents through the bed, means for advancing a separated heavier material along the bottom and lengthwise of the bed to a place of delivery at the end thereof, and for advancing a lighter separated material thereabove and transversely thereto to a place of delivery, and means for reciprocating said bed substantially longitudinally of itself.

16. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above, means for advancing a separated heavier material along the bottom and lengthwise of the bed to a place of delivery at the end thereof, and for advancing a lighter separated material thereabove and transversely thereto to a place of delivery, said means comprising devices for creating an air current upwardly through the bottom part of the bed, and then deflecting it to travel substantially in the direction of travel of said lighter separated material to its place of delivery, and means for reciprocating said bed substantially longitudinally of itself.

17. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, and means for stratifying and separating the compo-

nent materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving in transverse directions, said means comprising a support for the bed of materials, separating partitions mounted upon and projecting upwardly from said support, and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material transversely to the direction of travel of the heavy material toward the place of delivery.

18. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving laterally in transverse directions, said means comprising a support for the bed of materials, converging partitions mounted upon and projecting upwardly from said support, and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material toward the place of delivery, and means for reciprocating the bed substantially in the direction of travel of the heavier material.

19. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving laterally in transverse directions, said means comprising a support for the bed of materials, separating partitions mounted upon and projecting upwardly from said support, and converging forwardly and inwardly from the outer sides of the support, and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material toward the place of delivery.

20. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving in transverse directions, said means comprising a support for the bed of materials, converging partitions mounted upon and projecting upwardly from said support, and extending forwardly and inwardly from the outer sides of the support, and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material toward the place of delivery in a direction transverse to the direction of travel of the heavier material, and means for reciprocating the bed substantially in the direction of travel of the heavier material.

21. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above, and means for advancing a separated heavier material along the bottom and lengthwise of the bed to a place of delivery at the end thereof, and for advancing a lighter separated material thereabove and transversely thereto to a place of delivery, said means comprising devices for creating an air current upwardly through the bottom part of the bed, and then deflecting it to travel substantially in the direction of travel of said lighter separated material to its place of delivery in a direction transverse to the direction of travel of the heavier material, and also comprising separating partitions supported upon and projecting upwardly from said support and extending forwardly and inwardly from the outer sides of the support.

22. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, and means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving in transverse directions, said means comprising a support for the bed of materials and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material toward the place of delivery in a direction transverse to the direction of travel of the heavier material comprising a plate above the bed of materials and variably positionable relatively thereto.

23. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving laterally in transverse directions to different points of delivery, said means comprising

a support for the bed of materials and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material toward the place of delivery comprising a plate above the bed of materials and variably positionable toward and away from the top of the bed.

24. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving laterally in transverse directions to different points of delivery, said means comprising a support for the bed of materials, diagonally extending partitions on the support and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material toward the place of delivery comprising a plate above the bed of materials and variably positionable angularly relatively thereto.

25. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means for stratifying and separating the component materials with a heavier material below and a lighter material above and for delivering the so separated materials in streams moving laterally in transverse directions, said means comprising a support for the bed of materials, diagonally extending partitions on the support and devices for creating an air current passing substantially perpendicularly through the lower part of the bed and then traveling substantially in the direction of travel of the lighter material toward the place of delivery comprising a plate above the bed of materials and variably positionable angularly and transversely relatively thereto.

26. Mechanism for separating divided materials comprising an air pervious table, means for flowing air upwardly therethrough, means for vibrating the table, the action of the air and the vibration causing the materials to stratify, partitions on the table disposed at an angle to the flow of the heavier materials, and an air deflecting plate close against the upper stratum, for deflecting the upwardly flowing air, while still in the upper stratum, laterally, for causing the upper stratum to flow laterally.

27. Mechanism for separating divided materials comprising an air pervious table, means for flowing air upwardly therethrough, means for vibrating the table, the action of the air and the vibration causing the materials to stratify, partitions on the table disposed at an angle to the flow of the heavier materials, and an air deflecting plate close against the upper stratum adjustable at an angle, or in parallelism with the bed of materials, for deflecting the upwardly flowing air, while still in the upper stratum, laterally, for causing the upper stratum to flow laterally.

28. Mechanism for separating divided materials comprising an air pervious table longitudinally and upwardly inclined from the feed end to the discharge end thereof, means for flowing air upwardly therethrough, means for vibrating the table back and forth, slowly in one direction and rapidly in the other direction, and terminating the rapid movement by impact, an air deflecting plate just above the bed of materials, for deflecting the upwardly flowing air, while still in the upper part of the bed, laterally, to cause the materials in the upper part of the bed to flow laterally.

29. Mechanism for separating divided materials comprising an air pervious table, means for flowing air upwardly therethrough, means for vibrating the table slowly in one direction and rapidly in the other direction, and terminating the rapid movement by impact, the action of the air and the vibration serving to stratify the materials, partitions disposed at an angle to the flow of the heavier materials for creating a differential lateral flow between the lighter and heavier materials, and an air deflecting plate close against the upper stratum, for deflecting the air while it is still in the upper stratum, laterally, to cause such stratum to flow laterally.

30. The method of separating intermixed divided materials comprising stratifying the materials into upper and lower strata by vibration and by upwardly flowing currents of air, guiding the lowest stratum in one direction laterally and deflecting the upwardly flowing currents of air, while still in the upper stratum, in another direction laterally, to cause them to flow laterally and thereby cause the upper stratum to move laterally to a different point of discharge from that for the lower stratum.

31. The method of separating intermixed divided materials comprising stratifying the materials into upper and lower strata by longitudinal vibration and by upwardly flowing currents of air, terminating the longitudinal vibration by impact for causing the lower stratum to move longitudinally, effecting a separation between the strata with diagonal partitions, and deflecting the upwardly flowing currents of air, while still in the upper stratum, laterally, to cause them to flow laterally and thereby cause the upper stratum to move laterally to a different point of discharge from that for the lower stratum.

32. A mechanism for separating intermixed divided materials, comprising in combination an air pervious table which has a relatively narrow feed end and which spreads laterally at an intermediate portion thereof, diagonally extending, forwardly converging partitions on the table, means operating from above the bed to draw air currents therethrough and means for longitudinally vibrating the table.

33. A mechanism for separating intermixed divided materials, comprising in combination an air pervious table which has a relatively narrow feed end and which spreads laterally at an intermediate portion thereof, diagonally extending, forwardly converging partitions on the table, the inner ends of which terminate short of the center of the table for providing a central delivery passage for heavier materials, means operating from above the bed to draw air currents therethrough and means for longitudinally vibrating the table.

34. A mechanism for separating intermixed divided materials of different specific gravities including in combination means for maintaining a bed of materials, means employing upwardly directed air currents for stratifying and separating the component materials with a heavier material below and a lighter material above, means for advancing the separated heavier material along the bottom and lengthwise of the bed to a place of delivery at the front end thereof and for advancing the lighter separated material above and transversely to the direction of travel of the heavier material, and means for increasing the force of the upwardly directed air currents along the path of the advancing heavier material and for decreasing said force along the path of the transversely advancing lighter material comprising a series of gradated zones of air-perviosity.

35. A mechanism for separating intermixed divided materials varying relatively greatly in size and varying relatively little in their specific gravities including in combination means for maintaining a bed of the materials of substantial depth on an air-pervious table, means for stratifying the materials in substantially horizontal superposed strata, means for progressing the superior stratum of lighter materials to discharge, means for progressing the inferior settled heavier material to discharge in a direction transverse to that of the lighter material while maintaining the lighter and heavier strata in their superposed stratified positions, means for varying the lifting air forces in the direction of progression of the lighter material, and means for varying the lifting air forces in the direction of progression of the settled transversely moving heavier material.

36. A mechanism for separating intermixed divided materials varying relatively greatly in size and varying relatively little in their specific gravities including in combination means for maintaining a bed of the materials of substantial depth on an air-pervious table, means for stratifying the materials in substantially horizontal superposed strata, means for progressing the superior stratum of lighter materials to discharge, means for progressing the inferior settled heavier material to discharge in a direction transverse to that of the lighter material while maintaining the lighter and heavier strata in their superposed stratified positions, means for varying the lifting air forces in the direction of progression of the lighter material, and means for varying the lifting air forces in the direction of progression of the settled transversely moving heavier material, said air-force varying means comprising gradated zones of decreasing perviosity laterally of the table and zones of increasing air perviosity longitudinally forwardly of the table.

37. A mechanism for separating intermixed divided materials varying relatively greatly in size and varying relatively little in their specific gravities including in combination means for maintaining a bed of the materials of substantial depth on an air-pervious table, means for stratifying the materials in substantially horizontal superposed strata, means for progressing the superior stratum of lighter materials to discharge, means for progressing the inferior settled heavier material to discharge in a direction transverse to that of the lighter material while maintaining the lighter and heavier strata in their superposed stratified positions, means for decreasing the lifting air forces in the direction of progression of the lighter material, and means for increasing the lifting air forces in the direction of progression of the settled transversely moving heavier material.

38. The process of separating intermixed divided materials varying relatively greatly in size and varying relatively little in specific gravity comprising maintaining a bed of said materials of substantial depth upon an air-pervious table, subjecting the bed of materials to a plurality of forces including forcing air currents upwardly through the bed and longitudinally reciprocating the table whereby the materials stratify in superposed strata according to their specific gravities, and thereby progressing a stratum of one material along the table to discharge at the forward end thereof and progressing a stratum of another material laterally to discharge along the side of the bed, and gradually and progressively varying the intensity of the air currents in the directions of flow of both discharging materials.

39. The process of separating intermixed

divided materials varying relatively greatly in size and varying relatively little in specific gravity comprising maintaining a bed of said materials of substantial depth upon an air-pervious table, subjecting the bed of materials to a plurality of forces including forcing air currents upwardly through the bed and longitudinally reciprocating the table whereby the materials stratify in superposed strata according to their specific gravities, and thereby progressing a settled heavier material to discharge by friction and inertia, progressing a flotant superior stratum of lighter material transversely to the direction of movement of the heavier material while maintaining a substantially horizontal stratification throughout the bed, and gradually, progressively and substantially continuously gradating the lifting air forces both forwardly and laterally of the table.

40. A mechanism for separating intermixed divided materials varying relatively greatly in size and varying relatively little in their specific gravities including in combination means for maintaining a bed of the materials of substantial depth on an air-pervious table, means for stratifying the materials in substantially horizontal superposed strata, means for progressing the superior stratum of lighter materials to discharge, means for progressing the inferior settled heavier material to discharge in a direction transverse to that of the lighter material while maintaining the lighter and heavier strata in their superposed stratified positions, and means for varying the perviosity of the table surface both longitudinally and laterally thereof.

41. A mechanism for separating intermixed divided materials varying relatively greatly in size and varying relatively little in their specific gravities including in combination means for maintaining a bed of the materials of substantial depth on an air-pervious table, mean for stratifying the materials in substantially horizontal superposed strata, means for progressing the superior stratum of lighter materials to discharge, means including a plurality of separating partitions inclined with respect to the table for progressing the inferior settled heavier material to discharge in a direction transverse to that of the lighter material while maintaining the lighter and heavier materials in their respective superposed positions of stratification, and means for varying the perviosity of the table both longitudinally and laterally thereof, said variations being in definite relation to the spaces between the separating partitions.

42. In a dry cleaning apparatus, a pervious deck, means for feeding a flowing sheet of granular material thereacross, means for passing a moving column of air upwardly through the sheet, a hood located above the deck, means for withdrawing air from said hood, a flexible connection between the hood and the deck to limit the entrance of air between them, a chute through which material is discharged from the deck, the flexible connections overlying the chute and so arranged as to insure a draft of air upwardly through said chute in a direction opposite to the flow of the material as it is discharged from the deck.

43. A mechanism for separating intermixed, divided materials including in combination a reciprocable air-pervious table, means for maintaining thereon a bed of raw coal undergoing gradual stratification and separation, a stationary hood above the table, a dust-collecting chamber of relatively great cubic capacity communicating with the hood, a fan for passing lifting and loosening air currents upwardly through the table, connections from the fan to the hood and dust-collecting chamber for drawing dust-laden air from the space above the table into the dust chamber whereby the air loses velocity and deposits its dust, and a flexible connection between the hood and substantially the entire periphery of the reciprocable table to limit the passage of air between them, means for discharging a superior stratum of coal and a settled stratum of heavier material from different parts of the table periphery, and means for preventing escape of dust-laden air with the materials as they are discharged from the table.

44. In a dry cleaning apparatus, a pervious deck, means for feeding a flowing sheet of granular material thereacross, means for passing a moving column of air upwardly through the sheet, a hood located above the deck, means for withdrawing air from said hood, a flexible connection between the hood and the deck to limit the entrance of air between them, a passageway through which material is discharged from the deck, the flexible connections overlying the passageway and so arranged as to insure a draft of air upwardly through said passageway in a direction opposite to the flow of the material as it is discharged from the deck.

45. A mechanism for separating intermixed divided materials including in combination an air-pervious table, a plurality of separating partitions extending forwardly and inwardly from opposite sides of the table to constitute a substantially continuous central unobstructed portion for concentrating the heavier particles of the material, means for forcing lifting air currents through the table, and means for gradually varying the lifting air force along said central unobstructed portion comprising a series of zones of different permeability arranged in gradated sequence forwardly along the pervious surface of the table.

46. A mechanism for separating inter-

mixed divided materials of different specific gravities including in combination an air-pervious table for supporting a bed of materials, means for feeding intermixed materials to the rear end of said table, the table widening laterally forwardly from the feed end and having forwardly diverging bed-retaining walls for guiding the materials forwardly and outwardly toward the widened portion of the table, means for stratifying and separating the component materials with a heavier material below and a lighter material above including devices for passing lifting and loosening air currents through the bed and means, including forwardly converging separating partitions, for advancing a separated heavier material along the bottom and lengthwise of the bed to a place of delivery at the forward end thereof, and for advancing a lighter separated material thereabove and transversely thereto to a place of delivery.

In testimony whereof, I have signed my name to this specification.

KENNETH DAVIS.