

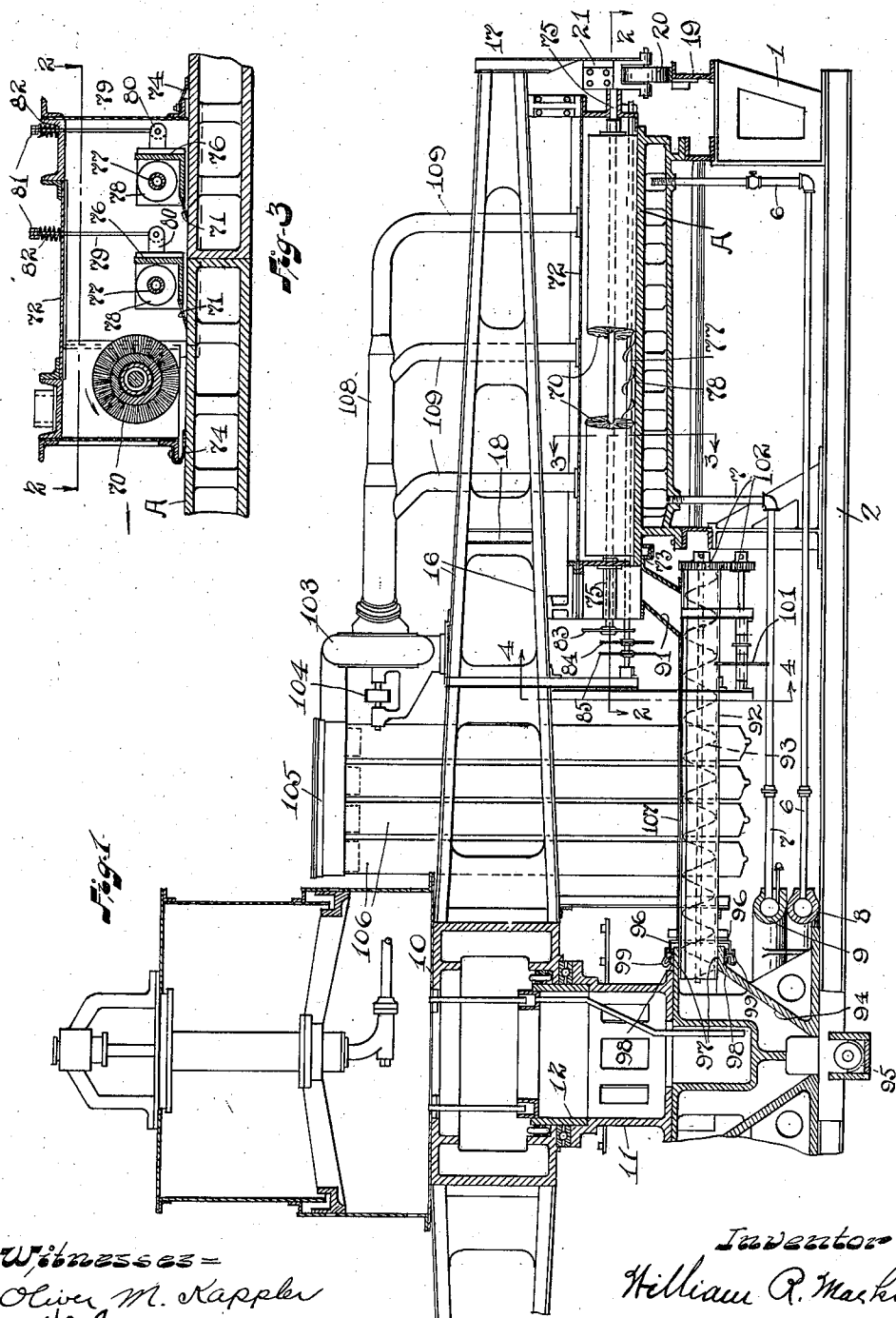
## MECHANISM FOR REMOVING TREATED MATERIALS FROM DRIERS AND THE LIKE.

APPLICATION FILED OCT. 2, 1913.

Patented Feb. 20, 1917.

4 SHEETS—SHEET 1.

**1,216,711.**



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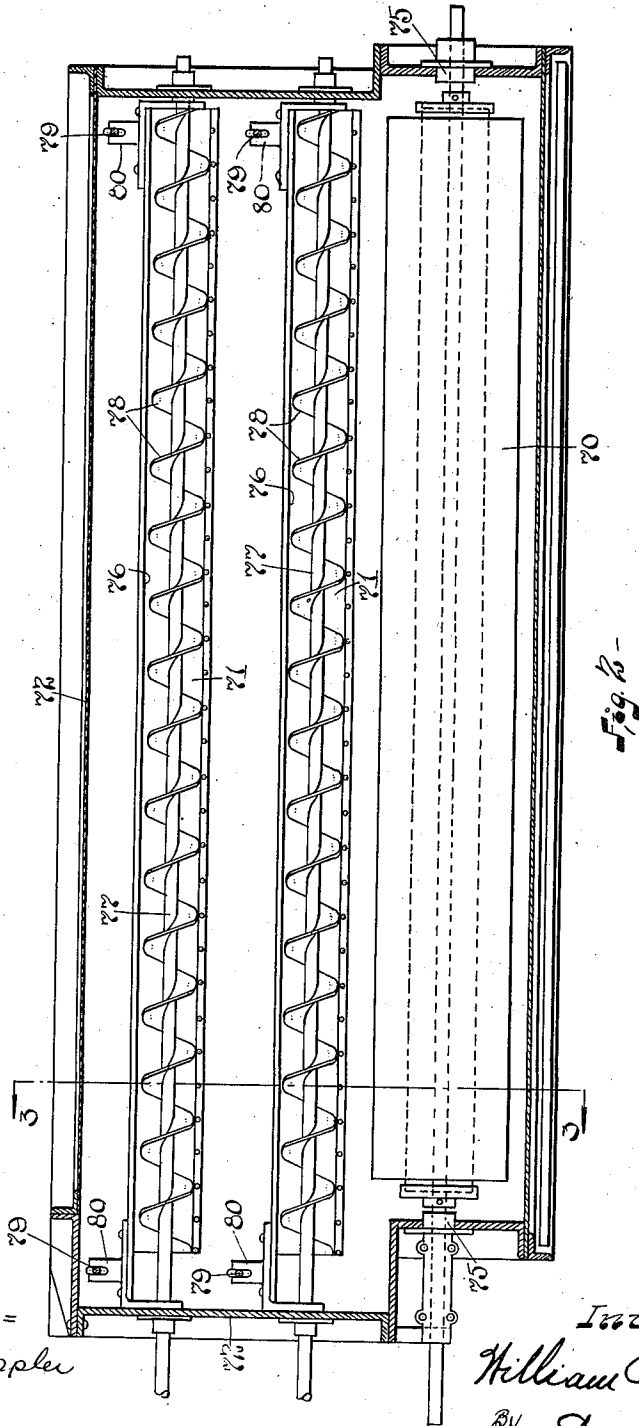


Fig. 2-

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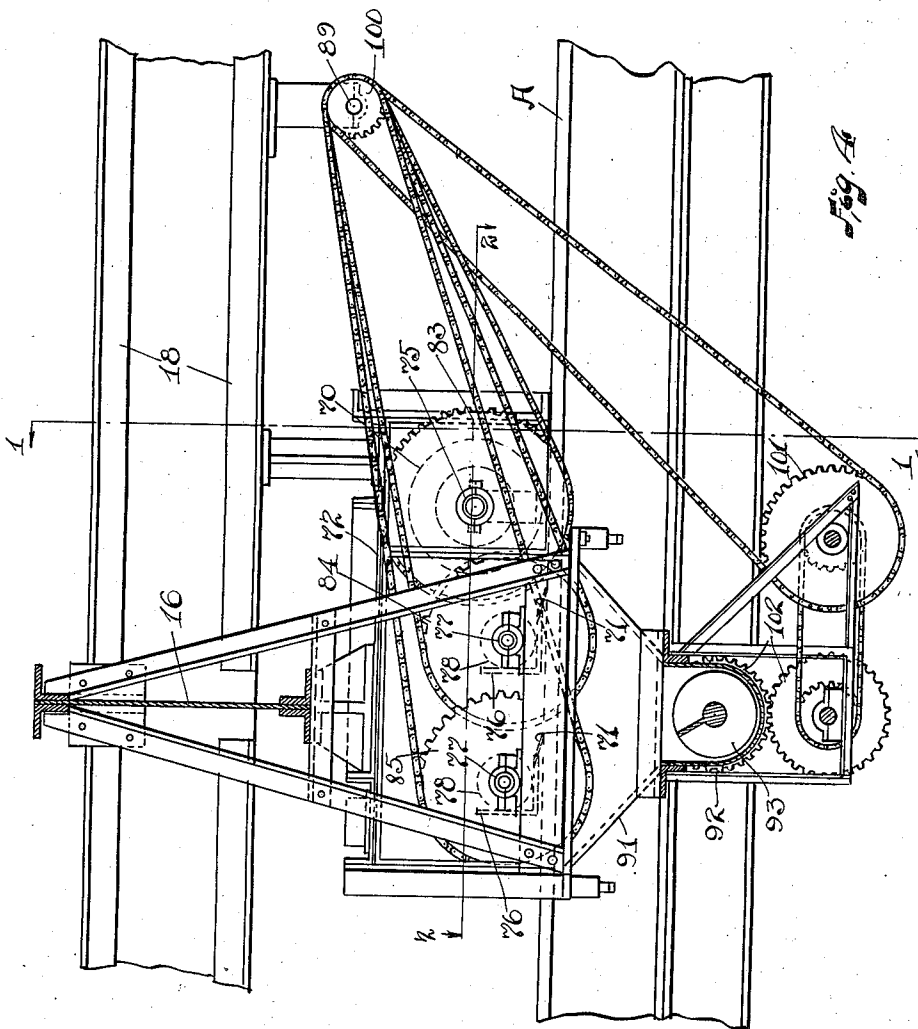
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4 SHEETS—SHEET 3.



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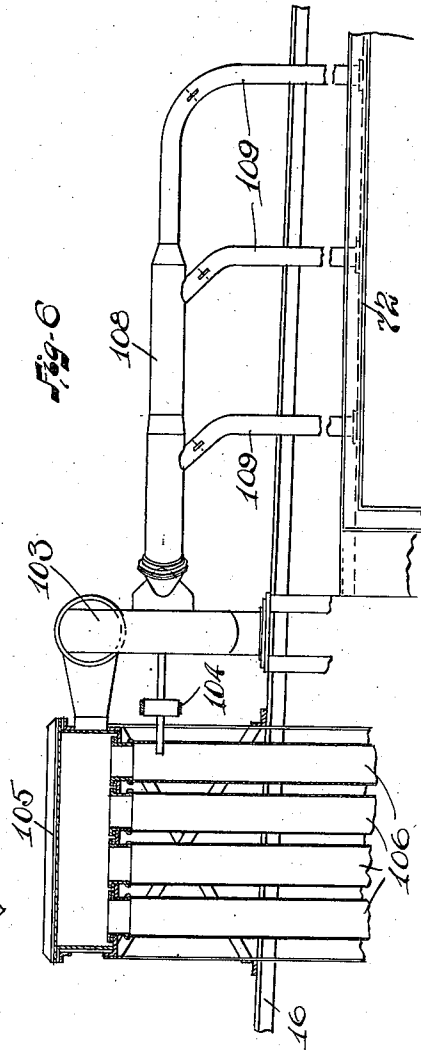
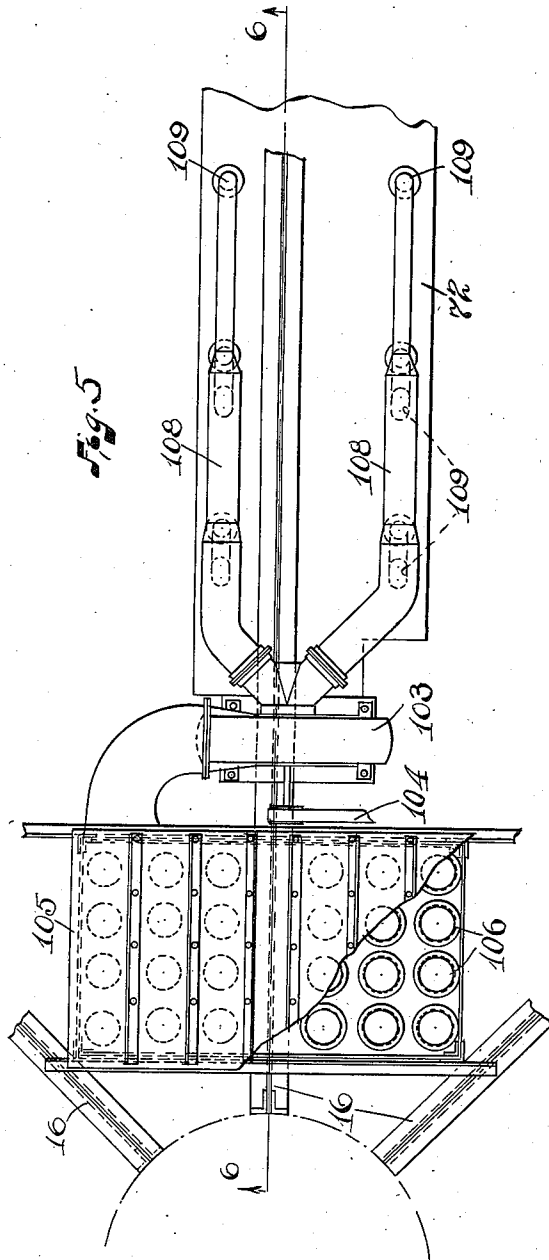
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# UNITED STATES PATENT OFFICE.

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MECHANISM FOR REMOVING TREATED MATERIALS FROM DRIERS AND THE LIKE.

1,216,711.

Specification of Letters Patent.

Patented Feb. 20, 1917.

Original application filed August 10, 1912, Serial No. 714,323. Divided and this application filed October 2, 1913. Serial No. 793,050.

*To all whom it may concern:*

Be it known that I, WILLIAM R. MACKLIND, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Mechanism for Removing Treated Materials from Driers and the like, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The improved mechanism which forms the subject matter of interest herein is designed primarily for removing and handling pulps, that is wet sludgy materials, both in mineral and vegetable products after they have been dried. A pulp of the kind in mind is produced in the manufacture of white lead and lead oxid, zinc oxid and other pigments, and in drying such a pulp the material is left in the form of a thin film on the drying surface from which it requires to be removed before another layer can be deposited and the drying operation continued. More specifically the present improved mechanism is designed for use in the fashion just described in connection with a continuous drying machine of the kind illustrated in my co-pending application filed August 10, 1912, Serial No. 714,323, out of which the present case has been required to be divided, such drying machine being characterized, among other things, by the use of an annular drying table. It will be understood, however, that my improved mechanism for removing treated materials, while thus designed for use in conjunction with a drying machine of this type, may also be advantageously employed in connection with other kinds of drying machines, and for that matter may be used in removing materials from machines which treat such materials in other ways than by drying the same.

Where the materials being dried, for example, are lead products such as certain of the pigments named above, it is desirable to provide against the escape of the material in the form of a powder into the surrounding atmosphere. The present improved mechanism, accordingly, has as its object not only the quick and thorough removal of the material from the surface, *e. g.* the drying table on which it has been treated, and

the conveying of such removed material to the desired point of discharge; but such improvements also have as an object the prevention of the escape of poisonous products into the atmosphere, thus rendering it safe for the operators to work about the machine. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Figure 1 is a vertical section of a portion of a general drying machine of the kind illustrated in my co-pending application just referred to, such section showing the manner in which my improved mechanism for removing the treated material is incorporated in such general machine; Fig. 2 is a horizontal sectional view of such mechanism or apparatus for removing the dried material; Fig. 3 is a transverse sectional view of said removing apparatus taken on the line 3—3, Fig. 2; Fig. 4 is a transverse sectional view of such conveying mechanism; Fig. 5 is a plan view, with parts shown in section, of a suction apparatus associated with such material removing apparatus and designed to prevent the escape of dust into the atmosphere incidentally to the removal of the dried material from the drying table; and Fig. 6 is a side elevational view and partial section of such suction apparatus.

The general features of construction characterizing the drying machine shown in the foregoing drawings need be only briefly noted in the present connection. Such machine comprises as its principal element an annular substantially horizontally disposed drying table A shown in transverse section in Fig. 1. This table is supported by means of a series of suitable supporting stands 1 upon the foundation 2, and is built up of a plurality of contiguous sections which are hollow so as to permit of steam being supplied thereto in order to heat the table. Pipes 6 and 7 are provided for respectively supplying steam to, and removing the water

of condensation from, such hollow table sections, these pipes being radially disposed and connected at their inner ends to circular headers 8 and 9 respectively.

5 In coöperative relation to said table are then provided a feeding apparatus for depositing onto the table a layer or film of the material to be dried; an apparatus for removing the vapor and moisture arising from  
10 the drying of such deposited material; and an apparatus for removing from the table the dried material and discharging the same from the machine. Of the foregoing, the only apparatus of present interest, as previously indicated, is the last named or material-removing mechanism, which will now be described.

Such removing mechanism is in the main carried in proper coöperative relation to the  
20 annular table A by a rotatable frame (Fig. 1), although it will be understood that if found feasible, by reason of variation in size, or for other reasons, to rotate the table instead of the supporting frame, this may be very well done so far as the principles of  
25 operation involved are concerned. The center of said rotatable frame is a cast iron spider 10 rotatably mounted on a central column 11 having a flanged top and a centering sleeve 12. A plurality of arms 16, fabricated of structural steel, extend radially from said spider 10 to beyond the outer edge  
30 or periphery of the annular drying table, such outer arm-ends being spaced from the surface of the table a sufficient distance to provide the necessary clearness for the parts suspended therefrom, as will be presently described. Two series of frame struts, an  
35 outer series 17 and an inner series 18, are bolted to such radial arms, the former to the extreme outer ends of the arms, and the latter at points substantially the same radial distance from the central axis of the machine as the inner edge of the annular table. It  
40 is not intended to support the entire weight of the rotatable frame from the central column 11, but, at least in a large machine such as the one illustrated, a circular track 19 is provided on the outer stands 1 of the annular table. Upon this track, rollers 20, mounted in brackets 21 extending downwardly from the outer ends of the respective radial  
45 arms 16, are adapted to run.

The means for rotating the frame about  
55 its central axis form no part of the present invention and so are not illustrated, and the same may be said of the apparatus for feeding the material onto the drying table A and for removing the same, or vapor that  
60 arises from such material, as the drying operation proceeds. It may be explained, however, that such feeding apparatus, and for that matter the vapor-removing apparatus likewise, is carried by the same rotatable frame which supports the material-re-

moving apparatus about to be described. Furthermore, the feeding apparatus is located just behind the removing apparatus having regard to the direction of rotation of the frame, so that as soon as the surface of  
70 the table has been cleared of the previously deposited and dried material, a fresh coat of the wet untreated material may be deposited thereon again and the drying operation thus continued indefinitely in continuous fashion,  
75 as the frame with the aforesaid apparatuses rotates.

The apparatus for removing the dried material is shown in detail in Figs. 2 and 3 inclusive, and consists essentially of a brush  
80 70 adapted to contact with the surface of the drying table A and followed by one or more scrapers 71 which gather up the material loosened by the brush, two such scrapers being employed in the machine  
85 illustrated. Both the brush and the scrapers are inclosed in a tight casing 72 that surrounds the same on all sides having close fitting contact with the drying table at its outer and inner edges, and depending into  
90 substantial contact with the surface of the same on either side of the removing apparatus. Such contact, in the case of the inner table edge, is secured with the under surface of such edge, which projects beyond the  
95 body of the table with this object in view, the casing 72, or rather the hopper 91 extending downwardly therefrom, being provided with an inwardly bent lip 73 faced with packing material. Close contact, in  
100 the case of the front and back walls of the casing is preserved by means of strips 74 of flexible material that depend from said walls' lower edges and drag along the surface of the table (see Fig. 3). Such front  
105 and back walls of the casing may be removed in order to obtain access to the brush and the scrapers, respectively.

As shown in Figs. 1 and 4, the inner and outer ends of the brush spindle are carried  
110 in bearings 75 which may be made vertically adjustable, whereby the degree of pressure exerted by the brush on the drying table may be varied, as desired. Each scraper consists of a strip of thin metal  
115 attached to the lower edge of an angular trough member 76 that is hung from the spindle 77 of a conveyer screw 78 disposed to fit snugly in said trough member. Rods 79, connected with brackets 80 that project  
120 rearwardly from the conveyer troughs, extend upwardly through the top of casing 72 where they are secured by nuts 81, compression springs 82 being interposed between said nuts and casing. By means of these  
125 nuts it will be evident that adjustment of the scrapers relatively to the surface of the drying table may be made. For the purpose of driving or rotating the brush and the conveyers they are provided at their inner  
130

ends with a series of sprockets 83, 84 and 85 which are connected with a corresponding series of sprockets on a jack-shaft 89 driven from a motor 90 (not shown).

5 In operation, it will be understood that the brush is designed simply to loosen and render fragmentary the layer or deposit of dried material on the table. The first scraper 71 will then pick up substantially  
10 all of such loosened material, the second being merely provided to insure the thorough and complete removal of the material. The conveyers 78, in operative conjunction with the scrapers, carry the material to the inner  
15 ends of the scraper troughs 76 so as to discharge the material into a hopper 91 that is suspended from and integral with the adjacent end of the casing 72 inclosing the removing apparatus. This hopper has a close  
20 fitting contact with the under edge of the table, by virtue of the lip 73 of the casing, previously described, so that no dust can escape.

Leading from the hopper is a conveyer  
25 trough 92, radially disposed with respect to the axis of the machine and having a screw conveyer 93 whereby the material received in said hopper 91 is carried to an inner conical hopper 94 formed integrally in the cen-  
30 tral column 11 whereon the rotatable frame of the machine is supported. This hopper 94 opens at its lower end into another conveyer 95 by means of which the material may be carried to any suitable discharge  
35 point away from the machine. The inner end of the conveyer 93, that extends from the removing apparatus to this central hopper 94, desirably has a close fitting connection with the opening in the latter, which  
40 must necessarily extend entirely around said hopper. Connection of the conveyer with the hopper is accordingly in the form of an annular closure 96 having a tight fitting contact with the lateral flanges 97 dis-  
45 posed above and below such opening, as shown in detail in Fig. 1. A tight, dust-proof fit between this closure and the flanges 97 is insured by the use of packing rings 98 that are held in contact with the flanges by  
50 means of resilient members 99.

The driving of the screw conveyer 93 is accomplished by means of the same motor that drives the removing apparatus proper. To this end another sprocket 100 is provided  
55 on jack-shaft 89 (Fig. 4), said sprocket being connected with a sprocket 101 located below the trough 92 that is in turn connected with the conveyer by intermediate gearing 102.

60 Despite the fact that the casing 72 that incloses the removing apparatus proper fits the drying table A as closely as possible, there will, nevertheless, be some dust or finely powdered material escape into the  
65 outer atmosphere unless additional precau-

tions be taken. Such additional precautions comprise a suction fan 103 (Figs. 1, 5 and 6) connected to be driven from the same jack-shaft 89 as the removing apparatus and conveyer 93 just described, by means of  
70 a belt 104. The intake to such dust fan leads from the casing 72 that incloses the aforesaid apparatus, while the discharge takes place into a dust collector head 105 from which depend a plurality of bags 106,  
75 of familiar construction, which allow the air to pass readily through but retain any dust that may be carried thereby. The lower ends of the bags are normally tied shut, but when a sufficient amount of dust accumu-  
80 lates therein to render such procedure desirable, they may be raised, and by tying the bags at an intermediate point and opening such ends, such dust may be dropped into the conveyer, a removable cover 107 being  
85 provided in the conveyer trough at a convenient point.

The preferred arrangement of intake is that shown in detail in Figs. 5 and 6 and consists of two branched trunks or pipes  
90 108, extending in a horizontal direction over the casing 72 and increasing in diameter toward their fan-ends at each juncture of the branches 109 therewith.

By the foregoing described means the  
95 dust which is collected by the fan is joined to the bulk of the material that is directly carried off by the removing apparatus. It will be understood that only a moderate suction requires to be produced by the fan, the  
100 only object being to produce a slight draft at the joints where the casing 72, that incloses the removing apparatus, fits the edges and surface of the drying table. This will  
105 serve to prevent any dust escaping into the outer atmosphere without imposing on the fan the duty of removing any considerable body of the material.

The mode of operation of the foregoing  
110 mechanism for removing the dried material from the drying table has been sufficiently indicated in connection with the description, above given, of the construction of such  
115 mechanism. As previously indicated, the removing apparatus immediately precedes the feeding apparatus, such removing apparatus breaking up and carrying to the inner edge of the annular table the layer of  
120 material that had been deposited on the table on the previous round. This dried material, as it drops over the inner edge of the table, is caught in the hopper, or chute 91, and is thence carried by conveyer 93 to the central hopper 94, and so away out of the  
125 machine.

By means of the suction fan 103, the air pressure within the casing 72, which incloses the aforesaid removing apparatus, is lowered sufficiently to prevent the escape of any  
130 dust that may be caused by the breaking up

of the material under the action of the revolving brush 70 and the scrapers 71. It is not the object, however, of this fan to create so strong a suction as to carry from the branched trunks 108 more than a minimum amount of the material, incidentally to the accomplishment of the foregoing object. This dust is collected in the bags 106 and added from time to time to the greater bulk of the material that is being constantly conveyed to the central hopper by the conveyer 93.

The utility of the arrangement whereby the escape of dust is avoided and the material conveyed away from the machine without exposure of the operator in any way, is highly important where poisonous materials are being handled, but in dealing with any class of materials the elimination of dust contributes not only to the comfort of the operators of the machine, but much facilitates the general operation. At the same time the mechanism provided for removing the material from the table surface is highly efficient and capable of very rapid operation, all contributing to render the apparatus as a whole a very desirable one for use in the connection in which it has been illustrated, as well as in various other fields of service.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In mechanism of the class described, the combination of an annular table; a hopper substantially centrally disposed with respect thereto; means movable in a circular path over said table and adapted to remove therefrom a layer of dried material; and conveying means connected with said first named means so as to travel therewith and extending radially inward from said table so as to convey such removed material to said hopper as fast as removed from said table.

2. In mechanism of the class described, the combination of an annular table; a hopper substantially centrally disposed with respect thereto; means movable in a circular path over said table, said means being adapted to loosen a layer of dried material on said table and to remove the same to the inner edge of the latter; and conveying means connected with said first named means so as to travel therewith and extending radially inward from said table so as to convey such material from the inner edge thereof to said hopper as fast as removed from said table.

3. In mechanism of the class described, the combination of an annular table; a hopper substantially centrally disposed with re-

spect thereto; means supported so as to be movable in a circular path over said table and adapted to remove therefrom a layer of material, said means comprising a radially disposed brush and a scraper following the same, both adapted to contact with said table; and conveying means connected with said scraper so as to travel therewith and extending radially inward from said table to said hopper so as to convey such material from said table to said hopper as fast as removed.

4. In mechanism of the class described, the combination of an annular table; a hopper substantially centrally disposed with respect thereto; means supported so as to be movable in a circular path over said table and adapted to remove therefrom a layer of material, said means comprising a radially disposed brush and a scraper following the same, both adapted to contact with said table; a conveyer extending lengthwise of said scraper and adapted to convey material received on the latter to the inner edge of said table; and another conveyer connected to travel with said scraper and extending from the inner edge of said table to said hopper, said last named conveyer being adapted to receive the material from said first conveyer and transfer the same to said hopper as fast as removed.

5. In mechanism of the class described, the combination of an annular table; means supported so as to be movable in a circular path over said table and adapted to remove therefrom a layer of material, said means comprising a plurality of radially disposed scrapers following one after the other; a conveyer extending lengthwise of each of said scrapers and adapted to convey material received on the latter to the inner edge of said table; and another radially disposed conveyer connected to travel with said scrapers and adapted to receive such material therefrom, said last named conveyer extending toward the central axis of said table.

6. In mechanism of the class described, the combination of an annular table; a hopper substantially centrally disposed with respect thereto; means adapted to remove a layer of material from said table, said means including a radially disposed scraper adapted to contact with said table; and other means connected with said scraper so as to travel therewith and adapted to convey such removed material to said hopper.

7. In mechanism of the class described, the combination of an annular table; means supported so as to be movable in a circular path over said table and adapted to remove therefrom a layer of material, said means comprising a radially disposed brush and a plurality of scrapers following the same, one after the other; a conveyer extending



lengthwise of each of said scrapers and adapted to convey material received on the latter to the inner edge of said table; and another radially disposed conveyer connected to travel with said scrapers and adapted to receive such material therefrom, said last-named conveyer extending toward the central axis of said table.

8. In mechanism of the class described, the combination of an annular table; a hopper substantially centrally disposed with respect thereto; means adapted to remove a layer of material from said table, said means comprising a radially disposed brush and a scraper following the same, both adapted to contact with said table; and other means connected with said scraper so as to travel therewith and adapted to convey such removed material to said hopper.

9. In mechanism of the class described, the combination of an annular table; means movable in a circular path over said table and adapted to remove therefrom a layer of the dried material; other means adapted to convey such removed material toward the axis of said table; a casing inclosing said removing means and having a close-fitting contact with said surface; and other means adapted to lower the air-pressure in said casing.

10. In mechanism of the class described, the combination of an annular table; means movable in a circular path over said table and adapted to remove therefrom a layer of the dried material; other means adapted to convey such removed material toward the axis of said table; a casing inclosing said removing means and having a close-fitting contact with said surface; a suction fan connected with said casing; and means adapted to collect any dust in the air withdrawn from said casing by said fan, said dust-collecting means being adapted to discharge such dust into said conveying means.

11. In mechanism of the class described, the combination of an annular table; a column centrally disposed with respect to said table; a hopper in said column having an opening encircling the same; a frame rotatably supported upon said column and extending over said table; means carried by said frame in operative relation to said table and adapted to remove material therefrom; and conveying means also carried by said frame, said conveying means leading from said removing means and discharging into said hopper opening.

12. In mechanism of the class described, the combination of an annular table; a column centrally disposed with respect to said table; a hopper in said column having an opening encircling the same; a frame rotatably supported upon said column and extending over said table; means carried by said frame in operative relation to said

table and adapted to remove material therefrom; a casing inclosing said removing means and having a tight-fitting contact with said table; conveying means also carried by said frame, said conveying means leading from said removing means and discharging into said hopper opening; and a closure for said opening rotatable with said frame.

13. In mechanism of the class described, the combination of an annular table; a column centrally disposed with respect to said table; a hopper in said column having an opening encircling the same; a frame rotatably supported upon said column and extending over said table; means carried by said frame in operative relation to said table and adapted to remove material therefrom; a casing inclosing said removing means and having a tight-fitting contact with said table; conveying means also carried by said frame, said conveying means leading from said removing means and discharging into said hopper opening; a closure for said opening rotatable with said frame; and a suction fan mounted on said frame and connected with said casing.

14. In mechanism of the class described, the combination of an annular table; a column centrally disposed with respect to said table; a hopper in said column having an opening encircling the same; a frame rotatably supported upon said column and extending over said table; means carried by said frame in operative relation to said table and adapted to remove material therefrom; a casing inclosing said removing means and having a tight-fitting contact with said table; conveying means also carried by said frame, said conveying means leading from said removing means and discharging into said hopper opening; a closure for said opening rotatable with said frame; a suction fan mounted on said frame and connected with said casing; and means adapted to collect any dust in the air withdrawn from said casing by said fan, said dust-collecting means including a bag depending over and adapted to be emptied into said conveying means.

15. In mechanism of the class described, the combination with a table; of relatively movable means for removing the dried material therefrom, said means comprising a rotary brush and a scraper following the same, both adapted to contact with said table; a casing inclosing said brush and scraper; and a suction fan connected with said casing and adapted to lower the air pressure therein.

16. In mechanism of the class described, the combination with a table; of relatively movable means for removing the material therefrom, said means including an angular trough tiltable about a longitudinally ex-

tending axis, a scraper attached to one edge of said trough and adapted to contact with said table, resilient means connected with said trough to hold said scraper in such contact, and a screw-conveyer extending lengthwise of said trough.

17. In mechanism of the class described, the combination with a table; of relatively movable means for removing the material therefrom, said means including an angular trough tiltable about a longitudinally extending axis, a scraper attached to one edge of said trough and adapted to contact with said table, resilient means connected with said trough to hold said scraper in such contact, means adapted to adjust the pressure exerted by said resilient means, and a conveyer extending lengthwise of said trough.

18. The combination of an annular table, a hopper located substantially at the center of said table, a rotatably mounted closure for said hopper, and conveying means extending from the inner edge of said table to said hopper closure and movable circularly along such table edge.

19. The combination of an annular table; a hopper located substantially at the center of said table; a rotatably mounted closure for said hopper; a conveyer extending from the inner edge of said table to said hopper closure and movable circularly along such edge; and means movable in a circular path over said table in unison with said conveyer and adapted to remove material from said table and discharge the same into said conveyer.

20. The combination of an annular table; a hopper located substantially at the center of said table; a rotatably mounted closure for said hopper; a conveyer extending from the inner edge of said table to said hopper closure and movable circularly along

such edge; means movable in a circular path over said table in unison with said conveyer and adapted to remove material from said table and discharge the same into said conveyer; and a casing inclosing said removing means.

21. The combination of an annular table; a hopper located substantially at the center of said table; a rotatably mounted closure for said hopper; a conveyer extending from the inner edge of said table to said hopper closure and movable circularly along such edge; means movable in a circular path over said table in unison with said conveyer and adapted to remove material from said table and discharge the same into said conveyer; a casing inclosing said removing means and having a close-fitting contact with the surface of said table; and other means adapted to lower the air-pressure in said casing.

22. The combination of an annular table; a hopper located substantially at the center of said table; a rotatably mounted closure for said hopper; a conveyer extending from the inner edge of said table to said hopper closure and movable circularly along such edge; means movable in a circular path over said table in unison with said conveyer and adapted to remove material from said table and discharge the same into said conveyer; a casing inclosing said removing means and having a close-fitting contact with the surface of said table; and a suction fan connected with said casing.

Signed by me, this 29th day of September, 1913.

WILLIAM R. MACKLIND.

Attested by:

OLIVER BOX,  
JONATHAN E. INGERSOLL.