April 9, 1940 E. F. ALLEN 2,196,650

MECHANICAL DEHYDRATION APPARATUS

Filed April 18, 1935 3 Sheets-Sheet 1

Fig. 2.

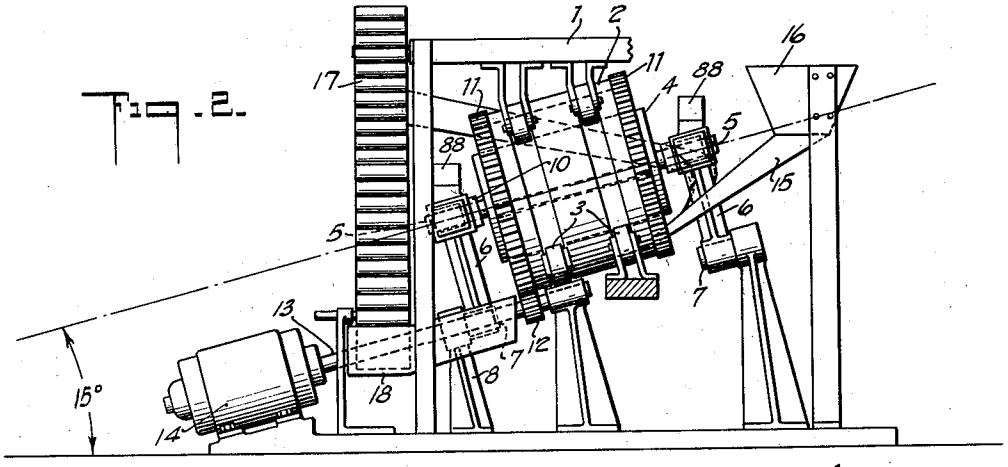
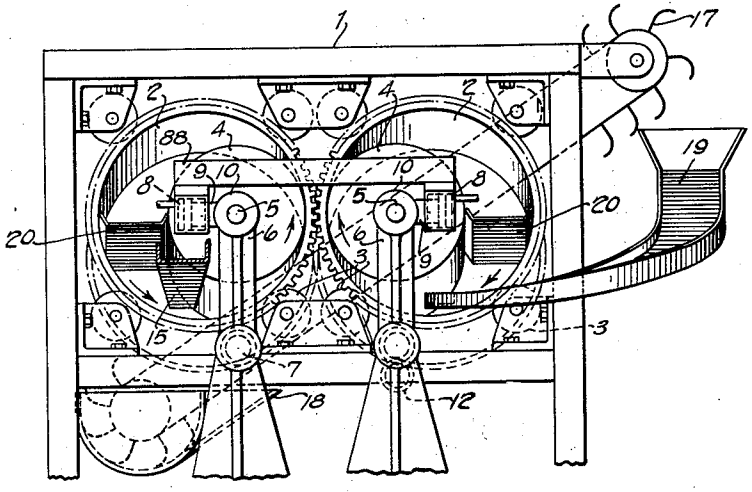


Fig. 1.



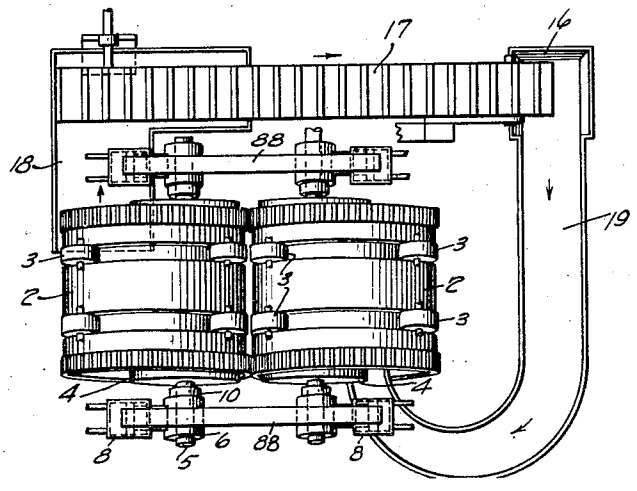


Fig. 3.

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MECHANICAL DEHYDRATION APPARATUS

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Fig. 4.

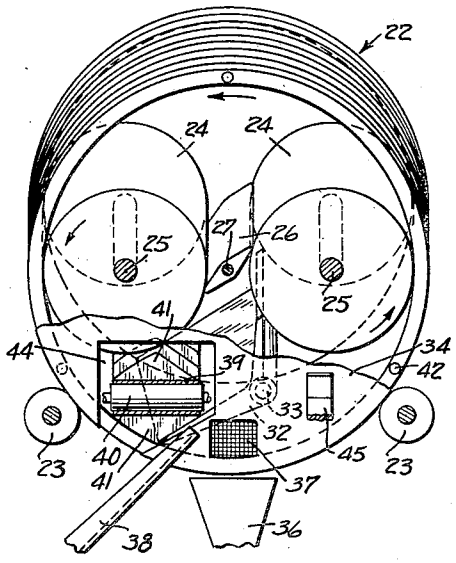
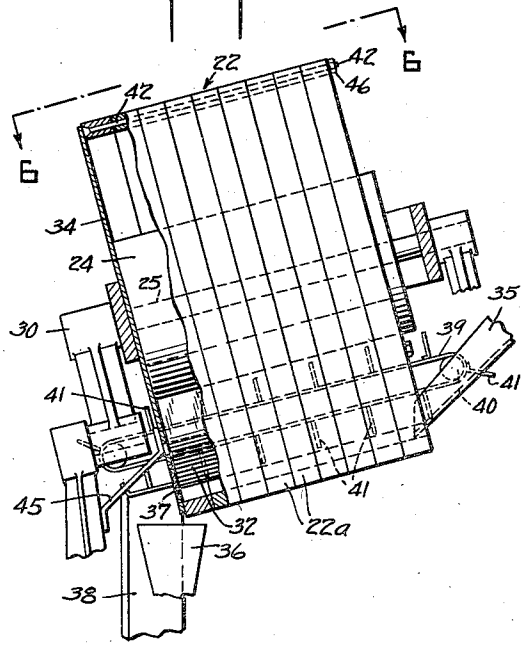


Fig. 5.



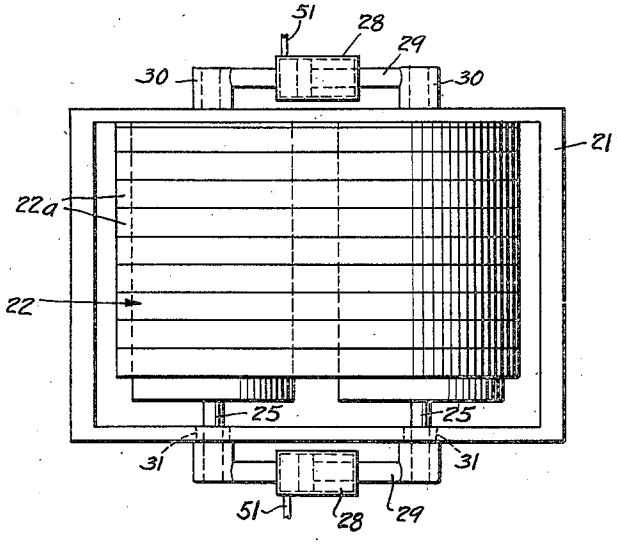


Fig. 6.

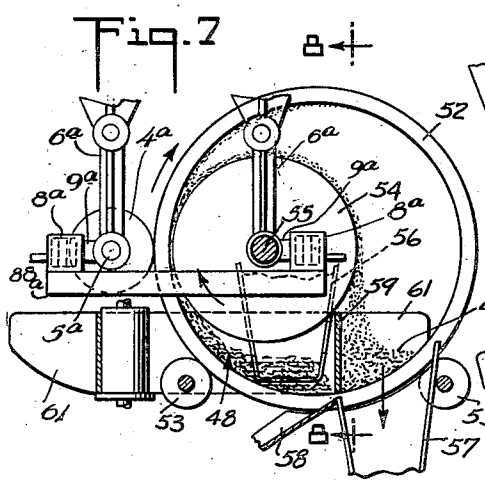
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MECHANICAL DEHYDRATION APPARATUS

Filed April 18, 1935 3 Sheets-Sheet 3

Fig. 7



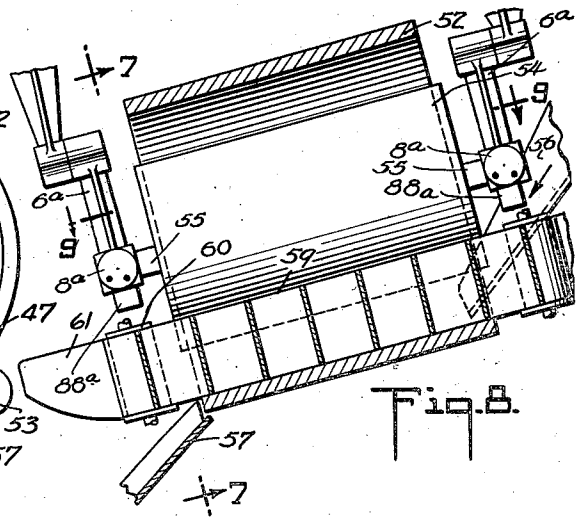


Fig. 8.

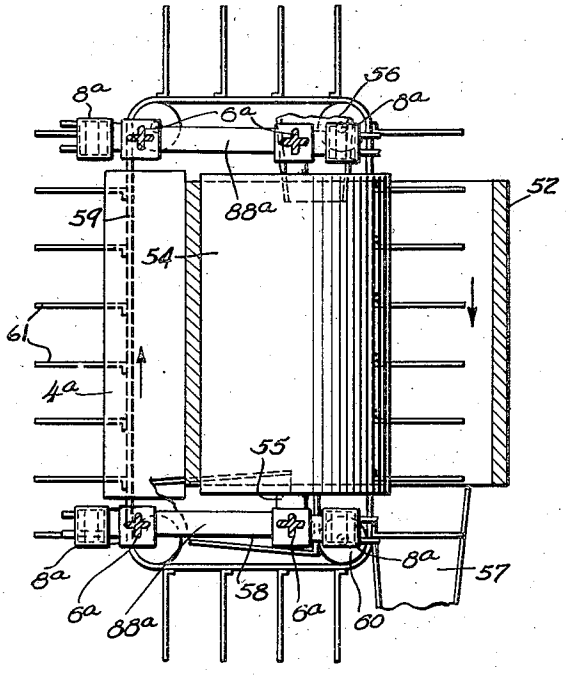


Fig. 9.

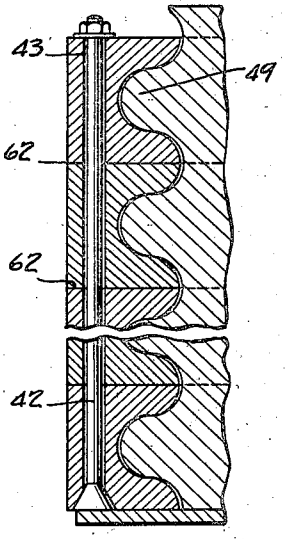


Fig. 10.

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UNITED STATES PATENT OFFICE

2,196,650

MECHANICAL DEHYDRATION APPARATUS

Earle F. Allen, Scarsdale, N. Y., assignor, by mesne assignments, to Stacom Process Corporation, Long Island City, N. Y., a corporation of New York

Application April 18, 1935, Serial No. 17,050

13 Claims. (Cl. 100—47)

This invention is designed to express economically and efficiently nearly all the liquid and soluble constituents of vegetable and animal matter and is particularly applicable to the economical disposition of garbage, though it can also be used to advantage in the separation of cellulose and other fibre from vegetation in other conditions.

The garbage collected in cities and towns is largely composed of natural cellulose fibre, which if freed from its large natural content of liquid, is highly combustible, yielding about 7000 B. t. u.'s per pound when burned. The drying of such garbage by heat sufficiently to burn it on an ordinary grate or in a mechanical stoker is, however, difficult and costly, while the odors produced are objectionable.

An important object of my present invention is to express the greater portion of such liquid by mechanical pressure so that the fibrous residue can then be easily ground to a fineness which will enable it to be consumed in a modern pulverized fuel burning furnace according to the method described in my co-pending application Ser. No. 729,577 filed June 8, 1934.

The apparatus for such mechanical dehydration described in this present application is, however, so efficient that it also removes the soluble coloring and other matter from vegetation so that the recovered cellulose fibre is clean and white, looking like cotton, and consequently can be used for making artificial silk and other cellulose products.

The apparatus, as hereinafter described, consists in substance of a rotary, continuously acting hydraulic press, the platen surfaces of which revolve into and out of contact one with the other, intead of reciprocating toward and from one another as in hydraulic or other presses of the prior art.

An important feature of the apparatus herein described consists in causing said platen surfaces to travel upward to their zone of contact and then feeding the material upward to said zone, instead of downward or horizontally as has been the procedure with prior liquid expressing rolls. As a result the expressed liquid flows downward by gravity from the pressure zone and is thereby completely and automatically separated from the solid matter which is carried upward and is ultimately delivered to any suitable discharging means entirely separate from the liquid collecting and discharging conduits.

Furthermore that dimension of the pressure zone extending in the direction of travel of the material is much greater than is the case with ordinary pressure rolls, so that said material is subjected to maximum pressure for a longer period, thereby giving the liquid more time in which to free itself from the solid material and drain backwards and downwards away from it.

The particular type of apparatus used comprises essentially a revoluble hollow cylinder in which is nested a roll of relatively considerable but lesser diameter, with the zone of contact located substantially on a level with the parallel axes of cylinder and roll and on that side of the latter at which the surfaces between which the material is compressed are traveling upward.

The inner surface of the hollow cylinder therefore serves as a conveyor element for carrying material dumped into its interior up to and into the pressure zone. Furthermore, the described arrangement produces a more acute cross sectional angle of entry (with curved sides) to the maximum pressure zone, thereby reducing greatly the natural tendency of larger particles of approaching material to stop, or slow down, their movement into the zone by reason of the converging surfaces slipping over them; which tendency materially interferes with the efficiency of an ordinary pair of opposed convex roll surfaces as arranged in ordinary roll presses.

A preferred subsidiary feature of my apparatus is the inclination of the roll and cylinder axes at a considerable angle to the plane of the horizon, resulting in the possibility of feeding the material into the higher end of the cylinder and allowing the dehydrated solids and expressed liquids to slide or flow automatically from the lower end thereof, thereby also preventing the treated material from mixing again with the raw or partly treated portions.

Incidentally, this procedure causes such portions of the solid matter as may travel around in and with the cylinder for recurrent passings through the pressure zone to follow a helical path about the cylinder's axis, and thereby become subjected to progressive compression and dehydration. To that end the roll and cylinder are given bearings one of which floats relatively to the other, so that the partly treated, more compacted material may be subjected to the same pressure as is the incoming, more bulky, raw material. Other objects, advantages, and novel features of the invention are pointed out in the subjoined detail description of the variously modified embodiments thereof and their respective modes of operation. The best form of apparatus embodying my invention at present known to me, together with certain modifications thereof, are il-

lustrated in the accompanying three sheets of drawings, in which

Fig. 1 is an end elevation of a dual mechanism embodying my invention.

Fig. 2 is a side elevation with parts omitted, and Fig. 3 is a plan view.

Fig. 4 is an end elevation of another dual embodiment with parts broken away, and others shown in section.

Fig. 5 is a similar side elevation and

Fig. 6 is a plan view in the direction of arrows 6—6 in Fig. 5, with parts omitted.

Fig. 7 is an end elevation looking in the direction of arrows 7, 7, of Fig. 8, with parts shown in section.

Fig. 8 is a longitudinal section on line 8—8 of Fig. 7.

Fig. 9 is an approximately horizontal section taken on line 9—9 of Fig. 8, and

Fig. 10 is a detail section of a modified construction of cylinders and rolls.

Throughout the drawings like reference characters indicate like parts.

Referring to Figs. 1, 2 and 3, 1 indicates a suitable supporting frame in which are supported two hollow cylinders 2, 2, which, as shown, are supported and held in position by a plurality of anti-friction idler wheels or rolls 3, 3, so that the side surfaces of the cylinder exteriors are closely adjacent one to another, or in actual contact. 4, 4, indicate two preferably solid rolls each of considerable diameter which is, however, less than the interior diameter of the cylinder in which it is nested, as shown. 5, 5, indicate the journals for said rolls which are supported in journal bearings having capability of slight movement such as will permit the rolls to be forced one toward the other, the construction shown comprising the vertical links 6, 6, supporting journal bearings 10, 10, and pivoted at 7, 7, to fixed supports. 8, 8, indicate hydraulic cylinders coupled together in pairs by tension members 88, 88, containing pistons 9, 9, arranged to press upon the journal bearings 10, 10, so that when liquid is forced into one or both cylinders the rolls 4, 4, will be pressed against the interior surfaces of the cylinders 2, 2, and said cylinders forced together, with great pressure. The assembly of cylinders and rolls above described may, of course, be rotated in unison by applying power to any one of them, but as shown in Fig. 2 power is conveniently applied by means of the ring gears 11, 11, connecting the cylinders and a pinion 12 on driving shaft 13 of electric motor 14, which pinion meshes with one of said ring gears. Pinion 12 is rotated in such direction that the adjacent surfaces of cylinders 2, 2, and the portions of surfaces of rolls 4, 4, in contact with the inner surfaces of said cylinders, will all move upward.

As shown in Fig. 2, the before described construction is inclined to the plane of the horizon at a considerable angle so that the axes of cylinders and rolls parallel to one another are in the same plane having such inclination. With this arrangement the material to be dehydrated is fed in to the lower portion of the upper end of the interior of one cylinder such as the left hand one looking at Fig. 1 by means of any convenient chute 15 leading from a hopper 16 and will thereupon be carried upward by the moving lower inner surfaces of the left hand cylinder 2, which is rotating in the direction of the arrow, into the compression zone existing between said cylinder surface and the surface of the roll 4. The expressed liquid thereupon can flow freely backward and downward and out of the lower end of said cylinder 2. The dehydrated material will pass upward and to the left over roll 4 and the greater portion of it be collected in the combined scraper and discharge trough 20 which is in contact both with the surface of the roll and the inner surface of the cylinder. This trough also would be inclined in a plane substantially parallel to the axes of roll and cylinder and the material can be discharged from its lower end into sump 18, and the elevator 17 will carry it up and to the right and dump it into second feed trough 19 through which it can be discharged into the lower portion of the upper end of the interior of the other, right hand cylinder and therein be subjected to a second stage compression, being ultimately discharged down right hand discharge trough 20. Any material or entrained liquid getting by either of these troughs will, of course, fall into the lower portion of one of the cylinder interiors from the lower end of which it will be discharged by gravity, or if it adheres to roll or cylinder surfaces will be carried around again for another compression stage.

Referring to Figs. 4, 5 and 6 another arrangement is indicated somewhat diagrammatically in which only one hollow cylinder 22, is employed supported on idler bearing wheels 23, 23, and containing two rolls 24, 24, oppositely disposed so that their outer surfaces are in contact with the cylinder interior along lines spaced apart 180° with reference to said cylinder. These rolls may have their journals 25, 25, rotating in journal bearings 30, 30, supported in main frame 21, with which they have slightly movable connection by reason of horizontally extending slots 31, 31. 28, 28, indicate hydraulic cylinders operatively connected each to one of each pair of roll journals, while its piston or ram is operatively connected to the other roll journal of said pair. 51, 51, indicate the fluid connections for cylinders 28 through which water or oil can be supplied under pressure to create the desired pressure of roll on cylinder.

Preferably the axes of cylinder and roll are also here inclined to the plane of the horizon and the material to be dehydrated would be delivered at the lower portion of the upper end of the interior of cylinder 22 by any suitable means such as trough 35 and thereupon carried up as before into the compression zone between the interior surface of the cylinder and the right hand roll 24, the cylinder and rolls being all rotated in a counterclockwise direction, as indicated by the arrows when looking at Fig. 4. The expressed liquid would run back down the cylinder surface out of the lower end of the cylinder. Preferably as shown the lower end of the cylinder may be closed by a plate 34, supported on any convenient stationary pedestal as 45 (Fig. 5) and said plate is provided with a netting covered opening 37 through which liquid may flow into the chute 36. It also has an opening 44 through which the greater portion of the dehydrated material can be discharged into chute 38.

To separate the solid material from the liquid, I may employ a double-edged scraper 32 of bell crank cross section, pivoted on a stationary shaft 33, which is slightly inclined upward (looking at Fig. 4) from the lower end therein shown so that the lower edge of the scraper, which is slightly curved but substantially parallel to said shaft, will run upward and to the left along the inner curved surface of cylinder 22, the scraper edge being curved to ensure contact with said cylinder

surface at all points in spite of this skewing. The upper edge of said scraper bears upon the downwardly moving surface of the right hand roll 24, and as a result the solid materials coming from the pressure zone at the left of left hand roll 24 will mainly be arrested by this scraper and, because of its skewed position, as above described, with its upper end advanced toward the approaching surface of the cylinder further than its lower end, this material will be shunted down into the chute 38. The vertical wing of the scraper prevents this material passing over to mix with the raw material coming in from chute 35 on its other side.

To further ensure sufficiently rapid discharge of the dehydrated material a power driven conveyor belt 39 may be extended through the cylinder interior, being supported from exterior belt pulleys 40 and carrying buckets 41, 41 of generally triangular shape, as shown in Fig. 4. Preferably the left hand side of this triangular outline would be slightly curved so as to conform to the curve formed by the intersection of the plane of the bucket with the inner curved surface of the cylinder 22.

To ensure a second stage compression for the bulk of the material another double-edged scraper 26 may be pivotally mounted on shaft 27 with its edges bearing against the opposite surfaces of rolls 24, 24. The mode of operation of this modification therefore would be in general as follows: The raw material coming in through chute 35 on the right hand side of scraper 32 (looking at Fig. 4) would gradually slide lengthwise along the lower interior surface of cylinder 22 and be carried upward to the right by the latter's rotation, to be caught between the cylinder surface and the right hand roll 24 and the greater portion of the liquid expressed therefrom, said liquid flowing back and out through netting 37 into chute 36. The solid material would pass up over roll 24 down onto scraper 26 and the greater portion of it carried up over the left hand roll 24 into a second pressure zone where more liquid would be expressed therefrom. The thoroughly dehydrated material would then pass onward down upon scraper 32 over which it would be shunted by gravity and the belt conveyor to the discharge chute 38. Any solid matter getting by the lower scraper 32 would go through the entire process again.

Referring to Figs. 7, 8 and 9 another form of power driven ejector apparatus for the dehydrated material is there shown in the form of a differently arranged belt conveyor 59 running around approximately vertical pulleys 60, with one strand located in the interior of cylinder 52 and traveling downwardly along the inclined bottom portion thereof. The buckets 61 on the exterior of said belt would preferably have curved lower edges as shown conforming to the curvature of cylinder 52. The raw material here would be fed in through the chute 56 to the upper end of the cylinder interior, as before, but to the left of the belt strand passing through the cylinder (Figs. 7 and 9). The other three strands of the belt are all outside of the cylinder as shown in Fig. 9.

These figures show the simplest form of my apparatus consisting of only one roll 54 and the cylinder 52 rotating in a clockwise direction on idler wheels 53, 53, as indicated by arrows in Fig. 7. Figs. 7, 8 and 9 show substantially the same form of pressure-applying mechanism as that of Figs. 1, 2 and 3, except that it is supported from hangers instead of on pedestals. The reference characters designating the parts of the pressure-applying mechanism in Figs. 7, 8 and 9 correspond, for like parts, to those of Figs. 1, 2 and 3, except for the addition of the subscript *a*.

The strand of the belt 59 inside of the cylinder could be made broad enough to serve as a flexible scraper with its lower edge resting on the inner surface of the cylinder and its upper edge pressed against the outer surface of the roll 54 by the weight and momentum of the mass 47 of the collecting dehydrated material.

57 indicates a discharge chute into which the belt conveyor could deposit the dehydrated material and the upper left hand wall of this chute (looking at Fig. 7) might support an inclined water shedding element 58 on which the expressed liquid would be discharged from the lower end of cylinder 52, to avoid its mixing with the dehydrated material 47.

The operation of this modification would, therefore, be substantially as follows: If the hydraulic or other pressure mechanisms are arranged to act upon cylinders 52 and 54 to force their surfaces together with great pressure, and if the roll and cylinder are rotated in clockwise directions, as indicated by the arrows in Fig. 7, the raw material 48 entering through chute 56, would be picked up by the moving inner surface of the cylinder and carried up into the roll-pass, the expressed liquid flowing backward and downward and out upon the watershed 58, while the dehydrated material would pass up over roll 54 and downward to the right hand side of belt 59 which would serve as a partition preventing it mixing with the outflowing water, or the incoming raw material, while the movement of said belt and buckets 61 would aid gravity in discharging the dehydrated material 47 into the chute 57.

If the conveyor belt is dispensed with and gravity feed of the material through the cylinder is relied upon, the incoming material, being deposited in a continuous but relatively small stream at the upper end of cylinder 52, would be carried immediately upward and around roll 54, and when dropping down from the upper surface of said roll or cylinder interior would strike the bottom of the cylinder interior at a point further down and in advance of the material then coming in through spout 56. This operation would be repeated several times according to the speed of rotation of the cylinder and its diameter before the material ultimately reached the lower end of the cylinder and was discharged into chute 57. Thus the material would follow a helical path from one end of the cylinder to the other.

Referring to Fig. 10, two modifications are therein illustrated as follows: Instead of plain cylindrical surfaces for roll and cylinder these may be given complementary corrugations, as shown at 49, thus producing longer elements of pressure surfaces for a given length of cylinder and also producting a grinding action between the side surfaces of the corrugations. Also in both plain and corrugated forms the hollow cylinder may be made in sections separated by planes at right angles to the axis, as shown at 62, 62, in Fig. 10. This sectional construction is also indicated at 22*a*, 22*a*, in Fig. 4. These sections would be held together by bolts 42, 42, passing through holes 43, of slightly larger diameter in the rings so as to permit the rings to move slightly one over another. The advantage of this construction is that if a particle or small mass of stone, metal or other highly incompressible material gets into

the garbage, the ring of the cylinder construction against which it is forced by a roll can spring a trifle toward an elliptical outline to permit it to pass without stopping the operation or breaking some other portion of the apparatus. This local displacement, however, will only allow a small portion of material to get by the roll without being sufficiently compressed, all the other rings retaining their circular outline and functioning normally.

Preferably the pressure mechanisms acting on opposite ends of each roll are independent one of the other so that each such roll may adjust itself automatically to any position necessary to give the same degree of pressure to the more compacted material at or near the discharge end of the surrounding cylinder as is given to the more bulky, raw material being fed into the upper end thereof, or may otherwise adjust its axial position so as to equalize pressures along its contact surface at any given period during the operation of the apparatus.

In the disposal of garbage according to the method described in my before-mentioned copending application Ser. No. 729,577 the larger solid components thereof, such as metal cans, bones, etc., are first picked out by hand or otherwise removed for any profitable use, as is now generally done in "picking over" the dumps or in "trimming the scows." The remaining material may then be passed through a magnetic separator to remove smaller metal objects and these can be sold as "scrap iron," while the final residue is put through a mascerator which will cut up the vegetable, animal and other soft materials into pieces not over about two inches in maximum dimensions. This partly mascerated mass is then fed to the dehydrator above described. The end-product from said dehydrator may be further dried out by heat, if necessary, when it is to be used for fuel, and thereafter put through a pulverizer before being delivered to the pulverized fuel burning furnace. Such heat treatment can be done without the liberation of odorous fumes or heavy smoke such as render the ordinary burning of garbage in the usual form of incinerator a public nuisance. This results from the fact that practically all of the fermenting constituents of the original mass have been previously squeezed out in liquid solution.

Moreover even this short heat treatment may be dispensed with if the final residue is to be used in making cellulose products, as it will then be treated with an acid solution, or some other chemical reagent in solution, and the presence of a small percentage of residual moisture in the material is then no disadvantage, being easily compensated for (perhaps) by the use of less water in the reagent solution.

A basic advantage of my present invention results from the fact that in all stages of operation (except that occurring while the material is passing down around the left hand roll shown in Fig. 4) the expressed liquid automatically flows down and away from the solid material being acted on in the pressure zone. This function of the apparatus and its resulting advantages are broadly new so far as I know and are sharply distinguished from the operation of an ordinary roll press through which the material must be fed downwardly, with the result that the expressed liquid is temporarily trapped in the upper portions or just above the pressure zone, where it backs up into the downwardly moving raw material and thereby saturates the latter to a degree greater than that existing when it was brought to the press. Consequently, the further raw material goes into the old roll press the more liquid per unit of volume thereof is present therein to be expressed at the final, narrow line of pressure where the convex surfaces of the rolls meet. With my apparatus on the other hand, such action is reversed, and also the period of greatest, and aproximately greatest, pressure is materially prolonged.

Various changes could be made in the details of construction of the apparatus above described as constituting my preferred embodiment of the invention and some of the described details omitted without departing from the substance and underlying principles thereof, so long as the basic idea of means disclosed is employed and the various possible further modifications are within the definitions of any of the appended claims.

As shown in the drawings (Fig. 2) the preferred angle of inclination to the plane of the horizon of the axes of both cylinder 2 and roll 4, is 15°, but this might be varied within limits, and even reduced practically to zero. I have found 15° to be the preferable angle because that produces sufficiently rapid and effective drainage for the expressed liquid, while avoiding any excessive sliding downward of the raw material lengthwise of the cylinder before it enters the zone of compression. Obviously, if the angle were increased to a point at which the downward pull of gravity on such material toward the lower, discharge end of any of the cylinders 2 exceeded the coefficient of friction thereof on the interior surface of the cylinder, much of the material would slide downward toward, and possibly all the way to and out of, the discharge end of the cylinder as soon as deposited therein, and no material would be carried up to the higher end of roll 4, thus preventing the apparatus working at full efficiency and allowing an indeterminate part to go through without any pressing action thereon, if no bottom face plate 34 were used.

Also, if the angle exceeded 45°, and the end plate 34 were used, most of the material might slide down against said plate as soon as it was deposited in cylinder 2, or at least before it was lifted to the compression zone by the inner surface of such rotating cylinder. This would bunch the material at the lower end of the cylinder and choke the apparatus, or at least leave its upper half (nearest the entrance point of the material) running empty.

Among other important novel features of my improved apparatus may be mentioned the location of the in-feed for the raw material at the lower portion of the end of the hollow cylinder—at the higher end of said cylinder if it is inclined, and placing the axes of cylinder 2 and roll 4 nested therein at substantially the same elevation so that this line of contact is similarly elevated. This leaves an open space beneath the roll into which the raw materials may be introduced in regulated quantities upon the moving lower, inner surface of the cylinder, and on and by it carried up to the much higher compression zone. As any particular area of such bearing surface becomes more and more sharply inclined to the plane of the horizon as it approaches the compression zone, the upper layers of any excess of material so carried thereon will tend to sag backward by gravity and so automatically tend to prevent the delivery of any undesirably thick layer thereof to the narrow zone of maximum pressure.

With my improved apparatus for dehydrating cellulose and other loose fibrous masses the main advantage results from the fact that enormous pressures (as much a 9000 lbs.) per linear inch of roll surfaces in contact can be applied without the material slipping back, away from the line of maximum pressure which it is approaching. Consequently sufficient pressure per square inch can be applied to break down the cellulose or other cells and transform them into fine, amorphous particles from which any liquid trapped in the original cells and not expelled by mere pressure can be easily and rapidly evaporated by air drying. Thus, a sheet of old newspaper run flat into my apparatus comes out as a disintegrated layer of amorphous cellulose which has no more coherence than so much soft soot.

In an arrangement as shown in Figures 1 to 3 but with the exterior surfaces of the rings actually in contact, either one of the rings or hollow cylinders 2 serves as a roller bearing for the exterior of the other which is forced against it by the hydraulic pressure exerted through one of the rolls 4 and the latter's journals and journal bearings. Taking either roll 4 and its surrounding cylinder together with the other cylinder and the hydraulic pressure system, they constitute a pressure roller mill in which the second cylinder is really a roller backing for the first cylinder to which latter the operating roll pressure is applied by roll 4 within it. Substantially the same floating roller bearing system is formed by the single cylinder 22 and two rolls 24 therein shown in Fig. 4. In this way the structural difficulty in creating the necessary very great pressure between an internal roll and an open ended cylinder or ring surrounding it (and therefore necessarily devoid of axial journals and journal bearings) is practically overcome.

Having described my invention, I claim:

1. A mechanical dehydrating apparatus, comprising an imperforate revolvable hollow cylinder having an annularly smooth inner surface, an imperforate revolvable roller, of somewhat less external diameter than the internal diameter of said cylinder and having an annularly smooth outer surface, positioned therein and always in contact with the inner surface of said cylinder except when material is being pressed therebetween, the line of contact of the roller and cylinder being substantially in a plane containing the axes of the roller and cylinder, said plane being substantially normal to the plane passing through the axis of the cylinder and the lowest point in its inner surface, means for forcing said surfaces toward each other with great but yielding pressure, means for positively rotating one of said revolvable members in such a direction that material to be dehydrated may be fed into the lower portion of the hollow cylinder.

2. A mechanical dehydrating apparatus, comprising an imperforate revolvable hollow cylinder having an annularly smooth inner surface, an imperforate revolvable roller, of somewhat less external diameter than the internal diameter of said cylinder but at least equal to the radius of the cylinder and having an annularly smooth outer surface, positioned therein and always in contact with the inner surface of said cylinder except when material is being pressed therebetween, the line of contact of the roller and cylinder being substantially in a plane containing the axes of the roller and cylinder, said plane being substantially normal to the plane passing through the axis of the cylinder and the lowest point in its inner surface, means for forcing said surfaces toward each other with great but yielding pressure, means for positively rotating one of said revolvable members in such a direction that material to be dehydrated may be fed into the lower portion of the hollow cylinder.

3. A mechanical dehydrating device as defined in claim 1 in which the plane of the axes is inclined to the horizontal in a direction longitudinally of the axes.

4. A mechanical dehydrating device as defined in claim 1 in which the plane of the axes is inclined to the horizontal at an angle of about 15° in a direction longitudinally of the axes.

5. A combination such as defined in claim 1 in which said axes are inclined at an angle of about 15° to the plane of the horizon.

6. An apparatus such as defined in claim 1 in which said axes are inclined to the plane of the horizon, combined with power driven means for ejecting dehydrated material from the lower portion of said cylinder.

7. An apparatus such as defined in claim 1 combined with a conveyor belt located in the lower portion of the interior of said cylinder, and means for causing said belt to travel lengthwise of said cylinder so as to eject dehydrated material therefrom.

8. An apparatus such as defined in claim 1 combined with a conveyor belt located in the lower portion of the interior of said cylinder, and means for causing said belt to travel lengthwise of said cylinder so as to eject dehydrated material therefrom, said belt running over pulleys having axes perpendicular to the axis of the cylinder, and being provided with conveyor scrapers projecting from one face thereof, one strand of said belt being arranged to travel along a portion of the lower inner surface of said cylinder which extends substantially parallel to the axis thereof, and the said feeding means being arranged to deliver the material to be dehydrated to the interior of the cylinder on that side of said belt strand away from which the surface of the cylinder is traveling; whereby said belt strand forms a partition for keeping the dehydrated materials separate from the incoming damp masses of material to be dehydrated.

9. A combination such as defined in claim 1 in which said cylinder is composed of a plurality of rings of elastic metal capable of slight radial movement one on another; whereby any one of said rings may be slightly deformed from circular to substantially elliptical outline by the passage of a partly incompressible body of matter between it and the roll without similar deformation of the remaining rings.

10. A mechanical dehydrating apparatus, comprising an imperforate rotatable hollow cylinder having a smooth annular surface, two rotatable rollers, each of somewhat less external diameter than the internal diameter of said cylinder and having smooth annular external surfaces, said rollers being positioned opposite each other at approximately 180° apart and having their external surfaces adapted to contact and roll upon the internal surface of the cylinder along lines in substantially the same plane and at substantially the same vertical elevation as the axis of the cylinder, means for forcing said surfaces into contact with great but yielding pressure, means for rotating the cylinder and rollers, and means for feeding the material to be dehydrated to the hollow cylinder at an elevation below the rollers.

11. An apparatus such as defined in claim 10

combined with a double edged scraper located in the lower portion of said cylinder interior and having its lower edge in contact with the inner surface thereof, while its upper edge is in contact with the roll surface which is moving downwardly past said edge, together with means for feeding material to be dehydrated to said lower cylinder interior space below said last mentioned roll and back of said scraper, whereby the treated material collecting in said cylinder's lower interior portion on the other side of said scraper is prevented from being carried onward to mix in with the incoming untreated material.

12. An apparatus such as defined in claim 10 combined with a double edged scraper located in said cylinder and bearing on the surfaces of both rolls at such inclination thereto that material thereby scraped off the surface of one roll shall be projected against that of the other and thereby and thereafter carried into contact with the cylinder wall for subjection to a second compression therebetween.

13. A combination such as defined in claim 10 including means for forcing one roll away from the other which comprises an hydraulic apparatus one element of which is operatively connected to the journal bearings of one of said rolls, while another relatively movable element is operatively connected to the journal bearings of the other roll, said journal bearings being capable of slight movement toward and from one another.

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