C. L. DEAN.

DRUM FOR DRYING PULP AND THE LIKE.

APPLICATION FILED MAR. 24, 1920.

1,422,039.

Patented July 4, 1922.

3 SHEETS—SHEET 1.

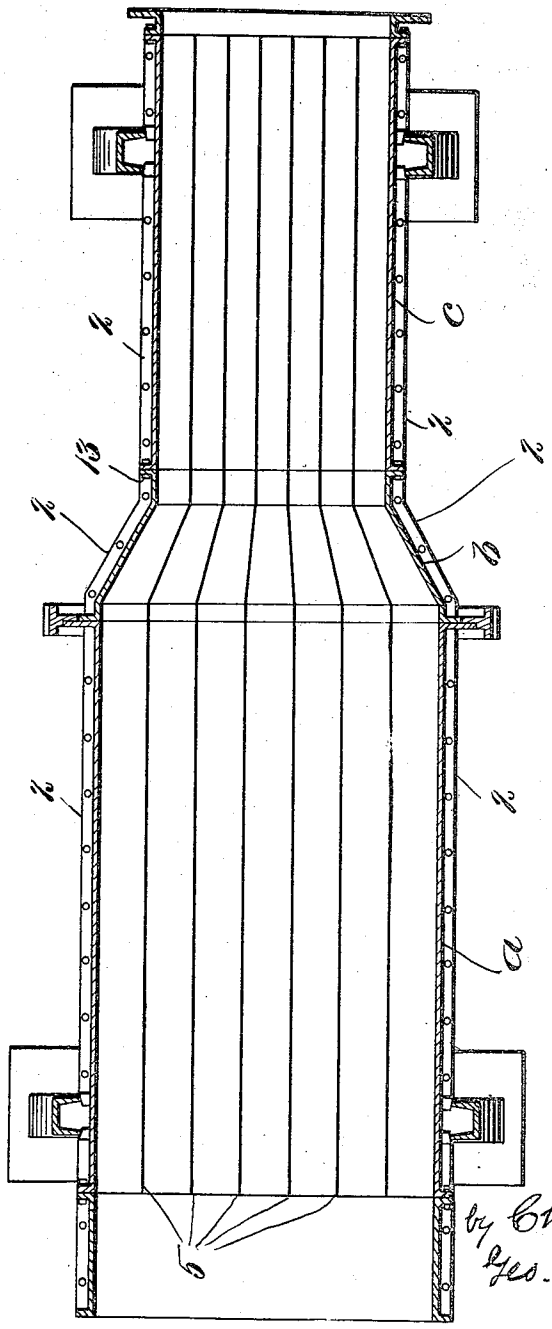


Fig. 1.

Inventor
by Charles L. Dean
Geo. N. Goddard
atty.

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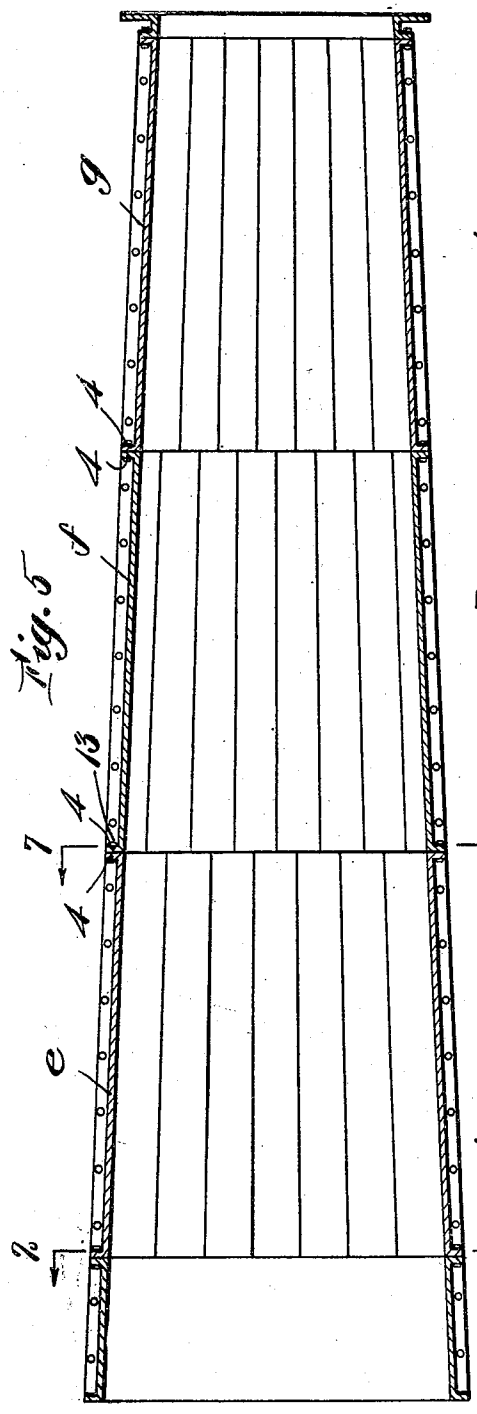


Fig. 5

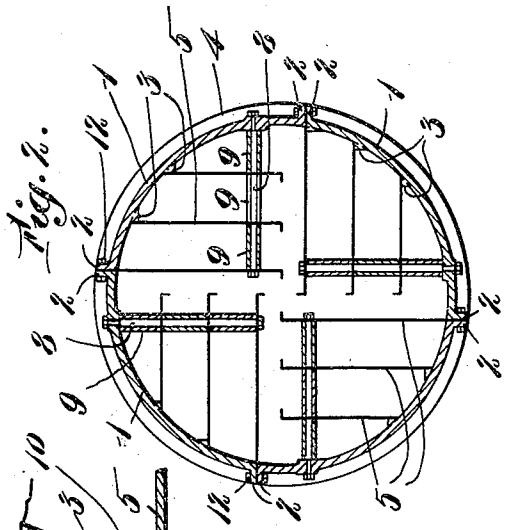


Fig. 2.

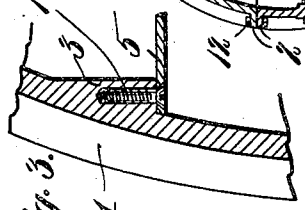


Fig. 3.

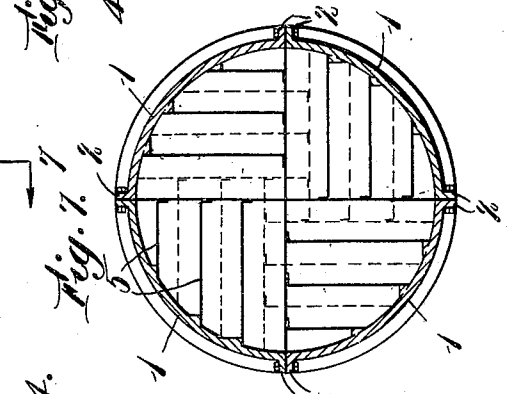


Fig. 7.

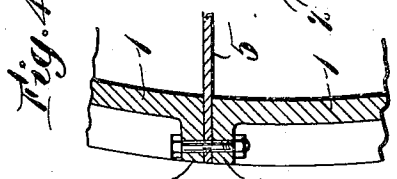


Fig. 4.

Inventor:
Charles L. Dean
by Geo. N. Goldard,
Atty.

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3 SHEETS—SHEET 3.

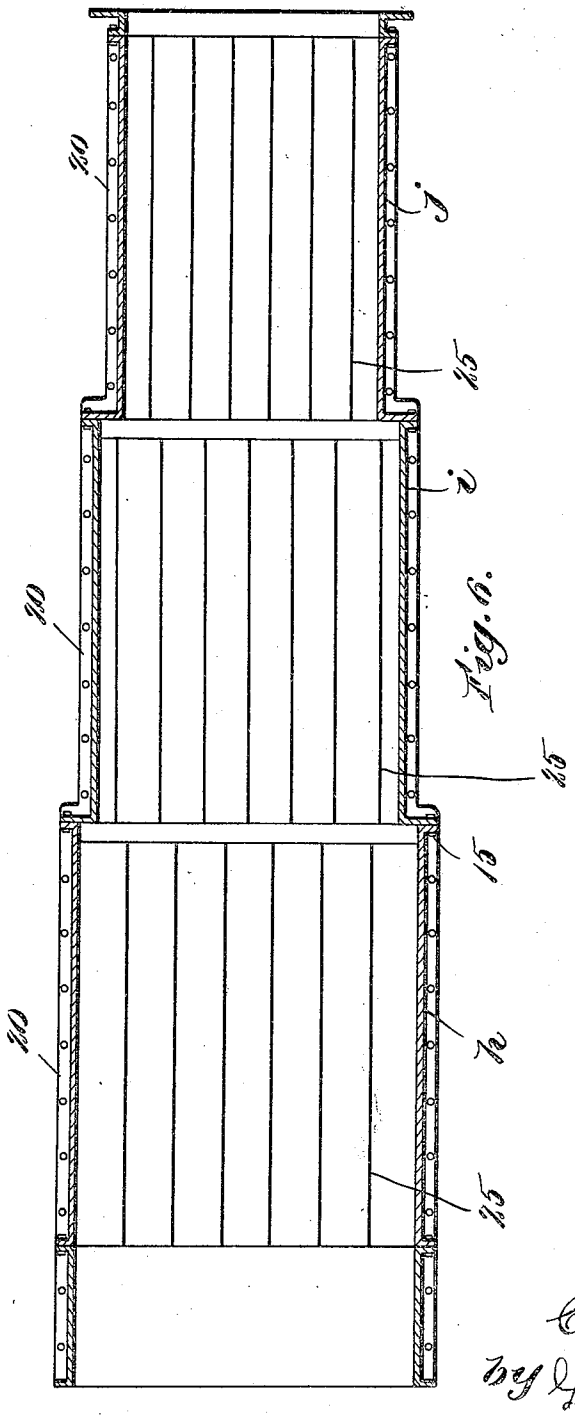


Fig. 3.

Inventor:
Charles L. Dean
by Geo. N. Goddard, atty.

UNITED STATES PATENT OFFICE.

CHARLES L. DEAN, OF DENVER, COLORADO, ASSIGNOR TO STEARNS-ROGER MANUFACTURING COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

DRUM FOR DRYING PULP AND THE LIKE.

1,422,039. Specification of Letters Patent. Patented July 4, 1922.

Application filed March 24, 1920. Serial No. 368,325.

To all whom it may concern:

Be it known that I, CHARLES L. DEAN, a citizen of the United States, and resident of Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Drums for Drying Pulp and the like, of which the following is a specification.

This invention relates to devices for drying pulp or other crushed or disintegrated material whether of animal, vegetable or mineral nature and is intended to provide an apparatus which shall be both efficient in action and economical in the consumption of fuel, and which shall also be so constructed as to be readily disassembled for the purpose of making repairs to the interior baffle or rippling plates, the arrangement of which constitutes one important feature of the invention.

Heretofore it has been proposed to make drums for this purpose with a long cylindrical shell formed by riveting together the peripheral plates of rolled steel and then fixing in such shell interior partitions. In the best practice the number of these plates or dividing partitions has been progressively increased in the middle and discharge portions of the shell for the purpose of obstructing or retarding the passage of the dryer material toward the discharge end of the drum.

This arrangement and construction however is very expensive and difficult to build and has the further disadvantage that when any of the interior plates become broken or badly bent the entire drum has to be torn down by cutting the rivets, a very laborious and expensive operation which involves practically the rebuilding of the drum since these drums as used often measure more than 40 feet in length and 8 feet in diameter.

The present invention consists generally in a drum whose shell is formed of a series of separately removable steel or iron sections each section preferably formed of quadrants or sectors whose partitions are secured thereto so that each sector with its interior plates forms a self contained unit capable of removal from the drum without disturbing or disassembling the other sectors, thereby permitting complete access to the interior plates.

A further feature of improvement consists in securing the desired degree of retardation of the partly dried material in its passage to the outlet end of the drum by a construction involving the contraction of the diameter of the drum of its cross sectional area thus dispensing with the necessity of inserting the additional partitions or baffle plates heretofore used for that purpose. This arrangement lessens the weight of the drum besides economizing material in its construction while at the same time increasing its efficiency.

In the accompanying drawings, I have illustrated different embodiments of the principles of this invention, in which—

Figure 1 is a central longitudinal section of a drum showing the partition or drizzling plates in their assembled position within the shell.

Figure 2 is a cross sectional view through one of the sections of Figure 1 showing diagrammatically the relative disposition of the interior plates or partitions.

Figure 3 is an enlarged sectional detail view showing the means for anchoring one of these plates to its surrounding sector.

Figure 4 is an enlarged sectional detail showing the means of fastening the sectors of each section together.

Figure 5 is a longitudinal sectional view showing a modified arrangement of cylinder in which the plurality of sections are continuously tapered.

Figure 6 is a longitudinal sectional view showing another modification in which the successive sections are stepped down from one cylinder diameter to a smaller one.

Figure 7 is a cross sectional view illustrating the staggered arrangement of the plates in successive sections.

Referring now to the form shown in Figure 1, in this case, the cylinder is shown as comprising a cylindrical section *a* of large diameter and an intermediate sharply tapered section *b* which joins the large section *a* with the small cylindrical section *c* at the exit or discharge end of the drying drum.

Each section of the drum is made of approximately quadrant sectors 1 each of which is formed along each longitudinal edge with a radial or outward projecting flange 2 perforated to receive fastening bolts so that the respective sectors of each section may be bolted to the adjacent sectors thereof to form a complete cylinder. Pref-

erably these sectors whether cylindrical or tapered are made of cast iron and are formed with interior ledges 3 forming guides or abutments against which the interior partition plates 5 are seated. The inner ends of these partition plates may be stayed or held in any suitable manner as for example by means of stay bolts 8, surrounded by spacing sleeves or tubes 9 of proper length to be interposed between the several plates and the peripheral wall of the drum. For further security the outer ends of the partition plates 5 may be fastened to the ledges 3 by means of screw bolts 10, as shown in Figure 3.

At each end each sector is formed with a peripheral flange 4 so that the complete sections may be assembled end to end and bolted together by means of said flanges.

It will be observed that the plate lying nearest the diametrical plane of each section has its outer end passed between the adjacent flanges 2—2 of two adjacent sectors of the section so that the fastening bolts may pass through the plates thereby holding the whole structure rigidly in place with the aid of the stay bolt sleeves or otherwise. By removing the row of bolts 12 along each longitudinal sector flange and by similarly releasing bolts 13 from the end flanges of any section, the section may be taken bodily away from the drum to permit repairs or replacement of the interior partition walls.

When the drying drum is made with a continuous taper as shown in Figure 5, it is desirable to have the partitions in each section *e*, *f*, and *g* somewhat staggered with relation to the partitions in the adjacent section as illustrated in Figure 7 in which the dotted lines indicate the position of the partition plates, say in section *e*, while the full lines denoting the partition plates 5 show the relative position of the partition plates in section *f*.

Instead of using a tapered construction to reduce the diameter or cross sectional area of the cylinder at the middle and outlet portion of the drum, each section of the drum may be made of cylindrical form as in the case of sections *h*, *i*, and *j* of Figure 6 with their coupling flanges 15 properly proportioned to enable the sections to be bolted together. In this case as in the others, each section is built up of flanged sectors 20 which may be of substantial quadrant shape the same as illustrated in Figures 2 and 7 and the partition plates 25 may have the same staggered arrangement as shown in Figure 7. In this case however, in order to provide for the free passage of the pulp from one section to another, the plates 25 at their discharge ends terminate somewhat short of the plane of the sectors 20 to allow the material to be drawn from the peripheral passages or compartments in one section into the corresponding compartments or passages of the next section.

I consider the forming of the sections in separate cast sections capable of being readily assembled and taken apart to be a particularly valuable feature of this invention since it often becomes necessary to get access to the interior to mend or replace broken plates, and in drums as heretofore constructed this was only possible by cutting the steel plate rivets and practically tearing down the whole drum. Moreover, by reducing the diameter of the drum, according to the principle described, the practice of greatly multiplying the number of inside partitions through the middle and end portions of the drums which is expensive in construction and involves much difficulty in upkeep and repair, is avoided thus resulting in great simplicity of construction and efficiency in operation so long as provision is made for the free passage of the pulp from one end of the drum to the other under forced draft of the drying blast.

While I have mentioned cast iron or steel as materials for constructing the drum it will be understood that drums utilizing this principle of construction may be made of any material whatsoever that may be appropriate to the particular work that they are intended to perform.

One of the marked advantages of this principle of construction is the fact that it tends to equalize and render uniform the velocity of movement of the gases through the drum as they become cooled in the drying operation.

When very wet material such as undried peat pulp which contains over 90% of moisture is being treated in this drying drum, it is preferred that the hot gases and the wet material that is undergoing the drying treatment shall be carried through the drying drum in the same direction, it being intended that they shall be introduced at the large end of the drum and discharged through the small end of the drum. On the other hand, when the moisture content is relatively small it may be found advantageous to introduce the material to be dried in the end opposite to that in which the hot gas or drying medium is introduced.

What I claim is:

1. In a drying drum the combination of a sectional peripheral shell comprising individual sectors having longitudinal external flanges at their opposite edges, means for detachably securing the adjacent flanges of the assembled sections together, and a series of interior partition plates whose outer edge portions are inserted between the adjacent sector flanges to be supported thereby in operative position, substantially as described.

2. A drying drum comprising a series of peripheral cast iron sectors having external

longitudinal flanges affording means for securing them to the adjacent sectors, a series of interior partition plates secured to each sector and removable herewith when the sector is disconnected from its adjacent sector whereby each sector and its attached partition plates may be bodily removed from the drum leaving the other sectors intact, substantially as described.

3. In a drying drum the combination of a sectional shell and interior partition plates, each section comprising a sector cast with integral external flanges and interior ledges, partition plates secured to the flanges and ledges respectively for support while the drum is in use and being removable with the individual sector to which they are secured, while leaving the other sectors and partitions intact, substantially as described.

4. A drying drum comprising a series of peripheral sectors each having external longitudinal and circumferential flanges at its edges affording means for securing it demountably to the adjacent sectors, a series of interior partition plates secured to each sector and removable therewith from the drum while leaving the other sectors and partitions intact, substantially as described.

5. A drying drum, a peripheral shell whose cross sectional area is reduced at its middle and at its discharge end, and interior partitions secured to said shell and suitably spaced therein to correspondingly subdivide the interior into longitudinal passages whose cross sectional areas are reduced through the middle and end portions of the shell, substantially as described.

6. A drying drum embracing in its construction a plurality of tubular sections of progressively diminished diameter detachably secured together end to end to form a continuous drum whose middle and outlet portions are of smaller diameter than the intake end portion, a series of longitudinal partitions arranged in each section to form compartments of larger cross sectional area at the inlet end of the drum than at the outlet end thereof, substantially as described.

7. A sectional drying drum comprising longitudinal tubular sections secured end to end each section comprising peripheral sectors of cast metal whose adjacent longitudinal edges are formed with projecting flanges, and a series of internal spaced partition plates secured to each sector to permit removal therewith and means for securing the individual sectors detachably together by means of said flanges, substantially as described.

8. A sectional drying drum embracing longitudinal tubular sections fastened end to end each section comprising a demountable shell consisting of peripheral sectors detachably secured together and a series of partition plates secured inside the sectors, means for supporting said partition plates in properly spaced relationship, the plate nearest the diametric plane of the section being extended to project between the longitudinal edges of two adjacent sectors to be held between them for support when the drum is assembled, substantially as described.

9. A drying drum comprising tubular sections of different diameter detachably secured together end to end, each section having series of internal partition plates to form longitudinal compartments, the partitions of one section being offset from the partitions of the next adjacent section, substantially as described.

In witness whereof, I have subscribed the above specification.

CHARLES L. DEAN.