March 4, 1930. C. J. BLEIL 1,749,525

DRIER

Filed April 12, 1928

Fig. 2.

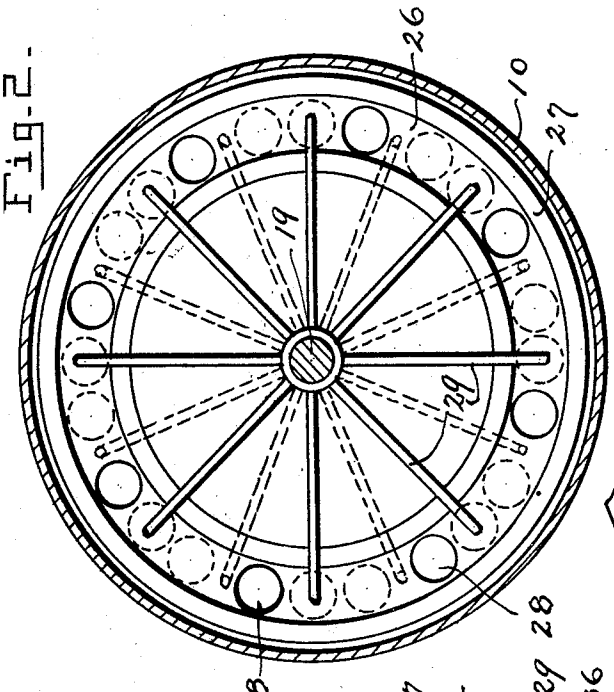


Fig. 3.

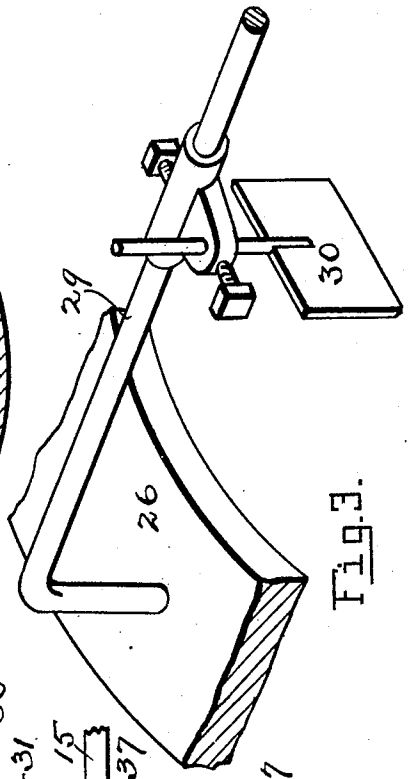
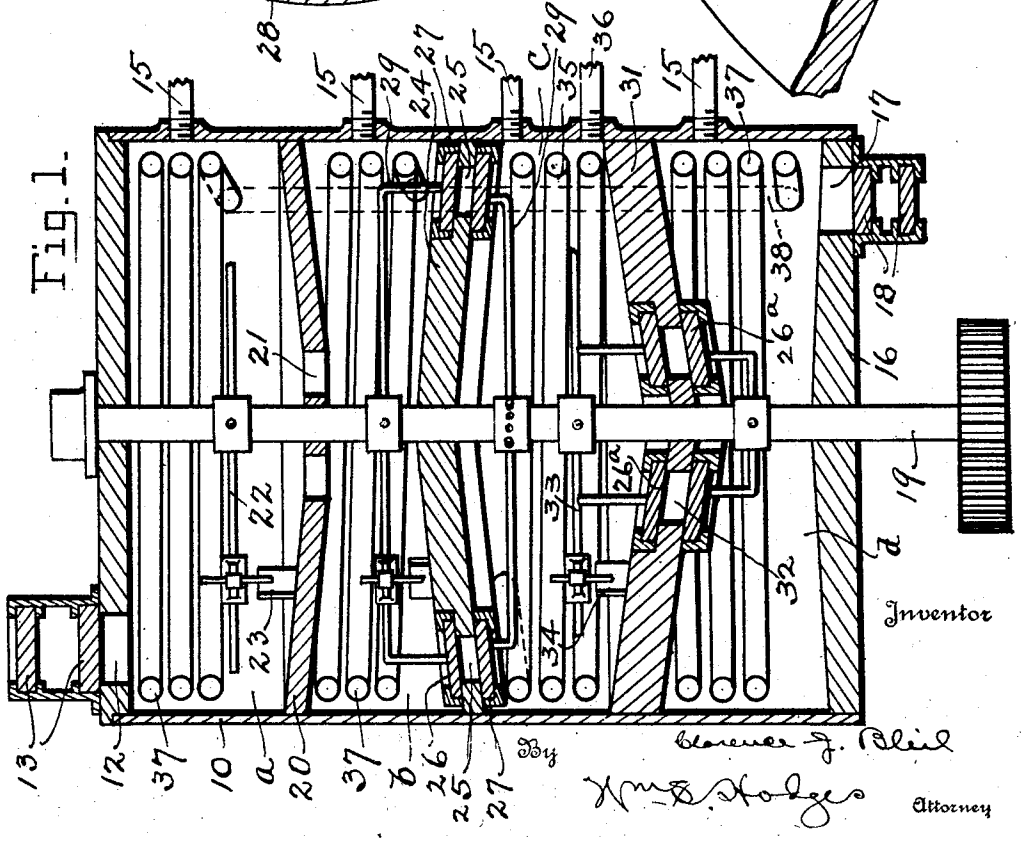


Fig. 1.



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1,749,525

UNITED STATES PATENT OFFICE

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DRIER

Application filed April 12, 1928. Serial No. 269,482.

This invention is an apparatus for subjecting various materials to a drying or moisture eliminating treatment, and particularly while said material is in transit from a source of supply to a position of delivery.

One of the objects of the invention is to provide simple and efficient means for effectively drying various materials, but more especially the residue remaining after the operation of an oil extracting apparatus, such as is described in a separate coincidentally filed application for patent filed April 12, 1928, Serial No. 269,484. The invention, however is not limited to this particular use. A further object is to provide simple means for keeping the material in motion, and passing it from one drying chamber to another in such manner that the moisture is effectively removed. A further object is to provide means for conducting away any volatile oil solvent or gaseous or vaporous constituents capable of being volatilized and subsequently recovered.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—

Figure 1 is a longitudinal sectional view of a drier constructed in accordance with the invention. Figure 2 is a transverse sectional view. Figure 3 is a detail view illustrating the portion of one of the valve rings and a scraper disk.

Referring to the drawing, 10 designates a cylindrical casing divided into a plurality of chambers by means of transverse partitions 11. In the drawing, four of such chambers are shown, indicated respectively at *a*, *b*, *c*, and *d*. In the top wall of the casing 10 is an inlet opening 12 which is controlled by suitable valve-like doors 13 capable of being operated alternately, so that material may be introduced into the chamber *a* without affecting the pressure conditions within the casing. Each chamber is provided with an outlet pipe 15, through which any volatile constituents which may be driven off by the drying process, may be conducted to a suitable recovery apparatus (not shown). For instance, said pipes may be connected with any desired type of suction apparatus for the purpose of maintaining a vacuum within the various chambers. The bottom wall 16 of the casing is provided with an outlet opening 17, closed by valves or doors 18, which are alternately operated so as to effect discharge of the dried material without in any way affecting the pressure conditions within the casing. Extending longitudinally through the casing 10 is a drive shaft 19 which may be rotated in any suitable manner.

The partition wall 20 between chambers *a* and *b* slopes downwardly and inwardly as indicated in the drawing and is provided with a central discharge opening 21. Secured to the shaft 20 are radial arms 22, each provided with a scraper 23 positioned to engage the top surface of said partition wall, so as to direct the incoming material toward said opening.

The partition wall 24 between the chambers *b* and *c* is arranged so as to slope downwardly and outwardly from the center, and is provided near the periphery of the chamber with a plurality of outlet openings 25. Cooperating with these openings are upper and lower ring-like valve members 26, which slidably engage guides 27, secured to said partition walls. Said valve slides are provided with spaced apart openings 28, adapted to register with the previously mentioned opening 25, during travel of the valve slides. Said slides are operated by means of radial arms 29 extending from the shaft 19 and engaging said slides, scrapers 30 being provided to assist in the movement of the material toward the openings in said partition wall.

The partition wall 31 which divides the chambers *c* and *d*, slopes downwardly and inwardly and is provided with a plurality of spaced apart outlet openings 32. These openings are controlled by valve-slides 26ª similar in construction to the previously mentioned valve slides 26, and are guided in the same manner. The valve slides 26ª are connected with radially disposed arms 33 secured to the shaft 19 and carrying scrapers 34 as shown.

The chamber *c* is heated in suitable manner, preferably by means of dry steam discharged from a coil 35, supplied through a

pipe 36 from any suitable source. Likewise the chambers *a*, *b* and *d* are heated by coils 37 to which wet steam is supplied by means of a pipe 38 connected with a suitable source of supply.

In operation, the material to be dried is introduced into the chamber *a* through the opening 12, by alternate operations of the valve members 13, so that the pressure conditions within said chamber are maintained. As the material falls upon the partition 20 it is stirred by the scrapers 23, and directed to the outlet openings 20, so as to be passed into chamber *b*. In entering chamber *b*, the material drops upon the partition 24, and is moved by the scrapers 30, so as to pass out through the openings 25 into the chamber *c*, said openings being alternately opened and closed by the valve slides 26. As the material enters the chamber *c*, it is highly heated by the dry steam coil 35, and as it drops upon the partition walls 31, it is moved and directed toward and through the openings 32 into the chamber *d*, and from the last mentioned chamber it passes out through the discharge opening 17 being thoroughly heated by the coil 37. Any vapors and gaseous constituents driven off during the drying operation are drawn off through the pipes 15 to any suitable form of recovery apparatus, and of course where said pipes are connected with a suction apparatus, such as a pump, a vacuum is maintained in all of the chambers, except chamber *c*, in which pressure is created by the discharge of dry steam thereinto.

The advantages of the invention will be readily understood by those skilled in the art to which it belongs. For instance, it will be observed that the material will be constantly agitated during its passage through the drier, and its transit from the inlet opening to the discharge opening is practically continuous. By placing the heating coils in the various chambers, it is obvious that thorough heating of the material is accomplished as it passes through the drier, reaching its maximum heat in the chamber *d*, so that substantially all of the volatile constituents are driven off. It will also be observed that the device is simple in construction and will not readily get out of order or become deranged.

Having thus explained the nature of the invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what is claimed is:—

1. In an apparatus for extracting oleaginous constituents, a drier comprising a chamber provided with partitions dividing it into a plurality of independent compartments, certain of said partitions being provided with centrally located openings, the alternate partitions being provided with openings near their peripheries, a rotatable shaft extended through said drier, and valves carried by said shaft and controlling the openings in the respective partitions.

2. In an apparatus for extracting oleaginous constituents, a drier comprising a chamber provided with partitions dividing it into a plurality of independent compartments, certain of said partitions being provided with centrally located openings, the alternate partitions being provided with openings near their peripheries, a rotatable shaft extended through said drier, spiders secured to said shaft and provided with valves controlling the respective openings, and scrapers secured to said spiders.

3. A drier of the character described comprising a casing provided with spaced apart partitions dividing it into a plurality of independent chambers, certain of said partitions being provided with centrally located openings, the alternate partitions being provided with openings near their peripheries, and means for successively opening and closing the openings in said partitions.

4. A drier of the character described comprising a casing provided with spaced apart partitions dividing it into a plurality of independent chambers, certain of said partitions sloping downwardly and outwardly from the center of the casing, the alternate partitions sloping downwardly and inwardly toward the center of said casing, said partitions being provided with openings, means for agitating material as it falls upon the respective partitions, valves controlling said openings, and a common means operating said valves and said agitating means.

5. A drier of the character described comprising a casing provided with spaced apart transverse partitions, one of said partitions having openings near its periphery and another partition having openings near the center thereof, movably mounted valve rings extending over said openings and provided with means for opening and closing the openings, and means for rotating said valve rings.

6. A drier of the character described comprising a casing provided with spaced apart transverse partitions, each of which is provided with openings therein, valve rings arranged in pairs with one above and the other below the openings in said partitions so as to control said openings, said valve rings being provided with openings adapted to successively register with the openings in the partitions, and means for imparting rotative movement to said valve rings.

7. A drier of the character described comprising a casing provided with spaced apart transverse partitions, each of which is provided with openings therein, valve rings mounted above and below the openings in said partitions, said valve rings being provided with openings adapted to successively register with the openings in the partitions,

a shaft extending through said casing, and arms extending radially from said shaft and engaging said valve rings so that rotation of said shaft will impart movement to said rings.

8. A drier of the character described comprising a casing having transversely disposed partitions provided with openings, a shaft extending axially through said casing, rods extending radially from said shaft, and sets of scrapers carried by said rods, one set for each partition, and valves controlling the openings in some of said partitions, said valves being connected to and operated by the adjacent radially disposed rods.

9. A drier of the character described comprising a casing provided with transverse partitions dividing it into a plurality of independent compartments, a vapor discharge pipe leading from each compartment, means for heating said compartments, a shaft extending axially through said casing, and means connected with the shaft for controlling the passage of material from one compartment to the other.

10. In an apparatus for extracting oleaginous constituents, a drier consisting of a chamber divided into a plurality of superposed compartments, means by which steam may be introduced into one or more of the compartments so as to mix with the contents thereof, means by which one or more of the remaining compartments may be maintained under vacuum, means for agitating the material in one or more of the compartments during the drying operation, and means for controlling communication between said chambers so as to prevent steam passing from the first mentioned compartments to the other compartments and to maintain predetermined pressure and heat conditions in the respective chambers.

In testimony whereof I have hereunto set my hand.

CLARENCE J. BLEIL.