July 19, 1927.

1,636,177

J. S. GAGE

CENTRIFUGAL DRYING MACHINE

Filed Feb. 28, 1920 2 Sheets-Sheet 1

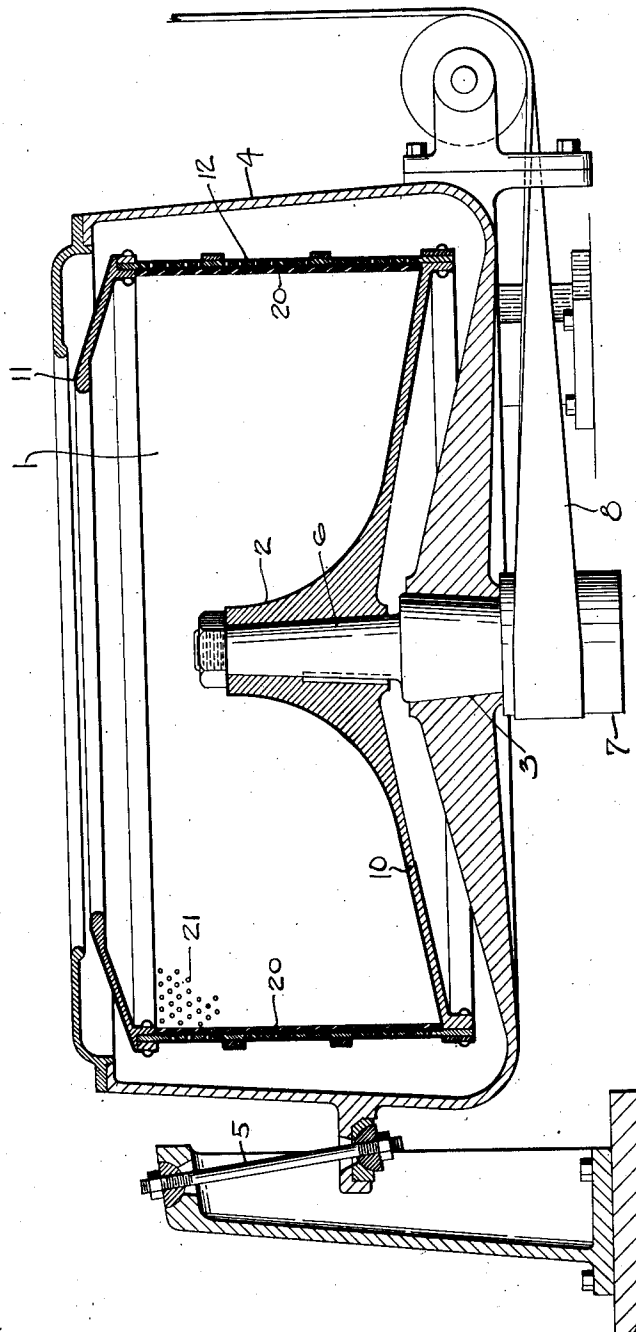


Fig. 1

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FIG 2

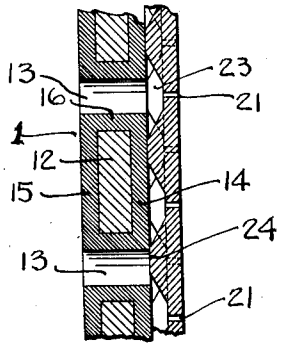


FIG 5

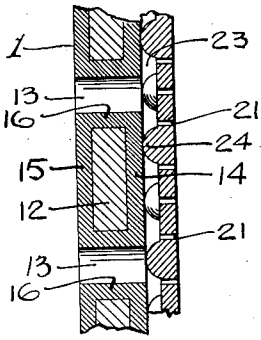


FIG 3

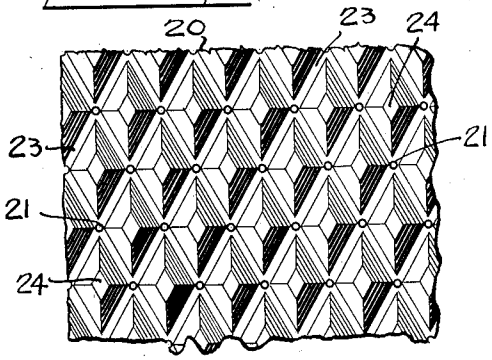


FIG 6

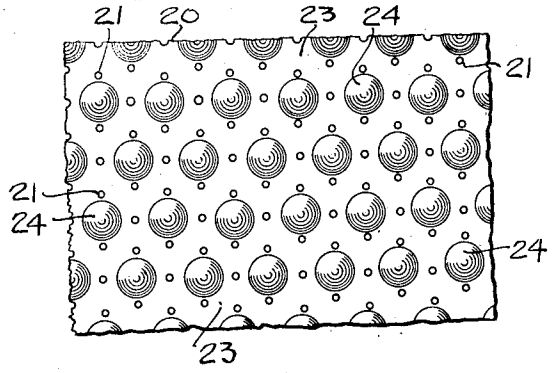


FIG 4

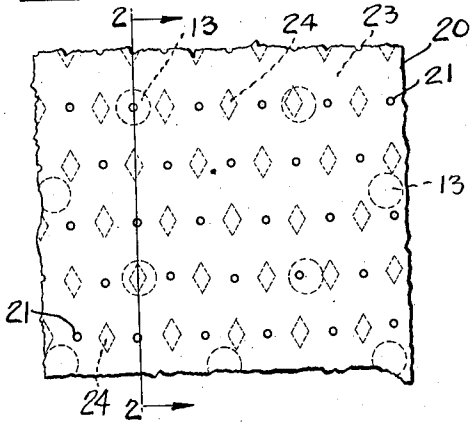
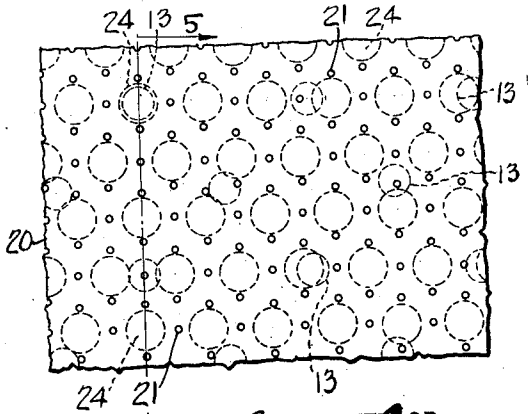


FIG 7



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UNITED STATES PATENT OFFICE.

JOHN S. GAGE, OF CHICAGO, ILLINOIS, ASSIGNOR TO TOLHURST MACHINE WORKS, OF TROY, NEW YORK, A CORPORATION OF NEW YORK.

CENTRIFUGAL DRYING MACHINE.

Application filed February 28, 1920. Serial No. 363,106.

The invention relates to centrifugal extractors for drying or dewatering finely crystalline or granular materials, and more especially to machines of this kind for drying or dewatering corrosive materials, such as many chemicals and like substances, and in certain aspects thereof the invention is likewise applicable to pressure and gravity filters, and has in view also to capacitate such machines for handling said corrosive materials.

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

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

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

Of the drawings:—

Fig. 1 is a central vertical view, partly in elevation, and partly in section through a centrifrugal machine embodying the invention;

Fig. 2 is a fragmentary section greatly enlarged of a portion of the wall of the basket and cooperating screen shown in Fig. 1;

Fig. 3 is a fragmentary elevation of the back side of the screen shown in Fig. 2;

Fig. 4 is a fragmentary elevation of the front side or inside of the screen shown in Figs. 2 and 3;

Fig. 5 is a view similar to Fig. 2, but showing a different form of screen;

Fig. 6 is a fragmentary elevation of the back side of the screen shown in Fig. 5; and

Fig. 7 is a fragmentary view of the front side or inside of the form of screen shown in Figs. 5 and 6.

In the work of drying or dewatering many substances, such as minutely crystalline, granular or comminuted materials, it is necessary to employ a screen sheet in addition to, or in cooperation with, the perforate vertical and cylindrical wall of the rotating basket, when the particles of material are sufficiently small to pass through the holes in the basket wall, so as to retain such minute or finely divided material within the basket under the centrifrugal action while permitting the liquid or fluid to pass therethrough and out through the perforations in the basket wall. This is due to the size or diameter of the perforations in the basket wall, which are too large to retain the minute materials, such as those referred to. Various mechanical limitations, such as required thickness and necessary rigidity of basket walls, as well as other limitations require that the holes through the basket wall be of a certain size and spaced a certain distance apart. These holes are usually ¼ inch in diameter on 1 inch or 1¼ inch centers, although it will be understood that the invention is not limited by these exemplary and explanatory dimensions.

It is also essential to provide not only for the retention of such minute or minutely divided materials, but in connection therewith provision must be made for transverse or lateral flow of the liquid or fluid material so that after passing through the relatively small and closely-spaced perforations in the screen sheet it may pass freely to, and out through, the perforations in the basket wall.

The present invention, in connection with the foregoing and in connection with handling materials of the kind specified and in the manner prescribed, provides for handling materials which are of a corrosive character, such as chemicals and other materials which would rapidly destroy the metals and like materials usually employed in dewatering machines and which themselves in turn might be damaged or contaminated.

Referring now in detail to the accompanying drawings, illustrating by way of example one embodiment of the invention, the rotatable basket of a centrifrugal machine is indicated by 1. The basket is shown with a bottom support or bearing 3 upon which the central hub 2 of the basket rests. The bearing 3 is carried by the centrifugal casing 4, which is slung in a plurality of bearings 5 (one only being shown). Within the hub 2 is the shaft 6 of the basket, and on its bottom end shaft 6 has a pulley 7, driven by a belt 8. So far as the present invention is concerned, the general construction of the machine may be widely varied, and it is shown applied to a machine of this type merely by way of example.

The basket 1 has a bottom 10 and preferably a top flange 11. The vertical cylindrical wall 12 of the basket has perforations 13 therethrough, usually spaced symmetrically apart. In accordance with one aspect or purpose of the invention, as previously stated, the basket 1 and the cooperating screen sheet are constructed and adapted to handle chemical and other corrosive materials. With this in view, the basket 1 has its interior surfaces covered by a sheet 14 of rubber or other corrosion resisting material, and the exterior of the basket is preferably also provided with a similar layer 15. The perforations 13 are also lined with the corrosion resisting material as shown at 16.

The screen sheet 20 is of corrosion resisting material, is designed, as already described, to retain the minutely divided material within the basket during the drying or dewatering process, and is placed within the vertical wall of the basket 1. This sheet is usually and preferably of equal height with the vertical basket wall 12 and extends throughout the circumference thereof, making a complete inner vertical cylindrical wall within the basket.

The screen sheet 20 has formed therethrough a plurality of perforations 21, which are smaller in size and are spaced closer together than the perforations 13 in the cylindrical wall of the basket 1. The screen sheet is thus adapted to hold back the minute or finely divided solid to be dried or dewatered, and it is also provided on the back side thereof, that is the side toward the cylindrical wall 12 of the basket 1, which fluid circulation means whereby the liquid or fluid after passing through the perforations 21 in the screen sheet 20 may flow freely to and pass through and out of the perforations 13 in the basket wall.

As embodied, and referring now more particularly to Figs. 2, 3 and 4, the screen sheet 20 has perforations 21 of relatively smaller diameter and spaced closely together as compared with the holes in the cylindrical wall of basket 1. In this embodied form the holes 21 are preferably about one-fourth the diameter of the holes 13 in the wall of basket 1.

Holes 21 open from the front or inner face of screen sheet 20 into the circulating spaces provided on the back or outer side of the screen sheet. These circulating spaces as here embodied comprise a plurality of intersecting or intercommunicating channels 23. These channels at their bottoms are preferably of a width substantially equal to the diameter of the holes 21, and widen out or are outwardly inclined toward the surface of the sheet 20. This is the surface or side of the sheet which is toward the cylindrical wall 12 of the basket 1. There are formed bearing knobs or points 24 between the channels 23, which provide bearings or supports for the screen sheet against the basket wall. These knobs are preferably integral with the screen 20. The material of the screen sheet will be such that the sheet will be sufficiently flexible to be curved into place within the cylindrical wall 12 of the basket and will be strong enough to resist deformation or flattening down between the supports 24, which would destroy the circulating space provided for the escape of the separated liquid or fluid, as already described.

In Figs. 5, 6 and 7, a somewhat different form of screen sheet is shown. The perforations are practically the same as in the preceding figures already described, but the supports 24 are shown as substantially hemispherical projections, which leave a very large area at the back of the screen sheet for the fluid circulating space. As shown in Figs. 6 and 7 the supporting projections 24 are preferably farther apart than the holes 21 through the sheet 20.

The material to be dewatered is placed in the basket 1, and is thrown against the screen sheet 20 by the centrifugal action, the liquid passing through the perforations 21 in the screen sheet. The liquid then passes along the circulating spaces on the back side of the screen sheet and flows out through the holes 13 in the wall 12 of the basket 1. The circulating spaces on the back of the screen sheet, or between the screen sheet 20 and the cylindrical wall 12 of the basket 1, give free flow and utilization of all the holes 21 in the screen sheet and all the holes 13 in the basket wall 12.

The sheet 20 is sufficiently strong, being of vulcanized rubber, or other suitable material, to resist the tendency to flatten down between the supports 24, due to the centrifugal action. The materials are all corrosion resisting and will therefore handle any chemicals or like substances which would destroy the ordinary fabric and metal devices used as screens, and which in turn would themselves be damaged.

The separated fluid is discharged through the holes 13 into the casing 4, which is provided with a suitable outlet or outlets.

It will be understood that the dimensions stated and referred to herein are merely exemplary and descriptive and are in nowise restrictive of the invention. It will also be understood that changes may be made from the described and illustrated details, within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A centrifugal drying machine including, in combination, a rotating basket having a perforate vertical wall and a screen

filter sheet therewithin continuous through the circumference of the basket, said sheet having perforations therethrough and having on its back a plurality of projections spaced from each other both vertically and horizontally, said projections spacing said screen sheet away from said basket wall and providing a circulating space for fluid passing through the perforations in the screen sheet and thence through the perforations in said basket wall.

2. A centrifugal drying machine including in combination a rotating basket having a perforate vertical wall and a screen sheet therewithin having perforations therethrough and projections on the back side thereof and spaced farther apart than the perforations through the sheet, and spacing the sheet away from the basket wall and providing a circulating space for fluid passing through the perforations in the screen sheet and thence through the perforations in the basket wall.

3. A centrifugal drying machine including in combination a rotating basket having a perforate vertical wall and a screen sheet therewithin of vulcanized material having perforations therethrough and projections on the back side thereof spacing it away from the basket wall and providing a circulating space for fluid passing through the perforations in the screen sheet and thence through the perforations in the basket wall.

4. A centrifugal drying machine including in combination a rotating basket having a perforate vertical wall and a screen sheet therewithin of vulcanized rubber and having perforations therethrough and projections on the back side thereof spacing it away from the basket wall and providing a circulating space for fluid passing through the perforations in the screen sheet and thence through the perforations in the basket wall.

5. A centrifugal drying machine including in combination a rotating basket having a perforate vertical wall and a screen sheet therewithin of vulcanized material and continuous through the circumference of the basket and having perforations therethrough and projections on the back side thereof spacing it away from the basket wall and providing a circulating space for fluid passing through the perforations in the screen sheet and thence through the perforations in the basket wall.

6. A centrifugal drier, including in combination a basket having a smooth inner surface, a unitary lining for the basket provided with perforations smaller than those in the basket, and knobs formed in the outer surface of the lining at spaced intervals, adapted to bear against the inner surface of the basket and hold the lining spaced from the wall of the basket for forming a fluid circulating space between the two.

7. A lining for placement within the basket of a centrifugal machine, comprising a sheet of filter material provided with perforations smaller than the perforations of the basket, and having on its outer surface a plurality of spaced apart knobs, adapted to bear against the inside of the basket and hold the sheet spaced therefrom, for forming a fluid circulating space between the sheet of material and the wall of the basket, the sheet being made of non-metallic material, with the knobs integral therewith.

8. In a centrifugal drying machine, a basket, a resilient cylindrical screen filter sheet having radial passages extending therethrough, said sheet being provided with means for spacing the outlets of said passages from the basket wall comprising outwardly extending radial projections having circulating passages extending circumferentially therearound, both the sheet and projections being of chemically corrosion resistant material.

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

JOHN S. GAGE.