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CENTRIFUGAL MACHINE

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Fig. 1.

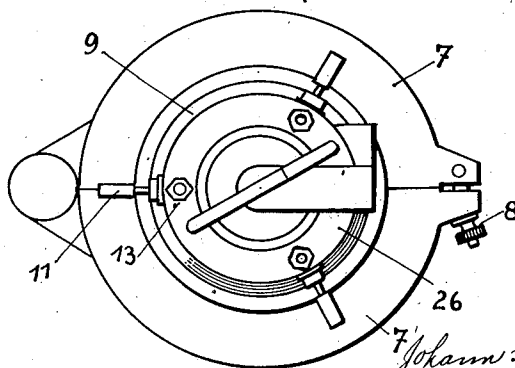
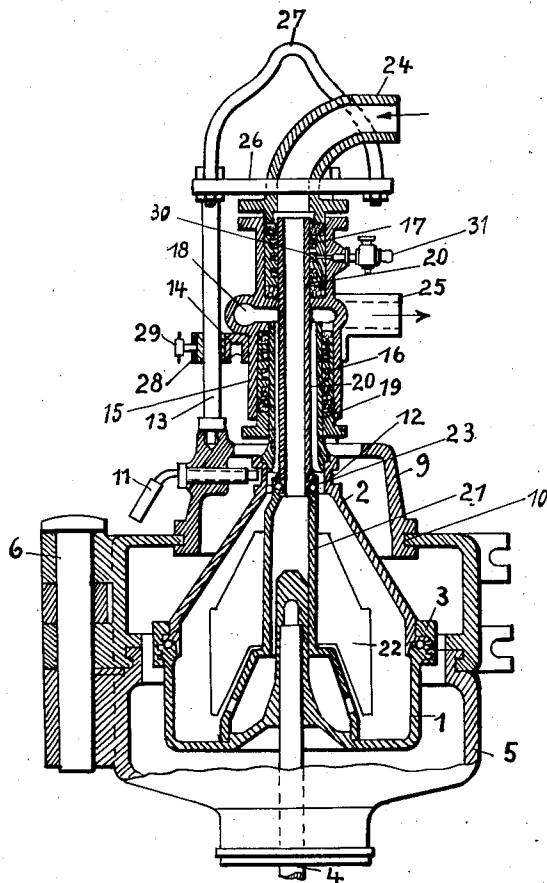


Fig. 2.

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CENTRIFUGAL MACHINE.

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This invention has reference to centrifugal drums for the separation of solids from liquids or for the separation of liquids of different specific gravities and for equivalent purposes, and it is particularly intended to devise means for effecting the rapid opening and closing of the drum and rapid and convenient means for cleaning the clearing body of the centrifugal machine without interfering with the tight closure of the admission and discharge pipes of the device. In the constructions of centrifugal drums as heretofore suggested, there was the difficulty that in the opening of the drum the collars surrounding the admission and discharge pipes had to be withdrawn, which greatly interfered with the tight closing of the collars or sleeves which, after the closing of the drum, had to be again exactly adjusted. This resulted in the further inconvenience of rather considerable loss of time for the intermittent operation of the devices referred to and the difficulty of shifting the parts into the proper respective positions for the opening and closing of the centrifugal drum.

Now, in accordance with this invention, the drawbacks referred to in connection with centrifugal drums and the like are overcome by so arranging the different parts, that the top portion of the drum may be upwardly moved together with the admission and discharge pipes and with the collars or sleeves surrounding the same, so that all these parts will be adapted to retain their mutual relative positions upon the opening of the drum. By this means any interfering with the tightening of the drums is avoided and the opening and closing procedures, and consequently also the cleaning of the device, are facilitated, simplified and accelerated. After the opening of the drum, it is only the clearing body which remains in the lower portion of the drum and may be easily removed therefrom for cleaning purposes. The collars are unchangingly retained on the admission and discharge pipes, respectively, so that there is no liability of any leakage points occurring in the opening and closing of the centrifugal drum.

In the practice of our invention, we preferably proceed by making the upper half of the stationary casing enclosing the centrifugal drum to comprise two sectional portions adapted to be swung on a vertical axis and

which in the open position with the sections swung back will expose a hood or the like adapted for the raising of the upper portion of the drum and surrounding the same and which may be detachably coupled to said upper portion and upon which the upper collars are adapted to be supported by means of vertical standards or the like. In order to be able to raise the admission and discharge pipes from the clearing body simultaneously with the upper part of the drum the admission and discharge pipes are preferably concentrically arranged in a continuous sleeve or collar and the connection of the admission pipe with the entrance port of the clearing body is effected by means of a tightening member which is automatically contracted upon the screwing in position of the cover of the drum. The continuous sleeve referred to may be provided with a testing cock for the purpose of ascertaining any possible points of leakage occurring in the operation, the said cock disclosing any possible leakage of the collars or sleeves existing, if opened at the path of the escaping liquid. These and other advantages and important objects of the invention will appear as the specification proceeds and from an inspection of the drawings.

In the drawings, a centrifugal drum according to our invention is shown in a preferred embodiment by way of exemplification, Fig. 1 being a vertical section through the entire centrifugal drum, while Fig. 2 is a top plan view of the centrifugal drum.

The centrifugal drum comprises a container 1 with a cover 2 and the screw-threaded annulus 3 connecting these parts with the intermediary of a packing, washer or the like. The drum is operated, for instance, from below and from any suitable source of power, not shown, by means of the suitably supported vertical shaft 4. The drum rotates in a stationary casing 5, the upper half of which consists of two sections 7, 7' which may be swung into the open position on a vertical axis 6, 6'. In the closed position the sections 7, 7' are connected to each other by bolts, latches or the like 8 and are in engagement with an annular groove 10 provided in the hood 9 and by which the hood is retained in position. Three screw bolts 11 are adjustably arranged in the hood 9 adapted for engagement with an external annular groove 12 of the cover 2 of the

drum. To the top of the hood 9 three vertical supports 13 are screw-threadedly secured which by means of the arms or brackets 14 are connected to the casing 15 of the stuffing boxes. In this casing 15 two stuffing boxes 16 and 17 are disposed one above the other and are separated by a transversely arranged passage 18. The lower stuffing box 16 serves as a means of guiding and tightening the enclosing pipe 19, while the stuffing box 17 surrounds a pipe 20 spacedly and concentrically disposed in the interior of the pipe 19. The inner pipe 20 is connected to the admission pipe 21 of the clearing body 22 of the drum 1, 2 by the intermediary of any suitable tightening means 23, thus, for instance, of a ring of elastic material. The clearing body 22 may consist, for instance, of a plurality of conical plates or disks kept in spaced relation to each other by suitable projections and through which the liquid is pressed towards the outlet pipe 19, or this body may be constituted, for example, by a non-subdivided cylindrical body working by centrifugal action. Upon effecting the connection of the cover of the drum to the container thereof the tightening means 23 are tightly packed by the screw-threaded ring 3 of the member 23. The admission of the liquid to be purified is effected through curved admission pipe 24 which is tightly secured to the inner pipe 20. The liquid is conducted through the pipe 20 into the interior of the centrifugal drum and, after the clarification has been accomplished, the liquid is conducted away through the space between the pipes 19 and 20 and into the passage 18 and thence to the exit pipe 24. The upper ends of the stays or supports 13 are connected to a horizontal ring 26 to which the yoke 27 is secured.

If the centrifugal drum is to be opened for cleaning purposes, the operation of the drum is discontinued and the screws 11 are made to engage the annular groove 12 of the cover 2 of the drum, so as to detachably connect the cover to the hood 9. Thereupon the two sections 7, 7' of the upper half of the stationary casing 5 are swung back, so that the hood 9 becomes exposed, whereupon by means of a windlass, pulley or the like connected to the yoke 27 and, after loosening the threaded ring 3, the cover 2 of the drum may be pulled upwardly together with the threaded ring and the admission and discharge pipes 19, 20 and the stuffing boxes 16, 17 by the intermediary of the hood 9 and the stays 13, until the container 1 of the drum and the clearing body 22 are freely exposed. The container 1 of the drum may be supported in the casing 5, and the clearing body 22 may then be removed therefrom for cleaning purposes. After cleaning and replacing the clearing body 22, the cover of the drum is again lowered up-

on the container 1 of the drum and is connected thereto again by tightening the screw-threaded ring 3. Then the screw bolts 11 are disengaged from the cover 2, after the sections 7, 7' of the casing have again been swung into engagement and have been made to engage the hood 9. During this entire opening and closing procedure the sleeves or collars 16, 17 are unchangingly retained in their position relatively to the pipes 19, 20, so that their adjustment and their tight position are not interfered with. On the other hand, the opening and closing merely requires a few manipulations and will be rapidly and securely effected.

By the insertion of the tightening member 23 between the admission pipe 20 and the clearing body 22 the possibility is provided in a very simple manner to automatically detach the clearing body 22 from the admission and discharge pipes and to freely expose the same simultaneously with the raising of the cover of the drum. The admission pipe is connected to the discharge pipe 19 which in its turn is secured to the cover 2 of the drum, so that all these parts may be lifted off together. In order to be able to withdraw the stuffing boxes 16, 17 for some purposes and to only re-insert the same after starting the operation of the drum, the arms 14 may be so arranged and constructed as to be displaceable along the stays 13. For this purpose the arms 14 may be provided with a stuffing or an insertion member 28 of elastic material, such as rubber and with set screws 29. Such a removal of the stuffing boxes may, for instance, be desired in the purification of oils, in order to produce easy and smooth starting of the centrifugal drum. By means of the set screws 29 the stuffing boxes may be locked in the upper position. After starting the drum, they are returned to their lower position and secured in this position in which they remain during the entire operation and in the cleaning periods. Along with the sleeves 16, 17 the curved admission pipe 24' and the exit pipe 24, 25 may be raised.

In order to ascertain any possible leaks in the stuffing boxes, a cavity 30 is provided substantially in the middle of the upper stuffing box 17 and communicates with a cock 31. The cavity 30 is not filled with the lubricating grease, while the remaining cavities of the so-called labyrinth tightening member of the stuffing boxes are filled, for instance, with tallow. After the opening of the cock 31, the existence and the location of any possible leakage may be ascertained; if unpurified substance under treatment is ejected from the opened cock, the leak will be located in the upper portion and the sleeves, while upon the ejection of the purified substance under treat-

ment the lower portion will show the leakage.

The centrifugal drum, according to our invention, may be utilized for the clarification of a great variety of liquids, thus, for instance, of beer or oil or for the separation of liquids with different specific gravities. The clearing body of the drum may be of any suitable shape in accordance with the prevailing conditions; it may be in the shape of a set of dishes, for instance, or of other form and arrangement. The driving of the vertical rotating drum may be effected in any suitable manner and it should, of course, be understood that the invention is merely shown in this specification and on the drawing by way of illustration of its principle, and it is not restricted to the particular form, shape and arrangement of parts described and shown by way of example, but modifications and changes may, of course, occur to be governed by the varying conditions of the application of the invention and without deviating from its spirit and scope, as expressed by the appended claims.

We claim:—

1. In a centrifugal machine in combination, a centrifugal drum, a detachable cover for said drum, a clearing body suspended in the drum, admission means, detachably connected to the clearing body, and eduction means detachably connected to said cover, a surrounding casing for the drum, a detachable cover for the casing, and stuffing boxes for the admission means and the eduction means supported on the casing-cover, and means for selectively and detachably connecting the casing-cover to the cover of the drum, and adapted by the operative insertion of said connecting means to detach the covers with the admission and eduction means and the stuffing boxes as a unit from the drum and the clearing body.

2. In a centrifugal machine in combination, a centrifugal drum, a detachable cover for said drum, a clearing body suspended in the drum, admission means, detachably fitted onto the clearing body, and eduction means spacedly surrounding the admission means and stuffing boxes, slidably surrounding the admission and eduction means, a surrounding casing for the drum, a detachable cover for the casing supporting the stuffing boxes, and removable connecting means between the casing-cover and the cover of the drum.

3. In a centrifugal machine in combination, a centrifugal drum, a detachable cover for said drum, releasable means for connecting the drum to said cover, a clearing body suspended in the drum, an admission pipe supported on the clearing body, eduction means spacedly surrounding the admission pipe and supported on the cover of the drum,

a casing surrounding the drum, and a detachable cover for the casing, stuffing boxes slidably surrounding the eduction and admission means and supported on the casing cover, outwardly projecting movable means on the casing-cover, engageable with the cover of the drum and adapted to connect the same to a unit, and means for raising the cover of the drum and the casing cover when so connected, with the parts supported thereupon, and driving means for the drum.

4. In a centrifugal machine in combination, a centrifugal drum, a detachable cover for said drum, releasable means for connecting the drum to its cover, a clearing body suspended in the drum, an admission pipe supported on the insertion body, tubular eduction means spacedly and concentrically surrounding the admission pipe and supported on the cover of the drum, a casing surrounding the lower part of the drum, a vertically bi-partite cover for the casing comprising two laterally swingable sections, slidable stuffing boxes around the eduction means and the admission pipe, supported on the bi-partite cover, outwardly projecting coupling means engaging the cover of the drum and the casing-cover and projecting therefrom, driving means for the drum, and means for vertically raising the covers in the operative position of the coupling with the parts supported thereupon.

5. In a centrifugal machine in combination, a centrifugal drum, a detachable cover thereupon, releasable means for connecting the drum to its cover, a clearing body supported in the interior of the drum, an admission pipe supported on the clearing body, tightening means intermediate the clearing body and the drum-cover and in engagement with the latter and adapted to be forced in tight contact with the clearing body and the admission pipe by the operation of the said releasable connecting means, tubular educting means surrounding the admission pipe in concentric spaced relation thereto and supported on the drum-cover, a casing surrounding the lower part of the drum, a casing cover, and an intermediate removable section between the casing and the casing cover, stuffing boxes for the admission pipe and the educting means supported on the casing cover, coupling means between the casing-cover and the drum-cover, and means to raise the said covers with the coupling means in the operative position, and the parts supported thereupon.

6. In a centrifugal machine in combination, a centrifugal drum, a detachable cover thereon, a clearing body supported within the drum, an admission pipe supported on the clearing body, a tubular eduction member spacedly and substantially concentrically surrounding part of the admission pipe, and

supported on the drum-cover, discharging means laterally connected to the eduction member, slidable stuffing boxes for the admission pipe and the eduction member above and below the discharging means, a casing around the centrifugal drum, a substantially hood-shaped cover detachably mounted on the casing and supporting the stuffing boxes, supporting and adjusting means on the casing cover, engageable with the stuffing boxes and adapted to displace and lock the same in position, and coupling means between the casing cover and the drum cover, and raising means connected to the supporting and adjusting means for the stuffing boxes.

7. In a centrifugal machine in combination, a centrifugal drum, a detachable cover therefor, a clearing body supported within the drum, an admission pipe detachably fitted to the clearing body, an eduction pipe, spacedly and concentrically surrounding the admission pipe and connected to the cover of the drum, a casing surrounding the centrifugal drum, a detachable hood on said casing stuffing boxes for the admission and eduction pipes supported on the hood, cou-

pling means between the hood and the drum-cover, an empty cavity in the stuffing box, surrounding the admission pipe and a test cock connected to said cavity.

8. In a centrifugal machine in combination, a centrifugal drum, a detachable cover therefor, a clearing body supported in the drum, an admission pipe detachably fitted onto the clearing body, an eduction pipe, spacedly and concentrically surrounding the admission pipe and supported by the cover of the drum, a casing surrounding the centrifugal drum, a detachable hood on said casing, a detachable connecting member between the hood and the casing, coupling means detachably connecting the hood to the drum cover, supporting stays on the hood, surrounding stuffing boxes for the admission and eduction pipes, movably secured to the stays, and manipulating and raising means connected to the stays.

In testimony whereof we affix our signatures.

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