Nov. 1, 1960 B. J. WICKLUND 2,958,462

CENTRIFUGAL SEPARATOR

Filed June 13, 1958

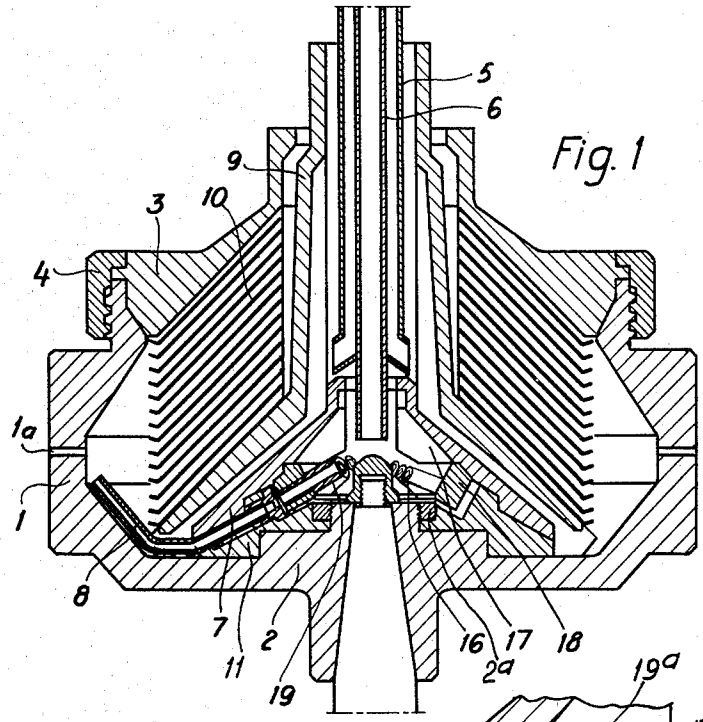


Fig. 1

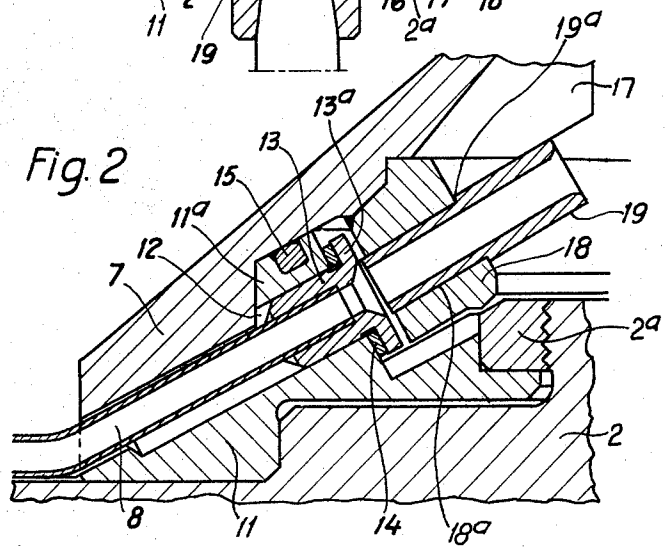


Fig. 2

INVENTOR
BIRGER JONAS WICKLUND
BY
Davies, Hoxie, Faithfull & Hapgood
ATTORNEYS

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CENTRIFUGAL SEPARATOR

Birger Jonas Wicklund, Hagersten, Sweden, assignor to Aktiebolaget Separator, Stockholm, Sweden, a corporation of Sweden

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The present invention relates to centrifugal separators of the type having a receiving chamber for sludge-containing liquid situated in the center of the separator rotor, a separator of this type being shown, for example, in Swedish Patent No. 141,959.

In such separators as commonly made, the central receiving chamber for the sludge-containing liquid has vanes extending radially outward and serving to entrain or pick up the incoming sludge so that it partakes of the rotation. It has been found, however, that these vanes, especially their lower portions, are worn through by the sludge which they are to entrain.

The principal object of the present invention is to overcome this problem.

According to the invention, at least those parts of the vanes which are exposed to the strongest wear are replaced by outwardly directed pipe pieces having inner free ends projecting into the receiving chamber, which serve to entrain in the rotation the liquid entering the pipe pieces and lead the liquid further outward toward the periphery of the separator rotor, the pipe pieces being arranged inside respective ducts for leading the sludge-containing liquid to nozzles situated in the rotor wall. Thus, each pipe piece can be placed directly opposite one of these ducts.

According to a further feature of the invention, the pipe pieces are fitted into holes in a ring concentric with the axis of rotation, these holes being spaced evenly along the periphery of the ring. However, owing to its content of solid particles, the liquid flowing through the pipe pieces will wear particularly on a certain portion of the inner periphery of the pipe pieces. For this reason, each pipe piece is arranged so as to be insertable in the separator in a selected position determined by rotating the pipe piece about its axis, the pipe piece being so inserted preferably by press-fitting it into the corresponding holes in the aforesaid ring. When the pipe pieces have become too worn at a certain region, they are turned to a new position, and such changes of position may be repeated until the pipe pieces have been worn out along their entire inside. The pipe pieces are thereupon replaced by new ones.

The invention is described more in detail below, reference being made to the accompanying drawing which shows the invention applied to a nozzle separator having provision for sludge recirculation. In the drawing:

Fig. 1 is a vertical sectional view of the separator rotor embodying a preferred form of the invention, and

Fig. 2 is a similar but enlarged view showing the fitting of one of the pipe pieces in the rotor illustrated in Fig. 1.

In the drawing, the reference numeral **1** designates the rotor body proper having peripheral nozzles **1***a*, a rotor bottom **2**, a rotor cover **3**, and a locking ring **4** threaded on the body **1** to hold the cover **3** thereon. The liquid-solids mixture to be separated is introduced through a central stationary feed pipe **5**. The latter is concentric to an inner stationary feed pipe **6** through which the rotor is supplied with sludge-containing liquid derived

from the separated sludge component discharged through the peripheral nozzles **1***a*, this sludge-containing liquid being recirculated through pipe **6**. A generally conical hood **7** is secured in the rotor below the main feed pipe **5**, the pipe **6** extending with a tight fit through the bottom of pipe **5** and projecting into the interior of hood **7**, with which it has a clearance The hood **7** is located above a series of generally radial pipes **8** and ensures that the sludge-containing liquid from pipe **6** is introduced into the pipes **8**. A distributor **9** serves to distribute the main feed from pipe **5** into the separating chamber of the rotor, which contains a set of spaced conical discs **10**.

It will be understood that when the locking ring **4** is unscrewed, and the feed pipes **5**—**6** removed, the parts **7**, **9**, **10** and **3** can be lifted from the rotor **1**.

Within the rotor, and located centrally on the bottom **2**, is a bottom piece **11** which is secured to the bottom by a nut **2***a*. The piece **11** has an upstanding annular flange **11***a* provided with a series of circumferentially spaced holes **12**, one for each radial pipe **8** (Fig. 2). Each hole **12** receives the inner end portion of the respective pipe **8**, to which is secured a collar **13** having a flanged-inner end **13***a*. A packing ring **14** surrounds each collar **13** between the flanges **11***a* and **13***a*, the latter flange serving to prevent outward displacement of the pipe **8** under the action of the centrifugal force in the rotor. Another packing ring **15** is seated in an annular recess in flange **11***a* and bears against the lower surface of hood **7**. The latter forms a central chamber **16** for receiving the sludge-containing liquid. On the lower surface of hood **7** are radial impeller vanes **17** and a ring **18**. This ring has a series of circumferentially spaced holes **18***a* aligned with the holes **12** in the bottom piece **11**. Each hole **18***a* receives a pipe piece **19** which is press-fitted into this hole to an extent limited by engagement of a shoulder **19***a* with the inner surface of ring **18**.

Sludge which is recirculated from the nozzles **1***a* is introduced through the pipe **6**. This sludge enters the receiving chamber **16** and is caught by the pipe pieces **19** which entrain the sludge in the rotation and lead it further into the pipes **8** which, in turn, return the sludge to the nozzles **1***a*.

Because the pipe pieces **19** extend a distance into the receiving chamber **16**, sludge which has deposited against the ring **18** between the pipe pieces **19** is prevented from scaling off in the form of large lumps and entering the pipe pieces **19** to clog these pieces, the pipes **8** or the nozzles **1***a*. The deposited sludge remains instead on the ring **18**. Further, when a portion of the inside of the pipe pieces **19** has become worn out, each pipe piece is turned through a suitable angle about its longitudinal axis so that the wear can act on another portion of the inside of the pipe pieces.

It will be apparent that the parts **7**, **8**, **11** and **18** constitute means forming a series of generally radial ducts each leading from the central chamber **16** to the immediate region of a corresponding discharge nozzle **1***a*, and each pipe piece **19** is arranged inside one of these ducts.

I claim:

1. In a centrifugal separator having a hollow rotor provided with a central chamber for receiving a sludge-containing liquid, the rotor also having peripheral nozzles for discharging a separated sludge-containing liquid, the combination of means in the rotor forming generally radial ducts each leading from said central receiving chamber to the region of one of said nozzles, and a generally radial pipe piece mounted at its outer end portion for rotatable adjustment within each duct and having an inner end portion projecting freely into said chamber, each pipe piece being operable to entrain in the rotation of the rotor the liquid entering the pipe piece

and to lead the entrained liquid outwardly into the corresponding duct.

2. The combination according to claim 1, in which said means include generally radial pipes leading to the regions of the respective nozzles, each pipe piece being located inwardly from but directly opposite the inner end of the corresponding radial pipe.

3. The combination according to claim 1, in which said means include a ring concentric to the rotor axis and having circumferentially spaced holes forming the inner ends of the respective ducts, each pipe piece being fitted in one of said holes.

4. The combination according to claim 1, in which said means include a bottom piece and an overlying hood

containing said central chamber, and defining generally radial holes, generally radial pipes leading outward from said holes to the regions of the respective nozzles, and a ring surrounding part of said central chamber and having generally radial holes aligned with said first holes, the pipe pieces being held in the ring holes.

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