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Experimenting with Fewer Plates in the
Laval Centrifuge

By Ruschmann, Scholven, 5 April 1941
(With 2 Sketches)

The normal distance between the individual plates on the plate shaft of the Laval centrifuge, which breaks up the diluted stall letdown into a centrifuge residue containing 38-40% solids and a centrifuge oil containing 10-12% solids, is 1 mm. This corresponds to 218 plates per plate assembly (Tellerstock). Experiments have been under way at Scholven to find out if fewer plates could be used. For this purpose a number of centrifuges with only 51 plates, corresponding to a plate distance of 4 mm, were compared with the 218 plate machines currently in use. The results are shown on attached Diagram 1. The full curve shows the results from the 218 plate machines and the dotted curves those from the 51 plate machines. Each daily value is an average of 5 to 8 machines.

Curves I show that the % solids in the centrifuge oil is uniformly higher for the 218 plate centrifuges than for the 51 plate machines. The average is 11.03% solids with 218 plates and 10.52% with 51 plates, or in favor of the centrifuge with the fewer plates.

Curves II show the % solids in the centrifuge residue. Here also, the 51 plate centrifuge has the advantage over the 218 plate machine, with an average solids content of 40.2% compared to an average of 38.4%.

Curves III show the frequency of flushing of the machines. The % of flushed centrifuges, based on the total number of machines running, is used for comparison. It may be seen from the curves that there is practically no difference between the 218 plate and the 51 plate machines. The calculated mean is 106.2 and 110.2, i.e., each machine had to be flushed on an average of once a day. This relatively high frequency of flushing, particularly observable for February, where on some days every machine had to be flushed 4 times a day, is due to the fact that the letdown lately contains very many coarse grained particles, the reason for which has not been satisfactorily explained. This caused plugging of the 1.9 mm centrifuge nozzles. To avoid these disturbances, Scholven is presently installing a 0.5 mm mesh vibrating screen, over which the entire centrifuge mixture is to be run before entering the centrifuge for the removal of these coarse grained particles.

Curves IV show the % of machines in operation, which had to be shut off because of plugging or poor centrifuge effect. It is likewise apparent here that the machine with the fewer plates is superior to the centrifuge used up to the present time. The proportion of shut down machines averages 17.8% with 218 plate centrifuges, against 9.4% for the 51 plate machines, both figures based on the number of machines in operation.

The comparison of the 2 machines with 218 and 51 plates, corresponding to a distance between plates of 1 and 4 mm, respectively, consequently favors the machine with the fewer plates in all essential respects. It should be added that in the 218 plate machine the assembly of the plates on top of each other is arranged so that there are 8 points of support on the inside and 16 on the outside, while in the 51 plate machine the plates have 8 continuous

radial ribs. See Diagram 2, Figs. 1 and 2. Now, for comparison, one 51 plate machine was tried out with 8 broken ribs. See Diagram 2, Fig. 3. Surprisingly, this machine indicated a further improvement, compared to the 51 plate machine with continuous ribs. The following table compares the results, and, at the same time, indicates the power requirements:

	% solids in cent. oil	% solids in cent. resid.	Kg. cent. oil/h	Kg. cent. Resid/h	Power		
					Watts	H.P. (P.S.)	kg/sec.
Centrifuge idling	-	-	-	-	4350	5.92	443.7
218 plate centrifuge	10.9	39.2	26.38	604	4900	6.66	499.8
51 pl. cent. with cont. ribs	10.0	42.3	23.19	667	4920	6.69	501.8
51 pl. cent. with brok. ribs	9.66	45.1	23.50	652	5000	6.80	510.0

In summary we may say that reducing the number of plates in the Laval centrifuge from 218 to 51 has a favorable effect on the separation of solids and oil in centrifuging hydrogenation letdown in all respects. It is also advantageous to shape the supports of the plates on each other in the form of broken (discontinuous) ribs, rather than as continuous ribs. These preliminary experiments are being continued in Scholven. It is primarily intended to determine the effect of a still greater distance between plates, i.e. the effect of still fewer plates.

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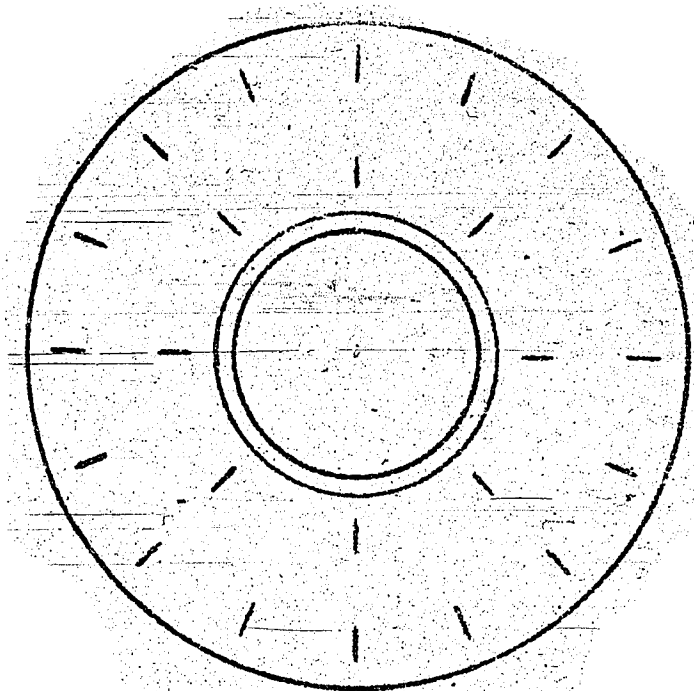


FIG. 1
NORMAL PLATE SUPPORT FOR
218 PLATE CENTRIFUGE.
8 RIBS INSIDE
16 RIBS OUTSIDE
1mm. DISTANCE BETWEEN RIBS

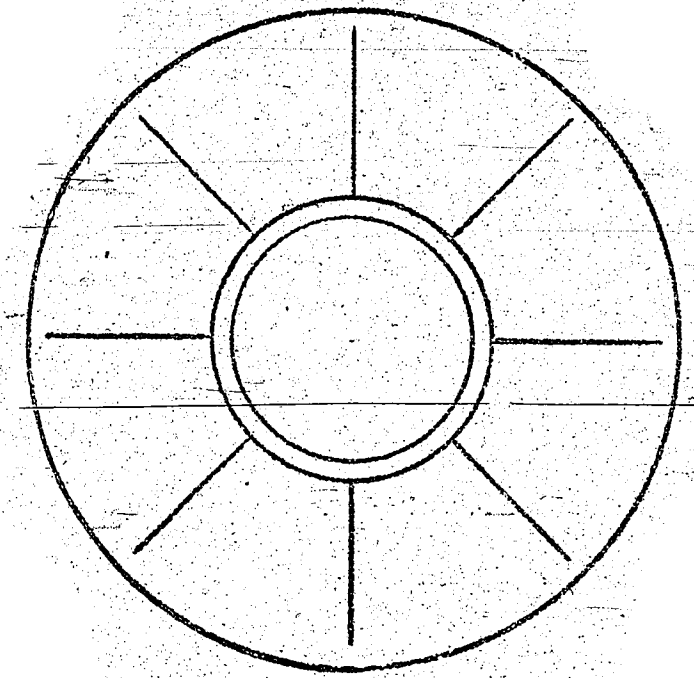


FIG. 2
51 PLATE CENTRIFUGE,
8 CONTINUOUS RIBS
4mm. DISTANCE BETWEEN RIBS

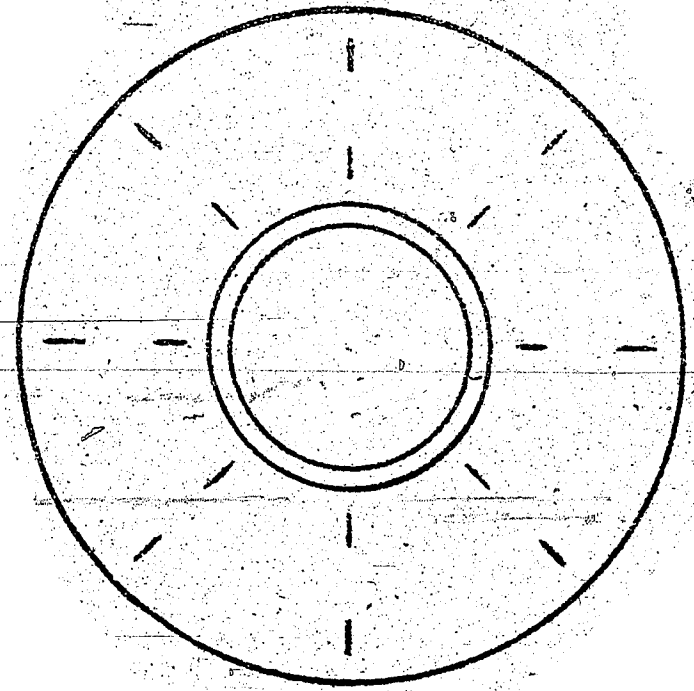


FIG. 3
51 PLATE CENTRIFUGE,
8 BROKEN RIBS
4mm. DISTANCE BETWEEN RIBS