July 29, 1958 J. GUYONNAUD 2,845,336

STATIC HYDROLYSER

Filed March 20, 1956

FIG.1.

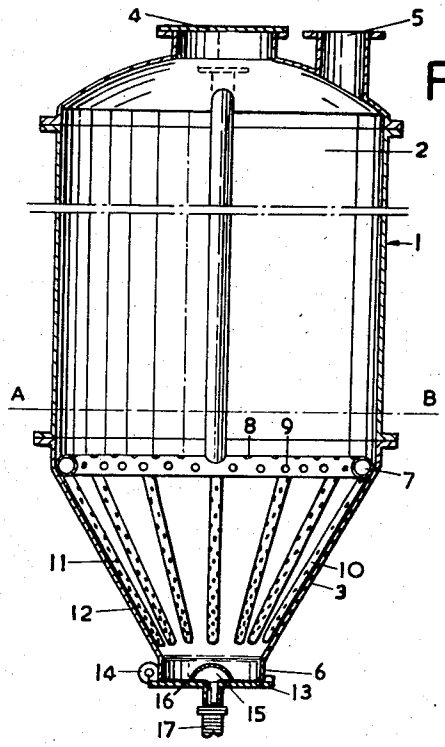


FIG.2.

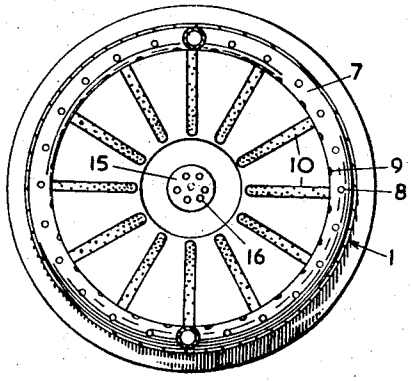


FIG.4.

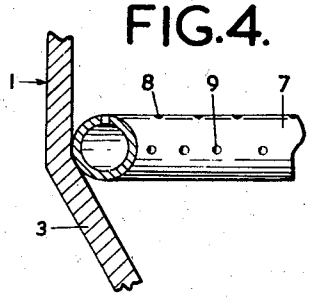


FIG.3.

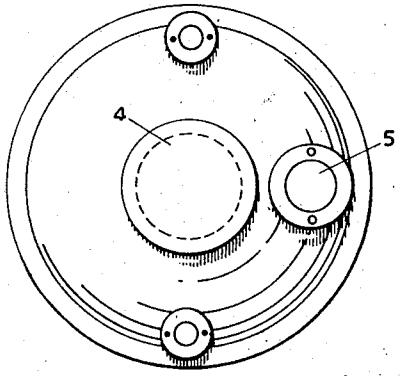
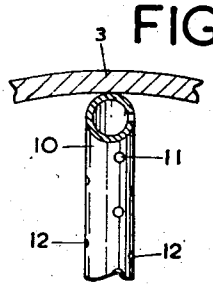


FIG.5.



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STATIC HYDROLYSER

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2 Claims. (Cl. 23—290)

Furfural is generally manufactured in static or rotary hydrolysing autoclaves. However the static hydrolysers, which are much simpler and are reliable in operation, do not permit of obtaining such high outputs as the rotary apparatuses.

The object of the invention consists in the provision of a static hydrolyser device permitting of obtaining a high output equivalent to, and even exceeding, the output of the rotary apparatuses.

In the accompanying drawings, which are given by way of non-limitative example of one embodiment of the invention:

Figure 1 shows the apparatus, seen in vertical section.

Figure 2 represents a cross-sectional view along the line A, B and Figure 3 is a plan view from above, of the hydrolyser.

Figure 4 is a cross-section of the annular steam pipe.

Figure 5 is a cross-sectional view of a depending injector tube.

The apparatus **1** in Figure 1 is a steel autoclave tank provided with an acid-proof lining and having an upper vertically disposed cylindrical portion **2** open at its lower end to a lower inverted conical portion **3**. At the upper part are a material charging opening **4** and a steam discharge opening **5**. At the lower end is a discharge opening **6**. An annular steam pipe is mounted within the tank adjacent its inside wall approximately at the junction between the lower end of the cylindrical portion **2** and the upper end of the inverted conical portion **3**.

This steam pipe has a first series **8** of spaced steam outlet holes positioned at its top to direct jets of steam upwardly parallel to and along the inside wall of the cylindrical portion **2** of the tank for dislodging material adherent to said wall, and a second series **9** of spaced steam outlet holes at its inner face positioned to direct jets of steam radially inwardly to move dislodged material inwardly and tend to keep such material centrally of the tank.

A plurality of other steam pipes **10** are connected at intervals along and depend from the annular steam pipe **7**, said pipes **10** lying below said annular pipe along the internal wall of the conical portion **3**. These pipes **10** are closed at their lower ends and have along their length a first series of spaced steam outlet holes **11** positioned to direct jets of steam downwardly and away from the central axis of the conical portion **3** onto the internal wall thereof for dislodging material from said wall, and a second series **12**, of spaced steam outlet holes in said pipes positioned to direct steam jets upwardly and inwardly towards the axis of the conical tank portion **3**, thereby to keep said dislodged material central in the conical portion.

A removable cover **13** is hinged at **14** on the discharge opening **6** of the lower end of the conical portion **3**, and a steam distributor nozzle **15** is carried on said cover **13** internally of the conical portion of the tank, said nozzle having spaced steam outlet holes **16** positioned to direct a plurality of jets of steam upwardly and divergently into the conical portion. The nozzle **15** is connected at any suitable source of supply of steam by a flexible hose **17**.

With this construction, the material is fed in at the top through charging inlet **4** and is treated with steam entering through the annular pipe **7**, the depending pipes **10**, and the nozzle **15**. Accordingly, there is no part of the tank **1** left without a steam circulation. The emission of steam jets at the base, from the nozzle **15**, ensures that steam passes upwardly through the entire mass of material to be treated. The furfuralated steam passes out through the outlet **5** to the usual condenser means, not illustrated. The apparatus permits working with small quantities of hydrolysing solution as it can be very easily emptied, and the materials can be evacuated even when in the form of a relatively viscous paste. When the cover **13** is opened, the lowest portion of the treated material drops by gravity. The rest would remain adherent to the internal walls, and so an injection of steam is made for a few seconds. The vertical jets of steam from the annular pipe **7** upstick the material from the walls of the upper part **2**. The other jets direct the loosened material towards the centre, whence it drops by gravity to the base. The inwardly directed jets of the lower steam pipes **10** tend to keep the material in movement at the centre of the conical portion **3**, whereby facilitating passage out through the lower end.

Hydrolysis would normally be effected with small quantities of acidulated water containing an appropriate proportion of acid. The pressure of the steam introduced could be from 5 to 9 hectogrammes per square centimetre, and the duration of the operation would normally be in the region of 1 to 3 hours, according to the nature of the substances treated.

The output varies with the richness in pentosans of the material treated. Using maize cobs, with a 3% solution of sulphuric acid, equal in weight to the quantity of dry material treated, under a pressure of 7 kilogrammes per square centimetre, and with a duration of hydrolysis of two hours, a furfural yield of 13% may be obtained with a stream circulation representing 10 times the weight of the dry material.

I claim:

1. A static hydrolyser, particularly for use in the production of furfural, comprising a tank including an upper vertically disposed cylindrical portion open at its lower end to a lower inverted conical portion, said tank having material charging and steam discharge openings in the upper part of its cylindrical portion, and a discharge opening at the lower end of the conical portion, an annular steam pipe mounted within the tank adjacent its inside wall approximately at the junction between the lower end of the cylindrical portion and the upper end of the inverted conical portion, said steam pipe having a first series of spaced steam outlet holes positioned in its upper part to direct jets of steam upwardly parallel to and along the inside wall of the cylindrical portion of the tank for dislodging material adherent to said wall, and a second series of spaced steam outlet holes at its inner face positioned to direct jets of steam radially inwardly to move dislodged material inwardly and tend to keep such material centrally in the tank, and a plurality of other steam pipes connected at intervals along and depending from the annular steam pipe and lying below said annular pipe along the internal wall of the conical portion, said other steam pipes being closed at their lower ends and having along their length a first series of spaced steam outlet holes positioned to direct jets of steam downwardly and away from the axis of the conical portion thereof onto the internal wall thereof for dislodging material from such wall, and a second series of spaced steam outlet holes in said other steam pipes positioned to direct steam jets upwardly and inwardly towards the axis of the conical

tank portion, thereby to keep said dislodged material central of the conical portion.

2. A static hydrolyser, as claimed in claim 1, including a removable cover on the discharge opening at the lower end of the conical portion, and a steam distributor nozzle carried on said cover and internally of the conical portion of the tank, said nozzle having spaced steam outlet holes positioned to direct a plurality of jets of steam upwardly and divergently into the conical portion.

References Cited in the file of this patent

UNITED STATES PATENTS

100,063	Pinger	Feb. 22, 1870
989,826	Thiele	Apr. 18, 1911
1,737,738	Spooner	Dec. 3, 1929