24. Introduction to the Ring-Type Extractor

1. Overview

The ring-type extractor is a highly efficient solid-liquid extraction oil production equipment widely used in the extraction process of plant oilseeds. It employs multi-stage counter-current spray extraction of oilseeds, featuring high extraction efficiency and adaptability to various types of oilseeds.

2. Working Principle

The working principle of the ring-type extractor is as follows:

1. **Material Conveyance and Spraying**: Pre-treated materials are conveyed into the leaching tank by a scraper conveyor. Once the material level in the tank reaches a certain level, the leaching tank begins operation as indicated by the level sensor, and the materials automatically enter the upper horizontal spraying section of the leaching tank. They are first sprayed with a higher concentration of mixed oil, then pass through the curved section and lower spraying section, and are successively sprayed with mixed oil of decreasing concentration.
2. **Extraction and Drainage**: Before entering the drainage section, the material is sprayed with fresh solvent. The drained wet cake is discharged from the bottom of the extractor and conveyed to the steam stripper via a wet cake scraper. The mixed oil is fed into the evaporation system.
3. **Solvent Recovery**: The mixed oil is filtered through a grid plate into an oil collection tank, pumped into a temporary storage tank via a mixed oil pump, and transported to the evaporation stripping section. The mixed oil with lower concentration continues to participate in the circulation spray.

III. Technical Features

The main technical features of the ring-shaped extractor are as follows:

1. **Ring-shaped structure**: The material undergoes one inversion during operation, allowing the mixed oil to fully soak the material and remain for sufficient time, ensuring that oils in the seed fragments are fully dissolved and extracted, thereby reducing residual oil in the meal to a relatively low level.
2. **Shallow Material Bed**: A completely dead-angle-free material flow path, combined with a newly designed spray nozzle, further ensures thorough extraction of the material.
3. **Unique Sealing Structure**: The main shaft features a unique sealing structure, preventing solvent leakage during equipment operation and enhancing process equipment safety.

4. **V-shaped grating plates**: Thin, fixed, self-cleaning V-shaped grating plates ensure reliable filtration and drainage, resulting in low solvent content in the wet meal and reduced steam consumption during solvent removal.
5. **Uniform feeding and meal discharge**: Uniform feeding and meal discharge in the extractor maintain stable system pressure throughout the process.

IV. Application Areas

The ring-type extractor is suitable for the extraction process of various oilseeds, including but not limited to:

1. 1.**Palm cake:** Palm cake after pressing contains approximately 10% oil content, which is reduced to 1% after extraction.
2. **Rice bran:** Particularly suitable for processing oilseeds with high powder content, such as rice bran. In the 2024 technical assessment, it was identified as the preferred equipment for rice bran oil extraction.
3. **Soybeans:** Widely used in soybean oil extraction, effectively extracting oils from soybeans.
4. **Rapeseed**: Suitable for rapeseed oil extraction, improving oil extraction efficiency.

V. Equipment Selection

The selection of ring-type extractors should consider the following factors:

1. **Processing capacity**: Processing capacity ranges from 50 to 2,000 tons per day, with new models capable of reaching 5,000 tons per day.
2. **Solvent consumption**: Solvent consumption as low as 0.6 kg per ton of material, with a solvent recovery rate exceeding 99.5%.
3. **Steam consumption**: Steam consumption ≤ 280 kg per ton of material (at 0.8 MPa pressure).

6. Advantages

Ring-type extractors offer the following advantages:

1. **High-efficiency leaching**: High leaching efficiency, suitable for various types of oilseeds, especially those with higher powder content, such as palm kernel meal, corn germ, and rice bran.
2. **Energy-saving and cost-effective**: Low solvent and steam consumption, with significant energy-saving effects.
3. **Stable operation**: Runs smoothly with low noise and extremely low maintenance costs.
4. **Safe and reliable**: Features a unique sealing structure with no solvent leakage, enhancing the safety of the process equipment.

The ring-type extractor, with its high efficiency, energy savings, and safety features, has become one of the mainstream pieces of equipment in the oil processing industry.

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