DEVICE FOR UNIFORMLY ADJUSTING THE MOISTURE CONTENT IN A COMPACTED MASS

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ABSTRACT

There is disclosed a device for dewatering a mass of nitrocellulose and replacing the water by alcohol so that the moisture content in the mass is adjusted for a uniformly distributed selected level. The device comprises a press, the cylinder of which is closed at one end by a removable cover mounting on its inner side a perforated plate and into which extends a power driven ram or plunger mounting on its face wall a second perforated plate. The mass of nitrocellulose to be processed is fed into the cylinder space between the two perforated plates. The perforated plate on the cover communicates with a conduit for feeding alcohol into the cylinder and the other perforated plate with a discharge conduit. These two conduits are interconnected by a conduit. A valve is included in the feed conduit upstream of the connection thereof to the discharge conduit and a second valve is included in the interconnecting conduit. First, alcohol is added via the feed conduit by opening the valve in the feed conduit and closing the valve in the interconnecting conduit. Then the valve in the feed conduit is closed and the valve in the interconnecting conduit is opened and, finally, the mass in the cylinder is compacted by activating the plunger. The water is pressed out during the compacting of the mass is discharged through the now open discharge conduit.

3 Claims, 1 Drawing Figure
DEVELOPMENT FOR UNIFORMLY ADJUSTING THE MOISTURE CONTENT IN A COMPACTED MASS

SPECIFICATION

The present invention relates to a device for dewatering a pliable mass and replacing the removed water by another liquid; more particularly, the invention relates to a device for dewatering a pliable mass of nitrocellulose and replacing the removed water by alcohol.

BACKGROUND

There are known presses for the above-referred to purpose in which a power driven ram or plunger slideable in the cylinder of the press mounts on its face wall a perforated plate which communicates with a discharge conduit and the cylinder is closed by a cover at its end opposite to the end through which the plunger is extended into the cylinder. This cover mounts on its inside a perforated plate which communicates with a liquid discharge conduit. Pressure devices of this kind are operated by feeding alcohol into the mass of nitrocellulose to be processed and by dewatering the mass by compacting the same, i.e., by a two-stage operation.

There is further known, from German Patent No. 1,164,298, a device in which a ram or plunger is slidably driven by the power drive of the press. The cylinder is closed at its end opposite to the end through which the plunger extends into the cylinder by a pivotal cover which communicates with a feedline for feeding alcohol into the cylinder. The liquid, such as water, pressed out from the nitrocellulose or other mass during the compacting of the same is discharged via a perforated plate mounted on the face wall of the plunger and communicating with a discharge conduit.

It has been found that dewatering of nitrocellulose in devices as heretofore referred to makes it difficult to distribute the added alcohol uniformly within the mass, particularly with respect to residual liquid still present in the mass after compacting thereof. As is obvious, compacting of the mass by the ram or plunger of the press is more effective adjacent to the plunger than in portions of the mass that are more remote from the plunger. This is caused by the frictional resistance experienced by the mass at the inner wall of the cylinder and which must be overcome by the force transmitted by the plunger to the mass. As a result, there is a variation of the density of the mass from a maximal density at the face of the plunger to a minimal density at the top of the mass and such decrease is always in the direction in which the pressure by the plunger movement is transferred to the mass. In practice, there is formed on the plunger a generally cone-shaped cake the base portion of which has the highest density. As a result, liquid to be removed from the mass will escape from the same only to limited extent and such escape becomes less and less uniform as the compacting force increases. A non-uniform distribution of the moisture content is most undesirable as further processing of nitrocellulose makes it absolutely necessary that the remaining moisture content in the mass is adjusted to a predetermined uniform level.

THE INVENTION

It is a broad object of the invention to provide novel and improved device for treatment of a mass of nitrocellulose and other mass so that the moisture content of the mass can be accurately reduced to a predetermined level and is uniformly distributed throughout the entire mass.

A more specific object of the invention is to provide a novel and improved device of the general kind above-referred to which permits dewatering of the mass and feeding of another liquid such as alcohol into the same by a one-stage operation.

SUMMARY OF THE INVENTION

The above-pointed out objects, features and advantages of the invention and other objects, features and advantages which will be pointed out hereinafter are obtained by providing a press with an open-ended cylinder into which a power driven plunger or ram extends from one end of the cylinder. The other end of the cylinder is closed by a removable cover preferably hinged to the cylinder end. The cover and the facing end of the plunger each mount a perforated or sieve plate. The mass of nitrocellulose to be processed is fed into the cylinder space between these plates.

The plate on the cover communicates with a feed conduit and the plate on the plunger with a discharge conduit. A third conduit interconnects these two conduits. A valve is included in the feed conduit upstream of the connection thereof. When the third conduit and a second valve is included in the third conduit.

The press is operated by first opening the valve on the feed conduit and closing the valve in the interconnecting third conduit for feeding alcohol into the cylinder space. The valve in the feed conduit is then closed and the valve in the interconnecting conduit is opened. When now the mass in the cylinder is compacted by power driving the plunger, the water then expelled from the mass is discharged from the cylinder through the third conduit.

DETAILED DESCRIPTION OF THE INVENTION

In the single figure of the drawing is a diagrammatic sectional view of a press according to the invention is shown by way of illustration and not by way of limitation.

Referring now to the figure in detail, only those components of the press which are essential for the understanding of the invention are illustrated. It should be understood that the press is conventional except with respect to components which are illustrated and described.

There is shown a cylinder 1 of a press open at both ends. The upper end of the cylinder is closable by a cover plate 2 which can be mounted in any convenient manner, i.e., it may be hinged to the cylinder. A ram or plunger 3 is slidable in the cylinder and is power driven by a piston 4. The press cake, such as a mass of nitrocellulose 7, to be processed in the cylinder space 1 is limited by cover 2 and the upper face of plunger 3. As it is indicated, the mass is compacted by pressure applied to it in response to an upward movement of piston 4 and thus of plunger 3 as is indicated by an arrow P. As a result of such compacting of the mass a pressure cone 7 is formed which is tapered in the direction of the applied pressure. As previously explained, the density in this mass forming the cone is highest at its base and decreases gradually toward the apex of the cone.

Cover 2 mounts on its side facing plunger 3 a perforated plate 5. Similarly, the side of the plunger facing
cover 2 mounts a perforated plate 6. Perforated plate 5 communicates with a duct 8 in cover 2 and perforated plate 6 communicates with a duct 9 extending through plunger 3. Both ducts are interconnected via pipes 8' and 9' respectively to a conduit 10 for collecting liquid released from the mass when the same is subjected to the aforesaid pressure and for discharging such collected liquid through conduit 10 as it is indicated by an arrow. Moreover, duct 8 in cover 2 is connected via pipe 8' with a feed pipe 11 for feeding liquid so that when a control valve 12 included in pipe 11 upstream of the connection with conduit 10 is opened and a corresponding control valve 13 in conduit 10 is closed liquid can be fed into the cylinder space 1' containing mass 7 before the mass is compacted, such liquid being usually alcohol.

Conversely, during the compacting operation, valve 12 is closed and valve 13 is opened to permit discharge of squeezed-out liquid, usually water, via perforated plate 5 and duct 8 in cover plate 2. As a result of such arrangement, the released water can be discharged via the upper perforated plate 5 and the duct 8 communicatetherewith, thereby considerably increasing the overall performance of the press.

While the invention has been described in detail with respect to a certain new preferred example and embodiment of the invention, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed:

1. A device for controlled displacement of water contained in a pliable mass of nitrocellulose by alcohol, said device comprising:
   - an upright cylinder closed at the top end by a closure member and open at the other end;
   - a pressure plunger slidably extending into the cylinder from the open end thereof for defining within the cylinder a receiving space of variable volume between the plunger and the closure member for receiving a pliable mass of nitrocellulose, the pressure stroke of the plunger being toward the top end of the cylinder;
   - a first perforated plate mounted on the side of the closure member facing the plunger;
   - a second perforated plate mounted on the plunger on the side facing the closure member;
   - a first conduit communicating with said first perforated plate on the side thereof facing the closure member for feeding alcohol into said space and discharging water therefrom;
   - a second conduit communicating with the second perforated plate on the side thereof facing the plunger for discharging water contained in said space;
   - a third conduit interconnecting the first and the second conduit for simultaneously discharging liquid pressed out of the mass through both said perforated plates;
   - a feed conduit communicating with said first conduit for feeding alcohol into said space through said first perforated plate;
   - a first control valve included in said feed conduit for controlling the feed of alcohol into said space; and
   - a second control valve included in said interconnecting conduit for selectively closing the flow of pressed out water through said interconnecting conduit, opening of the first valve and closing of the second valve establishing a connection for feeding alcohol into said space through the first perforated plate and closing of the first valve and opening of the second valve connecting both perforated plates to the interconnecting third conduit, displacement of the plunger toward said closure member correspondingly reducing said receiving space causing water and alcohol to be pressed out of the mass, said pressedout water and alcohol being discharged at both ends of mass through said perforated plates.

2. The device according to claim 1 wherein said closure member is a cover plate removably attached to the respective end of the cylinder, said first conduit communicating with the first perforated plate through said cover plate.

3. The device according to claim 1 wherein said second conduit communicates with said second perforated plate through the body of said plunger.