Feb. 11, 1969 W. H. COMBS ET AL 3,426,677

SCREW PRESS

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Sheet 1 of 2

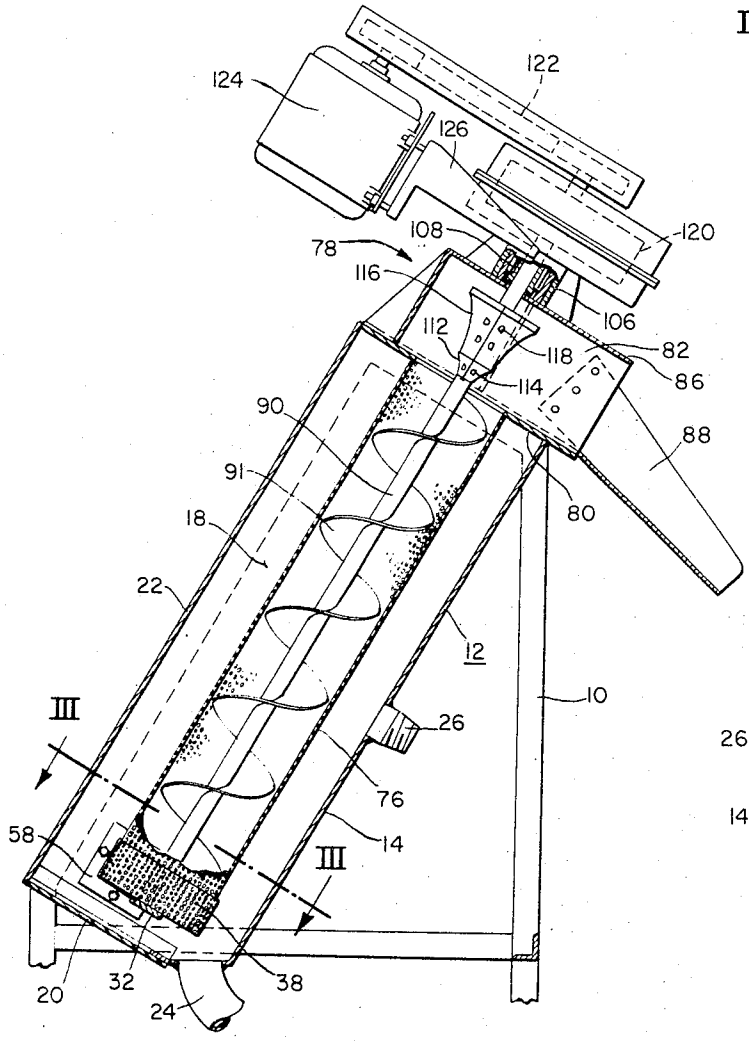

Fig. 2

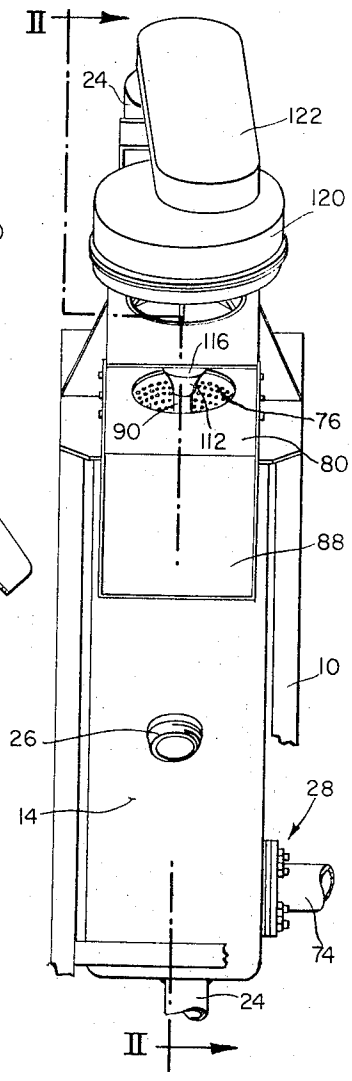

Fig. 1

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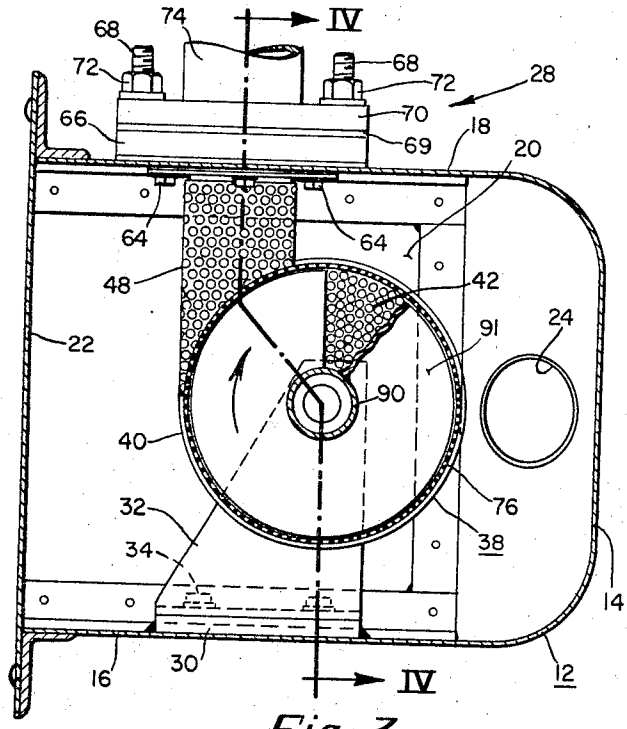

Fig. 3

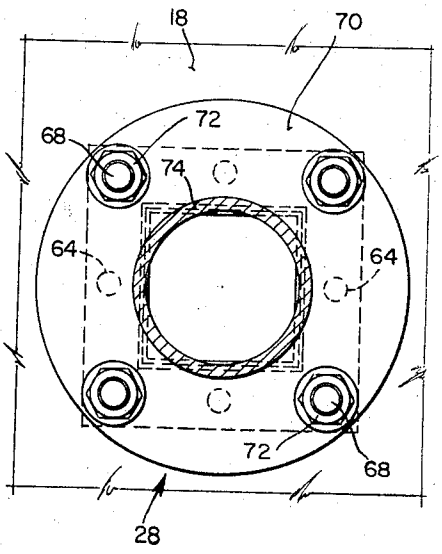

Fig. 5

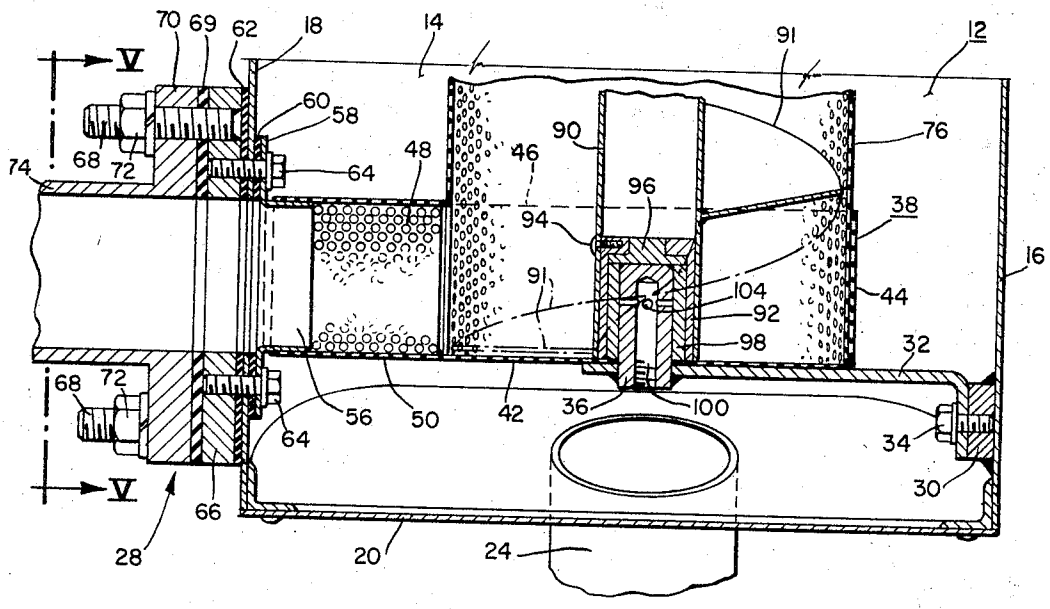

Fig. 4

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SCREW PRESS

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Int. Cl. B30b 9/18

ABSTRACT OF THE DISCLOSURE

A press for extracting water from a wet solids is provided, wherein the wet solids enter a chamber through a slurry passage, and are contacted by a rotating lifting screw which forces the wet solids upwardly, against a foraminous shell, whereby the pulpy material undergoes a "squeezing" action, for removing water therefrom.

This invention relates generally to presses for extracting water from wet solids, and particularly to presses of the type aforesaid having a lifting screw turning in a tubular screen housed in a water tight chamber having a slurry feed connection and a drain connection for water separated from the solids.

An important object of the invention is to provide improved means for conducting a slurry of waste material from said feed connection to said lifting screw.

Another object is to provide a slurry passage (leading from said feed connection to the lower extremity of the lifting screw) which is in constant communication with water accumulated in said chamber so that a thick slurry, immediately upon entering said passage, is thinned out sufficiently to flow properly.

Another object is to provide such a slurry passage which relieves high pump pressure at said feed connection so that any tendency for the pressure to be transmitted upwards along the screw is greatly reduced.

Other objects of the invention will become apparent when the following description is read with reference to the accompanying drawings, in which:

FIGURE 1 is a front elevation of a water press constructed in accordance with the invention;

FIGURE 2 is a section on line II—II in FIGURE 1;

FIGURE 3 is an enlarged section on line III—III in FIGURE 2;

FIGURE 4 is an enlarged section on line IV—IV in FIGURE 3; and

FIGURE 5 is a section on line V—V in FIGURE 4.

Referring to the drawings, the press constructed in accordance with the invention is mounted upon a floor supported frame **10**, being thereby inclined at an angle of approximately sixty degrees to the horizontal. The shell, generally designated **12**, is provided with a bottom wall **14** and opposite side walls **16** and **18**. The lower extremity of the shell is suitably flanged and fitted with a removable plate **20**, and the top of the shell is suitably flanged and fitted with a removable plate **22**. The shell **12** and the plates **20** and **22** are arranged to afford a water tight construction. At the very bottom of the shell is a drain line **24**, and extending from the bottom wall **14** of the shell, intermediate the opposite ends thereof, is an overflow connection **26**.

Referring particularly to FIGURES 3 and 4, affixed to the side wall **16** of the shell, at the lower extremity thereof, is a bar **30** from which there extends a bracket **32** secured to the bar **30** by means of screws **34**. Mounted upright upon the bracket **32**, on the central axis of the shell **12**, is a guide pin **36**. Fitted over the guide pin **36** and seated upon the bracket **32** is a retainer, generally

designated **38**, made in its entirety of foraminous sheet material. The retainer is provided with a main body portion **40** including a base wall **42** from which there rises an upright circular side wall **44**. The top of the main body portion **40** is open, as at **46**. Communicating with the interior of the main body portion **40** of the retainer **38** through the circular side wall **44** and extending tangentially therefrom is a square tubular section **48**. The bottom wall of the section **48**, designated **50**, is a planar extension of the base wall **42** of the main body portion **40** of the retainer **38**.

The outer end portion of the section **48** is fitted over a sleeve **56** having a flange **58**. A gasket **60** is provided between the flange **58** and the wall **18** of the shell, and a gasket **62** is provided between the wall **18** of the shell and a mounting plate **66**. Screws **64** extend through the flange **58**, gasket **60**, wall **18** of the shell, and gasket **62** and are threaded into a mounting flange **66**. Studs affixed to the mounting flange **66** extend therefrom through a gasket **69** and a pipe flange **70** secured to the mounting flange **66** by means of nuts **72** threaded on the studs, designated **68**. The flange **70** is on the end of a slurry line **74**.

The lower end portion of a tubular screen **76** extending longitudinally of the shell is nested in the main body **40** of the retainer **38**, a portion of the circumference thereof being removed for communication of the interior of the screen with the interior of the section **48** of the retainer **38**. The upper end portion of the screen **76** is secured to a head **78** mounted upon the upper end portion of the shell. The base wal **80** of the head is provided with an opening through which the interior of the screen communicates with the interior of the head. A chute **88**, affixed to the opposite side walls of the head, designated **82**, extends downwardly therefrom, as shown.

Within the screen **76** is a screw provided with a hollow shaft **90** and a ribbon flight **91**. Pressed into the lower end portion of the shaft **90** is a bearing retainer **92** secured by a screw **94** and provided with a cap **96**. Within the bearing retainer is an oilless bearing **98** provided with a threaded central bore **100** and several radially extending bores **104**. The upper end portion of the shaft **90** extends through the top wall of the head, designated **86**, and is journaled in a roller bearing **108** housed in a sleeve **106** mounted on the top wall **86** of the head. Upon the upper end of the shaft **90**, within the head **78**, is mounted a compression cone **112**, made in two parts and secured to the shaft by means of screws **114**, and a bursting cone **116**, made in two parts and secured to the shaft by means of screws **118**. Mounted upon the upper extremity of the shaft **78** is a change speed unit **120** connected by a drive **122** to an electric motor **124**, the motor being supported upon a bracket **126**.

In the operation of the press a slurry of wet solids, for example, waste material, is fed into the press through the slurry line **74**. Immediately upon issuing from the sleeve **56** the slurry comes into contact with water accumulated in the bottom of the shell to the level of the overflow connection **26**. The water enters the section **48** through the perforations in the bottom, side and top walls thereof and thereby thins out the slurry so that it flows easily through the section **48** to the lower end of the ribbon flight **91**, which is aligned with the passage through section **48**.

The electric motor **124**, through drive **122** and change speed unit **120**, drives the screw in a direction for lifting the solids to the top of the ribbon flight **91**. As the solid waste rises above the overflow water level, water drains therefrom and flows to the bottom of the shell, from whence it is drawn off through the drain line **24**. If the water level rises above the desired level, it is discharged through the overflow connection **26**. As the waste is forced upwardly it forms a solid mass compacted against the cone **112**, and as it rises still farther this mass is spread

and broken up by the bursting cone **116** and gravity discharged through the chute **88**.

It will be apparent that the arrangement may be used either for a close coupled system, which does not use a slurry pump to pump material from the pulper to the press, or for a remote system, which does use a pump.

The continuous supply of water to the passage **48** assures a thin enough slurry to permit proper flow to the base of the screw, which is of particular importance in an arrangement wherein the press follows a vertical pulper and a horizontal slurry passage, i.e., where gravity is of little or no assistance to flow.

In a remote system, i.e., where the press is remote from the pulper, a high pressure pump must be used. The foraminous walls of the tangential section **48** are of particular importance in such a system because they relieve high pressure at the earliest possible moment, and thereby reduce the tendency for the pressure to be transmitted upwardly along the ribbon flight.

It will be noted that the screws **90–91** and screen **76** may be removed without disturbing the slurry infeed connection or other piping. In addition, the guide pin may positively centered exactly in the screen, assuring concentricity of the screen and screw. It will be noted that no solids can be passed to drain, and that the lower extremity of the ribbon flight is lined up with the passage through the tangential section **48**, resulting in an optimum pick-up condition.

What is claimed is:

1. In a press for extracting water from a slurry of solids, the combination comprising a generally upright elongated shell having a fluid tight section at the bottom thereof, an infeed connection for slurry, a drain connection for removing from said shell water separated from said solids, a revolvable lifting screw extending longitudinally within said shell including a central shaft and a ribbon flight spiraling thereabout, a tubular screen circular in transverse section extending about said screw, a retainer including a main body portion having a bottom wall extending across the lower extremity of said screen, and having a tubular section made of foraminous sheet material extending from said screen, the lower terminal edge of said ribbon flight being close adjacent said bottom wall, the inner end of said tubular section being in communication with the interior of said screen, and the outer end of said tubular section being in communication with said infeed connecton, and means carried by said shell and mountng said retainer, and wherein a circular rim rises from the bottom wall of the retainer and is open at the top thereof, the lower end portion of the screen is fitted into said rim through the open top thereof, and the inner end of the tubular section communicates with the interior of the screen through registering openings respectively in said rim and screen.

2. The combination according to claim **1**, wherein said tubular section extends tangentially from said screen.

3. The combination according to claim **1** wherein the retainer is made in its entirety of foraminous sheet material.

4. In a press for extracting water from a slurry of solids, the combination comprising a generally upright elongated shell having a fluid tight section at the bottom thereof, an infeed connection for slurry, ad rain connection for removing from said shell water separated from said solids, a revolvable lifting screw extending longitudinally within said shell including a central shaft and a ribbon flight spiraling thereabout, a tubular screen circular in transverse section extending about said screw, a retainer including a main body portion having a bottom wall extending across the lower extremity of said screen, and having a tubular section made of foraminous sheet material extending from said screen, the lower terminal edge of said ribbon flight being close adjacent said bottom wall, the inner end of said tubular section being in communication with the interior of said screen, and the outer end of said tubular section being in communication with said infeed connection, and means carried by said shell and mounting said retainer, and wherein the infeed connection includes a sleeve connected with the outer end of the tubular section, said sleeve extending inwardly from the wall of the shell along said tubular section a distance which is short when compared with the length of the tubular section so as to leave substantial areas of the foraminated walls of the tubular section exposed for penetration of water therethrough to the interior of the tubular section.

5. In a press for extracting water from a slurry of solids, the combination comprising a generally upright elongated shell having a fluid tight section at the bottom thereof, an infeed connection for slurry, a drain connection for removing from said shell water separated from said solids, a revolvable lifting screw extending longitudinally within said shell including a central shaft and a ribbon flight spiraling thereabout, a tubular screen circular in transverse section extending about said screw, a retainer including a main body portion having a bottom wall extending across the lower extremity of said screen, and having a tubular section made of foraminous sheet material extending from said screen, the lower terminal edge of said ribbon flight being close adjacent said bottom wall, the inner end of said tubular section being in communication with the interior of said screen, and the outer end of said tubular section being in communication with said infeed connection, and means carried by said shell and mounting said retainer, and wherein the means mounting the retainer includes a bracket affixed to a wall of the shell, the bottom wall of the retainer is seated upon said bracket, one of the screw shaft and bracket mounts a pin, and the other mounts a bearing fitted over said pin, and said pin and bearing are operative to center the screw in said screen.

6. The combination according to claim **5** wherein the pin extends upright from the bracket, the bearing is of the sleeve type and is mounted in a bearing retainer, the screw shaft is a tubular member, and the bearing retainer is fitted into the lower extremity of the screw shaft.

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