This invention relates to a method of and means for the extraction of liquid from materials, such as fibrous or granular materials, which in bulk present foramina, and more particularly for the extraction of water from a mass of washed material such as textile fibres.

It has been previously proposed to provide a wringing machine for extracting water from washing, incorporating a container, a bag suspended in the container and adapted to receive a batch of washing, and means for compressing the bag by the pressure of water admitted to the container, so as to press water out of the washing.

Such a machine has the disadvantages that compression of the bag tends to cause folds in the bag which trap parts of the washing, it is possible to wring only one batch of washing at a time, and extraction of water from the bag necessitates the provision of a system of pipes for extraction of water from the bag.

The primary object of the present invention is to provide for extracting liquid from fibrous or granular materials in such a way that pressure is applied uniformly to the material.

A further object is to provide for the extraction of liquid from the material in a continuous manner.

The method according to the invention consists in the steps of bringing the material into contact with the outer face of an inflatable flexible bag, and inflating the bag by fluid pressure in such wise that the part of the bag in contact with the material is tensioned uniformly by the fluid pressure and is caused to conform readily to the configuration of the material.

The material is preferably conveyed intermittently into contact with the bag.

A press for performing the method according to the invention incorporates a rigid frame, a flexible bag inflatable by pressure fluid and suspended from the frame, and an orificed plate or a screen located below and vertically spaced from the frame, the bag being adapted to press material from which liquid is to be extracted towards the plate or the screen.

The bag is preferably spring-urged in the direction towards the frame.

A practical embodiment of the invention is illustrated in the accompanying drawings in which:

Fig. 1 is a side elevation of the press.
Fig. 2 is an end elevation.
Fig. 3 is a fragmentary side elevation of a flexible bag incorporated in the press.
Fig. 4 is a section of the bag.
Fig. 5 is a plan of the bag.

Referring to the drawings, 1 denotes a flexible bag in the form of a bellows inflatable by fluid pressure and suspended from a rigid frame 2. 3 denotes an orificed plate or screen supported by a frame 4 complementary to and vertically spaced from the frame 2.

An endless perforated conveyor belt, preferably of resilient material, trained around end rollers 6, 7 and having a horizontal upper flight 5 is adapted to travel between the frames 2, 4, and above the plate or screen 3 and to convey the material 8 from which liquid is to be extracted to a position beyond the bellows 1.

The driving means (including devices of known type and not illustrated) for the conveyor 5 is adapted to effect travel of the conveyor 5 in synchronism with operation of the bellows 1.

These operations may be effected by equipment of the type disclosed in United States Patent No. 2,272,009, in which the operating fluid supplied to the piston C-1 to move the plate 38 down, and later exhausted therefrom, would be used to inflate and deflate the bellows 1 of the present application.

The upper face of the frame 4 (as illustrated in Fig. 3) is formed with a plurality of channels 9 leading to a trough 10 (Fig. 1) which may be piped to a drain (not illustrated).

The lower flight 11 of the conveyor passes under guide rollers 12, 13 revoluble about horizontal axes in a framework 14 supporting the frames 2, 4 and the rollers 6, 7.

The bellows 1 is constituted by two resilient superposed sheets 15, 16 (Figs. 3 and 4) secured together at their marginal edge portions by a pair of superposed rings 17, 18 of rigid material interconnected, for example, by bolts and nuts.

The upper sheet 15 is formed with a central aperture 19 (Fig. 4). An annular flange 20 secured to said sheet 15 adjacent to the aperture 19 embraces one end portion of a pipe 21 connected to a source of pressure fluid supply. The pipe 21 passes through a vertical hole 22 (Fig. 1) formed in the upper frame 2.

The bellows 1 is sustained in engagement with the under face of the frame 2 by means of a plurality of vertical tension springs 23 each of which is connected at its lower end to the upper ring 17 of the bellows 1, and at its upper end to a bracket 24 projecting from the frame 2.

The channels 9 in the frame 4 are defined by the vertical limits of equi-spaced inverted T-shaped bars 25 the flanges of which are joined together in co-planar relationship to form in effect a continuous plate.

The pipe 21 for supply of pressure fluid to the bellows 1 is connected by an automatically operable valve arrangement (not illustrated) to the source of pressure fluid supply, the valve arrangement being devised alternately to admit fluid to the bellows and to exhaust fluid from the bellows. Where the pressure fluid is compressed air, the valve arrangement is devised to connect the pipe 21 alternately to the suction side and to the exhaust side of an air compressor.

In practice, material 8 from which liquid is to be extracted is placed on the upper flight 5 of the conveyor for conveyance to a position under the bellows 1. The driving means for the conveyor is arranged to cause the conveyor to travel a predetermined distance each time that pressure fluid is exhausted from the bellows 1, by the use of well-known devices in a well-known manner. Devices suitable for this purpose are disclosed in United States Patent 2,272,009, as pointed out above.

When the bellows 1 is inflated, travel of the conveyor is interrupted and the bellows 1, during its expansion, presses the material 8 on the conveyor against the plate or screen 3 (as illustrated in Fig. 3), liquid expelled from the material 8 passing through the perforations of the conveyor and through the plate or screen 3 to the channels 9 whence the liquid flows by way of the trough 10 to the drain.

After a predetermined period of time, the valve arrangement operates to exhaust pressure fluid from the bellows 1 which is deflated and rises under the influence of the associated springs 23 in the direction away from the frame 4. The timing and other operations here referred to may be effected by the equipment of the type dis-
closed in United States Patent 2,272,009 in the manner pointed out above.

The above-described operation is then repeated. It is to be noted that, when the bellows 1 is inflated, the fluid pressure in the bellows causes the face of the bellows 1 in contact with the material 8 to be tensioned uniformly and to conform readily to the configuration of the material, so that pressure is applied to all the material in contact with the bellows 1 and efficient extraction of liquid from the material 8 is effected.

What is claimed is:

1. A press for extracting liquid from materials which in bulk present foramina, including a perforated plate located at an extraction location, and a conveyor for conveying material to be extracted through said extraction location over said plate, the improvement in which the press includes a stationary rigid frame at said location extending above and across the plate and conveyor, a flexible inflatable and deflatable bag directly abutting the lower surface of said frame and suspended therefrom over said plate and conveyor, means acting upon said bag for maintaining it above the material on the conveyor when deflated, a source of pressure fluid for inflating said bag to flex it downwardly and to tension it, at the end, said bag when inflated engaging the surface of the material on the conveyor over the plate and compressing the liquid therefrom, and said bag when deflated permitting the conveyor to move the extracted material away from said location and simultaneously convey new material to be extracted to a position under the bag.

2. A press as claimed in claim 1, including a second rigid frame, complementary to and vertically spaced from the rigid frame from which the flexible bag is suspended, said second frame supporting said perforated plate and the conveyor at the extraction location and being provided at its upper surface with a plurality of channels, and a trough into which said channels lead.

3. A press as claimed in claim 1, in which the bag is in the form of a rectangular-shaped horizontally-arranged bellows, and wherein said means for maintaining the bag above the material on the conveyor when deflated includes a plurality of laterally-spaced vertically-arranged tension springs each connected at one end to the bellows and at the other end to the rigid frame, said springs suspending the bellows in contact with the undersurface of the rigid frame and retracting the bellows away from the extracted material when the bellows is deflated.

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