(No Model.)

E. E. HENDRICK.

FILTER PRESS.

No. 601,833. Patented Apr. 5, 1898.

Fig. 1,

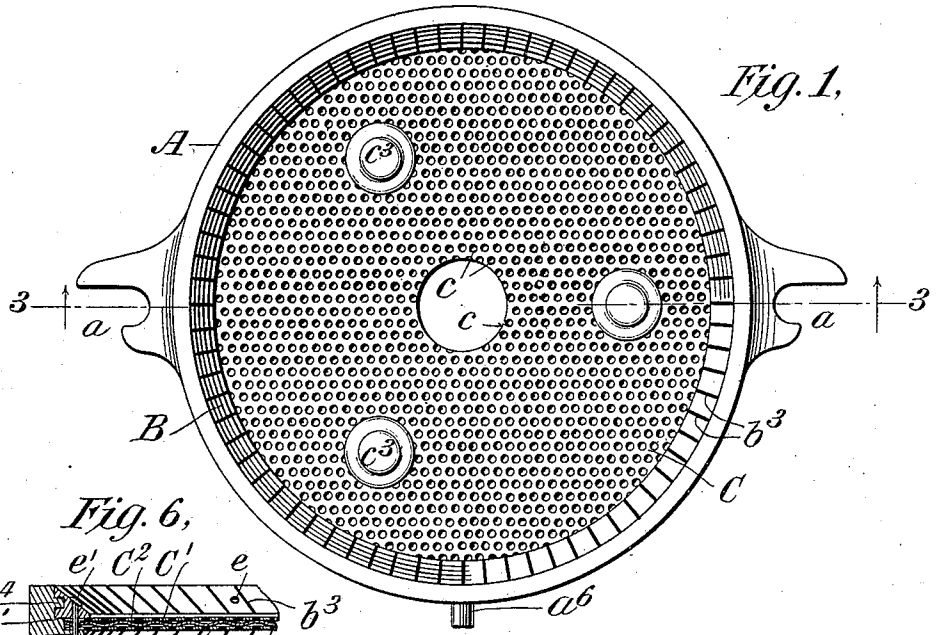


Fig. 6,

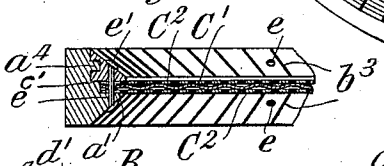


Fig. 3,

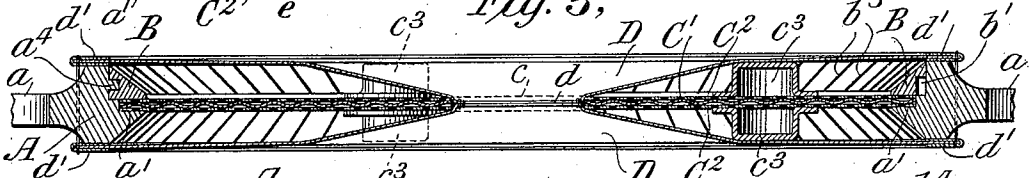


Fig. 4,

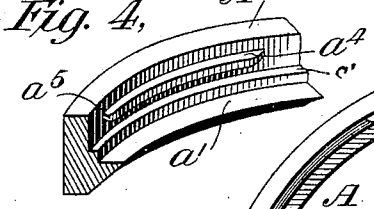


Fig. 2,

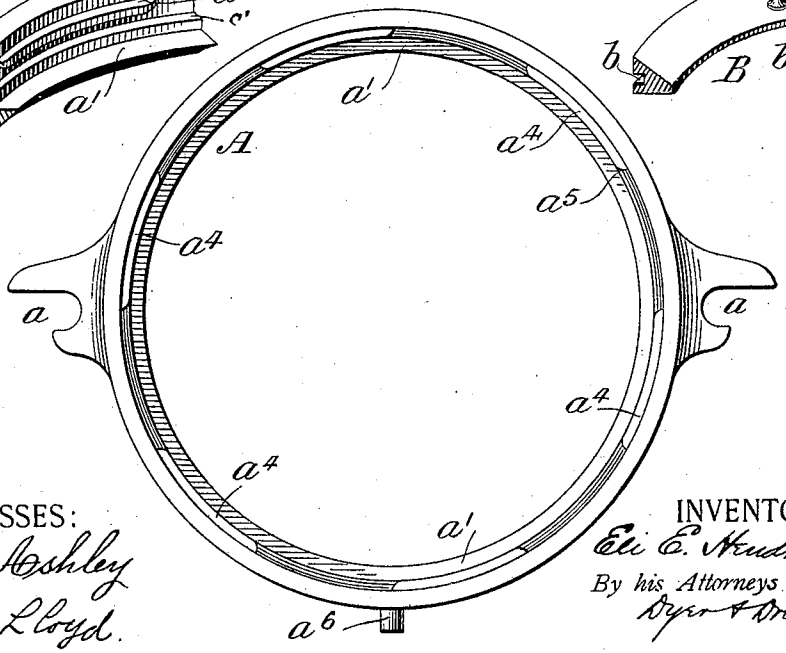
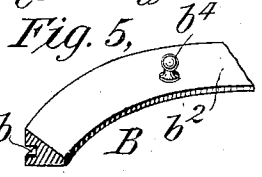


Fig. 5,



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UNITED STATES PATENT OFFICE.

ELI E. HENDRICK, OF CARBONDALE, PENNSYLVANIA.

FILTER-PRESS.

SPECIFICATION forming part of Letters Patent No. 601,833, dated April 5, 1898.

Application filed July 14, 1896. Serial No. 599,131. (No model.)

To all whom it may concern:

Be it known that I, ELI E. HENDRICK, a citizen of the United States, and a resident of Carbondale, in the county of Lackawanna and State of Pennsylvania, have invented a certain new and useful Improvement in Filter-Presses, of which the following is a specification.

This invention relates to filter-presses, and, while capable of use in the treatment of other liquids, is designed particularly for the separation of the solid or semisolid substances from oil. In filter-presses heretofore employed for this purpose perforate metallic plates or disks in series have been employed, the several series being separated from each other by means of layers of fabric—such as canvas, duck, &c. These have commonly been mounted upon a suitable supporting-frame, the oil being forced through a central perforation in said plates and fabric under high pressure. It has been the practice to employ between each two layers of fabric two and sometimes three metallic plates, the whole composing what I term a "filter-press element," and to secure these together in order to preclude disarrangement by the pressure of the oil. These securing devices I have found to be defective. The pressure under which the oil is passed through the apparatus, amounting frequently to one thousand pounds to the inch, often bends the plates and sometimes tears them apart, thus interfering greatly with the filtering operation. To overcome this objection I have devised a filter-press in which each series of plates is mounted separately in a ring or annulus, means being employed for permanently or detachably securing the plate or plates within said ring. In the present embodiment of the invention I employ a ring or annulus having separated lips projecting inwardly toward the center and a ledge upon which the plates bear near their peripheries. In conjunction with these I employ a locking-ring provided with internal separated rabbets or grooves of such size as to permit them to receive the lips on the interior of the ring or annulus when the plates are in position. This is accomplished by placing the internal locking-ring within the annulus in such manner as that the lips upon the interior of the latter coincide with the space between the rabbets in the locking-ring. The latter is then pressed downwardly upon the periphery of the plate or plates, thus binding them firmly upon the ledge on which they rest, and then turned so that the lips will engage with the rabbets or grooves in said locking-ring. This locking mechanism holds the plate or plates firmly in position, precludes their being torn apart or disarranged, and is quickly operated to attach or detach the plates from the annulus.

A further improvement contemplated by this invention concerns the disks of fabric commonly termed "blankets." These are usually perforated centrally, and two adjacent blankets are secured together around the perforation and at the periphery outside the annulus, locking-ring, and plates. I have found that these blankets fray rapidly and the securing devices for that reason become defective. To remedy this, I provide each blanket with a binding, also preferably, but not necessarily, of fabric. The adjacent edges of two blankets, at both central perforation and periphery, may then be attached either by strings or by stitching or other suitable means and the useful life of the whole prolonged.

In the drawings, Figure 1 is a face view of a press element embodying my invention. Fig. 2 is a similar view, the perforate plates and locking-ring being removed. Fig. 3 is an enlarged section on the line 3 3, Fig. 1. Fig. 4 is an enlarged detail perspective of a portion of the ring or annulus. Fig. 5 is a similar view of a portion of the locking-ring, illustrating a modification; and Fig. 6 is a detail sectional view illustrating a further modification of the locking-ring and annulus.

Referring to the drawings, in which similar letters of reference denote corresponding parts, A designates the ring or annulus in which the filtering devices are supported. This may be constructed of iron, brass, or other suitable material. This annulus is provided with ears *a a*, by means of which the element is supported upon the horizontal parallel rods of the supporting-frame.

a' designates an internally-projecting flange forming a ledge upon which rest the plates presently to be described. This flange is preferably so located relatively to the faces of the annulus as that the plates will rest

about midway between said faces, as shown in Fig. 3.

a^4 a^4 designate separated lips preferably formed integral with the annulus and extending inwardly therefrom. These lips coact with the locking mechanism.

B designates the locking-ring. This also is formed of a suitable metal and is of such size as to fit snugly within the annulus A. This is provided in its exterior with a series of separated rabbets or grooves b b, the spaces between these being cut away at b'. These cut-away portions coincide with the lips a^4. The upper surface b^2 of the locking-ring may be beveled, as shown, and this beveled surface may be serrated or lined, as at b^3, to facilitate the turning of the ring. If desired, the ring may be provided with a stud or boss b^4, Fig. 5, for the same purpose.

C designates the filter-plates. In the present instance these consist of the central imperforate corrugated plate C′ and the perforate plates C^2 C^2 on either side of said plate C′. These are preferably of the same size and are provided with the central perforations c, through which the oil is forced. The plates, as above indicated, rest near their peripheries upon the flange a' of the annulus. The interior of the latter may, if desired, be cut away, as shown at c', so as to make the seat for the plates C equal in height to the thickness of the plates.

Each of the outside plates C^2 is provided upon its exterior with bosses c^3, and the bosses upon each element coincide with those upon the next adjacent element. Each element therefore bears against the adjacent element not only at the annulus A, but also at the bosses c^3.

It should be understood that I do not limit myself either to the number of plates or to the particular description thereof above given. Both number and description may be varied to meet the requirements of use.

In operation the plates are placed upon the flange or ledge a' and the locking-ring B placed within the annulus so that the cut-away portions b' coincide with the lips a^4 of the annulus. The locking-ring is then pressed downwardly and partially revolved, so as to cause said lips a^4 to enter the rabbets or grooves b of said ring. This operation is facilitated by the beveling of the ends of the lips a^4, as shown at a^5. If desired, the ends of the flange forming the rabbets or grooves b may also be beveled in the direction opposite that of the bevel of the lips a^4. By this means the locking-ring is forced down upon the plates near their peripheries and the whole element firmly bound together.

In Fig. 6 I have illustrated a modification of the means for securing the plates in position. In this construction the flange a' and the locking-ring B are provided with perforations e to receive rivets or bolts e'. In making up an element of this structure the plate or plates are placed upon the flange a', the locking-ring B placed upon them and within the annulus, and the bolts or rivets passed through flange, plates, and ring and secured. This construction may be used either with or without the rabbets or grooves in the ring and the lips in the annulus.

Turning now to the blankets D, these consist of disks of fabric larger than the press element. They are provided with the central perforation d. Each blanket is preferably bound around its inner edge (not shown) and outer edge, as shown at d'. One blanket is placed on either side of the annulus and plates. The bound edges surrounding the perforation in one blanket are then stitched or otherwise secured to the corresponding edges of the blanket on the other side of the annulus and plates. The outer edges of the blankets extend beyond the annulus, and here each two blankets which are attached around the central perforation are secured together by stitching or other suitable means. The structure thus described constitutes a filter-press element. A series of these are mounted in juxtaposition upon the press-frame by means of the ears a a. The oil or other fluid is then introduced into the press and forced through under considerable pressure. During this operation the waxes and other solid matters are deposited upon the exterior of the blankets, the clarified oil passing through the blankets and perforate plates into the channels in the corrugated plate and running off through the outlet a^6 of the annulus.

A filter-press thus constructed will be found more efficient, as well as stronger and more durable, under the rough usage and high pressure required than presses heretofore employed.

Having now described my invention, what I claim is—

1. In a filter adapted to separate material under pressure, the combination of a series of press elements arranged in series, each element comprising a ring or annulus, a filtering medium removably connected therewith and having a substantially central opening, and a detachable locking-ring for securing said filtering medium to said ring or annulus, substantially as set forth.

2. In a filter-press element of the character described, the combination of a ring or annulus having an interior flange, a series of filter-plates removably secured to the same and supported thereby, (said series comprising a central vertically-corrugated plate and two adjacent perforate plates on both sides thereof) all of said plates having a central opening for the passage of the liquid under pressure, and two blankets secured together at said central opening and covering said plates and resting on the ring or annulus, substantially as described.

3. In a filter-press element of the character described, the combination of a ring or annulus provided with an interior flange, a filter-

plate supported on said flange, a locking-ring coöperating with the ring or annulus for securing said plate in position, said plate having a central opening for the passage of the liquid under pressure, and two blankets secured together at said central opening and covering said plate and resting on the ring or annulus, substantially as set forth.

4. In a filter-press element of the character described, the combination of a ring or annulus provided with an interior flange, a filter-plate supported on said flange, a locking-ring for securing said plate in position, means for detachably securing said locking-ring to the ring or annulus, said plate having a central opening for the passage of the liquid under pressure, and two blankets secured together at said central opening and covering said plate and resting on the ring or annulus, substantially as described.

5. In a filter-press element of the character described, the combination of a ring or annulus provided with an interior flange, a series of filter-plates supported on said flange, (said series comprising a central corrugated plate and two perforate plates on both sides thereof,) all of said plates having a central opening for the passage of the liquid under pressure, a locking-ring coöperating with the ring or annulus for securing said series of plates in position, and two blankets secured together at said central opening and covering said plate and resting on the ring or annulus, substantially as described.

6. In a filter-press element, the combination with a ring or annulus having internal lips, of a filtering medium within said ring or annulus and a locking-ring coacting with said internal lips to secure said filtering medium to said ring or annulus, substantially as described.

7. In a filter-press element, the combination with a ring or annulus having internal lips beveled at their ends, of a filtering medium and a locking-ring coacting with said internal lips to secure said filtering medium to said ring or annulus, substantially as described.

8. In a filter-press element, the combination with a ring or annulus having internal lips, of a filtering medium and a locking-ring, having rabbets or grooves coacting with said internal lips to secure said filtering medium to said ring or annulus, substantially as described.

9. In a filter-press element, the combination with a ring or annulus, of a filter plate or plates, a locking-ring for securing removably said plate or plates in position, and a disk of fabric, substantially as described.

10. In a filter-press element, the combination with a ring or annulus having an outlet for the filtered material, of a filter plate or plates having hollow bosses, a locking-ring for securing said plate or plates in position and a blanket of fabric on either side of said plate or plates, substantially as described.

This specification signed and witnessed this 7th day of June, 1896.

ELI E. HENDRICK.

Witnesses:
S. O. EDMONDS,
JOHN R. TAYLOR.