(No Model.) 2 Sheets—Sheet 1.

M. SWENSON.

FILTER PRESS.

No. 353,514. Patented Nov. 30, 1886.

FIG. 1.

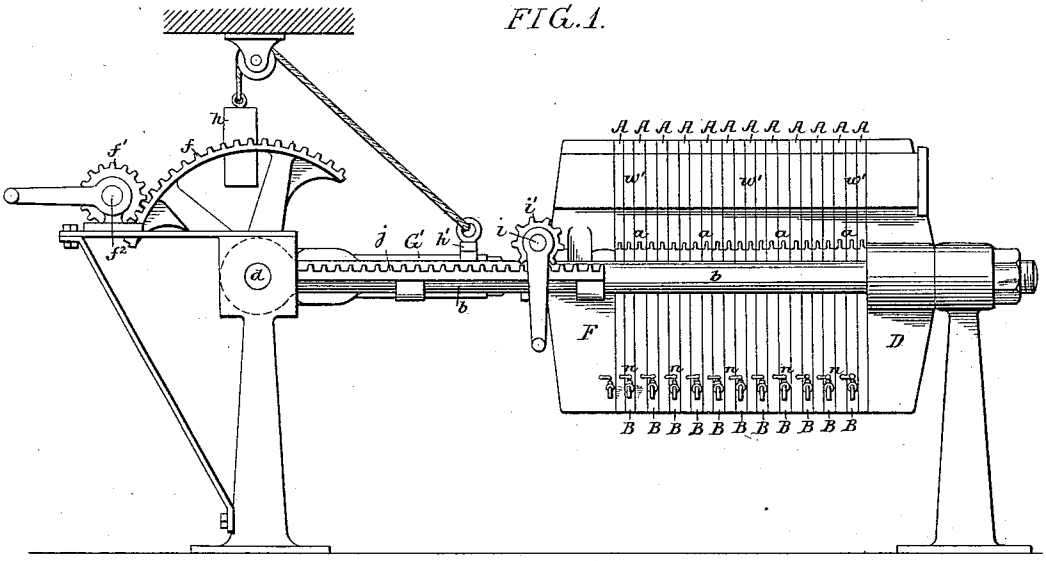
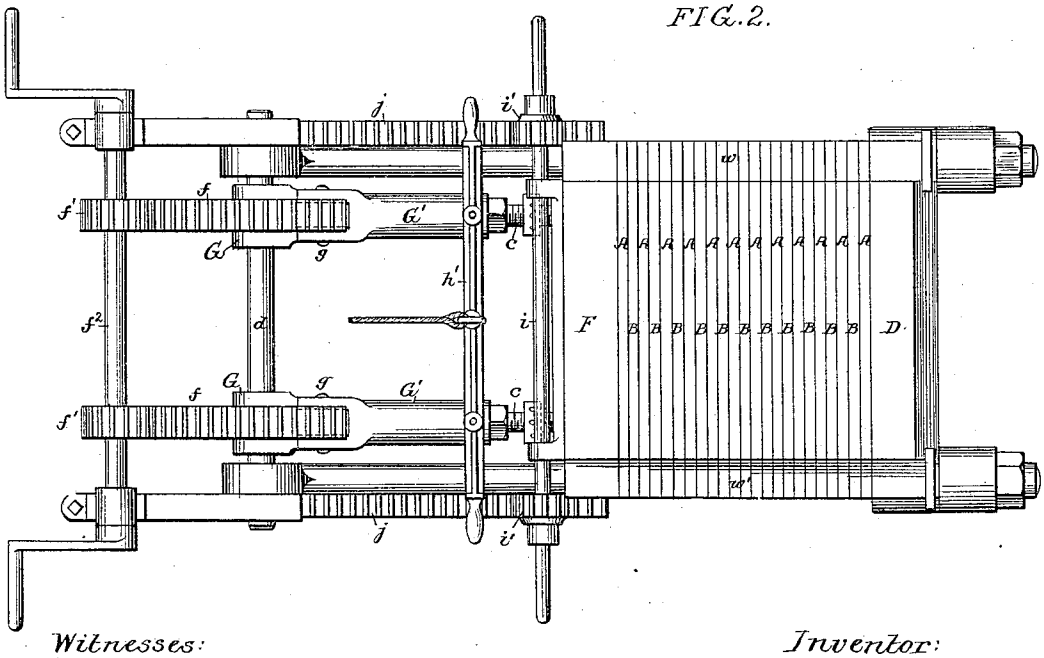


FIG. 2.



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(No Model.) 2 Sheets—Sheet 2.

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FIG. 3.

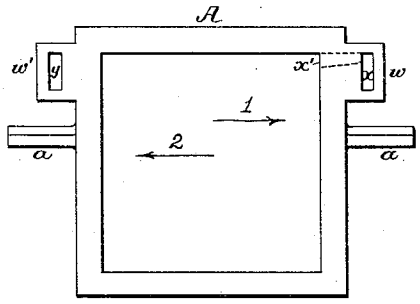


FIG. 4

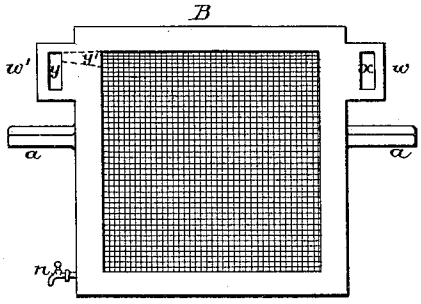


FIG. 5.

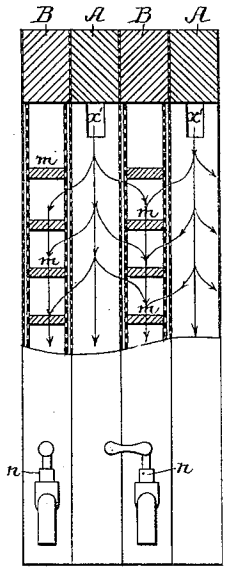
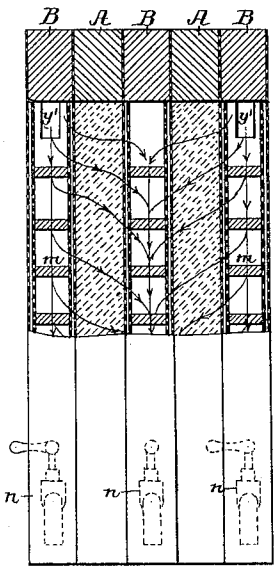


FIG. 6.



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UNITED STATES PATENT OFFICE.

MAGNUS SWENSON, OF FORT SCOTT, KANSAS.

FILTER-PRESS.

SPECIFICATION forming part of Letters Patent No. 353,514, dated November 30, 1886.

Application filed May 3, 1886. Serial No. 200,918. (No model.)

To all whom it may concern:

Be it known that I, MAGNUS SWENSON, a citizen of the United States, residing in Fort Scott, Kansas, have invented certain Improvements in Filter-Presses, of which the following is a specification.

My invention relates to filter-presses which are used for separating precipitated matters or other impurities from sugar or other liquors, one object of my invention being to provide for the ready clamping of the sections or leaves of the press together and the ready loosening of the same when necessary, and a further object being to so construct the leaves of the press as to permit the ready washing out of any liquor which may remain in the cake formed between adjacent filtering-leaves of the press.

In the accompanying drawings, Figure 1 is a side view of a filter-press constructed in accordance with my invention; Fig. 2, a plan view of the same; Figs. 3 and 4, face views of different leaves of the press; Fig. 5, an enlarged section looking in the direction of the arrow 1, Fig. 3, and showing adjoining leaves of the press to illustrate the operation of filtering the liquid; and Fig. 6, a similar view of adjoining leaves of the press, looking in the direction of the arrow 2, Fig. 3, and showing the operation of washing the press-cakes.

The press consists, as usual, of a number of alternating sections or leaves, A B, suitably supported by means of lugs *a* upon the opposite rods or bolts, *b*, of the fixed frame, the leaves of the press being clamped between the fixed head D and the movable head F, so as to prevent any leakage through the joints between the leaves, which joints are preferably provided with suitable packing.

Usually the movable head of the press is acted upon by nuts on the screw-rods *b b*, and the process of tightening and loosening the press is a slow one, due to the necessity of tightening up and unscrewing these nuts. In order, therefore, to overcome this objection I dispense with the usual screw-rods and nuts as a means of tightening the press and use in place of the same two pairs of toggle-levers, G G′, the lever G′ of each pair being provided with an adjusting-screw, *c*, which has a bearing upon the head F. The other lever, G, of each pair is secured to a rock-shaft, *d*, which is provided with toothed quadrants *f*, engaging with spur-wheels *f′* on a crank-shaft, f^2, by the rotation of which the pivotal connections *g* of the toggle-levers may be depressed so as to expand said toggle-levers and thrust the head F of the press forward, or the pivots may be raised so as to contract the toggle-levers and withdraw the bearing ends of the levers G′ from contact with the head F of the press, a counterbalance-weight, *h*, connected to a cross-bar, *h′*, on said levers G′, facilitating the throwing up of said levers out of the way as soon as the ends of the same are free. The head F can then be readily run back on the supporting-bolts *b* by rotating a crank-shaft, *i*, adapted to bearings on said head F, and having spur-pinions *i′*, engaging with fixed racks *j* at the opposite sides of the frame.

In reclamping the press, the head F is run forward by means of the rack and pinons, the toggle levers being then depressed, the screws *c* adjusted to their bearings on the head, and the quadrant *f* operated so as to depress the joints *g*, expand the levers, and tighten the press.

Although the toggle-levers afford a means of rapidly tightening and loosening the press, they provide a means of exerting great pressure upon the head F, this pressure increasing as the leaves of the press are forced together and the pivotal connections *g* of the toggle-levers approach nearer and nearer to a line drawn through the bearings of the levers and the center of the shaft *d*.

The quadrant may be operated to such an extent that the pivots *g* are carried to or slightly below this line, so that the levers will be locked and any back movement of the head prevented.

The leaves B of the press are the filtering-leaves, and carry opposite wire-guaze or perforated plate-screens which support the filtering-cloths, said screens being braced by transverse partitions *m*, suitably notched or perforated to permit the flow of the liquid through the space between the screens to the valved outlet *n* at the lower portion of the leaf.

All of the leaves of the press have at one side hollow lugs *w*, these lugs, when the leaves of the press are clamped together, forming a

passage, *x*, which is blank on all of the leaves B, but communicates through ports *x'* in the leaves A, Fig. 3, with the spaces inclosed by said leaves and between the filtering-faces of opposite leaves, B, of the press. The liquid to be filtered is pumped into these spaces and filtered through the filtering-cloths into the interior of the leaves B, from which it flows, as before remarked, through the valved escape-pipes at the bottom. (See Fig. 5.) The interior of each leaf A soon becomes filled with a cake of the precipitates and other impurities carried by the liquid, and this press-cake contains a considerable percentage of liquid, which it has been heretofore found difficult to remove, for if any attempt is made to wash the liquid from the cake by forcing water through the passage *x* and ports *x'* this water will escape at once into the filtering-leaves B, and a comparatively limited portion only of each cake at and near the port *x'* will be washed, while if, on the other hand, the cake is removed, broken up, and washed with clean water the percentage of valuable matter in the resultant wash-water is very slight.

In order, therefore, to permit the thorough washing of each cake in the press, I provide the leaves A and B of the same with supplementary lugs *w'*, forming a passage, *y*, which is blank on the leaves A, but communicates through ports *y'* with the interiors of some of the filtering-leaves B of the press—say with every alternate leaf, as shown in Fig. 6. By this means when the leaves A of the press have become filled with a cake, as shown, water may be caused to pass through the passage *y* and ports *y'* and to enter the interiors of the filtering-leaves with which said ports communicate, the escape-valves *n* of these leaves, of course, being closed. Water will thus pass from the filtering-leaves through the cakes in the adjacent leaves A, and into the intermediate filtering-leaf, as shown, for instance, by the arrows in Fig. 6, this flow of water being uniform throughout all portions of the cake, so that the liquid is washed therefrom rapidly and thoroughly, and by the use of a minimum amount of fresh water. The resultant wash-water discharged from the intermediate filtering-leaves contains a high percentage of valuable matter.

I am aware that toggle-levers are commonly used as parts of pressure-imparting mechanism in different forms of presses, and hence I lay no claim, broadly, to the use of toggle-levers as a means of imparting pressure to the movable head of the press; nor do I claim, broadly, the washing of the filter-cake by passing water through the same from one filtering-leaf to another, as this has been heretofore proposed; but

I claim as my invention—

1. The combination of the heads and leaves of a filter-press with a pressure device acting upon but disconnected from the movable head of the press and pivoted so as to be thrown up out of the way, all substantially as described.

2. The combination of the heads and leaves of a filter-press, a pivoted pressure device acting upon but disconnected from the movable head of the press, and a counterbalance-weight for facilitating the elevation of said pressure device when it is withdrawn from contact with the head, all substantially as specified.

3. The combination of the heads and leaves of the press, and a pressure device acting upon but disconnected from the movable head of the press, with pinions carried by said head, and fixed racks with which said pinions engage, whereby the head can be run to and fro when free from the control of the pressure device, all substantially as specified.

4. The combination, in a filter-press, of discharge-leaves B and cake-receiving leaves A, alternating with each other, and each having two hollow lugs or projections, one of which is blank and the other in communication with the interior of the leaf, whereby when the leaves are fitted together two longitudinal supply-passages are formed, one communicating with the interiors of the discharge-leaves B and the other with the interiors of the cake-receiving leaves A, all substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MAGNUS SWENSON.

Witnesses:
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SAML. C. BIDDLE.