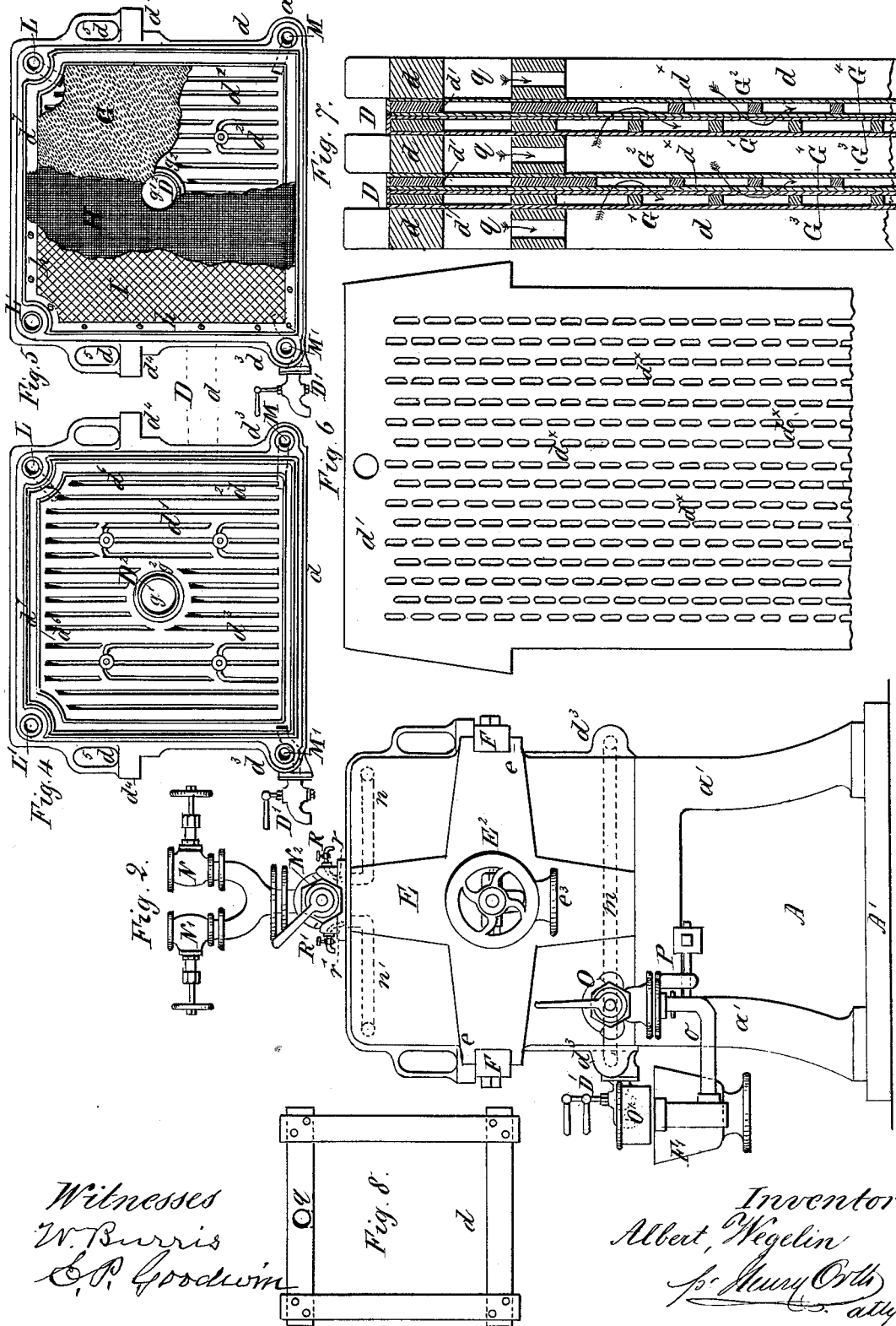


A. WEGELIN.
Filter-Press.

No. 220,686.

Patented Oct. 14, 1879.



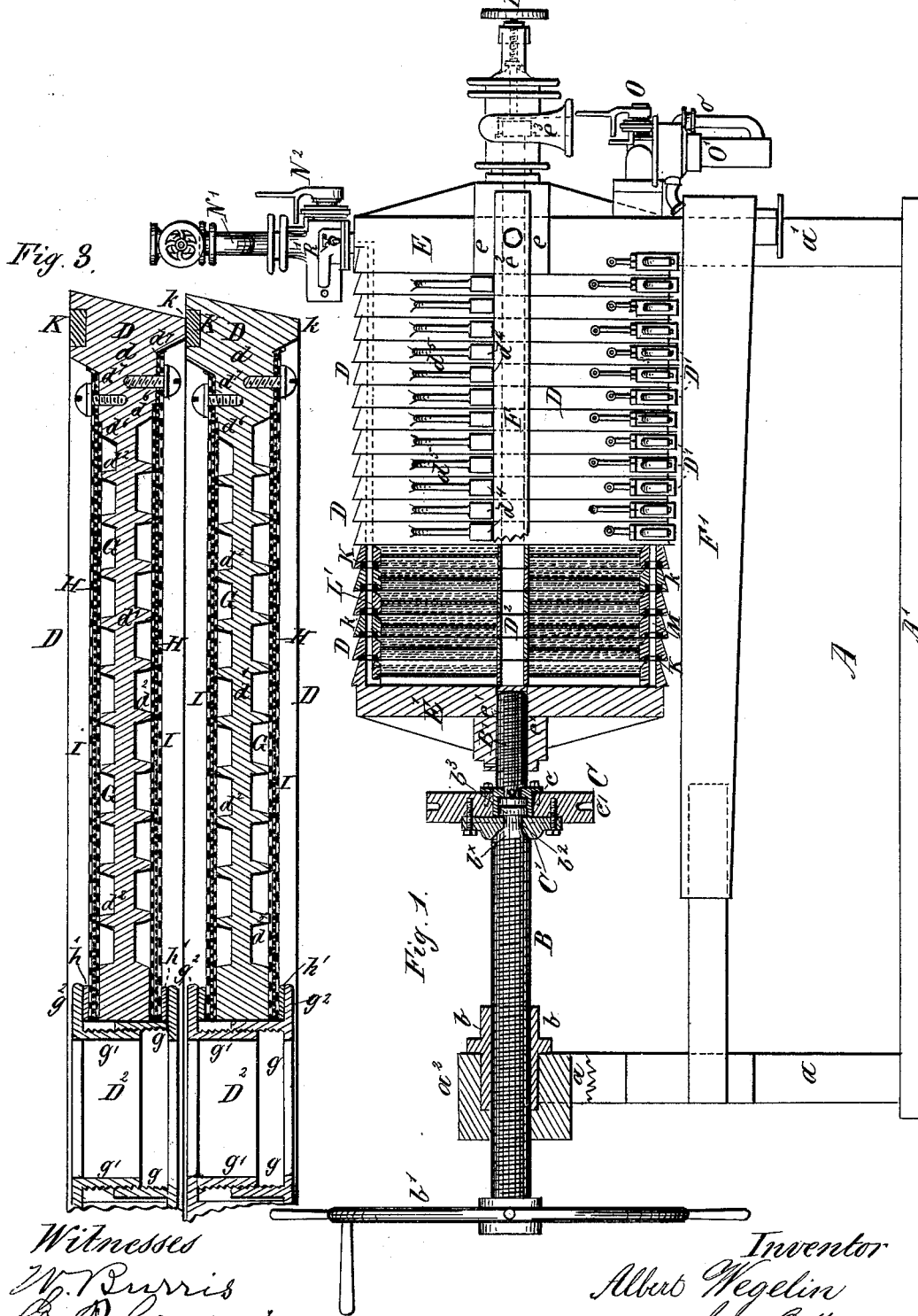
Witnesses
W. Burris
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Inventor
Albert Wegelin
per Murray Orth atty

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UNITED STATES PATENT OFFICE.

ALBERT WEGELIN, OF HALLE-ON-THE-SAALE, GERMAN EMPIRE, ASSIGNOR
TO HIMSELF AND ERNST HÜBNER, OF SAME PLACE.

IMPROVEMENT IN FILTER-PRESSES.

Specification forming part of Letters Patent No. **220,686**, dated October 14, 1879; application filed
June 28, 1879; patented in England, December 2, 1878.

To all whom it may concern:

Be it known that I, ALBERT WEGELIN, of the city of Halle-on-the-Saale, in the German Empire, have invented new and useful Improvements in Filter-Presses, for which invention I have obtained Letters Patent in England under date of December 2, 1878, and of which the following is a description.

The object of my invention is to improve the construction of filter-presses in several of their details, so as to render them more efficient, and also to adapt them to be more easily managed, as hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, and Fig. 2 an end elevation of a filter-press constructed according to my invention. Figs. 3, 4, and 5 represent, respectively, the manner of arranging the plates-together and the construction of said plates and connection therewith of the filtering media; and Figs. 6, 7, and 8 illustrate a slight modification of the same.

Similar letters of reference are employed to indicate like parts wherever such may occur in any of the above described figures of drawings, in which—

A represents the supporting-frame, which consists, essentially, of a bed-plate, A', and two forward standards, *a*, and two rear standards, *a*¹. In a cross-piece, *a*², of the standards *a* is mounted a nut, *b*, in which works one section, B, of a two-part power-screw, which carries on its outer end a hand-wheel, *b*¹, by means of which it is rotated.

B' represents the other section of the screw coupled to section B by means of a coupling-wheel, C, carrying a sleeve, *c*, adapted to receive the flanged end of the section B', and both the sleeve and screw are rigidly connected to the coupling-wheel in any usual or preferred manner.

The inner end of section B is reduced in diameter to form the inclined face *b*^x, the neck *b*² terminating in a flange or flaring collar, *b*³. It is connected with the coupling by means of two semicircular locking or coupling plates, C', adapted to fit the neck and inclined portion of the screw-section B in such a manner as to permit its free rotation, so that the movement

of said section will not affect the section B', and vice versa. The coupling-wheel has a number of holes, *c'*, in its periphery for the reception of handspikes or levers, by means of which it and the screw-section B' are rotated independently of the screw-section B, as plainly shown in Fig. 1. The diameter of the section B of the screw is greater than that of section B', and the thread is also much coarser and of greater pitch, so that when it is revolved in either direction it will travel rapidly to move the filtering-plates toward or from each other.

The means heretofore employed for forming a tight joint between the filtering-plates, either by means of gearing or a single screw-shaft operated by a hand-wheel, are more or less objectionable and deficient in action, the former on account of the time required either to press together or release the filtering-plates, and the latter on account of the insufficiency of the power applied to effect the desired result except by the greatest exertion, and even then a tight joint could not always be obtained throughout the entire series of plates. To remedy these difficulties I employ the two-part power-screw B B', above described, the section B of which is designed to move the filtering-plates rapidly into position close to one another, while the section B' is designed to apply the necessary power to form tight joints between the series of plates by revolving it by means of the coupling-wheel and handspikes or levers, as above set forth.

It has been customary in filter-presses as now constructed to hang a piece of filtering-cloth of proper length over each platen or plate to cover both its opposite sides, or to place a piece of such cloth sufficient to cover one side of the platen upon its two sides, each piece of cloth being provided with a series of strings or bands, by means of which they were tied over the edges of the platen.

It will be obvious that either method is objectionable for various reasons—first, on account of the difficulties experienced in producing a water-tight joint between each two platens requiring inordinate pressure; and, secondly, (owing to this very pressure,) on account of the very rapid wear of these cloths,

necessitating frequent renewal of the same at considerable loss of time and cost of material.

By means of the peculiar construction of my improved platens, and the arrangement upon them of the filtering media, I obviate the above-recited difficulties.

The filter-press proper is composed of a series of platens, D, and a stationary head, E, and a movable head, E', Figs. 1, 2, 4, and 5. The head E is rigidly mounted upon the standards a^1 of the frame A, and is provided upon opposite sides with projecting lugs or ears e , between which and like lugs upon the standards a of the frame are bolted the guide and supporting rails F for the movable platens D and head E'. The head E has a central passage, e^2 , communicating on one side with the inlet e^3 , through which the defecated sirup or other substance is forced into the press, said inlet being provided with a suitable valve or stop-cock, E², and on the other side with the central passage of the platens. This head is further provided with water-passages n n' m , (shown in dotted lines, Fig. 2,) for a purpose hereinafter described.

The movable head E' is provided with a threaded recess, e^1 , in its outer face, within which operates the section B' of the power-screw, and with projecting shoulders, which serve to support it upon the guide-rails F.

Referring more particularly to Figs. 3, 4, and 5, the platens D consist of a frame, d , its diaphragm d^1 , provided with a series of ribs, d^2 , and two projecting ears, d^3 , at the opposite lower corners, having passages M and M', communicating with the passage m of the head E. The platens are further provided with two passages, L L', in their opposite upper corners, communicating with the passages n n' of said head E, a central passage, D², communicating with the passage e^2 of the head E, and a discharge-cock, D¹, communicating with the filtering-chambers, through which the filtered sirup is discharged into a trough or receiver, F'. Upon the opposite sides of the platens D are formed the brackets or shoulders d^4 , from which they are supported upon the guide-rails F, and the handles d^5 , by means of which they are lifted in and out of the rails F. The front and rear faces of the frame d of the platens are provided with offsets d^6 and d^7 , for a purpose presently explained.

G, H, and I represent the filtering media. The former, G, consists of a plate of perforated sheet metal laid upon the ribs d^2 of the diaphragm of the platen, and of a size to fit the offset d^6 on the frame of said platen. H is a filtering-cloth (blanket, flannel, or other suitable material) laid over the perforated plate G, and cut to fit the offset d^7 of the frame of the platen D, and upon this is laid a wire-cloth, I, having coarse meshes, and of the same size as the cloth H, the two being secured upon the offset d^7 by means of a strip of perforated sheet metal, h , or other suitable material.

The filtering media G H I have each a central aperture, adapted to fit the hub of the dia-

phragm d^1 , upon which they are secured by means of two threaded sleeves, g g^1 , screwed one into the other in the hub, said sleeves having flanges g^2 , which project over the filtering media and are made fast by means of the washers h' , as plainly shown by Fig. 3. From the latter figure it will also be made plain that the cloth H and screen or wire-cloth I hold the perforated plate G upon its offset without any other special fastening.

The front faces of the frames of the platens are recessed to receive a cushion of lead, K, or other soft material, such as rubber or felt, and the rear face of said frame d is made to taper outwardly or conical in cross-section, as shown at k , Figs. 1 and 3, to form a tight joint between the plates and their respective heads without applying undue pressure.

The sirup or other substance to be filtered is introduced or forced into the press through the inlet e^3 of the head E, through which it passes to the respective filtering-plates, each being provided with a central aperture or passage, D². The hub of the plates in which these apertures are formed being of a less diameter than the frames of said plates, spaces or passages are formed between each two hubs to permit the sirup to pass to the filtering-chambers formed between each two diaphragms d^1 and their filtering media. It will be seen that by this arrangement a continuous, or practically continuous, passage is formed, communicating not only with the filtering-chambers, but also communicating with the passage e^2 and inlet e^3 of the head E, as already described. The sirup or other material then percolates through the filtering media, the solid substances being filtered or separated therefrom, flows down between the ribs of the diaphragms d^1 , and is discharged through the cocks D¹ into the trough F'.

In Figs. 6, 7, and 8 I have illustrated a slight modification in the construction of the platens and the arrangement of the filtering media, more particularly designed for the filtration of wine, beer, or fruit-juices.

The platen D is composed of an open frame, d , and a detachable filter-plate, d^1 , provided with a series of slits or oblong apertures, d^x , instead of ribs. Upon these plates are hung the filtering-cloth, so as to cover both sides, and one such plate is placed upon each side of the open frame d^1 , in such manner that the apertures d^x on one plate half cover the apertures of the plate opposite or adjacent thereto, so as to force the liquid to take the path indicated by the arrows, Fig. 7, the arrangement, as shown by said figure, being such that the liquid will have to percolate through the filter-cloths and the plates before reaching the discharge-orifice.

The greatest portion of the impurities will be deposited in the filtering-chambers and upon the cloths G¹ G², while the filtration is completed by the double thickness G³ G⁴ of said cloths, upon which the rest of the impurities are deposited. The liquid is here fed

through a passage, *g*, formed in the upper part of the frames, and allowed to escape into a vessel placed underneath them by percolating through between the frames.

In the filter-presses as heretofore constructed the arrangement for extracting the saccharine matter from the cakes or deposits in the press by means of water have been such as to conduct the latter into the filtering-chambers either from above or below, and allowing the water to escape after permeating said deposits, the operation being repeated until by test the water is found to contain too small a percentage of sugar to profitably work it, the water being forced upward in either case to the discharge-passage formed in the upper part of the platens.

After careful observation of the effects of this arrangement, I have found that the concentrated juices, lye, or salt solutions, owing to their greater specific gravity, tend always to sink to the lower portion of the filtering-chambers, and are but slowly diluted or permeated by the inflowing water. This not only greatly retards the process of extracting the saccharine matter therefrom, but also tends to unduly liquefy or dilute these deposits or cakes, which is detrimental to their subsequent use.

I remedy these defects by the following arrangement, whereby the charged water is drawn off from the bottom of the platens or filtering-chambers and fed from above, so that I am enabled to employ a relatively small quantity of water to extract the saccharine from the deposits; and to that end each platen *D*, as above described, is provided with four passages, *L L' M M'*, in its upper and lower corners, respectively, and when the platens are in proper position form continuous passages, those, *L L'*, in the upper corners communicating with the passages *n n'*, respectively, of the head *E*, and those, *M M'*, in the lower corners with the passage *m* of said head.

N N' are pipes communicating with a water-supply and with a three-way cock, *N²*, through which water may be admitted to the filtering-chambers alternately by one or the other of these pipes and the respective ports of the stop-cock to change the path of the water within the filter-press, as I will now describe.

The water is fed from an elevated reservoir (not shown in the drawings) or under pressure by some other suitable means through a pipe, *N*, provided with a stop-cock, thence through a port of the three-way cock *N²* into the passage *n* of head *E*, from which the water passes into passage *L* and the filtering-chambers of the platens *D*, permeating the cakes or deposits uniformly. After saturation the charged water escapes through passage *M'* and the passage *m* of the head *E*, thence through one of the ports of a three-way cock, *O*, into a discharge-pipe, *o*, which conducts the water charged with saccharine mat-

ter into an aerometer, *O'*, where the density thereof may be ascertained at all times during the operation, and from the aerometer the water flows into the trough or receiver *F'*.

The three-way cock *O* is provided with an adjustably-weighted valve, *P*, constructed like the ordinary, or somewhat like the ordinary, safety-valve, so as to permit of the adjustment of the pressure (within the filter-press) of the water. The function of this valve is of great importance, as it permits of the regulating of the time the water is to remain in the press, as it cannot flow out until it has attained the desired pressure to overcome the weight of the valve *P*. It is also of great importance when treating substances from which certain elements not readily soluble are to be extracted, as it is evident that by means of the valve *P* the length of time the substance is to be acted upon by the fluid may be readily adjusted, the pressure at the feed-head being known.

By reversing the three-way cocks *N²* *O* the feed-water is made to pass through pipe *N'*, the corresponding port of cock *N²*, the passage *n'* in the head *E'*, into the passage *L'* of the platens *D*, thence through the filtering-chambers diametrically opposite to the lower passage, *M*, thence into passage *m* of head *E*, through the corresponding port of the three-way cock *O*, the valve *P*, pipe *o*, aerometer *O'*, and finally into receiver *F'*, from which it is discharged either into condensers or other suitable remanipulating apparatus. Thus it will be seen that the path of the water may be reversed and made to cross the filtering-chambers in either direction from one upper to the opposite lower corner.

By this peculiar arrangement the saccharine or other substance to be extracted from the cakes or deposits or other material in the filtering-chambers may be effected very rapidly with a relative minimum quantity of fluid, and especially without unduly attenuating the material under treatment.

The three-way cock *N²* is provided with suitable vents *r r'*, communicating with the passages *n n'* and stop-cocks *R R'*, Fig. 2, to exhaust the air from the filter-press, and for ascertaining when the said press is full of fluid, which makes the three-way cock a try-cock and blow-off cock also.

Having described my invention, what I claim is—

1. A platen for a filter-press, consisting of the frame *d*, having four apertures, *L L' M M'*, in its four corners, and the offsets *d^b d'*, and the body or diaphragm *d*, having a central aperture, and provided with a series of projecting ribs and the stop-cock communicating with the opposite sides of the ribbed body or diaphragm, substantially as described, for the purpose specified.

2. The combination, with the platens *D*, having offsets *d^b d'* and a central aperture in its ribbed body or diaphragm *d¹*, of the filter-

ing media G H I and the attaching strip or band *h*, all arranged and operating as set forth.

3. In a filter-press, the means, substantially as described, for extracting the saccharine or other matter from the residue within the filtering-chambers, whereby the fluid employed is conducted to the filtering-chambers at their upper part on one side thereof, and is exhausted at their lower part on the opposite side, in combination with means, as set forth, for changing the path of the water, substantially as described, for the purpose specified.

4. In a filter-press, the combination, with the platens D, having passages L L' M M', of the stationary head E, having passages *n n'*

m and the three-way cocks N² O, and suitable induction and eduction pipes, substantially as described, for the purpose specified.

5. In a filter-press, the combination, with the pipes N N', the passages *n n'* of the head E and L L' M M' of the platens D, and the filtering-chambers, of the three-way cock N², provided with vents and try-cocks, substantially as described, for the purpose specified.

In witness that I claim the foregoing I have hereunto set my hand this 8th day of April, 1879.

ALBERT WEGELIN.

Witnesses:

CARL KESSELER,
BERTHOLD ROI.