(No Model.)

P. R. GRAY & P. R. GRAY, Jr.

PRESSURE FILTER.

No. 445,890. Patented Feb. 3, 1891.

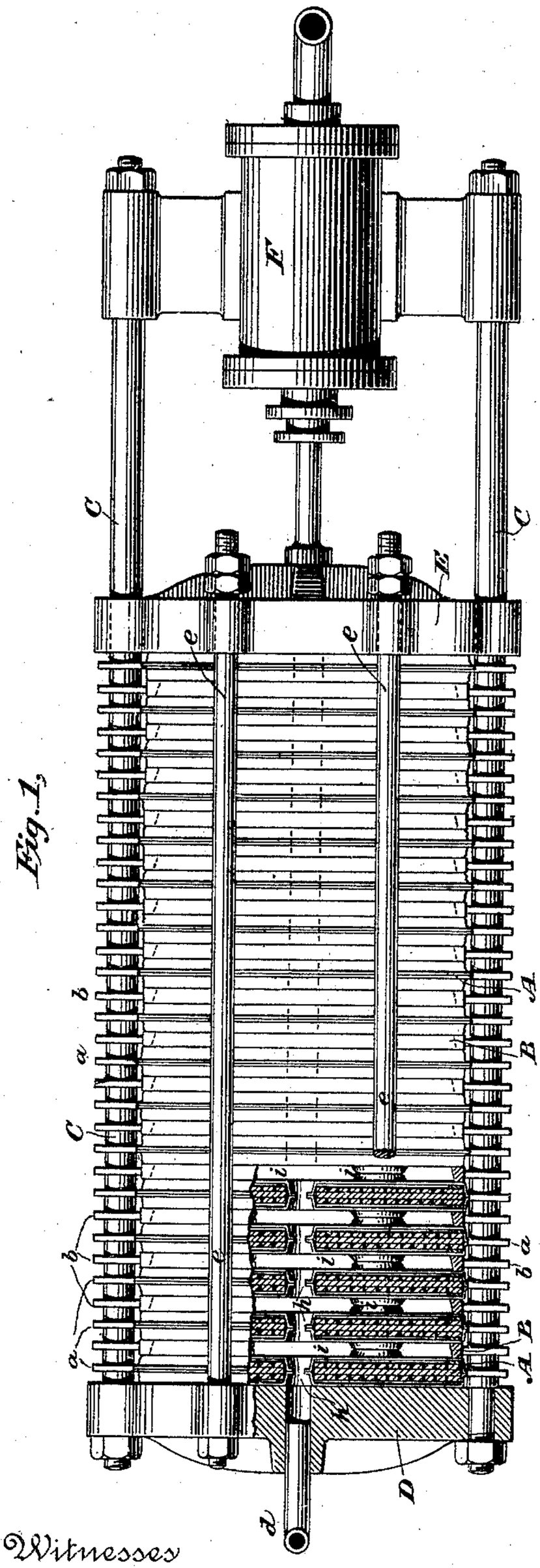

Fig. 1.

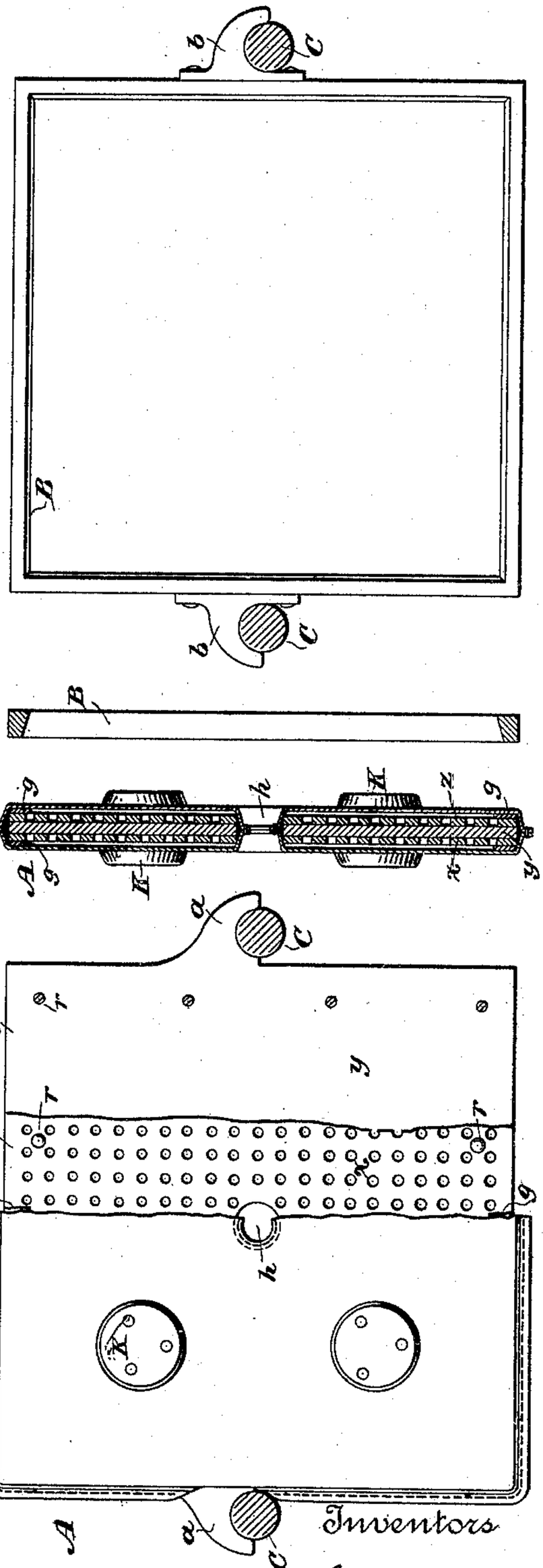

Fig. 4.

Fig. 5.

Fig. 3.

Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

PHILANDER R. GRAY AND PHILANDER R. GRAY, JR., OF ELIZABETH, NEW JERSEY.

PRESSURE-FILTER.

SPECIFICATION forming part of Letters Patent No. 445,890, dated February 3, 1891.

Application filed June 13, 1888. Renewed July 28, 1890. Serial No. 360,136. (No model.)

To all whom it may concern:

Be it known that we, PHILANDER R. GRAY and PHILANDER R. GRAY, Jr., citizens of the United States, residing in Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Pressure-Filters, of which the following is a specification.

The general objects of our invention are to improve the construction and operation of oil-pressure filters, to provide larger spaces or chambers for the collection of the paraffine-wax, and to provide for the more ready removal of the accumulated wax with but slight interruption of the working of the apparatus.

The features of the invention all fully appear from the following specification and accompanying drawings, in which—

Figure 1 is a plan, partly in section, of so much of a filter as is deemed necessary to illustrate our invention. Fig. 2 is a detached view, partly broken away, showing one of the "plates" of the filter; Fig. 3, a transverse central section through one of the plates; Fig. 4, an elevation of one of the spacing-rings which serve to form the wax-chambers between the plates; and Fig. 5 is a transverse section through the same.

The filter is made up of a series of plates A of a structure presently described and interposed spacing washers or frames B, the plates and spacing-washers being supported and traveling upon side bars C C by means of lugs *a* and *b* on the plates and washers, respectively. The aggregation of plates and washers is included between the fixed head D, through which the oil or other liquid is admitted under pressure to the bore of the plates from the pipe *d*, and the movable head or ram E, which travels on the bars *c c* and also on bars *e e*, and is operated by the piston of a hydraulic cylinder F to "set up" the aggregation of plates and washers with the proper pressure. Each plate A is made up of three metal sections or plates *x y z* having central apertures. The center one *y* has the lugs *a* and the two other ones *x z* are perforated and riveted thereto, as shown at *r*. The three sections are inclosed in filtering-cloth cut and sewed or riveted to completely inclose them, except the supporting-lugs, and having a central aperture corresponding with the apertures in the sections of the plates, so that the aggregation of plates has a bore *h* extending through it, as clearly seen in Fig. 1. Generally speaking, this construction is old. It is necessary to provide chambers between adjoining plates for the collection of wax in filtering oil, and this has been done heretofore in pressure-filters of the general character shown by forming an annular flange around the edges of the outside plate-sections *x y*. Where the plates have been made of disks inclosed in cloth by providing an annular flange or rim between the outer edge of the outside plate-sections *x y* and the enveloping filtering-cloth to form the wax-deposit chamber, this is objectionable, because the flange or rim being inside the filtering-cloth the pressure of the wax or solid matter upon the cloth at the edges of the flanges is liable to rupture the cloth. Since the cloth must have slack enough to conform to the wax-chamber when the chambers are filled and the plates are separated the wax or solid matter is liable to adhere to the cloth and drag it out from the faces of the plates. The breakage of a flange also involves the destruction of an entire plate. All these objections we overcome by making the outer sections or layers of the plates flat, enveloping the plates, as described, in the filtering-cloth, and then arranging spacing-washers D between the flat cloth-surfaces of adjoining plates. In this way wax-chambers are formed of any desired width, and the cloth lying flat against the face of the plate-sections is not liable to be torn or ruptured, either in the operation of filtering or the discharging of the press. To the inside of the cloth covers around the edges of each plate *x z* a cloth gasket or layer of fibrous material *g* of any suitable thickness is sewed. This further increases the width of the wax-chamber, gives a filtering-joint of greater thickness or capacity, and serves to keep the cloth off the sides of the plates more or less. On the outside of the cloth on each side of the plates and symmetrically disposed about the center, are riveted hubs or blocks K of compressed fiber or other suitable material of such thickness that when the filter is set up by press-

ure they abut against each other and hold the plates against warping or twisting. These hubs are made slightly tapering, as shown, to facilitate the removal of the wax cake, as presently described. Heretofore it has been customary to place the hubs upon the perforated plate; but we deem such an arrangement objectionable, because the cloth is liable to be torn if any considerable pressure is used, and the cloth being held away from the perforated plates by the hubs, the capacity of the wax-chamber is somewhat reduced. Square plates and spacing-washers have been shown. Of course they could be round; but we prefer to make them square, as there is less waste of material and the press has a greater capacity.

The plates and washers having been pressed together with sufficient force to form close joints, oil under pressure is admitted through the pipe *d* and is distributed to all the wax-chambers. The oil finds its way out at the joints between the plates and washers, and also passes through the area of filtering-cloth covers inside the washers and through the perforated plates to the solid plates, along which it passes to the edges of the plates, where it is discharged into a suitable receptacle or trough arranged beneath the press; but the paraffine-wax is retained by the filtering-cloth and remains in the chambers *i*. To remove the wax, the oil is shut off, and the pressure-head E being retracted, the plates and washers are separated and the cakes of wax removed. To facilitate the removal of the wax cake from the washer, the washer is beveled or chamfered upon its inner edges, as shown, and for the same reason the hubs K are tapered, as above mentioned.

To entirely free the wax and press from oil before removing the wax, we employ the following method: When the press becomes full of wax, more or less of oil remains in the cloths and between the solid and perforated plates, being held by capillary attraction, and is very slow to drip out. To discharge this oil, we disconnect the pipe *d* from the oil-supply and connect it with an air-compressor and maintain a pressure of, say, two hundred pounds on all parts of the press. This forces out all the oil from the wax and cloth and from between the disks or sections of the plates. The oil receiver or receptacle under the press being then cleared of oil, the press is open and the wax discharged into it.

We are aware of German Patent No. 9,907 of 1878, and of United States Patent to Laudry, No. 265,104, of September 26, 1882. The German patent shows independently-removable spacing-washers, and the Laudry patent shows filter-plates having beveled washers secured to the plates by the filtering-cloth.

We claim—

1. The combination of the sections of the filter-plates, the filtering-cloth cover, and the cloth or fibrous gasket *g*, substantially as set forth.

2. The combination of the sections of the filter-plates, the filtering-cloth covers, the cloth or fibrous gaskets *g* on the insides of the covers, and the independent spacing-washers arranged between the plates, substantially as set forth.

3. The combination, with the plates and filtering-covers, of the hubs secured upon the outside of said covers.

4. The combination, with the plates and filtering-cloth covers, of the tapering hubs secured upon the outside of said covers.

5. The combination, substantially as set forth, with the plates, filtering-cloth covers, and separate spacing-washers, of the abutting hubs located between the plates outside of the cloth-covers and within the spacing-washers, for the purpose specified.

In testimony whereof we have hereunto subscribed our names.

PHILANDER R. GRAY.
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Witnesses:
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