

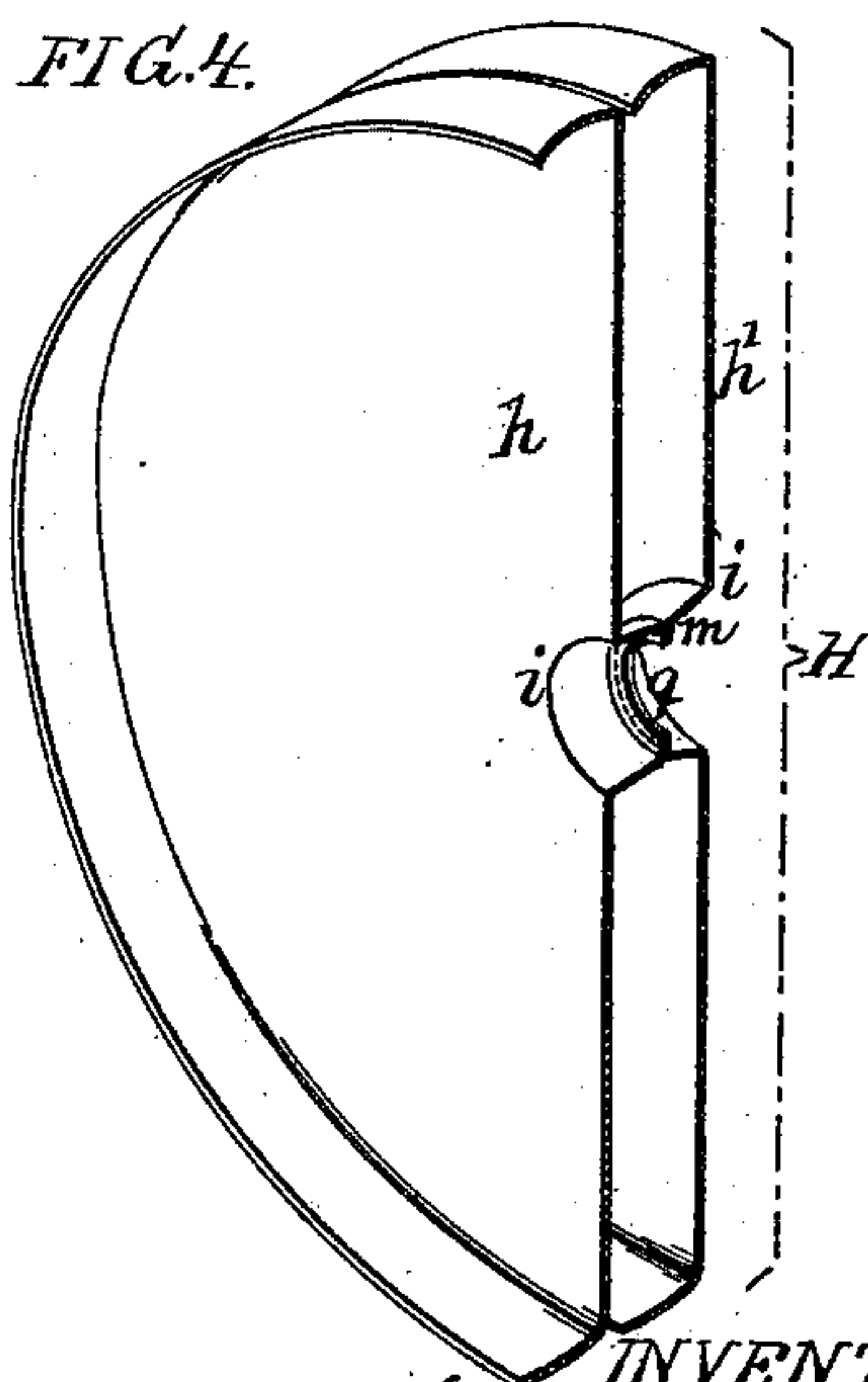
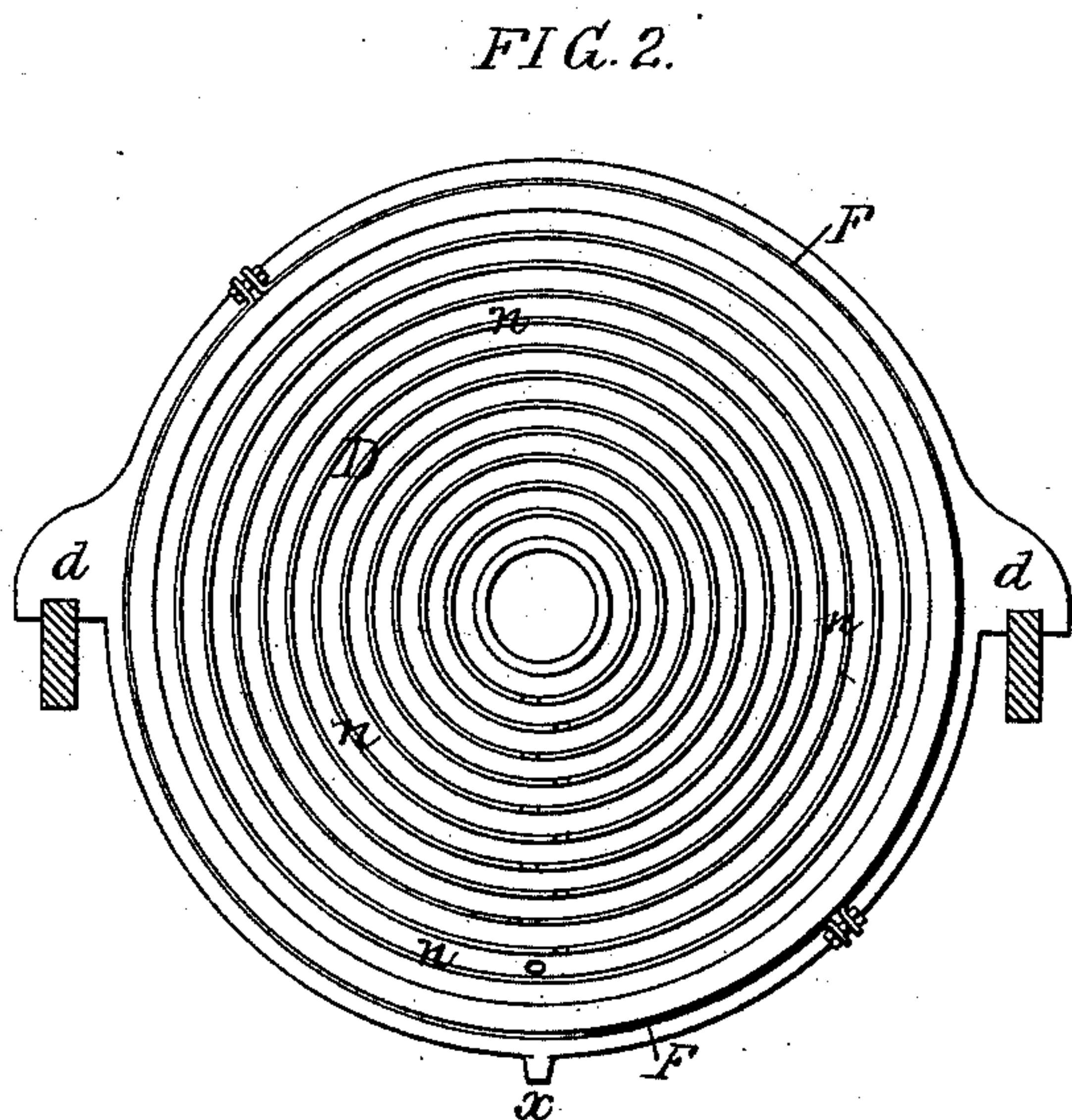
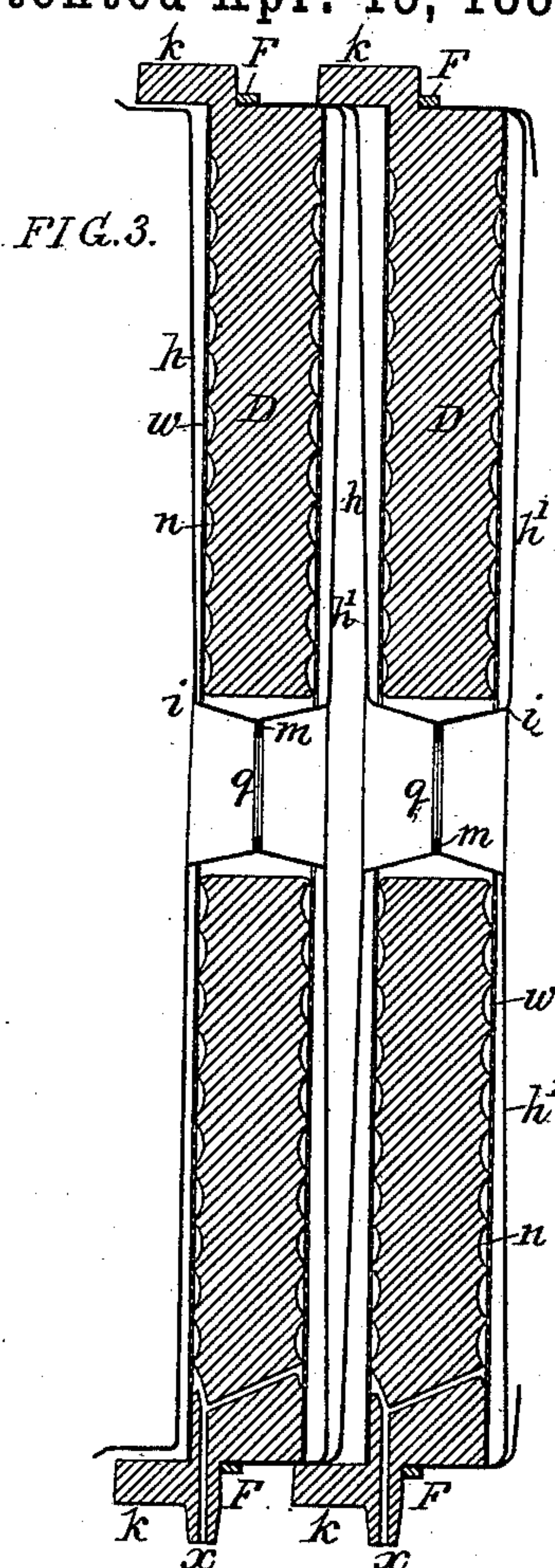
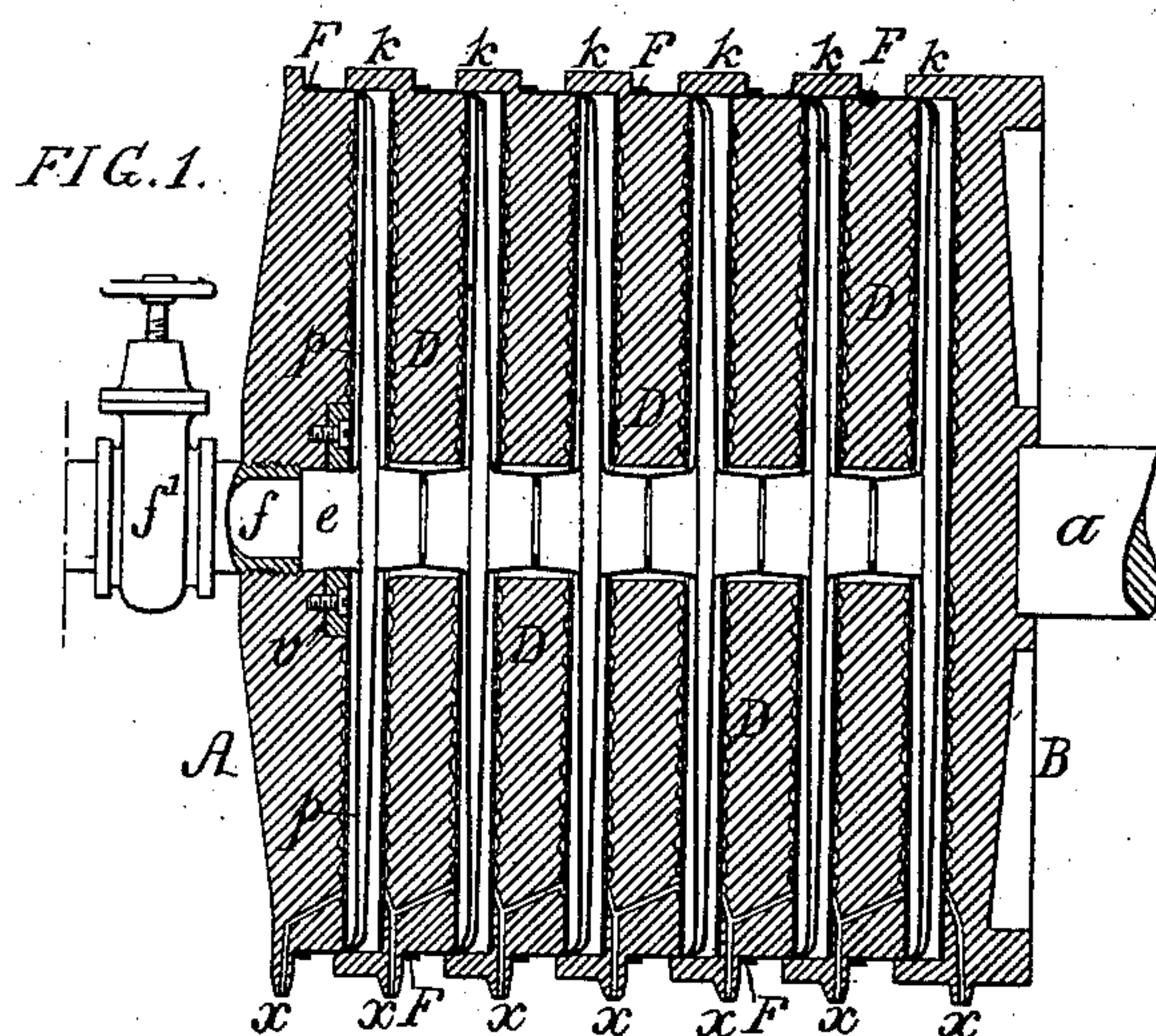
(No Model.)

H. WARDEN.

FILTER PRESS.

No. 297,042.

Patented Apr. 15, 1884.



WITNESSES:

James F. Tobin
Harry L. Ashenfelter

INVENTOR:

Henry Warden,
by his Attorneys
Howson & Sons

UNITED STATES PATENT OFFICE.

HENRY WARDEN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE ATLANTIC REFINING COMPANY, OF SAME PLACE.

FILTER-PRESS.

SPECIFICATION forming part of Letters Patent No. 297,042, dated April 15, 1884.

Application filed May 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, HENRY WARDEN, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Filter-Presses, of which the following is a specification.

My invention consists of a filtering-press constructed in the peculiar manner too fully described hereinafter to need preliminary explanation, the main object of my invention being to separate solid matter from liquids by compressing supply after supply of the latter between filtering-surfaces, thereby depositing layer after layer of solid matter in succession between said surfaces, one layer succeeding and being incorporated with preceding layers until a comparatively solid cake is produced.

In the accompanying drawings, Figure 1 is a vertical section of a filtering-press made according to my invention; Fig. 2, a transverse section, showing the face of one of the grooved plates of the press and appliances connected therewith; Fig. 3, part of Fig. 1 drawn to an enlarged scale, and Fig. 4 a sectional perspective view of one of the filtering-bags.

A and B are the two end plates of the press, the former being the fixed or abutment plate and the latter the movable plate, to which pressure is applied by any available mechanism, preferably by an ordinary hydraulic press, of which *a* is a portion of the ram or plunger.

It has not been deemed necessary to illustrate the frame-work of the press, as this may be varied in construction; but I have shown in Fig. 2 the tension-bars which form parts of the frame-work.

Between the two end plates, A and B, are a number of intermediate plates, D—five in the present instance—each of these plates, as well as the end plate B, being provided with opposite lugs, *d d*, having notches adapted to the tension-bars, so that the said plates can be moved to and fro when relieved from pressure.

In the inner face of each of the end plates, A and B, and in both faces of each intermediate plate, is a series of concentric annular grooves, *n*, which communicate with each other through notches made in the ribs between the grooves at the points indicated in Fig. 2, the outermost groove communicating through passages with an outlet, *x*, as best observed in

Fig. 3. The end plate A has a central opening, *e*, communicating with a pipe, *f*, for admitting the liquid to the press, the pipe being furnished with a suitable valve or cock, *f'*. Each of the central plates, D, has also a central opening. A perforated plate, *w*, which also has an opening in the center, is applied to the inner grooved face of each of the end plates, A and B, and a similar perforated plate to each of the grooved faces of each intermediate plate, D, each of the said perforated plates having a central opening, excepting it be that applied to the end plate B.

Each of the filtering-bags H used in connection with the above-described plates consists of two disks, *h h'*, of filtering fabric, the said disks being bent abruptly near the middle at *i*, and being united by an annular seam, *m*, so as to leave a central opening, *q*. Each of the plates D has an annular flange, *k*, projecting laterally beyond one grooved face of the plate and diametrically beyond the periphery of the plate, so that the flange of one plate will overlap the periphery of the adjoining plate. The periphery of the end or abutment plate A is in like manner overlapped by a flange, *k*, of the first intermediate plate, D, of the series, and the end plate B has a flange overlapping the periphery of the last intermediate plate of the series. There are two disks of filtering fabric between two adjoining intermediate plates, D, and these two disks are folded at and near their outer edges over the periphery of one of the disks, and both folded ends of the disks are overlapped by the flange of the adjoining disk, the internal diameter of the flange being such in respect to that of the periphery of the disk that the former can slide freely over the two folds of the fabric when pressure is applied to the end plate B.

The folded ends of each pair of filtering-disks are secured to the periphery of one of the plates, preferably by a two-part clamping-band, F, which is provided with lugs and bolts, so that on tightening the latter the band will be contracted, and will thus secure the folded ends of the filtering-disks. The band, however, should be of such a width compared with that of the periphery of the plate to which it is secured that the flange *k* of the adjoining disk will not be in contact with the

band when the said plate is brought into as close contact with the adjoining disk as the intervening filtering-disks and perforated plates will permit; or the band may be as wide 5 as the disk and the clamp only contracted, the flange k in this case sliding on the band. It will be seen that there is one intermediate plate between the two disks h h' of each bag, so that the disk h of one bag and the disk h' of the next bag are between two adjoining plates, 10 and these two filtering-disks are secured to the periphery of one of the plates in the manner described.

In addition to the bags, it is necessary, in 15 completing the filtering apparatus, to secure a separate filtering-disk, p , to the grooved face of the plate A, which may be done by a ring, v , for confining the disk to the middle of the plate round the central opening, the outer edge of 20 the disk, together with the disk h of the first bag, being confined to the periphery of the said end plate A. In like manner a filtering-disk is interposed between the end plate B and the disk h' of the last bag of the series, and the 25 two disks are confined to the last intermediate plate of the series. It will now be seen that a press having two end plates, A and B, and five intermediate plates has six communicating chambers bounded by filtering fabric for 30 the reception of oil.

In operating the apparatus the several plates are adjusted as far apart as possible without permitting the flange of one plate to escape from the periphery of the adjoining plate. The sev- 35 eral filtering-chambers having been filled with the liquid, which we will suppose to be paraffine-oil, the supply is cut off, and pressure is applied to the end plate B until the several plates sliding on each other are brought so 40 close together that nothing remains between them excepting the two perforated plates, two

filtering-disks, and a thin layer or film of paraffine, the oil having been forced from the chambers into the grooves of the plates, and thence 45 through the outlets. After this the plates are again moved apart from each other and a new supply of oil admitted to the filtering-chambers, preparatory to another application of pressure and the addition of another layer of paraffine to that previously contained in each 50 chamber, and these operations are continued until there is a solid thick cake of paraffine in each chamber, when the confining-bands are removed and the plates moved so far apart that the filtering-disks can be separated and the 55 cake of paraffine removed from between them by suitable instruments. Good merchantable paraffine can thus be produced in the form of a cake composed of a succession of layers, whereas two filtrations at least are 60 necessary in operating an ordinary filtering-press—that is to say, the paraffine obtained by one filtration must, after it is withdrawn from the press, be subjected to a second filtration before it is in a merchantable condition. 65

I claim as my invention and desire to secure by Letters Patent—

The combination, in a filtering-press, of a series of grooved plates, one plate having a flange overlapping the periphery of the ad- 70 joining plate, with filtering-disks folded at and near their outer edges over the periphery of one plate and attached thereto, all substantially as set forth.

In testimony whereof I have signed my name 75 to this specification in the presence of two subscribing witnesses.

HENRY WARDEN.

Witnesses:

HARRY L. ASHENFELTER,
HARRY SMITH.