No. 768,094. PATENTED AUG. 23, 1904.

R. B. TURNER, DEC'D.

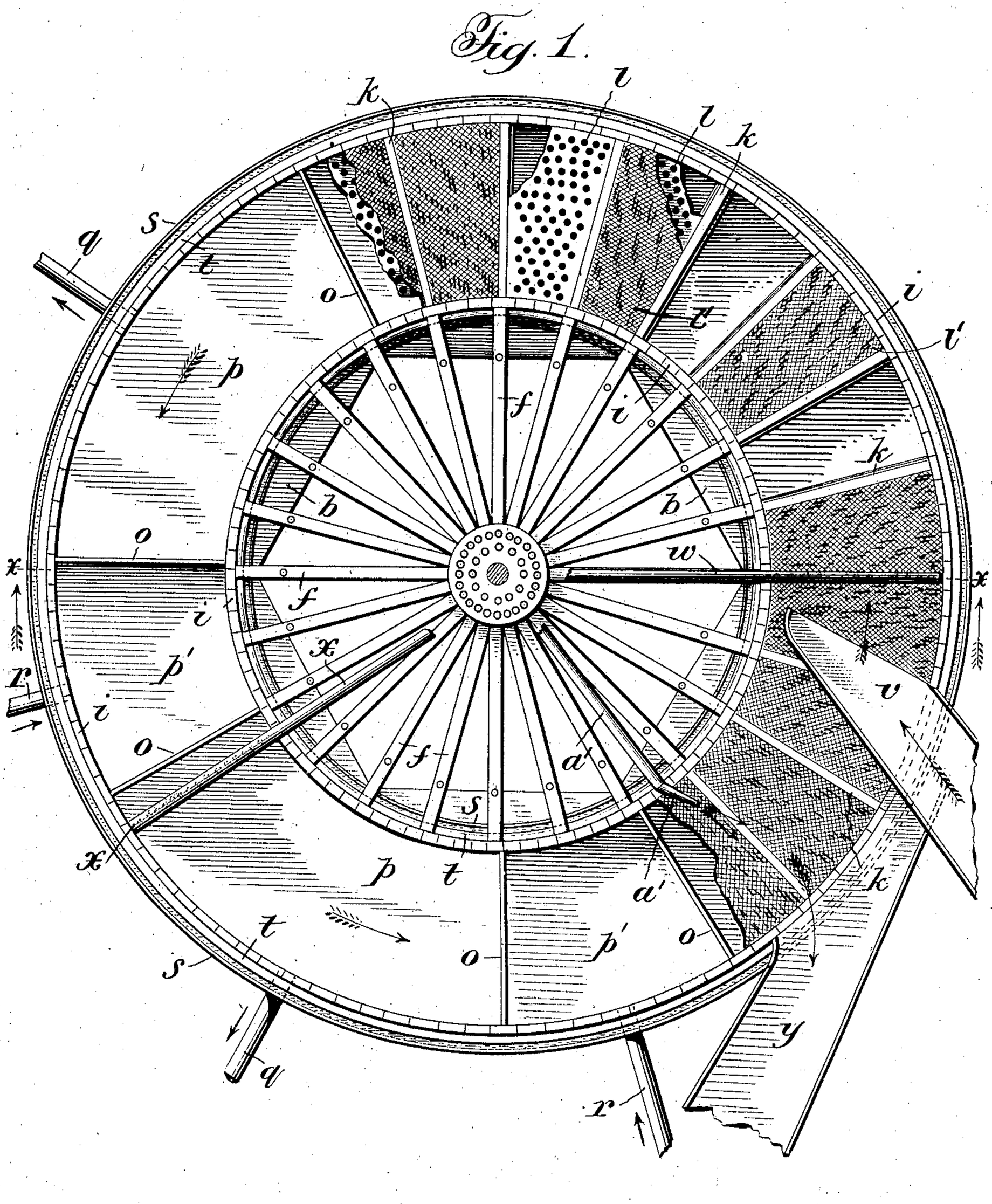
L. S. TURNER, ADMINISTRATRIX.

FILTERING APPARATUS.

APPLICATION FILED FEB. 8, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

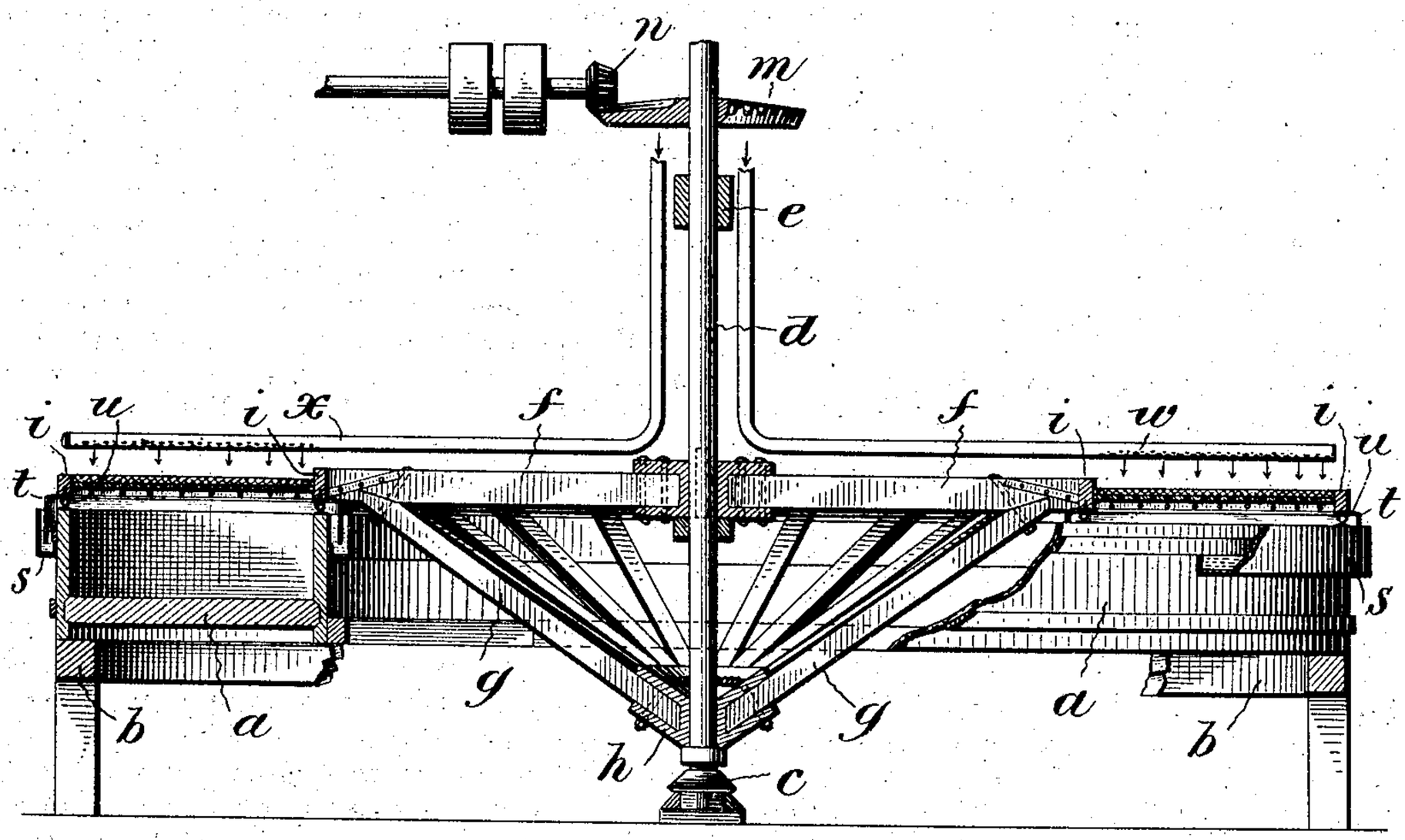
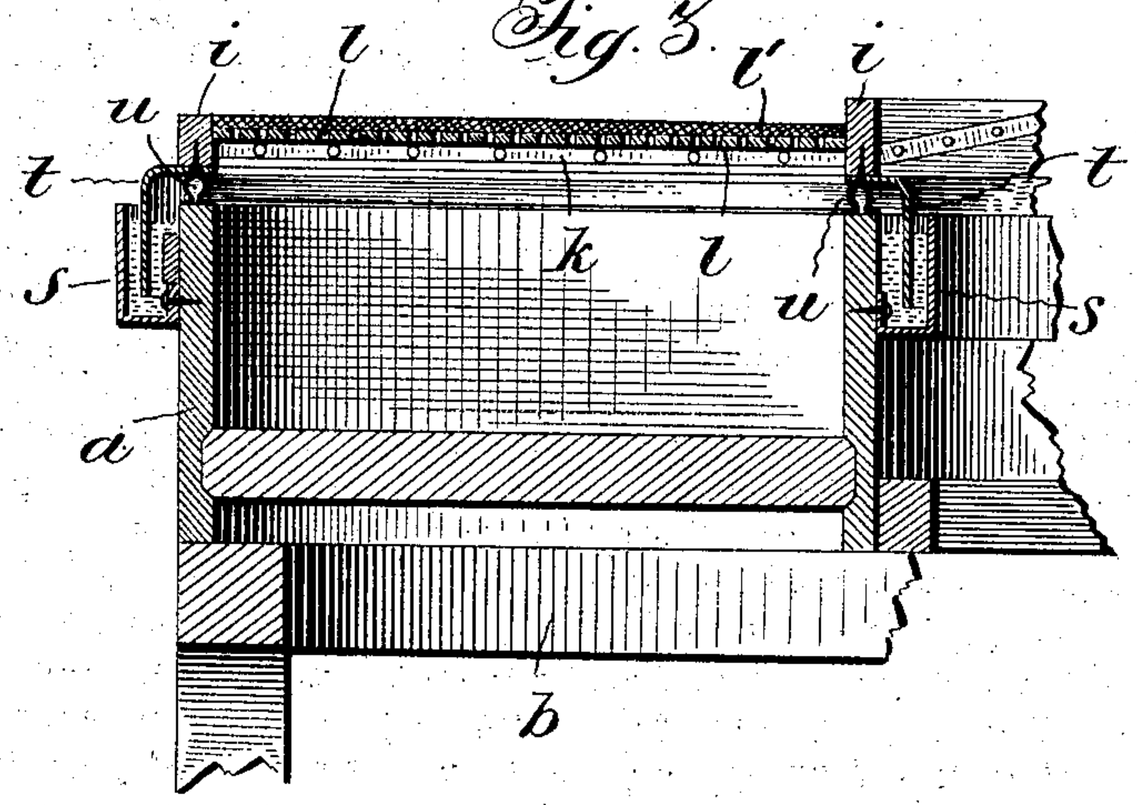


Fig. 3.



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No. 768,094. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

LILLIAN STELLA TURNER, OF VIRGINIA CITY, MONTANA, ADMINISTRATRIX OF ROBERT B. TURNER, DECEASED.

FILTERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 768,094, dated August 23, 1904.

Application filed February 8, 1904. Serial No. 192,619. (No model.)

To all whom it may concern:

Be it known that ROBERT B. TURNER, now deceased, late a citizen of the United States, residing at Virginia City, in the county of Madison and State of Montana, did invent certain new and useful Improvements in Filtering Apparatus for Continuously Separating Metals from Pulverulent Ores; and the following is hereby declared to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of the invention is to provide an apparatus whereby the separation of gold, silver, and other metals from tailings, slimes, pug, or other pulverulent form of ores may be conducted continuously and without interruption in contradistinction to the usual plan where settling-tanks are employed and where the separation is unnecessarily intermittent.

The essential features of the invention consist in making the filter-floor in the form of a ring or annulus, whereby an endless floor is obtained, and in moving this annular floor continuously above a correspondingly-shaped stationary trough, which is divided into chambers that are alternately vacuum and compression chambers, air-tight joints being maintained at the edges of the trough, so that the material on the floor may be alternately subjected to the action of suction and blast as it passes above the different trough-chambers.

Specifically, the invention consists in the construction hereinafter described and claimed, and illustrated in the accompanying drawings, forming part of the specification.

In the drawings, Figure 1 is a plan view of the entire apparatus, parts of the filter-floor being broken away so as to show the manner of forming the filter-surface. Fig. 2 is a vertical diametric section of the apparatus on the line *x x* of Fig. 1; and Fig. 3 is an enlarged detail in section, intended to show more clearly the construction of the filter-floor and the air-tight joints between it and the stationary trough.

Referring to the views, *a* denotes an annular trough which is erected upon a suitable stationary frame *b*. This trough may be of any suitable dimensions as to length, breadth, and depth, and the framework may be of any suitable height. On a bearing *c* in the center of the annulus formed by the trough and framework a vertical shaft *d* is stepped, suitable upper bearings *e* being provided to steady and support the shaft. Projecting horizontally from the shaft slightly above the level of the trough is a series of radial arms *f*, these arms being braced and supported from the lower end of the shaft by braces *g*, extending diagonally upward and outward from a casting *h*, just above the stepped bearing *c*, to a point near the outer ends of the radial arms, where they are securely fastened. The framework formed by the arms *f* and *g* carries a flat shallow annular filter-floor corresponding in width to the stationary trough *a*. This floor is formed by rings *i i*, that are connected together by small radial sills *k*, that are preferably located so as to form extensions of the radial arms *f* of the floor-supporting frame. Between these rings and supported by the sills *k* are perforated metal plates *l*, and above the plates there is a covering of burlap, canvas, or other fibrous or textile material *l'*, forming a continuous unbroken surface throughout the length and width of the floor.

The floor is supported and carried by the shaft *d* through the intermediacy of the arms *f* and *g*, and the shaft is provided with gearing *m n* for driving it, so that in the operation of the apparatus the filter-floor travels continuously above the trough.

As best indicated in Fig. 1, the trough is divided by transverse partitions *o* into separate chambers, of which those denoted *p* are exhaust-chambers, being connected by pipes *q* with suitable apparatus for exhausting the air, and those denoted *p'* are compression-chambers, being connected by pipes *r* with suitable air-blast apparatus. As here shown, there are two exhaust-chambers and two blasts or compression-chambers; but the invention is not limited to any particular number of these chambers, and the trough will be divided up into such number and size of chambers as experience shows that the material to be operated upon requires.

As will be understood from the drawings, the trough *a* is open at the top except for the cover formed by the overlying moving filter-floor. The weight of this floor is mainly carried by the rotating supporting-frame, already described; but as the successful operation of the apparatus requires the maintenance of air-tight joints between the trough and the floor liquid-holding gutters *s* are secured to the inner and outer sides of the trough near its upper edges, and the rings *i* of the filter-floor are provided with flanges *t*, which project laterally and then downwardly below the liquid in the gutters, so as to form a seal or air-tight joint between the filter-floor and the trough, notwithstanding the fact that the floor travels above the trough during the operation of the apparatus.

In order to support yieldingly whatever portion of the weight of the moving floor that may rest upon the trough, as well as to more effectually seal the joint between the trough and the floor, the upper edges of the trough are provided with rubber packing *u*, preferably in the form of hollow rings or tubes, as best shown in Fig. 3. The rings *i* of the filter-floor rest lightly upon this packing, thereby reducing the friction between the floor and the trough in addition to performing the other functions above described.

In the operation of the apparatus the shaft is rotated, so that the floor travels continuously above the trough in the direction of the arrows shown in Fig. 1. The slimes, tailings, or other pulverized material to be operated upon are delivered upon the floor in a continuous film or layer by the feed-chute *v* and are immediately sprayed with a strong leaching solvent from the pipe *w*, located above the floor adjacent to the end of the chute. As the floor travels the wet material is carried around with it, the water percolating through the porous floor until the first vacuum or exhaust chamber is reached, when the suction in the chamber draws the leaching solvent through the fibrous floor into the vacuum-chamber. As the floor moves on, the material passes over the first compression-chamber *p'*, where the outward blast through the floor relieves the fibrous covering of such particles of fine ore as have lodged in its meshes. The air also reoxidizes the ore at this point and tends to separate the particles. The continued movement of the floor carries the material over the second vacuum-chamber *p*, and at this point a weak solution is sprayed upon the ore from an overhead pipe *x* for the purpose of washing it and further removing valuable products. This compression-chamber is of sufficient length to permit the washing solution to be immediately drawn through the layer of ore into the chamber, and the ore then passes above the last compression-chamber *p'*, where a blast of air is again forced upward through it, so as to further free the fibrous surface of the filter-floor from any remaining fine particles of ore that may have lodged therein. At this point in the circumference of the trough and the floor, and preferably between the last compression-chamber and the feed-chute, there is located a discharge-chute *y*, which takes the material from the floor and conducts it away to any convenient point.

For the purpose of facilitating the discharge of the material from the moving floor into the chute *y* there is arranged a pipe *a'* with its end directed outward across the filter-floor from the inner side toward the mouth of the discharge-chute, so that the material the treatment of which has been concluded when it reaches this point may be forced off the floor and the surface of the filter washed clean, ready for the reception of new material as it passes under the mouth of the feed-chute.

Such being the construction and operation of the apparatus it is to be noted that any suitable devices may be employed for maintaining the suction and blast in the respective vacuum and compression chambers.

It is also to be noted that though the preferred operation completes the treatment of the material during one revolution of the moving floor, if the ores are particularly refractory it is entirely feasible to retain them on the floor until the latter has made a sufficient number of revolutions.

Having thus described the invention of Robert B. Turner, what is claimed, and desired to be secured by Letters Patent, is—

1. In a filtering apparatus, the combination of a stationary annular trough divided into compression and vacuum chambers, a rotating frame carrying an endless annular filter-floor traveling above the chambers, and air-tight joints between the floor-frame and the trough.

2. In a filtering apparatus, the combination of a stationary, annular trough, a rotating frame carrying an endless, annular filter-floor above the trough, liquid-holding gutters around the trough, and flanges depending from the floor-frame into the liquid.

3. In a filtering apparatus, the combination of a stationary trough, a rotating frame carrying an endless, annular filter-floor above the trough, and rubber packing between the upper edges of the trough and the floor-frame.

4. In a filtering apparatus, the combination of a stationary, annular trough, a rotating frame carrying an endless, annular, filter-floor traveling above the trough, a feed-chute delivering material upon the floor at one point, a discharge-chute for conveying the material from the floor at another point, and a water-jet delivering across the floor toward the discharge-chute.

5. In a filtering apparatus, the combination of a stationary, annular trough, divided into compression and vacuum chambers, a rotating frame carrying an endless, annular filter-

floor traveling above the trough, a feed-chute delivering material upon the floor at one point, a pipe for spraying solution upon the material adjacent to the feed-chute, exhaust and blast pipes communicating with the vacuum and compression chambers, respectively, and a pipe over one of the exhaust-chambers whereby the material is sprayed with weak solution.

In testimony whereof I affix my signature in presence of two witnesses.

LILLIAN STELLA TURNER,
Administratrix of the estate of Robert B. Turner, deceased.

Witnesses:
PETER KOCH,
LESTER S. WILLSON.