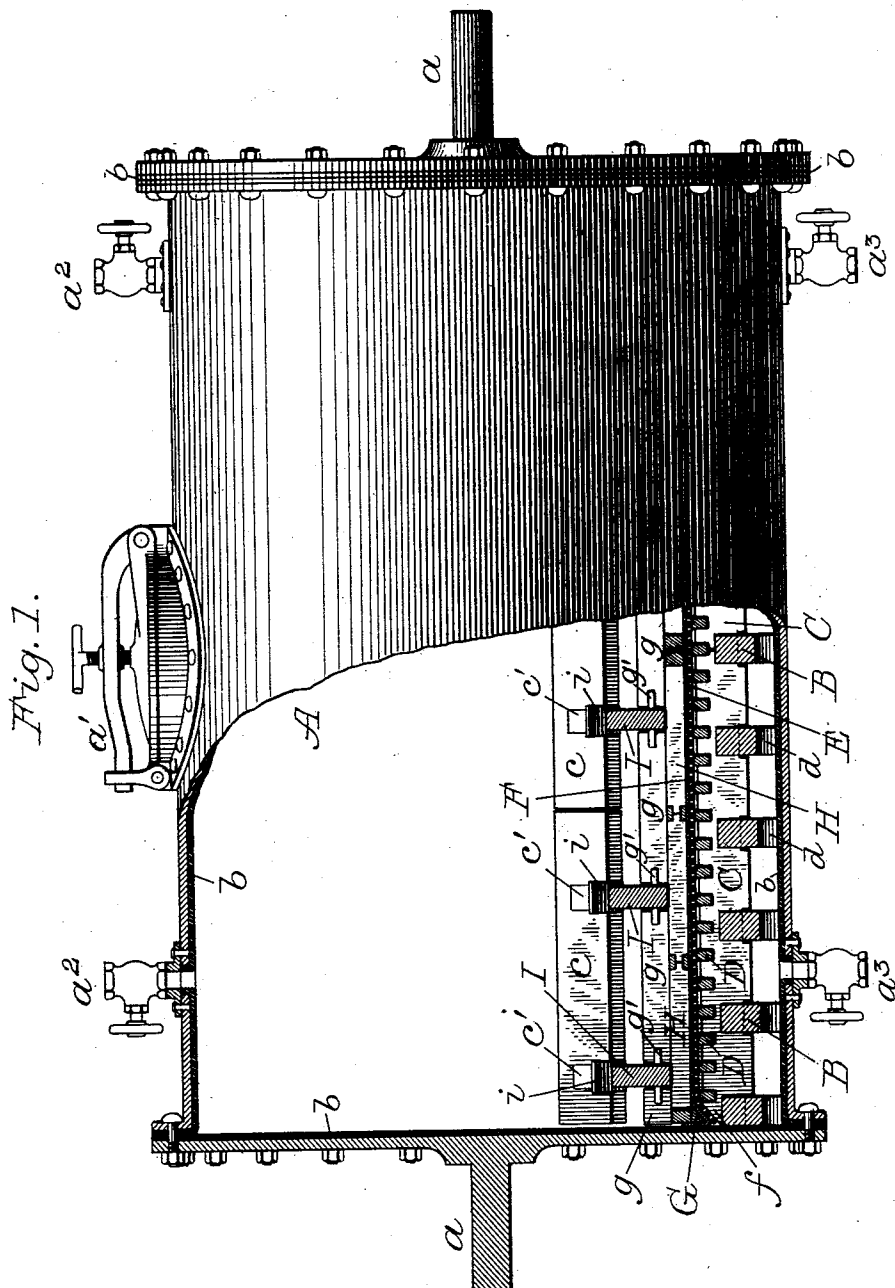


2 Sheets—Sheet 1.

No. 587,874.

Patented Aug. 10, 1897.



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(No Model.)

2 Sheets—Sheet 2.

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BARREL FILTER.

No. 587,874.

Patented Aug. 10, 1897.

Fig. 2.

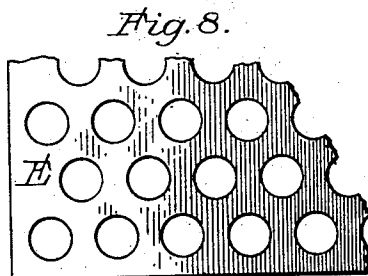
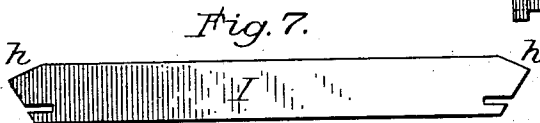
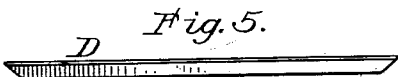
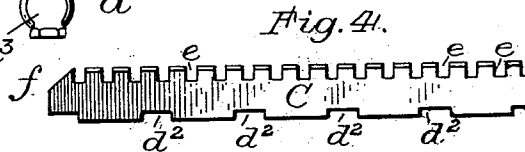
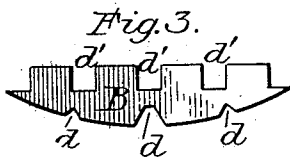
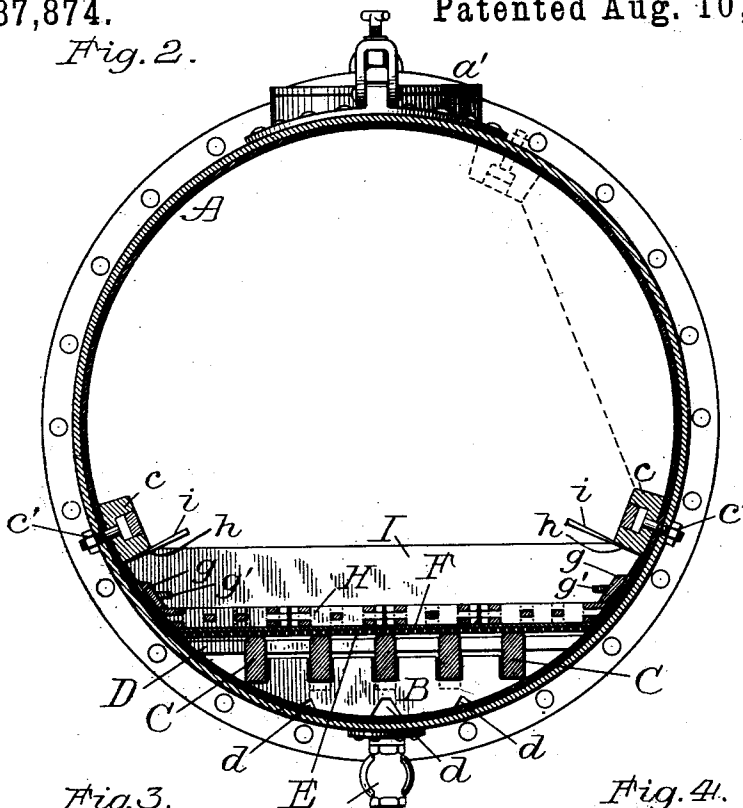
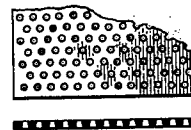


Fig. 10.



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UNITED STATES PATENT OFFICE.

EDWARD D. SLOAN, OF GILLETT, COLORADO, ASSIGNOR OF ONE-HALF TO
EDWIN N. HAWKINS, OF SAME PLACE.

BARREL-FILTER.

SPECIFICATION forming part of Letters Patent No. 587,874, dated August 10, 1897.

Application filed November 7, 1896. Serial No. 611,345. (No model.)

To all whom it may concern:

Be it known that I, EDWARD D. SLOAN, a citizen of the United States, residing in Gillett, in the county of El Paso and State of Colorado, have invented certain new and useful Improvements in Barrel-Filters for Use in the Filtration of Precious-Metal Solutions, as in the Chlorination Process; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of my invention.

The object of my improvement is to provide a suitable filter-barrel with a durable and highly-effective filter at comparatively low cost. With a view to securing the desired ends the usual trunnioned iron barrel is lined with lead. The framing of the filter-bed is composed wholly of suitable wood capable of fairly resisting the action of chlorin and acids and which may be filled with suitable matter to enable it to better resist the destructive action of the corrosive solutions. The filtering medium is composed of material which resists the solutions, is well protected against undue abrasion due to the action of the solid matter during the rotation of the barrel, and it has its filtering area supported to enable it to safely bear the overlying contents of the barrel by an underlying floor of such metal as will practically resist the action of chlorin and sulfuric acid—as, for instance, a lead floor—and the latter is freely perforated to admit of the prompt discharge of the filtered liquid. The filtering-surfaces are flat, and hence the body of any woven filtering medium is maintained in a condition more favorable to the passage of the liquids than would be the case if it occupied a curved line and said surfaces were concave in conformity with the interior contour of the barrel. The framing of the filter-bed involves inexpensive straight work as distinguished from the curved or segmental work in framing, which is made to conform to the interior of the barrel, as heretofore, and the filter-framing is constructed in parts which are so interlocked as to secure rigidity, but which may be readily applied to or removed from the barrel by way of the usual manhole and without deranging the lead lining or the means

by which the lining is clamped to the barrel.

My said improvements in their best form are illustrated in the annexed drawings, in which—

Figure 1 illustrates one of my barrel-filters partly in side view and partly in longitudinal central section. Fig. 2 illustrates the same in lateral section. Figs. 3, 4, 5, 6, and 7 illustrate portions of the bed-framing, these being, respectively, one of the bed-beams, one of the longitudinal stringers, one of the lateral filter-floor supports, one of the grating-sections which overlies the filtering medium, and one of the clamping or tie beams which overlie the grating. Fig. 8 illustrates, in top view, a portion of the perforated-metal floor which underlies the filtering medium. Fig. 9 illustrates, in edge view, a filtering medium composed of lead wire. Fig. 10 illustrates properly-perforated sheet-lead which may be used as a filtering medium.

The barrel A is preferably from four to five feet in diameter and from eight to ten feet long, (or much larger if desired,) and it is, as usual, an iron cylinder provided with trunnions *a* and mounted in a suitable frame and provided with gearing (not shown) by which rotative power may be applied. It has also the usual manhole *a'*, one or more induction pipes and cocks, as at *a''*, at which detachable pipe connections may be made for enabling liquid under pressure to be delivered to the barrel at its upper side when at rest, and one or more induction pipes and cocks below the filter at *a'''* for the simultaneous discharge of the filtered solution by way of other detachable pipe connections. This barrel is, however, provided with a heavy lead lining *b* for protecting the iron from acids, this lining being firmly clamped to the barrel at the two sides by a series of longitudinal wooden bars *c c*, &c., which are secured by bolts *c' c'*, &c., which pass through the side of the barrel and have their nuts on the outer side. Each bolt is preferably covered with lead and its head is well housed within its bar by means of a mortise, which may be filled with suitable waxy cement, which, with the tightly-strained nuts, will guard against leakage adjacent to the bolts. These bars *c* are practically permanent and

need never be loosened or disturbed, except when new ones are needed or for the renewal of the lead lining. The interior surfaces of the heads of the barrel are also protected with lead, the joints with the cylindrical lead being closed either by clamping flanged portions of the main lead lining between the lead-lined heads and the ends of the barrel or by fused lead in a manner well known.

All of the filter-bed framing is composed of wood, preferably hickory, and while such material is capable of long resisting the action of the acids, &c., it will be advisable to have the several parts first thoroughly dried and then immersed in linseed-oil or in a solution of waxy matter, such as paraffin, which will penetrate and fill the pores of the wood and contribute to its durability.

The several bed-beams B are each straight on top, but their lower edges conform to the lead lining, although cut away to afford ports, as at *d d d*, enabling free flowage of liquid beneath them, and their top edges are mortised, as at *d'*.

The several longitudinal stringers C are each in two straight pieces, end to end, mortised at their lower edges at *d'* for receiving the bed-beams and registering with their mortises *d'*, so that they interlock, and the stringers serve as space-blocks for the bed-beams, and the latter in like manner for the stringers. The stringer-pieces are also mortised at their top edges, as at *e*, and at its outer end each stringer is beveled, as at *f*, to afford a clamping-seat for the ends of the filtering medium and lead floor, as will be hereinafter described.

The several filter-floor supports D are each straight pieces, and each occupies its appropriate mortises *e* in the stringers C, and its ends are beveled in general conformity to the interior surface of the barrel. The top surfaces of these supports and of the stringers are flush, and their upper corners are beveled, so as to obviate undue contact with the overlying lead floor E.

The lead floor E is regularly perforated in zigzag rows, as shown in Fig. 8, the holes being preferably from four to five sixteenths of an inch in diameter and one-half inch from center to center, thus securing ample support by the lead, and an extensive capacity for the discharge of the filtered liquid from the filtering medium F. Along the side edges the lead floor is in tight engagement with the lead lining of the barrel, and at the ends its edges are bent downward upon the beveled seats *f* at the ends of the stringers C and into contact with the heads of the barrel.

The filter-cloth F in its best form is composed of finely-woven lead wire, Fig. 9, but the fabric commercially known as "asbestos cloth" and still other varieties of suitable sheeted material may be employed in connection with the lead floor and framing without departure from my invention. The filter-cloth is laid flatly on the perforated lead floor,

and it is larger than it, so that at the sides the cloth may extend liberally upward against the lining of the barrel and its ends extended downwardly over the bent ends of the lead floor, and thence upwardly against the heads of the barrel, so that these ends may be firmly clamped by overlying lateral clamping-bars G, which are angular in cross-section and operate as wedges in response to pressure applied at their upper surfaces. The filter-cloth, whether of woven lead-wire or asbestos, lying flatly, maintains its normal filtering capacity instead of being compacted on top, as it would be if supported upon a curved bed.

Overlying the filter-cloth is a wooden grating H, constructed in eight sections or parts in detachable pieces or of such dimensions that each section may be readily passed through the manhole of the barrel. Each section is composed of longitudinal slats spaced by appropriate cross-slats, affording intervening open spaces which are quite small in width, but long lengthwise of the barrel, so that during the necessary rotation of the barrel prior to the filtering operation the surface of the filtering-cloth is not exposed to undue abrasion by the solid matter as it travels across the bed. The outer longitudinal slats of the outer sections of the grating have their edges so conforming to the lining of the barrel that the intervening upwardly-turned sides of the filter-cloth are snugly confined and afford a joint which excludes the passage of solid granular matter.

Overlying the grating there are several lateral tie-bars I, appropriately spaced at their ends by means of intervening space-blocks *g*, which are locked in place by keys *g'*, occupying mortise-seats cut laterally through the tie-bars. Each tie-bar at its ends has a lower bevel, which generally conforms to the interior of the barrel, and also an upper bevel *h*, which is so shaped with reference to the under surface of the adjacent permanently-bolted bar *c* as to afford a seat for a wedge *i*, so that by means of two of such wedges each tie-bar is firmly clamped in position, thus solidly binding all of the underlying parts together and securing them against displacement during the rotation of the barrel and closing the portion of the barrel below the lead floor against the passage of liquid from above except by percolation through the filter-cloth.

It will be seen that after the removal of the wedges *i*, the keys *g'*, and the space-blocks *g* each tie-bar I may be swung away from beneath the permanently-fixed bars *c*, thus providing for the ready renewal of any or all of the parts if need be, each of said parts being of such dimensions that it may be readily passed through the manhole. The lead floor may be in any desired number of pieces, but if in one piece and coiled widthwise it may be passed through the manhole. Although the several fixed bars *c* serve as permanent binders for the lead lining of the barrel, they also serve as wedging-abutments with rela-

tion to the entire filter-bed, and hence should no lining be employed the same or any other form of fixed abutment could be relied upon.

The flat arrangement of the filter and its bed, as compared with the usual concave arrangement, is more conducive to effective tumbling of the contents of the barrel during its rotation preparatory to filtering, and, if desired, a second filter-bed may be employed in the same barrel, as indicated in dotted lines in Fig. 2, in which case while either filter is in service the other may have its cloth well cleared by the induction of water by way of its pipe connection simultaneously with the induction at the regular top connection at a^2 during the discharge from the filter then in service. Two of such beds in one barrel would occupy considerable space, but any desirable charging-space would only involve the use of a barrel of suitable dimensions.

A woven-lead fabric is believed to be a novel filtering medium in this connection, and while the best of results will accrue from its use the asbestos cloth is a valuable substitute therefor; but quite desirable results will accrue from the use of properly-perforated sheet-lead, as illustrated in Fig. 10. The lead for this purpose should weigh about four pounds to the square foot and be closely perforated, the holes being from one-sixteenth to one thirty-second of an inch in diameter on top of the sheet and larger at the under side, as shown, and spaced about one-eighth of an inch from center to center. This perforated sheet lying flatly upon the lead floor is well supported, and the intervening space being very slight permits the passage of liquid, while arresting the passage of such solid matter as might pass through the small perforations.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent—

1. In a barrel-filter, the combination with a suitable barrel or cylinder, of a flat perforated floor, a sheeted filtering medium flatly laid thereon, a wooden framing for said floor, composed of lateral and longitudinal parts spaced and united by appropriate mortising, a grating overlying the filtering medium, a series of lateral tie-bars on said grating, abutments at the sides of the interior of the barrel overlying the ends of the tie-bars, and wedges which are tightly interposed between said abutments and tie-bars and firmly lock all of the parts of the filter and its framing in position with relation to each other and to the barrel, substantially as described.

2. In combination with a suitable barrel or cylinder, a flat perforated lead floor, a framing beneath said floor affording a firm support as well as suitable space below for the passage of filtered liquid, a suitable sheeted filtering medium flatly laid on said floor and beyond its sides and ends, and a grating adapted to be firmly clamped for confining the filtering medium upon the floor, and binding its edges against the interior sides of the barrel, and lateral wedge-bars, which are actuated by the pressure of the grating and bind the ends of said filtering medium against the interior ends of the barrel, substantially as described.

3. In a barrel-filter, the combination with a suitable bed or support and a perforated lead floor, of a filtering medium composed of lead in sheeted form, open to the filtering passage of liquid, substantially as described.

EDWARD D. SLOAN.

Witnesses:

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JAMES O. ORR.