

No. 609,769.

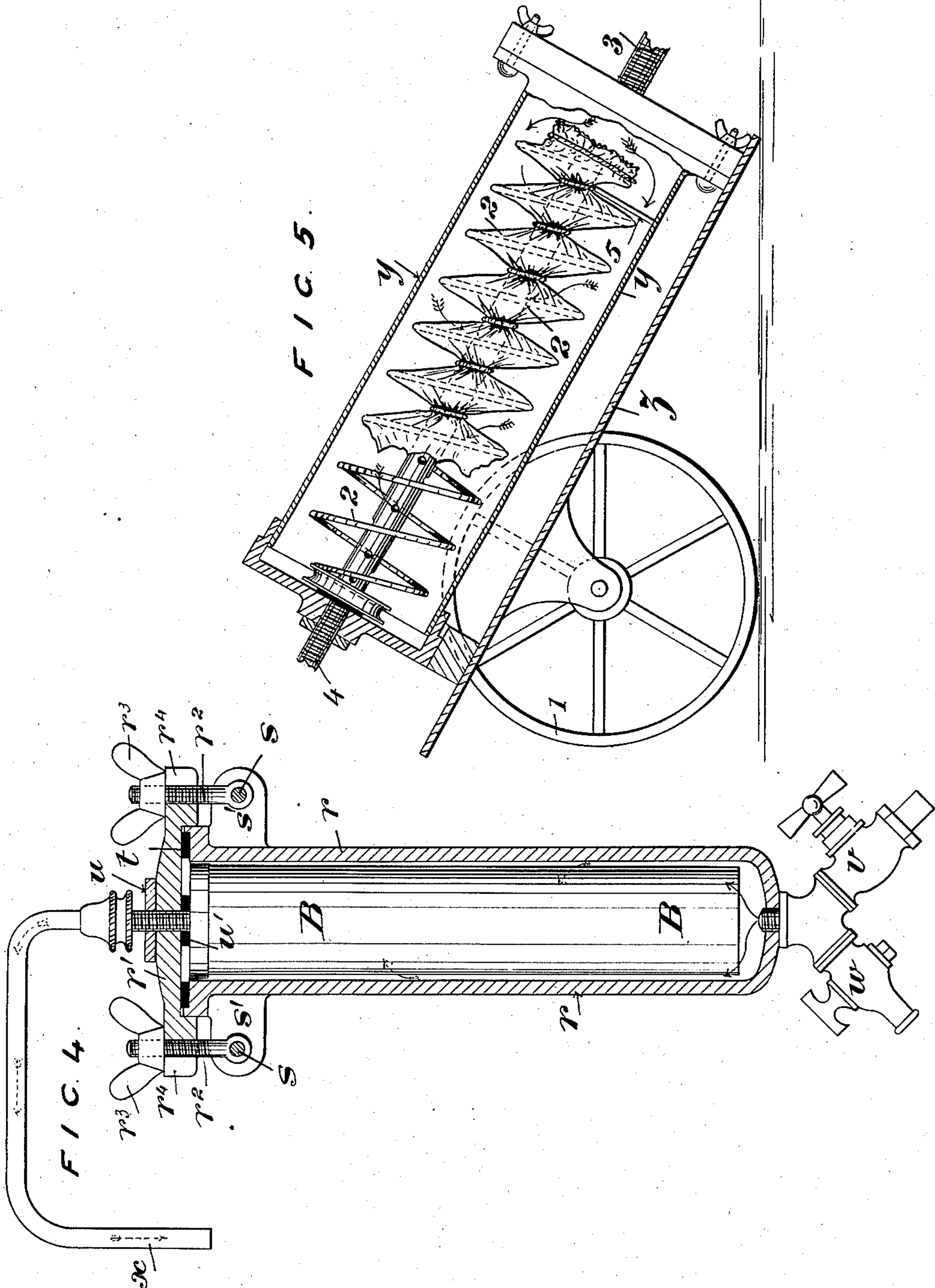
Patented Aug. 30, 1898.

W. H. BARR.
DOMESTIC OR OTHER FILTER.

(Application filed Dec. 2, 1897.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses
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UNITED STATES PATENT OFFICE.

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DOMESTIC OR OTHER FILTER.

SPECIFICATION forming part of Letters Patent No. 609,769, dated August 30, 1898.

Application filed December 2, 1897. Serial No. 660,536. (No model.) Patented in England February 27, 1897, No. 5,272.

To all whom it may concern:

Be it known that I, WILLIAM HENRY BARR, a subject of the Queen of Great Britain and Ireland, and a resident of Belgrave Place, Bury, county of Lancaster, England, have invented certain new and useful Improvements in Domestic or other Filters, (for which I have received a patent in Great Britain, No. 5,272, bearing date February 27, 1897,) of which the following is a specification.

My said invention relates to improvements in domestic and other filters for use in the filtration and purification of water, beer, cider, spirits, and other liquids.

The object of my invention is to provide a large filtering-surface within a comparatively small space and thus obtain a filter having high efficiency without being of undue dimensions or bulk.

My invention will be more fully understood from an inspection of the accompanying two sheets of drawings, in which—

On Sheet 1, Figure 1 is a sectional elevation, broken in its length for want of space, of one form of my improved filter-bed. Fig. 2 is a sectional elevation of a modified form of the filter-bed shown in Fig. 1. Fig. 3 represents a further modification of my improved filter-bed. On Sheet 2, Figs. 4 and 5 show my improved filter-bed applied to casings suitable for various uses.

Referring in the first place to Fig. 1, Sheet 1, of the drawings, I provide a framework of three hollow perforated metal cylinders of decreasing diameter, placed one within the other, so as to provide annular spaces between the cylinders. In the drawings these cylinders are respectively marked *a b c*. The outer cylinder *a* is sweated, brazed, or otherwise suitably secured to a metallic cap *d*, formed with an annular groove *d'* and delivery-nozzle *d''*. The cylinder *b* is brazed or otherwise suitably secured to a metallic screwed ring *e*, which is screwed to the cap *d*, as shown. A trough-shaped ring *f* is disposed at the lower ends of the cylinders *a* and *b* and secured thereto by brazing or other means, thus closing the ends of the cylinders *a b* and keeping them apart. The inner cylinder *c* is brazed at its upper end to a hollow screwed plug *g* and is also provided with a metallic disk *h*. The screwed plug *g* engages with

the interiorly-threaded extension *d'''* of the cap *d*. A plug *i* closes the lower end of the cylinder *c*.

The outer cylinder *a* is covered with a layer or layers of fine strong closely-woven cotton cloth *A* of suitable length, which is secured to the cap *d* by means of a cord or elastic band or the like. The straining cloth or jacket is then tucked within the space between the cylinders *a* and *b* and secured to the disk *h*, preferably by means of an elastic ring, and from thence the cloth is disposed around the central tube *c* and finally secured to the plug *i*. The disk *h* provides clearance for the outlet. The cloth or straining-jacket *A* is represented in the drawings by dotted lines. The straining-cloth is jammed by the incoming water against the lower side of the disk *h*. The jacket of cloth *A* acts as a straining medium both within and without the combined cylinders *a b c*, the liquid being delivered through the nozzle *d''*, as shown by the arrows. It will thus be evident from an inspection of Fig. 1 of the drawings that by the employment of the concentric cylinders of decreasing diameter, placed one within the other, I am enabled to obtain a vastly-greater filtering area than would be possible if the cylinder *a* were used alone, and this without increasing in any way the bulk or external area of the filter-bed.

It will be obvious that a greater or less number of perforated concentric cylinders may be used, if desired. For example, two perforated metal cylinders may be used, as shown in Fig. 2. In this case a cylinder *j* of smaller diameter and length is secured within an outer cylinder *k*, so as to leave an annular space between the two cylinders. The two cylinders *j k* are secured together at one end by brazing or other suitable means, and distance-pieces *l* are provided to keep the cylinders apart. The upper end of the inner cylinder is provided with a strip of perforated metal *m*, by means of which the inner cylinder *j* is secured to the wall of the outer cylinder and serves to maintain the annular space between the two cylinders. The strip of metal *m* also acts to limit the upward movement of the filter-cloth *A*, so as to prevent the same from obstructing the delivery-outlet of the filter. The outer cylinder is

provided with a grooved cap n , formed with an outlet-pipe n' . The outer cylinder is covered with a layer or layers of the straining-cloth A. This cloth or straining-jacket is
 5 secured with a cord a' or the like within a groove made in the cap n , secured to the outer perforated metal cylinder. The straining-jacket A is tied up with a cord or thread at its other end, so as to resemble a closed
 10 sack. This free closed end is then thrust within the interior of the inner cylinder, and the cloth is of sufficient length to reach to the top of the interior cylinder j . The pressure of the liquid will jam the straining-jacket
 15 against the walls of the inner cylinder and metallic strip m . In case the water-pressure should fail to accomplish this a plug of loofah or other permeable material may be employed. The jacket of cloth thus acts as a
 20 strainer both from within and without the combined cylinders j k , the filtered water or other liquid passing along the annular space between the cylinders to the delivery-orifice provided in the closed end of the outer cyl-
 25 nder. A greatly-increased filtering-surface is thus obtained than could be accomplished if the outer cylinder k were used alone.

In Fig. 3 I show a modification which I may also use. I provide a perforated metal de-
 30 livering-tube o , around which a spiral coil of wire p of suitably-larger diameter is secured. A straining-jacket A of cloth similar to the above is placed around the coiled wire. In the drawings the cloth A is shown on the lower
 35 portion of the tube only, being removed from the upper portion to more clearly show the perforated tube and coiled wire. A cord q secures the straining-cloth A to a grooved disk o' , carried by the delivery end of the
 40 perforated tube o , and the cord is then wound tightly between the spirals of wire p , pressing the straining-cloth A to the inner perforated tube o at these points. The loose end of the cloth is then secured to a grooved disk
 45 o^2 on the end of the tube o . The fabric is thus stretched and conducted from the periphery of each metal coil p to the fixed central conducting-tube o , and a greatly-increased
 50 straining-surface is obtained over what would be provided by the outer periphery of a cylinder of equal length and diameter of the coiled wire. The fixed central perforated tube is provided with a delivery-nozzle o^3 to carry away the filtered liquid. Each end of
 55 the central perforated tube may be provided with a delivery-nozzle, if desired.

The cotton cloth used for straining purposes may be of two kinds—either the finest cambric or a cloth having a plush-like nap of
 60 cotton filaments and sold as fustian cloth.

For very fine filtering purposes layers of cotton-cellulose paper pure and free from size are placed within folds of the cotton strain-
 65 ing-cloth.

The filtering cylinders or spirals after being covered with the straining-cloth are placed within a suitable outer casing, which is se-

cured by any suitable means to the water-supply.

On Sheet 2, Fig. 4 represents one of my 70 improved filter-beds placed within a casing suitable for domestic use. The casing consists of a tubular metallic or other body r , provided with a cover r' , which is secured to the body r by means of hinged bolts r^2 and
 75 wing-nuts r^3 . The hinged bolts r^2 swivel upon pins s , secured to lugs s' , cast upon the body r , and are housed between lugs r^4 , formed in the cover r' . A rubber or other resilient washer t secures a fluid-tight joint
 80 between the cover r' and the top of the tubular body r . The straining-bed B is secured to the cover r' by means of a nut u , a fluid-tight connection being obtained by means of the rubber or other washer u' . The foot of
 85 the casing r is provided with a tap v to conduct water to be filtered to the interior of the casing r . A flush-tap w is also provided for use when cleansing the filter-bed or for emptying the casing r . The water to be
 90 filtered enters the filter-casing via the tap v and passes through the filter-bed B to the delivery-nozzle x , as indicated by the arrows. The filter-bed B may be cleansed by flushing the same with water through the tap v and
 95 allowing the water to escape through the flush-tap w , which is opened for the purpose.

Another form of casing in which my improved filter-beds may be used is shown in Fig. 5. This form is particularly applicable 100 for filtering large volumes of liquid—such as water, beer, cider, or the like—and is readily portable. A tubular casing y is suitably secured to the platform z , which is carried upon wheels 1. The casing y is shown as provided 105 with a spiral-wire filter-bed 2, constructed as already described, and which is supported at its lower end by means of a curved plate 5. More than one such filter-bed of suitable size may, however, be used within the portable cas- 110 ing y , and these filter-beds may be formed of concentric tubes or spiral wire, as described, or the two forms may be used in conjunction. The beer or other liquid to be filtered is forced under pressure through the nozzle 3 to the interior of the casing y and after passing through the filter-bed 2 is delivered at the delivery- 115 nozzle 4, as indicated by the arrows. The filter may be cleansed by a reverse current of water or other fluid or by introducing the 120 nozzle of a hose-pipe within the interior of the casing y . I do not, however, confine myself to any particular form of casing for use with my improved filter-beds, as the same must be governed by circumstances and the 125 quantity of liquid to be filtered.

Before turning on the flow of liquid I place within the interior of the casing a quantity of pulverized and sterilized agalite, either alone or in conjunction with porous pipe-clay 130 or earthenware-clays, which have been sterilized by heat or by well-known chemical substances, either in a state of fine powder or mixed into a thick cream along with water

or a clear portion of the liquid to be filtered, such as cider, beer, spirits, and the like. The inflowing liquid is admitted at the base of the filter-casing, so that it takes an upward or inclined direction. The water or other liquid thus carries with it the sterilized and filtering materials forcibly onto the surface of the straining-bed and jams its minute interstices with a fine porous sterile earth, and thus at once coats the straining-cloth with a close porous covering, which arrests all suspended and vegetable slimy matters contained in the liquid. The filter-bed thus obtained is of very high efficiency without the disadvantageous fragility of baked earthenware cylinders, while at the same time possessing their valuable properties of arresting and holding micro-organisms.

The advantage of directing the incoming water to the filter in an upward direction is most evident when the filter has not been used for some little time, as any of the filtering medium which may fall to the bottom of the casing is at once carried upward with the incoming liquid and forcibly carried upon the straining-cloth. The upward rush of liquid thus secures the automatic and reliable coating of the straining-cloth with the filtering medium.

Although I prefer sterilized agalite for coating the straining-cylinder, I might also make use of a combination of several other sterile and oxidizing substances for the same purpose—such as agalite, porous earthenware-clays, fossil-earth, and purified animal and wood charcoal—which are pulverized, purified, and sterilized by heat before use. I might also use with the agalite kaolin, silica, and porous iron or any oxidizing agent.

The regulating-tap may, if desired, be placed on the delivery side of the filter-bed and maintain the coating of filtering material undisturbed and preserve it from shock and recoil. The cylinders and spiral coils may be cleansed *in situ* by a reversed current of filtered water and air or by steam.

In order to secure the perfect sterility of the agalite or other filtering medium, the filter-casing may be formed as a boiler or kettle and may be placed over a flame and the filtering material carried upon the straining-jacket at a temperature of boiling-point or even higher temperature, or I might place the filtering medium within a separate vessel and boil the same in water and deliver the boiling water and filtering medium into the casing containing the filtering bed or beds.

A further method of coating the straining-beds of cloth with a filtering medium is as follows: I take a quantity of cellulose-pulp, which I briskly stir in a sufficiency of water until I obtain a cellulose-starch. I then while stirring gradually add to this cellulose-starch finely-powdered china-clay, kieselguhr, agalite, or other suitable filtering or oxidizing substance, such as purified animal or wood charcoal. These filtering substances may be

used either alone or in conjunction. By these means I obtain a stiff curdy mass, which is dried by heat and afterward rubbed into a fine powder. This powder is applied to the surface of the filter-bed by direct water-pressure, or it may be mixed with the water and the surface of the filter-bed be coated by creating a vacuum within the interior of the filter-casing. The finely-divided fibers of cellulose-pulp, intimately mixed as they are with the powdered filtering substance, carry and hold such filtering substance on the straining-bed. The cellulose fiber becomes felted into a covering of paper-like substance upon the straining-bed and holds the particles of clay firmly and jams the same upon the straining area. With such a method of coating the filter-beds, where concentric perforated cylinders are used, as described, by constructing the cylinders of metallic gauze or finely-perforated metal, no straining-cloth would be needed. Moreover, such a filtering-surface of cellulose fibers and clays is easily washed off the filter-bed when choked with foul matter by means of a hose-pipe directed against it, or it may be scraped off or thrown off by a reversed current of steam, water, or air. For domestic filters I prefer to use cotton cellulose; but where required for use on a large scale wood cellulose can be used.

Although I have instanced more particularly the filtration of drinking-water, beer, cider, and the like, it is obvious that my improved filter-bed with its increased area of straining-surface is also applicable for the rapid filtration and purification of river and canal waters and also for sewage. On a large scale in case of sewage and the like the cloth jacket can be dispensed with where multiple cylinders are used. In this case the metallic cylinders are provided with perforations so small that the cellulose-pulp mixed with kieselguhr or other porous filtering-earths is thrown on with pressure by the sewage, so as to form a thin felt of paper-like substance on the perforated surface of the cylinders.

When dealing with sewage and other foul water of a like nature, the cellulose-pulp and porous filtering-earths are mixed with oxidizing agents, such as the persalts of iron and persalts of manganese and lime.

What I claim as my invention is—

A filter-bed for the indicated purposes consisting of a central perforated tube around which is arranged a spiral coil of wire upon which is secured a straining-cloth or cloth and paper on the surface of which is carried and deposited a close porous coating of filtering medium arranged and acting in conjunction with a suitable casing in the manner and substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

WILLIAM HENRY BARR.

Witnesses:

JOSHUA ENTWISLE,
ALFRED YATES.