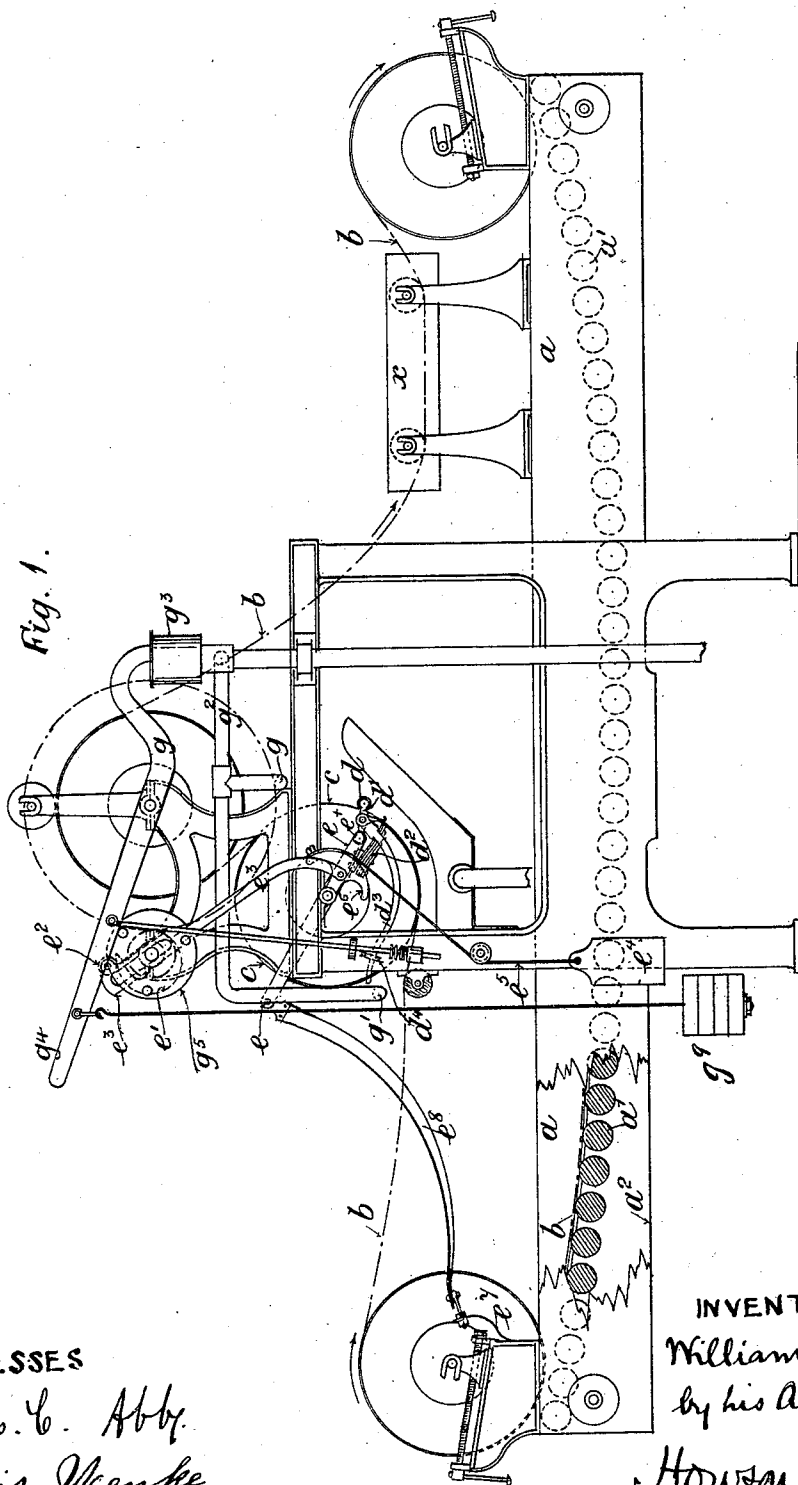


W. BIRCH.

APPARATUS FOR FILTERING SEWAGE OR IMPURE LIQUIDS.

No. 582,518.

Patented May 11, 1897.



WITNESSES

Geo. C. Abby.
Louis Menke

INVENTOR
William Birch
by his Attorneys

Howson and Howson

(No Model.)

3 Sheets—Sheet 2.

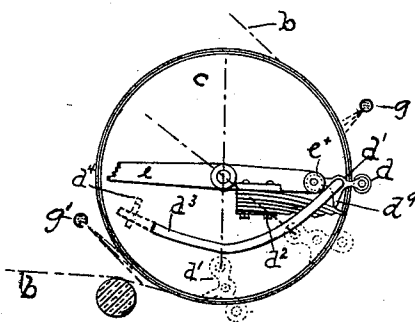
W. BIRCH.

APPARATUS FOR FILTERING SEWAGE OR IMPURE LIQUIDS.

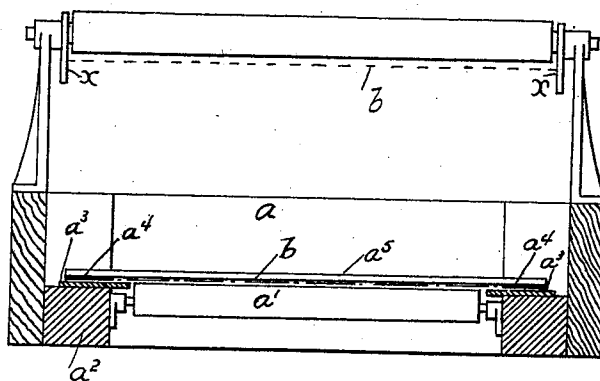
No. 582,518.

Patented May 11, 1897.

F. G. E.



F. I. G. - 3.



WITNESSES:

F. W. Wright.

A. C. Connor

INVENTOR

William Birch

BY

Howson T. Howson
ATTORNEY.

ATTORNEY

(No Model.)

3 Sheets—Sheet 3.

W. BIRCH.

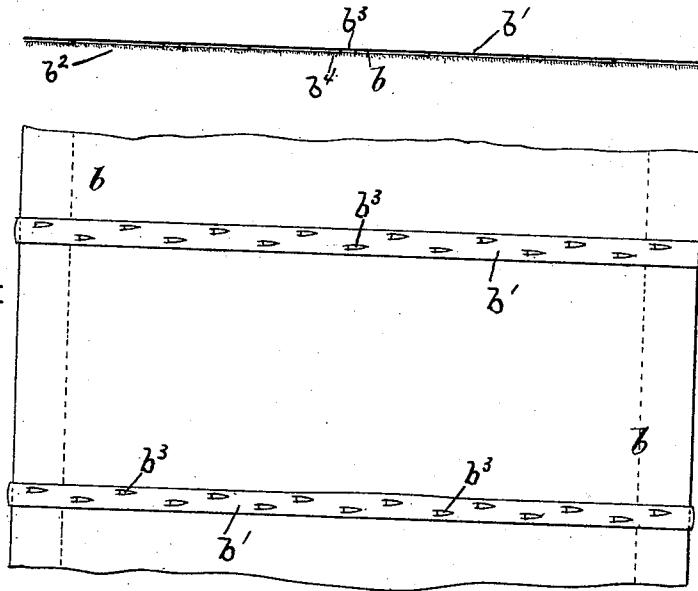
APPARATUS FOR FILTERING SEWAGE OR IMPURE LIQUIDS.

No. 582,518.

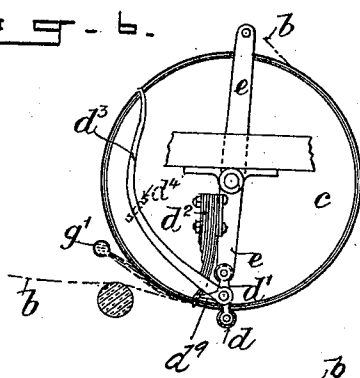
Patented May 11, 1897.

F : 5 4

Fig. 5.



F : 5 - 6.



F : 5 - 7.

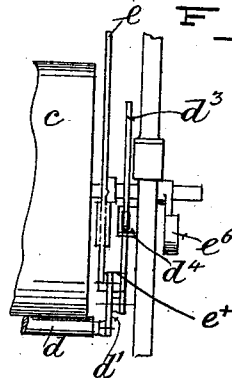
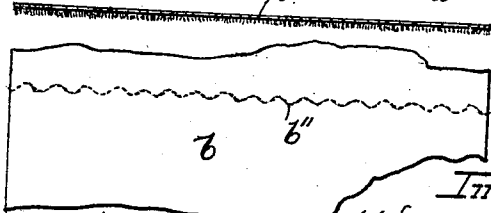


Fig. 8.



WITNESSES.

G. W. Wright.
S. C. Connor

INVENTOR.

William Birch.

By

Howen & Howen
his Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM BIRCH, OF MANCHESTER, ENGLAND.

APPARATUS FOR FILTERING SEWAGE OR IMPURE LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 582,518, dated May 11, 1897.

Application filed May 19, 1896. Serial No. 592,219. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BIRCH, a subject of the Queen of Great Britain, residing at Lower Broughton, Manchester, in the county of Lancaster, England, have invented Improved Apparatus for Filtering Sewage or Impure Liquids, of which the following is a specification.

This invention relates to improvements upon the apparatus for which Letters Patent No. 461,232 were granted to me October 13, 1891, for machines in which an endless felted filtering cloth or fabric is used as the filtering agent dipping into a trough or vessel and passing over a suitably-formed gridded or false bottom, the said filtering-cloth being cleansed by the intermittent rush of a roller over its surface.

My invention will be readily understood from the following description on reference to the accompanying drawings.

Figure 1 is a side elevation of my improved filtering apparatus, drawn partly in section. Figs. 2 and 3 are detached views hereinafter more particularly referred to. Fig. 4 is a cross-section, and Fig. 5 a plan, of a portion of one form of the filtering-band. Fig. 6 is a view similar to Fig. 2, but showing the parts in a different position. Fig. 7 is a side elevation of Fig. 6. Fig. 8 shows a section and a plan of a portion of another form of filtering-band.

a is the trough to contain the water to be filtered, the bottom of the said trough being composed of a series of rollers a' , carried by side pieces or beams a^2 , as seen on the detached transverse section, Fig. 3, and forming a concave surface, as seen at Fig. 1.

b is the filtering-cloth, passing in the direction indicated around a drum c , which is capable of turning freely on its axle.

According to my invention, instead of using felt, as usual, for the filtering-cloth b , I make this filtering-cloth of a strong cotton-woven fabric with a pile b^2 raised upon one side thereof, as shown in Figs. 4 and 8, and at intervals I throw in a weft b^{11} of crimped or other wire across the same to keep it to its proper width and flat, as shown in Fig. 8. Instead of these wires I sometimes fix across the cloth narrow steel plates b' , Figs. 4 and 5, for the same purpose, and the ends of these

wires or plates working between two fixed guide-plates x , Figs. 1 and 3, will keep the filtering-cloth in a central position and prevent it from diverging in a lateral direction. The teeth b^3 of the plates b' are passed through the cloth and clenched on the face thereof, as shown in Fig. 4.

d is the small cleaning-roller, carried by a lever e , which is mounted on the axis of the drum c . This lever e is raised by the cam e' , Fig. 1, acting on an antifriction-roller e^2 on the slotted link e^3 and is pulled down when released by the cam e' by the weight e^4 , fixed by a cord e^5 or otherwise to the quadrant e^6 . The spring e^7 receives through the straps e^8 the shock of the fall of the weight e^4 .

I mount the roller d upon a small link d' , pivoted at e^x to the lever e . This link d' is made with a finger or projection d^9 , (see Fig. 2,) against which a spring d^2 , fixed to the lever e , acts and presses the roller d hard against the surface of the cloth b , holding the link d' at an angle to the lever e , as indicated in Fig. 6 and by the dotted positions in Fig. 2; but when the end of the lever e , which carries the link d' , has been raised by the cam e' and link e^3 to the position shown by the full lines on Fig. 2 the link d' is drawn down by a curved arm d^3 , loosely connected to the link d' at one end, the other end passing through an eye d^4 , fixed to the frame. This arm d^3 is so formed that as the end of the lever e , carrying the link d' , rises the arm d^3 is pressed upon by the boss e^x of the lever e or by a similar projection, and the other end of the arm d^3 bears hard against the bottom of the eye or slotted bracket d^4 . The boss or projection e^x , acting as a fulcrum, causes the arm d^3 to become a lever, and the end at d^4 being stationary the other end will draw down the link d' , overcoming the action of the spring d^2 . This turns the link d' parallel with the arm e , and thus removes the roller d from the cloth b , so that water issuing from a spirt-pipe g will run down the surface of the cloth and moisten the same ready for the downward rush of the roller d when released by the cam e' . I arrange a second spirt-pipe g' at the other side of the drum c , which supplies water to the other surface of the cloth b , and as it passes around the drum c this water is pressed through the cloth and helps to loosen the dirt or deposit

on the surface presented to the action of the roller *d*. To facilitate this action, I cover the drum *c* with a coating of thick felt or other resilient and absorbent material which will retain a considerable quantity of water and allow the roller *d* to force the same out through the filtering material each time that it descends.

The pipes *g* and *g'* are supplied continuously by the piping *g²* from a pump *g³*, which is worked by a lever *g⁴* and a revolving disk *g⁵*, carrying three crank-pins, this lever *g⁴* being weighted by weight *g⁶*. As shown, the lever is pivoted to the axis of the upper drum, but other means could be used for holding it against the cam. Thus both surfaces of the fabric *b* are supplied continuously with water close to the point where the said fabric is to be cleaned by the roller *d*, and the impurities are thus loosened from the said fabric and more easily removed by the said roller.

The space between the ends of the rollers *a* and the side pieces *a²* is covered as nearly as possible by long strips or laths *a³* (see Fig. 3) of wood or metal, upon which the edges of the fabric *b* rest, and the said edges are held down to follow the curved form (seen at Fig. 1) of the side pieces *a²* and strips *a³* by the weight of strips *a⁴* of lead or other suitable material, connected together by cross-bars *a⁵* at suitable intervals.

I claim as my invention—

1. An endless filtering cloth or fabric of woven cotton having a raised pile surface and occasional cross wires or plates, substantially as and for the purposes set forth.

2. In an apparatus for filtering impure liquids, the combination of an endless filtering cloth or fabric of woven cotton having a raised pile surface and occasional cross wires or plates with guides against which the wires or plates act, all substantially as and for the purposes set forth.

3. In a filtering apparatus, the combina-

tion of an endless filtering-cloth, and a cleansing-roller, with a drum around which the cloth passes and over which the cleansing-roller works, the said drum having a covering of thick felt or other absorbent and resilient material, alternately taking up and parting with cleansing water or fluid, and a spurt-pipe to supply the fluid, all substantially as and for the purposes set forth.

4. In filtering apparatus, the combination of an endless filtering-cloth, a cleansing-roller and a drum around which the cloth passes and over which the cleansing-roller works, with a cam-shaft, water-pipes and a pump actuated by the cam-shaft for giving a continuous supply of water to both sides of the filtering-cloth, substantially as set forth.

5. The combination of an endless filtering-cloth, with a drum around which the cloth passes and over which a cleansing-roller works, a lever provided at one end with a link carrying the cleansing-roller, a spring acting on the link for holding the cleansing-roller to the surface of the cloth, a cam-shaped arm carried by the link and passing through a fixed eye, and a projection on the lever aforesaid to bear on the said arm when the cleansing-roller has been raised to remove the roller from the surface of the cloth, substantially as and for the purpose set forth.

6. In a filtering apparatus, the combination of an endless filtering-cloth, and a trough, the bottom of the trough being composed of a series of rollers, with strips *a³*, strips *a⁴*, and cross-bars *a⁵* connecting the strips *a⁴*, substantially as and for the purposes set forth.

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

WILLIAM BIRCH.

Witnesses:

CHARLES A. DAVIES,
JNO. HUGHES.