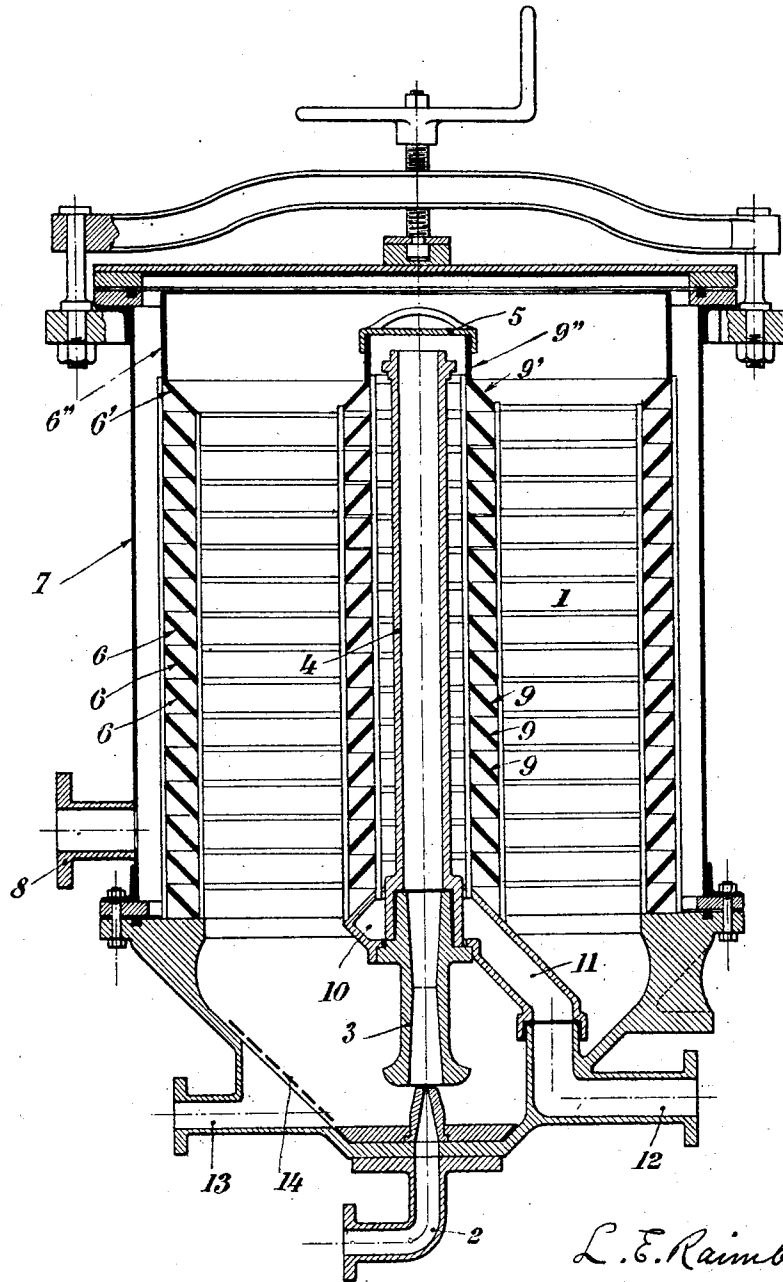


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SAND FILTER.
APPLICATION FILED MAR. 15, 1921.

1,410,121.

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Specification of Letters Patent. Patented Mar. 21, 1922.

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To all whom it may concern:

Be it known that I, LOUIS ERNEST RAIMBERT, residing at Paris, 150 Boulevard Magenta, France, have invented certain new and useful Improvements in Sand Filters, of which the following is a specification.

This invention relates to sand filters of the type in which an annular sand chamber is combined with a tubular central member for the passage of the sand into a washing basin, an injector for the water under pressure being placed in the lower portion thereof for injecting the water which draws the sand with it from the annular chamber into the central tube, and from here into the washing basin.

Sand filters of this type have already been constructed in which the lateral surface of the sand, on the arrival of the liquid to be filtered, was supported by a series of conical sheet iron rings arranged one above the other and supporting the sand, by providing between the filtering sand and the plain wall of the filter a free space through which the liquid to be filtered could pass freely. These superposed conical rings were placed either at the outer periphery or at the cylindrical interior portion of the annular space forming the chamber for sand.

The invention has for its object a sand filter of the type described in which the annular chamber for the sand is limited both at the interior and the exterior by two series of superposed conical rings. This arrangement of double rings does not constitute a simple repetition of a well known device, but in the present instance particular results are obtained in that it is possible to extend the field of the use of the sand filter to industries in which filters hitherto constructed of a single series of rings could not be applied.

The invention also relates to the secondary devices which are hereinafter described.

In the accompanying drawing is shown by way of example an axial section of one form of construction according to the invention.

1 is the annular sand chamber, 2 is the inlet for the water under pressure, 3 is the injection cone for the sand which mixes with the water, 4 is the central tube for causing the sand to pass into the washing basin by means of a device (not shown) provided at the upper end of 4. Normally

the central tube 4 is closed or surmounted at shown by a cover 5. A series of superposed conical rings 6—6, of which the upper ring 6' is provided with a cylindrical casing 6'', forms the outer bearing surface for the sand enclosed in the chamber 1, and between this series of rings and the outer wall 7 of the filter is provided a free space in which terminates a tubular inlet 8. An inner series of smaller conical rings 9, of which the upper ring 9' is also provided with an upward cylindrical extension 9'', limits the annular chamber for the sand towards the centre, and between this inner series of small rings and the plain central tube 4 is provided a free space communicating by the annular space 10 and a tubular member 11 with the tubular outlet 12. 13 is a tubular discharge member from the sand chamber. 14 is a perforated plate supporting the sand above the edge of the tubular member 13 provided at the lower end of the sand chamber. It will be understood that the reverse arrangement may be adopted the liquid to be filtered being preferably effected in the exterior annular portion between 6 and 7 through a tubular member 8, the outflow taking place between 4 and 9 through tubular members 11, 12, this admission of the liquid through the exterior affording the advantage of supplying to the liquid at the end of the operation, that is to the liquid which is the most charged with impurities, the larger filtering surface in consequence of the larger surface of the outer rings.

In order that when the liquid in the filter rises to an abnormal level above the sand it is prevented from passing directly over the upper ring 9' into the space reserved for the filtered liquid, the upper ring 9' has been provided with a plain extension or cylindrical casing 9'' rising to a sufficiently high level and closed by the cover 5 so that the liquid cannot pass over it in any case. For a similar reason the upper outer ring 6' is also provided with a cylindrical extension 6'' rising sufficiently high so that the liquid cannot flow over it. The sand rises between the casings 6'' and 9'' to a height sufficiently above the annular passage between the two upper rings so that the liquid preferably flows between the central rings rather than rise above the cover 5. The cover 5 also prevents the penetration of the sand into the

central part whilst the filter is being charged and facilitates its distribution in the annular chamber.

Sand filters with a single series of superposed conical rings, for example on the admission side for the liquid, are necessarily provided at the opposite side and along the whole height of the filter with a perforated sheet metal plate, or with a trellis work, or with a metallic sheet so as to maintain the sand uniformly at the outlet for the liquid. These filters, even with this arrangement, cannot be used for the filtration of all kinds of liquid and in particular for the filtration of acids and alkalis; for acids, for example, it would be necessary either to use lead or ceramic wax. The employment of ceramic wax is evidently impossible for the construction of a perforated cylindrical wall of the height of the filter with very small perforations; as regards lead, it is impossible to form a trellis work in consequence of its softness or a perforated plate in consequence of the weakness which it is impossible to avoid and in consequence of the impossibility of having perforations of the desired fineness. With double rows of rings in a filter according to the present invention it is possible to construct these rings either of ceramic wax or preferably of lead; these rings are separately mounted, their individual weight is very suitable and there is no fear of weakening as they are separately supported as is well known. Again the inner walls of the casing 7 of the filter may be easily covered with any suitable insulating material such as vitrified sheet iron, varnish, enamel, or a lining of lead; or the case 7 may be made of tough ceramic wax or lead which would be impossible with a perforated wall. The present arrangement gives a very favourable advantage as the possibility of the use of the sand filters may be extended to other uses such as the washing of the sand to chemical industries and particularly to the filtration of acids and alkalis where the use of known sand filters has hitherto been excluded.

Claims—

1. In a sand filter, an annular sand chamber between two series of superposed conical rings limiting said chamber towards the exterior and towards the interior, means for supplying the liquid to be filtered to a series of said rings and for collecting the filtered liquid from the other series, a central projection pipe in the central passage of the inner

series of superposed conical rings, means for injecting water together with the sand of the chamber from bottom to top in said pipe.

2. In a sand filter, an annular sand chamber between two concentric series of superposed conical rings limiting said chamber towards the exterior and towards the interior, a central projection pipe in the central passage of the inner series of smaller conical rings, means for supplying the liquid to be filtered to the annular passage between the external wall of the filter and the outer series of conical rings, and for collecting the filtered liquid from the passage between the inner series of smaller conical rings and said central projection pipe, means for injecting water together with the sand of the chamber from bottom in said pipe.

3. In a sand filter, an annular sand chamber between two series of superposed conical rings limiting said chamber towards the exterior and towards the interior, means for supplying the liquid to be filtered to a series of said rings and for collecting the filtered liquid from the other series, a central projection pipe in the central passage of the inner series of superposed conical rings, means for injecting water together with the sand of the chamber from bottom to top in said pipe, the upper ring of the series for outlet of the liquid being provided with an upward plain cylindrical casing for preventing the liquid from passing over it after the latter reaches a level above the sand in the annular sand chamber, and the upper ring of the other series for inlet of the liquid being also provided with an upward plain cylindrical casing for preventing the raw liquid from passing directly into the sand chamber.

4. In a sand filter according to claim 1, the construction wherein the annular collector at the lower end of the injection tube for the washing is provided with an inclined upper surface so as to form a cone which is parallel to the inner rings thus forming the first ring of the column.

5. In a sand filter according to claim 1, the construction wherein the cylindrical casing of the upper inner ring is closed by a suitable cover which prevents the passage of sand or of liquid into the central part of the filter.

In testimony whereof I affix my signature.

LOUIS ERNEST RAIMBERT.