

Feb. 23, 1926.

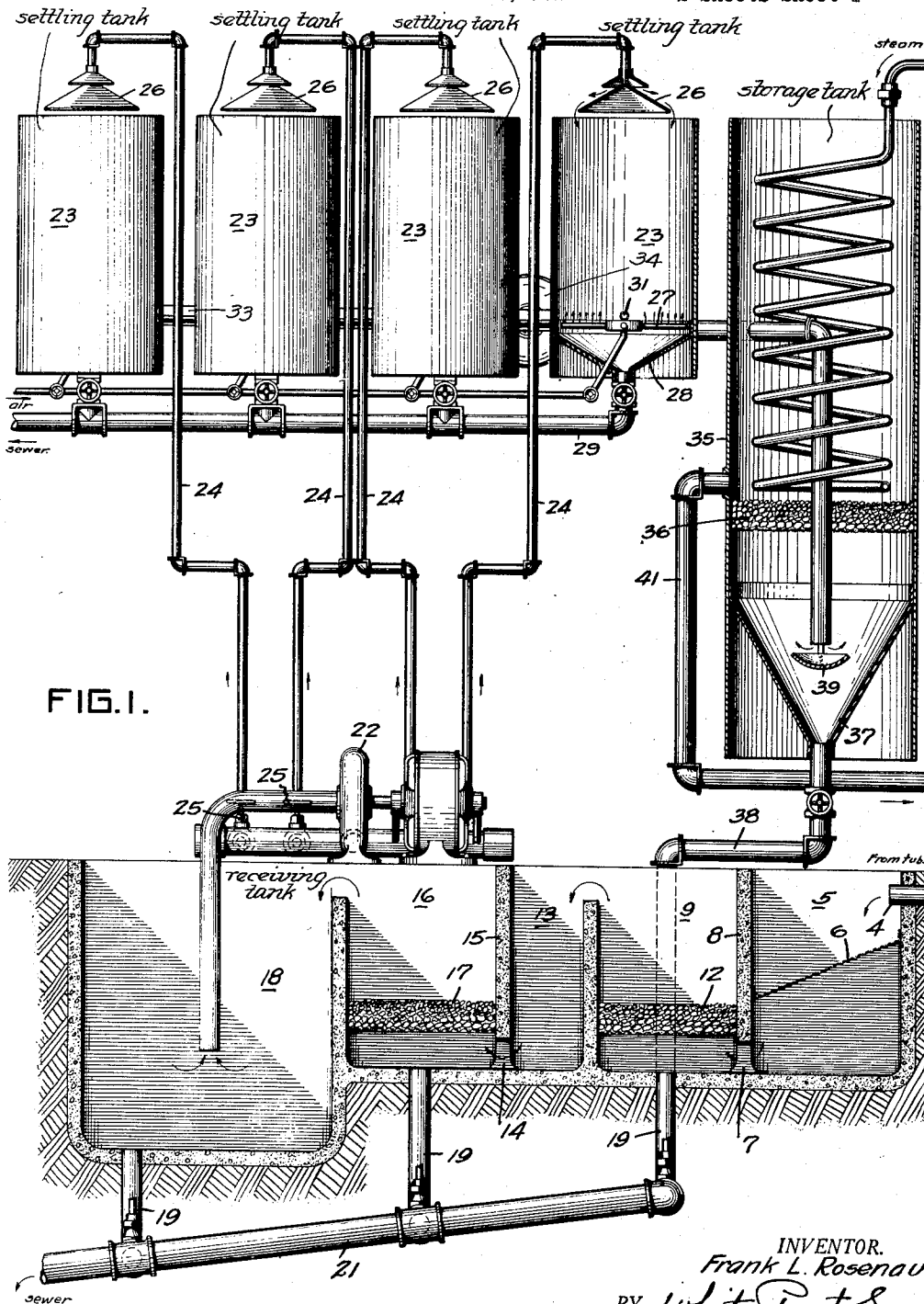
1,574,170

F. L. ROSENAU

SYSTEM FOR RECOVERING USED LAUNDRY MATERIALS

Filed Nov. 6, 1922

2 Sheets-Sheet 1



WITNESS:
H. Sherburne

INVENTOR.
Frank L. Rosenau.
BY *White Frost & Evans*
his ATTORNEYS.

Feb. 23, 1926.

1,574,170

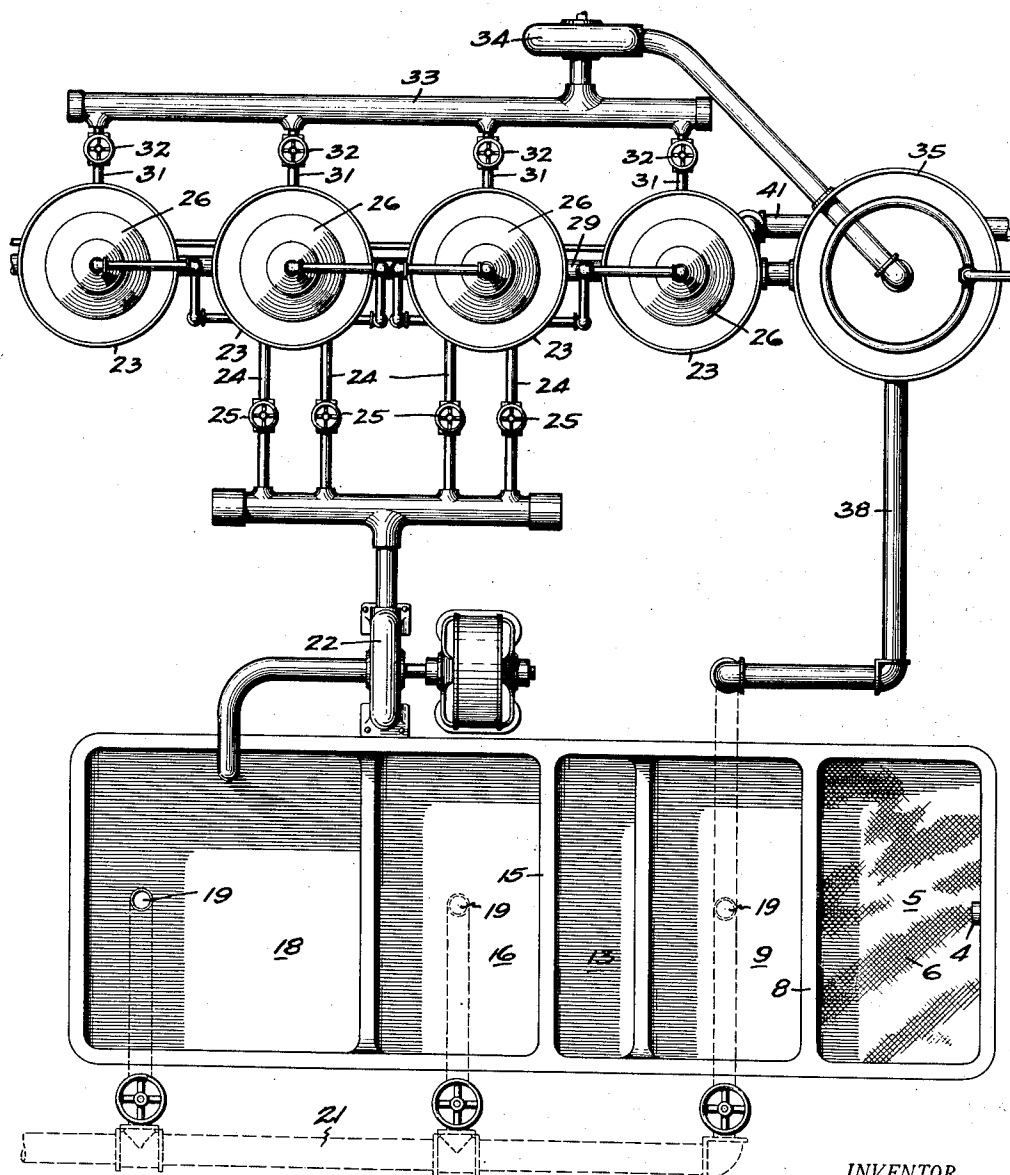
F. L. ROSENAU

SYSTEM FOR RECOVERING USED LAUNDRY MATERIALS

Filed Nov. 6, 1922

2 Sheets-Sheet 2

FIG. 2.



WITNESS:

H. Sherburne

INVENTOR.

Frank L. Rosenau.

BY *White & Evans*
his ATTORNEYS.

UNITED STATES PATENT OFFICE.

FRANK L. ROSENAU, OF SAN FRANCISCO, CALIFORNIA.

SYSTEM FOR RECOVERING USED LAUNDRY MATERIALS.

Application filed November 6, 1922. Serial No. 599,447.

To all whom it may concern:

Be it known that I, FRANK L. ROSENAU, a citizen of the United States, and a resident of the city and county of San Francisco and State of California, have invented a certain new and useful System for Recovering Used Laundry Materials, of which the following is a specification.

The invention relates to a system of recovering water and other materials used in washing clothes and other fabrics, for re-use in subsequent laundering operations.

The process of washing clothes and other fabrics comprises a plurality of operations which are usually substantially as follows. The clothes are placed in the washing machine into which the soapy water, known to the laundryman as suds, is introduced and the clothes are agitated in the suds for a sufficient time, usually twenty minutes, to release the adhering dirt from the clothes. The dirty first suds are then discharged from the machine and run to waste. The clothes are then given the first rinse with soft water and after a suitable interval of time the first rinse water is discharged from the machine and run to waste.

The clothes are then given the second suds which are for the purpose of removing stains and material which has lodged within the fibers of the fabric. After a suitable interval of time, the second suds are discharged from the machine and flowed to waste. The clothes are then given three rinses, known as the second, third and fourth rinses, and the rinse water from these operations has also ordinarily been flowed to waste. The second rinse is a soft water rinse and the third and fourth rinses are hard water rinses.

An object of the present invention is to provide a system to recover and save, for re-use in subsequent laundry operations, a large proportion of the water, soap and water softening material which is now flushed directly to the sewer.

Another object of the invention is to provide an apparatus for removing from the retained liquid, those materials which are deleterious to the washing operation, so that the retained water may be used for further washing operations.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the fol-

lowing description, where I shall outline in full, that form of the apparatus of my invention which I have selected for illustration in the drawings accompanying and forming part of the present specification. In said drawings I have shown one embodiment of my invention, but it is to be understood that I do not limit myself to such form, since the invention, as set forth in the claims, may be embodied in a plurality of forms.

Referring to said drawings:—

Figure 1 is an elevation, somewhat diagrammatic, of the apparatus of my invention.

Fig. 2 is a plan, somewhat diagrammatic, of the apparatus of my invention.

The first suds and the first rinse contain large quantities of dirt and other foreign matter and are not passed through the system of my invention, but are flowed directly to the sewer. All of the suds and rinses after the first rinse are passed through the system, in which any foreign material or dirt contained therein is removed and the water, soap and water-softening material reclaimed for re-use in subsequent washing operations. The second suds, which are comparatively clean and which contain soap and water-softening material, are flowed from the washing machines, after the second washing operation, through a conduit 4 and the second, third and fourth rinses are also discharged from the washing machines through the conduit 4. The second rinse is a soft water rinse and, as discharged from the washing machine, contains soap and water-softening material. The third and fourth rinses are hard water or natural water from the wells or other source of supply.

The suds and rinses discharge from the conduit 4 into a tank 5, preferably placed below the level of the washing machines, so that the liquid flows thereto by gravity. The tank 5 comprises one of a series of tanks which are preferably formed of concrete, the tanks being separated by dividing walls. The tank 5 is provided adjacent its bottom with an inclined screen 6, which separates any larger pieces of material, such as collars and napkins, from the liquid. The liquid passes from the tank 5 through an aperture 7 in the bottom of the wall 8 into the bottom of the tank 9, which is partially filled, above the aperture 7, with a gravel bed 12 through which the liquid

passes upwardly, and in which lint and other larger particles of foreign matter are retained. The liquid overflows the tank 9 into the well 13 and passes through an aperture 14 in the bottom of the well wall 15, into the tank 16, which is provided above the inlet aperture 14, with a gravel bed 17 through which the liquid rises and in which additional foreign matter is retained. From the tank 16, the liquid flows into receiving tank 18. The tanks 9, 16 and 18 are provided at their bottoms with valve controlled discharge pipes 19, connected to the main discharge line 21, so that the tanks may be readily flushed to cleanse them of collected foreign matter.

From the receiving tank 18, the liquid is raised, by a pump 22, to a settling tank 23 in which the major portion of the remaining foreign material in the liquid is removed. A plurality of settling tanks are employed, so that a supply of reclaimed liquid is always available. In practice I prefer to employ four settling tanks so that one may be filling, another treating the liquid, the foreign material settling in the third tank and the fourth being emptied. The tanks are connected to the pump 22, by a system of pipes, each pipe 24 leading to each separate tank, being provided with a valve 25, so that the liquid may be directed to the desired tank. The liquid pumped is introduced into the top of the tank being filled, over a spreader 26, so that the liquid falls into the tank in a sheet, with a large air exposure. The liquid pumped into the settling tanks is a mixture of suds, containing soap and water-softening material, soft water and hard water. The water softening material solution reacts with the alkali in the hard water, causing the formation of gelatinous material which remains in suspension in the liquid, rendering it unfit for further laundry use. This suspended material is caused to precipitate by agitating the liquid with air introduced into the liquid at the bottom. For this purpose, each settling tank is provided adjacent the bottom with a hollow perforated spider 27 into which air under pressure is delivered in sufficient quantity to agitate the liquid in the tank. The spreading of the liquid as it is discharged into the tank also assists in aerating it to cause precipitation of the gelatinous material. After the liquid has been subjected to aeration for a sufficient time, the supply of air is cut off and the liquid permitted to remain quiescent for sufficient time to permit the heavier material therein to settle. Each settling tank is provided with a conical bottom 28 into which the heavier material settles and from which it is drained off through the pipe 29.

Connected to each settling tank, adjacent to, but above the bottom thereof, is a dis-

charge pipe 31, each pipe being provided with a valve 32, to control the emptying of the desired tank. The four pipes 31 are connected to a header 33, which, in the present instance, is connected to the intake side of a pump 34, which discharges the liquid into the storage tank 35. The tank 35 is provided between the top and bottom, with a fine filter bed 36, which prevents the passage of any remaining deleterious material in the liquid. The liquid is introduced into the storage tank below the filter bed and passes upward through the bed, leaving the deleterious material behind. The storage tank is provided with a steep conical bottom 37, connected to a waste discharge pipe 38. The entering liquid is prevented from disturbing the material collected on the bottom, by a concave bowl or basin 39, disposed directly below the end of the discharge pipe and serving to deflect the entering liquid upward.

The reclaimed, cleansed liquid is stored in the tank above the filtered bed, and in this portion of the tank there is preferably arranged a water heater, of any suitable type, usually comprising a coil through which steam is passed. The heated cleansed liquid is drawn off for reuse through the pipe 41.

I claim:

1. An apparatus for recovering laundry materials from solutions resultant from laundering operations comprising a filter through which the solution passes upwardly, a receiving tank, a plurality of settling tanks, means for passing the solution from the receiving tank to any desired settling tank, means for aerating the solution as it discharges into the settling tank, a storage tank to which the solution passes from the settling tank and a filter in the storage tank through which the solution passes.

2. An apparatus for recovering laundry materials from solutions resultant from laundering operations comprising a filter through which the solution passes, a settling tank into which the solution is introduced, means for aerating the solution in the settling tank whereby a precipitation of material occurs therein, a storage tank, a filter in said storage tank and a conduit for conveying the supernatant solution from the settling tank to the storage tank.

3. An apparatus for recovering laundry materials from solutions resultant from laundering operations comprising a filter through which the solution passes, a settling tank arranged to receive solution passing the filter, conduits connected to the settling tank for discharging the settled material and the supernatant solution, a storage tank into the bottom portion of which said supernatant solution discharges, a filter disposed across said storage tank above the solution

inlet, a conduit connected to the storage tank above the filter for drawing off the solution for reuse and a waste conduit connected to the bottom of the storage tank.

- 5 4. An apparatus for recovering laundry materials from solutions resultant from laundering operations comprising a filter through which the solution passes, a settling tank arranged to receive solution passing the filter, conduits connected to the settling tank for discharging the settled material and the supernatant solution, a storage tank into which the supernatant solution conduit extends, the discharge end of said
10 conduit being vertically disposed and opening downwardly adjacent the bottom of the tank, a deflector arranged adjacent the discharge end of the conduit and

discharge pipes connected to the storage tank at different levels.

- 20 5. An apparatus for recovering laundry materials from solutions resultant from laundering operations, comprising a filter through which the solution passes, a plurality of sloping bottomed settling tanks, means for selectively directing the filtered
25 solution to the settling tanks, discharge conduits for the settled material and the supernatant solution connected to each settling tank, a storage tank for the supernatant solution and means for selectively discharging the settling tanks to the storage tank.

In testimony whereof, I have hereunto set my hand.

FRANK L. ROSENAU.