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PURIFICATION PLANT

FOR

CREAMERY WASTE

Issued by the
State Board of Health of Wisconsin
1913

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THE SANITARY DISPOSAL OF CREAMERY WASTE

The owners of creameries and cheese factories in Wisconsin, even under the most favorable conditions, are experiencing great difficulty in disposing of the waste products so as to prevent the creation of a nuisance or the pollution of streams and other bodies of water.

This pamphlet is issued to assist in providing a proper system for the disposal of creamery waste. We believe that this is an exceedingly difficult problem and we trust that the suggestions offered will aid in providing a sanitary method for disposing of this waste material. Copies of this publication will be sent to all persons interested in this subject upon request and, in addition, the State Board of Health invites correspondence with the owners of creameries and cheese factories to the end that a satisfactory system of disposing of waste will be provided. Please read carefully the plans and specifications before any attempt is made to install this system and, if possible, we also advise that a sanitary engineer be consulted if there are unusual conditions to be met.

In many cases the owners of cheese factories and creameries make no effort to dispose of the washings and other waste from the factory until an unbearable nuisance is created and the health authorities, both local and state, have been appealed to for assistance.

As a result of failure on the part of many creameries and cheese factories to care for the waste material, nuisances are created and an excellent breeding place for flies is provided. This alone, when we consider the number of diseases which are spread by flies, is sufficient reason for the adoption of a satisfactory system for the disposal of all waste.

All pools of water accumulating about a cheese factory or creamery, either resulting from rains or the wash water from

the factory, become polluted, rendering the environment of such factory unsanitary and often creating a nuisance.

It is essential, therefore, that every precaution be exercised to prevent the collection of not only wash water, but all pools or mudholes in or near the factory.

The factory buildings should be so located that proper drainage is provided on all sides for surface water, then by providing a system as outlined in the plans and specifications herein incorporated, a great advance in the sanitary environment of creameries and cheese factories will be made.

Windows and doors of such factories should be carefully screened so as to exclude all flies from the interior of the factory. By taking care of the unsanitary elements outside of the factory, the elimination of the fly in the vicinity of such factories will be accomplished and the fly nuisance, as well as other nuisances so frequently complained of, will be abated.

In the past many of the cheese factories and creameries, which have been inspected by the officials of the State Board of Health, and also by representatives of local boards of health, show that the wash water is frequently allowed to flow on the public highway in ditches, or accumulate in considerable quantities in some stagnant pool. As result of this practice, the soil soon becomes thoroughly saturated with such refuse material and during hot weather a nuisance is created which is extremely objectionable, not only to private residences located near such creameries or cheese factories, but also to the general public who patronize the factories or who are compelled to pass along highways.

By simple, positive care on the part of the owners or managers of cheese factories or creameries, a great advance will be made and the betterment of the business as a whole will be largely advanced.

It is essential, therefore, that every cheese factory and creamery in the state discontinue throwing its waste material in ditches streams, along public highways, or in low places which will act as a receptacle for such washings or refuse.

Similar plans for the purification of creamery waste that are prepared by our Consulting Engineer have been thoroughly tested by actual operation and, if the plant is properly constructed and operated, there is practically no danger of creating a nuisance in disposing of the waste material.

In cases where the owners of cheese factories or creameries neglect or fail to properly dispose of the wash water and other waste from the creamery or cheese factory, the local boards of health are requested to make an investigation of the complaint and determine the character and the extent of the existing nuisance.

Section 1414 (W. S. 1898) authorizes the local boards of health to order the abatement of any and all nuisances under their respective jurisdiction, whether they are connected with creameries or cheese factories, or exist as result of the improper handling of other waste material.

The law authorizes the local health authorities to take charge of such nuisances whether they exist on private property or whether they are found on public highways or alleys.

In the case of Price vs. Oakfield, Highland Creamery Company, Volume 87, Wisconsin Reports, Page 536, the court states that: "A creamery company will be enjoined from causing offensive waste matter to flow upon another's pasture to its injury."

The court in the case of Greene vs. Nunnemacher, 36 Wis., Page 50, stated that: "Putting deleterious and offensive substances in a stream is a nuisance and can be prohibited."

Section 3180 of the Revised Statutes of 1898 provides that the Circuit Courts shall have jurisdiction of actions to recover damages for and to abate private nuisances or a public nuisance from which any person suffers a private or special injury. The circuit court also has the authority to grant injunctions to prevent the creation of a nuisance.

We realize that before systematic plans and specifications were gotten out, that certain localities often experienced difficulties in disposing of the waste product from creameries and cheese factories.

Since there is available a satisfactory and also an economical system for handling the waste material from creameries, the plea that has been made heretofore can no longer be accepted and the State Board of Health will insist that the waste from creameries and cheese factories of the state of Wisconsin must be disposed of in a sanitary manner.

We are willing at any time to co-operate with the owner or manager of any such industry and assist to the best of our ability

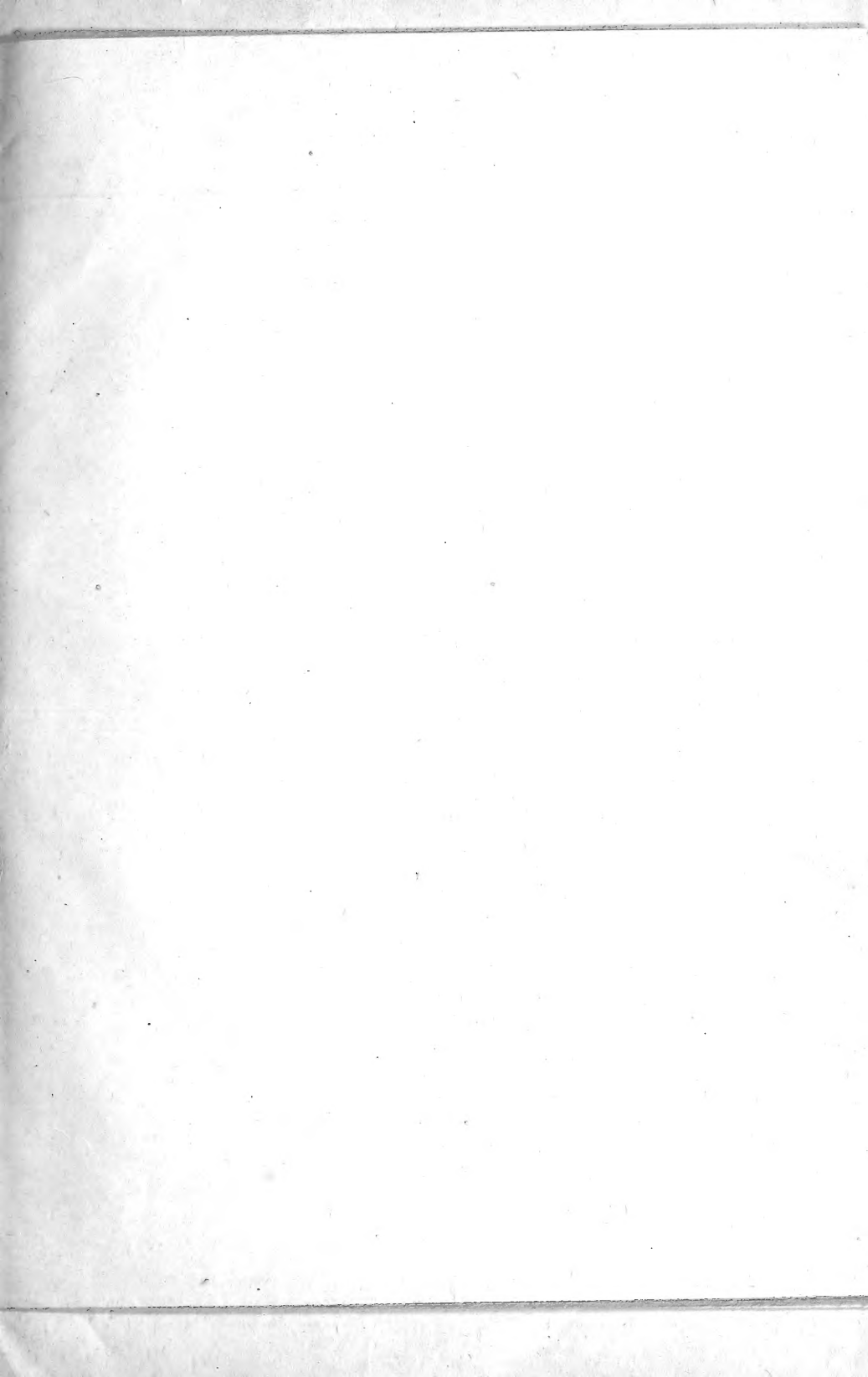
in removing unsanitary conditions, the continuation of which usually develops into a nuisance. The object of this circular is to point out the way for every creamery and cheese factory not having a proper system for disposing of its waste material to install, at a very small expense, a system that we are confident, if properly handled, will prove satisfactory and extremely economical in the end. The great dairying industry of this state, and the reputation that this state has for its dairy products, demands that the factories be operated on a higher plane from a sanitary and hygienic point of view.

PLANS FOR PURIFICATION OF CREAMERY WASTE.

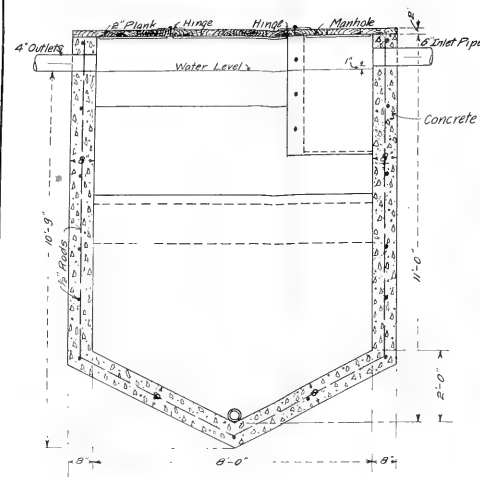
GENERAL DESCRIPTION.

The plan consists essentially of three parts; a double story settling tank, a filter and a dry well. In localities where there is a flowing stream, drainage ditch, pond or lake of sufficient size, or any place where only a partial purification is desired, it may be possible to use only the double story settling tank. In places where greater purity is essential, either or both the filter and dry well should be added. If the final disposal is to a ditch, stream, lake or pond, use the filter. If the final disposal is to be by percolation into the ground and the soil is a very coarse sand or gravel, the filter may be omitted, but if the soil is clay or a sandy clay or only a small amount of sand or gravel in the bottom of the dry well, then all three parts of the plant should be installed. If in doubt as to the best combination, you had better seek further advice from this Board or from a competent sanitary engineer.

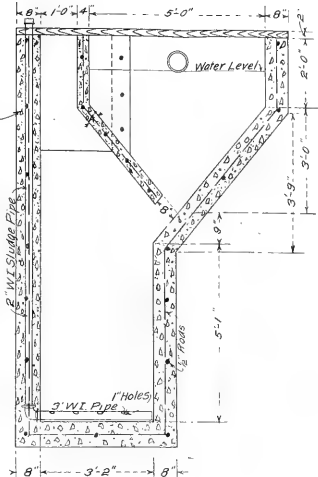
The settling tank is designed for a maximum of 400 pounds of butter per day and a maximum of 750 gallons of liquid per day. If you are wasting a greater amount of liquid than the above, the upper tank will have to be enlarged. If you are making more than an average of 400 pounds per day, then the lower tank will have to be enlarged. The solid contents of the lower tank should be pumped out once every three or four months no matter what amount of butter you are making. If you waste less liquid than 750 gallons and make less than 400 pounds of butter per day, the tank could be made smaller, but it would be preferable to leave it as designed unless the difference in capacity



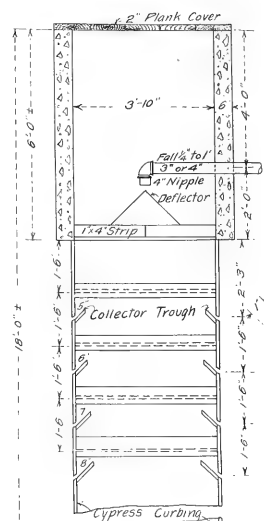




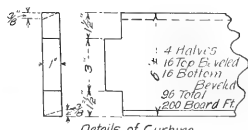
Sectional Elevation A-B of Settling Tank



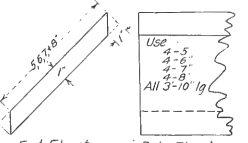
Sectional Elevation C-B of Settling Tank



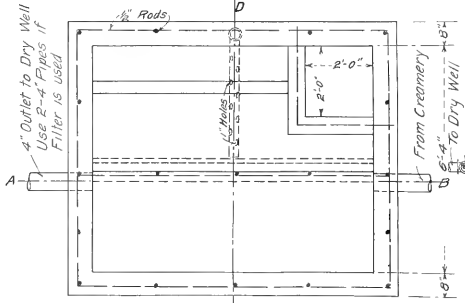
End Elevation Collector Trough Scale 1/4"=1'



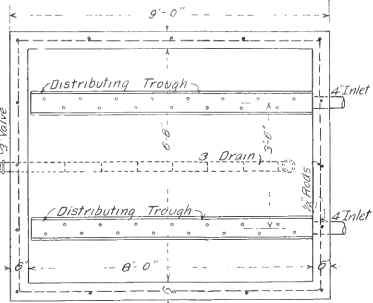
Details of Curbing Scale 1/4"=1'



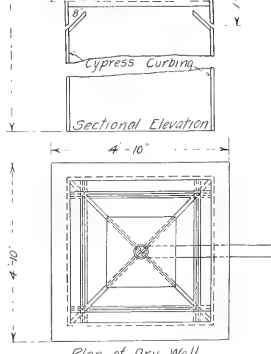
Side Elevation Collector Trough Scale 1/4"=1'



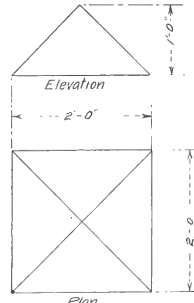
Plan of Settling Tank Scale 1/2"=1'



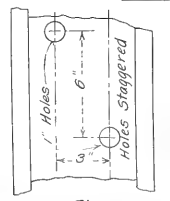
Plan of Filter Bed Scale 1/2"=1'



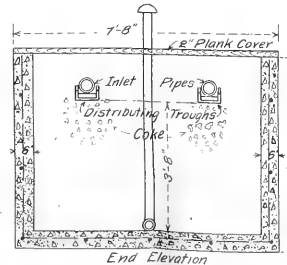
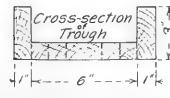
Plan of Dry Well Scale 1/2"=1'



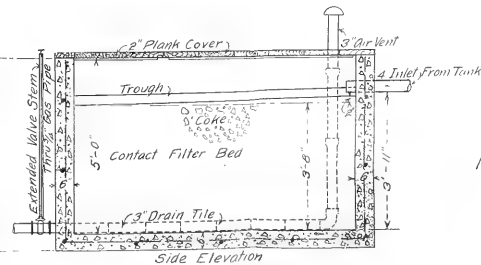
Plan Pyramidal Galvanized Iron Deflector Scale 1/4"=1'



Plan 2 Troughs 8'-0" long Scale 1/2"=1'



End Elevation

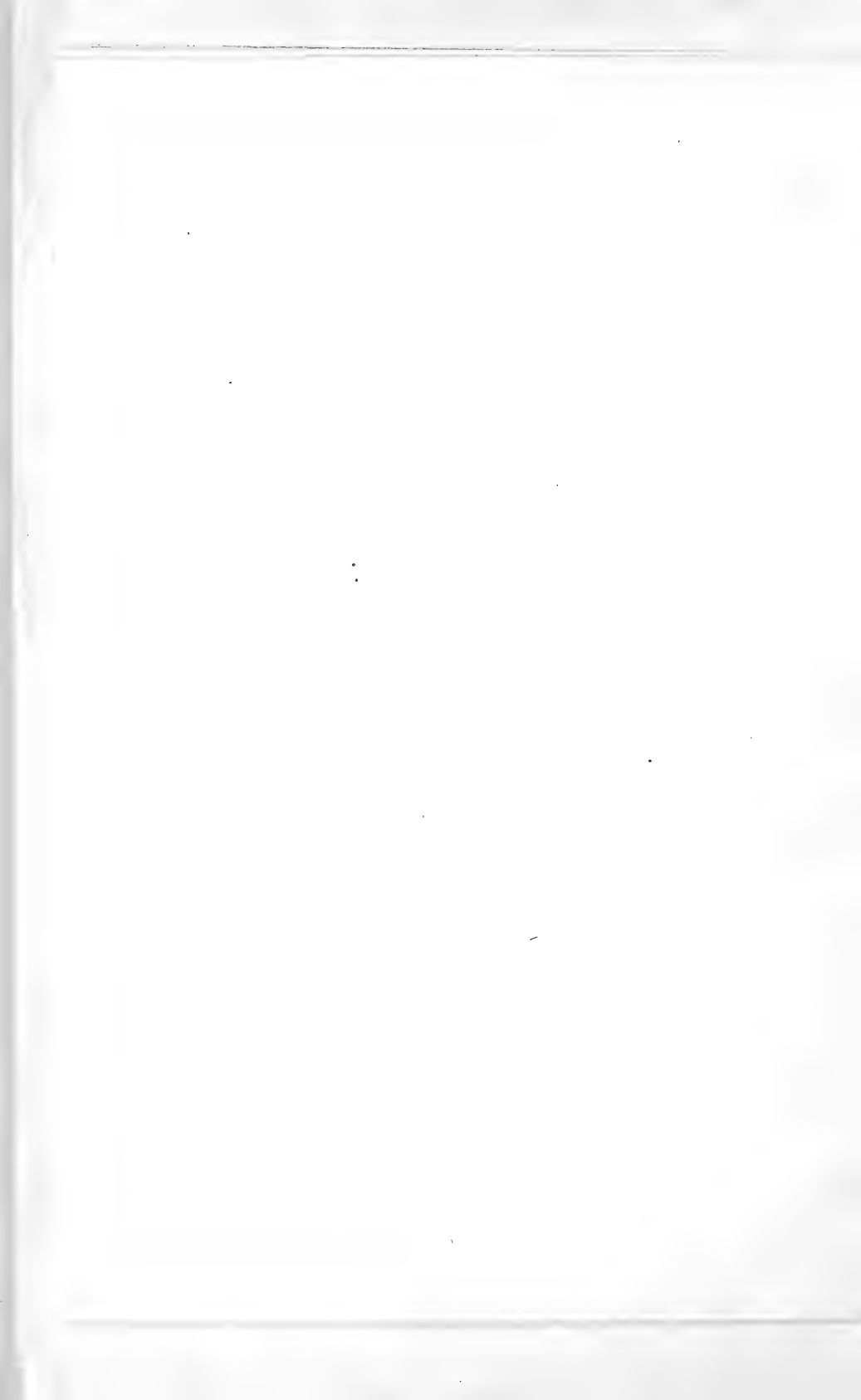


Side Elevation

Filter Bed Scale 1/2"=1'

Plan of Purification Plant for Creamery Waste
 Creamery Capacity 400⁰s of Butter and a Maximum of 750 Gallons of Liquid per Day 1913

Prepared for State Board of Health, By W.G. Kirchoffer, Hydraulic & Sanitary Engineer. Madison, Wisconsin.



between creamery and the capacity provided for in this plant were very great and it was absolutely necessary to economize.

The above reasoning should apply to the filter as well. It can readily be made larger by lengthening it. To economize in the cost of the plant where the tank and filter are both used, the outlet end wall of the tank can be the same as the inlet end of the filter.

As creamery waste is always acid, it will aid in the purification of the waste products to install a small receptacle containing milk of lime directly over the drainage channel in the creamery where it leaves the building and allow a small amount to drip into the channel or, if this is not practical or is inconvenient, put lumps of lime in the channel where the water may flow over it.

In localities where the care taker lives over the creamery, it would be advisable to have the waste from the kitchen sink, bath room and water closet drain into the tank; or if this is impossible, place the outside water closet directly over the tank.

Where the tank is used alone, a single outlet pipe is sufficient but where the filter is used also, two pipes will be used as shown on the plans of the filter.

OPERATION OF PLANT.

The flow thru the tank will be continuous while the creamery is in operation. The flow thru the filter should be intermittent, that is, the valve on the outlet should be opened every evening after operations for the day are complete and it should be closed every morning before the plant starts.

The lower compartment of the settling tank should be pumped out by placing a pitcher spout pump on the vertical sludge pipe once every three or four months. The contents make a good fertilizer for gardens.

SPECIFICATIONS FOR PURIFICATION PLANT FOR CREAMERY WASTE.

TANK: The settling tank is to be constructed in two compartments, one above the other so arranged that the solid matter in the wash water will settle out and drop thru the slot in the upper tank. Care should be taken to see that the slot does not project vertically over the lower compartment. It is essential

that no gases or floating material in the lower tank should rise into the upper tank.

CEMENT: The cement may be any of the following brands of American Portland Cement: Medusa, Atlas, Lehigh, Vulcanite, Universal, Whitehall, Alpha, Marquette, Chicago A.A. or Owl.

SAND: The sand to be used as a part of the gravel shall be taken from the pit and must be free from loam, sticks or other organic matter. All soil found in pockets, or that over-lying the gravel bed in the pit must be excluded.

GRAVEL AND SAND: The gravel used for making concrete shall consist of sand and small stones not over one and one-half inches in diameter. The amount of sand present should be at least 40% but not over 50%. The gravel should be clean and free from dust and other foreign matter which would impair the strength of the concrete.

STEEL RODS: The steel used shall be $\frac{1}{2}$ " round rods in lengths convenient for the work and of a quality used on other similar concrete work.

CONCRETE: The concrete for the tank shall be composed of one part cement mixed with 6 parts of gravel or, if crushed stone is used, it shall be a 1:3:5 concrete.

The concrete shall be mixed on a substantial platform of planks or boards securely fastened together so that the various materials of the concrete can be kept entirely free from admixture of foreign matter. A sufficient quantity of water must be added to form a good paste. The amount mixed at one time shall not exceed that amount which can be used up before the cement has time to set. The use of a concrete mixer is preferred.

PLASTERINGS When the tank walls are thoroughly set, they shall be thoroughly cleaned and a coating of one-half inch of Portland cement mortar plaster, mixed 1:1, shall be applied to the bottom and side walls.

CEMENT WASH: After plastering, there shall be applied with a broom to the bottom and side walls of said tank, a wash of neat Portland cement mixed with water and applied as thick as it can be put on.

FORMS: The earth bank, unless caved in, shall be used for the outside form of the concrete work. The inside forms for

the side walls shall be 1" boards or 2" plank, whichever may be most convenient. These shall be lightly nailed to 2 x 4 studding spaced 4' or less cc.

VALVE: The outlet valve to the contact filter will be a 3" stop cock of standard make and with threaded ends. The top of the plug should have a hole in it to which the handle may be attached.

FILTER: The water contained in the contact filter will be removed by means of 3" drain tile laid in the bottom of the filter. They shall be laid as close together as possible and the joints shall be covered with pieces of burlap. The drain tile will be surrounded with stone 1½" or more in diameter taken from the gravel.

TROUGHS: The troughs for the distribution of the effluent over the filter shall be made of 1" cypress 6" wide and 8' long. Each trough will have 16 1" holes drilled in the same, according to the dimensions given. The troughs shall be put in place after the filter has been filled with coke, and shall have a slope of 2" across the filter as shown on the plans.

COKE: The coke may be purchased from any commercial gas plant, but shall contain no pieces smaller than 1" in diameter. It shall be sound, clean and of good quality. Or in place of coke, if a sufficient amount of coarse clinkers could be obtained, they could be substituted.

COVER: The cover of the tank and filter shall be made of a good quality of pine or cypress planks 2" thick. They should be reasonably straight so as to leave no large openings for dirt to fall into the tank. These planks should be nailed together with strips of 1" board. A portion over the manhole into the lower chamber and a piece 3' x 8' over the lower end of the tank shall be made in the form of doors with the necessary hinges. Holes should be made in the cover for the air and ventilator pipes.

The covers should not be put in place until all of the work upon the tank has been completed, including the placing of the coke.

DRY WELL.

EXCAVATION: Dig a hole 4' 10" square and 6' more or less deep at the location chosen for the purification plant. Put in a form of boards or planks so as to make a 6" wall.

CONCRETE WALLS: Fill in the 6" wall space with concrete mixed the same as that specified for the tanks and filter. When the concrete has set sufficiently, remove the forms.

CURBING AND EXCAVATION: The remainder of the well is to be curbed up with 1" x 6" cypress boards used in the same manner as those used for curbing up wells in the regular way.

The ends of the curbing will be notched so as to leave a tenon 1" x 3" and cut 1½" from the top of the boards. On two sides of the well at the top one-half boards must be used. As this curbing is put in place, the earth within the well will be removed in the usual manner. When a depth of 1' 6" has been reached, the curbing board will be put in place on two sides of the well, which has its lower edge beveled ⅜". Directly below this board will be placed another one having a top edge beveled ⅜". This will leave a slot in the curbing from ½ to ¾" in width, depending upon the exact width of the curbing boards. When a depth of 2' 3" has been reached, similar boards will be placed on the two opposite sides of the well. The same operation will be repeated every third board on each side of the well until four slots have been formed on each side of the well. The excavation will then be continued, using plain curbing, until a depth of 18' has been reached or until sand or gravel is reached, if it is not encountered at a higher level. If ground water level is reached, it will do little or no good to excavate below it.

COLLECTOR TROUGHS: After the excavation has been completed, cypress boards 1" x 6" to 10" in width will be beveled, as shown in the plans, cut to the exact length and nailed just below each one of the slots. The 5" boards will be placed on the four upper slots and the 6" ones on the next four slots, and so on, until the last one will have 8" boards.

These collector troughs should be supported at each end by nailing cleats to the opposite sides of the well curb. Care should be taken that the joints should be made as nearly water tight as possible so as to force all the water to flow out thru the narrow slot. Below the collector troughs the curbing should be braced by nailing 1" x 4" strips vertically in each corner of the well.

INLET PIPE: The inlet pipe will be 3" or 4" wrought iron pipe of a length sufficient to reach from the outside of the contact filter to the center of the dry well. The end of the inlet pipe

will be turned down with a 3" or 4" elbow and end in a nipple.

DEFLECTOR: Water entering the dry well will be collected into the collector troughs by means of a pyramidal galvanized iron deflector. The deflector will be 2' square on the base by 1' high with side slopes of 45 degrees in all directions. The deflector will be supported upon 1" x 4" strips placed diagonally across the well at the bottom of the concrete. These may be held in place by wedges or by cleats nailed from the curbing up to the strip.

COVER: The cover for the dry well will consist of 2" plank nailed together with 1" strips. For purpose of inspection two or more planks should be nailed together to form a trap door.

ESTIMATE OF MATERIALS.

SETTLING TANK.

8.6 cu. yd. concrete.
388' $\frac{1}{2}$ " round rods.
160 Board ft. of 2" plank.
3'-3" W. I. pipe with 8-1" holes.
1-3" elbow; 1-3" to 2" reducer; 1-2" cap.
11'-2" W. I. pipe.
4 hinges.

FILTER BED.

4.2 cu. yds. concrete.
230'- $\frac{1}{2}$ " round rods.
6240 pounds coke.
7'-3" drain tile; 4 $\frac{1}{2}$ '-3" vitrified pipe.
1'-3" vitrified elbow; 1 C. I. 3" air vent.
8'- $\frac{3}{4}$ " gas pipe; 1-3" stop cock with 8" stem.
144 board ft. of 2" plank.
16 board ft. of 2" cypress plank.

DRY WELL.

2 cu. yds. concrete,
56 board ft. of 2" plank.
1 galvanized iron deflector.
1-3" or 4" W. I. pipe elbow.
1-3" or 4" W. I. nipple.
250 board ft. of 1" cypress.

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