

973,120.

Patented Oct. 18, 1910.

2 SHEETS-SHEET 1.

Fig. 1

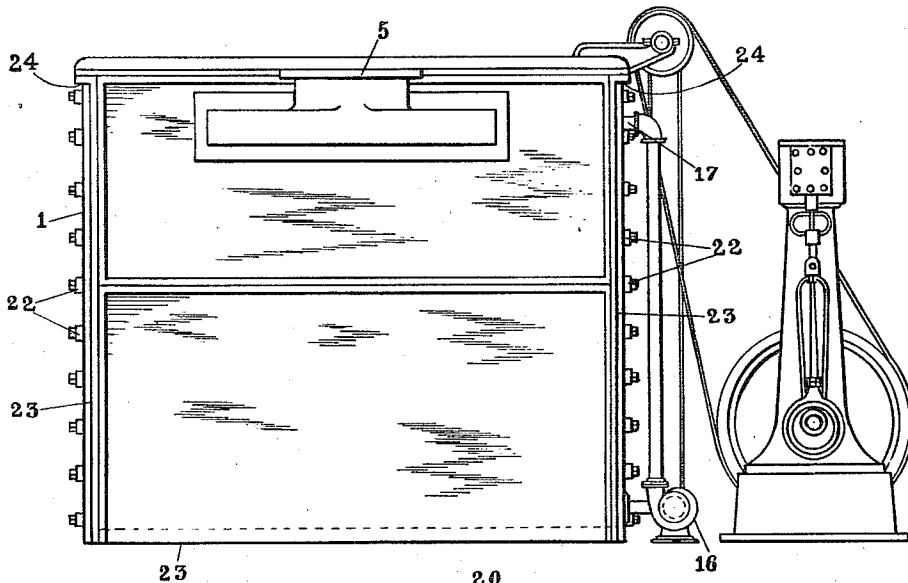


Fig. 2

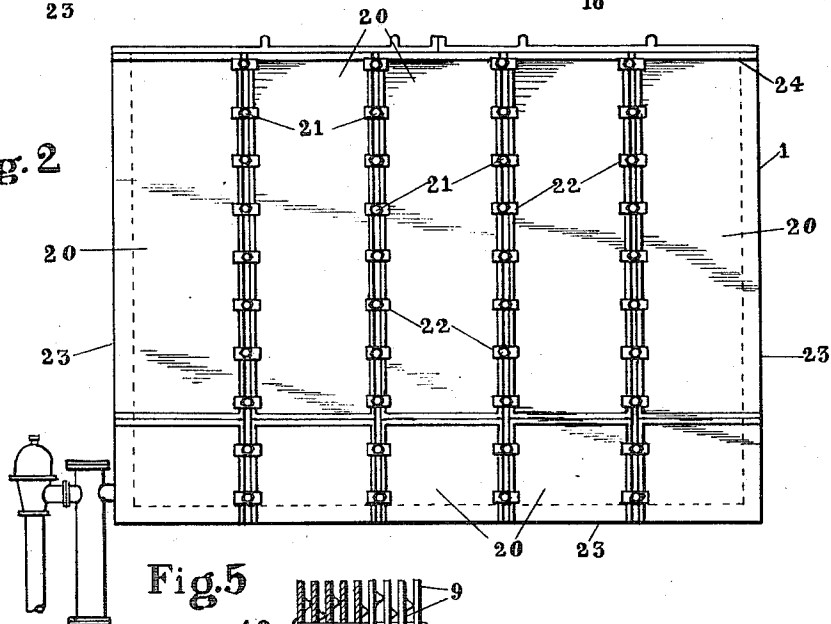
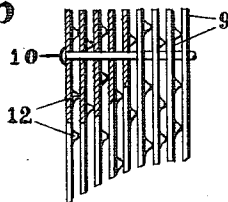


Fig. 5



WITNESSES:

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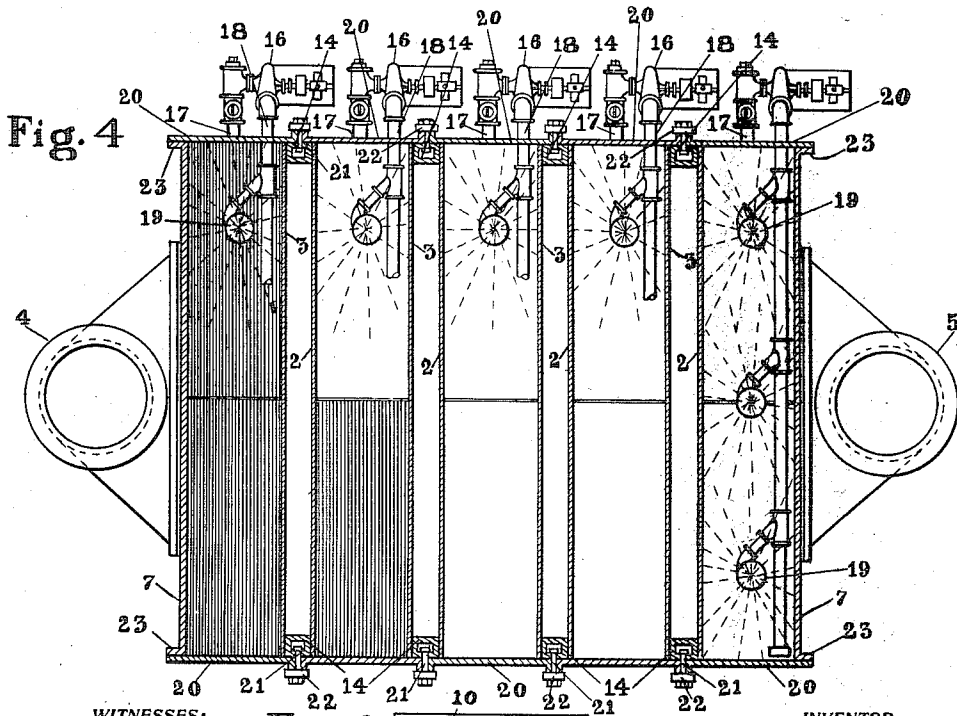
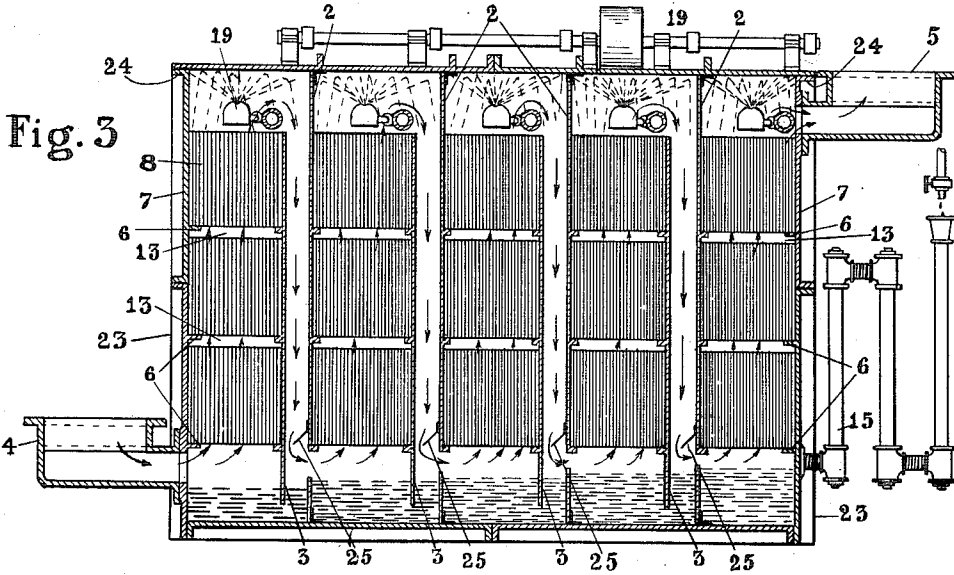
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GAS SCRUBBER.

APPLICATION FILED APR. 24, 1909.

Patented Oct. 18, 1910.

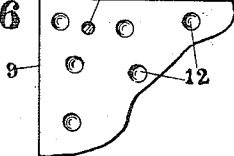
2 SHEETS-SHEET 2.



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Fig. 6



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UNITED STATES PATENT OFFICE.

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GAS-SCRUBBER.

973,120.

Specification of Letters Patent.

Patented Oct. 18, 1910.

Application filed April 24, 1909. Serial No. 491,952.

To all whom it may concern:

Be it known that I, ERNEST F. LLOYD, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Gas-Scrubbers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to scrubbers for the purification of illuminating gas and more especially to certain features thereof that increase the efficiency of the apparatus and simplify its construction.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a view in end elevation of an apparatus embodying features of the invention. Fig. 2 is a view in side elevation of the apparatus. Fig. 3 is a view in longitudinal vertical section of the scrubbers. Fig. 4 is a view in horizontal section of the scrubber with parts removed. Figs. 5 and 6 are views in detail of scrubbing plates or trays.

Referring to the drawings, a rectangular casing 1 is divided by a number of vertical internal interrupted partitions 2 and 3 so disposed in pairs that the interruptions or openings through one partition 3 of each pair occur at the top and bottom thereof, and of the adjoining one 2 near to the bottom. The latter interruptions or openings are so disposed that when water is filled into the bottom of the casing, it stands at different levels between the partitions 2 while the partitions 3 have their lower edges projecting into the liquid so as to prevent the passage of the current of gas thereunder, the whole arrangement being such that a current of gas entering at one end through a suitable inlet 4 is required to take a sinuous course up and down to reach an outlet 5 at the opposite end. Ledges 6 are so disposed on the casing end walls 7 and the proximate faces of the partitions 2 and 3 that they form supports for scrubbing trays 8. These scrubbing trays are stacks of thin rectangular sheets 9 of metal held in spaced relation by stay rods 10 and are either made by being run through a roll in such manner as to put a slight crimp at intervals across the sheet preferably at a slight angle to the margin, or else the sheets are irregularly pitted, the resulting bosses 12 standing out

from one face of the sheet only, to facilitate assembling. If crimped sheets are used they are assembled so that the crimps cross each other at angles leaving spaces between the sheets for the passage of gas. If the pitted sheets are employed, the irregular disposition of the pits prevents their registration when stacked, and effects the same result. A sufficient number of sheets are bolted together to form a stack or tray which rests upon the ledges 6 on each side of the chamber in which they are placed with the sheets on edge and are made to only a loose fit to the side of the chamber, the projection of the ledges being sufficient to prevent the leakage of gas between the outside sheets of the bundle and the adjacent side of the chamber. The advantage of this construction primarily lies in the fact that no surface is removed from the sheets in manufacture, nor is their weight increased by addition of baffles to their faces, neither is any surface covered from access to it by gas as is the case where sheets are held apart by spacing bars and the spacing is more uniform. The ledges being set at the same level throughout the casing, the partitions in conjunction with the square ends of the chambers form each in themselves a rectangular chamber into which, when one side of the casing is removed, each rectangular bundle of sheets may be slid as a drawer, and the intervals 13 occasioned by the ledges 6 between each stack and the one above it form equalizing chambers so that the partial clogging of one set or bundle of sheets in a tier does not serve to interfere with the uniform passage of the gas through the next one above.

It is known in the art of scrubbing gas for the removal of ammonia and similar impurities, that it is desirable to first treat the gas with liquor which has been brought to the greatest strength by reason of having treated the greatest quantity of gas previously. Accordingly by reason of a uniform variation in height from the bottom, of the openings in the partitions 2, water which enters at the outlet end of the machine through a supply pipe 15 flows uniformly toward the inlet, but is of varying qualities of strength uniformly from the inlet toward the outlet, the strongest water or liquid being that in the compartment into which the gas first enters. It is also essential that the gas should pass over surfaces which are uniformly and very thoroughly

saturated with such liquor. For this purpose a series of pumps 16 of the rotary or other suitable type are provided, or a single pump is used having a number of independent chambers, there being one such pump or chamber for each compartment of the machine. This pump has its inlet 17 leading from the bottom of its compartment or division, and its discharge 18 to spray nozzles 19 of a suitable character disposed in the top of the same compartment and above the body of trays, stacks or grids in that compartment. With the pumps in operation, the liquor is being continually drawn from the bottom of each compartment and is continually being delivered into the top of the same compartment, thereby being repeatedly pumped over, the excess fed in through the supply pipe 15 overflowing continually to the compartment next ahead of it and finally away to a suitable drain. The spray nozzles, pumps and power for driving the latter may be of any suitable or desirable kind or type.

The construction of the casing to enable a device of this character to be built, is an important matter. All of the partitions are continuous across the machine horizontally. As a preferred method of building each pair of the partitions 2 and 3 are fastened at each end on opposite sides of a hollow column 14 or stationary part of the main casing, which has two of its sides parallel for receiving the partitions and its outer face at right angles for receiving a sealing door 20. The inner portion of the column is hollow with openings on its outer face of such a character that tee-headed bolts 21 may be passed into the column from the face and supported at predetermined intervals by webs or partitions (not shown) which likewise form strengthening ribs on the interior of the column. The doors 20 or plates forming the closure to the ends of each compartment are set up against the outer faces of the columns and by means of yokes 22 passing over the tee-headed bolts are fastened with nuts to the outer face of the hollow columns to make a gas tight joint. The outer faces of the columns are likewise in alinement with bottom and end flanges 23 of the casing and may either be in alinement with a similar flange 24 forming the top of the machine or may have their ends finished at right angles thereto so that they stand between the bottom and top of the casing, the construction being such that they form openings closed with doors for the very ready removal of any of the bundles which may require to be changed by reason of clogging or otherwise, each door and thereby the trays in the compartment which it closes, being independently removable. It is obvious that the construction of the fastenings may be such that a single yoke holds

together the adjoining edges of two doors or each may be separately secured by the employment of a double number of bolts, by cotter bars, by lugs cast upon the doors themselves with a bolt passing through such lug or the column may be solid with external means of fastening, or any other suitable manner of securing the fastening may be used.

To obtain a further spraying action, near the bottom of each passage between the partitions 2 and 3 in which the gas passes downwardly, is an inclined plate 25 upon which a considerable quantity of the water delivered by the sprays, impinges, and by reason of the height of the drop, splatters and forms a spray or mist through which the gas has to pass on its way to the next compartment.

A closed opening in each door or closure at the end of each compartment affords access for cleaning tools into the bottom of the compartments; thus the entire bottom of the casing is readily accessible for cleaning purposes.

The scrubbing trays, although herein shown in the preferred form, may be of any suitable design or may be replaced by a bed of coke, shavings or the like supported in the chambers at an interval above the bottom thereof.

Obviously, changes in the details of construction may be made without departing from the spirit of the invention and I do not care to limit myself to any particular form or arrangement of parts.

What I claim as my invention is:—

1. In a gas scrubber, a closed casing provided with closing doors, transverse partitions therein whose upper and lower margins are separated from the casing, a division wall in spaced, parallel relation to each partition extending to the casing top and bottom and having a transverse opening near its lower end above the depending margin of its companion partition, horizontal continuous ledges on the proximate faces of the partition walls in the tray compartments, a gas inlet at one end of the casing near the bottom, a gas outlet at the other end, a water circulating system adapted to introduce water at the outlet end of the casing and withdraw it from the other end, means for raising the water in the bottom of each chamber between the pairs of partitions to the top of the chamber and spraying it down, and tiers of removable single scrubbing trays, each tray consisting of a stack of upright spaced sheets filling the interval between the chamber sides and supported by the ledges in each chamber, and removable endwise through the doors in the casing.

2. In a rectangular gas scrubber a closed casing with a gas inlet at one end and a gas outlet at the other, divided into chambers by

pairs of transversely disposed partitions, in
 spaced relation and constituting a gas pas-
 sage, the upper and lower margins of one
 of the partitions of each pair toward the
 5 inlet being separated by an interval from
 the top and bottom of the casing, and the
 other partition having a transverse opening
 above the lower margin of the companion
 wall, posts interposed between the lateral
 10 margins of each pair of partitions and form-
 ing the marginal support and spacing there-
 for, doors forming the casing sides detach-
 ably secured against the outer faces of the
 posts between the plane of the partitions
 15 separated by the posts, horizontal tiers of
 single scrubbing trays removably secured
 in each chamber and removable through the
 doors, and means for raising water trapped
 in each chamber between the partitions to
 20 the top thereof and spraying over the trays
 and into the space between the pairs of par-
 titions.

3. In a gas scrubber, a closed casing with
 a gas inlet at one end and a gas outlet at
 25 the other, divided into chambers by pairs

of transversely disposed partitions, the up-
 per and lower margins of the partition of
 each pair toward the inlet, being separated
 by an interval from the top and bottom of
 the casing, and the other partition having
 30 an opening above the lower margin of the
 companion wall, a water circulating sys-
 tem adapted to introduce water at the gas
 outlet end of the casing and withdraw it at
 the other, means for raising water in the
 35 bottom of each chamber to the top thereof
 and spraying it down, horizontal alined
 ledges on the chamber walls extending con-
 tinuously from end to end thereof, and
 a scrubbing tray consisting of stacks of up-
 40 right sheets in spaced relation bridging the
 gap between and resting on each pair of
 ledges, said trays being removable endwise
 from the casing.

In testimony whereof I affix my signature 45
 in presence of two witnesses.

ERNEST F. LLOYD.

Witnesses:

C. R. STICKNEY,
 A. M. SHANNON.