

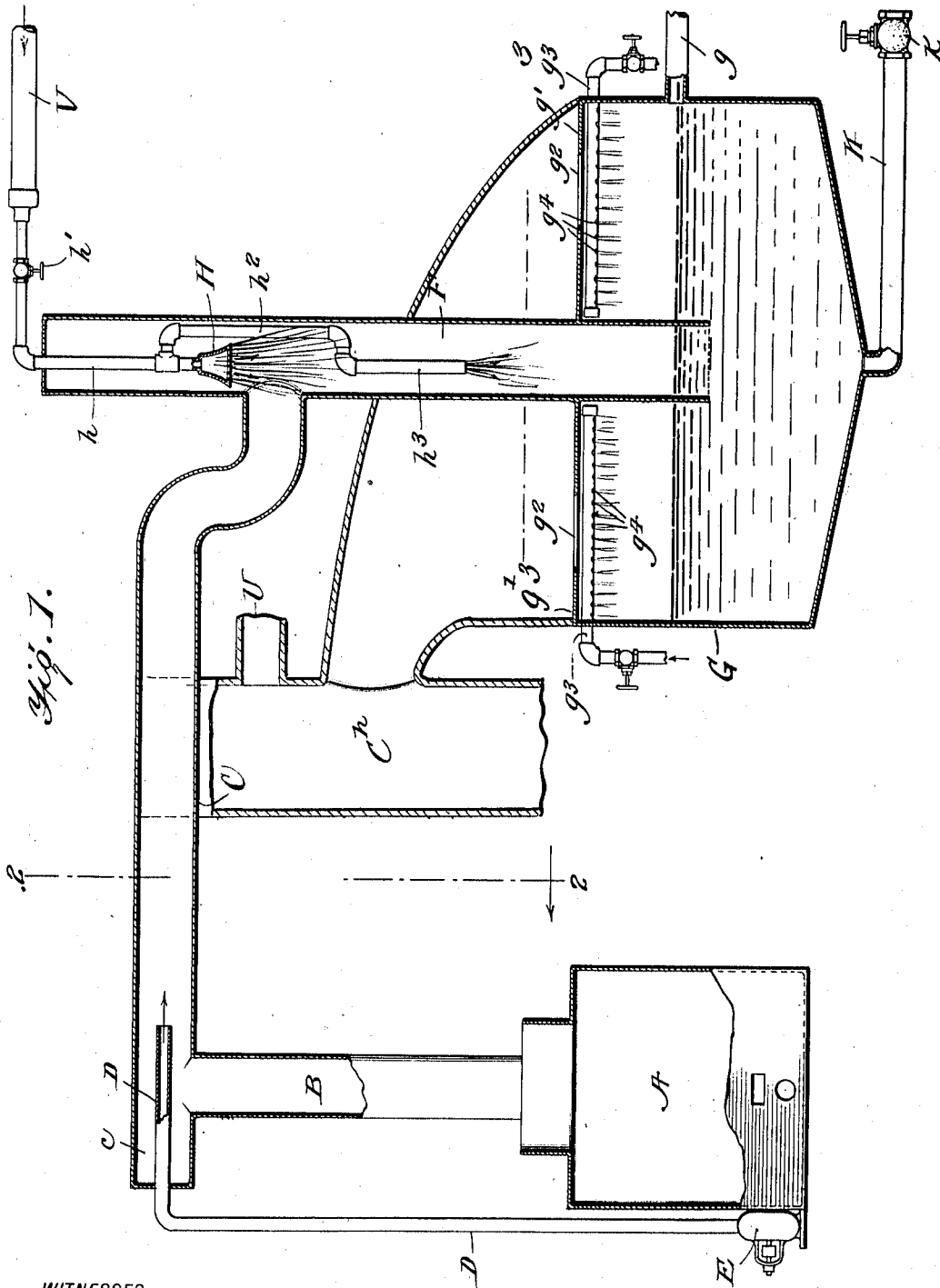
C. C. WHITMORE.
FUME ARRESTER.

APPLICATION FILED MAR. 24, 1909.

Patented Mar. 22, 1910.

3 SHEETS—SHEET 1.

952,970.



WITNESSES

L. H. Schmidt.
L. Stanley

INVENTOR

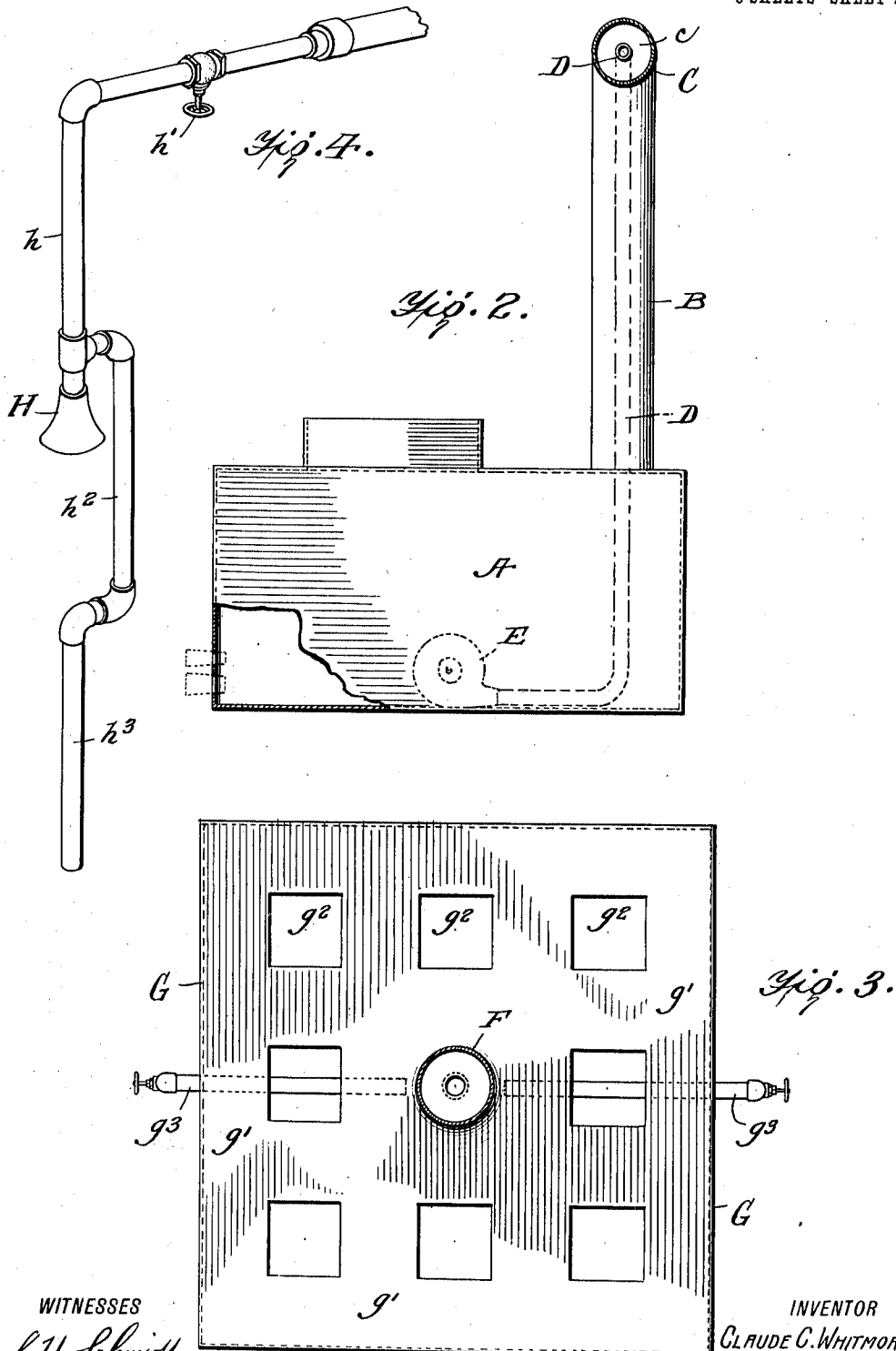
CLAUDE C. WHITMORE,
BY *Wm. Co.*
ATTORNEYS

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3 SHEETS—SHEET 2.



WITNESSES
L. H. Schmidt.
L. A. Stanley

INVENTOR
CLAUDE C. WHITMORE,
BY *Munn & Co.*
ATTORNEYS

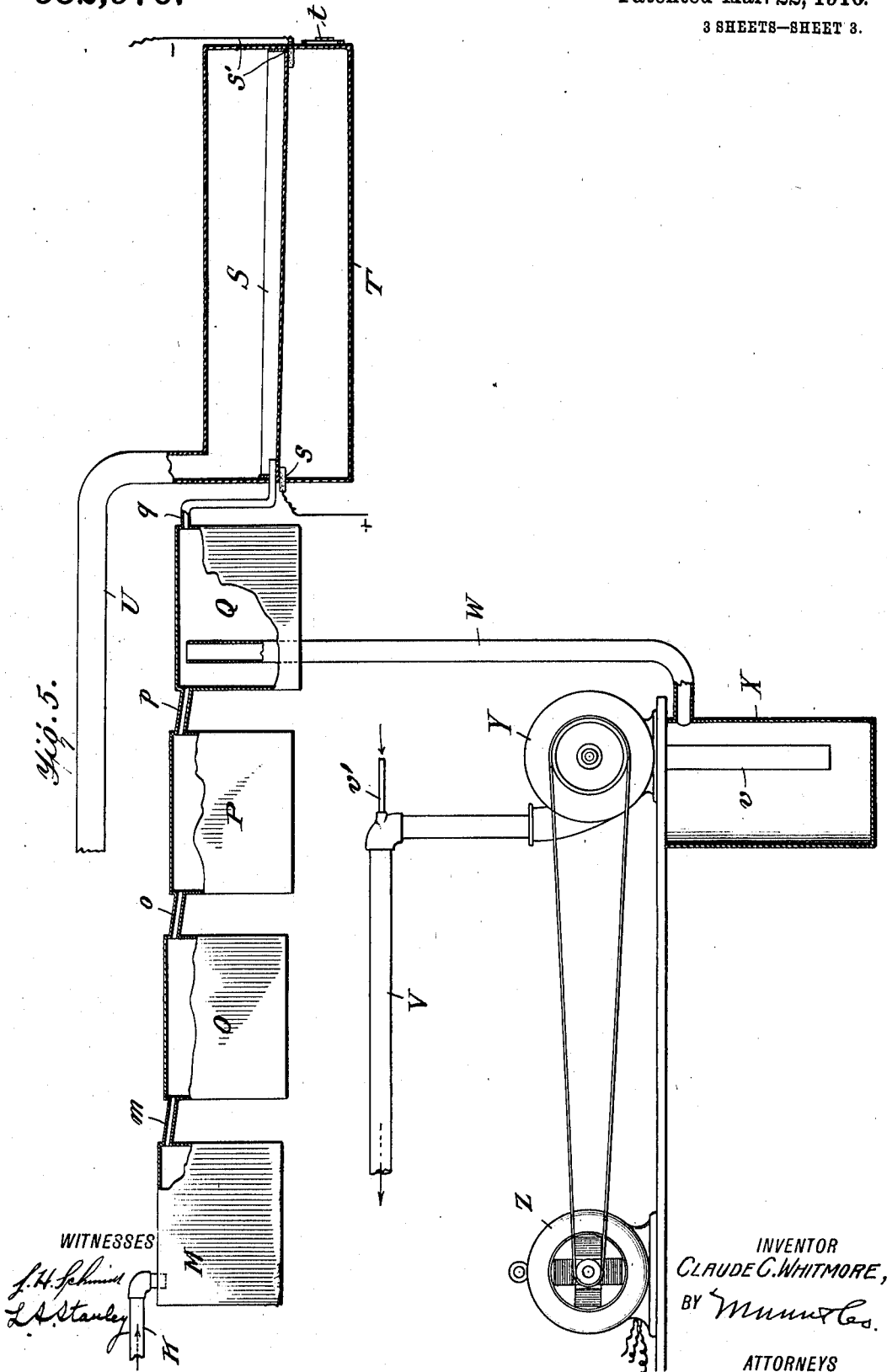
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3 SHEETS—SHEET 3.

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UNITED STATES PATENT OFFICE.

CLAUDE C. WHITMORE, OF BUTTE, MONTANA.

FUME-ARRESTER.

952,970.

Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed March 24, 1909. Serial No. 485,542.

To all whom it may concern:

Be it known that I, CLAUDE C. WHITMORE, a citizen of the United States, and a resident of Butte, in the county of Silverbow and State of Montana, and whose post-office address is No. 213 North Idaho street, have invented a certain new and useful Improvement in Fume-Arresters, of which the following is a specification.

My invention relates to devices for arresting the fumes in smoke and obnoxious gases from furnaces, and it consists in combinations, constructions and arrangements herein described and claimed.

My invention is especially applicable to those furnaces in use in smelters, in which certain ores are roasted which give off gases and fumes that are injurious to vegetation and which tend to render the atmosphere of the surrounding locality unfit to breathe.

The main object of my invention is to provide a device which may be attached to the furnace of the ordinary smelter and by which the smoke and gases may be condensed and the injurious substances extracted.

A further object of my invention is to provide a condensing system in which the water, which constitutes the main condensing agent, may be used again and again, thereby rendering the condensing plant economical in operation.

Other objects and advantages will appear in the following specification and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, in which similar reference characters indicate like parts in the several views, and in which—

Figure 1 is a sectional view of one portion of the condensing system. Fig. 2 is a view partly in section of the furnace taken along the line 2—2 of Fig. 1, looking in the direction of the arrow. Fig. 3 is a plan view of the water tank taken along the line 3—3 of Fig. 1. Fig. 4 is a detail view and perspective of the spraying device and Fig. 5 is a sectional view of another portion of the condensing system.

Referring now to Fig. 1, I have shown therein a furnace A of ordinary type for smelting ores. From the top of the furnace there extends an exit flue B. At the top of the exit flue is a lateral flue C, through the extended end *c* of which the

pipe D, from the blower E, extends. The pipe C communicates with a vertical pipe F which is secured to the top of a water tank G, as clearly shown in the figure. The tank G is normally filled with water up to the overflow pipe *g* and the end of the pipe F extends underneath the water to a distance which depends upon the force with which the gases are carried along by the air blast.

The top *g'* of the tank G is provided with openings *g''*, and just underneath the top is a transverse pipe *g'''* which is perforated on its underside at *g''''* to permit fine streams of water to fall therefrom.

Disposed within the pipe F is a condensing device which consists of a spray H, at the end of a pipe *h* controlled by a hand-valve *h'*. A branch pipe *h''* forms a by-pass for part of the water. This pipe connects with a vertically depending pipe *h'''* which is located preferably in the center of the pipe F.

At the bottom of the tank G there is an out-flow pipe K, provided with a valve *k* for the regulation of the flow, which leads to the first settling tank M shown in Fig. 5. This tank communicates with another tank O by means of the over-flow pipe *m*, which, in turn, is connected with the tanks P and Q by the pipes *o* and *p* respectively. The last tank Q communicates by means of the over-flow pipe *q* with the pan S in the furnace T; the latter is provided with an exit flue U which communicates with the main chimney C^b. This furnace may be of any approved type. The pan S is arranged to be heated by fuel placed underneath the pan which may be introduced through the door *t*. The walls of the furnace which are of non-conducting material are provided with the electrodes *s* and *s'* which are directly in contact with the pan S. The latter, when filled with the liquid from the tank Q constitutes a conductor between the electrodes *s* and *s'* the resistance of which is great enough to cause intense heat and the consequent evaporation of the liquid. The electrodes *s* and *s'* are connected with a suitable supply of electric current and they may be used either with the heating means to assist the latter or separately.

Leading outwardly from the settling tank Q is a pipe W which communicates with the pump well X. The rotary pump Y, which is driven by the motor Z, is adapted to pump

the water from the well X through the pipe *v*, into the pipe V, leading to the spray H, in Fig. 1.

From the foregoing description of the various parts of the condensing system, the operation thereof may be readily understood.

The ore is smelted in the furnace A in the usual manner, the smelting operation forming no part of the present invention. The smoke and gases of combustion then pass upwardly through the pipe B and meet the air blast from the fan E, being forced along the pipe C. The hot gases then meet the water coming from the spraying device H, which absorbs a large portion of the soluble gas and dust. As the smoke passes on down through the pipe, it is further condensed by the water coming from the pipe *h*³. The mingled air and smoke are driven into the water in the tank G by means of which the dust, solid particles and soluble gases are extracted, the remaining constituents of the gas passing up in the form of bubbles in the vacant space at the top of the tank where it meets the fine spray from the pipe G². From thence the air passes out through the opening G² and on up into the stack Cⁿ. The pipe *g* is for the purpose of regulating the height of the water which will run out through this pipe if the valve *k* of the outlet pipe at the bottom of the tank is not properly regulated. The water containing the solid matter and the soluble matter is now run out through the pipe K into settling tanks M, O, P and Q. Of course there may be as many of these settling tanks as is necessary. In the drawing I have shown four. The soluble matter which may consist of certain acids such as sulfuric acid is allowed to pass by means of the over-flow pipe *q* into the pan S in the furnace T where the concentration of the acid takes place. The heat for the evaporation of the water may be supplied by electrical means through the electrodes *s* and *s'*. The vapor passes out through the pipe U to the stack.

A portion of the water which is now partly purified by the precipitation of the solid matter in the settling tanks is taken out through the pipe W into the well from whence it may be pumped into the pipe V leading to the spraying device, when it may be again used for condensing the gases. Since the pipe *q* and the pipe W are at the same level, another portion of the partly purified water passes over through the pipe *q* into the pan S. The pipe *v'* leads from the supply well, (not shown) and sufficient water may be pumped through the pipe into the pipe V to off-set the overflow through the pipe *q* into the pan S. The acid is being concentrated in the pan S while the pure water is being supplied to the sys-

tem through the pipe *v'*. Thus it will be seen that a continuous cycle is effected in which the pure water is mingled with the water pumped back through the pipe V, thereby diluting the latter. The diluted water takes up more acid in the manner already described, and the acidulated water again goes through the process of partial dilution and partial concentration.

I am aware that other forms of the device based upon the same general idea might be made but I consider as my own all such modifications as fairly fall within the spirit and scope of the invention.

I claim:

1. In a fume arresting system, a furnace, an exit flue, an air blast communicating therewith, a water tank, a condensing pipe in communication with said exit flue carried by said water tank and arranged to normally project underneath the water, a spraying device disposed in said condensing pipe, a perforated water pipe arranged in the top of said tank above the surface of the water, settling tanks and an evaporating device connected with said water tank.

2. In a fume arresting system, a furnace, an exit flue, an air blast communicating therewith, a water tank, a condensing pipe in communication with said exit flue carried by said water tank and arranged to normally project underneath the water, a spraying device disposed in said condensing pipe, a perforated water pipe arranged in the top of said tank above the surface of the water, a series of settling tanks connected with said water tank, an evaporating pan in communication with the last tank of said series and means for heating said pan.

3. In a fume arresting system, a furnace, an exit flue, an air blast communicating therewith, a water tank, a condensing pipe in communication with said exit flue carried by said water tank, and arranged to normally project underneath the water, a spraying device disposed in said condensing pipe, a perforated water pipe arranged in the top of said tank above the surface of the water, a series of settling tanks connected with said water tank, an evaporating pan in communication with the last tank of said series, a furnace for heating said pan, and a main chimney or stack, said main stack having communication with said water tank and said furnace.

4. In a fume arresting system, a furnace, an exit flue, an air blast communicating therewith, a water tank, a condensing pipe in communication with said exit flue carried by said water tank, and arranged to normally project underneath the water, a spraying device disposed in said condensing pipe, a perforated water pipe arranged in the top of said tank above the surface of the water, a series of settling tanks connected with

said water tank, an evaporating pan in communication with the last tank of said series, a furnace for heating said pan, a main chimney or stack, said main stack having
5 communication with said water tank and said furnace, a well, an overflow pipe leading from said last tank of said series, a

pump communicating with said well and a pipe for conveying the water pumped from said well to said spraying device.

CLAUDE C. WHITMORE.

Witnesses:

G. D. MOORE,
WILLIAM MEYER.