M. J. SMITH & M. O. KONGSLI.

DEVICE FOR PREVENTING WASTE OF MINERALS.

APPLICATION FILED JAN. 22, 1909.

936,377.

Patented Oct. 12, 1909.

2 SHEETS—SHEET 1.

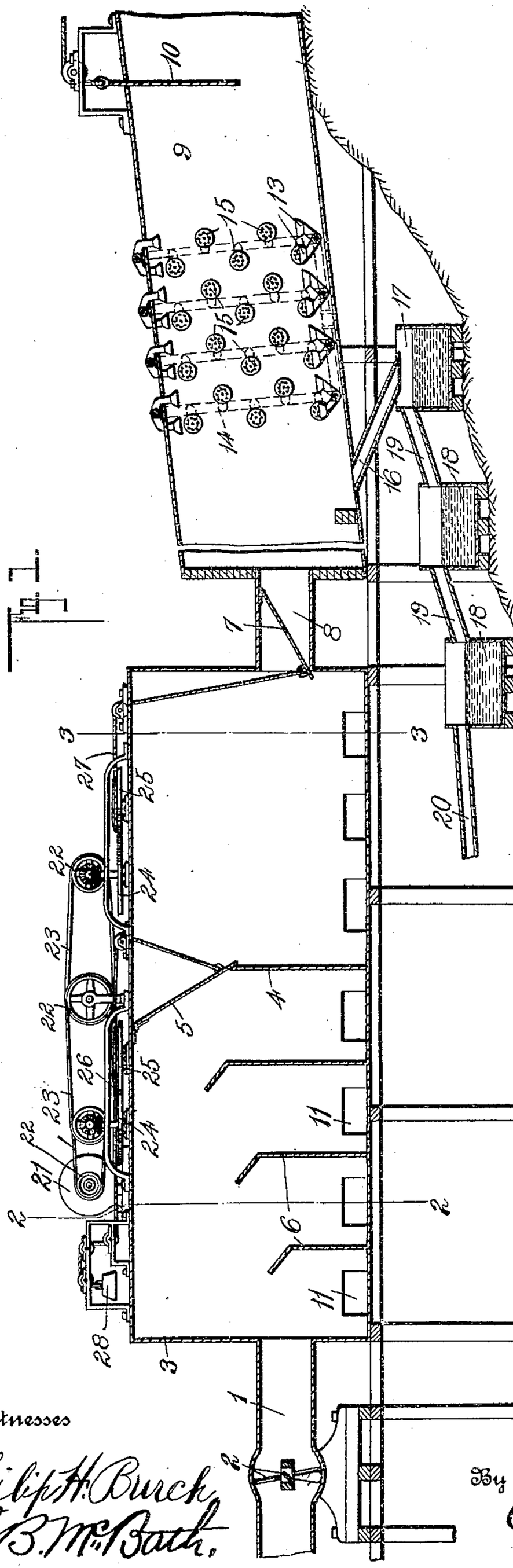


Fig. 1.

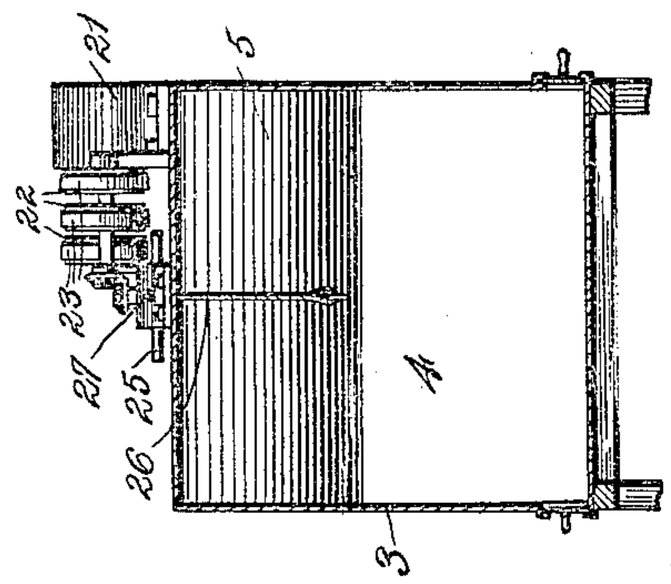
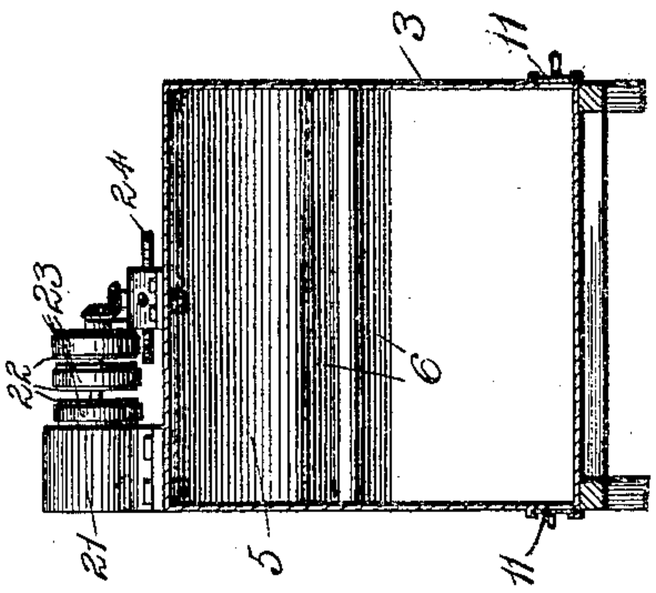


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

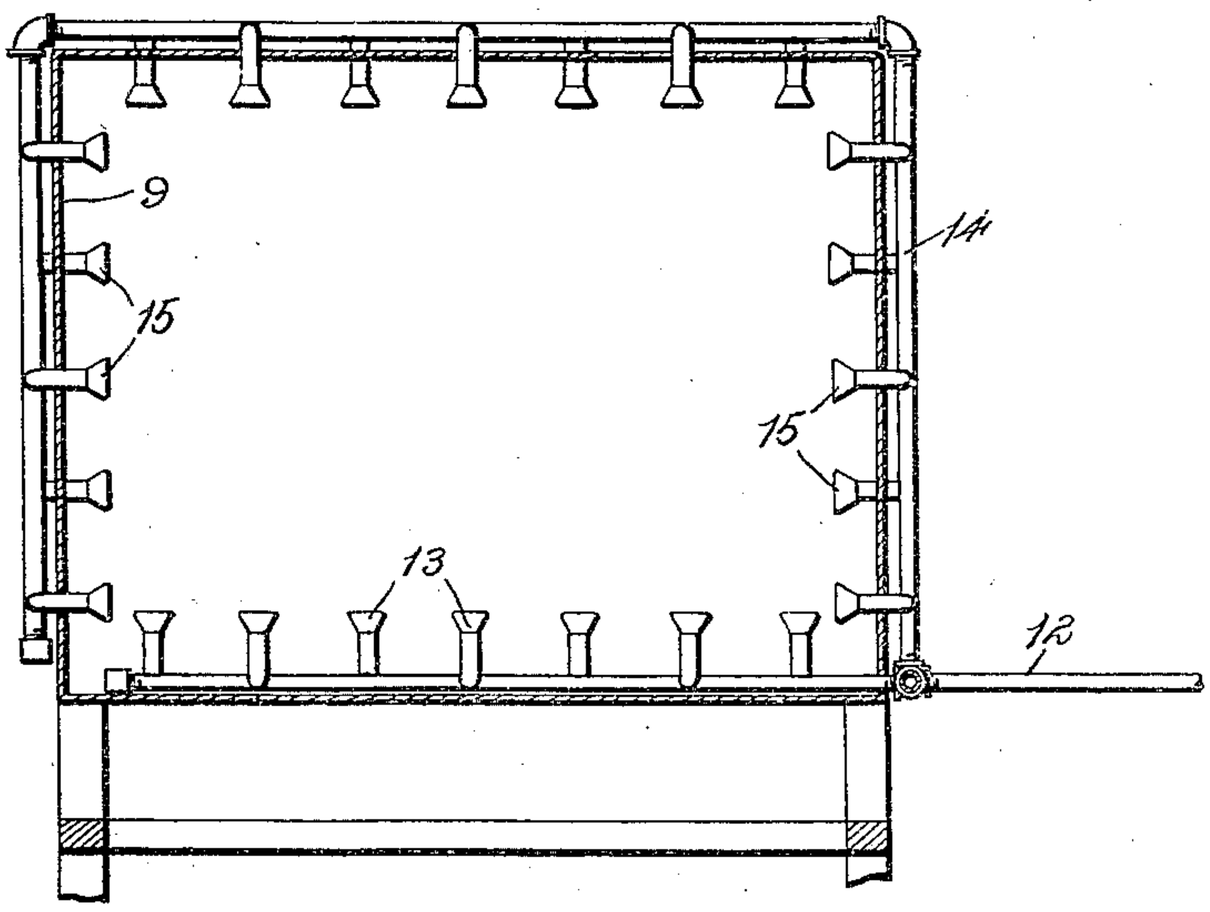
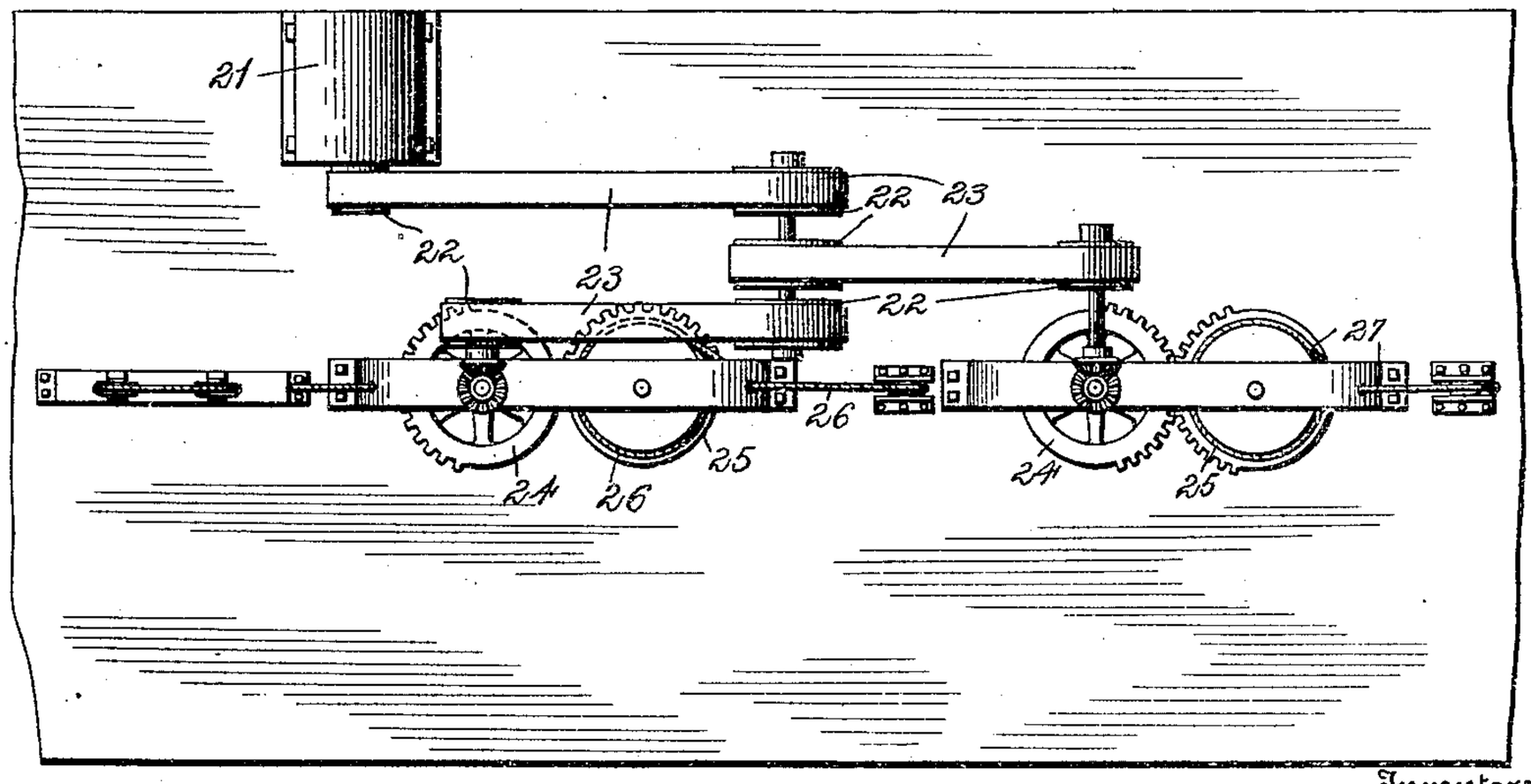


Fig. 5.



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UNITED STATES PATENT OFFICE.

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DEVICE FOR PREVENTING WASTE OF MINERALS.

936,377. Specification of Letters Patent. **Patented Oct. 12, 1909.**

Application filed January 22, 1909. Serial No. 473,781.

To all whom it may concern:

Be it known that we, MICHAEL J. SMITH and MARTIN O. KONGSLI, citizens of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented a new and useful Improvement in Devices for Preventing Waste of Minerals, of which the following is a specification.

This invention relates to a device for recovering waste mineral matter which is at present lost in the process of smelting copper by escaping through the stacks with the smoke. This mineral matter is recovered by retarding the passage of the smoke to the stack, and also by washing said smoke before it enters the stack, thus freeing it of all valuable mineral particles which may have been held in suspension in the smoke.

In the accompanying drawings, Figure 1 is a longitudinal section through our device. Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a section on the line 3—3 of Fig. 1. Fig. 4 is an enlarged transverse section through the smoke washing compartment. Fig. 5 is an enlarged plan view of the central portion of the smoke detaining compartment.

In operating the device, the smoke is conveyed from the smelter through a pipe 1 in which is placed a suction fan 2 which draws the smoke into said pipe and forces it into a box 3 divided into front and rear compartments by means of a partition 4 and a swinging trap door 5, the trap door forming the upper portion of said partition. The front compartment is divided into a series of bins by means of angled retaining walls 6 arranged transversely across the box, and these walls increase gradually in height from front to rear, in which are caught more or less of the mineral matter contained in the smoke, these walls catching and retaining in its passage through the compartment the heaviest portions of the smoke, and the bins formed by these retaining walls receiving the heaviest mineral particles brought into said compartment by the smoke. We also provide means to be described hereafter for opening the trap door 5 at regular intervals which allows the smoke, after depositing a portion of its mineral wealth, to pass into the rear compartment in which it is temporarily held by a trap door 7 placed in an exit pipe 8, and in the rear compartment are dropped mineral particles which succeeded in escaping from the front compartment, but which are still of a comparatively heavy weight. Upon lifting of the trap door 7, the smoke now carrying only the finest of the particles passes into a washing box 9, its passage through said box to the stack being regulated by means of a transversely arranged and vertically movable damper 10.

The box 3 adjacent its bottom is provided with suitable openings 11 through which the deposited material may be drawn off. A water supply pipe 12 runs into and across the washing box and is provided with a plurality of upwardly extending sprayers 13. A branch pipe 14 leads from the pipe 12 and encircles the side and top of the washing box and is provided with suitable sprayers 15 which project into the box. We prefer to provide a number of branch pipes 14, and also to suitably branch the pipe 12, and also to arrange the sprayers carried by each pipe so that they will be staggered or offset as shown in the drawings, thereby subjecting the smoke as it passes through the said washing box to the action of sprays distributed over a considerable area of the bottom, sides and top of the washing box. By passing the smoke through such a spraying device, all of the heavy particles contained therein are washed from the smoke, and fall to the bottom of the washer, which is inclined, and escape from said washing box through an inclined chute 16 into a water containing tank 17. We provide also a series of other tanks 18 connected with the tank 17 by suitable pipes 19 and by passing a stream of water into the tank 17 the materials passing down the chute 16 will be separated, the heavier particles settling in the tank 17, and other particles being conveyed to one of the tanks 18. An overflow pipe 20 is provided for the last of the tanks 18. It will be understood that the tank 17 is also supplied with water from the sprayers the water discharged into the washing box escaping through the chute 16 and carrying with it the particles deposited in said box.

In order to open the trap doors 5 and 7 at the proper time and alternately, we provide upon the top of the box 3 a motor 21 which by means of suitable pulleys 22 and belts 23 drive mutilated gears 24. These gears cooperate with suitable gears 25 which are carried by suitable drums upon which wind cables 26 and 27, the cable 26 running to the trap door 5 and the cable 27 running to the

trap door 7. To prevent the trap door 5 which forms a part of the partition in the box 3 from falling with sufficient force to loosen the partition 4 we extend the cable 26 beyond the drum upon which said cable winds and connect to the end of the cable opposite the trap door a suitable counterbalance weight 28. It will of course be understood that any desired arrangement of belts, pulleys and gears, etc. can be employed in order to impart rotation to the mutilated gears 24, and the motive power may be obtained from any suitable source which may be available.

In operation the trap door 5 will remain in closed position until the teeth of one of the gears 24 engage those of the gears 25 when the cable 26 will be wound and the trap door 5 lifted. The smoke which has accumulated in the first compartment of the box 3 will then pass into the second or rear compartment where it will be held until the trap door 5 has again closed, by which time the teeth of the other gear 24 will engage the other gear 25 and the cable 27 will be wound upon its drum thus lifting the trap door 7 and permitting the smoke to pass through the washing box 9, its passage therethrough being regulated by the position of the damper 10.

By means of the construction above described and illustrated in the drawings, or an equivalent construction, the materials which now pass from the furnaces directly to the stack are removed from the smoke and saved.

What we claim is:—

1. A device of the kind described comprising a box divided into two compartments, and a washing box, a trap door controlling communication between the compartments of the box, a trap door controlling communication between the box and the washer, means for throwing a spray into and across the washing box, and means for opening the trap doors alternately, the said boxes being arranged between a furnace and a stack and having communication with them.

2. A device of the kind described comprising two boxes interposed between a furnace and a stack, one of said boxes being divided into compartments, means for throwing a spray of water into the other box, means for opening and closing communication between the compartments of one box, means for opening and closing communication between the two boxes, the said opening and closing means operating in succession, and means for drawing smoke from a furnace into the first compartment of the box.

3. A device of the kind described comprising a smoke delivery pipe, a box connected thereto, said box being divided into front and rear compartments, a door giving communication between the said compartments, a washer box, said box having communication with the rear compartment of the first mentioned box, a water supply pipe encircling said washer box, sprays carried by said pipe, said sprays discharging water into the washer box from the bottom, sides and top, the smoke passing between said sprays, means for discharging water from said washer box, a door controlling communication between the first mentioned box and the washer box, and means for alternately opening and closing said doors.

4. In a device of the kind described, a washer box, means for passing smoke through said box, a supply pipe running into said box, branches inclosing the sides and top of the box, branches within the box extending transversely across the bottom of the box, sprayers carried by all of said branches and discharging into the box at right angles to the branches by which they are carried, the said sprayers being staggered with respect to each other, a series of tanks communicating with each other, and a chute leading from the washer box and discharging into the first of said tanks.

5. In a device of the kind described, a box divided into two compartments, a door controlling communication between said compartments, means for delivering smoke to said box, a door controlling exhaust of smoke from said box, angled and vertically arranged smoke retaining walls arranged in one of the box compartments, said walls increasing in height from front to rear of the box, and means for alternately opening and closing the door between the compartments, said door permitting smoke to exhaust from said box, as and for the purpose set forth.

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