

Sept. 13, 1927.

1,641,995

C. J. SCHOBRONE
SMOKE TREATING APPARATUS

Filed June 27, 1925

3 Sheets-Sheet 1

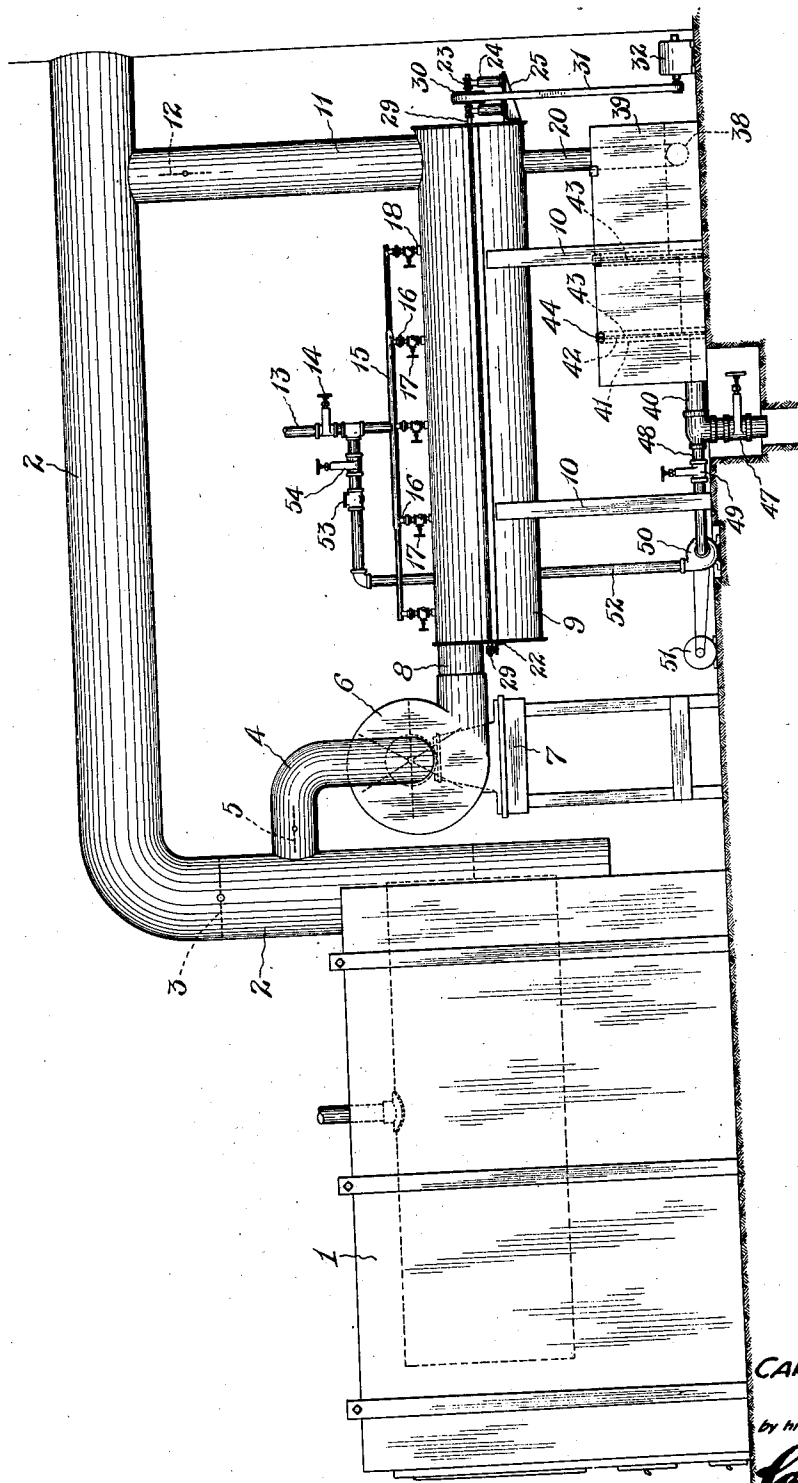


FIG. I.

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by his atty.

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3 Sheets-Sheet 2

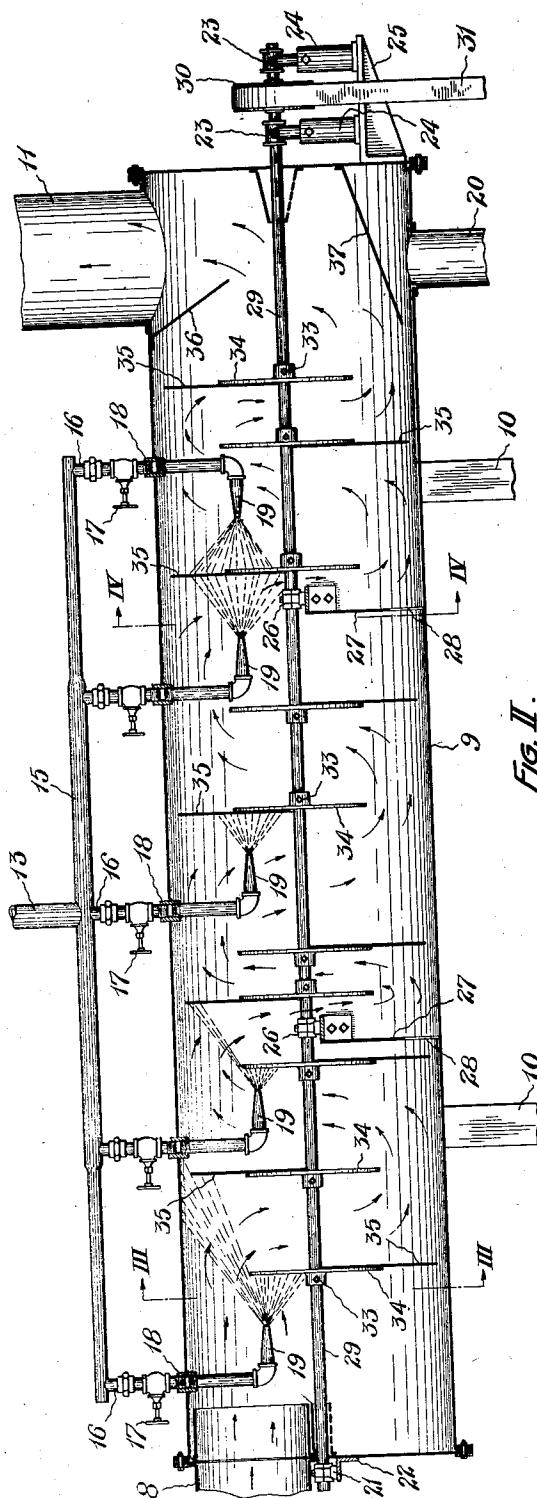


FIG. II.

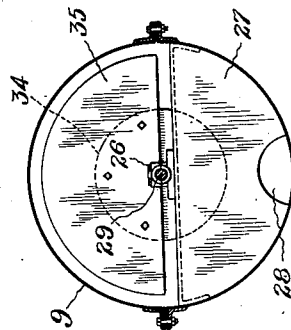


FIG. IV.

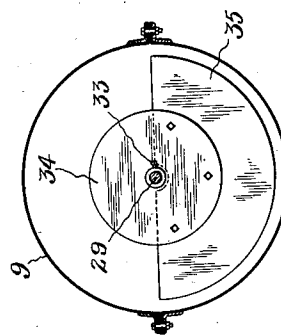


FIG. III.

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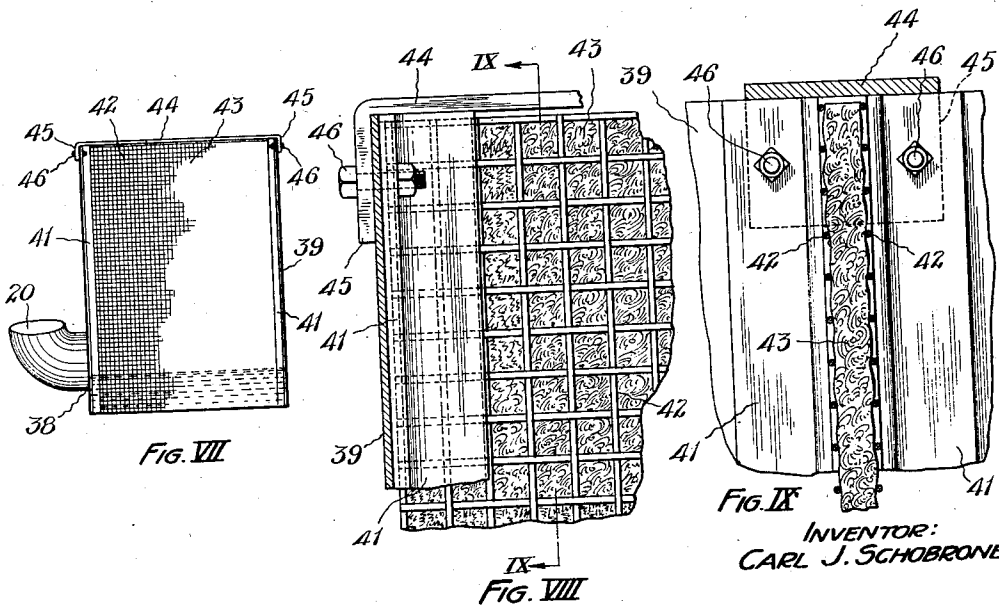
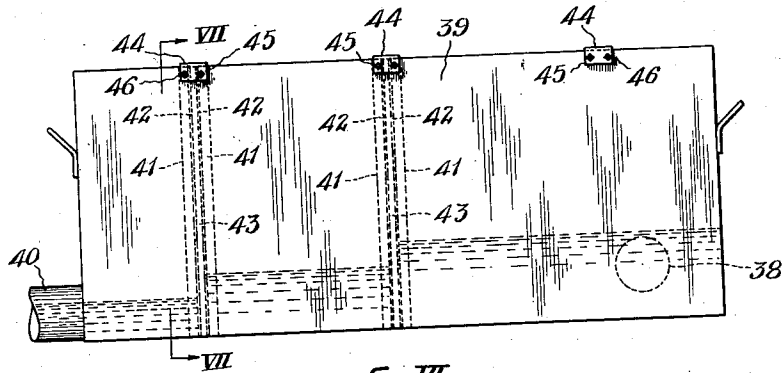
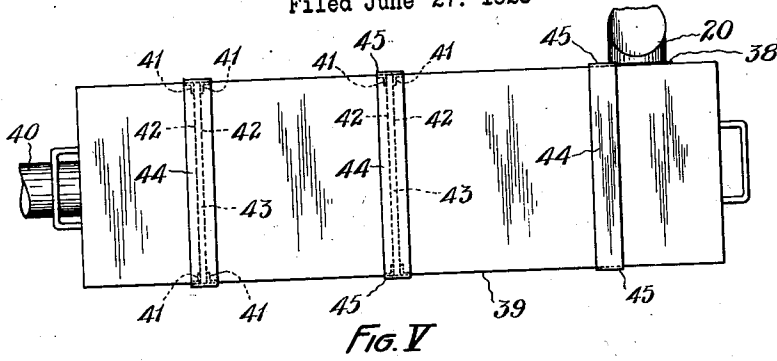
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3 Sheets-Sheet 3



INVENTOR:
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Patented Sept. 13, 1927.

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UNITED STATES PATENT OFFICE.

CARL J. SCHOBORNE, OF CLEVELAND, OHIO.

SMOKE-TREATING APPARATUS.

Application filed June 27, 1925. Serial No. 40,063.

My invention pertains to a smoke treating apparatus as well as to the method of its use for reclaiming lampblack or carbon combustion smoke.

5 The subject matter of this application may be considered an improvement upon the invention shown, described and claimed in my copending application under similar title filed July 27, 1921, Serial No. 488,045 which has resulted in Patent No. 1,595,060, issued August 3, 1926.

10 The particular art to which this invention belongs is evidenced to have been rather well developed, the most common principle employed being the comingling with the smoke of a liquid spray. Industrial plants have been reluctant to install smoke treating apparatus, properly known as smoke consumers, even where laws have been passed requiring reduction in soot discharge from smoke stacks, because of ineffective enforcement; any particular company being loath to assume the initial investment, however strong the civic spirit of its personnel, unless a competing company does likewise. That is so, notwithstanding that a bushel of coal has been learned to yield five gallons of moist soot or three ounces of dried lampblack which is the substantial equivalent of two hundred gallons per ton of coal and notwithstanding that the reclaimed carbon is salable at a good price.

30 I realize that the scope of my invention comprehends many equivalent methods and constructions. The showing of the drawings and the particular description are merely specific exemplifications of a plurality of mechanical embodiments and arrangements.

Adverting to the drawings:

40 Figure I, is a side elevation of apparatus embodying my invention shown operatively connected with a boiler.

Figure II, is a longitudinal section of a chamber comprising a part of my apparatus.

45 Figure III, is a vertical cross-section on line III—III of Figure II.

Figure IV, is a vertical cross-section on line IV—IV of Figure II.

50 Figure V, is a plan view of a soot collecting tank.

Figure VI, is a side elevation of a tank shown in Figure V.

Figure VII, is a vertical cross-section on line VII—VII of Figure VI.

55 Figure VIII, is an enlarged broken view of the upper left hand corner of Figure VII.

Figure IX, is a cross-section on line IX—IX of Figure VIII.

A boiler 1 is adapted to discharge smoke through a pipe 2 subject to the control of a damper 3 ahead of which is connected a pipe 4 similarly provided with a damper valve 5. The outer end of the pipe 4 communicates with an exhaust fan 6 (to be operated in any approved fashion not shown) carried on a suitable support 7 and adapted to force the production of combustion through a pipe 8 leading into one end of a cylindrical chamber 9, the construction of which embraces some of the features of my invention and which is suitably supported on standards 10. The further end of the chamber communicates above with a combustion gas outlet pipe 11 which is also connected with the pipe 2 and subject to the control of a valve 12. The pipe 2 beyond the point of connection therewith of the pipe 11 communicates with a stack, not shown.

A liquid supply pipe 13 for conducting water, with or without chemical impregnation, connects with a valve 14 which is in turn connected with a manifold 15 having, as exemplified, five outlet pipes 16 each controlled by a valve 17 and all leading into the top of the chamber 9 at appropriately spaced distances between the inlet 8 and outlet 11 and suitably connected therewith at fittings 18. The inner ends of the pipes 16 carry nozzles 19 adapted to direct liquid sprays in a substantially horizontal direction, but it will be observed that the series of four nozzles to the left spray in a direction toward the outlet 11, whereas the fifth or right end nozzle 19 sprays in a counter direction so that the fourth and fifth nozzles are directly opposed and the spray from each is adapted to impinge against a periodically interpositioned baffle as will be later explained.

Below the outlet 11 the chamber 9 is provided with a liquid outlet 20.

Mounted axially of the chamber 9 for rotary movement in a bearing 21 carried on a bracket 22 at the inlet end of the chamber, and in a pair of bearings 23 carried on standards 24 which are supported on a bracket 25 at the outlet end of the chamber and for rotation in a pair of interiorly positioned bearings 26 supported on brackets 27 having water passage holes 28 is a shaft 29. Between the bearings 23 the shaft 29 carries a pulley 30 driven by a belt 31 which

is operatively connected with a motor 32. Adjustably mounted on the shaft 29 by means of set screws 33 so as to be capable of being fixed in various positions along the shaft and relative to the nozzles 19 and to each other are a plurality of discs 34, ten of which are illustrated in the exemplification of Figure II of the drawing. Fixably carried in diametrically staggered relationship on the discs 34 are semi-circular baffles 35. It will be observed that two of the discs 34 and hence two of the movable baffles 35 are adapted for movement between the pair of nozzles nearest the inlet 8, likewise two of each between the third and fourth nozzles and likewise two of each between the fifth nozzle and the outlet 11, whereas the three baffles 35 are adapted to describe orbital paths between the second and third nozzles and only one baffle 35 adapted to become interposed between the opposed sprays of the fourth and fifth nozzles. Inspection of Figure II will disclose a fixed baffle 36 inclined obliquely downward from the top of the chamber 9 just ahead of the outlet 11 and another fixed baffle 37 sloping obliquely downward from the near end of the chamber 9 in a counter direction with respect to the disposition of the baffle 36 and so as to extend over the outlet 20.

The liquid discharge outlet 20 connects near one end at 38 with a soot collecting tank 39 which is open above. The opposite end of the tank 39 communicates with an outlet pipe 40. The tank according to my invention is to be divided into three compartments by filtering devices constructed and supported as will now be described. The interior of the tank 39 carries three opposed and spaced pairs of angle irons 41 between each pair of which is inserted a pair of spaced wire screens 42. Each adjacent pair of screens 42 confines a piece of felt 43. The screens and felt are suitably secured in place by brackets 44 which straddle the top of the tank by reason of having flanges 45 engaging the sides of the tank, and which flanges may be detachably secured to the tank by means of bolts 46 passing through the angle irons 41. It will now be apparent that the successively functioning filtering devices may be readily removed for cleansing or repair.

The pipe 40 connects with a valve chamber 47 adapted to control the flow of liquid from the tank 39 to a sewer drain. If desired, the valve 47 may be closed and the filtered liquid from the pipe 40 led to a pipe 48 through the valve chamber 49 to a return pump 50 operated by a motor 51 and adapted to force the filtered liquid up through a pipe 52 past a check valve 53 through a valve chamber 54 for connection with the supply pipe 13.

The operation of my apparatus is as follows:

The damper 3 having been closed and the damper 5 and valve 12 opened, as shown in Figure I, the motor 32 is set in motion, and optionally the motor 51, if the valve 47 be closed and the valves 49 and 54 open, then the valves 14 and 17 should be opened so that the liquid sprays from the nozzles coming with the entering smoke in a constantly changing manner by reason of the periodic interference of the induced flow caused by the revolving semi-circular baffles 35, which alternately interrupt the liquid stream from the nozzles at varying distances from the discharge ends thereof. The liquid particles which do not come to impinge against the baffles 36 and 37, but which settle earlier may flow through the openings 28 directly to the outlet 20. The varying disturbances or comingling agitation of the induced flow of the smoke and gases of combustion and water spray has been established, by actual full size model demonstration, to be very effective and the success may be partially attributed to the peculiar periodical meeting of the counter sprays from the last two nozzles. The gases of combustion from which the soot will have been extracted pass upwardly through the outlet 11 whereas the moist soot is collected in the tank 39 and progressively filtered preparatory to being collected as the occasion may require.

I claim:

1. Apparatus of the character described comprising a chamber, a series of nearly horizontally directed spray nozzles therein, a series of baffles movably mounted in said chamber and each adapted periodically to intersect the spray from a corresponding one of said nozzles though so arranged that the time when one baffle occupies its spray intersecting position is different from the time when another baffle occupies its intersecting position, a plurality of said baffles being adapted to be opposed at varying distances from some of said nozzles, means for actuating said baffles and means for forcing combustion products into said chamber in the direction of spray of said nozzles.

2. Apparatus of the character described comprising a chamber, a pair of nozzles therein for directing liquid sprays in different directions, a circular disc rotatably mounted in said chamber and adapted constantly to intersect the spray from both of said nozzles, a sector-shaped baffle carried by said disc, means for rotating said disc and means for forcing combustion products into said chamber.

3. In a smoke consumer, the combination of an elongated chamber provided at one end with an inlet and also provided with an outlet, means for forcing combustion

products through said chamber from said inlet toward said outlet, a longitudinally directed liquid spray nozzle, a shaft, disc and sector baffles rotatably mounted on said shaft in the line of spray of said nozzles, the former adapted continuously and the latter adapted intermittently to intersect the path of spray of said nozzle and means for rotating said shaft.

10 4. In a smoke consumer, the combination of an elongated chamber provided at one end with an inlet and at the other end with a pair of outlets, means for forcing combustion products to said inlet, a longitudi-
15 nally directed liquid spray nozzle, a shaft

mounted in said chamber, a disc carried on said shaft in opposition to a part of the spray from said nozzle, a plurality of single-sector baffles carried on different sides of and in spaced relation along said shaft beyond said disc with reference to said nozzle, said baffles adapted in turn to project beyond said disc and in the path of spray which passes the edge of said disc, said baffles adapted alternately to intersect the path of spray from said nozzle respectively and means for rotating said shaft.

Signed by me, this 16th day of June, 1925.

CARL J. SCHOBRONE.