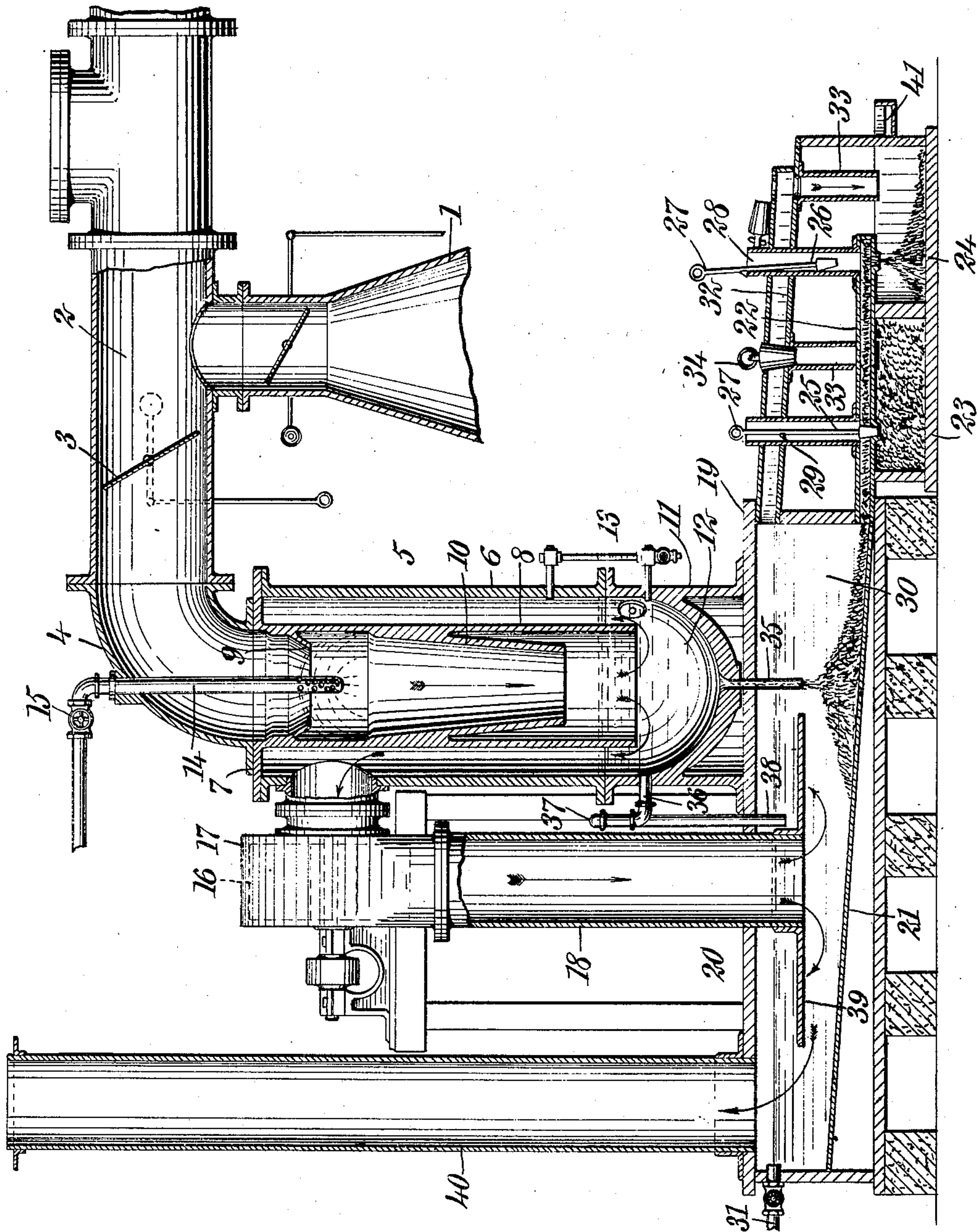


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T. E. LAMBERT.
SMOKE PURIFIER AND FUME ARRESTER.

APPLICATION FILED AUG. 15, 1907.



WITNESSES

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THOMAS EDWARD LAMBERT, OF BUTTE, MONTANA.

SMOKE-PURIFIER AND FUME-ARRESTER.

No. 889,694.

Specification of Letters Patent.

Patented June 2, 1908.

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To all whom it may concern:

Be it known that I, THOMAS EDWARD LAMBERT, a citizen of the United States, and a resident of Butte, in the county of Silver Bow and State of Montana, have invented a new and Improved Smoke - Purifier and Fume-Arrester, of which the following is a full, clear, and exact description.

This invention relates to smoke purifiers and fume arresters such as are used in connection with furnaces, gas plants, chemical works, and similar industrial works.

The object of the invention is to produce an apparatus for the purpose stated, which will operate to remove the impurities from smoke and gases, so that they will not be poisonous or obnoxious to life.

While the invention is intended to render the escaping gases or smoke harmless to vegetation and animal life, a further object of the invention is to prevent the loss of valuable substances which might be otherwise carried away by the smoke or gases.

In the construction of the apparatus it has been an object to arrange the parts so as to enable the material removed from the gases or smoke to be continually removed, so that the purifying operation will be continuous and will not necessitate shutting down the operation of the plant or the industry with which the invention is employed.

The invention consists in the process and apparatus to be described more fully hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure is substantially a vertical central section through the purifying apparatus, some parts being shown in elevation and some broken away.

Referring more particularly to the parts, 1 represents the upper portion of a blast furnace, smelting furnace, or crucible, which is supposed to be used in carrying out metallurgical processes of any nature which produce smoke or gases. The upper end of this furnace or crucible is connected with a main pipe 2, to which similar furnaces or crucibles may be connected, as will be readily understood. This pipe 2 is provided with a damper 3, past which the gases flow through an elbow 4. This elbow delivers into the upper end of a sprinkler 5. This sprinkler has a cylindrical casing 6 provided with a head 7 at the upper end thereof, through which the elbow 4 communicates with the interior of

the sprinkler. This head 7 is integral with an ejector or inner sleeve 8, which is also of tubular form and extends downwardly within the casing 6 as indicated. The bore of this sleeve is in communication with the bore of the elbow 4, so that the incoming gases pass downwardly through the sleeve as indicated by the arrows. In the upper portion of the sleeve or ejector 8 an inwardly-projecting flange or baffle 9 is provided, which tends to throw the gases inwardly toward the central portion of the ejector. In the lower middle portion of the ejector or sleeve 8, a conical nozzle 10 is formed integral with the ejector, and this nozzle also tends to concentrate the gases toward the central portion of the ejector as they descend. The ejector casing 6 is mounted upon a bowl or basin 11, containing a bath 12 of water or similar liquid, and the side of the sprinkler is provided with a water gage 13 which indicates the level of the bath, as will be readily understood. The lower end of the ejector or sleeve 8 is immersed in the bath as shown.

In the upper portion of the ejector or sleeve 8, a sprinkling pipe 14 is arranged centrally in a vertical position, the same being supplied with water by a suitable pipe having a valve 15 therein for controlling the flow, as will be readily understood. On one side and near its upper portion, the casing 6 of the sprinkler is in communication with a centrifugal fan or blower 16, which fan is mounted in a suitable fan casing or housing 17. This housing seats upon a down pipe 18, so that the gases which are drawn into the fan casing by the fan may be forced downwardly in this pipe, as indicated by the arrow.

The apparatus described above is supported upon the cover 19 of a tank or washer 20. This tank or washer has an inclined floor 21, so that slime or sediment settled thereupon will tend to gravitate toward an outlet spout 22, arranged at one side of the tank as shown. This spout 22 passes over settling pockets 23 and 24. The flow from the spout 22 into these pockets is controlled by vertically-movable plugs 25 and 26, which seat in openings in the lower side of the spout as shown. These plugs 25 and 26 are provided with upwardly-extending stems 27, which are held in trunks or housings 28. The stems 27 are provided at one side with teeth 29, which enable the plugs to be held in a raised position as indicated. At the plug 26, the tooth 29 is

in engagement with the upper edge of the housing of the plug as shown. In this way, one plug may be removed from its opening so as to allow the sediment to pass into one of the pockets while the opening of the other pocket is closed, and vice versa. By this arrangement I am able to use the pockets alternately.

In the washer 20, a bath 30 of water or similar liquid is supplied through a suitable pipe 31. The level of this bath is maintained by an overflow outlet 32, which extends over the settling pockets 23 and 24, and is provided with downwardly-extending spouts 23 which lead, respectively, into the pockets. The communication from the overflow outlet to these spouts is controlled by removable plugs 34. When one of these plugs is in position, the other is removed as shown, so that the overflow may be directed into the pockets alternately. The bottom of the basin or bowl 11 is provided with a vertically-disposed drain pipe 35, which extends downwardly into the bath 30, the lower end of the drain pipe being disposed below the level of the bath as shown. The impurities which are removed from the smoke or gases in passing through the bath 12, pass down through this pipe 35 and are deposited in the form of mud or sludge on the inclined bottom 21. From this point they gravitate slowly through the spout 22, as indicated in the drawings. The level of the bath 12 is maintained by means of an overflow pipe 36, which is provided with a riser 37 and a downward extension or leg 38 which carries the overflow down into the bath 30. The down pipe 18 referred to above, passes down through the cover 19 into the interior of the washer 20, and its lower end is provided with a large circular plate or umbrella 39, said umbrella being in a horizontal position as shown. At one side of the washer 20, the cover thereof is provided with a vertical stack 40 which carries off the purified gases or smoke as will be readily understood.

The method of operation of the purifier will now be described: The smoke or gases from the main tube pass downward into the ejector or sleeve 8, and, at the same time, water is admitted through the sprinkling pipe 14, the lower end of the said pipe being perforated as shown. A spray is formed which passes downwardly through the nozzle 10. This spray moistens the solid particles in the smoke or gases and they are then precipitated into the bath 12. The gases pass through the bath 12 by passing under the lower edge of the ejector, as indicated by the arrows, and then the gases pass upwardly in the casing 6 and flow into the housing or casing 17, from which point they are forced downwardly into the down pipe 18 or into the washer 20. The umbrella 39 is below the level of the bath 30 in the washer, so that

the gases in passing from the lower end of the pipe 18 flow along the under side of the umbrella or plate 39. The gases then bubble up through the bath 30 and pass out through the stack 40. In passing through the washer 20 any solid particles in the smoke or gas which have not been removed by the sprinkler remain in the bath 30 and sink to the bottom 21, from which point they gravitate toward the pockets 23, 24. The inflow of water which is admitted through the sprinkling pipe 14 should be substantially equal in volume to the volume of the deposits which pass out through the drain pipe 35 from the basin 11. In this way, the level of the bath 12 is maintained substantially constant.

It should be evident from the description above that the apparatus may operate continuously, the pocket 23 being evacuated while the pocket 24 is being filled, and vice versa. The pockets 23 and 24 may be provided with a drain 41 from which the contents of the pockets may gravitate. In removing the same for treatment in chemical processes for removing the valuable components, if the sludge or sediment is to be at a higher level than that of the pockets 23 and 24, it may be pumped to this higher level if desired.

As the impurities in some cases might be of such an amount, more pockets or tanks would be required. They may be made of sufficient size and number to accommodate the excess, and also in duplicate, and adapted or located to receive the discharge from 41.

Having now described my invention, I claim as new and desire to secure by Letters Patent:

1. In a fume arrester, in combination, a sprinkler having a vertically disposed casing, an ejector extending downwardly through said shell and having its lower edge disposed near the lower end of said shell, a sprinkling pipe in the upper portion of said ejector, and from which a spray may descend with the descending current of smoke, said sprinkler having a bath through which the gases pass before ascending in said shell, means for withdrawing the smoke from the upper portion of said shell, a baffle flange above the end of said sprinkling pipe, and a conical nozzle within said shell and below said sprinkling pipe for concentrating the smoke and spray as they descend toward said bath.

2. In a fume arrester, in combination, a sprinkler having a vertically disposed shell, an ejector having a head seating on the upper end of said shell, and a sleeve extending downwardly therein, a sprinkling pipe in the upper part of said sleeve, a baffle flange in the interior of said sleeve above said pipe and tending to concentrate the descending current upon the spray from said pipe, a cone within said sleeve below said pipe tend-

ing to mix the spray and smoke, said ejector having a bath on the lower part thereof through which the smoke must pass, and means for withdrawing the smoke from the upper part of said shell.

3. In a smoke purifier, in combination, a sprinkler having a bath therein, a washer also having a bath therein, an ejector within said sprinkler and adapted to pass the smoke through said first-mentioned bath, means for spraying the smoke within the said ejector, means for withdrawing the smoke from said sprinkler, a pipe extending downwardly into

said washer and through which the smoke is forced from said sprinkler, said pipe having a horizontal plate attached to the lower end thereof below the level of said second-named bath, and means for withdrawing the deposits from said baths. 15

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses. 20

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Witnesses:

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