M. PAVELLA.

SMOKE CLEANING DEVICE.

APPLICATION FILED JULY 26, 1911.

1,010,068. **Patented Nov. 28, 1911.**

2 SHEETS—SHEET 1.

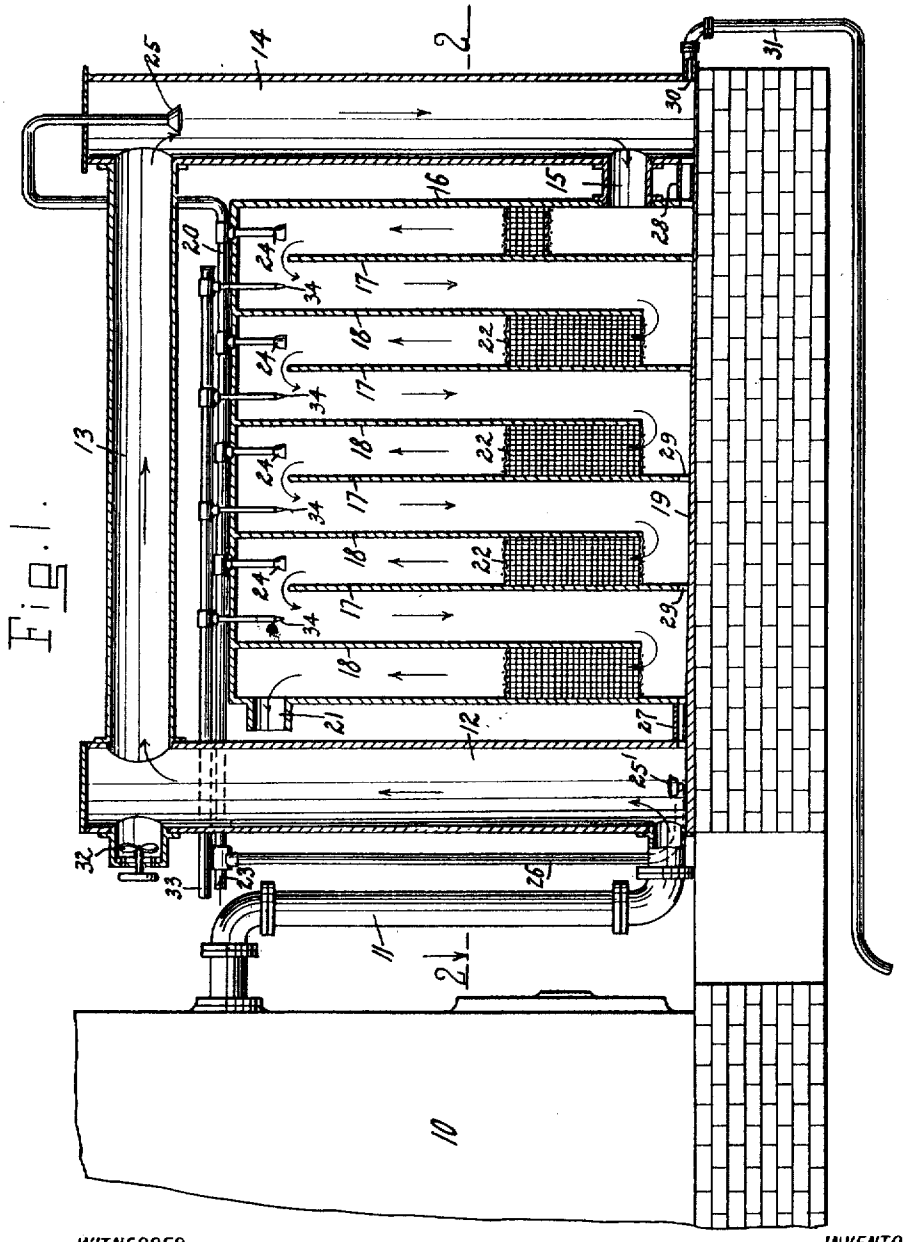

Fig. 1.

WITNESSES

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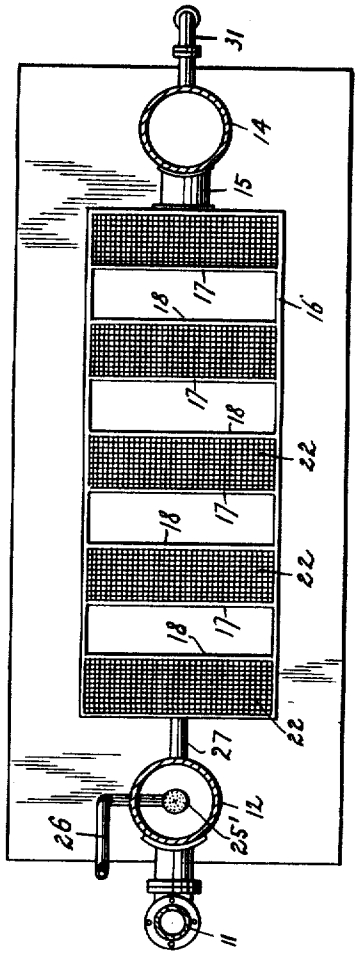

Fig. 2.

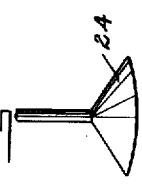

Fig. 5.

Fig. 6.

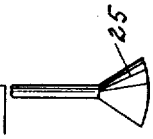

Fig. 3.

Fig. 4.

WITNESSES

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UNITED STATES PATENT OFFICE.

MARTIN PAVELLA, OF SOUTH LORAIN, OHIO.

SMOKE-CLEANING DEVICE.

1,010,068. Specification of Letters Patent. Patented Nov. 28, 1911.

Application filed July 26, 1911. Serial No. 640,593.

To all whom it may concern:

Be it known that I, MARTIN PAVELLA, a subject of the King of Hungary, and resident of South Lorain, in the county of Lorain and State of Ohio, have invented certain new and useful Improvements in Smoke-Cleaning Devices, of which the following is a specification.

The present invention relates to a smoke cleaning device, and has for one of its objects to provide a simple and efficient device of this type, whereby the heavy and thick particles of combustion, such as unconsumed carbon particles and other impurities, may be removed from the smoke prior to its entrance to the stack proper.

Another object of the invention is to produce a device of this character in which steam and water are made use of for cleaning purposes, said steam and water creating at the same time a draft which tends to carry effectively the gases from the flue to the stack.

With these and other objects in view, which will more fully appear as the nature of the invention is better understood, the same consists in the combination, arrangement and construction of parts hereinafter fully described, pointed out in the appended claims and illustrated in the accompanying drawings, it being understood that many changes may be made in the size and proportion of the several parts and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

One of the many possible embodiments of the invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a vertical sectional view of an apparatus embodying the invention; Fig. 2 is a section taken on line 2—2 of Fig. 1; Fig. 3 is a side elevation of one of the water spray heads used upon the apparatus; Fig. 4 is a bottom plan view thereof; Fig. 5 is a side elevation of another spray head; and Fig. 6 is a bottom plan view of the head shown in Fig. 5.

In the drawings, the numeral 10 indicates a boiler, from which leads a flue 11 to the lower end of a vertical conduit 12, which communicates through a substantially horizontal pipe 13 with a second vertical conduit 14. The conduit 14 communicates through a passage 15 with a cleaning chamber 16, which latter is provided with a plurality of partitions 17 and 18, which are arranged alternately. The partitions 17 rise from the slightly inclined bottom 19 of the chamber 16 toward the top 20 thereof, but terminate a suitable distance below said top, while the partitions 18 extend from the top 20 toward the bottom 19, terminating a suitable distance above the latter, whereby a sinuous passage is formed through which the smoke is conducted, to be discharged through a conduit 21 into the stack proper. The flow of the products of combustion is obstructed in the chamber 16 by wire screens or other suitable filtering means 22, 22, which are arranged between the partitions 18 and 17, and extend throughout the widths thereof.

A pipe 23 leads to the apparatus, which pipe is adapted to convey water from any suitable source (not shown in the drawings). With this pipe communicate spray heads 24, 24, which are elongated in form, as shown in Figs. 5 and 6 of the drawings, and arranged in alternate bends of the passage in the cleaning chamber 16. These spray heads project downward, and are located near to the top 20 of the cleaning chamber. A spray head 25, also connected with the pipe 23, is placed near to the top of the conduit 14; said spray head projects also downward and is, preferably, of circular configuration, as clearly shown in Figs. 3 and 4 of the drawings. A similar spray head 25′ projects upward from the bottom of the conduit 12, and is connected with the pipe 23 by means of a branch pipe 26. The spray head 25′ is arranged in proximity to the outlet of the flue 11, for a purpose which will be hereinafter described.

A pipe 27 connects the lower end of the conduit 12 with the bottom of the cleaning chamber 16, which latter communicates through a pipe 28 with the lower end of the conduit 14. The partitions 17 in the clean-

ing chamber are provided in their lower ends with small openings 29, 29, through which the water and the deposits which accumulate in the apparatus are adapted to flow through an outlet 30 in conduit 14 into a discharge pipe 31, to be carried off to a waste pipe, or to a suitable apparatus in which the water is filtered to be again reutilized in the apparatus.

To increase the draft in the apparatus, a current of air, as for instance by means of a blower 32, which is driven by any suitable source of power, may be introduced into the pipe 13. A pipe 33 leads furthermore to the apparatus, which conveys steam to the same, which issues out from nozzles 34, 34, arranged alternately with the spray heads 24. Those nozzles direct the streams of steam from the top 20 of the cleaning chamber 16 downward toward the bottom thereof.

The operation of the device is as follows: The smoke is carried through the flue 11 to the bottom of the conduit 12, where it meets with a spray of water issuing from the spray head 25′. The water spray effectually separates the thicker and heavier particles of the products of combustion from the fire gases, and deposits the said particles in the bottom of the conduit 12. The liquid collecting in the conduit 12 carries these particles toward the discharge pipe 31. The fire gases, with those heavy and thick particles which have not been separated by the spray head 25′, pass toward the pipe 13, where they are forced by a current of air from the blower 32 toward the conduit 14. The water jets issuing from the spray head 25 again separate unconsumed carbon particles and other impurities from the products of combustion passing downward toward the lower end of the conduit 14, and from there through the passage 15 into the cleaning chamber 16. The products of combustion travel in the cleaning chamber in the direction shown by the arrows, in Fig. 1, and it will be observed that they pass first through one of the wire screens 22 to meet then with the jets of water issuing from the spray head 24 which is arranged above it, and then with a steam jet, to pass again through a wire screen, after which the play now described is repeated, until they finally pass through the conduit 21 into the stack.

It will be observed that in the smoke chamber the direction of the products of combustion and that of the water jets are opposite to each other, whereby the carbon particles and other impurities are even more effectively separated from the gases than by the spray heads 25′ and 25, from which the water jets issue in the direction of travel of the products of combustion. The steam issuing from the nozzles 34 mingles effectively with the products of combustion, which travel in the same direction as the steam, and when then the mixture of steam and the products of combustion come in the next bend of the passage of the cleaning chamber 16 under the action of the next spray head 24 in the series, the steam will be condensed, which condensation will result in a still further purification of the smoke and in a partial vacuum, whereby the draft in the device will be increased to a great degree. The water of condensation and also that flowing out from the spray heads, together with the impurities in the smoke, flow toward the discharge pipe 31, to be carried off by the latter. The wire screens 22 in the cleaning apparatus serve as additional means for purifying the smoke, and it will be observed that, instead of the same, other filtering means can be made use of just as well.

It will be observed that the conduit 21 need not necessarily lead to the smoke stack, but might be connected with the ash-pit of the boiler, whereby a mixture of hot air and fire gases is conducted to the grate thereof, which will greatly aid the combustion of fuel in the fire space of the boiler.

What I claim is:

1. In a smoke cleaning device, the combination with a chamber having a plurality of partition walls therein, whereby a sinuous passage is formed in the same, said chamber having an inlet for the products of combustion near to the bottom of the first bend of said passage and an outlet at the opposite end of said passage, a plurality of spray heads arranged at the top of the alternate bends of said passage so as to direct the water spray in a direction opposite to the direction of travel of the products of combustion in said passage, the first of said spray heads being located in the first bend of said passage, a plurality of nozzles for admitting steam into said passage in the direction of travel of the products of combustion, and filtering means arranged in those bends of said passage in which said spray heads are located.

2. In a smoke cleaning device, the combination with a chamber having a plurality of partition walls therein, whereby a sinuous passage is formed in the same, said chamber having an inlet for the products of combustion near to the bottom of the first bend of said passage and an outlet at the opposite end thereof, a conduit for the products of combustion leading to said inlet, a plurality of spray heads in said conduit, means for forcing a current of air into said conduit, a plurality of spray heads arranged at the top of the alternate bends of said passage so as to direct the water spray in a direction opposite to the direction of travel of the products of combustion in said passage, the

first of said spray heads being located in the first bend of said passage, a plurality of nozzles for admitting steam into said passage in the direction of travel of the products of combustion, and filtering means arranged in those bends of said passage in which said spray heads are located.

Signed at South Lorain, in the county of Lorain and State of Ohio this 14th day of July, A. D. 1911.

MARTIN PAVELLA.

Witnesses:
GEORGE OROSZY,
L. B. HENDRIX.