July 18, 1950 M. H. LIPTON 2,515,455

UNIFORM FUEL FEED FOR SMOKE GENERATORS

Filed June 11, 1947 2 Sheets-Sheet 1

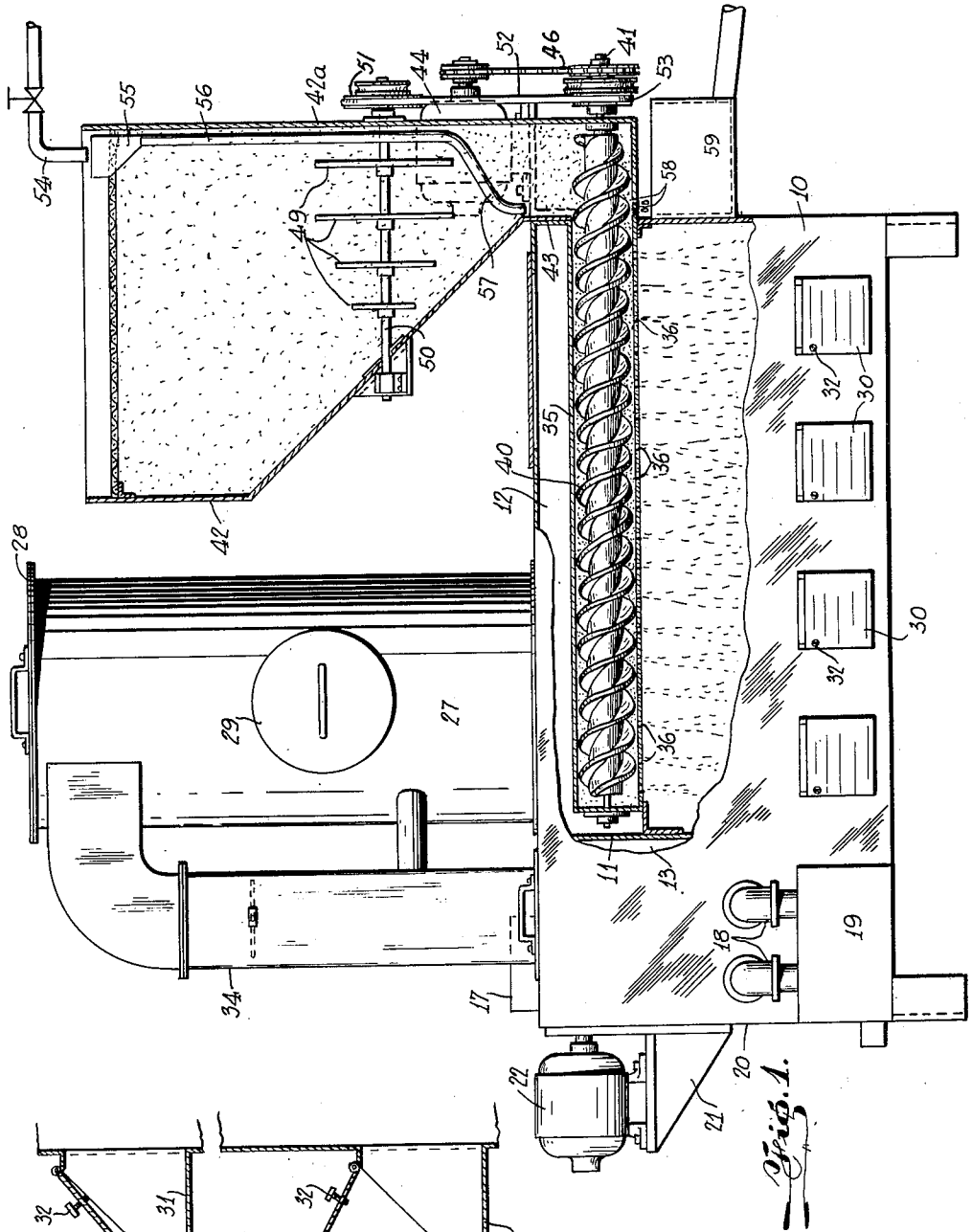


Fig. 1.

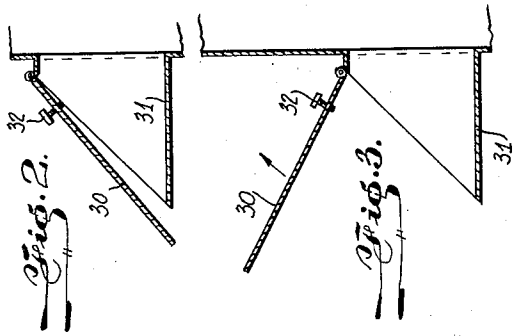


Fig. 2.

Fig. 3.

INVENTOR.
MARTIN H. LIPTON.
BY Percy Freeman
ATTORNEY.

July 18, 1950 M. H. LIPTON 2,515,455

UNIFORM FUEL FEED FOR SMOKE GENERATORS

Filed June 11, 1947 2 Sheets-Sheet 2

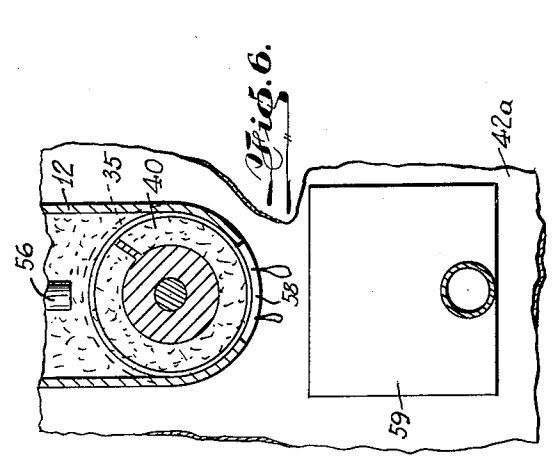


Fig. 6.

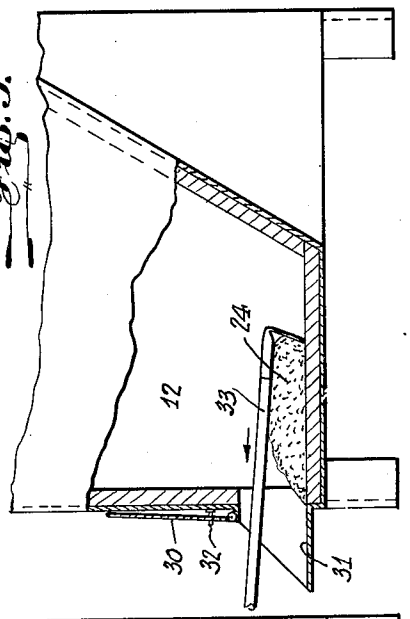


Fig. 5.

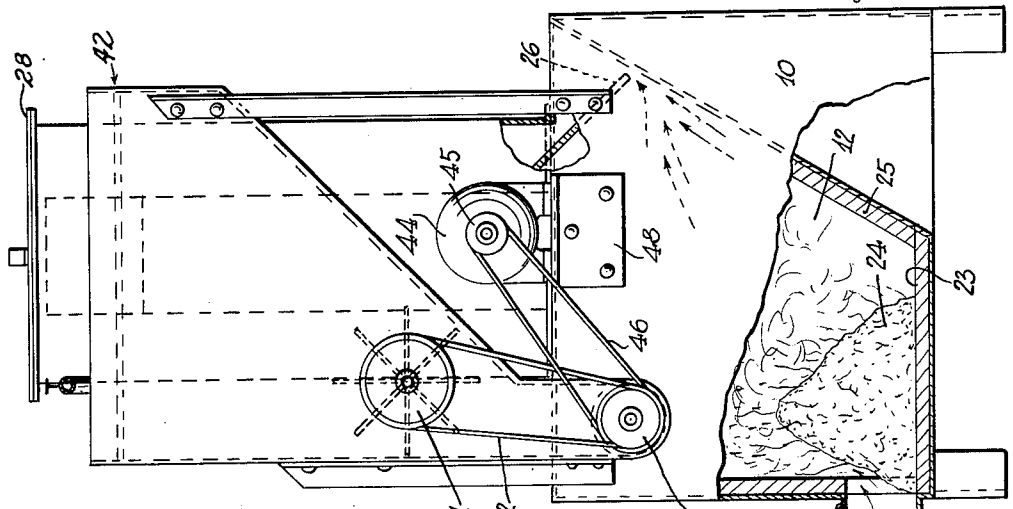


Fig. 4.

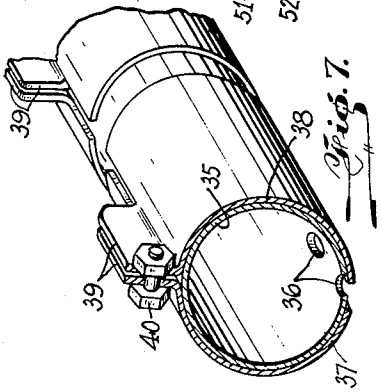


Fig. 7.

INVENTOR.
MARTIN H. LIPTON.
BY Percy Freeman
ATTORNEY.

Patented July 18, 1950 2,515,455

UNITED STATES PATENT OFFICE

2,515,455

UNIFORM FUEL FEED FOR SMOKE GENERATORS

Martin H. Lipton, Forest Hills, N. Y.

Application June 11, 1947, Serial No. 753,971

2 Claims. (Cl. 126—59.5)

1

This invention relates to new and useful improvements in apparatus for feeding material to smoke generators and for controlling the combustion thereof, and has particular reference to such devices in which smoke is produced for use in chambers where food products and other articles of various kinds are to be smoked.

In previous apparatus used for this purpose, the consumption of material has been very high and the efficiency of the device has, therefore, been lowered, added to which has been the uneven distribution of the material into the heating or combustion chamber and the uneven manner in which it has been wetted. It is an object of this invention to so uniformly feed the material to the combustion chamber in a regular controlled manner and wetted also under definite control that the output of smoke is even and the consumption of material is greatly lowered for the same amount of smoke produced, hence raising the efficiency of the generator.

A further object is to provide a supply of material and feed it in such manner that the supply need be replenished only at long intervals, such as once a day, and thus reduce labor time in this part of the work.

Yet another object is to provide a simple and efficient means to regulate the flow of the material to the combustion chamber so that uniformity of flow can be obtained even though the granular condition of the material may vary.

Further and more specific objects, features, and advantages will more clearly appear from a consideration of the detailed specification hereinafter set forth especially when taken in connection with the accompanying drawings which illustrate a present preferred form which the invention may assume and which form part of the specification.

In brief and general terms, the invention concerns the combination of a combustion chamber with a means to feed material into it along its entire length evenly and uniformly so that the combustion and generation of smoke throughout the chamber is uniform. Furthermore, the invention includes means related to the feeding apparatus whereby the material as it enters the combustion chamber is evenly wetted throughout so that the production of smoke from the burning material is made more even and effective. Further, the invention relates to adjustable mechanism which may alter the rate of feed of the material so as to adjust the feed device to the

2

differing kinds of material which may be used for producing smoke.

The present preferred form which the invention may assume is illustrated in the drawings of which:

Fig. 1 is a front elevation, partly in section of the generator.

Figs. 2 and 3 are partial sectional views of the means for adjusting the doors to the combustion chambers to obtain desired draft control.

Fig. 4 is an end elevation, partly in section, of the generator.

Fig. 5 is a partial end elevation, broken away, to show the manner of withdrawing ashes from the combustion chamber.

Fig. 6 is a cross section, in part, of the conveyor pipe, showing the means to allow excess liquid to drop into a drain tank.

Fig. 7 is a section through the conveyor showing the means for adjusting the openings through which the material gravitates.

Referring now merely to the specific form of the invention shown in the drawings, it will be observed that there is an enclosed casing 10 which, near one end, is divided by a transverse partition 11 into a large combustion chamber 12 and a smaller discharge and suction chamber 13. The chamber 13 has an exhaust pipe 17 for the smoke. The floor of the chamber 13 is connected to liquid discharge pipes 18 disposed above a drain tank 19 for reception of the liquid settling from the smoke in the chamber 13. On the end wall 20 of the casing 10 is disposed a bracket 21 supporting a motor 22, on the inner of the shaft of which is mounted a suction fan (not shown) to create and maintain a constant suction of air through the entire casing to draw the smoke off through the pipe 17.

With reference to the combustion chamber 12 shown at the right portion of the casing 10 in Fig. 1, it is to be noted that its floor 23 is flat and smooth and preferably formed of heat-resistant material. On it the sawdust or other material 24 to produce the smoke is disposed, and suitably ignited in the beginning by any suitable means. The back wall 25 of the combustion chamber 12 is also lined with the bricks and is a rearwardly sloping wall which extends to the top of the casing. Disposed on the top wall within the combustion chamber and extending downwardly and rearwardly therein is a baffle plate 26 which extends along the entire length of the chamber 12 and its lower end is disposed at a point very close to the rear wall 25. Above

this baffle plate, the top of the chamber 12 is opened in certain parts to permit the escape of the smoke into a washing tower 27 shown at the left of the chamber 12 in Fig. 1, and disposed on top of said chamber. This washing tower may be constructed in any suitable manner, but is shown as cylindrical and provided with a removable top plate 28 and a side inspection door 29. It is evident that any smoke arising from the slow-burning piles of material 24 will rise, but to escape from the chamber it will have to move to the rear along the wall 25 and pass around the lower end of the baffle plate 26 and thence up into the washing chamber. This indirect passage will tend to cool the smoke initially and possibly cause some part of the solid matter and liquid therein to begin to deposit even before it reaches the washing tower 27. The construction of the passage thus formed will also tend to make the smoke move much faster here and will create a better draft for the combustion.

The draft or admission of air is controlled by means of a series of air doors 30 which are top-hinged to cooperate with scoops 31 through which the material is introduced into the chamber 12. The doors 30 are provided with screws 32 which are disposed in the plane of the side walls of the scoops so that when the doors are lowered against the front face of the scoops the screws may be adjusted to keep the doors slightly open as shown in Fig. 2, and the degree of opening may obviously be altered as desired. With the doors 30 completely elevated a rake 33 may be inserted easily to remove the ashes, as shown in Fig. 5.

Now, in order to cool and wash the smoke as it leaves the combustion chamber, the washing tower 27 referred to is provided and its bottom opens into the top of the chamber 12 at the left as seen in Fig. 1. At the top of the tower, an exhaust smoke pipe 34 extends down to the top of the chamber 13 where further deposition of the deleterious ingredients in the smoke is made, and which flow down the sloping floor of the chamber 13 to and through the outlet pipes 18 into the drain tank 19. In the tower the washing of the smoke with cool water or by the intermediary of other washing and cooling elements is conducted in any well known and suitable manner (not shown herein).

Turning now to the main feature of my invention, the introduction and feed of the material such as sawdust from which the smoke is produced, there is provided along within the top of the chamber 12 a pipe 35 suitably supported at each end and projecting at the right end beyond the confines of the chamber. Within the chamber and along the bottom of the pipe 35 are disposed openings 36 through which the sawdust drops into the combustion chamber. The size of the openings effectively can be changed at will as follows: Enveloping the outside of the pipe 35 are sleeves curved to fit around the pipe and made of two plates 37 and 38 in length equal to the distance covered by several openings 36. There are, therefore, several of these sleeves along the pipe 35. The plates 37 and 38 have at the top, ears 39 abutting each other and fastened together adjustably by screws 40. The lower edges of the plates 37 and 38 do not quite meet and are spaced apart a distance not less than the diameters of the openings 36. By angularly adjusting the plates 37 and 38 on the pipe 35, the edges of these plates can be caused to overlap the openings 36 so as to decrease their effective size and thus regulate the openings through which the material drops. By having several plates along the pipe 35, the flow at different points along the pipe may be separately controlled, as may be desired.

Now considering the feed of the sawdust, it is to be noted that within the pipe 35 there is disposed a screw conveyor device 40 which is turned on its shaft 41 to advance the material through the pipe 35. On the frame of the casing 10 there is suitably supported a hopper 42 having sloping walls extending down to an outlet neck 43 opening into the righthand end of the conveyor pipe 35. The shaft of the conveyor screw 40 is turned by a motor 44 having on the end of its shaft a stepped drum 45 connected by belt 46 to a similar drum 47 on the shaft 41 of the screw 40. This enables the speed ratio between the shafts to be altered as desired. The motor 44 is supported on a suitable bracket 48 connected to the side of the casing 10.

In order to stir up the material in the hopper 42, a plurality of stirrer blades 49 are within the hopper disposed on a shaft 50 connected to a stepped drum 51 outside the hopper 42 and connected by a belt 52 to a similar stepped drum 53 on the screw shaft. Thus, the ratio of speed between the screw and the stirrers may be changed at will and the stirrers are located low down in the hopper 42 near the outlet neck 43, to insure that the material here will not clog up and interrupt the even flow of material into the conveyor pipe.

As the material is fed into the combustion chamber 12, it is necessary to dampen it to produce the character of smoke desired, and to this a supply of water is furnished from a source 54, passes into a small tank 55, to which is connected a pipe 56 extending down close to the wall of the hopper 42, but near the bottom the pipe 56 is bent to cross the hopper, as seen at 57, and extends to a point in the neck 43 of the hopper at its left wall, as seen in Fig. 1. This will cause the water to come into contact with the sawdust just as it is about to move into the conveyor portion which is located in the combustion chamber 12.

It will, therefore, be seen that as the material becomes subject to the heat in the combustion chamber, it is wetted uniformly and thoroughly but to the right of this point, it may be more or less dry to make more effective its feed from the hopper. The bottom of the conveyor pipe 35 near its feed end is provided with holes 58 which permit excess water to drip out into a drain tank 59.

In a general résumé of the invention thus specifically set forth herein in the form of a preferred embodiment thereof, it is evident that there is provided a combustion chamber with means to feed material at a uniform rate and in a controlled manner into said chamber all along its length. It also includes means for easily adjusting the air inlet elements to control the draft through the chamber and simple manipulatable means to adjust the feed openings in the feed device in accordance with the character of the material being fed to the combustion chamber.

While the invention has been described in detail and with respect to a present preferred form which the invention may assume, it is not to be limited to such details and forms since many changes and modifications may be made in the invention without departing from the spirit and scope of the invention in its broadest aspects. Hence, it is desired to cover any and all forms

and modifications of the invention which may come within the language or scope of any one or more of the appended claims.

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

1. In a smoke generator, the combination of means forming an elongated combustion chamber, screw conveyor means therein to feed regulated amounts of material into the chamber uniformly along its length, a hopper connected at one end of the combustion chamber to the conveyor means, means for driving the conveyor screw and for stirring the material in the hopper, and means for feeding water to the material at the bottom of the hopper at a point adjacent the combustion chamber.

2. In a smoke generator, a combustion chamber, a conveyor pipe extending into said chamber along the top thereof, apertures in the bottom of said pipe, a plurality of sleeves, each having free spaced edges, adjustably clamped around the pipe, the adjacent free edges of said sleeves being

spaced apart a distance at least as great as the diameter of the apertures in the bottom of the pipe, said sleeves being adjustable so that one of the free edges thereof may restrict the opening in the pipe to regulate the flow of material therethrough.

MARTIN H. LIPTON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
364,851	Patullo	June 14, 1887
532,876	Hendrix et al.	Jan. 22, 1895
707,534	Alves	Aug. 26, 1902
820,783	Harcharick	May 15, 1906
951,911	Hoehne	Mar. 15, 1910
1,644,693	Robertson	Oct. 11, 1927
1,670,295	Bailey	May 22, 1928
1,958,095	Papez	May 8, 1934
2,265,857	Reynoldson	Dec. 9, 1941