

March 2, 1937.

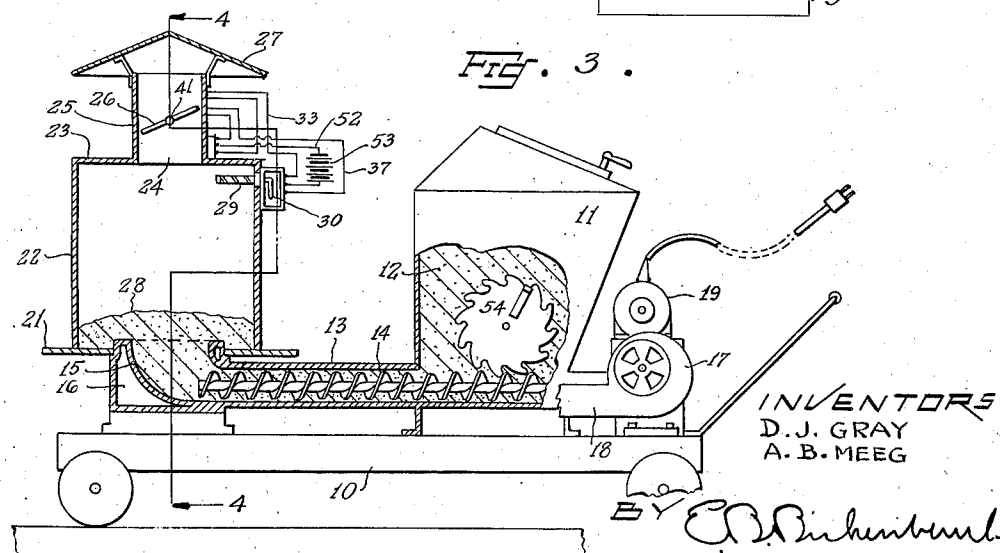
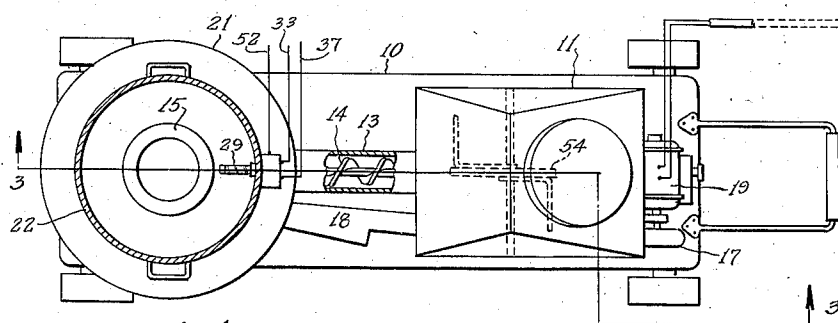
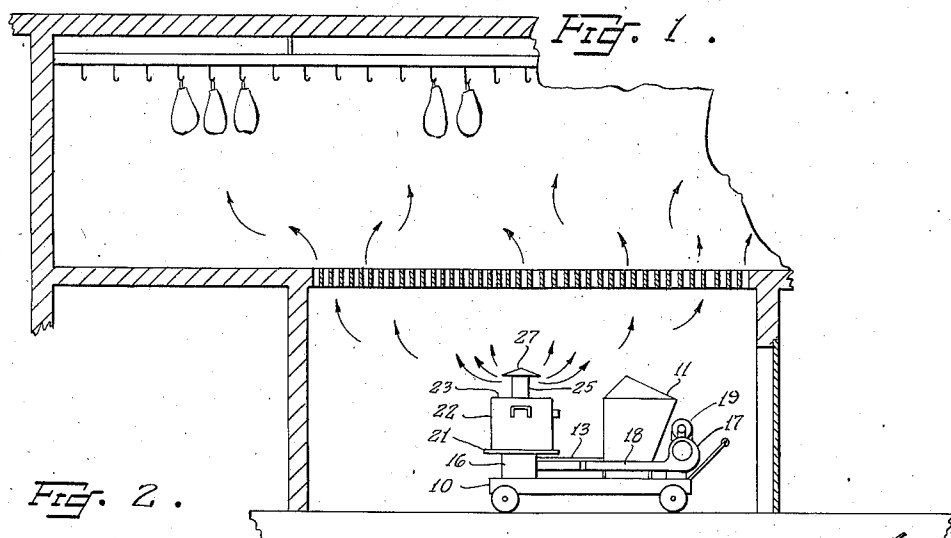
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2,072,364

SMOKE PRODUCER

Filed Jan. 7, 1933

2 Sheets-Sheet 1



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FIG. 4.

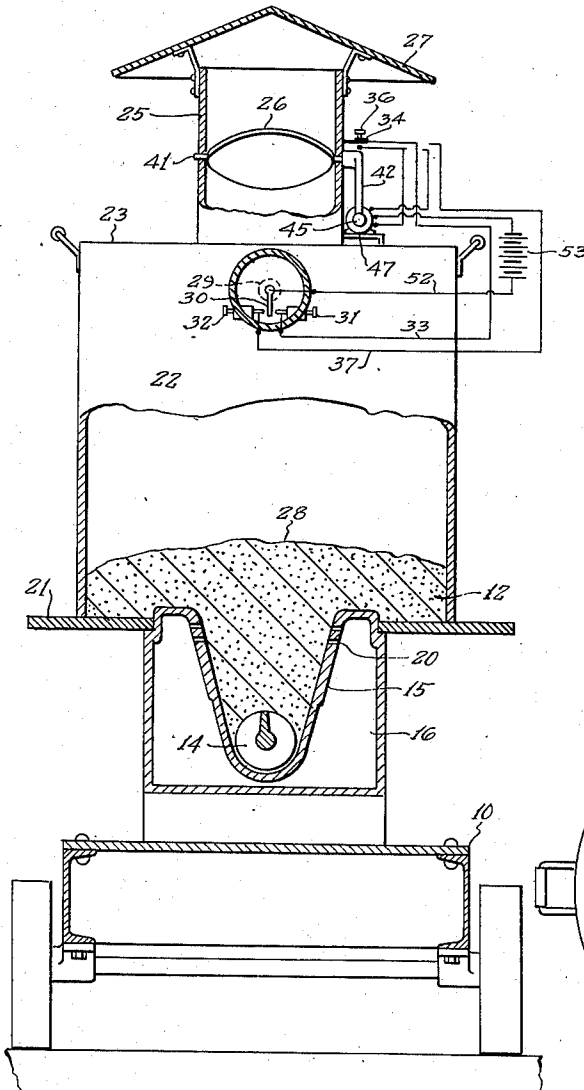


FIG. 6.

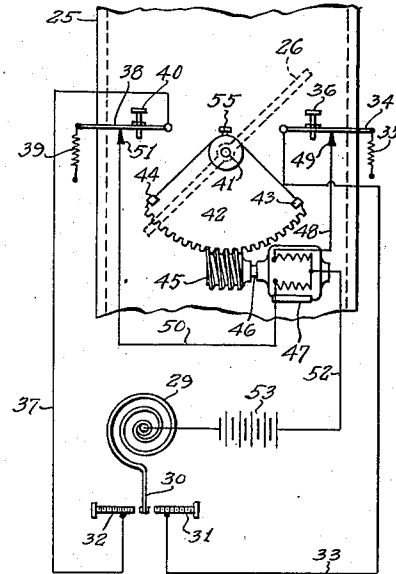
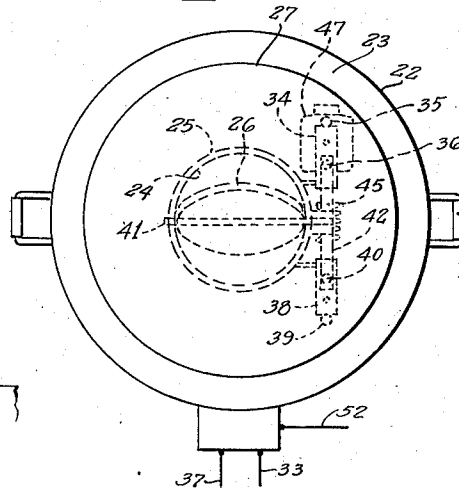


FIG. 5.



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2,072,364

SMOKE PRODUCER

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Application January 7, 1933, Serial No. 650,686

3 Claims. (Cl. 126—59.5)

This invention relates generally to smoke producing devices, and particularly to a type adapted to produce smoke from sawdust for use in meat packing plants.

5 The main object of this invention is the provision of a smoke producing apparatus which will produce a uniform and ample supply of smoke with a minimum amount of labor and discomfort on the part of the workmen.

10 The second object is the production of a smoke producing unit which can be moved into position for service in a number of different locations.

The third object is to construct a smoke producer with a regulating appliance for preventing 15 same from producing an undesirable amount of heat, and at the same time producing a maximum amount of smoke.

The fourth object is to entirely eliminate the necessity of placing a charge of sawdust on the 20 floor of the smoke producing room and continually raking same for the purpose of maintaining a smoldering condition.

The fifth object is to construct the device in a manner that a pressure can be maintained in 25 the sawdust above the retort of the device for the purpose of preventing same from bursting into flame.

These, and other objects, will become more apparent from the specification following as illustrated in the accompanying drawings, in which:

30 Fig. 1 is a vertical section through a representative form of smoke house showing the device in use.

Fig. 2 is a plan of the device.

35 Fig. 3 is a vertical section along the line 3—3 in Fig. 2.

Fig. 4 is a section taken along the line 4—4 in Fig. 3.

Fig. 5 is a plan of Fig. 4.

40 Fig. 6 is a diagrammatic view of the damper regulator.

Similar numbers of reference refer to similar parts throughout the several views.

Referring in detail to the drawings, same will 45 be seen to consist of an underfeed stoker which, in this instance, is mounted on a vehicle 10 and is comprised of a storage hopper 11 for sawdust 12 which is fed therefrom through a sawdust feed duct 13 by means of a sawdust feed screw 14. 50 The duct 13 terminates in a retort 15 which is surrounded by a plenum chamber 16 to which air is delivered by means of a fan in the casing 17 through the air duct 18. Rotation is supplied to the screw 14 and the fan by means of a 55 motor 19. Air is permitted to pass from the plenum chamber 16 through the openings 20.

60 A floor plate 21 surrounds the retort 15 near its top edge. Resting on the floor plate 21 is a drum 22 whose top side 23 is closed except for an opening 24 over which is mounted a short stack

25 containing a damper 26. A smoke deflecting cap 27 is placed above the top of the stack 25 in spaced relation thereto. The damper 26 is normally set in almost a fully closed position in order to maintain a pressure on the top side of 5 the smoking sawdust 28.

In order that the sawdust 28 may burn with a deficiency of air there is provided a damper control which will still further close the damper 26 should the temperature within the drum 22 rise 10 to an objectionable amount. This consists simply of a helical bi-metallic element 29 which will be referred to as a thermostat and whose end 30 is disposed between the contact screws 31 and 32; the former being joined by a wire 33 to a hinged 15 arm 34 which is normally urged downward by means of a spring 35 and carries along its length an adjusting screw 36. The wire 37 connects the screw 32 with the hinged arm 38 which is urged downwardly by the spring 39 and carries an ad- 20 justing screw 40.

On the shaft 41 of the damper 26 is a worm wheel segment 42 provided with the inturned 25 lugs 43 and 44, the former of which engages the screw 36 when the temperature in the drum 22 rises to an objectionable amount, and the lug 44 engages the adjusting screw 40 when the temperature in the drum 22 falls below a desired amount.

The worm wheel 42 meshes with the worm 45 which is secured to the shaft 46 of a reversible 30 motor 47, one of whose leads 48 extends to the contact point 49 under the arm 34, while its lead 50 connects with the contact point 51 which engages the arm 38. A neutral wire 52 extends from the motor 47 through the source of power 53 to 35 the thermostat 29.

It is desirable to provide an agitator 54 within the hopper 11 for the purpose of preventing arching of the sawdust in the hopper. The type of agitator illustrated is shown in detail in Patent 40 Number 1,812,911.

The operation of the device is as follows: A supply of sawdust 12 is placed in the hopper 11 and the motor 19 is started, causing the sawdust to be carried by the screw 14 into the retort 15 45 where it is ignited in any convenient manner. The sawdust 28 is now permitted to burn within the drum 22, but with an insufficient amount of oxygen and under a pressure above that of the atmosphere, in order to prevent it from bursting into a blaze, the damper 26 having been set with relation to the shaft 41 by means of the set screw 55 to provide the desired amount of restriction in the stack 25 to secure the right smoking condition, during which time the thermostat end 30 floats 55 between the screws 31 and 32.

If, due to atmospheric conditions, moisture contained in the sawdust, or other factors, the fire begins to die down the end 30 will come into contact with the screw 31, causing current to flow 60

from the source 53 through the thermostat 29, the wire 33, the arm 34, then through the wire 48 to the motor 47 and back through the neutral wire 52 to the source 53, causing the motor 47 to turn the worm 45 in a direction which will cause the damper 26 to move toward a vertical position until the fire is either built up to the desired point which will cause the end 30 to engage the screw 32, or, if the fire has gone out entirely, the motor 47 will be stopped by reason of the fact that the lug 43 has lifted the arm 34 away from the contact 49. If, on the other hand, after the smoke producer has been operating satisfactorily for a period of time the temperature begins to rise, the damper 26 is made to close by reason of the fact that the end 30 engages the contact 32 causing the motor 47 to turn in the opposite direction, due to a flow of current through the end 30 until the temperature within the drum 22 either drops sufficiently for the arm 38 to leave the contact 32 or the lug 44 has lifted the arm 38 out of engagement with the contact 51.

In other words, the arms 34 and 38 are tripped when the damper 26 is wide open or fully closed, although in normal operation the damper 26 would float between these two extremes under the control of the thermostat 29.

It will be seen from the foregoing that we have evolved a new apparatus for producing smoke from sawdust, involving not only the elimination of secondary air but the confinement of the smoke produced under pressure for the purpose of preventing the smoldering sawdust from bursting into flame.

It will be understood, of course, that this can be accomplished by providing an insufficient quantity of primary air, in which event however, only a limited amount of smoke can be produced; but by supplying a desired amount of primary air to produce the necessary amount of smoke and then holding this smoke under pressure there is no danger of the gases bursting into flame, since there is an insufficient proportion of oxygen present to support this degree of combustion.

Owing to the fact that the drum 22 is filled with smoke under pressure when the device is in operation the thermostat control for the pressure element can be substituted by or supplemented by one or both of two equivalent control systems. For example, instead of employing temperature to actuate the control, a pressure actuated device would serve equally well, or there could be employed a photoelectric cell by means of which any light occasioned by a burning of the gases in the drum 22 would, through the cell, cause the control apparatus to be operated.

The use of pressure controlled devices and photoelectric cells are so well understood as to require no explanation in regard to the manner in which they would be employed.

It is of course understood that the fan 17 is provided with a control for its inlet whereby the amount of air delivered to the combustion may be accurately controlled, and thereby the thermostat control in conjunction with the fan control, becomes a positive means for regulating the amount of smoke produced by the device.

It will be understood, of course, that the damper 26 constitutes a means for controlling the air delivered by the fan when pressures are employed in the drum 22; but when the photoelectric cell,

for example, is employed it will in most cases be found necessary to further regulate the flow of air by means of the damper on the fan itself.

Whereas the stoker has been shown mounted on a four wheeled truck, in many instances it will be found desirable to leave the entire stoker outside of the smoke house using a duct from the smoke chamber leading into several smoke houses, in which event the smoke delivered to each house would be controlled by means of dampers and one machine could do the work of several, and at the same time the machine would always be accessible for feeding and servicing.

It is also desirable in some installations to provide an agitator for the smoldering sawdust, and this may either be manually or power driven as desired, although in most instances when the automatic damper arrangement is employed the use of an agitator will be found to be entirely unnecessary.

We claim:

1. In a smoke producer, the combination of a vehicle, a sawdust hopper mounted on said vehicle, a retort including a plenum chamber also mounted on said vehicle, a conveyor worm within a sawdust feed duct communicating between said hopper and retort, a fan for supplying air to said plenum chamber, means for driving said worm and fan, a pressure-tight drum mounted over said retort within which said sawdust may be burned, a smoke outlet at the upper end of said retort having a deflector on the top side thereof and having a damper within said outlet together with an automatic control for said damper including a reversible motor for actuating same in a manner to move said damper in a closing direction during over-temperatures and to move said damper in an opening direction during under-temperatures, and trip means associated with said damper whereby said motor will be stopped in either of its extreme positions.

2. A smoke producer having in combination an underfeed sawdust delivering stoker including a retort in which the delivered sawdust is held, means for feeding air and sawdust into said retort from its under side, a closed drum forming an insufficient combustion space communicating with said retort, means for restricting the flow of smoke from said drum for the purpose of reducing the tendency for the sawdust to form a blaze and a temperature controlled outlet for the said drum adapted to restrict the escape of smoke therefrom when the temperature of said drum exceeds a predetermined maximum.

3. A smoke producer having in combination a fuel feed duct, a worm for moving sawdust through said duct upwardly into said retort, a fan for supplying air upwardly through said sawdust, a drum communicating with said retort having insufficient combustion space for the complete burning of the sawdust, said retort having a smoke outlet opening, a damper for restricting the flow of smoke from said opening and temperature controlled means for moving said damper to increase the restriction to the flow of air through said opening during over temperatures in said drum and to decrease said restriction during sub-normal temperatures in said drum.

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