Dec. 5, 1961 D. WEISSMAN 3,012,124

SMOKE GENERATOR

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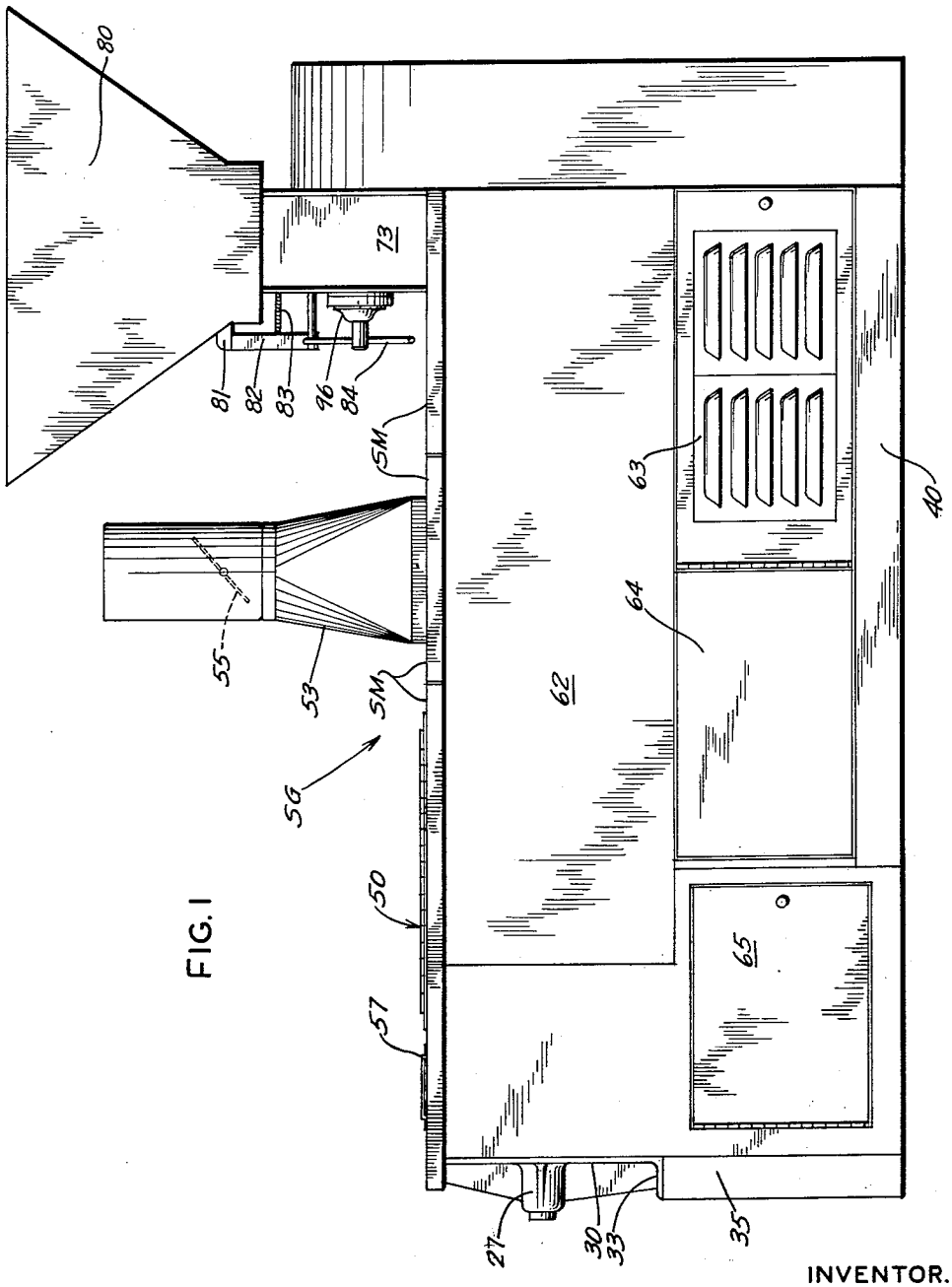


FIG. 1

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SMOKE GENERATOR

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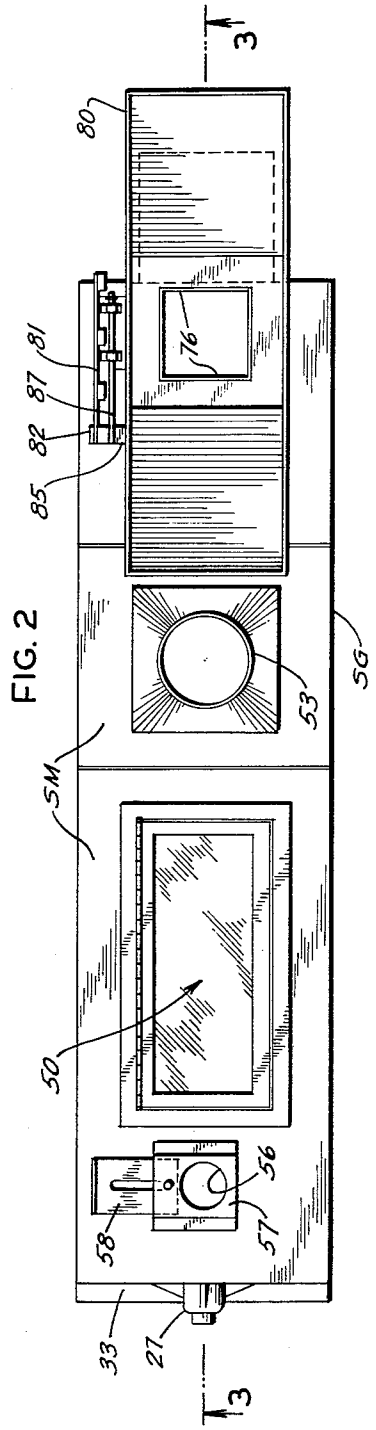


FIG. 2

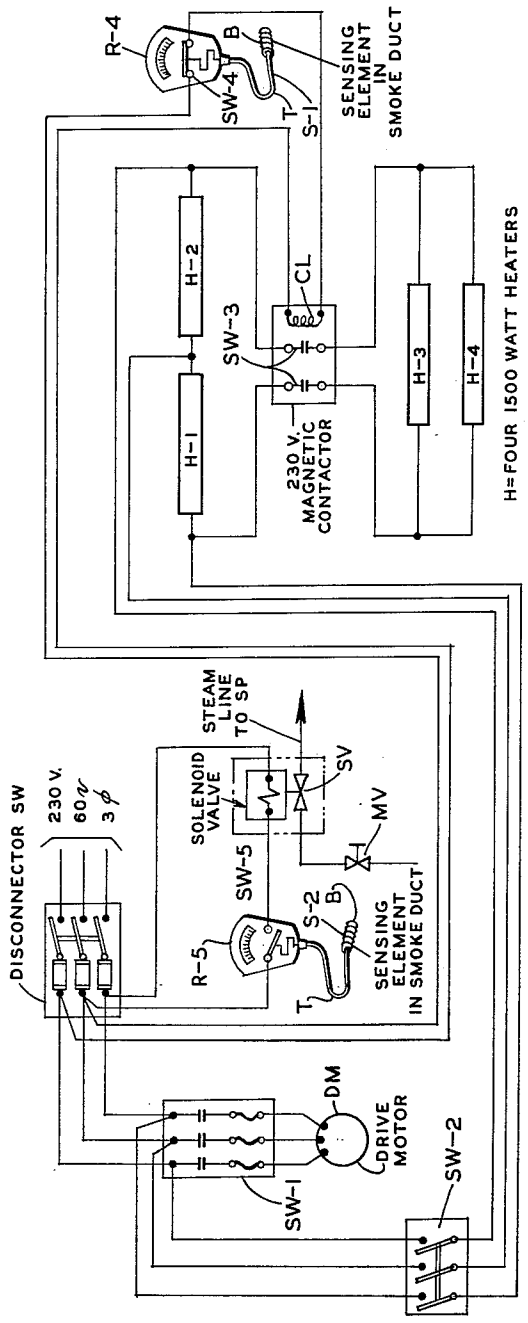


FIG. 6

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SMOKE GENERATOR

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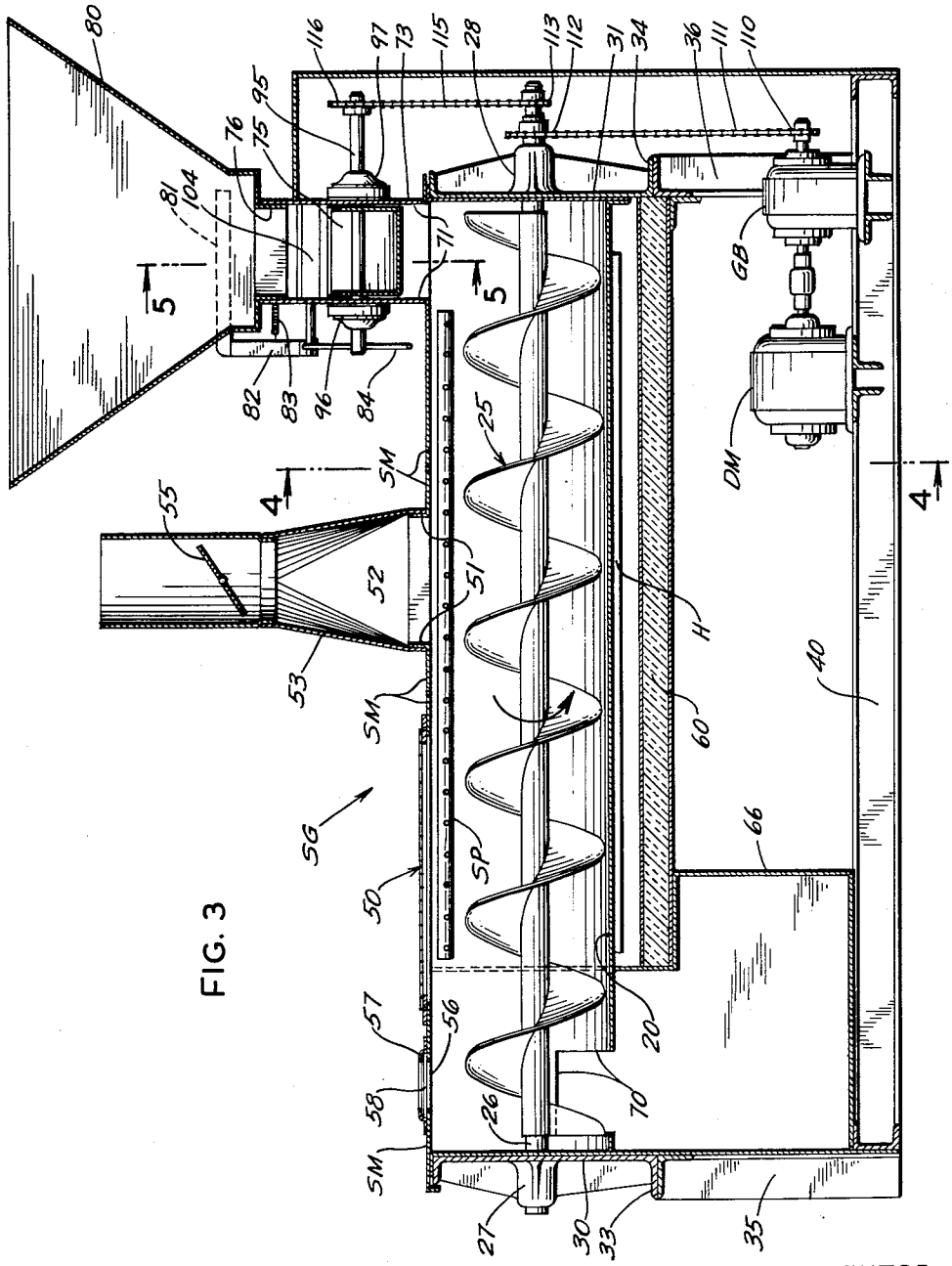


FIG. 3

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SMOKE GENERATOR

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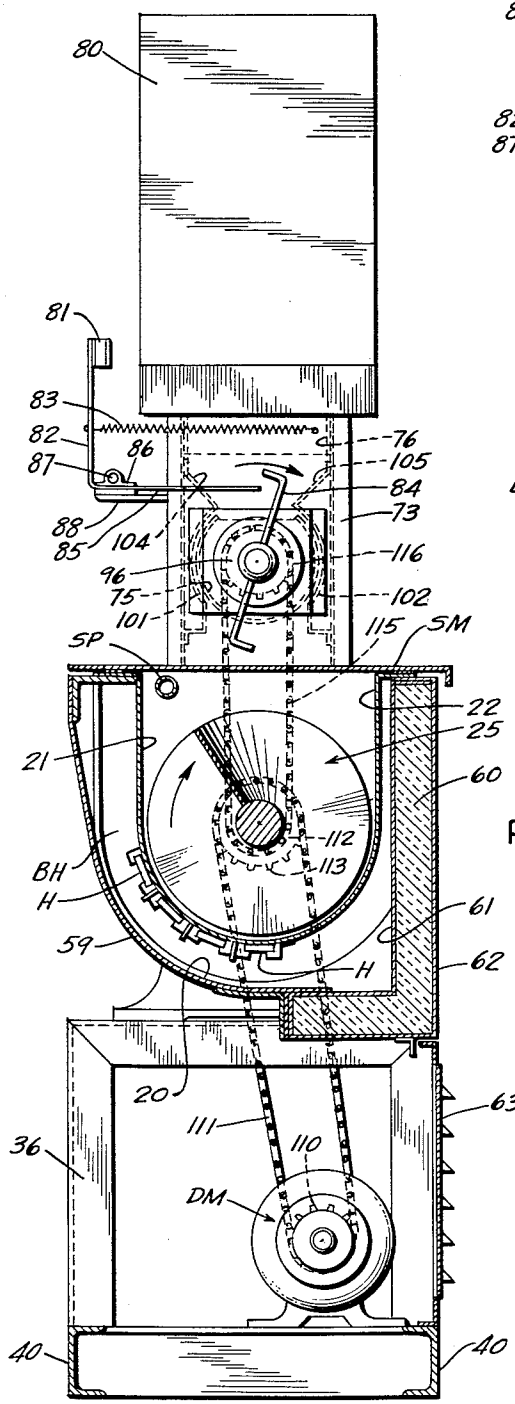


FIG. 4

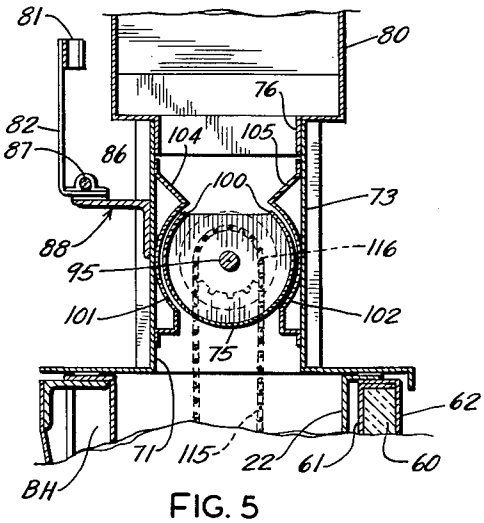


FIG. 5

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3,012,124

SMOKE GENERATOR

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Filed Sept. 23, 1958, Ser. No. 762,734
6 Claims. (Cl. 219—19)

This invention relates to a smoke generator for generating smoke from hard wood chips to be used in curing comestibles.

The smoke generator of the present invention includes a trough of arcuate form having a charging end into which wood chips are fed and a discharging end from which the chip residue is discharged. The trough is heated by electrical resistance elements, and an Archmedean screw is supported rotatably within the trough to advance the wood chips from the charging end to the discharging end. One of the primary features of the present invention is that the electrical resistance elements for heating the trough are located on that side only of the trough toward which the wood chips tend to be shifted by the rotating screw. It has been found that this arrangement greatly increases the operating efficiency of the smoke generator, and such an arrangement constitutes one of the primary objects of the present invention.

In accordance with the present invention, the raw wood chips are fed to the charging end of the trough by a rotating drum that is interposed between the charging end of the trough and a feed hopper which holds a large quantity of the raw chips. This drum has an opening in one side which repeatedly rotates past the discharge throat of the hopper and thence past the charging end of the trough, and in this manner copious quantities of the raw wood chips are picked up from the hopper and disgorged into the heating trough. The drum is carried by a driven shaft, and this shaft is arranged parallel to the drive shaft for the screw. These two shafts are driven by a common drive motor, and drive means are extended from the drive motor to the shafts in an advantageous relation constituting another object of the present invention. In this connection, it should be pointed out that the present apparatus also includes a vibrator for repeatedly striking one side of the hopper to assure good gravity flow of the raw chips therein toward the discharge throat of the hopper, and this assures full charging of the rotating drum so as to establish a uniform feed to the heated trough. The vibrator is repeatedly tripped by a trip arm which is mounted coaxial with the shaft which carries the rotating drum, and this specific arrangement constitutes another object of the present invention.

For optimum operating conditions, it is advantageous to assure that the wood chips are merely smoldered since under this condition the largest quantities of smoke are generated. It therefore becomes important to present heating of the wood chips to such a degree as to encourage flaming, and another object of the present invention is to so arrange the heater bars that predetermined ones of these will have current thereto interrupted in the event that the temperature within the trough reaches a degree where a flame is likely to occur. Of course, it may be that an actual flame does occur, and another object of the present invention is to afford and arrangement whereby quenching steam will be injected into the trough in the event that a flame does occur.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principles thereof

and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention.

In the drawings:

FIG. 1 is a front elevation of a smoke generator constructed in accordance with the present invention;

FIG. 2 is a top plan vew of the smoke generator;

FIGS. 3, 4 and 5 are sectional views taken substantially and respectively on the lines 3—3, 4—4 and 5—5 in FIG. 2; and

FIG. 6 is a wiring diagram showing the electrical connections embodied in the present structure.

The smoke generator of the present invention is illustrated at SG in FIG. 1 and embodies a trough 20, FIG. 3, which has an arcuate bottom wall and vertical straight upper side walls 21 and 22, FIG. 4. The trough 20 is conveniently constructed from sheet metal and is supported within the closed cabinet structure that is evident in FIG. 1.

Rotatably supported within the chamber of the trough 20 is an Archimedean screw 25, FIG. 3, which as viewed in FIG. 4, rotates in a clockwise direction. The drive shaft 26 for the screw 25 is supported at its opposite ends in bearing structure 27 and 28, FIG. 3, and this bearing structure in turn is rigidly secured in place to the respective end wall structure 30 and 31 constituting part of the cabinet closure. It will be observed in FIG. 3 that these end plates 30 and 31 have flanges 33 and 34 which are supported on floor mounted uprights 35 and 36 constituting the standard or base of the apparatus. Floor supported horizontal cross members 40, FIG. 3 serve as stabilizers and spacing structure and also constitute part of a suitable support for a drive motor DM and gear box GB drivingly coupled thereto as illustrated in FIG. 3.

The chamber in which the screw 25 rotates is the chamber in which smoke is to be generated by heating wood chips to a smolder state. This chamber is partly closed off at its top by means including sheet metal plates generally indicated at SM in FIGS. 2, 3 and 4. The top plate structure thus provided enables a hinged glass viewing panel 50, FIG. 2, to be mounted at the top of the smoke generating chamber to enable conditions within the chamber to be readily observed. To the right of the viewing panel 50 as seen in FIG. 3, the top wall of the chamber is provided with a smoke take-off opening 51, and the boundaries of this opening are defined by a vertically oriented stub sleeve 52 which is shaped from parts of the adjacent sheet metal sections SM. This sleeve constitutes a mounting base for a smoke take-off stack 53 of conventional construction, and it should be pointed out that this stack embodies a damper 55, FIG. 1. Sensing elements are mounted within the smoke stack as will be explained to sense temperature conditions.

To the left of the viewing panel 50 as seen in FIG. 3, the top wall of the smoke generating chamber is formed with a draft opening 56 which is cut in the corresponding sheet metal member SM. A plate 57 having an opening in registry with the opening 56 is located thereover as shown in FIG. 2, and this plate has upwardly off-set guide and retaining flanges as shown in FIG. 3 to enable a slide plate 58 to be arranged in sliding fashion therebelow. By sliding the plate 58 in and out relative to the opening 56, the effective area of the latter can be varied as a manually dampered opening to minimize or enlarge the amount of air admitted to the smoke generating chamber.

Referring to FIG. 4, electrical resistance heater bars H,

four in number in the present instance, are secured to the outside of the trough **20**, and in accordance with the present invention these heater bars are shifted to the left side of the trough **20** as viewed in FIG. 4 so as to be on that side only of the trough toward which the chips within the trough tend to be shifted by the rotating screw **25**. Thus, it will be recognized that it is the left side of the trough as viewed in FIG. 4 which is heated directly, since this is the side where the wood chips will be present for the most part. Accordingly, the smoke generator of the present invention can be quickly brought up to heat, in a manner of speaking, since the heater bars are concentrated in the proper area. The heater bars H are otherwise of a known construction and alloy composition and are of a length approximately forty-two and one-half inches in the commercial construction. In this connection, it should be further pointed out that the screw **25** has a length of four feet ten inches and a ten inch diameter, which will give some appreciation of the dimensions of the installation under consideration. Of course, it will be realized that the screw **25** should rotate within the trough **20** with as close tolerance and little friction as possible, and with a relatively slow motion speed consistent with advancing the wood chips through the trough with such a speed that the chips are practically in ash state once reaching the discharge end of the trough. As shown in FIG. 4, the heater bars H are held in contact with the outside of the trough **20** by bracket structure BH.

A reflector plate **59** of good reflector quality is located outward of the heater bars. This plate is generally complemental to the heated side of the trough and is restricted thereto so as to be coextensive with the heater bars.

The front or opposite side of the trough **20** on the other hand is insulated, that is, the side adjacent the attendant. This insulation is afforded by an L-shaped insulating panel illustrated at **60** in FIG. 4 and includes a pair of spaced complementally associated L-shaped plates **61** and **62** which are arranged and supported in place in such a manner that the front vertical side **22** of the trough is insulated by the long vertical section of the insulating panel whereas the lower curved right-hand quarter of the trough **20** as viewed in FIG. 4 is insulated by the horizontal inwardly directed insulation section. The insulation housing plate **62** is also shown in FIG. 1, and it will be noted that this is disposed above a louvered door **63** which is part of the exterior cabinet and which affords access to the motor and gear box arrangement. The panel **64** to the left of the door as viewed in FIG. 1 affords a convenient control panel on which many of the instruments and switches to be described hereinafter are conventionally located for setting and observation. The door **65** to the left of the control panel **64** as viewed in FIG. 1 affords access to an ash drop housing **66**, FIG. 3, which corresponds to what may be considered the discharge end of the smoke generating chamber or trough. Thus, as shown in FIG. 3, the housing **66** is of sheet metal construction and is configured to fit neatly about the lower section of the insulation panel and to abut one end of the trough **20**. This end of the trough **20** is cut out at **70** and the screw **25** extends across this cutout opening **70** so as to feed the chip residue practically in an ash condition to the opening **70** where the same drops into the ash housing **66**. In this connection, it will be noted that the damper opening **56** referred to above is located above the ash drop opening **70**, and hence air which is admitted to the smoke generating chamber through the opening **56** sweeps from the discharge end of this chamber in the direction of the take-off opening **51** so as to constitute an advantageous flow of air.

The charging end of the smoke generating chamber into which the raw chips are fed is defined by an opening **71**, FIG. 3, and this opening in the sheet metal top wall of the smoke generating chamber is surrounded by an upstanding housing **73** in which a drum **75** is arranged for rotation as will be described. The upper end of the housing **73** is also open and receives the discharge throat end **76** of a wood chip hopper **80**. Hence, it will be seen that the flow of wood chips supplied by the hopper **80** is downward by gravity through the discharge neck **76** thereof, toward the drum **75** and from the drum **75** into the charging opening **71**. Thus, the raw wood chips as produced or furnished are dumped into the hopper **80** and are free to flow therein unimpeded by gravity down through the neck **76**. In order to encourage this flow, a striker arm or vibrator **81** is located externally of one side of the hopper **80**. This strike arm **81** is disposed in a horizontal plane and at one end, outboard of the housing **73**, is provided with a depending leg **82**. At an intermediate point of the dimension of the leg **82**, a coil spring **83** is secured thereto, and the opposite end of this coil spring is anchored on a pin in turn fast on the housing **73** as shown in FIG. 4. The spring **83** normally tends to hold or dispose the striker **81** approximately in the position illustrated in FIG. 4, but as will be explained below, a rotating two-armed trip **84** is provided which is adapted to engage a horizontal extension **85** which is secured to a horizontal extension of the leg **82**. The leg **82** and extension **85** as thus joined together are provided with a bracket **86** which is journalled on a pin **87**. The pin **87** is supported by a flange **88**, FIG. 5, secured to the housing **73**.

The drum **75**, located within the housing **73**, is carried on a shaft **95** which is supported in bearing mounts **96** and **97**, FIG. 3, located externally of and secured to the housing **73**. The shaft **95** extends outwardly of the left-hand bearing mount **96** as viewed in FIG. 3, and the trip **84** is secured thereto so as to rotate with the shaft **95**. The drum **75** is, as shown in FIG. 4, of generally cylindrical form but has a relatively wide cut-out opening **100** at a peripheral segmental portion thereof. The drum **75** turns within a pair of plates **101** and **102**, FIG. 5, which have curved sides parallel to the curved sides of the drum **75**, and these plates **101** and **102** have bent end ears and flanges which are secured to the inside walls of the housing **73**. In this connection, it should be pointed out that the plates **101** and **102** are provided with upper flanges **104** and **105** which are located immediately below the hopper **80** and converge toward one another in a direction proceeding downwardly from the discharge throat **76** of the hopper **80**. These flanges **104** and **105** are quite widely spaced at their upper ends to conform substantially to the width of the hopper discharge throat **76**, and are gradually narrowed to a dimension which corresponds approximately to the width of the opening **100** in the drum **75**. Hence the plates **104** and **105** constitute a guide throat for directing raw wood chips flowing from the hopper **80** into the drum **75** when the opening **100** spans the gap between the lower edges of the plates **104** and **105** as viewed in FIG. 5.

The drum **75** rotates clockwise as viewed in FIG. 4, and when thus charged with raw wood chips, which in effect are scooped up by the drum as it rotates past the neck opening between the plates **104** and **105**, disgorge the chips into the charging opening **71** when the opening **100** is disposed 180° from the position illustrated in FIG. 4. It will be recognized that the arcuate side of the plate **102** constitutes a retaining cap preventing premature discharge of the chips in the drum **75**. In this connection, it will also be recognized that the two arms of the trip **84** are so oriented as to be more or less in phase with the opening **100** in a manner of speaking. Thus, referring to FIG. 4 it will be realized that the upper arm of the trip **84**, just a little bit prior to the time when the opening **100** in the drum **75** reaches the position shown in FIG. 4, strikes the extension or follower **85**, and this causes counterclockwise rotation of the leg **82** as viewed in FIG. 4. Then, when the trip arm disengages the follower **85**, the spring

83 is effective to pull the striker 81 violently in the direction of the hopper causing striking of the latter, This joggles the hopper, causing a good flow of wood chips into the drum 75 just as the opening 100 passes beneath the discharge throat of the hopper so as to assure a substantially complete loading of the drum. The lower arm of the trip 84 will next be effective, and this will assure good compaction of the wood chips available as the next charge for the drum 75. In this manner, it is assured that the charges in the drum 75 will be substantially constant in weight, and hence there is little likelihood of feast and famine so far as charging of wood chips into the trough 20 is concerned.

The drive motor DM is arranged to drive the shaft 26 for the screw 25 and the shaft 95 which, it will be noted, are parallel one to another. The drive connections in the present instance are in the form of sprocket chains. Thus, the drive shaft of the drive motor DM includes a sprocket 110, FIG. 3, which drives a chain 111 in turn trained about the drive sprocket 112 for the drive shaft 96. Also rotating with the drive shaft 26 is a sprocket 113 which drives a chain 115 in turn played about a drive sprocket 116 affixed to the drum drive shaft 95.

The four strip heaters H are so arranged that two are in continuous operation when the apparatus has been energized, but two of these strip heaters are arranged to be cut out within the temperature range of 200 to 220° F. to prevent a near-flame condition within the smoke generator chamber. In the utmost of precaution, a steam pipe SP, FIG. 3, is located within the smoke generator chamber and is provided with discharge orifices for injecting live steam into the smoke generator chamber in the event that the temperature therein is determined as being near 300° F. corresponding to a flame condition. Any steam so injected will tend to extinguish the flame.

The controls whereby these effects are achieved will now be explained with reference to FIG. 6 which bears descriptive legends for the most part explaining the actual controls involved. The electrical connections include manual off-on switches SW–1 and SW–2 respectively for the drive motor and the heater bars. These switches will be mounted on the control panel referred to above. It should be pointed out, however, that whereas the heater bars H–1 and H–2 are so connected as shown in FIG. 6 as to receive a continuous supply of current so long as the starting switch SW–2 is in its "on" position, the two heater bars H–3 and H–4 have their wires connected to a pair of magnetically controlled contactor switches SW–3. These switches are controlled by a coil CL which in turn is adapted to be energized by a pressure-responsive control switch SW–4 which in turn is under control of a sensing element S–1 of the known expandable fluid type. Thus, the bulb B of the sensing element S–1 is located withn the smoke take-off duct 53. The switch S–4 is associated with a dial indicator R–4 which is located on the control panel 64 referred to above together with the manual starting switches. Switch S–4 and its related sensing element are set so that switch S–4 is normally closed in the assembled apparatus, but in the event that the temperature in the stack reaches a predetermined degree, say 200 to 220° F., the fluid in the tube T associated with the bulb of the sensing element S–1 expands sufficiently to open switch S–4 thereby de-energizing coil CL and allowing the switches SW–3 to open, breaking circuit to the heater bars H–3 and H–4.

The steam line for supplying the steam injector pipe SP is indicated by legend in FIG. 6. This line has a main manually controlled cut-off valve MV and a solenoid controlled valve SV. Valve SV is normally closed and effective to withhold steam from the steam injector pipe SP, but is arranged to be opened upon energization of its coil in the event that the temperature in the stack reaches a predetermined maximum, say 300° F. Thus, circuit to the coil for the solenoid valve is interrupted by a normally open pressure responsive switch SW–5 associated with a dial recorder R–4 which is also mounted on the control panel referred to above. The contactor for switch SW–5 is under control of a sensing element S–2 which has a bulb B mounted in the smoke take-off duct. The fluid containing tube T associated with the sensing device S–2 is extended from the bulb B to the contactor of switch SW–5, and upon expansion of fluid in the tube T corresponding to the selected temperature, the contactor for switch SW–5 is closed, thereby extending circuit to the coil for the solenoid valve SV causing opening of the latter accompanied by injection of live steam into the smoke generating chamber.

It should be pointed out that the switch contactors SW–4 and S–5 are of the settable type, being similar to thermostat controls, and hence can be adjusted for operation at a selected or predetermined temperature and of course, embody the usual differential features preventing continuous operation about the set point.

It will be seen from the foregoing that the smoke generator of the present invention operates with a high degree of efficiency in the first instance due to the advantageous mounting of the heater bars relative to the trough in which the Archimedean screw operates, and moreover, this trough is conveniently insulated with a minimum amount of insulation while having a good heat reflector associated therewith. The particular relationship between the charging drum and the hopper vibrator assure full and effective loading of the feed drum, and a minimum amount of drive connections are required in view of the arrangement of the drive shafts for the screw and the drum. Finally, it should be stressed that by having a predetermined number of the heater bars continuously in circuit, the smoke generator is maintained at a threshold condition at all times even though circumstances may require injection of live steam to extinguish a flame. Further, the remainder of the heater bars are so connected as to be cut out as a flame condition is approached and while steam is conveniently resorted to it will be appreciated that any other desired fluid quenching medium may be used as carbon dioxide and so on.

I claim:

1. In a smoke generator: an arcuate trough affording a chamber for heating wood chips to the smoldering state and having a charging end for receiving the raw wood chips to be heated and a discharge end for discharging the chip residue, said trough having a left and right-hand side, means affording a smoke take-off and stack communicating with said chamber, an Archimedean screw supported for rotation in a predetermined direction in said trough to shift the chips to one of said left and right-hand sides to gradually advance the chips from the charging to the discharging end, a plurality of electrical resistance heater elements supported externally of said trough in position to heat the same and being located on the side only of the trough toward which the chips are shifted by the rotating screw, a sensing element for sensing the temperature of generated smoke and a cut-out switch connected to said sensing element and the wiring leads to a restricted number of said heaters to interrupt current to said selected heaters in the event the temperature of the smoke reaches a predetermined maximum and safety means for extinguishing a flame in said wood chips comprising, a line for injecting quenching medium into said trough to quench any fire that may develop therein, a normally closed valve in said line withholding the quenching medium therefrom, and a sensing element for sensing a fire condition in said trough and arranged to control the opening of said valve.

2. In a smoke generator: an arcuate trough affording a chamber for heating wood chips to the smoldering state and adapted to be only partly filled with the wood chips to be heated, said arcuate trough having a charging end for receiving the raw wood chips to be heated and a discharge end for discharging the chip residue, said discharge end communicating with an ash drop, a hopper above

the charging end of said trough for containing raw wood chips, a rotatable drum having an opening in one side thereof and interposed between said hopper and said charging end of the trough to feed chips from the hopper and disgorge the same into the trough, means affording a smoke take-off and stack communicating with said chamber, an Archimedean screw supported for rotation in a predetermined direction in said trough to gradually advance the chips from the charging to the discharging end, a plurality of electrical resistance heater elements supported externally of said trough in position to heat the same and being located on the side only of the trough toward which the chips are shifted by the rotating screw, a sensing element for sensing the temperature of generated smoke and a cut-out switch connected to said sensing element and the wiring leads to selected of said heaters to interrupt current to said selected heaters in the event the temperature of the smoke reaches a predetermined maximum and safety means for extinguishing a flame in said wood chips comprising, a line for injecting quenching medium into said trough to quench any fire that may develop therein, a normally closed valve in said line withholding the quenching medium therefrom, a sensing element for sensing a fire condition in said trough and arranged to control the opening of said valve; said screw having a drive shaft, and said drum having a drive shaft parallel to and above that for said screw, and a common drive motor and drive means connected to said shafts for driving the screw and drum at speeds insuring only partial filling of the trough with wood chips.

3. In a smoke generator: an arcuate trough affording a chamber for heating wood chips to the smoldering state and having a charging end for receiving the raw wood chips to be heated and a discharge end for discharging the chip residue, a hopper above the charging end of said trough for containing the raw chips to be fed to the trough, a rotatable drum interposed between said hopper and the charging end of said trough and having an opening in one side thereof to receive chips from the hopper and disgorge the same into the trough, means affording a smoke take-off and stack communicating with said chamber, an Archimedean screw supported for rotation in a predetermined direction in said trough to gradually advance the chips from the charging to the discharging end, heater means for said trough and shifted to that side only of the trough toward which the chips are shifted by the screw, a drive shaft for said screw, a drive shaft for said drum arranged parallel to that for the screw, a common drive motor for said shafts and drive means extended thereto from said motor to rotate the drum and screw at speeds insuring only partial filling of the trough with wood chips and means, including a draft opening and coacting slide plate, for regulating the amount of air admitted to the smoke generating chamber.

4. In a smoke generator: an arcuate trough affording a chamber for heating wood chips to the smoldering state and having a charging end for receiving the raw wood chips to be heated and a discharge end for discharging the chip residue, said discharge end communicating with an ash drop, a hopper above the charging end of said trough for containing raw wood chips, a rotatable drum having an opening in one side thereof and interposed between said hopper and said charging end of the trough to feed chips from the hopper and disgorge the same into the trough, means affording a smoke take-off and stack communicating with said chamber, an Archimedean screw supported for rotation in a predetermined direction in said trough to gradually advance the chips from the charging to the discharging end, a plurality of electrical resistance heater elements supported externally of said trough in position to heat the same and being located on the side only of the trough toward which the chips are shifted by the rotating screw, a reflector panel outward of said heater elements, an L-shaped insulating panel on the side of the trough opposite said reflector panel and including a vertical section covering the vertical portion of the trough and a horizontal section covering the lower quarter of the trough, a sensing element for sensing the temperature of generated smoke and a cut-out switch connected to said sensing element and the wiring leads to selected of said heaters to interrupt current to said selected heaters in the event the temperature of the smoke reaches a predetermined maximum and safety means for extinguishing a flame in said wood chips comprising, a steam line for injecting live steam into said trough to quench any fire that may develop therein, a normally closed valve in said steam line withholding steam therefrom, a sensing element for sensing a fire condition in said trough and arranged to control the opening of said valve; said screw having a drive shaft, and said drum having a drive shaft parallel to and above that for said screw, and a common drive motor and drive means connected to said shafts.

5. In a smoke generator: an arcuate trough affording a chamber for heating wood chips to the smoldering state and having a charging end for receiving the raw wood chips to be heated and a discharge end for discharging the chip residue, a hopper above the charging end of said trough for containing the raw chips to be fed to the trough, a rotatable drum interposed between said hopper and the charging end of said trough and having an opening in one side thereof to receive chips from the hopper and disgorge the same into the trough, means affording a smoke take-off and stack communicating with said chamber, an Archimedean screw supported for rotation in a predetermined direction in said trough to gradually advance the chips from the charging to the discharging end, common drive means for rotating the drum and screw at speeds insuring only partial filling of the trough with wood chips, heater means for said trough and shifted to that side only of the trough toward which the chips are shifted by the screw, a reflector panel restricted to said side of the trough, and an insulator panel restricted to the opposite side of the trough.

6. In a smoke generator: an arcuate trough affording a chamber for heating wood chips to the smoldering state and having a charging end for receiving the raw wood chips to be heated and a discharge end for discharging the chip residue, a hopper above the charging end of said trough for containing the raw chips to be fed to the trough, a rotatable drum interposed between said hopper and the charging end of said trough and having an opening in one side thereof to receive chips from the hopper and disgorge the same into the trough, means affording a smoke take-off and stack communicating with said chamber, an Archimedean screw supported for rotation in a predetermined direction in said trough to gradually advance the chips from the charging to the discharging end, heater means for said trough, a drive shaft for said screw, a drive shaft for said drum arranged parallel to that for the screw, a common drive motor for said shafts and drive means extended thereto from said motor, a vibrator for said hopper, a trip for the vibrator and being rotatable with said drum, and said trip being oriented to trip the vibrator substantially at the time the opening in the drum is presented to the hopper.

References Cited in the file of this patent

UNITED STATES PATENTS

1,468,379	Easton	Sept. 18, 1923
2,265,857	Reynoldson	Dec. 9, 1941
2,398,446	Phillipson	Apr. 16, 1946
2,606,546	McMullen	Aug. 12, 1952
2,667,157	Vastola	Jan. 26, 1954
2,677,038	Reynoldson	Apr. 27, 1954
2,721,729	Van Riper	Oct. 25, 1955
2,732,837	Portwancher et al.	Jan. 31, 1956
2,843,106	Tipper	July 15, 1958