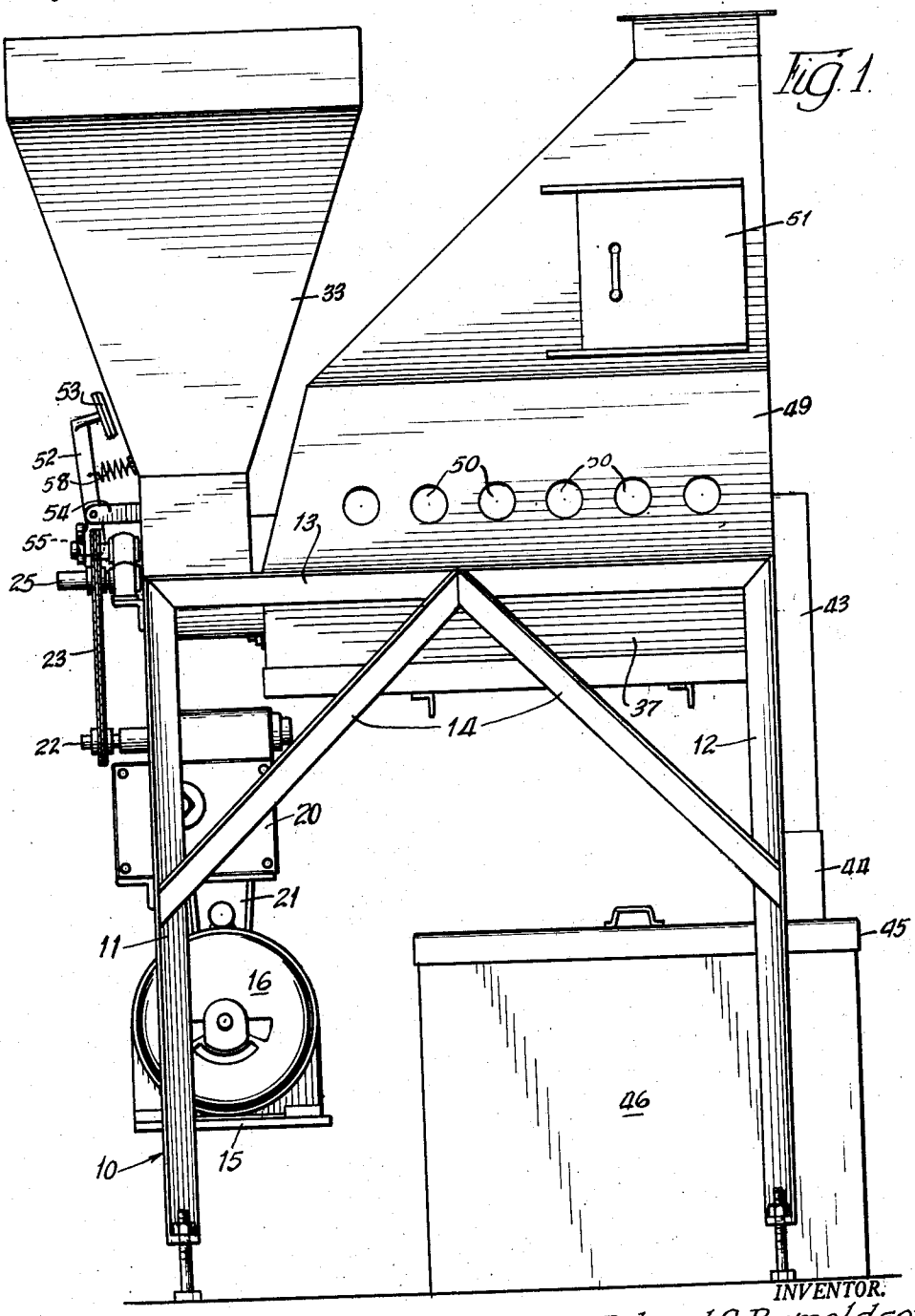
April 27, 1954 R. G. REYNOLDSON 2,677,038

SMOKE GENERATOR

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Fig. 1.



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Fig. 2

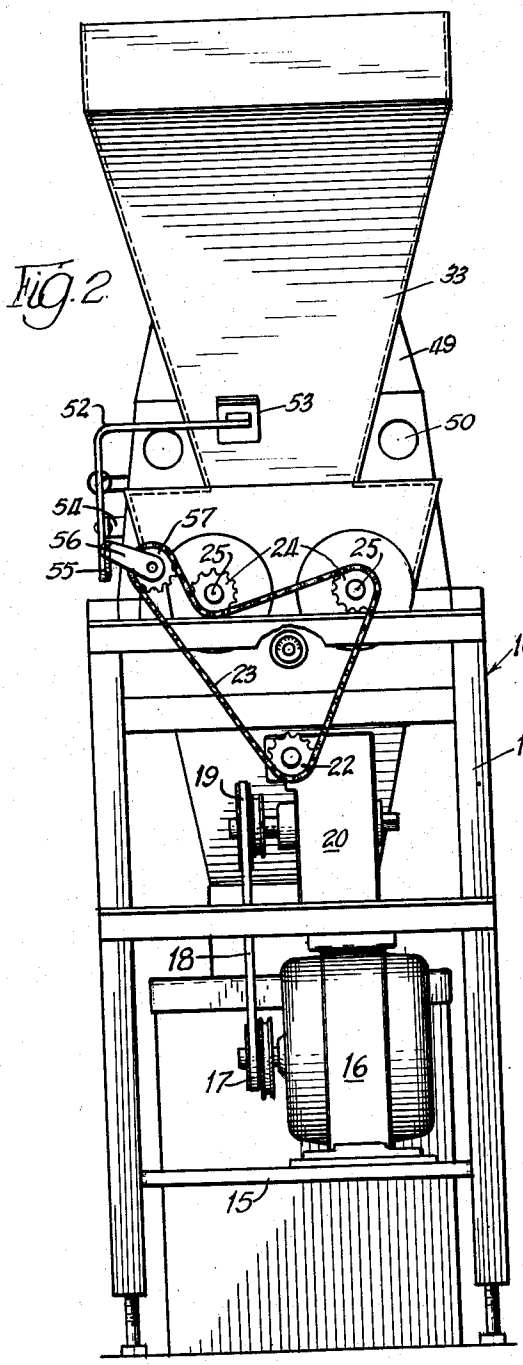
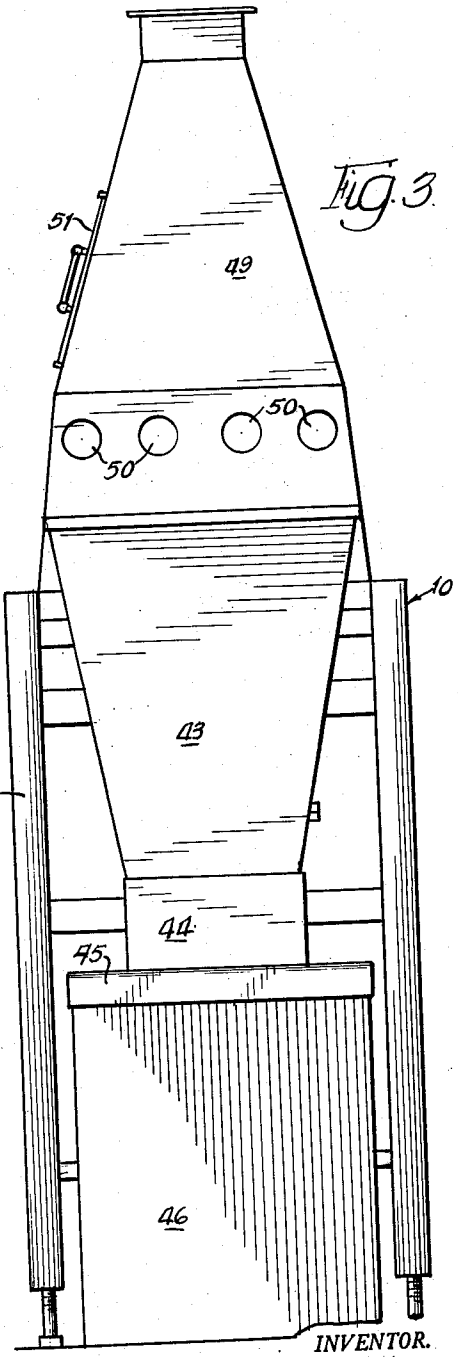


Fig. 3



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Fig. 4

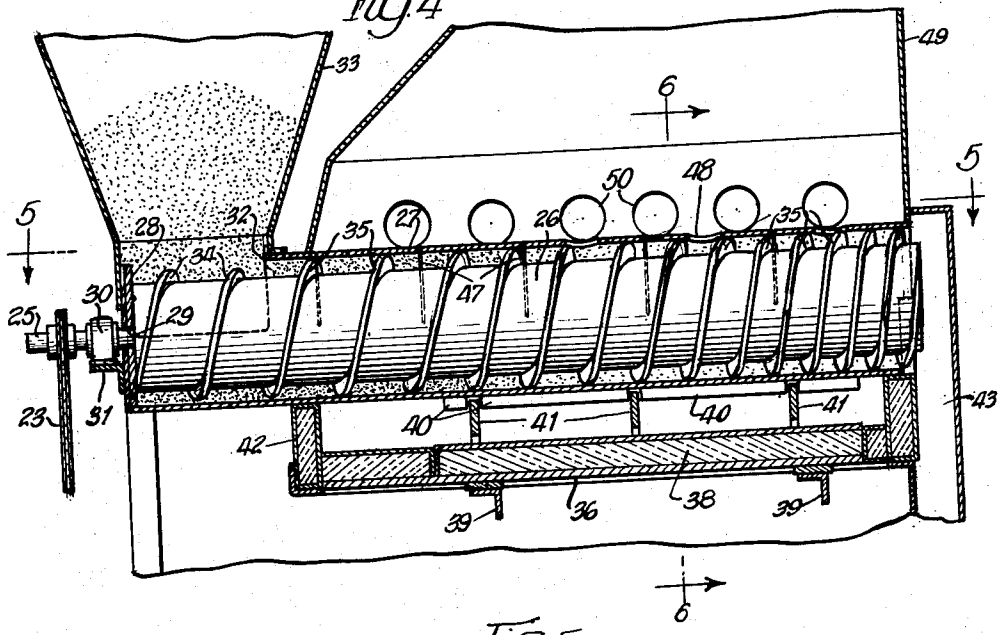
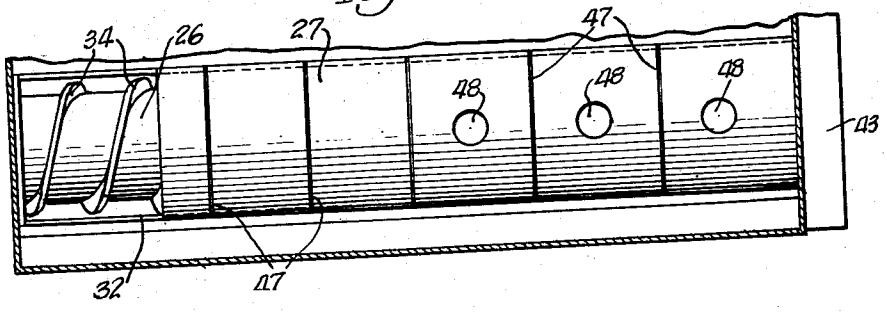


Fig. 5



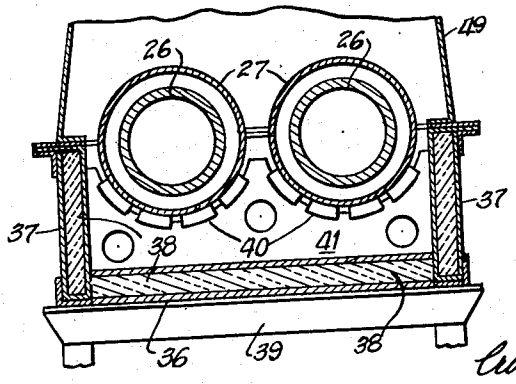


Fig. 6.

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SMOKE GENERATOR

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Application September 8, 1950, Serial No. 183,701

3 Claims. (Cl. 219—19)

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This invention relates to apparatus for use in the curing of meats or other foods or substances and is more particularly concerned with improvements in a device for subjecting wood to destructive distillation.

It is a general object of the invention to provide an improved apparatus for subjecting wood to destructive distillation which is simple in construction, which is efficient in operation and which may be constructed with a minimum of cost.

It is a more specific object of the invention to provide a mechanism for producing smoke by the destructive distillation of finely divided wood or sawdust wherein improved means is provided for obtaining uniform feed of the sawdust during the process of distillation.

It is a still more specific object of the invention to provide a smoke generator wherein slowly rotating feed screws are arranged in heating chambers or smoke tubes in such a manner that the sawdust is continuously moved in a thin layer through the tube which is heated by suitable means for reducing the sawdust to produce smoke which is collected in a smoke chamber and delivered to the smoke house.

Another object of the invention is to provide in a smoke generator a sawdust feed tube which comprises a shaft member having feed veins arranged to extend radially and in a continuous spiral axially of the shaft with the pitch decreasing progressively from the feed hopper for the sawdust towards the ash discharge at the end of the shaft.

It is another object of the invention to provide a smoke generator in which the feed screws for the sawdust extend through a smoke tube which is partially enclosed in a heating chamber wherein the heating chamber is insulated and heat is provided for the tubes by electrical heating elements.

These and other objects of the invention will become apparent from a consideration of the apparatus which is shown by way of illustration in the accompanying drawings, wherein:

Fig. 1 is a side elevation of a smoke generator embodying the principles of the invention;

Fig. 2 is a front end elevation of the smoke generator;

Fig. 3 is a rear end elevation of the smoke generator;

Fig. 4 is a longitudinal section taken at one of the feed screws;

Fig. 5 is a longitudinal section taken generally on the line 5—5 of Fig. 4; and

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Fig. 6 is a transverse section taken generally on the line 6—6 of Fig. 4.

Referring now to the drawings there is illustrated a smoke generator which embodies the principal features of the invention and which is designed to be used in supplying smoke to a smoke house for the processing of meats or similar substances.

In the illustrated device there is provided a supporting frame structure 10 which includes a front cross frame 11, a rear cross frame 12, a top horizontal frame 13, and longitudinal bracing arranged diagonally at 14 which connects the front and rear cross frames to the top frame 13. A platform 15 is supported near the bottom of the front frame 11 and is arranged for supporting a driving motor 16. The drive pulley 17 on the motor 16 is connected by means of a belt 18 with the pulley 19 on a speed reducer 20 supported on a bracket 21 above the motor 16. A driven sprocket 22 on the speed reducer 20 is connected by means of chain 23 in driving relation with sprockets 24 on a pair of horizontal feed shafts 25 which constitute portions of the feed screws 26.

The feed screws 26 are arranged in a pair of cylindrical smoke tubes 27 which are closed at the forward ends by an end plate 28. The end plate 28 is apertured at 29 and the shafts 24 extend forwardly through the same and are received in a bearing 30 mounted on the top cross member 31 of the front end frame 11. The smoke tubes 27 are provided at the forward ends with top openings 32 for receiving sawdust from a supply hopper 33 which extends upwardly of the forward end of the apparatus.

The feed screws 26 are each provided with a continuous radial vein or blade which extends spirally of the length thereof with decreasing distance or pitch between the spirals or turns in the direction toward the end of the screw. The first two turns 34 of the spiral blade are of less circumferential diameter than the remaining turns 35 and extend beneath the aperture 32 where they receive the sawdust from the hopper 33. The remaining turns 35 of the spiral blade are close to the inside diameter of the tube 27 so that when the feed screw is rotated the blade 34, 35 moves the sawdust out of the hopper and towards the other end of the tube 27. The reduced diameter of the blade portions or turns 34 results in the feed of a thinner layer of the sawdust as the screws 26 are rotated. The distance between the remaining blades being decreasing towards the ends of the feed screw results in the partially

burned or distilled sawdust moving slower as it approaches the end of the smoke tube 27.

The smoke tubes 27 extend through a heating chamber or firebox which comprises a bottom 36 and side walls 37 which are provided with a heat insulating material indicated at 38. The firebox is supported on cross pieces 39 and other members of the supporting frame structure 10. A plurality of heating bars 40 which may be electrical resistance elements are arranged on cross supporting members 41 in contact with the bottom portion of the tubes 27 throughout a substantial portion of the length of the same. The end walls 42 of the firebox or heating chamber are recessed to support portions of the tubes 27. At the rear end of the machine the tubes 27 open into an ash drop 43 which extends from the end of the tubes to a funnel 44 mounted on a removable lid 45 on an ash receiver 46.

The firebox may be provided with a door or other opening for removal of the heating elements 40 and their supporting structure 41 to facilitate replacement and repair.

The smoke tubes 27 are provided along the top surface with axially spaced transversely extending slots 47 and a plurality of circular apertures 48 spaced between the slots 47 which permit the smoke to escape from the tubes 27 upwardly of the same. The upper open portion of the firebox or heating chamber is covered by a hood 49 which collects the smoke and directs it upwardly into a conduit or other connection with the smoke house. The hood 49 is provided adjacent its bottom with a series of apertures 50 which permit the entrance of air immediately above the tubes 27 to reduce the temperature of the smoke below the flash point. The hood 49 may be provided with a door 51 to permit access to the same when required.

The supply hopper 33 for the sawdust may be provided with a vibrating mechanism for insuring a uniform feed of the sawdust. The illustrated mechanism consists of an L-shaped arm 52 which carries at its upper end a pad or striker 53 for intermittent engagement with the side of the hopper. The arm 52 is pivoted at its other end to a bracket 54. The pivoted end of the arm 52 is enlarged to provide a cam portion 55 which is engaged by a striker arm 56 which is mounted on a rotatable sprocket 57 supported by a stub shaft adjacent one of the sprockets 24 and driven by the chain 23. The spring 58 cooperates with the cam 55 to vibrate the striker pad 53.

In operation the hopper 33 is provided with a supply of the sawdust which is fed to the screws 26 through the hopper openings 32. The operation of the motor 16 slowly drives the feed screws 26 through the drive belt 18 and drive chain 23. The hopper is agitated or vibrated of course, by intermittent movement of the striker pad 53. The feed screws 26 move a relatively thin layer of sawdust into the smoke tubes 27 and over the heated areas provided by the heating elements 40. As the sawdust is moved toward the rear of the machine by the relative slow rotation of the screws 26 it is burned to provide a quantity of smoke. The pitch of the blades on the feed screws 26 cause the material to move more slowly as it approaches the end of the tubes 27 and results in almost complete distillation with the ash being delivered to the ash receiver 43. The smoke generated in the tubes 27 escapes through the slots 47 and apertures 48 in the upper surfaces of the tubes 27 and into the smoke chamber 49 being mixed with a sufficient quantity of air to cool it below the flash point as it moves upwardly in the smoke chamber and is delivered from the same to the smoke house.

While specific details of construction have been referred to in describing the illustrated form of the apparatus it will be understood that other details of construction may be resorted to within the spirit of the invention.

I claim:

1. In a device for generating smoke from sawdust, a supporting frame, members forming an insulated heating chamber mounted on said frame, members forming a smoke receiving chamber above said heating chamber, tube forming members extending through said smoke chamber and having a sawdust receiving aperture at one end thereof, said tube having axially spaced smoke emitting apertures connecting the same with said smoke chamber, electrical heating elements arranged in said heating chamber along the bottom of said tube, a sawdust supply hopper connected to said tube at the sawdust receiving aperture therein, a sawdust conveyor in said tube, said conveyor being characterized by a tubular core of substantial diameter and a relatively narrow continuous peripheral blade arranged in spiral relation thereon, said blade being of less diameter immediately beneath said sawdust receiving aperture and the pitch thereof decreasing progressively from said aperture to the discharge end of said tube, and means for slowly rotating said conveyor to move a thin layer of sawdust continuously through said tube with the thickness of said layer of sawdust being maintained substantially constant throughout the length of the tube as said sawdust is progressively consumed.

2. In a smoke producing apparatus, members forming a smoke accumulating chamber, a smoke generating tube extending into said chamber and having apertures spaced along the top surface thereof for emitting smoke, a rotatable sawdust conveyor screw in said smoke generating tube, a sawdust supply hopper exterior to said smoke chamber and having a connection with one end of said conveyor to supply sawdust to said conveyor, said conveyor screw being characterized by a tubular core of substantial diameter and a relatively narrow continuous peripheral blade arranged in spiral relation thereon, said blade being of less diameter immediately beneath said sawdust supply hopper and the pitch thereof decreasing progressively from said connection to the discharge end of said smoke generating tube, heating means for raising the temperature within said smoke generating tube to cause distillation of the sawdust as it is conveyed therethrough, and said smoke accumulating chamber having a plurality of spaced apertures in the walls thereof adjacent the apertures in the smoke generating tube, whereby smoke generated in said smoke generating tube passes through the apertures therein and is mixed with a sufficient quantity of air passing into the smoke chamber through the apertures in the walls thereof to cool it below the flash point as it moves upwardly in the smoke chamber.

3. A smoke generator comprising a supporting frame, members forming an insulated heating chamber mounted on said frame, members forming a smoke chamber arranged above said heating chamber, a hollow elongate tubular member forming a distillation chamber extending through said smoke chamber above said heating chamber and having a sawdust feeding aperture located at one end thereof which is exterior of

said smoke chamber, said tubular member having axially spaced smoke emitting apertures connecting the same with said smoke chamber, heating means arranged in said heating chamber along the bottom of said tubular member, a sawdust supply hopper connected to said tubular member for delivering sawdust through said feeding aperture, a sawdust conveyor in said tubular member, said conveyor being characterized by a tubular core of substantial diameter and a relatively narrow continuous blade arranged in spiral relation on the periphery thereof, said blade being of less diameter immediately beneath said feeding aperture and the pitch of said blade decreasing progressively from said feeding aperture to the discharge end of said tubular member, and means for slowly rotating said sawdust conveyor to move a relatively thin layer of sawdust of substantially uniform thickness through said tubular member with the rate of movement of the sawdust being decreased as it approaches the discharge end thereof and said sawdust is progressively consumed.

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