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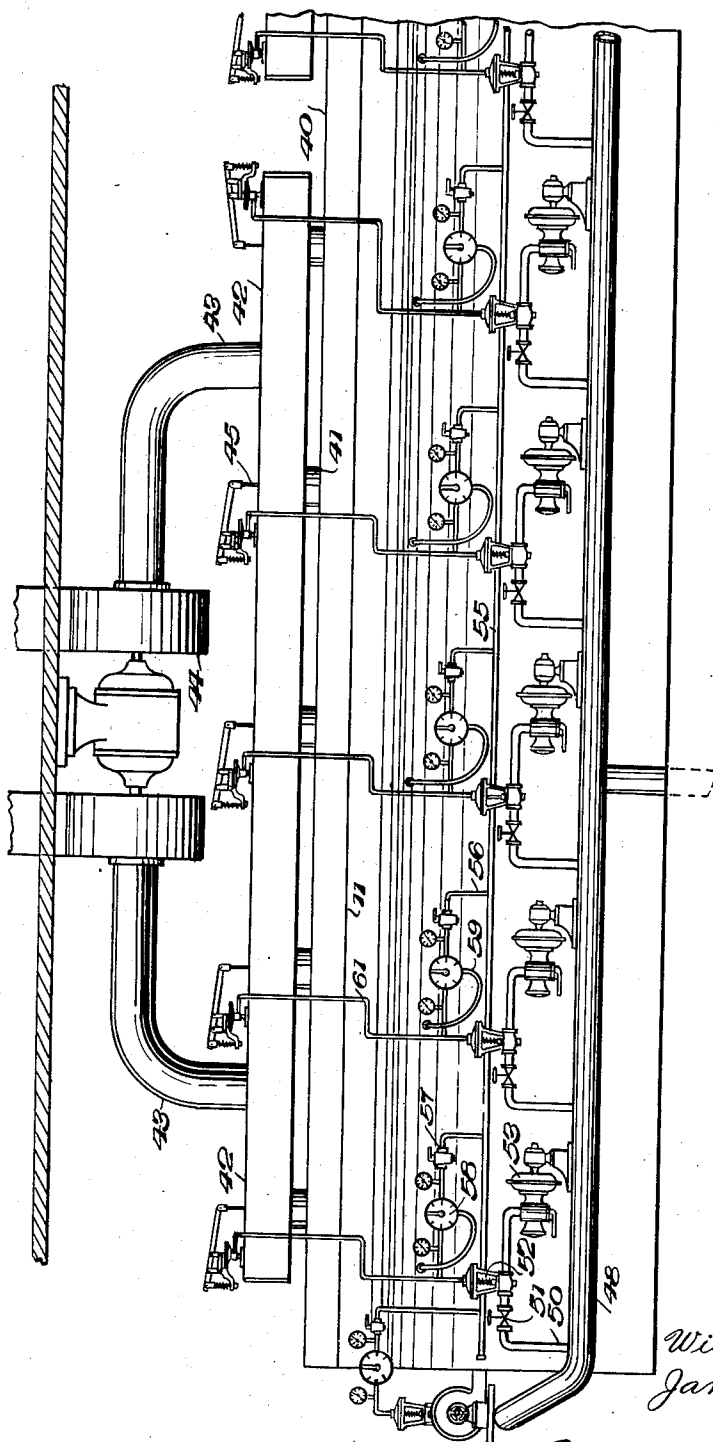
W. L. PHILLIPS ET AL

1,793,009

ROASTING OVEN

Filed March 29, 1929

6 Sheets-Sheet 1



Inventors

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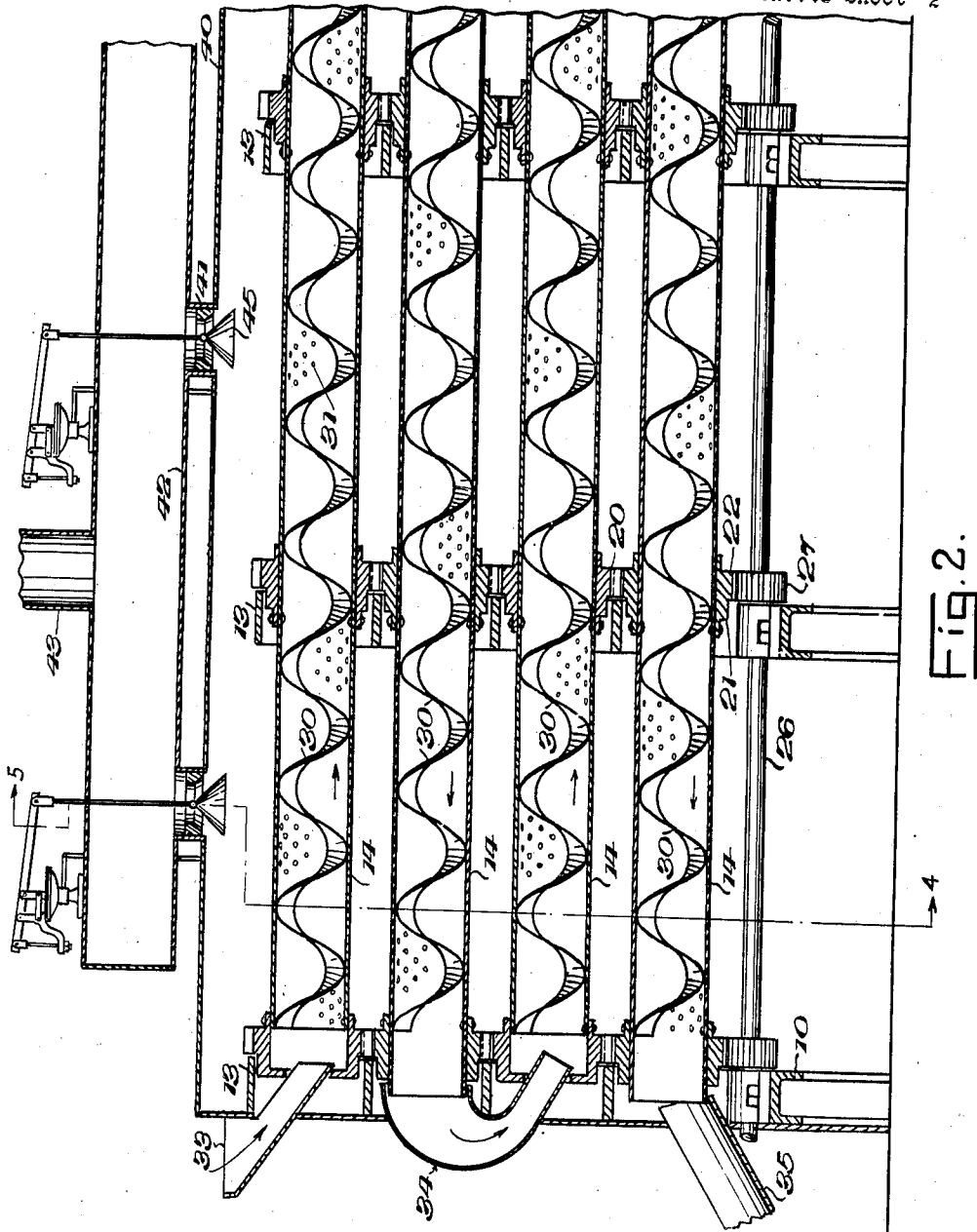
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6 Sheets-Sheet 3

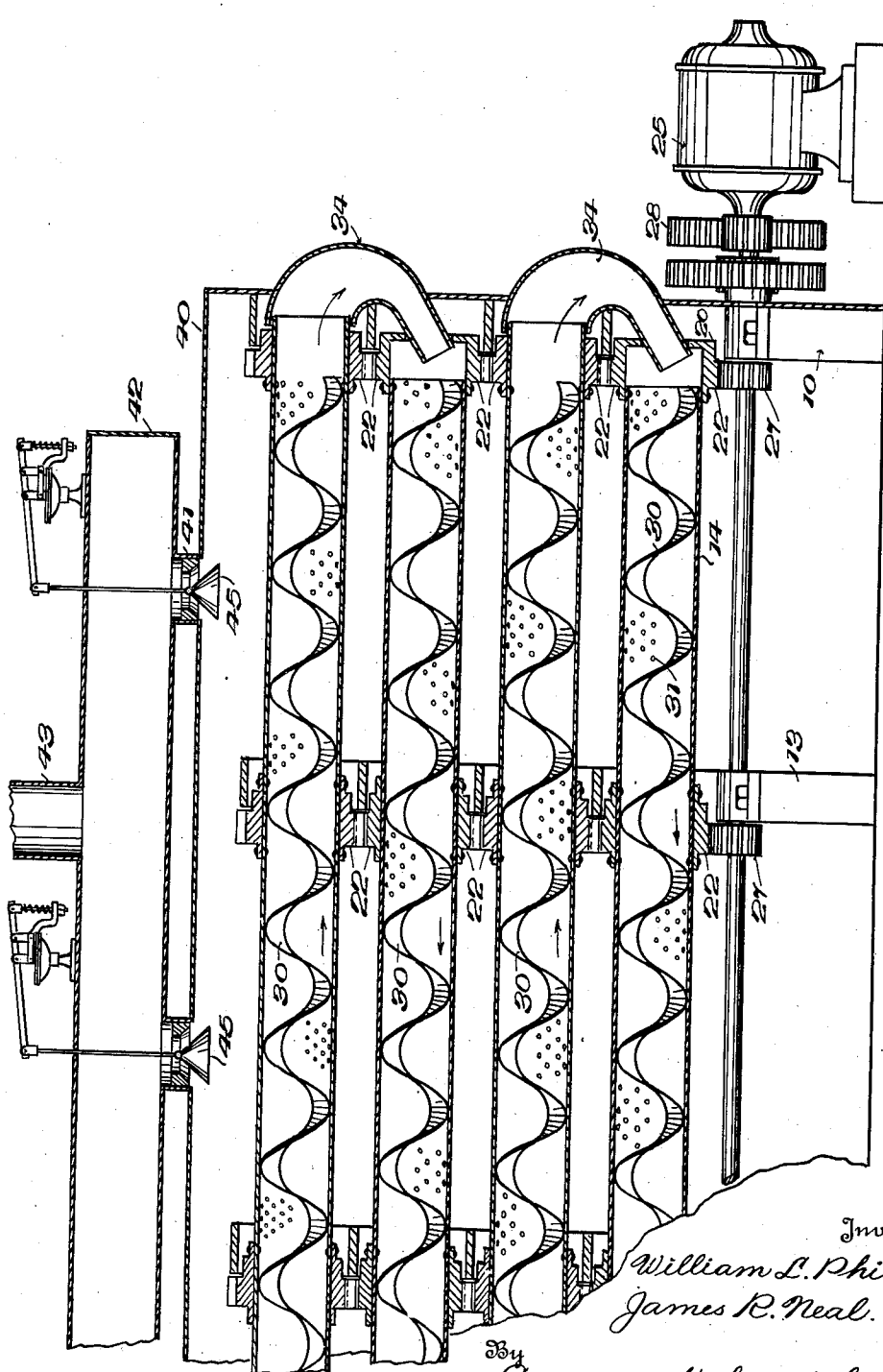


Fig. 3.

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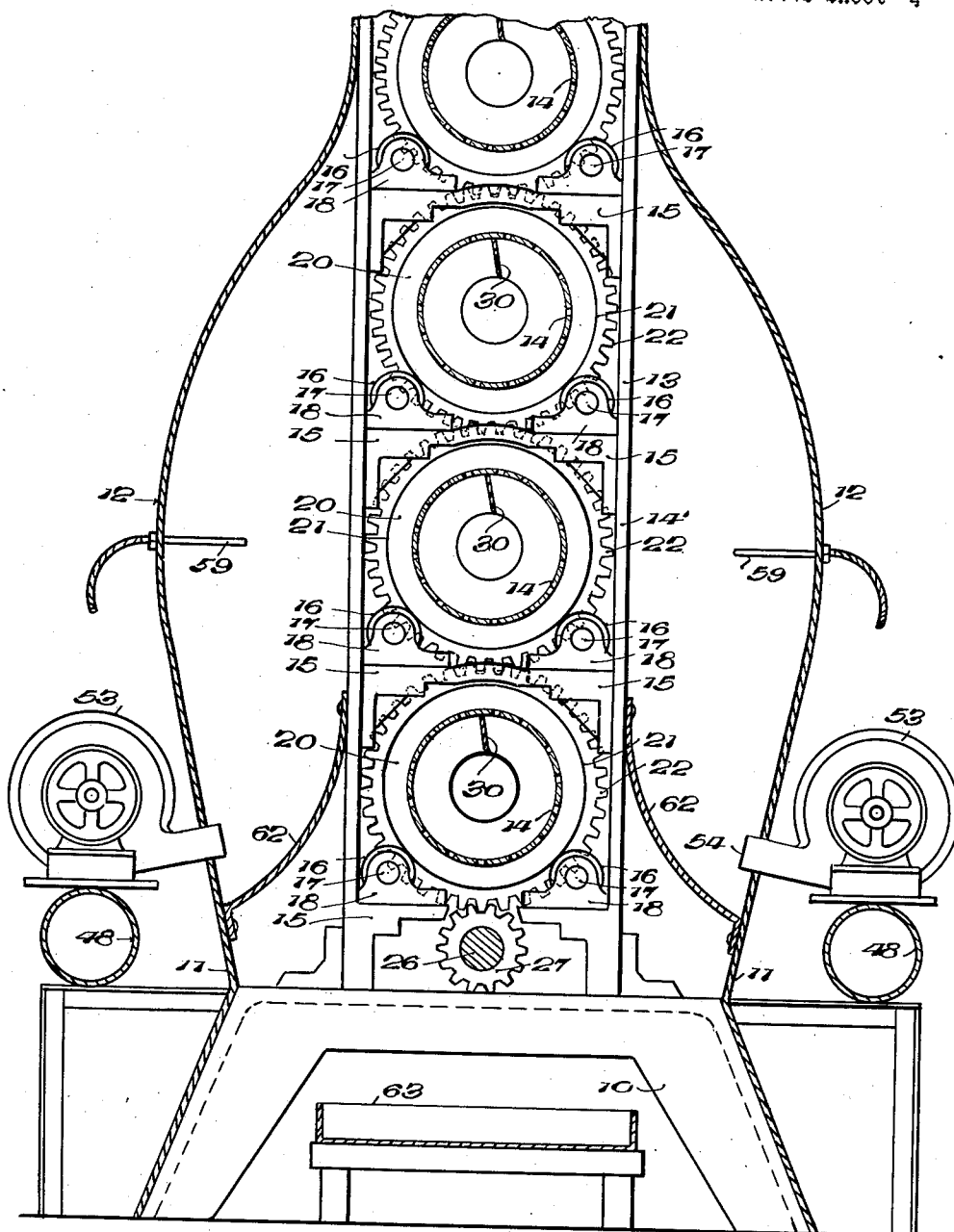


Fig. 4.

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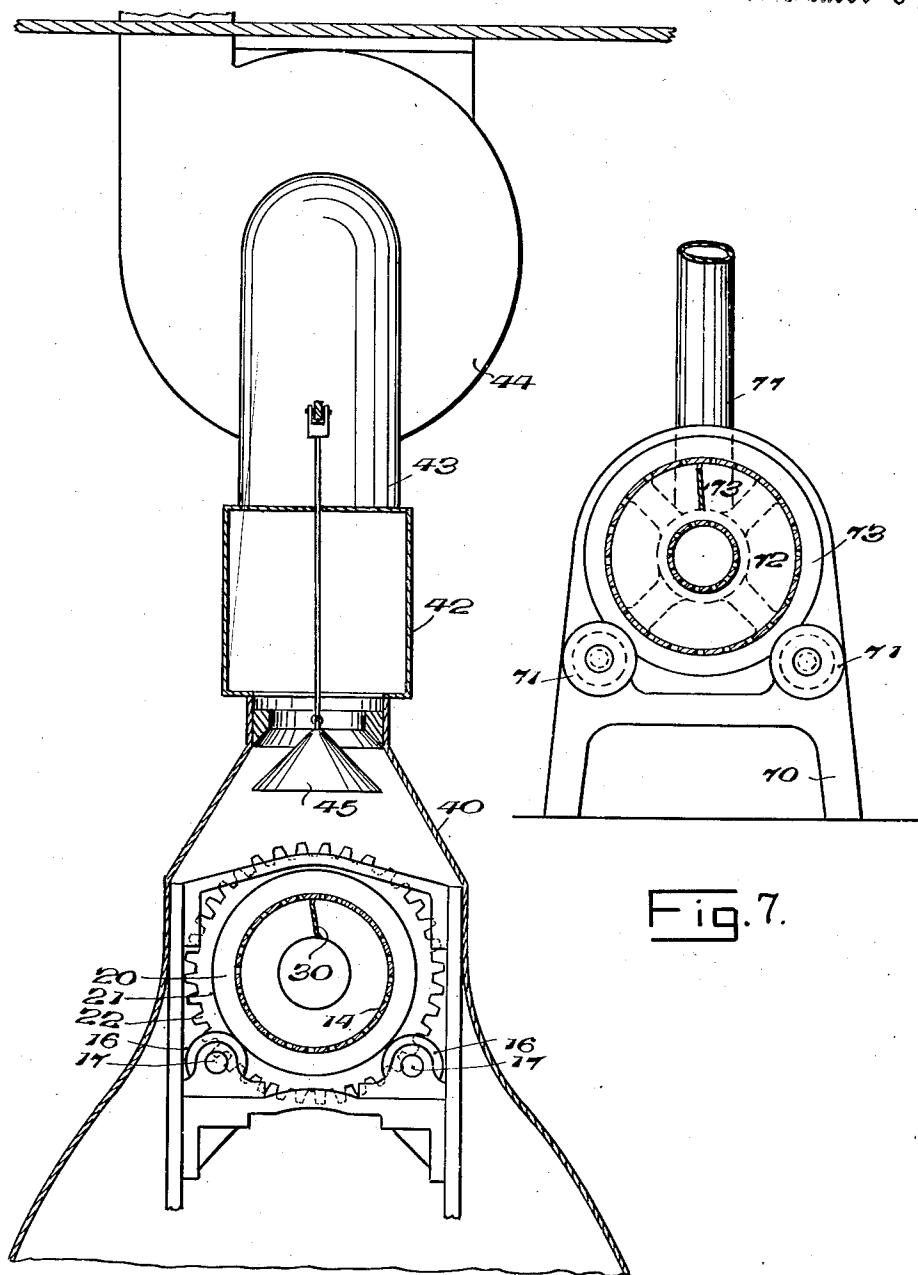


Fig. 5.

Fig. 7.

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6 Sheets-Sheet 6

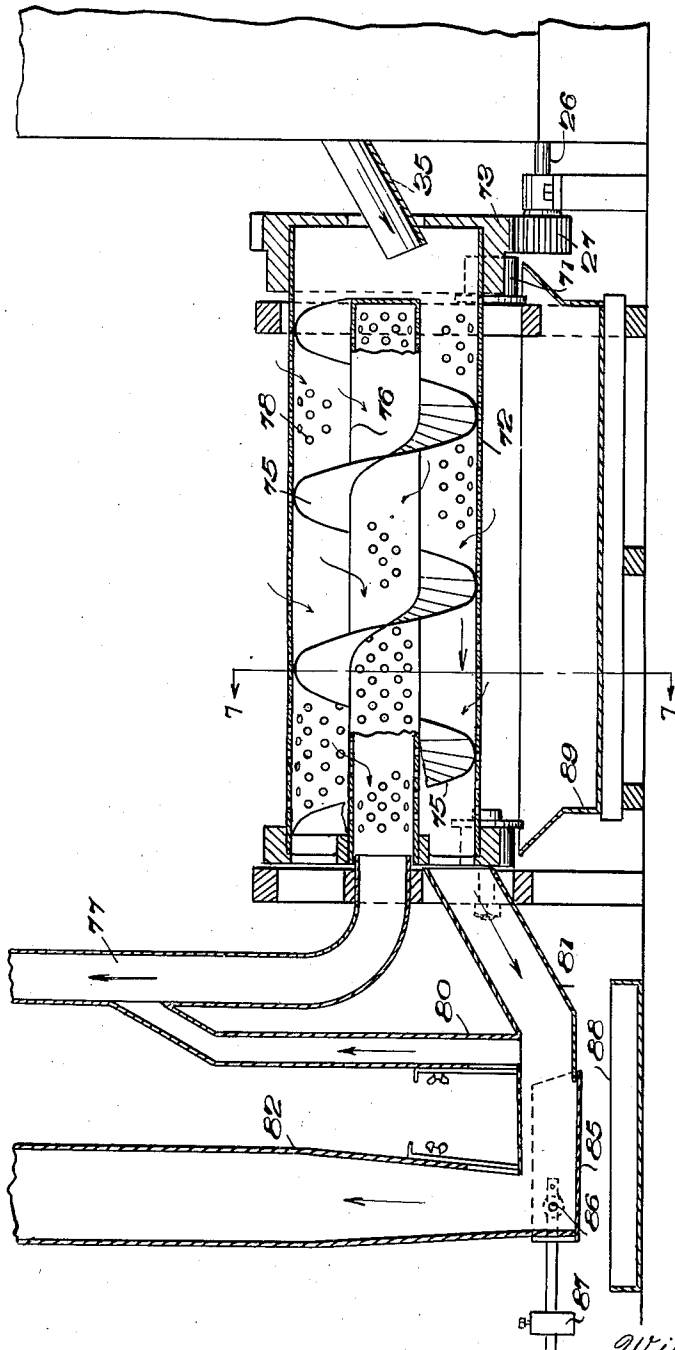


Fig. 6.

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UNITED STATES PATENT OFFICE

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ROASTING OVEN

Application filed March 29, 1929. Serial No. 351,016.

This invention relates to roasting ovens such as are used in parching coffee, cereals and the like.

In roasting coffee and cereals it is desirable that a uniform heat be applied thereto and also that the grains be constantly moved to prevent scorching. It is accordingly one of the objects of our invention to provide an oven construction wherein the grains are continuously moved thru a tortuous passage.

Another object is to combine with the oven an automatically controlled fuel feeding device by which any desired temperature in the oven may be maintained.

Still another object is to provide a ventilating apparatus, preferably combined with the automatic fuel feed, which will act to lower the oven temperature when the fuel feed is reduced or cut off.

It is also an object of the invention to provide in combination with the roasting oven a novel cooling device to draw the heat from the roasted material and also remove any objectionable matter which may have become mixed therewith.

Other objects of our invention will be apparent to those skilled in the art to which it appertains as the description of the invention proceeds.

With these objects in view the invention consists in a roasting oven provided with a prolonged sectional passageway, with the several sections located in different horizontal planes, combined with means, such as spiral conveyors, for continuously conveying the material to be roasted, and means connecting the delivery end of each section with the receiving end of the next lower section, to the end that the material may be fed by gravity from section to section.

The invention further consists in such an oven combined with a source of fuel, preferably gas, a burner or burners therefor and means, automatically controlled by the temperature of the oven, for feeding the fuel to said burners. The invention still further consists in such a furnace combined with an automatic ventilating apparatus, also controlled by the temperature of the oven, to prevent the temperature of the oven from

rising to a point that would scorch the grains. Preferably the automatic ventilator is combined with the automatic feed and fuel control valve, to the end that they may conjointly and automatically act to regulate the oven temperature. To this end both the fuel valve and the ventilator are under the control of a suitable power device, such as a column of compressed air, whereby the fuel valve is moved towards closed position and the ventilator is simultaneously moved towards its open position. This compressed air column is regulated, preferably through a suitable valve, by a thermostat exposed to oven temperature and operatively connected to said valve. Furthermore, the invention consists in a roasting oven combined with a cooling device to which the roasted material is continuously fed at the delivery end of the oven, which cooling device is also provided with means for separating foreign matter from the roasted grains.

One embodiment of the inventive idea is shown for the purpose of illustration in the accompanying drawings, but it is to be expressly understood that such drawings are for illustration only and are not designed to define the limits of the invention, reference being had to the appended claim for this purpose. In said drawings

Fig. 1 is a side elevation of the improved roaster showing the arrangement of the automatic heat controls and ventilators, as well as the air circulators.

Fig. 2 is a central vertical section of the roaster showing the entrance and outlet end of the tortuous passage.

Fig. 3 is a view similar to Fig. 2 but showing the opposite end and a driving power unit.

Fig. 4 is a sectional end view of the roaster disclosing the driving mechanism for the several tubes making up the tortuous passage.

Fig. 5 is a detail view partly in section and partly in elevation showing the top tube, ventilator and air circulator.

Fig. 6 is a central vertical section of the cooling unit and showing the mechanism for removing foreign materials.

Fig. 7 is an end view of the cooling unit showing the mounting of the concentric tubes.

The internal construction of the roaster may be best described by having reference to Figs. 2, 3 and 4, wherein 10 designates a base or foundation adapted to support the entire apparatus which includes a housing 11 having arcuate side portions 12. In this housing is a supporting frame 13 adapted to receive a plurality of tubes 14 located in different horizontal planes and which are here shown as being vertically disposed one above the other. However, these tubes may be staggered with respect to each other if desired to present a larger area for direct heating. The frame 13 may comprise upright member 14' and cross bars 15 each of which latter forms a support for a pair of rollers or bearings 16 mounted to rotate on stub shafts 17 carried by blocks 18. Each tube 14 carries a plurality of flanges or rings 20, having an annular smooth track 21 to travel on the rollers 16 and a geared portion 22. The tubes 14 may have such length as may be required to provide suitable capacity or roasting area. Obviously the number of frames 13 provided depends on the span or length of the tubes 14, but they should be so spaced as to provide adequate support for the tubes to prevent any sag.

Referring to Figs. 3 and 4 a power unit 25, thru a gear train or reduction gears 28, rotates a shaft 26, turning in bearings carried by the lower cross bars 15 of the frames 13. Preferably the shaft 26 extends the entire length of the tubes 14 and it has thereon a pinion gear 27 adjacent each frame 13. These pinions mesh with the gears 22 of the lowermost tube 14. Each succeeding higher gear 22 meshes with the one just below, so that the entire series of tubes are rotated in alternate directions by the shaft 26.

Each tube 14 has means, here shown as a spiral conveyor 30, to feed the material there-through, see Figs. 2 and 3. This spiral conveyor is secured to the inner surface of the tube, but preferably the conveyor blade is not quite as wide as the radius of the tube, leaving a central longitudinal opening thru the tube. As the tube is rotated the grains will roll and tumble along the tube and conveyor, being gradually conveyed the full length of the tube. Any desired number of perforations 31 may be made in the wall of the tube 14 to permit circulation of heated air currents. An inlet chute 33 is provided whereby a stream of the material to be roasted is constantly fed into the top tube of the series. The rotation conveys the material to the end of this tube whence it falls by gravity through an elbow 34 to the next lower tube through which it travels in the reverse direction and is delivered to the next lower tube. The speed of rotation of the tubes and the number

and length of the tubes may be varied at will to obtain a period of travel for the material which at the proper roasting temperature will give the required degree of parching. The simplicity of the arrangement may be especially noted and the fact that the material treated moves by gravity from tube to tube of the roaster is of material advantage.

Fig. 4 shows the housing 11 as merging with the frame 13 near the top thereof and, as seen in Figs. 2 and 3, a covering 40 spaced somewhat above the top tube 14 completely encloses the frames and tubes to form the roasting oven. At spaced intervals along the cover 40 are arranged vents 41 leading to an exhaust manifold 42 to which are connected pipes 43 thru which a forced draft is drawn by the fans 44. Each of the vents 41 is provided with a closure member or valve 45 which is shown as upwardly closing.

The fuel pipes 48 are shown at each side of the housing. Gas is preferably used, although other fuels are optional. The fuel from this pipe supplies the various burners which will now be described. The heating mechanism is seen in Fig. 1 and includes the fuel inlets 50 from the fuel line 48, hand valve 51, automatic valve 52 and forced draft feed 53, leading to the burner 54. A suitable number of these burners may be arranged along the oven as desired. The amount of fuel may be manually controlled by the valves 51, but preferably is controlled by the automatic valve 52 by means of a thermostatic regulator. This regulator comprises a pipe line 55 leading from a source of compressed air to a position along the oven. It has branch lines 56, each having a valve 57 and thermostat 58 therein. This thermostat is operated by means of a leader 59 placed in the wall 12 of the housing 11 at a point where the average temperature may be encountered. Thus, changes in temperature of the oven actuate the thermostat to control the flow of compressed air thru the pipes 56.

The automatic valve 52 is connected operatively to the compressed air line 61 from the thermostat 58 and is opened or closed by variation from any set temperature. The closure member 45 is also arranged to be operated by the compressed air from the thermostat thru the pipe 61. Thus, when the temperature of the oven exceeds that set on the regulator, the feed of fuel is throttled down by the valve 52 and the closure member 45 is allowed to drop open to permit the escape of the heated air in the oven. It is to be understood that any suitable fuel may be used and that the thermostat may be actuated by hydraulic pressure or otherwise as desired. Fig. 4 shows deflectors 62 to prevent the direct force of the burned flame from striking the lower tube. A chaff pan is shown at 63 located below the tubes.

The parched material is discharged at 35

from the lower tube. It is then at a high temperature and must be cooled. The cooling unit is shown in Figs. 6 and 7 and comprises a frame 70 carrying rollers 71 upon which the cylinder 72 is adapted to rotate.

5 This cylinder 72 may be driven from one of the pinion gears 27 on the shaft 26 by means of the ring or flange 73. The outlet 35 of the roasting oven is shown as discharging into the cylinder 72 which is preferably somewhat larger in diameter than the tubes 14 and is of sufficient size to receive the baffle or spiral conveyor 75. This spiral is somewhat similar to the spiral 30 but has a central perforated strainer or sleeve 76 which is concentric with the cylinder 72.

15 An exhaust line 77 connects with the perforated sleeve 76 whereby a draft is maintained thru the openings 78 in the cylinder 72 to cool the material and is drawn thru the perforations in the sleeve 76. Small particles of chaff may be drawn out by this means. A branch line 80 of the exhaust 77 connects with the discharge chute 81 to aid in further cooling the material as it passes from the cylinder 72.

20 The discharge 81 leads to a pneumatic conveyor 82 which is operated with a greater draft than the exhaust thru the sleeve 76. The draft of air for this conveyor is also drawn thru the openings 78 in the cylinder 72. A trap door or pan 85 is arranged in the discharge 71 and is pivoted at 86 and retained closed by a counterweight 87. Thus if heavy foreign materials should be mixed with the treated material they are not lifted by the pneumatic conveyor 82 but are allowed to accumulate on the pan 85 until they overbalance the counterweight 87, whereupon the pan tilts and allows this foreign material to slide into the receptacle 88. The counterweight 87 immediately closes the trap and the flow of roasted material is resumed. A chaff pan 89 is disposed under the cylinder 22.

45 By proper adjustment of the thermostat the fuel valve can be opened at the desired temperatures, and the ventilator be correspondingly actuated to the end that a substantially uniform temperature is maintained in the oven.

50 It will be readily appreciated by those skilled in the art that various modifications of the construction herein shown may be made without departing from the invention defined in the claim.

What is claimed is:

60 In a roasting oven, the combination of a chamber, a series of intergeared grain-conducting conduits arranged one above the other within and in open relation with said chamber, means supplying grain to be roasted to the upper conduit, means conducting the grain downward from each conduit to the one next below, a series of fuel burners

arranged along each side of said chamber opposite the lowermost conduit, means shielding said last named conduit from said burners, a series of ventilator openings from said chamber above the upper conduit, valves controlling said openings, fuel valves controlling the supply of fuel to the burners, a series of thermostats within the opposite sides of the chamber above the level of the lowermost conduit and the burners, and a series of fluid-pressure conduits each simultaneously controlling a fuel valve and a ventilator valve and in turn controlled by one of said thermostats.

In testimony whereof we have signed this specification.

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