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APPARATUS FOR TREATING MATERIALS

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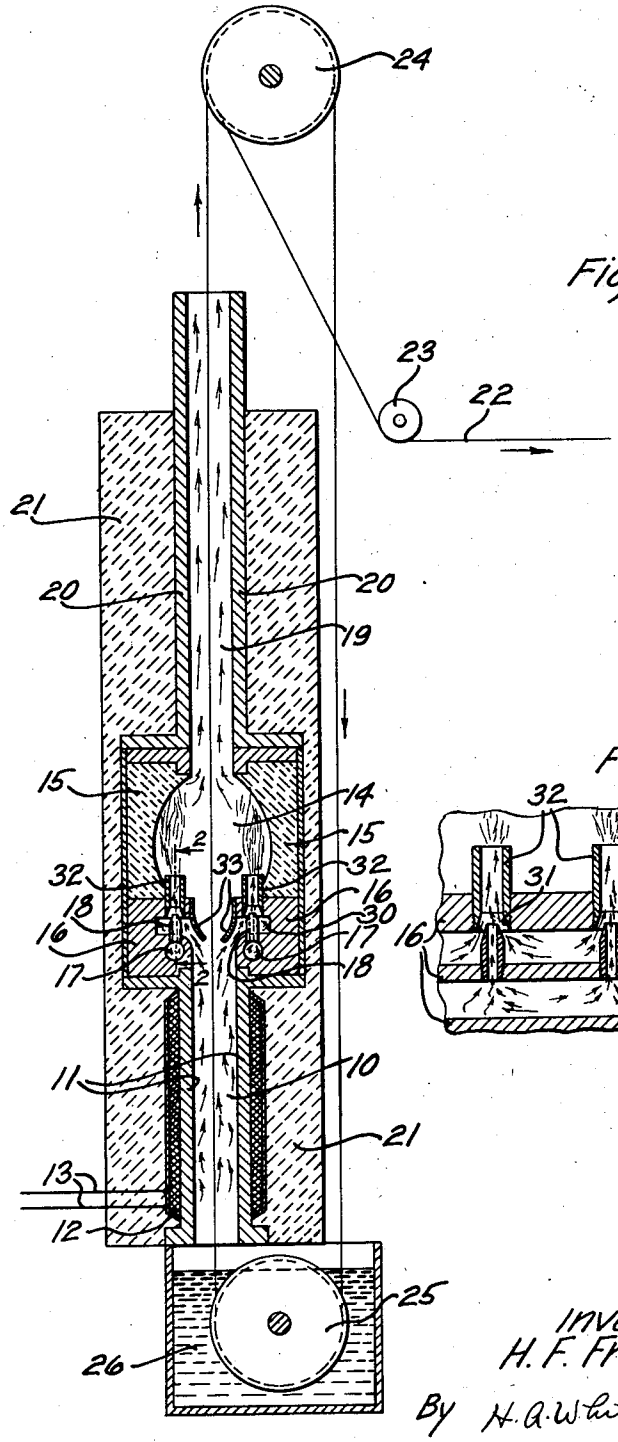


Fig. 1.

Fig. 2.

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APPARATUS FOR TREATING MATERIALS

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7 Claims. (Cl. 91—55)

This invention relates to an apparatus for treating materials and more particularly to an apparatus for treating materials applied to a filiform core.

An object of the invention is to provide a simple and effective apparatus for heating a coating applied to a filiform core, such as a strand or ribbon, and in particular for baking a coat of enamel on wire.

In one embodiment of the invention a tubular oven is provided having in continuous sequence a tubular vaporizing zone, a transversely cylindrically expanded combustion zone and a tubular baking zone all in alignment. The vaporizing zone is externally heated; and when a wire coated with raw enamel containing a volatile combustible ingredient passes through the oven, the volatile ingredient is vaporized in the vaporizing zone. At the entrance of the combustion zone inspirators are provided supplied with air from a compressed air manifold and so proportioned and directed as to draw the combustible vapors from the vaporizing zone and mix them with air before entering the combustion zone. The mixed air and vapors are directed along the expanded cylindrical side walls of the combustion zone where they are burned out of contact with the wire passing through the center. The hot gaseous products from this combustion pass out through the relatively long, narrow baking zone and there bake the residual enamel on the wire which they accompany to the exit end of the oven.

Other objects and features of the invention will be apparent from the following detailed description and from the appended drawing in which

Fig. 1 is a schematic, central, longitudinal section of an apparatus presenting one embodiment of the invention, and

Fig. 2 is a fragmentary section taken on line 2—2 of Fig. 1.

In carrying out the invention as herein shown, there is employed an oven having an elongated tubular vaporizing zone 10 delimited by walls 11—11 of some suitable heat transmitting, heat resistant material, such as cast iron, cast aluminum, molded clay, alundum, or the like. An electrical heating coil 12 surrounds the walls 11—11 externally to heat the vaporizing zone and is supplied with current by leads 13—13 from a source (not shown).

The upper end of the vaporizing zone 10 opens into an expanded combustion zone 14 delimited laterally by blocks 15—15 of some appropriate heat insulating, heat resistant material, such as lavite, fire brick, magnesite or the like. The inner faces of the blocks 15—15 are cylindrically curved as shown in the drawing so that the lateral dimension of the combustion zone is considerably larger than that of the vaporizing zone, of which the combustion zone is a continuation.

Between the combustion zone and the vaporizing zone and forming in effect a spatial continuation of the latter is a manifold or mixing block 16 of cast iron, molded clay or the like, having in its interior an air feed passage 17 in the form of a horizontal loop or of two parallel lines enclosing the juncture of the combustion zone and vaporizing zone. Above the manifold passage 17 a groove 30 is provided extending laterally from the vaporizing zone into manifold block 16. The manifold block above groove 30 is provided with a plurality of apertures 31 which are partly threaded and receive tubes 32. Extending from the manifold into each of the apertures 31 is an air jet or nozzle 18. Thus when compressed air is forced through nozzles 18 from the manifold which is supplied from a source of compressed air (not shown), vapors are drawn from the vaporizing zone into tubes 32 where they are thoroughly mixed with air before entering the combustion zone. The manifold block 16 may be provided with an apron or baffle 33 to restrict the opening to the groove 30 and thereby increase the velocity of the vapors entering the groove or in other words the suction produced by the nozzles 18 is increased.

The combustion zone 14 merges at its upper end into an elongated tubular baking zone 19 delimited by walls 20—20 of material similar to that of the walls 11—11. Any horizontal transverse section of any of the three zones as here shown is, generally speaking, rectangular.

The whole structure thus far described is embedded in a protective coating 21—21 of suitable heat insulation, such as asbestos cement or the like.

In operation, a wire 22 from a source of supply (not shown) passes under a tensioning pulley 23, over an idler sheave 24, down outside the oven, and under an idler sheave 25 immersed in a bath 26 of raw enamel containing a volatile combustible ingredient, such as gasoline, benzol, alcohol, acetone, or the like. The wire thus coated with raw enamel then passes

upward through the oven and over a second idler sheave 24 to a take-up device (not shown).

As the raw enamel coated wire passes through the heated vaporizing zone, the volatile ingredient is vaporized. The vapors thus evolved are drawn up by the nozzles 18, mixed with air in the tubes 32, and driven outwardly along the curved walls of the blocks 15—15 where they are burned out of direct contact with the wire as it passes up through the middle. When the walls of blocks 15—15 reach the operating temperatures, the vapors burn with a sort of volume combustion resembling a flameless glowing. The best results are obtained when the flame of combustion completely disappears, although good results may be had with a small flame present. The hot gaseous combustion products pass on up through the long narrow baking zone 19 in intimate contact with the wire and complete the baking of the enamel which was commenced by the radiant heat from the flames in the combustion chamber.

If it be desired to apply and bake several successive coats of enamel, the wire may pass from the second sheave 24 down outside the oven to a second sheave 25, up through the oven to a third sheave 24 and so on.

If desirable and necessary, instead of only air additional fuel gas may be fed mixed with the air through the manifold 16. Thus any desired baking temperature within practical limits may be attained in the combustion zone and baking zone and the procedure may be so regulated that the combustion products discharged from the top of the oven are harmless and inoffensive.

It is evident that the embodiment here shown is only illustrative and may be modified in many ways without departing from the scope and spirit of the invention as more particularly pointed out and described in the appended claims.

What is claimed is:

1. An apparatus for treating cores comprising means to deposit a composition containing a volatile combustible ingredient upon a core, means to vaporize the volatile ingredient, a combustion chamber in which the vaporized volatile ingredient is burned out of contact with the core, an inspirator through which the vapors pass for mixing air with the vaporized ingredient, and a baking chamber in which the core is subjected to the heat of combustion products from the combustion chamber.

2. In an apparatus for treating cores, means to deposit a composition containing a volatile combustible ingredient upon the core, means to vaporize the ingredient, means for mixing air with the vaporized ingredient, including a tube, a nozzle for forcing air and drawing vapors into the tube to mix the air and vapors, and means for burning the vapors to bake the composition on the core.

3. In an apparatus for treating cores, means to deposit a composition containing a volatile combustible ingredient upon the core, a vaporizing zone for vaporizing the ingredient, a combustion zone, an aperture connecting the vaporizing and combustion zones, and a nozzle for forcing air and drawing the vapors through said aperture into the combustion zone.

4. In an apparatus for treating cores, means to deposit a composition containing a volatile combustible ingredient upon the core, a vaporizing zone for vaporizing the ingredient, a combustion zone, a manifold block having a laterally extending groove therein, a plurality of nozzles extending into said groove, an aperture over each nozzle leading into the combustion zone, said block having a passage for supplying air to said nozzles to draw vapors into the combustion zone and mixing the vapors with air.

5. In an apparatus for treating cores, means to deposit a composition containing a volatile combustible ingredient upon the core, a vaporizing zone for vaporizing the ingredient, a mixing block having a laterally extending groove opening into the vaporizing zone, and means for drawing the vapors into said groove to mix the vapors with air and transfer them to the combustion zone.

6. In an apparatus for treating cores, means to deposit a composition containing a volatile combustible ingredient upon the core, a vaporizing zone for vaporizing the ingredient, a mixing block having a laterally extending groove opening into the vaporizing zone, means for drawing the vapors into said groove to mix the vapors with air and transfer them to the combustion zone, and a baffle adjacent the open end of the groove.

7. An apparatus for treating cores comprising means for depositing a composition containing a volatile combustible ingredient upon a core, means for vaporizing the volatile ingredient deposited on the core, means for deflecting the vaporized volatile ingredient away from the core, means for mixing air with the vaporized volatile ingredient away from the core, a combustion chamber in which the volatile ingredient after being mixed with air is burned out of contact with the core, and means for advancing the core through the vaporizing means and the combustion chamber.

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