March 27, 1951 T. W. MUNFORD 2,546,697

ANNEALING FURNACE

Filed Nov. 4, 1948 2 Sheets-Sheet 1

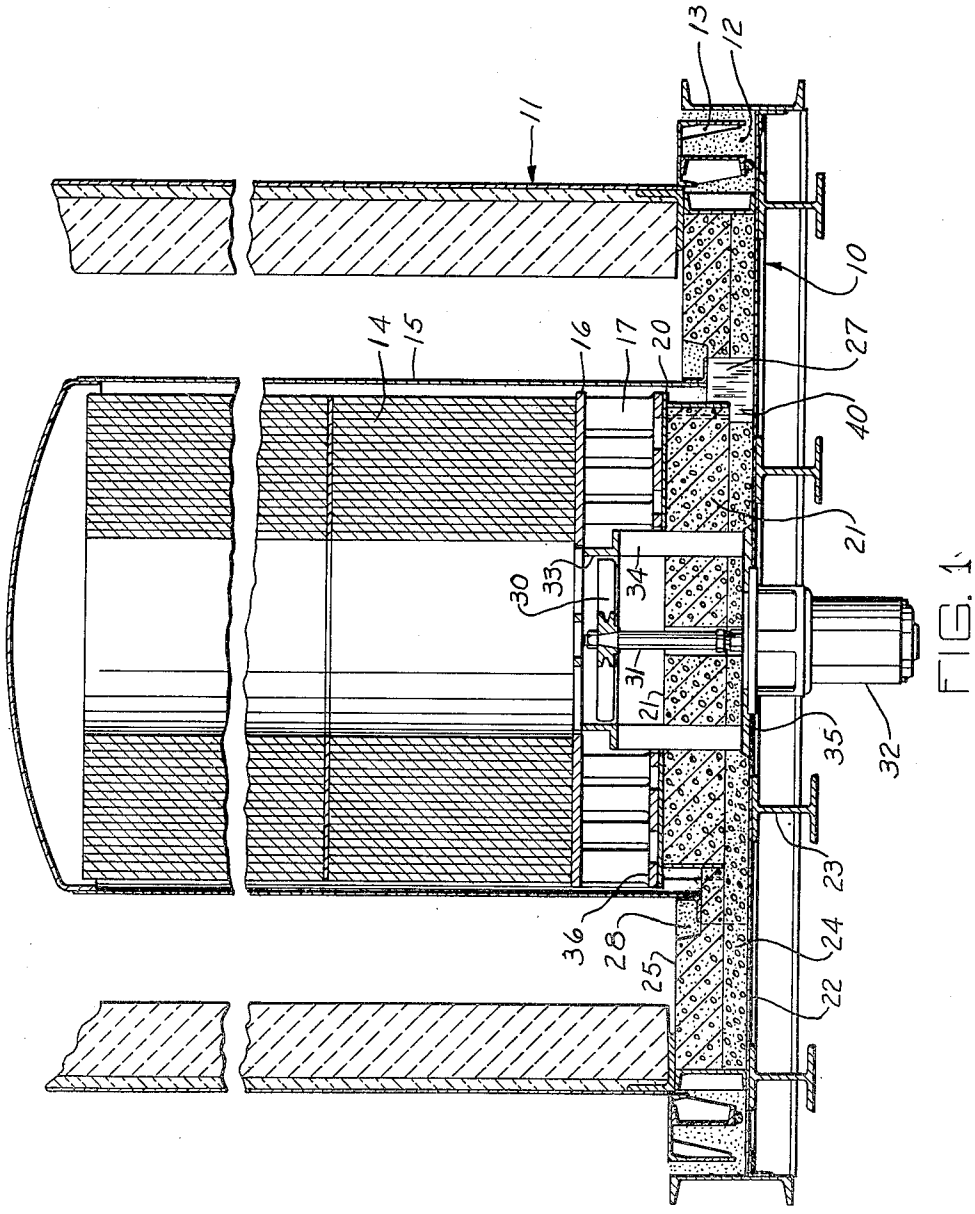


FIG. 1.

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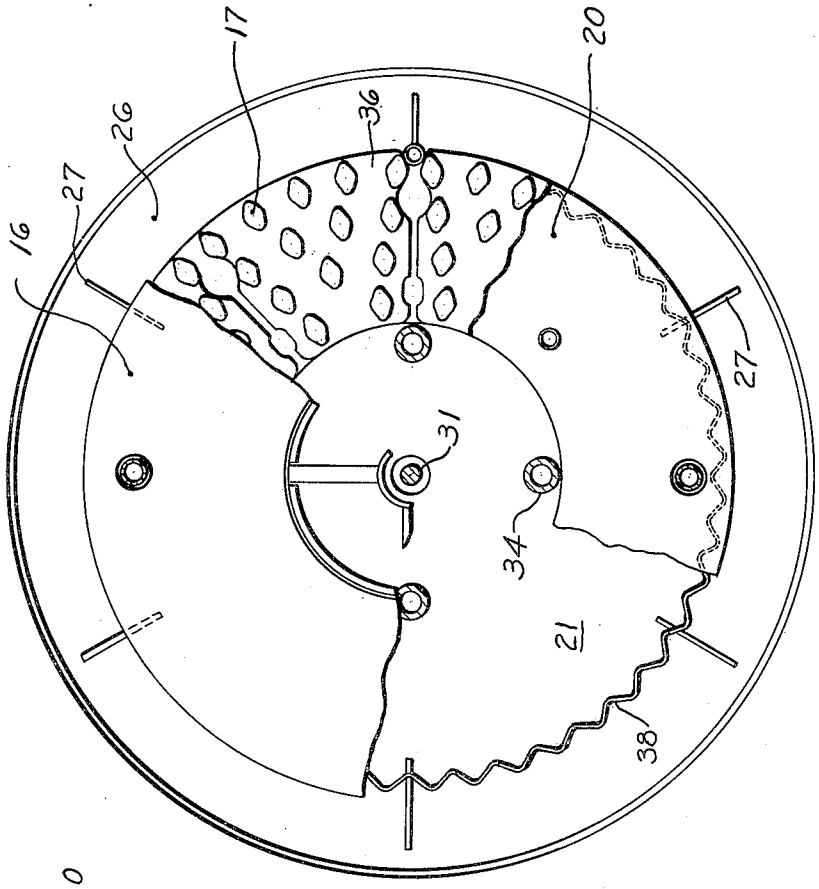


FIG. 2

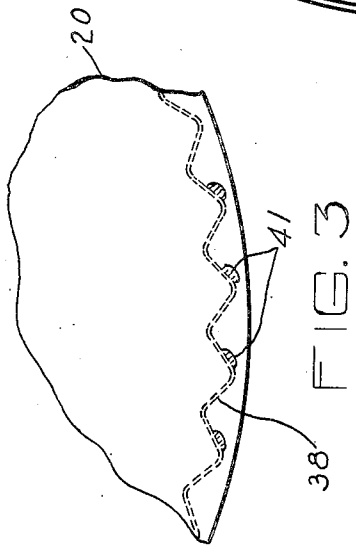


FIG. 3

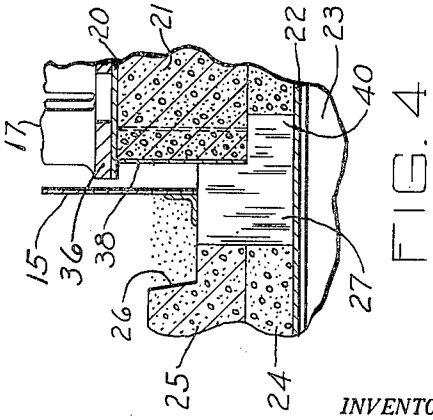


FIG. 4

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UNITED STATES PATENT OFFICE

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ANNEALING FURNACE

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2 Claims. (Cl. 263—47)

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Coiled sheet metal is customarily annealed under a bell type cover so that a protective atmosphere may be maintained about the metal during the annealing operation. The cover is tall enough to accommodate a stack of coils and the stand or base on which the stack is supported comprises a refractory pad or pedestal on the furnace base. The sides of the pedestal are commonly protected by a metal sheath or band and the top by a metal plate. However, the incidents of placing the coils on the stand and building up of the stack are such that it is practically impossible to avoid doing some damage to the edge of the pedestal with consequent spalling of the edges. These spalled particles tend to crowd into the space between the sides of the pedestal and the encircling sheath as thermal expansion of the sheath permits with the result that radial stress is applied to the inner side of the sheath on cooling. Moreover, as a result of repeated heating and cooling vertical cracks tend to develop in the body of the pedestal and sand entering these cracks tends to widen the cracks with resultant radial stress on the encircling sheath from this cause also. These several radial stresses on the encircling metal sheath and other stresses resulting from the repeated heating and cooling of the furnace incident to the annealing operation eventually cause the sheath to become so distorted as to necessitate shutdown of the furnace for repairs to the coil supporting stand. The object of the present invention is to provide an improved type of sheath or band about the pedestal and to provide other related improvements for increasing the life of the coil supporting stand.

For a consideration of what I consider to be novel and my invention attention is directed to the following specification and the claims appended thereto.

In the drawings forming part of this specification—

Fig. 1 is a vertical sectional view of the base portion of a furnace embodying the present invention with parts of the upper portion of the furnace omitted.

Fig. 2 is a partial plan and sectional view of the stand portion of the furnace.

Figs. 3 and 4 are enlarged fragmentary detail views.

The furnace comprises a base 10 and a bell type heating hood 11 removably seated on the base (in the drawing the roof or top portion of the heating hood has been omitted). A substantially gas-tight seal is maintained between

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the base 10 and hood by means of sand 12 about depending sealing blades 13 carried by the hood.

The furnace base is provided with a coil-supporting stand whereon a stack of coils 14 to be annealed may be supported, the stack being covered by a metal cover 15 to permit a protective atmosphere to be maintained about the coils during the annealing operation. The stand comprises a metal plate 16 whereon the coil stack is seated, a plurality of pillars 17 whereon the plate 16 is removably seated, a metal plate 20 whereon the pillars 17 are removably seated, a refractory body 21 in the form of a pedestal whereon the plate 20 is seated, the said refractory body constituting an integral part of the furnace base 10.

The bottom portion of the furnace base 10 comprises a sheet metal floor 22 on supporting beams 23. The floor 22 supports a layer 24 of heat insulating concrete which in turn supports a refractory concrete floor 25. The pedestal 21 is part of the floor 25 and is poured at the same time as the latter. The refractory floor 25 has a trough 26 around the pedestal 21 for granular sealing material 28 about the foot of the protective cover 15. Several plate-type supports 27 mounted on the metal floor 22 under the foot of the protective cover 15 transmit the weight of the latter to the underlying supporting structure of the furnace base.

Means not shown but carried by the hood 11 heat the inner cover 15 which in turn heats the coils 14 to be annealed. Rapid heating of the coils is promoted by circulating the protective atmosphere through and about the coils and this circulation is produced by a power driven fan 30 mounted on a vertical drive shaft 31 driven by an electric motor 32 suspended from the underside of the furnace base 10. The fan is located in a short vertical duct 33 supported on and integral with a plurality of underlying supporting fingers 34 which rest on a reinforcing plate 35 on the metal floor 22, this reinforcing plate providing a suitable overhead support for the electric motor 32. The atmosphere circulated by the fan 30 flows laterally below the top plate 16 of the coil stand through passage between the supporting pillars 17, the pillars rising from segmental bases 36 which rest on the wear plate 20.

In the present invention the refractory pedestal 21 is surrounded by a vertically corrugated metal wall or band 38, this band initially constituting a form whereinto refractory concrete is poured to form the pedestal, hence the side

surface of the pedestal is vertically corrugated in conformity with the corrugations of said band. The lower edge of the band is supported on spacers 40 conveniently formed as radial extensions of the several underlying supports 27 for the protective cover 15.

As already explained, the incidents of placing the sheet metal coils 14 on the coil-supported stand and of building up the stack of coils are usually such that it is practically impossible to avoid doing some damage to the top edge of the refractory pedestal at least to the extent of causing spalling of said edge. These spalled particles tend to crowd into the space between the band and the pedestal as thermal expansion of the band permits and thus set up radial stress in the band during cooling, tending to cause distortion of the band on repeated heating and cooling. Moreover vertical cracks tend to develop in the body of the refractory pedestal as a result of repeated heating and cooling and sand entering these cracks tends to prevent closing of the cracks during cooling with the result that the band around the pedestal is under radial stress from this cause also. However, in the present invention the transverse corrugations in the band 38 permits stretching or yielding of the band under radial stress without destructive distortion with the result that a vertically corrugated band has a substantially longer life than a flat metal band.

The foot or lower portion of the band 38 is embedded in the underlying concrete of the floor 25 and may if desired be extended down to the metal floor 22 so that load imposed on the band from above may be transmitted direct to the underlying supporting structure of the furnace base. The upper edge of the band is welded at its crests, as indicated at 41, to the underside of the projecting edge of the wear plate 28, whereby the trough portion of the band is free to move with respect to said plate, as under thermal expansion.

From the foregoing description it will now be understood that the use of a vertically or transversely corrugated band about the refractory pedestal of the coil supporting stand may be said to constitute the crux of the present invention.

What I claim is:

1. A charge support for a furnace base comprising a generally circular refractory pedestal on the base, a metal band surrounding and embracing the pedestal to form a protective outside wall therefor, said pedestal comprising a filling of refractory concrete next adjacent the inner side of said band, and said band having vertical corrugations to permit the band to yield outwardly on cooling by flattening of the corrugations under radial stress applied to the inner side of the band by spall of the like foreign matter which has found its way between said band and pedestal during thermal expansion of said band.

2. A charge support for a furnace base comprising a generally circular refractory pedestal on the base, a metal plate forming a protective cap for the top of the pedestal, a metal band surrounding and embracing the pedestal to form a protective outside wall therefor, said pedestal comprising a filling of refractory concrete next adjacent the inner side of said band, said band having vertical corrugations to permit said band to yield outwardly on cooling by flattening of the corrugations under radial stress applied to the inner side of the band by the spall and the like which has found its way between said band and pedestal during thermal expansion of said band, and means for securing the upper edge of said band to said plate at peripherally spaced points along said band.

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