

Jan. 14, 1947.

W. W. WILSON

2,414,130

INTERCHANGEABLE COIL STAND

Filed June 28, 1945

3 Sheets-Sheet 1

FIG. 1.

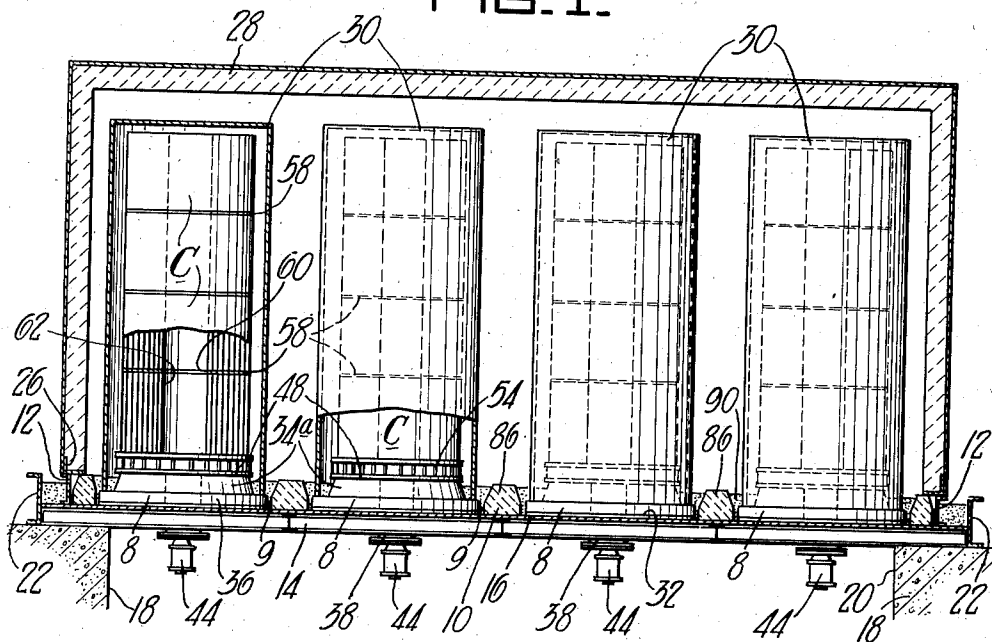
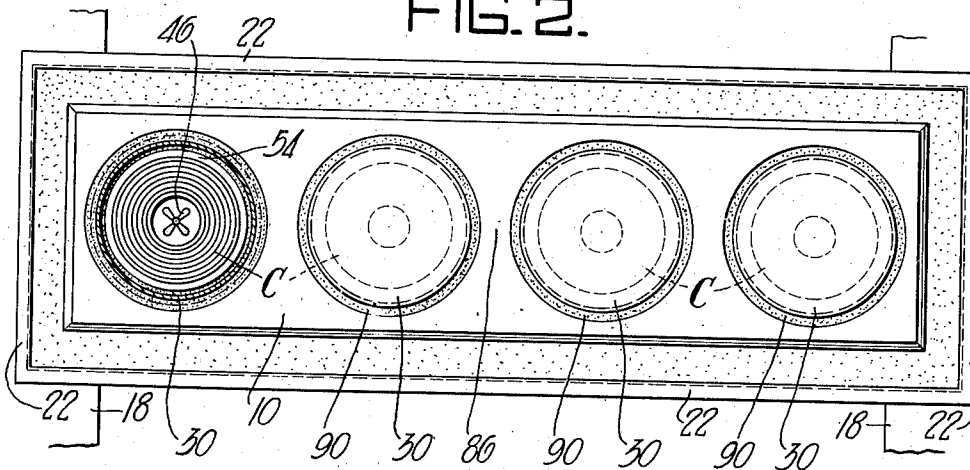


FIG. 2.



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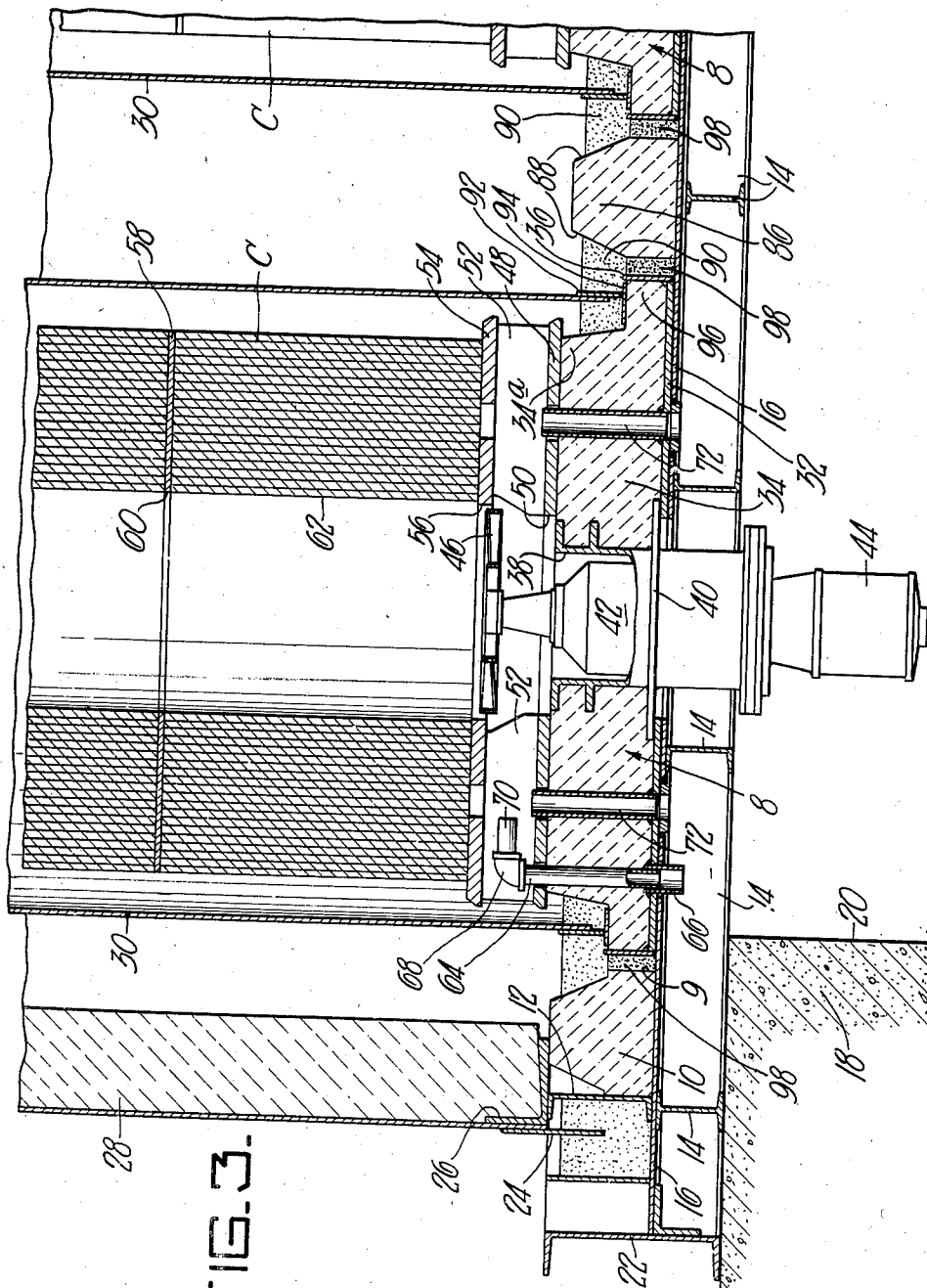
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

FIG. 4.

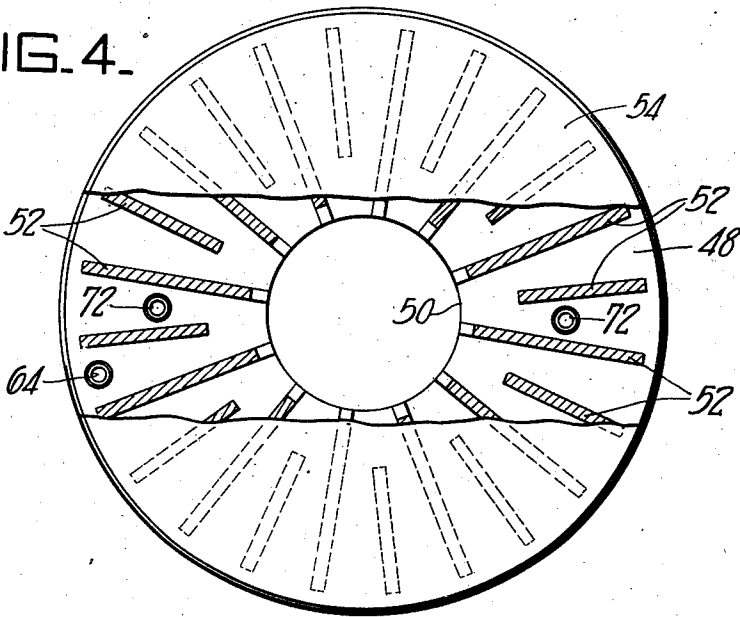
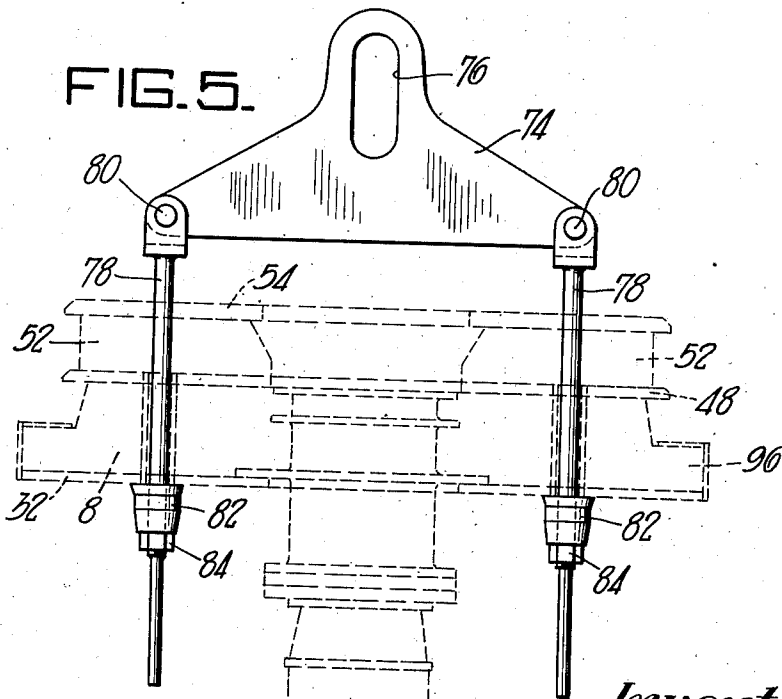


FIG. 5.



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UNITED STATES PATENT OFFICE

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INTERCHANGEABLE COIL STAND

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Application June 28, 1945, Serial No. 602,026

6 Claims. (Cl. 263-47)

1

The present invention relates to an improved interchangeable coil stand for an annealing furnace.

Experience shows that there are inherent defects in coil stands of conventional design, such as the cracking of the thin steel plate supporting the refractory pedestal, thus permitting leakage of the deoxidizing gas constituting the annealing atmosphere contained under the usual inner cover of the apparatus.

One object of the present invention is to provide an annealing coil stand so constructed and arranged as to eliminate the gas leakage resulting from cracks in the base plate.

Another object is to provide an interchangeable annealing coil stand which may be readily spotted on and removed from the fixed annealing furnace base.

A further object is to reduce maintenance costs and to cut down operating delays due to maintenance requirements of prior types of coil stands.

The invention will be fully apparent from consideration of the following detailed description and the appended claims when read in connection with the accompanying drawings, in which:

Figure 1 is a vertical section on a small scale, through an annealing furnace embodying the invention.

Figure 2 is a plan of Figure 1, with the outer cover removed and showing a plurality of removable interchangeable stands adapted to receive the coiled product to be heated.

Figure 3 is an enlarged detail showing the construction of the interchangeable coil stand and its relation to the permanent foundation of the furnace.

Figure 4 is a detail plan view of an interchangeable coil stand.

Figure 5 is a view illustrative of lifting means for interchanging the coil stands.

Referring in detail to the drawings, reference numerals 8 represent a plurality of removable coil stands adapted to be interchangeably seated in recesses 9 of the refractory base 10 which is a fixed part of an annealing furnace structure including marginal channels 12 and floor beams 14 which support a thin steel floor plate 16. The floor beams 14 rest on a suitable concrete foundation 18 having a chamber 20 formed therein so as to permit access to the under side of the base 10. The base 10 is surrounded on its exterior by a marginal channel frame 22, and the space between the channel 22 and the marginal floor beam 12 is adapted to contain a body of sand so as to form a sand seal with a projecting

2

member 24 secured to a frame member 26 carried at the bottom of an outer cover indicated as a whole at 28. The outer cover is adapted to contain suitable heating means of conventional type, and it is removable by means of an overhead crane so as to permit the spotting of a plurality of interchangeable portable bases or stands 8 and loading of coils on such bases. Each of the interchangeable bases 8 is adapted to receive a stack of coils C to be annealed and respective inner covers 30 are provided, adapted to enclose the coils supported by each removable stand 8.

Heretofore, annealing furnaces of the type to which the claimed invention relates did not have the removable stands, and considerable time was lost between charges to clean the fixed base prior to placing a new batch of coils to be annealed in the furnace. By having the stands 8 in the form of separate interchangeable units, a great saving occurs, since a number of spares can always be kept on hand and thus when a given stand burns out or otherwise becomes disabled after repeated use, it is merely necessary to remove the previously used interchangeable stand and to substitute a fresh clean one, thus greatly minimizing the out-of-service time of the furnace, thereby effecting an important operating economy.

An inherent defect in prior constructions of coil annealing furnaces was that the thin steel floor plate corresponding to that shown in 16 in the drawings, frequently became cracked. This resulted in damage to the refractory flooring of the base and permitted leakage of the deoxidizing gas such as is conventionally charged to the interior of the inner covers 30. This defect is overcome by my improved construction by the provision of a heavy steel bottom plate 32 for supporting the main pedestal-like refractory body 34 of the interchangeable stand. This heavy base plate 32 is surrounded by an annular shell 36 which is welded or otherwise secured thereto. Each portable stand 8 includes a central hollow casing 38 having an annular flange 40 bolted or otherwise secured to the heavy base plate 32. The hollow casing 38 forms a support for fan mechanism including housings 42, fan motor 44 and fan impeller 46.

Mounted on top of the refractory pedestal 34 is a heavy steel stool 48 having a central opening 50 therein to accommodate the fan mechanism. The stool 48 is formed with a plurality of upstanding ribs 52 on top of which rests a heavy steel disc 54 having a central opening 56 therein to accommodate the fan impeller. The bottom-most coil of strip steel to be annealed rests

3

directly on the disc 54, and a number of coils are superposed one over another as shown, with steel separator plates 58 between them, these plates having openings 60 therein of approximately the same size as the central eye or opening 62 of the steel coil so as to permit the free passage of gas through each stack of coils C enclosed by each inner cover 30. Each portable stand carries a pipe 64 with a coupling portion 66 adapted to be detachably connected with a suitable source of deoxidizing gas. At the upper end of each pipe 64 is an elbow 68 having an outlet nozzle 70 for directing the deoxidizing gas laterally through the space between certain of the bottom stand ribs 52, as shown. The deoxidizing gas thus introduced is adapted to be circulated through the center of the several coils C and around the exterior thereof by means of the fan impeller 46. Penetrating the refractory pedestal body 34 of each stand is a pair of spaced diametrically disposed sleeves or tubes 72 which serve two functions, one being to provide for the entrance of thermocouples and the other being to facilitate the spotting and removing of the portable bases by means of suitable overhead lifting tackle. Such lifting tackle is shown in Figure 5, and includes a yoke 74 having an eye 76 adapted to be engaged by a crane hook or other suitable traveling hoist. Depending from the yoke is a pair of rods 78 pivotally secured to the yoke by pins 80. The space between the rods 78 corresponds to the diametric spacing between the tubes 72; and in order to lift and remove the portable stand so as to interchange a new for an old stand, after a given stack of annealed coils has been unloaded, it is merely necessary to spot the rod 78 over the sleeves 72 and then pass said rods 78 down through the sleeves and secure collars 82 and holding nuts 84 to the depending rods.

Figure 5 in full lines shows the lifting tackle, and in dotted lines indicates an interchangeable stand unit in the act of being transported. The dotted showing may be regarded either as a used stand being transported to a cleaning station, or a fresh stand about to be installed on the fixed base to receive a new batch of coils to be annealed.

The upwardly extended central portion 34* of the refractory pedestal, in coaction with the upwardly projecting portion 86 of the fixed base, forms a circular pocket or depression 88 adapted to receive a body of sand such as indicated at 90. The lower portion 92 of the inner cover 30 enters the sand and rests on a metal ring 94 mounted on the outer annular flange portion 96 of the refractory pedestal, thus making a substantially gas-tight seal. Surrounding the annular space between the outer wall of the flange 96 and the bottom portion of the inner wall of the pocket 88 it is desirable to place a body of removable filling material 98 such as magnesia, so as to prevent leakage.

Practical use of the described interchangeable coil stands has demonstrated important economies by greatly reducing the out-of-service time for each furnace base. The construction and arrangement of the interchangeable stand shown with particular respect to the provision of the heavy steel bottom plate 32 and shell 36 encircling the refractory pedestal 34 eliminates cracking of the furnace base and wasteful leakage of deoxidizing gas such as frequently occurred in prior art constructions.

While I have shown and described in consider-

4

able detail an embodiment of the invention which an actual reduction to practice has demonstrated is highly desirable, it is not to be construed that I am limited thereto, since various modifications and substitutions of equivalents may be made by those skilled in the art without departure from the invention as defined in the appended claims.

I claim:

1. An apparatus for annealing coiled material, comprising a fixed supporting frame having a refractory body thereon formed with a recessed portion and an interchangeable coil stand adapted to be engaged and disengaged from said recessed portion, said stand having means incorporated therein for engagement with lifting tackle adapted to transport it to and from said recessed portion.

2. An apparatus for annealing coiled material, comprising a fixed supporting frame having a plurality of beams supporting a sheet metal floor, a refractory body on said floor having a recessed portion, and an interchangeable coil stand seated within the recessed body on said floor, said stand comprising a heavy steel bottom plate carrying a refractory pedestal supporting a metal stool formed with a plurality of upstanding ribs jointly supporting an apertured disc on which the coils to be annealed are adapted to be stacked.

3. An apparatus for annealing coiled material, comprising a fixed supporting frame having a plurality of beams supporting a sheet metal floor, a refractory body on said floor having a recessed portion, and an interchangeable stand seated within the recessed body on said floor, said stand comprising a heavy steel bottom plate carrying a refractory pedestal supporting a metal stool formed with a plurality of upstanding ribs jointly supporting an apertured disc on which the coils to be annealed are adapted to be stacked, said bottom plate, said refractory pedestal, and said stool being pierced by a pair of tubular members adapted to be engaged with depending members of lifting tackle for transporting said stand.

4. An apparatus for annealing coiled material, comprising a fixed supporting frame having a plurality of beams supporting a sheet metal floor, a refractory body on said floor having a recessed portion, and an interchangeable stand seated within the recessed body on said floor, said stand comprising a heavy steel bottom plate carrying a refractory pedestal supporting a metal stool formed with a plurality of upstanding ribs jointly supporting an apertured metal disc on which the coils to be annealed are adapted to be stacked, a hollow metal casing secured to said bottom plate at the central region thereof extending through said refractory pedestal, a cover adapted to rest on said stand, and fan mechanism carried by said casing for circulating a gas within said cover around and through the center of coils of steel strip material adapted to be supported on said disc.

5. An apparatus for annealing coiled material, comprising a fixed supporting frame having a plurality of beams supporting a sheet metal floor, a refractory body on said floor having at least one recessed portion, and an interchangeable stand seated within the recessed portion, said stand comprising a heavy steel bottom plate carrying a refractory pedestal supporting a metal stool formed with a plurality of upstanding ribs jointly supporting an apertured disc on which the coils to be annealed are adapted to be stacked, a hollow metal casing secured to said bottom plate at the central region thereof extending through

5

said refractory pedestal, an outer annular shell surrounding the lower part of said pedestal and secured to said bottom plate, the stand being provided with a deoxidizing gas connection adapted to discharge gas between certain of said ribs, the upper part of said pedestal and the recessed portion of said refractory body jointly defining a cavity for containing sealing sand, and a body of removable sealing material adapted to make a gas-tight closure between said annular shell 10

6

and the inner wall of the recessed portion of said refractory body.

6. An apparatus for annealing coiled material, comprising a fixed support formed with a recessed portion and an interchangeable coil stand adapted to be engaged and disengaged from said recessed portion, said stand having means for engagement with lifting tackle adapted to transport it to and from said recessed portion.

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