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2,490,412

MEANS FOR ANNEALING COILED LIGHT GAUGE SHEET METAL

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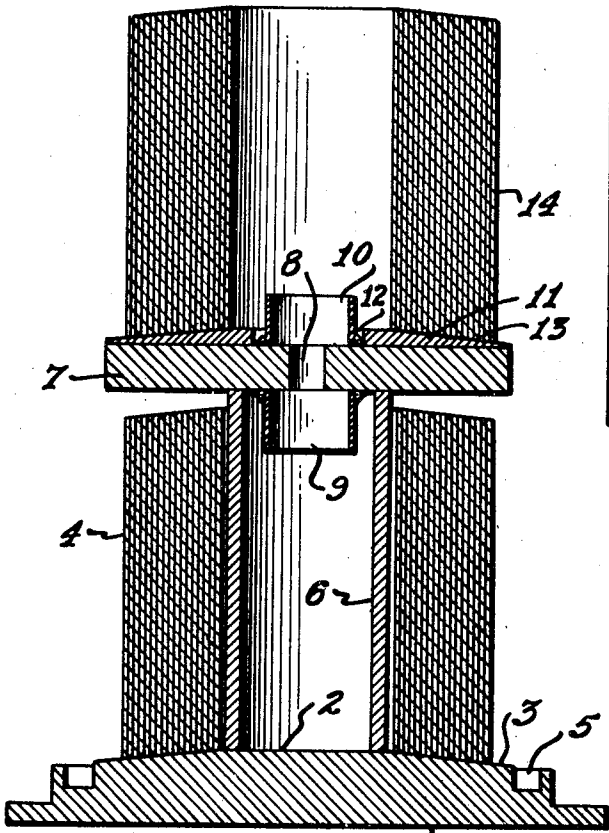


FIG. 1.

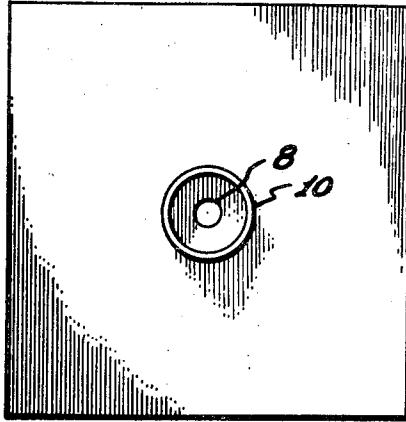


FIG. 2.

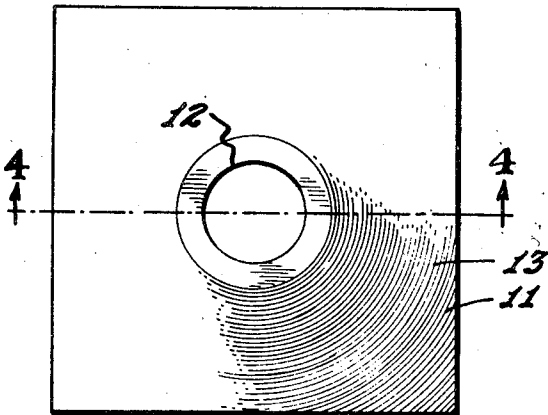


Fig. 3.

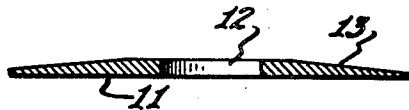


FIG. 4.

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MEANS FOR ANNEALING COILED LIGHT
GAUGE SHEET METALFrank Burdette, Butler, Pa., assignor to Armco
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7 Claims. (Cl. 263-47)

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This is a continuation in part of my co-pending application of the same title, Ser. No. 556,869, filed October 2, 1944, since abandoned.

The invention relates to the annealing of sheet metal in coils, which is accomplished by standing the large and heavy coils on end. The nature of the furnace used for the annealing does not form a limitation on this invention, nor does the nature or gauge of the coiled sheet or strip metal. By way of example, light gauge electrical sheet steel, such as silicon steel, is usually annealed by placing the coil on end on a furnace base, whereupon a furnace housing is lowered by means of a crane over the coil and onto the base, to which it is then luted. The furnace housing will be provided with any suitable heating means such as electrical resistance elements, radiant tube heaters, or others, and will usually be equipped with gas connections so that a desired atmosphere may be maintained in the furnace during the annealing operation.

In order to utilize the furnace capacity to the best advantage, it is usually desired to stack coils on each other; but this involves certain difficulties. The metal becomes softer at high heats and since the coils are very heavy, considerable damage is done to the edges of the sheet metal in the coils. It is usual in stacking coils upon each other to place waster sheets or the like between them, but all this does is to prevent direct contact of the edges of the sheet metal in one coil with the edges of the sheet metal in another. The result of stacking one coil on another (assuming the coils to be of equal size and weight), is not only to subject the top surface of the under coil to the weight of a coil, but to subject the under surface of the under coil to twice the weight of a coil.

The principal object of the invention is the provision of a solution for this problem, other objects being the provision of a supporting means for overhead coils which does not rely on a lower coil for support or stability, which improves the action of annealing by separating coils so that the furnace gases may get at them more readily, which is simple and inexpensive in construction, which may be used in any furnace capable of accepting stacked coils, and which may readily be handled and conveniently used during the assembly of coils for annealing.

These and other objects of the invention which will be set forth hereinafter, or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that certain construction and arrangement of parts of which I

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shall now describe an exemplary embodiment. Reference is made to the accompanying drawings wherein:

Figure 1 is a vertical section of a furnace base and stacked coils including the means of this invention.

Figure 2 is a top plan view of the supporting structure.

Figure 3 is a top plan view of a plate which I prefer to use surmounting the table.

Figure 4 is a sectional view thereof.

Briefly in the practice of the invention, I provide a central standard or column of a diameter to pass through the central hollow of a coil and rest upon a furnace base or another support such as I am describing. The column terminates upwardly in a table for supporting an upper coil; and the length of the column is made greater than the length of the underlying coil so that the lower surface of the table is above the top surface of the under coil. This not only relieves the top surface of the under coil from all weight, but permits free circulation of the furnace atmosphere to the lower coil. An upper coil is placed upon the table as I shall hereinafter describe.

Referring to Figure 1, I have shown a furnace base 1 having a coil supporting surface 2, which may be, and preferably is, bevelled slightly in a downward and outward direction beyond a central portion, as at 3, to assist in the stable support of a coil 4 placed thereon for annealing. The furnace base 1 usually has a groove 5 to accept the lower flange of a furnace cover (not shown). The groove may be filled with sand or other substance, as a luting to form a gas-tight seal.

In forming my supporting means, I make a column 6 of circular form and of a diameter to fit easily into the central space of the coil 4, the column being somewhat longer, as shown, than the length of the coil 4. The column is preferably hollow to save weight; and it may conveniently be formed of a section of heavy pipe, or of cast, forged, drawn or welded metal. The thickness of the walls of the column 6 may be considerably varied, and will be chosen with an eye to the weight sustaining requirements of the structure, particularly under the high and continued furnace temperatures. The column is surmounted by a table or plate 7 which may be of circular or other conformation, but will be larger in its dimensions than the coil which it is to support.

The materials and design of these parts can be varied to suit particular annealing condi-

tions. For low temperature annealing high strength alloys are not required, and the table 7 can be welded to or cast with the column 6. For high temperatures annealing a high strength, heat resisting plate is preferable, and in some instances a high strength column.

The column 6 may be made from a forged ingot iron plate; but a cast, thicker-walled tube has more strength, more seating area, and is cheaper. An alloy plate or table is preferred by me. For example, for tables approximately three and one-half feet square, I am currently employing metal about four inches thick, hot sheared or otherwise cut from stainless steel slabs. I may also employ an alloy of molybdenum, nickel and iron, or other suitable heat resistant alloys.

In high temperature annealing, there is some tendency for the table to sag. Hence, I find it generally preferable to leave the table free of the column so that the table may be reversed on the column between successive heats.

The table preferably has a central perforation 8 which may be burned, punched, or otherwise formed in it to serve as a gas passage. It is also provided with guide means to facilitate its location on the column. These guide means may have various shapes, but I prefer to provide them in the form of short pipe-like sections 9 and 10 welded to the table. Since the table is to be reversed, I provide one of these pipe like guides on each side of it, the upper one also serving to facilitate the proper positioning of the upper coil on the table. The pipe like guides may be substantially less than the internal diameter of the column 6, since exactly accurate location of the table is not necessary.

As indicated above, it is well to have the coils resting upon chamfered surfaces. For the upper coil, it would be possible to chamfer the surface of the table and where the table is to be reversible to chamfer both surfaces of it. This, however, is both expensive and has the effect of weakening the resistance of the table to distortion under high heats. As a consequence, I prefer to use a separate plate 11 as shown in Figures 3 and 4. This is cut to fit the table and will be very much thinner than the table in usual practice, since it receives its support from the table. It will be provided with a central perforation 12 to pass over the guides 9 and 10, and will be chamfered on one face as indicated at 13. It may, if desired, be made of the same heat resisting material as the plate, but this is not necessary. Since it is thin enough to conform to the surface of the table, it need not be reversed. It is chamfered on one surface only.

In the use of my apparatus, as will be clear from Figure 1, the initial coil 4 will be placed on the annealing base 3. The column 6 will be passed downwardly through the central opening of the coil 4 and caused to rest upon the base. The table 7 will be placed upon the column, being located as set forth above; and the chamfered plate 11, where used, will be placed upon the table. The upper coil 14 will then be located upon the table. Annealing proceeds in the usual fashion. The parts of my apparatus are readily handled by a crane with such grapples as may be required. The parts I have described may be provided if desired with handles or perforations for engagement by hooks.

An additional support such as I have described, may be lowered into position so that its column extends through the upper coil 14, and rests upon the horizontal, planar, central portion of the

table 7, whereupon an additional coil may be lowered on to the table of the second support. The vertical stacking of coils in this manner will be limited by the capacity of the furnace cover or the stability of the stack as determined in large measure by the size and weight of the coils, and hence the size of the supporting means of this invention.

It will be understood also that where the size of the furnace cover is such as to permit coils to be placed on it in side by side relationship, stacking means in accordance with this invention may similarly be used to support upper coils as respects all of the coils on the base.

Modifications may be made in the invention without departing from the spirit of it.

Having thus described the invention in an exemplary embodiment, what I claim as new and desire to secure by Letters Patent is:

1. An annealing support for light gauge coiled metal comprising a cylindrical column member of a diameter which will pass through the central hollow of such a coil so as to rest firmly on a furnace base, and being of greater length than the height of such a coil, and a table member capable of being placed on the upper end of said column and having sufficient size to support a second coil of approximately the same diameter resting on said table so that the weight of said second coil may be transferred directly to said furnace base on which said support rests without affecting the first mentioned coil.

2. A structure according to claim 1, having an overplate with a chamfered surface capable of resting upon said table beneath said coil.

3. A structure according to claim 1 in which said column is a pipe-like member of metal and said table is a plate-like member of metal, said members having sufficient wall thickness at temperatures of annealing to support the weight of said second mentioned coil.

4. A structure according to claim 1 in which said column and said plate are attached together.

5. A supporting means for coils in vertically stacked relationship on a furnace base, comprising an individual tubular column of a diameter which, extending through the central space of a coil resting upon a furnace base, will rest firmly on said base at its lower end, said column being a hollow metal body of substantially uniform shape throughout its length, and a table comprising a thick plate of heat resistant metal of sufficient size to support an overlying coil, and adapted to rest on the upper end of said column and to be supported solely thereby, said plate and said column being unattached, whereby the column and table may be reversed between heats.

6. A supporting means for coils in vertically stacked relationship on a furnace base, comprising an individual tubular column of a diameter which, extending through the central space of a coil resting upon a furnace base, will rest firmly on said base at its lower end, said column being a hollow metal body, and a table comprising a thick plate of heat resistant metal of sufficient size to support an overlying coil, and adapted to rest on the upper end of said column and to be supported solely thereby, said plate and column being unattached, whereby the table may be reversed between heats, said table having guide means of a size to fit into the hollow of said column, said guide means being located on both sides of said table.

7. A supporting means for coils in vertically

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stacked relationship on a furnace base, comprising an individual tubular column of a diameter which, extending through the central space of a coil resting upon a furnace base, will rest firmly on said base at its lower end, said column being a hollow metal body, and a table comprising a thick plate of heat resistant metal of sufficient size to support an overlying coil, and adapted to rest on the upper end of said column and to be supported solely thereby, said plate and column being unattached, whereby the table may be reversed between heats, said table having guide means of a size to fit into the hollow of said column, said guide means being located on both sides of said table in combination with a thinner plate perforated to pass over said guide means and rest on said table, said thinner plate

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having a chamfered surface to assist in positioning a coil of metal placed thereon.

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