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WIRE GRID FORMING APPARATUS

Filed May 31, 1955

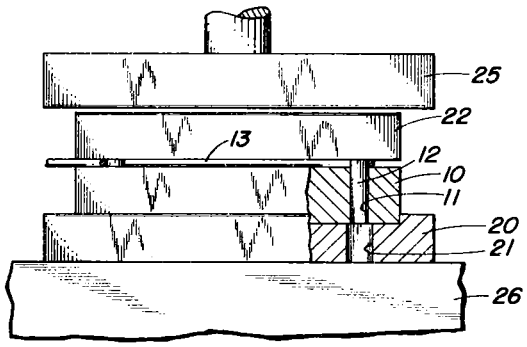

 FIG. 1

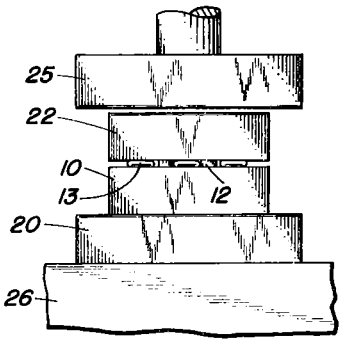

FIG. 2

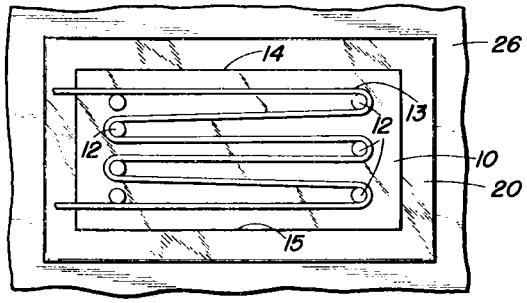

FIG. 3

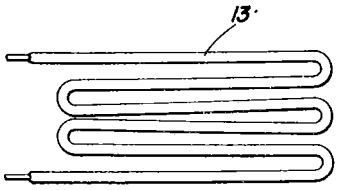

FIG. 4

FIG. 5

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WIRE GRID FORMING APPARATUS

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1 Claim. (Cl. 78—1)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to apparatus for making wire grids and more particularly to production apparatus for forming wire grids which are especially adaptable for use in electric strain gages.

In the types of apparatus in current use, the gage manufacture involves use of a jig to produce the desired gage grid configuration. To attach the formed gage, the entire jig, holding the grid, may be placed on the test structure while the grid is being partially cemented to the surface, the jig being then removed. Or, alternatively, the jig holding the grid is placed on a special surface and cement is then applied. After the cement has hardened and the jig removed, the cement film containing the grid is peeled from the special surface and stored for later application to a test structure.

Both of the described techniques and associated equipment have important disadvantages. In the first, the jig is usually too bulky for easy handling on the test surface and impractical for application to curved surfaces. Further, the apparatus used requires application of a partial cement coat which must be dried before further steps are taken. The jig is then removed and the final coat of cement added, steps that require considerable skill and are time consuming.

The utilization of the jig in the second technique presents difficulties in that the cement used is not pliable and it is very difficult to secure a firm bond between the gage film and the test structure. Moreover, it is not ordinarily possible to apply the gage to a contoured surface.

An object of the present invention is to provide an apparatus for forming wire grids, which grids are readily applicable to any test structure. An object also is to provide a wire grid forming apparatus which can be operated without unusual skill on the part of the user.

An object of importance is that of providing a wire grid forming apparatus which lends itself to volume production.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a view in elevation of the grid forming apparatus with the grid in position for compression;

FIG. 2 is an end view of the apparatus for FIG. 1;

FIG. 3 is a plan view of the grid and supporting equipment prior to compression;

FIG. 4 is a plan view of the compressed grid; and

FIG. 5 is an elevational section of the grid cemented on the test structure.

The grid forming apparatus of the invention is disclosed in FIGS. 1, 2 and 3 and includes a hardened steel block or plate 10 of greater length than breadth, provided with alined holes 11 transversely placed adjacent the block ends in which a series of pins 12 are press-fitted to protrude above the plate, giving the desired form structure. The grid wire 13 is then woven back and forth over these

pins, beginning with the pins on one side 14 of the plate and moving to the opposite side 15, as shown in FIG. 3.

The formed grid with its supporting structure is then placed on a flat metal relief block 20, provided with holes 21 which register with holes 11 in plate 10. A hardened flat steel block 22 is then placed on the pins 12 and the unit transferred to a press between jaws 25 and 26 where it is subjected to a pressure of such value as to flatten the wire 12, as shown in FIG. 4. At the same time the pins 12 are driven downwardly, entering holes 21 of block 20, to produce a form for another grid. It is apparent that, in sequence, grids may be rapidly constructed, reversing the form block for such successive grid.

The flattening of the grid wire is, obviously, a cold working process step, and a result of this operation is to produce a stabilized grid which can be readily handled with reasonable care, for direct use or for storage or shipment.

In the compressed form the grid is ready for immediate application to test structure for electric gage uses. While variable methods of application may be used, it is preferred to pre-coat the test structure surface with cement, as indicated at 30 in FIG. 5, place the grid on this cement surface, and then add a cement cover coat 31. This simple procedure does not require film cementation, or use of grid forms or jigs which, in application, may easily cause mal-function. The grid is simply placed on the test structure and cemented.

The step of cold forming the grid by the pin-block method is by way of example, other methods of producing the wire deformation being usable. The degree of pressing of the gage wire is not necessarily critical, but it should be adequate to fix the grid form to a point where the grid may be handled without permanent distortion of shape. Further, the grid form is merely illustrative, different configuration being usable dependent on the directions of strain measurement. No particular limitation as to grid wire is required since the material will vary with use, wires of tungsten, platinum, nickel and nickel alloys such as nickel-chromium and iridium-platinum all being usable. As to dimensions, the grid wire is generally of the order of 0.001 to 0.002 inch diameter and of sufficient length to provide a gage resistance of from 50 to 500 ohms. The cement, which should be electrically non-conducting, will vary in composition depending on whether use is with low or high temperature gages, various ceramic or other cements being available for high and low temperature uses.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claim the invention may be practiced otherwise than as specifically described.

What is claimed is:

An apparatus for use in forming wire grids from wire stock comprising a plate having a plurality of apertures therethrough between the top and bottom flat faces thereof, said apertures being positioned along and adjacent to the sides of at least one pair of opposite sides of said plate, pin members having a length greater than the sum of the plate thickness and the wire stock thickness, said pin members tight-fittedly disposed in said apertures and being slidable therein under pressure, said pin members having one end thereof protruding beyond the top face of said plate for retaining the wire stock to be formed, a relief block positioned beneath the bottom face of said plate and having a plurality of holes therein in registry with said apertures for reception of said pin members, a flat surfaced pressure applying block for simultaneously forming the retained wire stock and depressing said protruding ends of said pin members, said pin members when in depressed position projecting beyond the bottom face of

said plate to provide a grid wire forming element thereon whereby wire grids may be formed alternately on the faces of said plate.

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