June 2, 1953 J. HAUSNER 2,640,789

METHOD OF PRODUCING REINFORCED WIRE NETTING

Filed Dec. 4, 1948

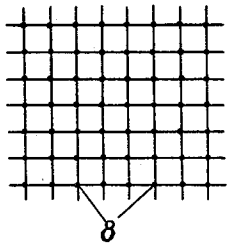
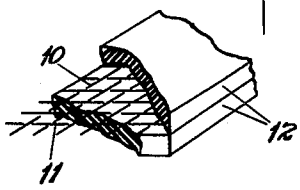


Fig. 1.

Fig. 2.



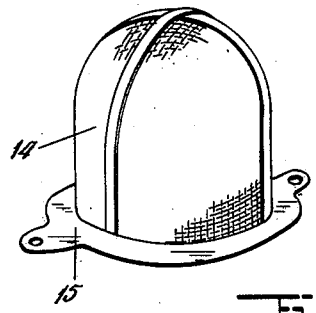


Fig. 3.

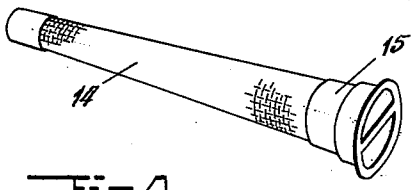


Fig. 4.

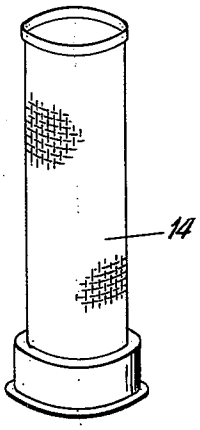


Fig. 5.

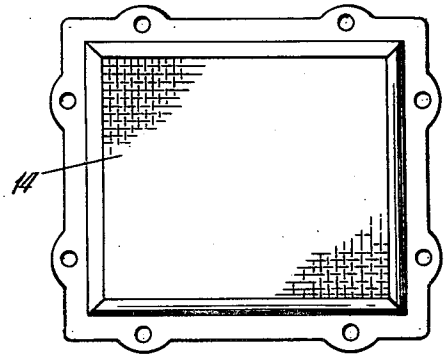


Fig. 7.

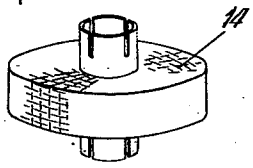


Fig. 6.

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METHOD OF PRODUCING REINFORCED WIRE NETTING

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1 Claim. (Cl. 117—65)

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The present invention relates to improvements in the manufacture of metal products of the kind in which a number of substantially similar elements are to be assembled to constitute structures such as screens, filters, strainers, etc. In one particular aspect, the invention relates to products of the type known as woven wire screen, wire cloth and the like, and to the production of a novel and stronger type of such material, as well as to novel methods for the manufacture thereof.

Wire cloth or metal screening as heretofore made suffers from various disadvantages among which may be cited in the first place that the edges thereof unravel very readily which makes them unfit for a number of applications. Furthermore, screen openings vary when subjected to certain types of prolonged usage by virtue of the fact that the wires displace each other or become dislodged from their anchorage places.

Also when subjected to heavy duty some of the prior art wire meshes become deformed due to the fact that the wires increase in length under a heavy load.

Furthermore, when it is desired to cut such prior art screens or meshes into small circular sections such as are used in connection with pipes, ducts, and the like, the outer or shorter wires of such circular sections have a tendency to fall off.

In accordance with the present invention there are provided novel methods of manufacture and novel types of products of the kind mentioned in which the above stated disadvantages are eliminated while at the same time the tensile strength, the compression strength and the workability which are imparted to the new material are found to be far superior to substantially similar types of materials heretofore produced.

Referring now to the accompanying drawings which form a part of this specification:

Fig. 1 is a view of one specific embodiment of the present invention; and

Figs. 2 through 6 are perspective views of further embodiments of this invention.

In a preferred method of manufacturing the stabilized products of the present invention, a wire screen or similar product made by any conventional prior art method is first cleansed to remove any oily film present, as for example by means of a pickling bath, or by electrolytic means. After this treatment, the wire screen or the like is immersed in a bath containing a 10% to 20% aqueous solution of crystalline copper sulphate, and a small percentage of any reactive acid, such as sulphuric acid. The screen is thus

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covered with a layer of copper. The product is then dried and heated in a furnace having a non-oxidizing atmosphere, whereby the coating of metal is caused to melt and to adhere firmly not only upon the entire surface of the product, but is particularly concentrated by capillary action upon the mesh intersections 8, shown more particularly in Fig. 1, which are thus securely anchored and bonded together. The coated and bonded product thus made is then cooled in the same protective atmosphere.

If desired, the bonded and stabilized material thus produced may be passed through another metal deposition step such as electroplating for example in which the surface thereof is covered with cadmium or zinc.

In the case of a web like structure such as a woven wire screen it is desirable that the wire screen is passed through the successive plating baths and drying apparatus in a continuous manner and at the same overall speed. This may also be accomplished, in order to maintain the correct periods of exposure to the various treatments by varying the paths of travel in the installations such as by providing any desirable number of drums or rollers around which the web like material may be successively passed. Another desirable step in the process is to adapt the concentration of the plating bath to the speed of travel which is determined by the speed of drying. Usually it will be found that the more rapid the passage through the furnace, the longer should be the path of travel in the plating bath or the higher should be the concentration of the said bath or baths.

It will also be appreciated that while a woven wire screen is being subjected to heat it should not simultaneously be subjected to considerable tensile stress, preferably only to so much tensile stress that it does not touch the bottom of the heating furnace.

Advantages of the non-electrolytic deposition of the bonding metal upon the various articles of this invention are that the thickness of the layer deposited is independent of the width of the product or of the size of the interstices, factors not obtainable electrolytically in the case of fine mesh sizes.

Second, while the invention contemplates the use of wires made of metals or alloys such as bronze, Phosphor bronze, brass, aluminum etc. it is possible to achieve a perfect degree of surface protection against corrosion by using even the most corrodible types of iron or steel for the mesh elements, since the bonding treatment

at the same time constitutes one of the most effective anti-corrosion measures.

Furthermore, the protective and bonding metal coating, covers the entire metal surface. In other words the copper coating after heating and fusion thereof does not merely consititute a bonding metal or solder but forms a continuous and uninterrupted layer, thus providing a highly economical protection against corrosion. Also non-electric deposition of metal is considerably simpler in practice than the use of electric means.

A particular modification relating to an advantageous field of application of one type of product obtained by the present invention is to be found in the manufacture of a woven wire cloth imbedded in a layer of rubberlike material as shown for instance in Fig. 2 in which 11 indicates the wire screen and which may or may not be bonded together at their intersections. In this particular embodiment of the invention the amount of bonding metal deposited upon the surface and at the intersections of the wire may be and preferably is less than that of the other modifications of the invention, inasmuch as the rubberlike material 12 which surrounds all sides of the wires of the screen assists in the stabilization and protection thereof. Such a composite material may find particular usefulness whenever a material is desired which does not expand laterally when subjected to compression, such as for example for certain gaskets etc. A further advantage of this embodiment of the invention is found in the fact that the wires of the screen will not unravel, irrespective of its particular shape or contour.

Other modifications of the invention are illustrated in Figs. 3 through 7 which show a variety of filter elements as used in various industrial applications. Each of these elements or units comprises the filter section proper 14 which is made of the stabilized wire cloth according to this invention and a mount, frame or stiffening element 15 which is integrally connected to the filter section by means of brazing, welding or the like. Both of these members, i. e. the filter and the mount may preferably consist of economical ferrous material such as soft steel for the wire mesh and hardened steel for the mount, but the wire may also consist of Phosphor bronze, bronze, brass, aluminum or other suitable material. In accordance with the invention the composite article is first cleansed to remove any oily film present, as for example by means of a pickling bath or by suitable electrolytic means, and is further treated as above described. It will frequently be found after this treatment that at some places which require greater amounts of covering metal than other places, there is insufficient covering or protective metal present. This is usually the case at those points where the wire mesh comes in contact with the mounts. It is therefore desirable to supply additional covering material in the form of paste or leaflets, or else by the use of the spray gun. The entire composite article is thereupon heated in the protective atmosphere of a furnace as set forth above.

Increases in tensile strength up to 30% as compared with ordinary wire screens are readily obtained by means of the stabilized screens of the present invention. As to the workability of the stabilized screens of the present invention, it has been ascertained by tests that whereas sheet steel of a thickness of 0.3 mm. and which consisted of a kind of steel having maximum deep drawing properties, the Erickson deep draw value was 8.8 mm., whereas a stabilized screen according to this invention having a wire diameter of 0.3 mm. and a mesh of 0.6 mm. square, was ascertained to have a value of 14 mm.

The resistance to mechanical deformation of the stabilized wire mesh was exemplied as follows:

Five cylindrical filter elements substantially of the shape shown in Fig. 5 and having a diameter of 50 mm. and a length of 125 mm. were subjected to axial pressure until they were shortened 1 mm. Elements 1 and 3 were made of ordinary steel wire mesh with the difference that the woof and weft of the mesh of the first pipe ran at an angle of 45° to the directrix, and in the case of the third filter element, the woof and weft were arranged parallel and at right angles respectively, to the directrix. Elements 2 and 4 were made of stabilized wire mesh in such a way that, in the case of No. 2, the wires also ran at an angle of 45°, and in case of No. 4, parallel and perpendicular, respectively, to the directrices. The fifth cylinder was made of steel sheet.

The pressure required for the shortening of 1 mm. were as follows:

No. 1	No. 2	No. 3	No. 4	No. 5
10 kg. (22 lbs.)	75 kg. (165 lbs.)	200 kg. (440 lbs.)	382 kg. (840 lbs.)	389 kg. (856 lbs.)

A further advantage of the present invention is to be found in the fact that it gives the engineer the possibility of studying the strains and stresses as well as the flow of material by making simple tensile or compressive tests, without it being necessary to "score" such test specimens. It is merely necessary to choose a suitable stabilized test specimen as to its screen openings and wire gage, and to subject it to the desired tensile or compression tests, whereby the strain or flow of metal thus produced is rendered visible for immediate observation.

While the invention has been described and illustrated by means of several embodiments, it is to be understood that the invention is capable of numerous modifications and adaptations without departing from its spirit or exceeding its scope as defined in the appended claim.

What is claimed is:

The method of producing reinforced wire netting which comprises immersing a wire screen of a metal of higher electromotive force and higher melting point than copper in a relatively concentrated aqueous solution of crystalline copper sulphate and sulphuric acid to produce a metal coating upon said screen, and heating the coated screen in a non-oxidizing atmosphere at a temperature sufficient to fuse the coating upon the wire screen and to braze the wires at their intersections.

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