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M. B. DIGGIN

2,321,367

ANODE BAG

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FIG. 1.

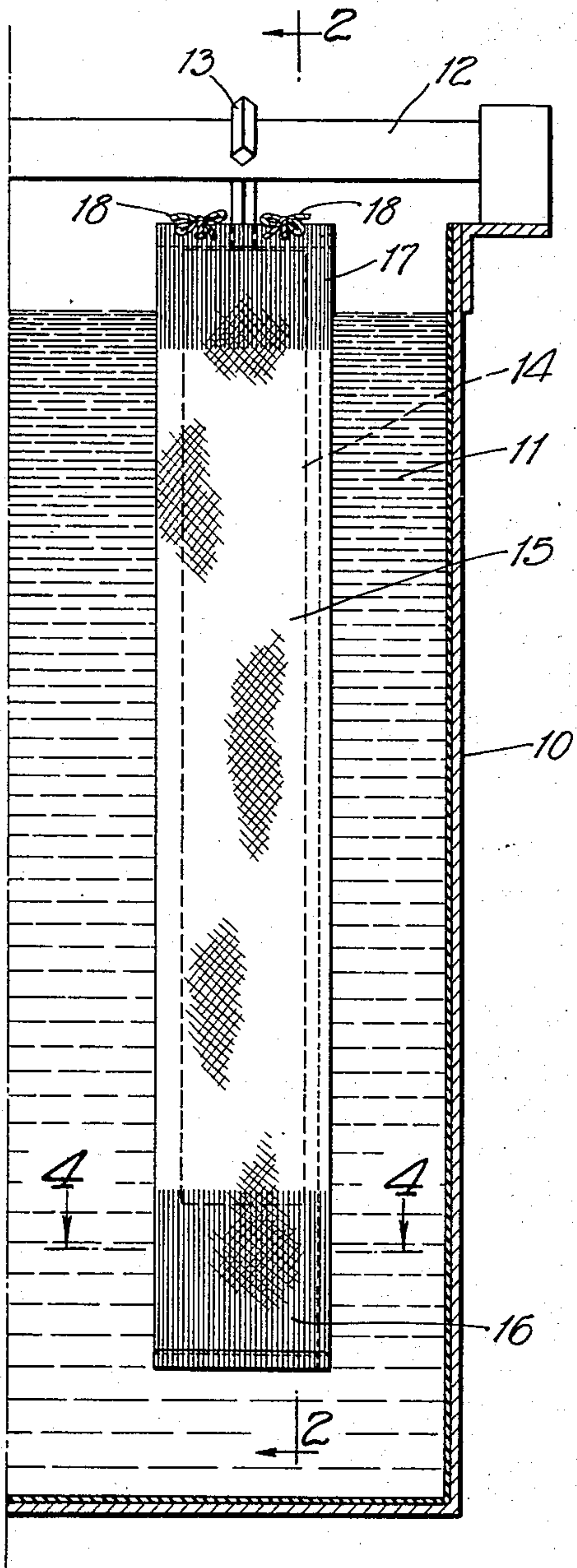


FIG. 2.

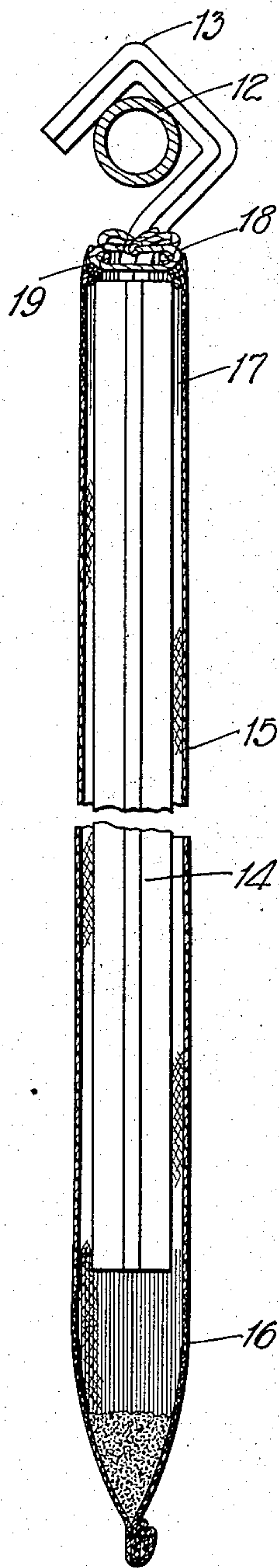


FIG. 3.

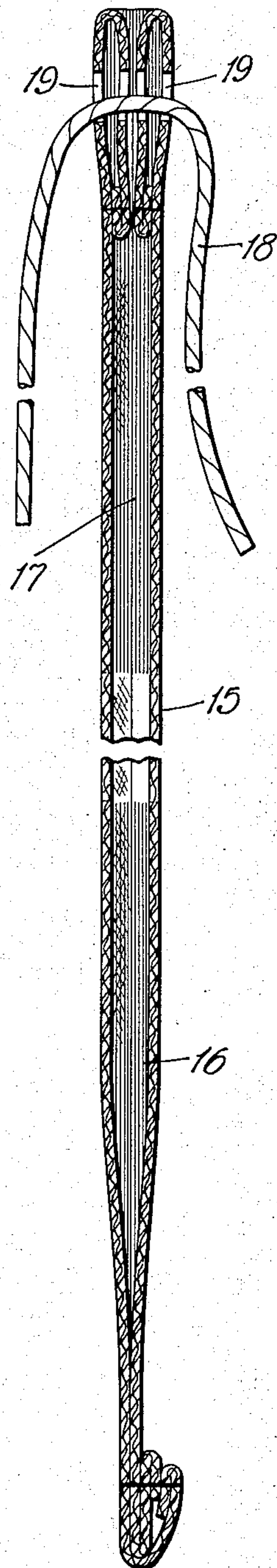
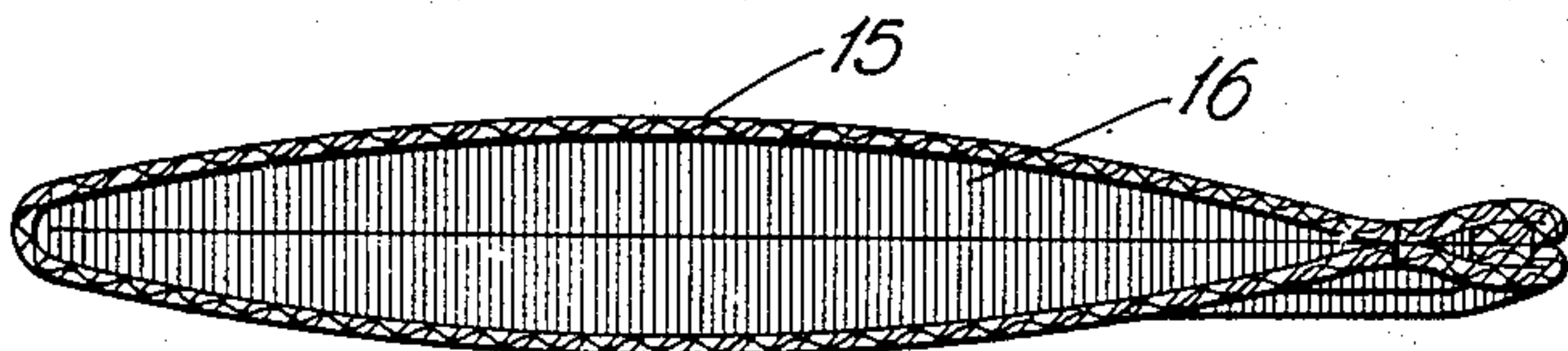


FIG. 4.



INVENTOR  
Myron B. Diggin  
BY  
Knight Bros.  
ATTORNEYS



## UNITED STATES PATENT OFFICE

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## ANODE BAG

Myron B. Diggin, Matawan, N. J., assignor to  
Hanson-Van Winkle-Munning Company, Mata-  
wan, N. J., a corporation of New Jersey

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3 Claims. (Cl. 204—279)

This invention relates to anode bags which are in general well known in the electroplating industry for preventing contamination of the plating bath by solid particles set free from soluble anodes by electrolytic corrosion. Such bags are more particularly well known in nickel plating practice, but their use is not limited to this field.

The ordinary or well-known anode bags are made of materials which are permeable to the solution but supposedly impermeable to the solids, and their action is essentially that of a filter. The material usually employed is a woven fabric of, for example, cotton. This material is subject to comparatively rapid deterioration in the vicinity of the solution level, evidently due to the air exposure in this locality or to the crystallization of salts from the solution which creeps by capillary attraction from the liquid solution body into the top of the anode bag above the solution level. A further objection to the commonly employed anode bags of textile fabric is that fine particles of sludge which collect in the bottom of the bag from the electrolytic corrosion of the anode frequently find their way through the pores of the bag at this point. It should be explained that standard practice in the use of anode bags employs an overall length of the bag sufficiently greater than the length of the anode to provide a definite free pocket at the bottom below the end of the anode, in which the sludge accumulates as the anode corrodes. While the nature of the commonly employed textile fabric is such that such accumulation of sludge might be securely retained in the bag if allowed to remain undisturbed, the commonly practiced agitation of the solution or the movement of the anode causes this depending pocket of accumulated sludge to find its way through the pores of the bag to a sufficient extent to cause serious roughening of the deposit on the cathode. This action is particularly noticeable where the swinging of the depending bottom portion of the bag causes it to impact against the tank wall or adjacent anodes.

The objects of my invention include the provision of an anode bag provided with a special construction to avoid early deterioration of the bag at the top or escape of sludge particles through the wall of the bag at the bottom, in addition to the normal function of the bag in acting as a filter over the greater portion of its length. These objects are accomplished by employing at the top and bottom of the permeable textile fabric a terminal band or zone of inert and impervious non-conductive material. In its preferred

form, this construction is achieved by impregnating and coating the bag at these top and bottom zones with a plastic embodying a synthetic resin or other material which can be applied in the form of a solution or fused solid which will subsequently dry or set by evaporation of the solvent or the restoration of normal temperature. Examples of materials I have found satisfactory for this purpose are co-polymers of vinyl chloride and vinyl acetate in a suitable solvent, modified polystyrene resins in suitable solvents, chlorinated naphthalene compounds and rubber latex. These materials are mentioned simply by way of example, as it will be apparent to others that these examples do not by any means represent the limits of suitable materials for the purpose contemplated. Obviously, plasticizers may be employed in accordance with the knowledge of those skilled in the art of plastics. The effect of these bands of impervious material at the top and bottom of the bag is in the first place to completely fill the pores of the fabric at these portions so that the solution does not creep by capillary attraction at the top of the bag and the particles of sludge are not permitted to escape through the walls of the pocket at the bottom of the bag below the lower end of the anode. The function of the impregnation and coating at the top of the bag is furthermore to resist chemical attack where the surface of the liquid is in contact with air, and also to lessen or entirely eliminate the incrustation which commonly occurs at the top of the anode in the use of anode bags of the ordinary type.

The construction of the invention is illustrated by a typical example in the accompanying drawing, in which—

Figure 1 is a vertical section through a portion of the plating tank wall, illustrating the anode and anode bag hanging in the bath.

Figure 2 is a detail vertical section through the anode and anode bag, taken on the plane 2—2 of Figure 1.

Figure 3 is a vertical section on a somewhat larger scale indicating the construction of the bag, and

Figure 4 is a transverse section of the bag on the plane 4—4 of Figure 1.

Referring in detail to the drawing, the tank wall is indicated at 10, the solution or bath at 11, the anode rod at 12, the anode hook at 13, and the anode at 14. The anode bag is indicated by the reference character 15. It will be noted that the bag 15 is somewhat longer than the anode 14 so that it extends from the top of the



anode to a substantial distance below the bottom of the anode where the pocket for the accumulation of sludge is provided. The walls of this pocket, as indicated at 16, are impregnated and coated with the impervious inert and electrically non-conductive plastic, such band of impervious material extending downward from slightly above the bottom of the anode. This impervious walled pocket may, for example, extend upward from the bottom of the bag a distance of, say, three and one-half to four and one-half inches.

A similar band 17 of impervious inert and electrically non-conductive plastic extends downward from the top of the anode for a distance of about three inches. The dimensions cited as examples represent what I have found to be satisfactory for nickel anodes between twelve and forty inches in length. The relation of the bath level to the top of the anode and the anode bag is preferably maintained such that the anode and bag extend a short distance above the surface of the liquid, and the impervious band at the top extends downward a short distance below the liquid level. For maintaining the bag in proper relation to its anode, cords 18, which may be impregnated and coated with the same material as the top and bottom of the bag, are passed through perforations 19 near the top of the bag in position to rest upon the upper end of the anode, where they may be tied or otherwise secured in bag-supporting relation thereto.

From the foregoing description it will be seen that my improved anode bag comprises a tubular woven fabric of cotton or the like, pervious to the solution over the major portion of its length but impervious to the solution at top and bottom. It is, of course, closed at the bottom and open at the top, so that it may readily be drawn over the anode from the bottom and tied at the top to support it in its operating position. Some of

the features of the impervious plastic impregnation and coating are applicable to anode bags constructed of other permeable material than woven cotton fabric, and hence these impervious bands at top and bottom may be employed to advantage on anode bags of any permeable material. The impervious nature of this impregnating plastic may thus be employed, for example, on an anode bag of a woven glass fiber to render it impervious at top and bottom so that the solution would not creep by capillary attraction at the top of the bag and the fine particles of sludge could not escape from the sludge pocket at the bottom of the bag.

I claim:

1. An anode bag comprising a tubular envelope of woven fabric permeable to liquid, said bag being closed at the bottom and open at the top, and the fabric of said bag being impregnated and coated with an impermeable inert and electrically non-conductive plastic throughout a band or zone extending entirely around and for a short distance down from the top of the envelope.

2. An anode bag comprising a tubular envelope of woven fabric permeable to liquid, said bag being closed at the bottom and open at the top, and the fabric of said bag being impregnated and coated with an impermeable inert and electrically non-conductive plastic throughout a band or zone extending entirely around and for a short distance up from the bottom of the envelope.

3. An anode bag comprising a tubular envelope of woven fabric permeable to liquid, said bag being closed at the bottom and open at the top, and the fabric of said bag being impregnated and coated with an impermeable inert and electrically non-conductive plastic throughout a band or zone extending entirely around and for a short distance down from the top and up from the bottom of said envelope.

MYRON B. DIGGIN.