

[54] METHOD OF MANUFACTURING
ELECTRODE GROUPS OF ALKALINE
ACCUMULATORS

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[51] Int. Cl. H01m 35/18

[58] Field of Search 136/19, 35, 36, 48, 136/50, 52, 64, 65, 66-67, 75, 176; 29/2.592 136/120, 16

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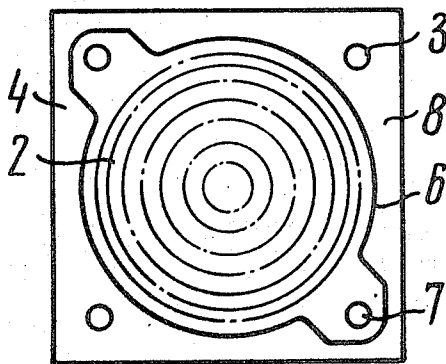
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[57] ABSTRACT

A method of manufacturing disc-mounted electrode groups of alkaline accumulators comprising the steps of stamping the perforated bottom of the disc and, simultaneously forming, locating holes spaced outwardly of the perforated part from a steel band, fixing the band on locating holes and cutting it into separate plates each having the perforated bottom of the disc and with locating holes drawing from the profile of the future disc, punching the disc with the contact holes, and assembling the electrodes into groups.

2 Claims, 12 Drawing Figures



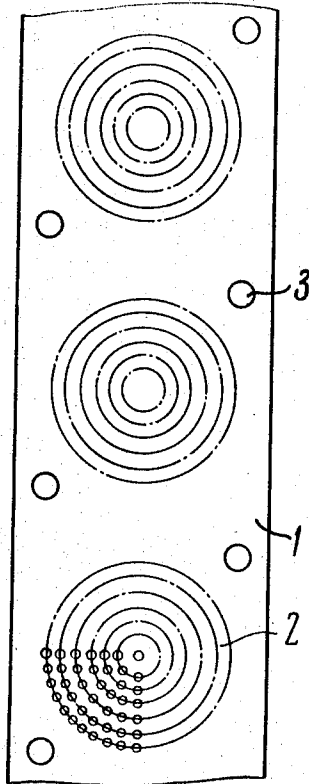


FIG. 1

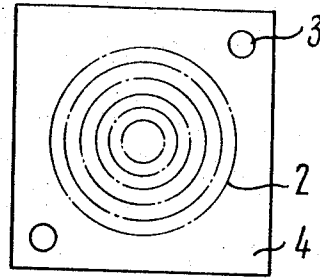


FIG. 2

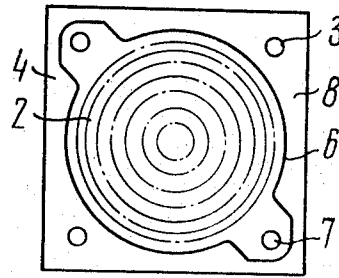


FIG. 4

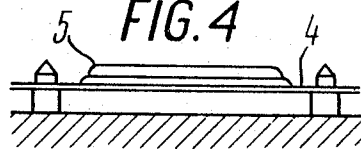


FIG. 3

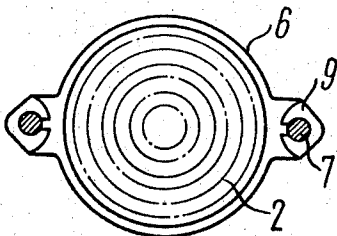


FIG. 5

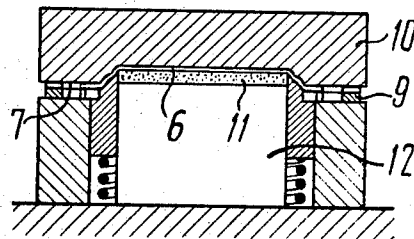


FIG. 6

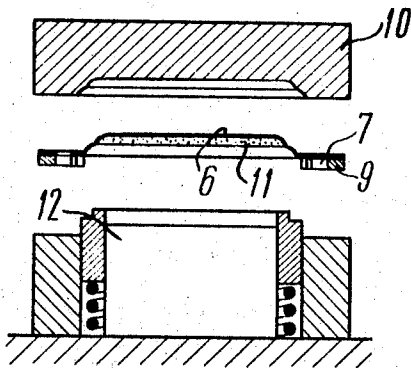


FIG. 7

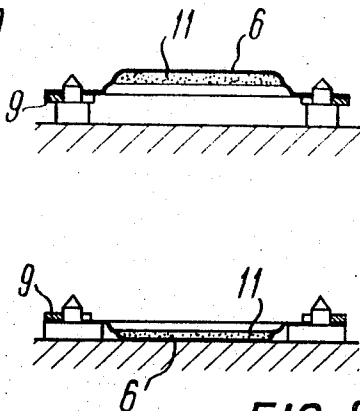


FIG. 8

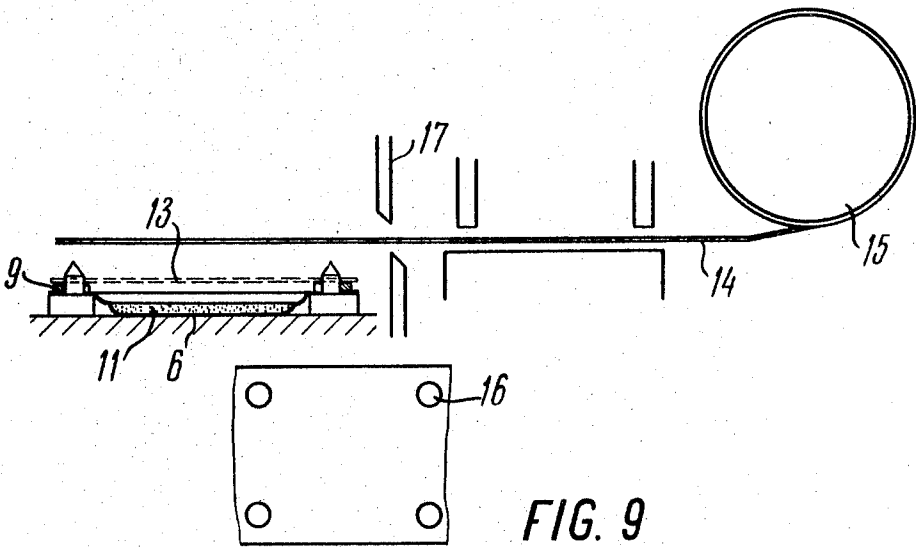


FIG. 9

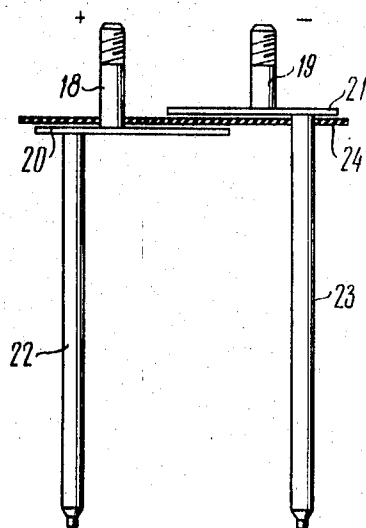


FIG. 10

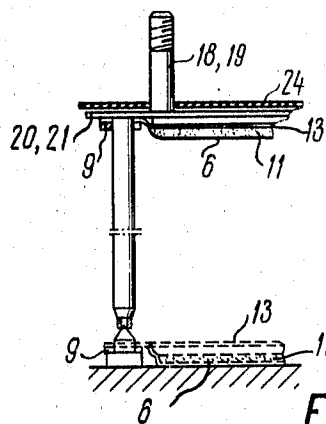


FIG. 11

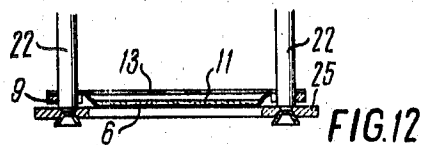


FIG. 12

METHOD OF MANUFACTURING ELECTRODE GROUPS OF ALKALINE ACCUMULATORS

The present invention relates to alkaline accumulators and, more particularly, to a method of manufacturing electrode groups from which the alkaline accumulator is assembled.

This invention can be used most successfully in manufacturing accumulators used for starting automobile and tractor engines. However, it can be equally well used for accumulators employed in electric locomotives, lift trucks, electric power trucks and in electric motor cars as traction accumulators.

Known at present are methods of manufacturing electrode groups of alkaline accumulators comprising the steps of stamping the discs, one after another, with a perforated bottom and contact holes from a steel band; transferring these discs for pressing in an active mass of different polarity for making electrodes, carrying these electrodes manually to subsequent work stations for assembly into electrode groups, slipping the contact holes of these electrodes on contact pins of opposite polarity, simultaneously placing insulating spacers between the unlike electrodes and rigidly fixing the whole set of electrodes on the pins. In this prior art method the positive electrodes are made by nickel-plating the discs with the perforated bottom and contact holes one after another and by manually preparing the insulating spacers.

In the known methods of making the discs and transferring them from one operation to another their locating base is not retained; as a result, the dimensions of the discs differ and their profile is distorted. The absence of the locating base, the use of manual labor and of piece-by-piece manufacture, and nickel plating of the discs interfere with a continuous and automated manufacture of the electrode groups, which causes an increase in the amount of wasted material and required labor.

A specific object of the invention is to provide a method of manufacturing electrode groups for alkaline accumulators with support discs made in such a manner whereby the method facilitates the continuous and automated manufacture of the electrode groups, providing for an identical locating base, accurate dimensions and profile for the discs and a resultant reduction in the amount of waste material and required labor.

This object is achieved by providing a method of manufacturing electrode groups, comprising the steps of stamping the discs to form a perforated bottom and contact holes from a continuous band, pressing an active mass of opposite polarity into the discs for making electrodes, slipping the formed contact holes of these electrodes about dissimilar contact pins with the simultaneous placing of insulating spacers between the electrodes, and rigidly fixing the entire set of electrodes on the pins to make a group. According to the invention, first the perforated bottom of the proposed disc is formed in the band while simultaneously, the locating holes are made outwardly of the extent of the perforated part, then the band is positioned by means of the locating holes and cut into separate segments with each having a portion defining the perforated bottom of disc and including at least one of the locating holes, after which the profile of the future disc is drawn out from the plate and, finally, the disc with the contact holes is punched from the plate. This method ensures a contin-

uous automated process of manufacturing the electrode groups, while at the same time using the same locating base.

It is desirable that, after making the perforated bottoms of the discs and the locating holes, the band should be nickel plated. This will increase the labor efficiency and reduce the amount of required labor.

The method disclosed herein sharply increases the labor productivity, improves the quality of the product, the labor conditions and the working safety. It reduces the required production areas for the same output as compared with the piece-by-piece manufacture of electrodes and manual assembly and concurrently provides the possibility of saving on costly basic materials.

In order to make the invention more readily apparent it will now be described in detail by way of example with reference to the accompanying drawings in which:

FIG. 1 shows a band with the perforated bottom of the proposed electrode-supporting disc and with locating holes;

FIG. 2 shows a plate with the perforated bottom of the disc and with locating holes;

FIG. 3 shows a plate with the drawn-out profile of the disc, fixed by means of the locating holes;

FIG. 4 shows a plate with contact holes;

FIG. 5 is the same as FIG. 4 but with welded terminal contacts;

FIG. 6 shows a disc with an active mass being pressed thereinto;

FIG. 7 shows a finished electrode with the press-mould opened;

FIG. 8 shows the position of the electrode before and after reorientation;

FIG. 9 shows the relative positions of the electrode and band for making electric-insulating spacers and placing the latter on the electrodes;

FIG. 10 shows an electric contact unit with contact pins;

FIG. 11 shows the arrangement of electrodes on contact pins; and

FIG. 12 shows the fixing of the entire set of electrodes on contact pins.

A method for manufacturing the electrode groups of alkaline accumulators consists in making a perforated bottom 2 of an electrode support disc and simultaneously locating holes 3 beyond the perforated part by stamping them from a steel band 1 (FIG. 1), the perforated parts being spaced at a definite pitch depending on the size of the disc. The band 1 then is fixed on the locating holes 3 and cut into separate plates or segments 4 (FIG. 2) each having the perforated bottom 2 of the proposed disc and at least one of the locating holes 3. The plate 4 is placed on a conveying means (not shown) onto which it is then fastened by means of the locating holes 3. This conveying means carries the plate 4 to the working station for drawing out the stepped profile 5 (FIG. 3) of the future disc, and which is then followed by punching out a disc 6 (FIG. 4) with contact holes 7. After punching, part 8 of the plate 4 together with the locating holes 3 is ejected and the contact holes 7 used as new locating holes. The discs 6 are then fixed with the aid of their locating holes 7 on the conveying means by which they are carried to the next working station where spring-like terminal contacts 9 (FIG. 5) are welded thereto. The same conveying means then carries the disc 6 to a pressing sta-

tion where it is placed into a press-mould 10 (FIG. 6) which is filled in advance with an active mass of corresponding polarity. This mass is then pressed into the perforated bottom of the disc 6 by a punch 12. After pressing, the finished electrode is withdrawn from the press-mould 10 (as shown in FIG. 7) and transferred to the working station for reorientation as shown in FIG. 8. The reorientation is necessary because in the assembled group the electrodes should be positioned with the active mass pointing upward. The finished electrode is then covered with an insulating spacer 13 (FIG. 9) which is made as follows. An alkaliproof porous band 14 of the same width as the required width of the spacer is unwound from a reel 15 and transferred to provide for punching out holes 16. This band is then cut by a cutter 17 into lengths corresponding to the required lengths of the spacer.

In addition to electrodes and spacers, the electrode group produced by the present method comprises a contact unit. The latter consists of positive and negative pole terminals 18 and 19 (FIG. 10) welded to bridges 20 and 21 and pins 22 and 23 of opposite polarity similarly welded to the corresponding bridges, with the bridges being separated by an insulating gasket 24.

The reoriented electrode with the spacer 13 (FIG. 11) is then transferred to the electrode group assembly station where the contact holes of the electrodes of opposite polarity are aligned with the corresponding pins 22 or 23 after which the first positive electrode is slipped on the pin 22 till it bears against the bridge 20. In this position the electrode is fixed by the spring-like terminal contacts 9. Then the first negative electrode is slipped on in the same manner and also clamped by the springy terminal contacts 9.

Subsequently, the process of alternate installation of

the positive and negative electrodes together with the insulating spacers 13 is continued until the contact pins 22 and 23 are completely filled. After the last electrode has been put on, the entire set of electrodes is fixed by placing a steel bottom plate 25 (FIG. 12) on like pins, and then securing this plate in position.

The positive electrodes are made by nickel-plating the band 1 after the perforated bottoms of the future discs and the locating holes have been made therein.

The present method can be carried out on known rotor-type machines which are interconnected by suitable conveying means, i.e., a chain.

What is claimed :

1. A method of manufacturing electrode groups for alkaline accumulators, said electrode groups being positioned on supporting discs; comprising the steps of forming perforations in a continuous steel band defining the bottoms of electrode-supporting discs, concurrently forming locating holes in said band outwardly of the perforations, positioning said band in predetermined locations by means of said locating holes, cutting said band into segments each having perforations for one of said discs and at least one locating hole, drawing each said plate segment into a disc-forming profile, punching out a plate segment portion so as to form contact holes, pressing an active mass of opposite electrical polarity into each of said punched discs to provide electrodes, positioning the contact holes about dissimilar contact pins while concurrently positioning insulating spacers between electrodes of opposite polarities, and rigidly fastening all of the electrodes on said contact pins to form an electrode group.

2. A method as claimed in claim 1, including the step of nickel plating said steel band subsequent to the forming of the perforations and locating holes therein.

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