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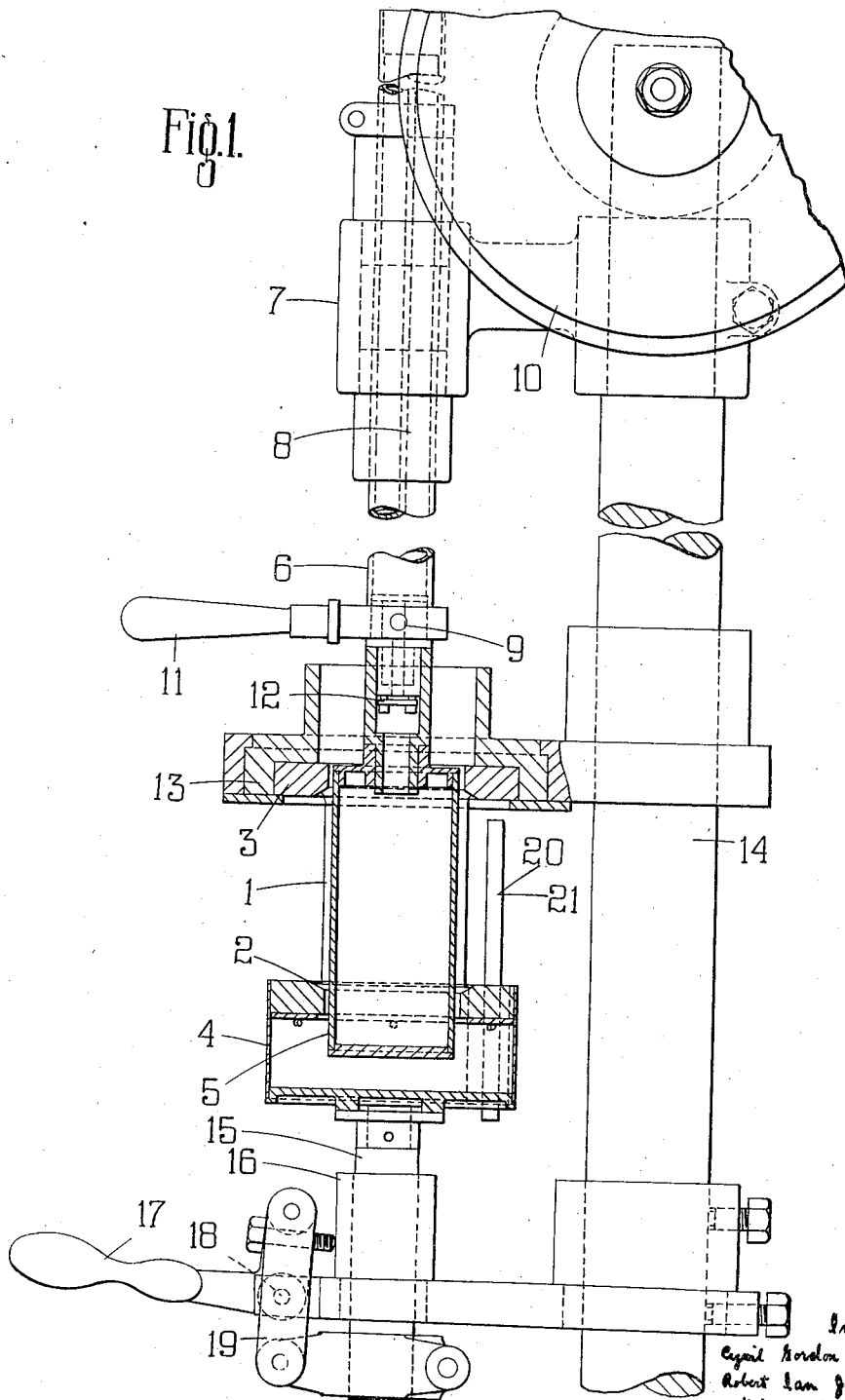
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2,215,166

METHOD OF COATING METAL FOR FOODSTUFF CONTAINERS

Filed Feb. 7, 1938

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

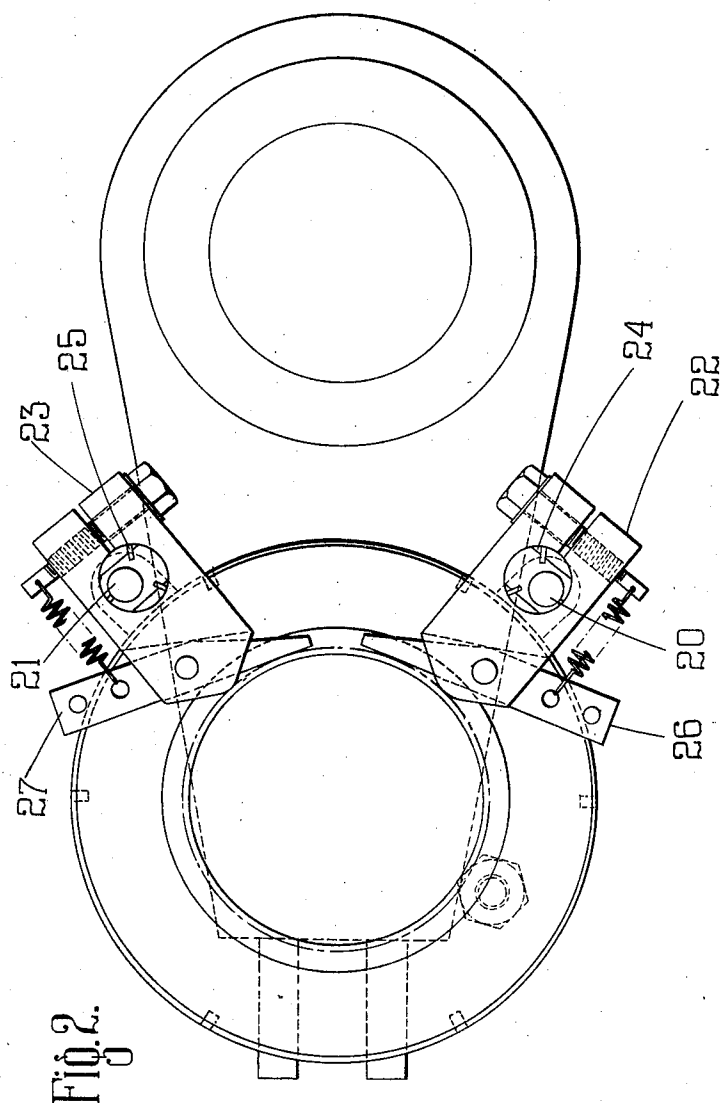


Fig. 2.

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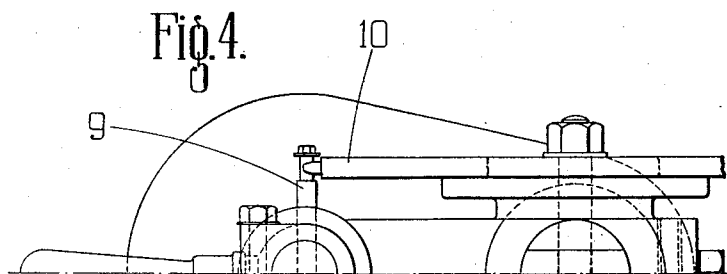
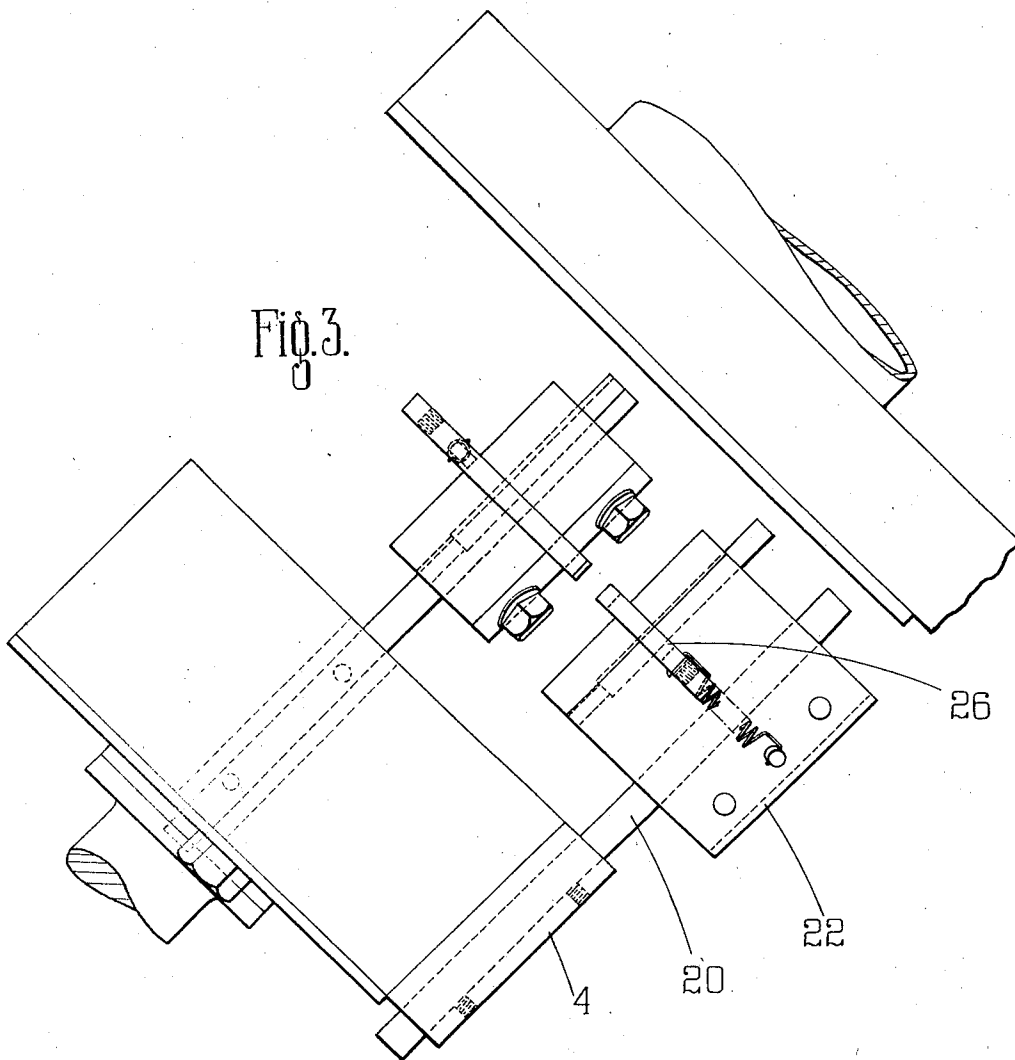
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METHOD OF COATING METAL FOR FOODSTUFF CONTAINERS

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,215,166

METHOD OF COATING METAL FOR
FOODSTUFF CONTAINERS

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3 Claims. (Cl. 204—1)

It has been proposed to coat metal containers internally after fabrication, by electrodeposition of lacquer from an emulsion of the oil-in-water type. This process is applicable both to solid drawn containers which are formed by drawing from a single piece of sheet metal, and to containers (without lids) which are made from two or more parts seamed or soldered together. When containers of the latter type are to be used for hermetically sealing the contents, for example a foodstuff, it is necessary to solder the longitudinal joint in the body, whether or not this is lock-seamed, but one or both of the ends of the sealed container may be affixed by double-seaming without soldering.

The usual method of making an internally lacquered container, by fabrication from previously lacquered sheet, has the disadvantage that the forming operations are liable to damage the lacquer coating. This is principally true of the body of the container, since in addition to scratches caused by the body maker, the soldering of the longitudinal joint may scorch the lacquer. Furthermore, if the joint is of the lock-seamed type, the coating is subjected to severe bending at the seam, with consequent tendency to rupture. This severe bending is obviated if the joint is formed by simple overlap, but in this case, metal may be exposed to contact with the food or other material, along the inside edge of the seam. In the case of a lock-seam joint, metal may be exposed at the notches. On the other hand, the forming operations for the ends of the container may be made much less damaging to the lacquer coating, and no bare edges need be exposed.

Furthermore the preferred form of the seam between the end and body of a container varies according to the particular views of the can maker and in certain cases the seaming technique employed may result in the presence of a narrow but deep annular gap between the end and body of the container. This gap may occasionally give rise to some difficulty in securing perfect lacquering by electrodeposition at this point as pinholes are liable to appear deep down within the gap.

These difficulties may be largely overcome if the interior surface of the body of the container is lacquered by electrodeposition, after fabrication but before attachment of the bottom end. By this means the longitudinal seam and any damage done to the tin coating during fabrication are completely covered with lacquer, and scratching or rupture of the lacquer is avoided. While not so independent of the fabrication processes as the method of lacquering the complete con-

tainer (apart from the lid), this method has the further advantage that the apparatus and operations for electrodeposition may be simplified or facilitated, owing to the fact that the partially completed container has no blank end, but is essentially a tube. According to the present invention both ends of the container which may be lacquered by electrodeposition or formed from plate previously lacquered in the usual manner, are attached to the body after the latter has been lacquered by electrodeposition.

In an example of an apparatus adapted to lacquer a sequence of container bodies by electrodeposition, each body is conveyed to an electrode station. The body is brought to rest, relative to the electrode, on a base preferably consisting of, or faced with, insulating material, and provided with a gasket of rubber or other elastic composition. When the electrode is in position inside the body, the latter is pressed onto the base in such a way that liquid may be introduced without leakage. A suitable emulsion is caused to fill the whole of the volume between the electrode and the inner surface of the container body, by introduction through an orifice in the base or by other means. The electrodeposition process is then carried out. The surplus emulsion is then withdrawn, and the container body is discharged from the electrode station. The body then passes on to be sprayed with wash liquor for removal of the emulsion adhering to the deposited lacquer film, and to be subjected to air jets or other means of removing adherent drops of wash liquor, before drying, and, if required, stoving the lacquer. Alternatively the spraying and blowing operations may be carried out before the body leaves the electrode station.

The electrode station or stations may be fixed and the container bodies may be conveyed through the machine in intermittent movement, or the electrode stations may move in a definite closed path and the bodies may pass through the machine either in continuous or in intermittent movement. Coating of the container body by electrodeposition before, instead of after, affixing the bottom end, has the following advantages:

1. The tubular body may be filled, when in position, through the fixed base plate instead of through the electrode assembly.
2. The tube may be emptied while still in position and means of overturning a can for emptying are not necessary.
3. Washing off the adherent emulsion is simplified since the flow of liquid may be unidirectional. When spraying a can with a blank end, the wash-

ings must run out at the same end as wash liquor enters, and it is more difficult to cover the whole surface effectively. In the case of a tube, a maximum efficiency may be obtained by using a spraying nozzle, which moves downwards through the tube, sweeping the emulsion in front of it. The nozzle may rotate.

4. Similar considerations apply to the removal of adherent drops of wash liquor by air jets. These also may be swept down through the tube, whereas with a blank-ended can it is difficult to arrange jets to play in the right direction for removing the drops out of the can.

The invention also includes the method of simultaneously lacquering or coating both the inside and outside of a tubular open ended can body, by electrodeposition; in this case the can body is readily treated while totally immersed in aqueous lacquer dispersion and the necessary mechanism is again much simpler than would be required for treatment of a blank-ended can.

The process may be applied to container bodies comprising one or more parts, provided that both ends are open. It may be applied to any metal or combination of metals suitable for use as containers, for example, in the case of foodstuff containers steel plate tinned on one or both sides, untinned steel, or aluminium may be used.

A further application is the internal coating of container bodies made from seamless or welded tube, where roller application of the lacquer is impracticable.

The invention is also applicable to the treatment of container bodies made from prelacquered plate, for the purpose of covering the exposed portions by, for example, an air-drying lacquer.

Although lacquer is mentioned particularly, other materials suitable for food containers fall within the scope of this invention, for example, waxy materials may be electrodeposited from dispersions in aqueous media.

An example of the application of the invention is more particularly described below with reference to the accompanying drawings, of which Figure 1 is a part sectional elevation of an electrode station in a machine adapted to coat single container bodies, Figure 2 is a plan of a section through the plane AB (Figs. 1 and 3) intersecting the container body, Figure 3 is an elevation in the plane XY (Fig. 2) and Figure 4 is a half-plan.

Referring to Figure 1, the container body 1 is held between a lower gasket 2 and an upper gasket 3, which may be of rubber or similar insulating material. A suitable emulsion or other treating liquid is contained in a sump 4, from which it is displaced by downward movement of the electrode 5, so as to fill completely the volume between the body 1 and the electrode. Electrode 5 is carried by, but electrically insulated from, tube 6, which is slidably mounted in guide 7. A chain 8 is attached to stud 9, and passes over a sprocket 10 to a counter-balance weight (not shown). Chain 8, stud 9, and sprocket 10 are duplicated on the other side of the machine. The up and down movement of the electrode is effected by manipulation of handle 11. Electrical contact with the electrode is made by an insulated wire

passing down tube 6, the end being secured by clamp 12.

The upper gasket 3 is carried by a mounting 13 which is clamped to the fixed pillar 14. The sump 4 carrying the lower gasket 2 is mounted on rod 15, which is capable of vertical movement in collar 16, the latter also being carried from the fixed pillar 14. Vertical movement of rod 15 is obtained by actuation of the handle 17, working about a pivot 18 and coupled to rod 10 15 through link 19.

Attached to sump 4 are vertical pillars 20, 21, to which are clamped blocks 22, 23 (Figs. 2 and 3, not shown in Fig. 1) of insulating material, through eccentric mountings 24, 25, the latter allowing of adjustment. Blocks 22, 23 carry spring-loaded metal arms 26 and 27, which engage with the outside of the container body and serve to make electrical contact therewith.

In operation of the machine, the electrode 5 is first raised by means of handle 11 until clear of the upper gasket 3, and the sump 4 is lowered by means of handle 17. A can body is placed in position on the lower gasket 2, and is held against arms 26, 27, while handle 17 is raised to press the body into contact with the upper gasket 3. Electrode 5 is now lowered through the body by means of handle 11, thus displacing liquor from the sump 4, into the volume between the electrode and the body, sufficient to bring the level above the top edge of the latter.

An electric current is then passed through the liquid between the electrode 5 and the body 1 which serves as the complementary electrode, in such a way as to effect the desired treatment. Electrode 5 is raised again to its upper position, sump 4 is lowered, and the treated body is withdrawn, after which it may be washed and dried by suitable means.

We declare that what we claim is:

1. In a method of fabricating open-ended tubular stock suitable for foodstuff containers, the steps of temporarily closing an end of the tubular stock, introducing an aqueous dispersion of lacquer into said tubular stock, electrodepositing a lacquer coating on said stock from said dispersion, and removing the surplus dispersion.

2. In a method of fabricating open-ended tubular stock suitable for foodstuff containers, the steps of temporarily closing an end of the tubular stock, supplying an aqueous dispersion of lacquer to cover the internal and external walls of said tubular stock, electrodepositing a lacquer on said stock from said dispersion, and withdrawing the surplus dispersion.

3. In a method of fabricating open-ended tubular stock suitable for foodstuff containers, the steps of temporarily closing an end of the tubular stock, introducing an aqueous dispersion of lacquer into said tubular stock, electrodepositing a lacquer coating on said stock from said dispersion, removing the surplus dispersion, removing the temporary closure, and washing the coated stock by a washing liquid flowing through said stock.

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