Oct. 29, 1946. A. C. HERRO ET AL 2,410,213

ELECTROLYTIC CAN CLEANER

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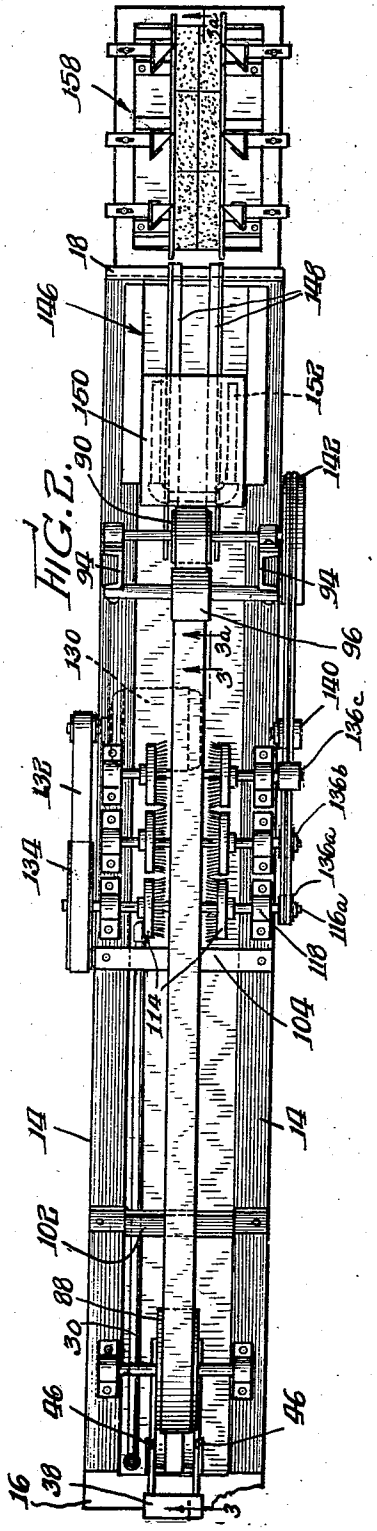


FIG. 2.

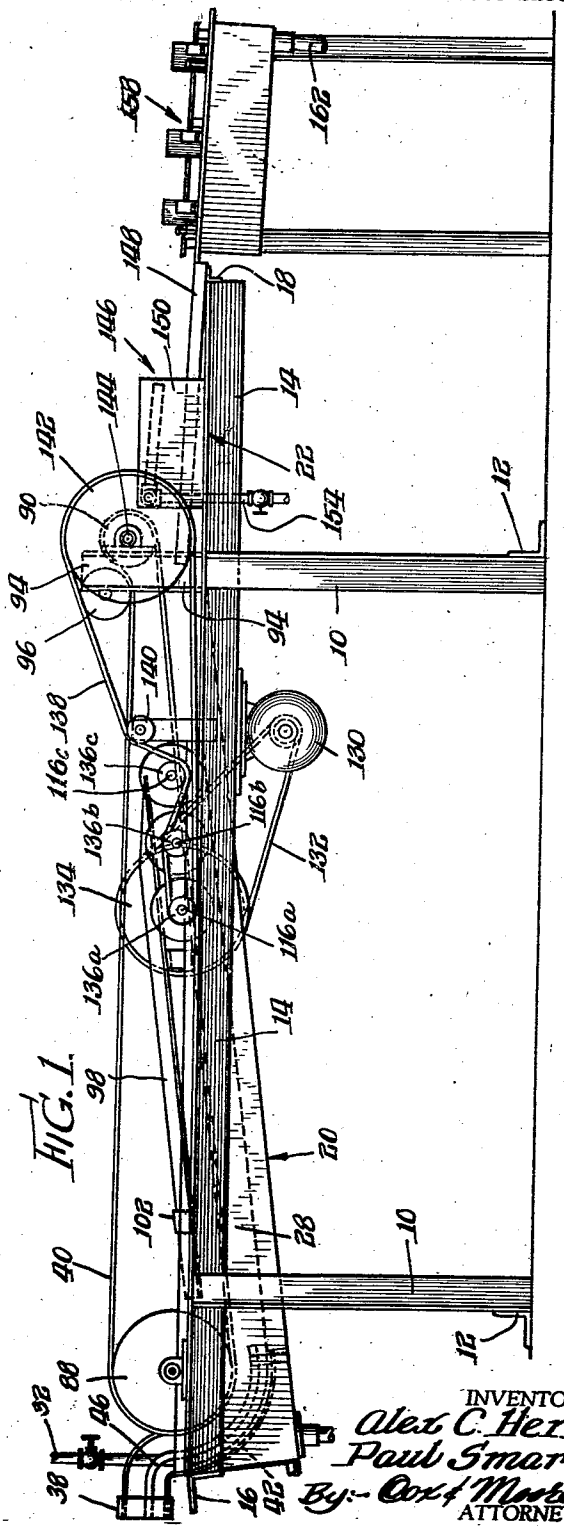


FIG. 1.

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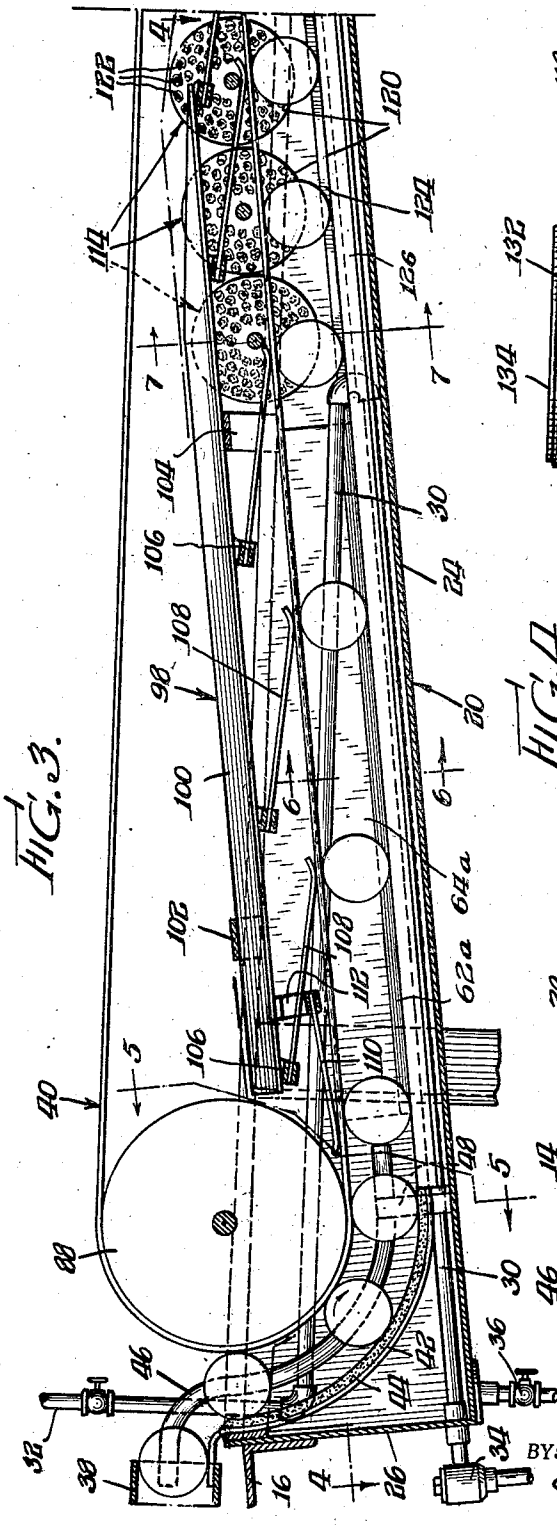


FIG. 3.

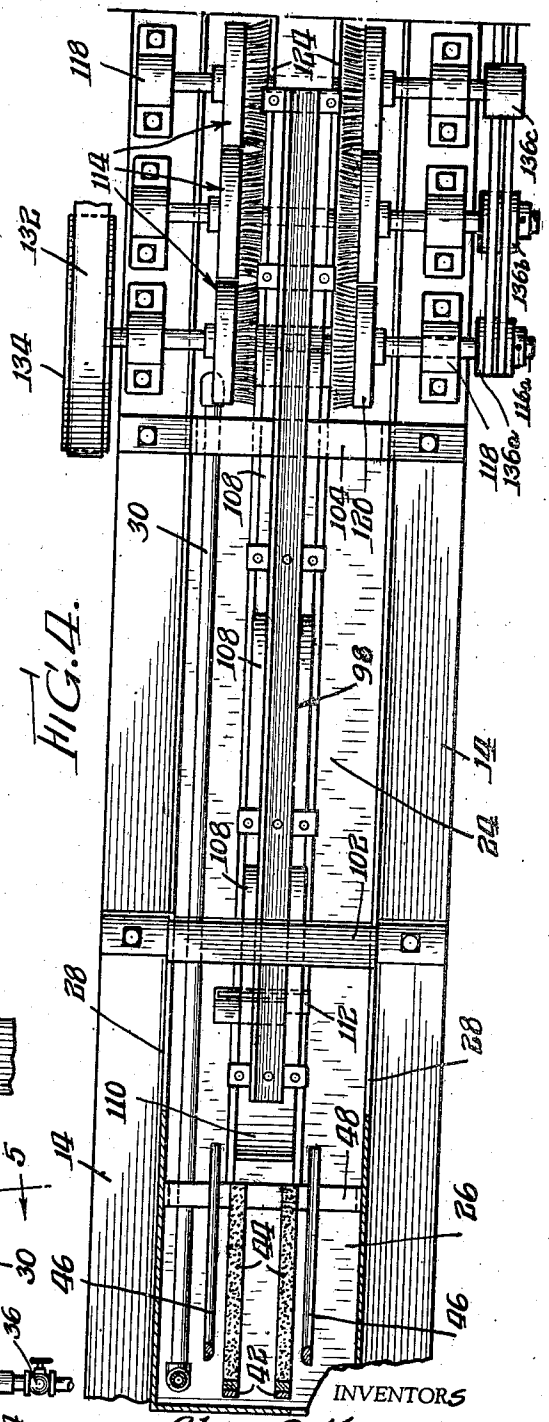


FIG. 4.

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ELECTROLYTIC CAN CLEANER

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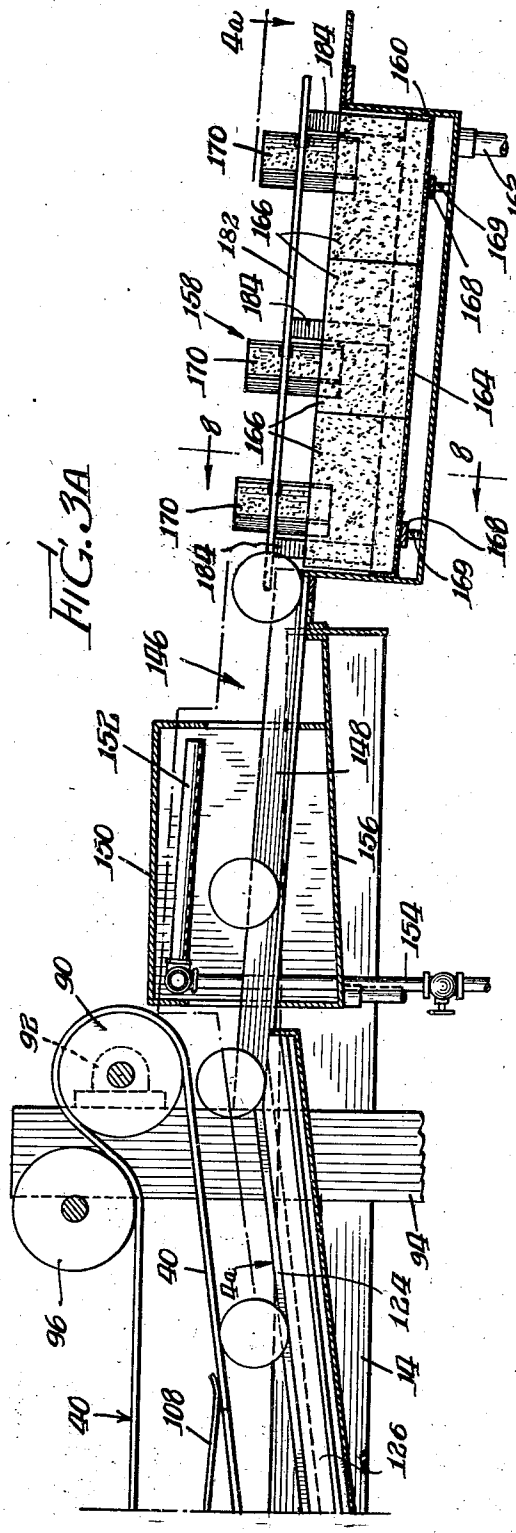


FIG. 3A.

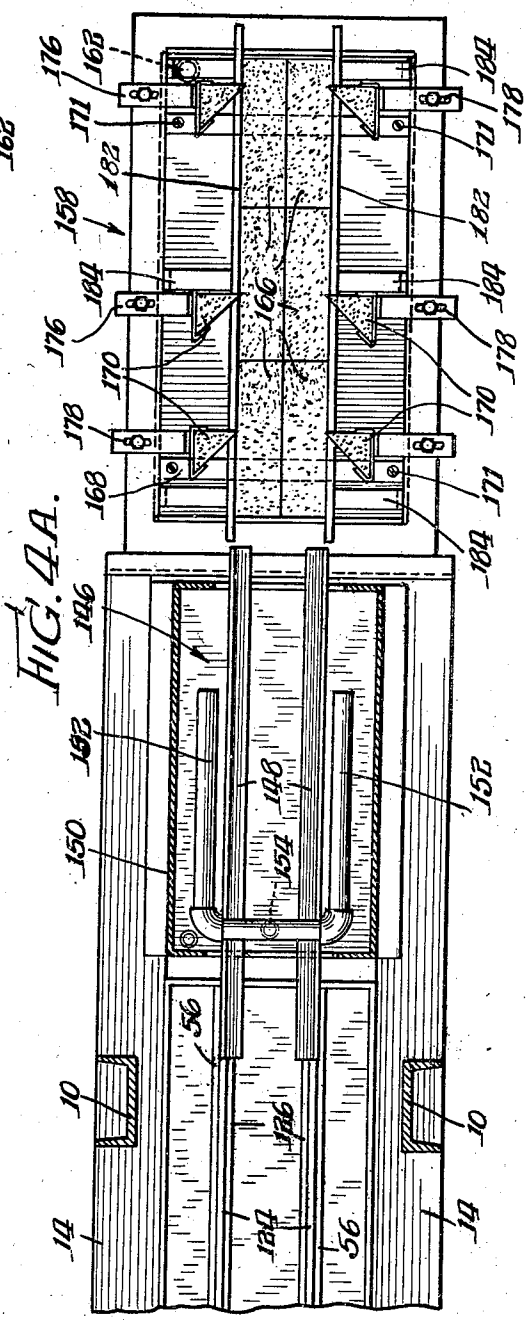


FIG. 4A.

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ELECTROLYTIC CAN CLEANER

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FIG. 5.

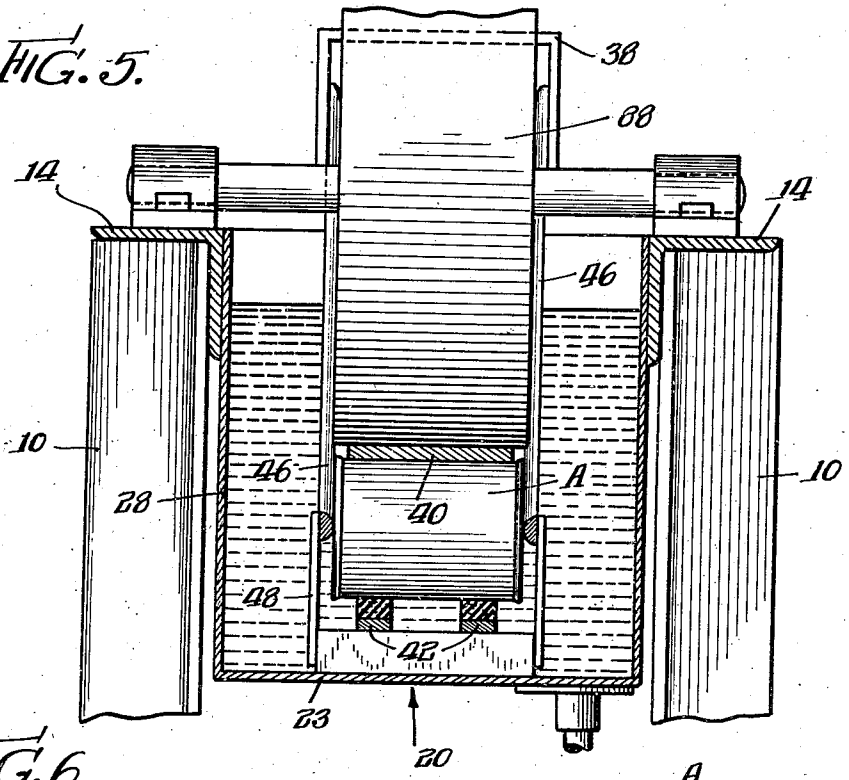
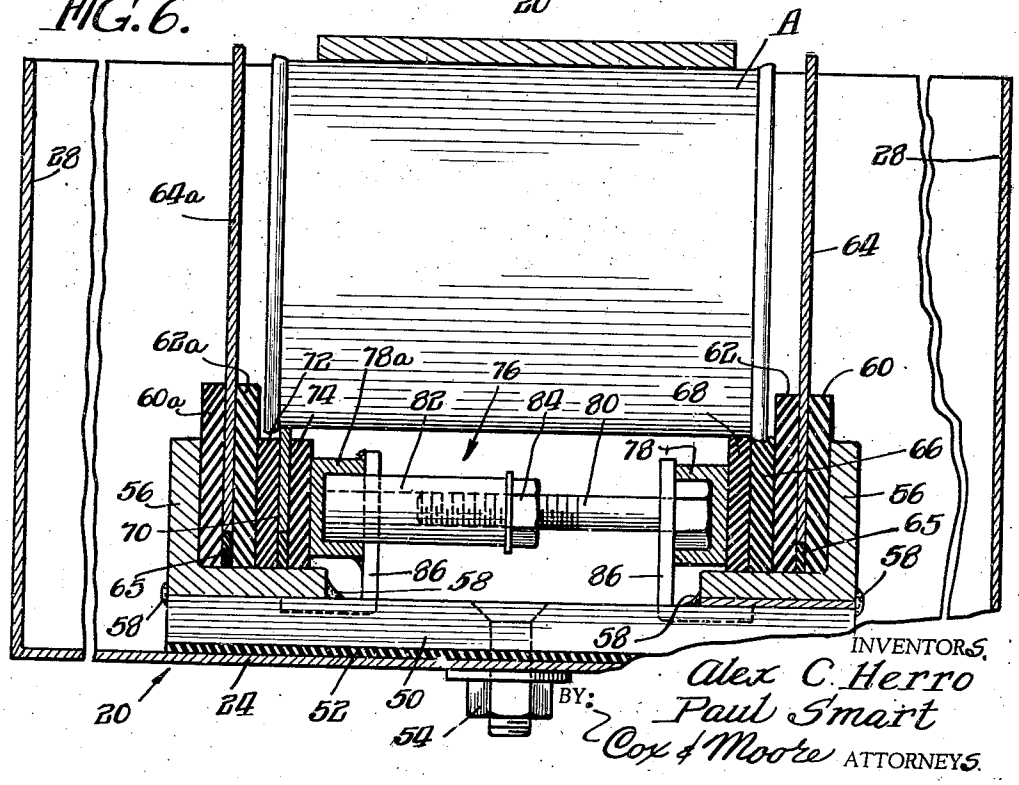


FIG. 6.



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FIG. 7.

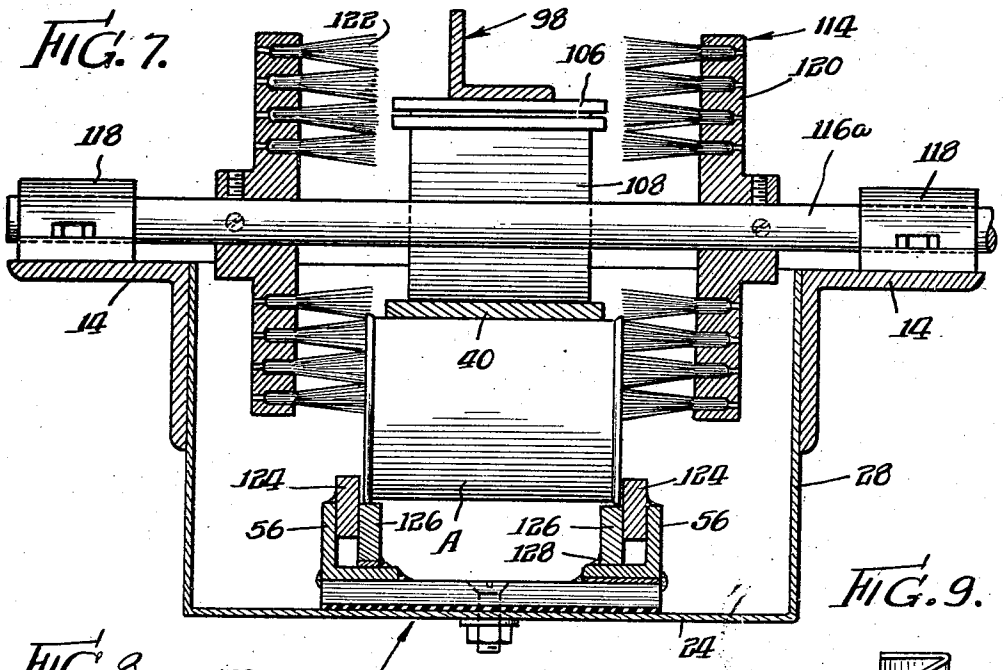


FIG. 9.

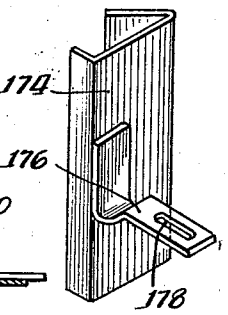


FIG. 8.

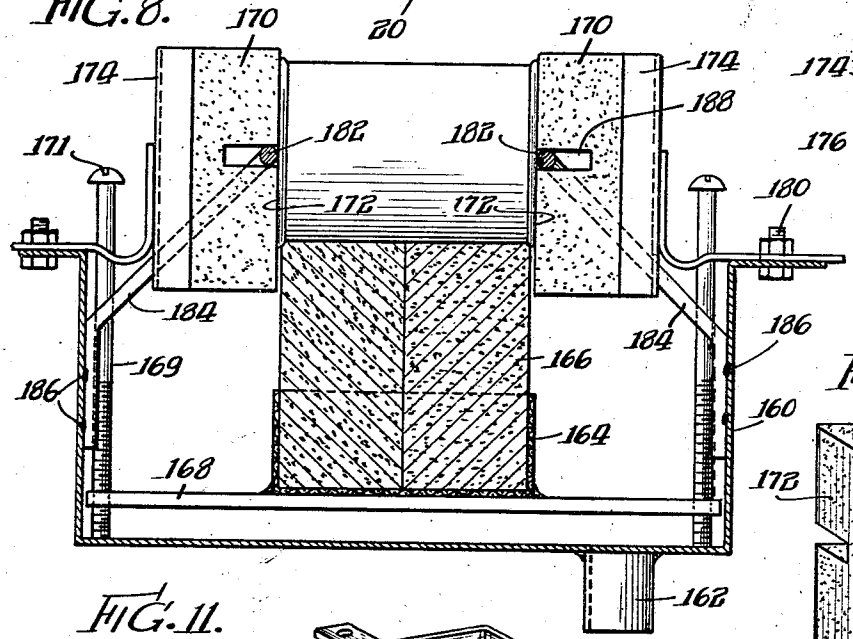


FIG. 10.

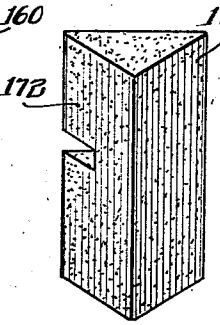
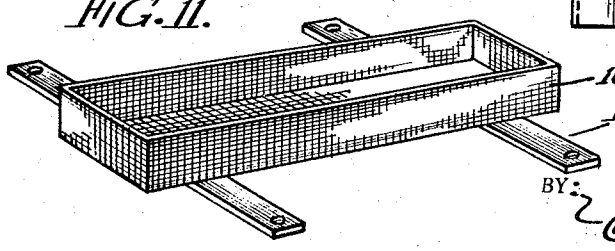


FIG. 11.



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UNITED STATES PATENT OFFICE

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ELECTROLYTIC CAN CLEANER

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Application November 6, 1939, Serial No. 302,942

4 Claims. (Cl. 204—141)

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The present invention relates to the art of cleaning, and more particularly concerns the cleaning of containers or vessels for food products, to provide a clear and sanitary exterior. In the case of packing, canning, and enclosing food products containing appreciable moisture and requiring sterilization, it is not unusual that a film, possibly composed of food elements, oil, solids from evaporation of water, and syrup, accumulates on the outer surface of the containers. Such a film may confer a dull appearance upon the final package, and in many cases promotes the appearance of dust. In any event, the sales appeal of the packaged article sold under the foregoing conditions may be and frequently is seriously affected.

In the past such containers have been manually wiped and cleaned or subjected to polishing by abrasive polishing means. It is evident, however, that the use of an abrasive affects the desirable properties of the protective coating when using containers of tin-plate, while at the same time the action of polishing tends to "smear" certain surface materials.

It is an object of the present invention to overcome the foregoing difficulties and provide a device and method for cleaning cans and like containers continuously and automatically in such a manner as to rapidly remove all surface film therefrom, and to discharge the individual containers in dry, clean condition.

More particularly, the present invention contemplates the treatment of cans of the so-called tin-plate type, and to this end it is proposed to regularly submerge the cans, under controlled conditions, in a bath wherein they are subjected to electrolytic treatment for loosening and separating the film of foreign matter, in combination with the step and means for applying relatively soft brushes to finally loosen and separate any of the film which has been insufficiently released by the electrolytic action. Such electrolytic action results in loosening of the film through the mechanical action of gases released directly against the metallic surface. Since all of the foreign surface material, though not completely removed from association with the can surface, is necessarily partially so removed, it has been discovered that the present steps, when applied in combination in accordance with the present invention, cooperate to result in an effective and improved cleaning action.

It is an important object of the present invention to provide endless gripping means individually and yieldably engageable with containers

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for conveying them under predetermined conditions in the path of treatment, in accordance with which it will be evident that the time and degree of subjection to the cleansing treatment may be carefully controlled, and the device readily applied to coordination with any continuous packing or sterilizing machine.

Another object of the present invention is to provide an improved guide track and conveyor means for handling cylindrical cans, which continuously rotate the cans in the cleaning solution and instrumetnalities.

Another object of the present invention includes the flushing or rinsing of the containers immediately after their cleansing treatment, followed by removal of the surface moisture by contact with a resilient, water absorptive member.

Yet other and further objects of the present invention will be more apparent from the following detailed description when considered in connection with the accompanying drawings, wherein

Figure 1 is an elevational view showing a machine embodying the principles of the present invention;

Figure 2 is a plan view of the machine shown in Figure 1;

Figure 3 is a sectional view taken centrally through the machine on the vertical plane indicated by the line 3—3 of Figure 2, and showing the left-hand portion of the machine as viewed in Figures 1 and 2;

Figure 3A is a continuation of the sectional view shown in Figure 3, showing the details of construction of the right-hand portion of the machine viewed in Figure 2 and taken on the plane indicated by the line 3*a*—3*a* thereof;

Figure 4 is a detail view of the portion of the machine corresponding to Figure 3, and taken on the horizontal plane indicated by the line 4—4 in Figure 3;

Figure 4A is a detail view, taken on the line 4*a*—4*a* in Figure 3A, of the opposite section of the machine represented in Figure 3A;

Figure 5 is a detail sectional elevation taken on the vertical plane indicated by the line 5—5 in Figure 3;

Figure 6 is a detail sectional view taken on the vertical plane represented by the line 6—6 in Figure 3;

Figure 7 is a further detail view of the brushing assembly taken on the plane represented by the line 7—7 in Figure 3;

Figure 8 is a detail sectional view taken through the wiper assembly on the line 8—8 in Figure 3A;

Figure 9 is a perspective detail view of one of

the wiper supporting brackets shown in Figure 8;

Figure 10 is a perspective detail view of one of the wipers supported by the bracket in Figure 9; and

Figure 11 is a perspective view of the supporting screen for mounting the lower drying elements.

Referring to the figures of the drawings wherein one illustrated embodiment falling within the purview of the present invention is disclosed more in detail, there is shown, particularly in Figures 1 and 2, a supporting frame construction comprising four vertical legs **10** of angular section, each pair being laterally spaced at the lower portions by transversely extending, welded angle members **12**. Legs **10** are welded to a pair of spaced, parallel frame members **14** spaced at their opposite ends by welded angle bars **16** and **18**, respectively, and by other spacing members, as will hereinafter more fully appear.

It will be apparent that the frame members function to support the various mechanisms and treatment instrumentalities, among which is a cleaner tank **20** and a rinse tank **22**.

In accordance with the details shown in Figures 3 and 4, the cleaner tank has an upwardly inclined bottom wall **24** and appropriate end and side walls **26** and **28**, respectively, for containing an electrolytic solution. The tank maintains its position within the supporting frame members **14** and **16** by positive attachment thereto through the agency of welding or any other fastening means.

It is proposed, in accordance with the present invention, to supply the tank or container **20** with an electrolytic cleaning liquid for removing foreign matter from the surface of can containers arranged therein in electrically conducting relation, and to the end that the electrolytic conditions may be rendered most favorable, a heating element, in the form of an inversely extending conduit or pipe **30**, is arranged within the tank, as shown in Figure 3, and adapted to be supplied with steam from an inlet **32**. The outlet portion of the conduit **30** is sealed within the end wall **26** of the tank and passes to steam trap **34**. A tank drain outlet is shown at **36**.

The containers to be treated enter the present machine through a guide **38** which may comprise the outlet of a hopper, the discharge extremity of a sterilizing machine, or any other equivalent instrumentality through which the cans are continuously delivered in seriatim order.

In accordance with the present invention, the containers are delivered to the space between a gripping belt **40** and opposed tracks or guides **42**, between which they are yieldably supported. The tracks **42** are arcuately formed downwardly into the tank shown in Figure 3, and are faced with a covering layer **44** of suitable resilient gripping material, such as rubber.

Lateral guide rails **46**, contoured in accordance with the rails **42**, are fastened to the guideway **38** and to a bracket **48** in the lower part of the tank by welding, and laterally retain the cylindrical containers upon the trackway afforded therefor.

The lower extremity of the guideway **42** supplies the articles to an upwardly inclined conveyor track construction shown more in detail in Figures 3 and 6. In the latter figure, the reference letter A represents a cylindrical can container arranged in normal position upon the track construction, in order to more clearly indicate the operation and construction of the guide track. In accordance with this construction, the track

is mounted upon longitudinally disposed, laterally extending blocks **50** spaced from the bottom wall of the tank **20** by insulating strips **52** and fastened by machine bolts **54**. Parallel, longitudinally disposed angle rails **56**, welded to the blocks **50** as at **58**, support the guiding and associated instrumentalities.

More particularly within the recesses formed by the angle of the members **56** (referring to the right-hand portion of the assembly) is arranged a series of laminations comprising a layer **60** of insulating substance, and an opposed layer **62** oppositely engaging the lower portion of an anode plate **64**. The anode plate is spaced at its lower extremity from the rail **56** by means of a short insulating strip **65**. Insulating strips **66** and **68**, of relatively lower elevation, complete the series of laminations. On the opposite track assembly a similar anode plate **64***a* is likewise embraced and supported by opposed insulating strips **60***a* and **62***a*.

A further conducting member or rail **70** is gripped between opposed insulating strips **72** and **74** arranged at a relatively lower elevation, so that the upper margin of the rail **70** is free to make contact with the surface of the can container.

In accordance with the present invention, the foregoing elements are releasably held within the supporting rails **56** by a clamping assembly **76**, shown in Figure 6, permitting the opposite yieldable gripping of all of the parts within the angle recesses. To this end the clamping assembly comprises opposite, longitudinally disposed channels **78** and **78***a* provided, respectively, with a threaded shank **80** and an embracing sleeve **82**. The threaded shank receives a rotary nut and washer **84** so that, when arranged as shown in Figure 6, rotation of the nut **84** will effect a relative expansion or contraction of the sleeve and shank assembly to grip the opposed assemblies.

Spaced angular finger members **86**, welded to the channels **78** and **78***a*, engage beneath the angle rails **56**, as shown in Figure 6, at points between the supporting blocks to facilitate vertical location of the clamping assemblies.

It will be understood, from the foregoing, that the present arrangement provides a simple and durable arrangement, permitting rapid adjustment, change and replacement of any of the parts, while normally maintaining the conducting elements in insulated relationship.

It is particularly important that the guide strips **62**, **66** and **62***a* may be and preferably are formed of soft, resilient material, such as soft rubber, to cushion the contact with the containers, as well as to facilitate the foregoing gripping interassembly of the parts. The remaining laminations, with the exception of insulating strips **65**, may desirably comprise some relatively rigid substance.

It is evident, from the foregoing, that the can containers A, when arranged upon the guide track assembly, may be placed in a circuit through the medium of anode plates **64**, and the conducting rail **70** connected with a suitable electrical source by means not shown.

Movement of the containers upon the track is effected by means of the gripping conveyor belt heretofore mentioned and arranged in endless relation upon pulleys **88** and **90** (see Figures 3 and 3A).

Pulley **88** is journalled upon the frame members **14**, whereas pulley **90** is journalled in brackets **92** on an upright channel member **94** welded

to the frames in vertically disposed relation just above the right-hand support legs 10, as viewed in Figure 1. The channel member further mounts an idler pulley 96 for adjusting the tension on belt 40.

It is to be particularly noted that pulley 88 is coaxial with the arcuate curve of the guides 42 and, by virtue of the annular disposition, permits gripping interengagement of containers supplied to the guides 42. Thus, when rotated in the direction of the arrow, in Figure 3, by means hereinafter to be described in detail, the containers supplied to the guide 38 are carried downwardly in the bath in a predetermined path and at a predetermined rate. This action continues to move the containers up the inclined track by virtue of the corresponding inclination of the lower run of the belt 40 and the provision of yieldable pressure assembly 98 cooperating therewith.

The pressure or spring assembly 98 comprises an inclined angle rail 100 welded to spaced, longitudinally disposed brackets 102 and 104 secured laterally between the frame rails 14 at longitudinally disposed points. Longitudinally spaced brackets or blocks 106, rigid with the rail 100, support a series of resilient spring plates 108 inclined in the direction of movement of the belt for applying a suitable pressure adjacent the lower portion of the belt. Adjacent the pulley is provided an oppositely extending spring plate 110 mounted upon a downwardly projecting bracket 112.

It is thought that it will be obvious, from the foregoing, that the spring assembly at all times functions to urge the drag belt downwardly to grip the containers. As a result, the container is yieldingly held and carried upwardly in an inclined plane by the movement of the drag belt. It is particularly important to note, moreover, that during movement the containers are continuously rotated about their central axes, since this improvement has been found to contribute to the efficiency of the electrolytic action.

It is pertinent to note that the electrolytic cleansing action may be effected by any suitable electrolytic cleaner, such, for example, as solutions of sodium or potassium carbonate, or alkali bicarbonate, silicate, metasilicate, hydroxide, phosphate, borate, tetraborate, or the like, or any suitable mixture thereof.

When the moving metallic container becomes a cathode within such a bath, the surface film is in effect lifted and flooded from the underlying metallic surfaces by mechanical action of gas created as a result of the electrolytic action. This action is enhanced by the detergent properties of the solution. It has been found, however, that this film may not be completely removed by electrolytic treatment unless by the coincidental application of a supplementary brushing treatment, preferably in the presence of the detergent solution.

To this end, there is shown, in Figures 2, 3, 4 and 7, three opposed pairs of brushes 114 fixed upon shafts 116*a*, *b* and *c*, respectively, which are in turn journalled upon the frame rails, as at 118. It will be obvious, from the drawing, that each brush comprises a disk-like face plate 120 coaxial with each shaft 116 and supporting axially, inwardly disposed tufts 122 in position to engage the end walls of the container A.

Adjacent the brush construction the supporting rails assume the form shown in Figure 7, wherein angle rails 56 support a pair of guide strips 124 and 126 welded in position, as at 128, to restrain the containers from movement along the track.

Actuation of the foregoing moving parts is effected by means of a motor 130 mounted in inverted position on the bottom of the rails 14. The motor, through drive belt 132, rotates a drive pulley 134 on brush shaft 116*a*. A smaller pulley 136*a* rotates a drive belt 138, which drive belt embraces, in driving relationship, pulleys 136*b*, 136*c*, idler pulley 140, and drag belt drive pulley 142. The pulley 142 is fixed on the shaft 144 which mounts the right-hand drag belt supporting pulley 90, and it is through this means, therefore, that the drag belt is operated. It will be evident that the driven pulleys 136*b* and 136*c*, being fixed to the shafts 116*b* and *c*, respectively, function to operate the associated brushes.

From the foregoing, it will be apparent that in operation the can containers continuously move into the brushing zone wherein the relatively soft tufts loosen any remaining film from the ends of the containers. It should be noted that during this operation the rotational movement of the containers causes all portions of the can extremities to contact the brushes.

Immedately subsequent to removal from the foregoing bath, the present invention provides for removal of all adherent electrolyte by rinsing means 146 (Figures 1, 2, 3A and 4A).

The containers are conveyed through the rinse by a guideway comprising opposed, parallel, downwardly inclined angles 148 upon which the containers are deposited by the drag belt 40. Tracks 148 are preferably provided with drain slots (not shown) in their bottom portions to interrupt and prevent liquid flow down the incline.

The rinsing means comprises in general a housing 150 embracing a pair of longitudinally apertured spray pipes 152 supplied with fresh water from conduit 154. The lower part of the housing comprises a drip tray 156 drained by an outlet conduit. The containers, in rolling down the inclined track 148, accordingly are rinsed with an excess of water as they pass through the housing 150.

At the foot of the inclined track is arranged a dryer 158, as shown more in detail in Figures 3A, 4A, and 8 to 11. The operation of this dryer depends upon the observation that sponging materials, and particularly so-called cellulose sponges, possess the property of continually absorbing moisture on the upper surfaces while releasing this moisture at lower portions. In accordance with this observation, the present invention provides a drain receptacle or tray 160 provided with an outlet conduit 162 in which is arranged a reticulated or foraminated tray 164. The tray 164 has a general form of a rectangular box-like receptacle receiving a plurality of rectangular blocks 166 of the above-described cellulose sponge material. It is supported upon a pair of transverse bars 168 engaged at their extremities by the threaded shanks 169 of elongated adjustment bolts 171.

Figure 8 clearly shows how the lower extremities of the fastener shanks rest upon the bottom wall of the draining receptacle 160 to provide supporting leg portions of adjustable length.

Since the assembly is inclined in alignment with the guide rails 148, as shown in Figure 3A, the containers continue to roll thereacross under the influence of gravity, so that the outer wall bears and wipes against the upper surface of the sponges. It has been discovered that, under

the influence of this rolling action, the sponge surfaces abstract the surface moisture from the cans.

Attention is particularly directed to the fact that the abstracted moisture continually drains away from the upper surfaces so that the sponges are, in effect, self-clearing or draining.

In order to effect a like removal of moisture from the end surfaces of the cylindrical can containers, we have provided laterally disposed end wipers comprising prismatic blocks **170** of sponge material (Figures 8 and 10) arranged to present an acute wiping corner **172** into the path of movement of the container. Means for supporting each of the blocks **170** comprises a channeled guide **174** in which the block **170** is received in vertical sliding movement. The channel is mounted by a bracket **176** having an elongated slot **178** to receive a fastener **180** on an outer flange of the tray or receptacle **160** so that each of the wiper blocks is laterally adjustable.

The blocks **170** are vertically supported upon parallel, longitudinally disposed guide rails **182** supported upon longitudinally disposed, inwardly and upwardly extending brackets **184** welded to the side walls of the receptacle **160**, as at **186**. Rails **182** are received within lateral extending slots **188** formed in the sponge blocks **170**.

From the foregoing, it will be obvious that the can containers are guided in their gravity movement by the rails **182** while rolling upon the flat, inclined sponge surface formed by the blocks **166**. During the passage the acute wiping edges **172** impinge the opposite ends of the container. A fine degree of control over the wiping engagement of the lateral sponge blocks **170** may be effected by the adjustable slot and fastener connection represented by the reference numerals **178** and **180**.

The operation of the foregoing mechanism is as follows:

The cylindrical containers are continuously fed into the arcuate bight between the drag belt and the curved rail **42**, and positively conveyed down into the cleaning solution and upwardly of the inclined path, during which time they are cathodically connected in electrical circuit. Accordingly, as electrolytic cleaning action progresses, the containers are continuously turned over and over, wiping meanwhile against the under surface of the belt **40** which assists in loosening the surface film.

When reaching the brushes **114**, the axial end surfaces are polished by a soft brushing action while still moistened with the preferably detergent electrolytic solution. While in the embodiment shown, the electrolytic action ceases just prior to the brushing action, nevertheless, it is within the contemplation of the present invention to continue the electrolytic action during the brushing step, if desired.

The containers are next discharged upon the downwardly inclined rails and moved by gravity through the chamber **150** where they are sprayed on all sides by an excess flow of fresh water to wash away the electrolytic solution. Continuing the downward path of movement, the containers roll over the sponge surface where the film of water is abstracted.

The present invention provides an improved machine for rapidly and positively removing surface foreign matter, and particularly films of organic food matter, from sealed containers. It is particularly interesting to note that so-called

tin-plate surfaces subjected to treatment in the foregoing machine possess a much brighter appearance than an equivalent surface subjected to polishing. Complete cleansing of the surfaces in accordance with the present method is a practical matter superior to polishing.

It is further important to note that the drying action of the instant sponge members, though of extremely short time duration, effects a removal of surface moisture and leaves the container in substantially the same condition as though it had been wiped with a chamois. The minute amount of residual moisture may accordingly be permitted to dry in the air or pass through any suitable dryer.

Many variations of the above invention coming within the scope of the following claims will be evident to those skilled in the art in view of the above specification.

The invention is hereby claimed as follows:

1. A device of the class described for cleaning the surfaces of a metallic tin plate container to remove external foreign matter, which comprises an electrolytic cleaning bath, means for immersing said container in said bath, means for connecting said container as an electrode during at least a portion of its period of immersion in said bath to effect said electrolytic cleaning, and brush means at least partially in said bath and movable relative to the container surfaces for separating electrolytically loosened surface material therefrom.

2. A device of the class described for cleaning the exterior surfaces of metallic tin plate containers to remove surface foreign matter, comprising means for immersing said containers in an electrolytic cleaning bath, means for simultaneously connecting a plurality of said containers as cathode during at least a portion of their period of immersion in said bath to effect said electrolytic cleaning, and means for mechanically acting upon said surfaces during at least a portion of the time the containers are connected as cathode to facilitate removal of electrolytically loosened foreign material.

3. In a device of the class described for removing surface films of foreign matter from the surfaces of a metallic pin plate container, means forming a vessel accommodating an electrolytic cleaning bath, means associated with said vessel for continuously conveying a succession of containers into and out of said electrolytic cleaning bath, means associated with said conveyor means to connect each of said containers as an electrode during at least a portion of its period of immersion in said bath to effect said electrolytic cleaning, and soft, wet, revolving brush means, adjacent to the place where said containers leave said electrolytic bath arranged to contact said containers to remove electrolytically loosened surface material.

4. A method of cleaning the exterior surfaces of metallic tin plate containers to remove surface foreign matter therefrom, which comprises subjecting the surfaces of said containers to electrolytic cleaning while the containers are immersed in an electrolytic cleaning bath, and thereafter, while said surfaces are still moist with electrolyte, mechanically acting upon said surfaces and thereby removing the electrolytically loosened foreign matter.

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