United States Patent [19]

Keister et al.

[11] **3,885,987**

[45] **May 27, 1975**

[54] **PROCESS FOR CLEANING AND SANITIZING EAR SETS**

[75] Inventors: **Alvin L. Keister,** Altadena; **Joseph A. Machuszek,** Lennox; **Joseph M. Machuszek,** Manhattan Beach, all of Calif.

[73] Assignees: **Flight Services Unlimited Inc.,** El Segundo, Calif.; **Flight Services Industries Inc.,** Bensenville, Ill.; **Flight Services Industries Inc.,** New York, N.Y.

[22] Filed: **Dec. 13, 1973**

[21] Appl. No.: **424,554**

[52] **U.S. Cl.** **134/6;** 21/58; 134/18; 134/21; 134/26; 134/30; 134/32; 134/63; 134/73; 134/131; 179/185

[51] **Int. Cl.** **B08b 7/04**

[58] **Field of Search** ..... 134/6, 18, 21, 26, 30, 134/32, 63, 72, 73, 131; 21/2, 58, 61, 80, 82 R, 85, 86, 87, 91, 92, 103, 105; 15/302, 306 B; 179/185; 34/15, 92

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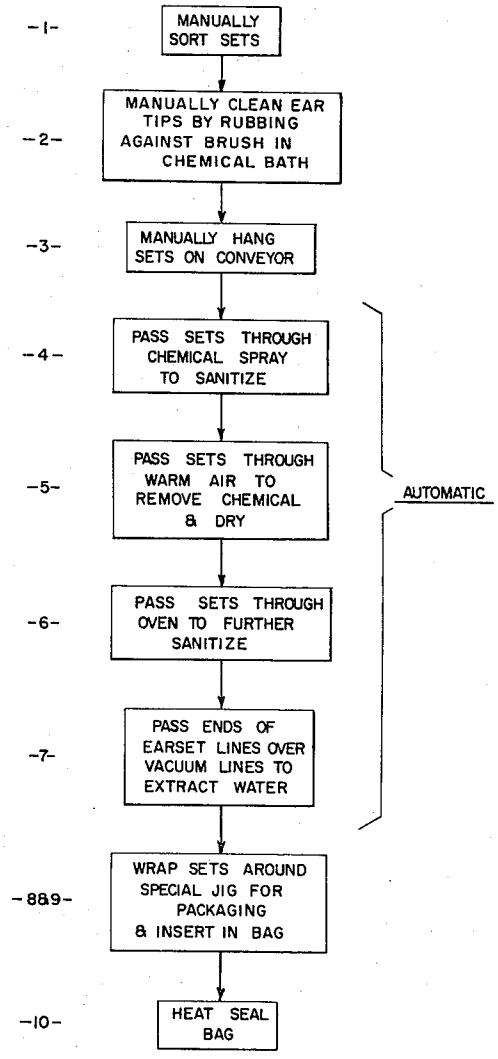
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Primary Examiner—S. Leon Bashore
Assistant Examiner—Richard V. Fisher
Attorney, Agent, or Firm—Edward A. Sokolski

[57] **ABSTRACT**

Ear sets to be cleaned and sanitized are placed through a series of manual and automated operations which (1) chemically sanitizes the ear sets, as well as cleans them with water; (2) dries the ear sets and removes water from the interior parts thereof, as well as the ear set lines; and (3) wraps the ear sets and packages them in sealed bags.

8 Claims, 8 Drawing Figures



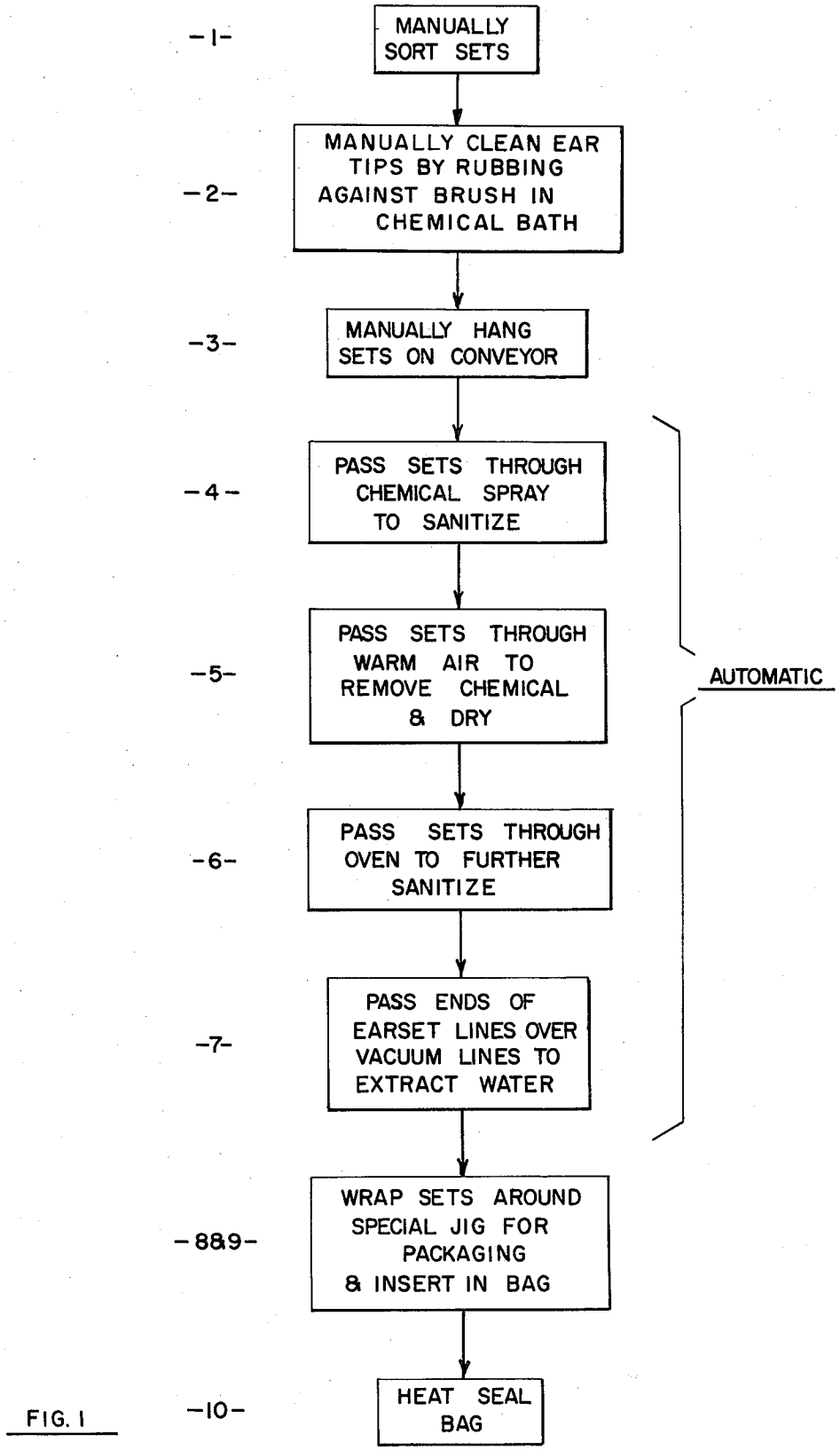

-1-
MANUALLY SORT SETS
-2-
MANUALLY CLEAN EAR TIPS BY RUBBING AGAINST BRUSH IN CHEMICAL BATH
-3-
MANUALLY HANG SETS ON CONVEYOR
-4-
PASS SETS THROUGH CHEMICAL SPRAY TO SANITIZE
-5-
PASS SETS THROUGH WARM AIR TO REMOVE CHEMICAL & DRY
-6-
PASS SETS THROUGH OVEN TO FURTHER SANITIZE
-7-
PASS ENDS OF EARSET LINES OVER VACUUM LINES TO EXTRACT WATER
AUTOMATIC
-8&9-
WRAP SETS AROUND SPECIAL JIG FOR PACKAGING & INSERT IN BAG
-10-
HEAT SEAL BAG

FIG. 1

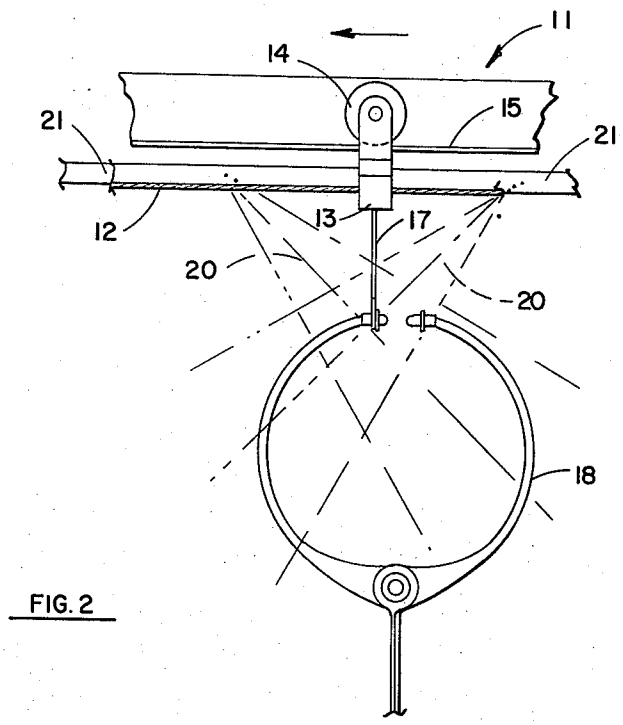


FIG. 2

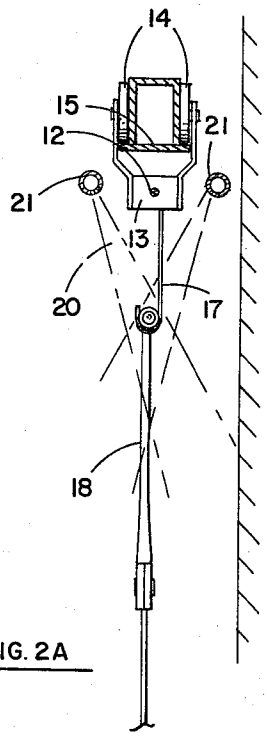


FIG. 2A

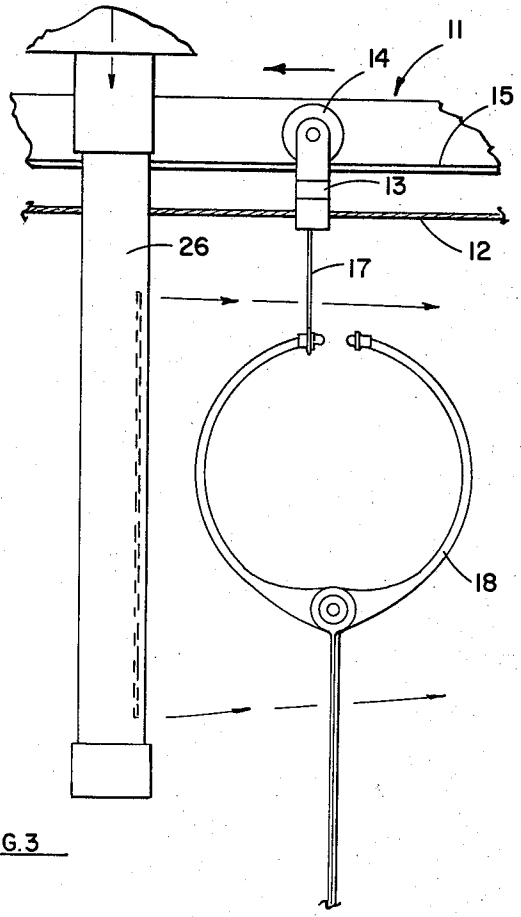


FIG. 3

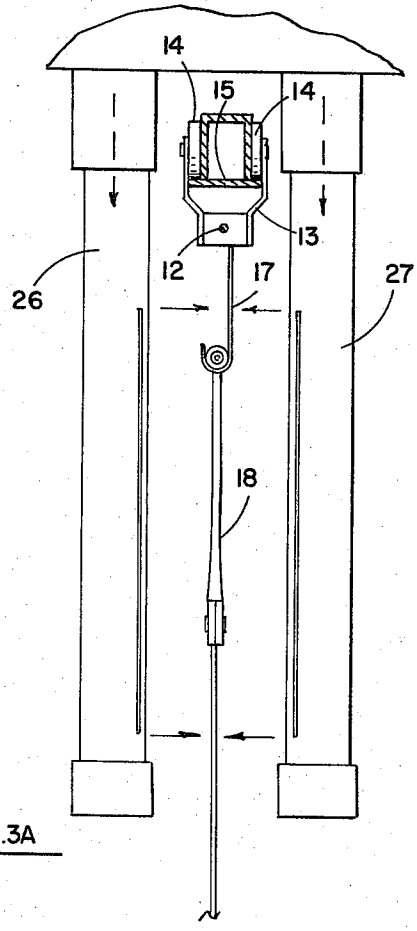


FIG. 3A

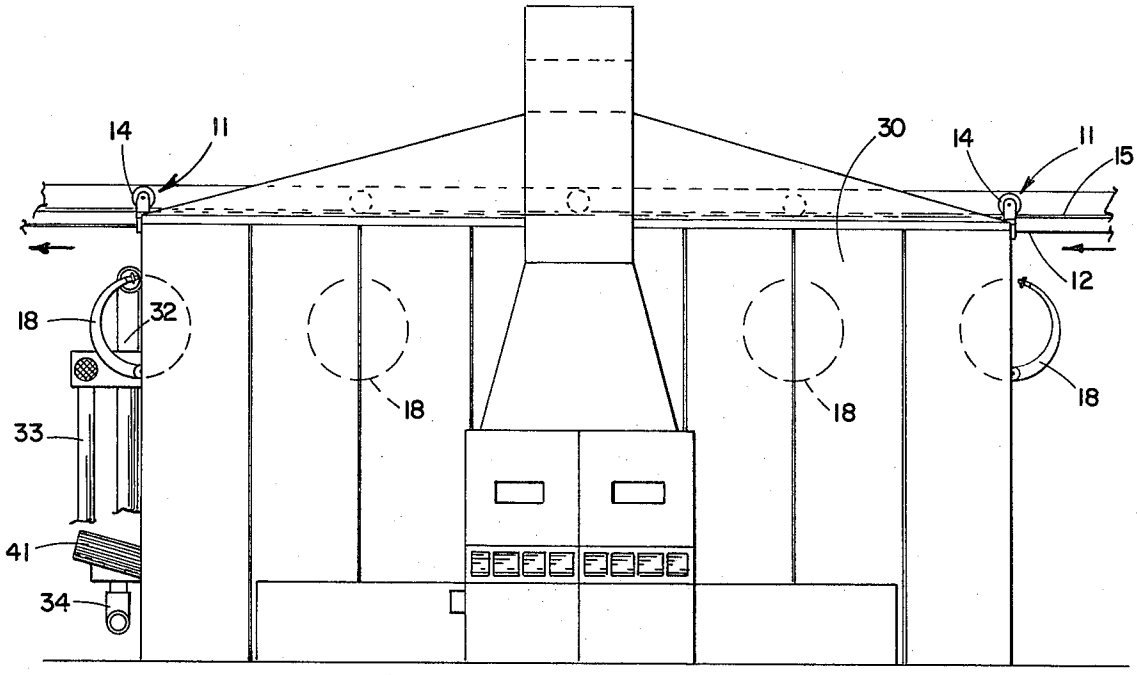


FIG. 4

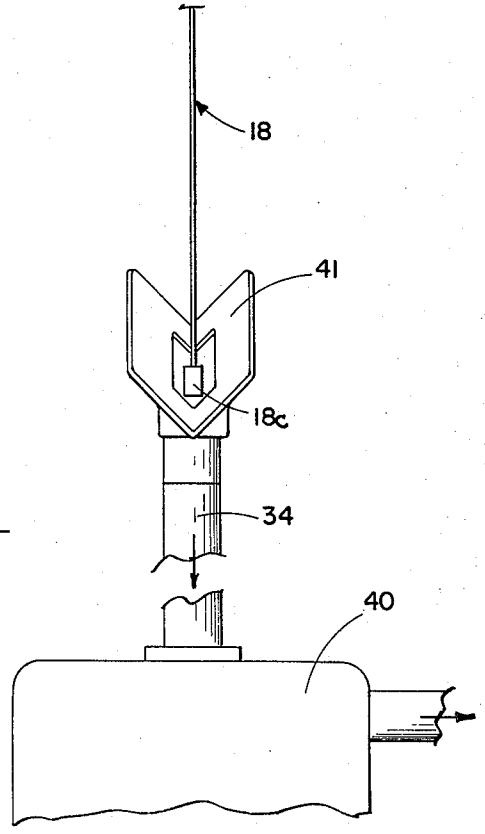


FIG. 5

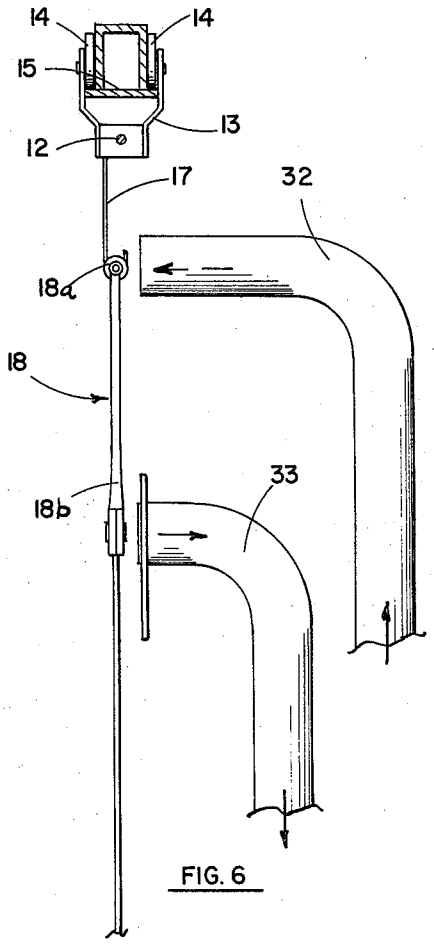


FIG. 6

PROCESS FOR CLEANING AND SANITIZING EAR SETS

This invention relates to the cleaning and sanitizing of articles, and more particularly to a process including manual and automated steps for cleaning and sanitizing audio ear sets.

Audio ear sets are used extensively on airplanes and other public places in providing audio entertainment to the public. For health and sanitation reasons, these ear sets must be thoroughly sanitized and cleaned each time they are used, and repackaged for subsequent utilization. In operations such as occur in the airline industry, many thousands of such ear sets are utilized each day. The processing of such a large number of ear sets in a manner which will assure that they have been thoroughly sanitized and cleansed and at a cost which is economically feasible, poses a distinct problem. Prior techniques have involved fully manual operations which are questionable as to their effectiveness in sanitizing and cleaning and which require substantial numbers of personnel in their implementation, greatly adding to the cost of the operation. Further, such manual operations of the prior art are overly time consuming, making the handling of large numbers of ear sets on an expedited basis (often overnight delivery is required) difficult or impossible.

The process of this invention overcomes the aforementioned shortcomings of the prior art in providing a systematic assemblyline type technique for processing large numbers of ear sets. In the process of the invention, a minimum number of manual operations are utilized such that large numbers of ear sets can be handled by relatively few personnel. In addition, the automatic steps chemically treat the head sets in a manner to assure thorough sanitizing, the sanitizing process being further implemented by passing the sets through an oven at a high enough temperature to assure thorough sanitization.

It is therefore an object of this invention to provide an improved method for cleaning and sanitizing ear sets on a mass production basis.

It is a further object of this invention to provide a more economical technique for cleaning and sanitizing large numbers of ear sets.

It is still another object of this invention to provide a technique for more effectively and more efficiently sanitizing and cleaning ear sets.

Other objects of this invention will become apparent as the description proceeds in connection with the accompanying drawings, of which:

FIG. 1 is a flow drawing illustrating the successive steps in the process of the invention;

FIG. 2 is a side elevational view illustrating the step of chemical spraying of the process of the invention;

FIG. 2A is an end elevational view of the step shown in FIG. 2;

FIG. 3 is a side elevational view illustrating the step of drying of the process of the invention;

FIG. 3A is an end elevational view of the step shown in FIG. 3;

FIG. 4 is an end elevational view illustrating the step of oven sanitizing of the process of the invention;

FIG. 5 is a side elevational view illustrating the step of vacuum extracting water from the ear set lines of the process of the invention; and

FIG. 6 is an end elevational view illustrating the step of drying the ear sets of the process of the invention.

Briefly described, the process of the invention is as follows. The ear sets are successively manually sorted, the ear tips thereof manually cleaned in a chemical bath, and the sets then placed on a conveyor. By means of the conveyor, the ear sets are first passed through a liquid chemical spray where they are sanitized and then are passed through warm air which removes the chemical and dries the sets. The conveyor then passes the ear sets through an oven where they are further sanitized and, finally, the conveyor passes the ear sets over vacuum lines which operates to extract any liquid inside of the ear sets and in the ear set lines. The sets are then manually removed from the conveyor, wrapped around a special wrapping jig and packaged in a bag.

Referring now to FIG. **1**, a flow diagram is shown illustrating the steps in the process of the invention. The ear sets are first manually sorted, i.e., separated from each other on a sorting table and any damaged head sets removed. Next, the ear tips of the sets are manually placed in a chemical bath, the ear tips being rubbed against a brush mounted in the bath. The chemical may be any suitable liquid disinfectant such as quaternary ammonium compound. The head sets are then mounted on a motor driven conveyor **11**, as shown in FIGS. **2** and **2A**. The conveyor may include a moving cable **12** to which bracket **13** is fixedly attached. Bracket **13** rotatably supports wheels **14** which ride on runner **15**. The ear sets **18** to be cleaned and sanitized are suspended from brackets **13** on hook members **17**.

The head sets are first passed by the conveyor through a chemical spray **20** which is discharged from nozzles **21**. It is to be noted that a plurality of head sets are passed along the conveyor simultaneously on a mass production basis on brackets **13** which may be spaced about twelve inches apart.

After the head sets have been thoroughly sanitized by the spray, they are passed through warm air which serves to remove any excess chemical and to dry the ear sets as illustrated in FIGS. **3** and **3***a*. The warm air is supplied from conduits **26** and **27**, which are positioned on opposite sides of the ear sets **18**. The air is preferably supplied from a high speed blower to rapidly remove excess chemical and dry the ear sets.

From here, the continuously moving conveyor moves the ear sets through an oven structure **30**, as shown in FIG. **4**. The oven is maintained at a temperature of 180°–185°F, so that the ear sets are heated sufficiently to kill any germs which may still be present thereon. As the ear sets exit from the oven, water is removed therefrom as illustrated on the left side of FIG. **4** and in FIGS. **5** and **6**. This end result is achieved by means of vacuum lines **33** and **34**, which are attached to vacuum pump **40**. Vacuum line **33** draws off any remaining moisture from the yoke portions **18***b* of the ear sets. Vacuum line **34** has a trough **41** attached at the end thereof, over which the open end portions **18***c* of the ear set lines pass. Thus, as the end of the ear set lines pass over vacuum line **34**, any moisture present inside of the ear set lines is drawn out. Line **32** is a blower line which provides an air stream to blow moisture off ear tips **18***a* as they pass.

The ear sets are then removed from the conveyor belt and manually wrapped on a jig for packaging and finally, inserted into a plastic bag which is heat sealed.

Thus, by a combination of automatic assembly line type procedures in conjunction with certain manual operations, it is possible to cleanse and sanitize a great

quantity of ear sets rapidly and efficiently, with only a few operating personnel.

While the invention has been described and illustrated in detail, it is to be clearly understood that this is intended by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of this invention being limited only by the terms of the following claims.

We claim:

1. A process for cleaning and sanitizing ear sets having ear tips, yoke portions, ear set lines, and ear set line portions, comprising in sequence the steps of:

cleaning the ear tips of said sets in a chemical bath,

spraying the ear sets with a liquid chemical spray to sanitize said ear sets,

passing the ear sets through warm air to remove liquid chemical deposited thereon during both the bath cleaning and the spraying and dry the outer portions thereof,

passing the ear sets through an oven heated to a temperature sufficient to effect further sanitization of the ear sets,

passing the ear sets by vacuum and blower lines to extract liquid from inside the ear sets and the ear set lines,

wrapping the ear sets around a jig, and

packaging the ear sets in bags.

2. The process of claim 1 wherein said ear sets are mounted on a continuously moving conveyor after the step of cleaning the ear tips and passed on the conveyor through the chemical spray, passed through warm air, passed through the oven and passed by the vacuum and blower lines, the sets then being manually removed from the conveyor for wrapping and packaging.

3. The process of claim 2 wherein the ear sets are suspended on said conveyor which comprises a motor driven cable having brackets attached thereto, said ear sets being suspended from said brackets.

4. The process of claim 1 wherein the ear tips are cleaned by rubbing them against a brush mounted in the chemical bath.

5. The process of claim 1 wherein the oven is maintained at a temperature of 180°–185°F.

6. The process of claim 2 wherein the warm air for removing the liquid chemical and drying the ear sets is supplied from conduit outlets positioned on opposite sides of the ear sets.

7. The process of claim 2 wherein the step of passing the ear sets by vacuum line inlets comprises passing the open end portions of the ear set lines over a trough, said trough having a vacuum line mounted therein to draw moisture out of said ear set lines.

8. The process of claim 7 wherein the step of passing the ear sets by vacuum line inlets additionally includes passing the yoke portions of the ear sets past vacuum line inlets and wherein additionally the ear tips of the ear sets are passed by blower line outlets.

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