MAGAZINE FOR AERIAL DISPENSER AND METHOD OF MAKING SAME

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References Cited
UNITED STATES PATENTS

Abstract

A magazine for holding a number of cartridges containing flares, metallic chaff and the like for aerial dispensation. The magazine has a simple open frame or shell in which any required number of cartridge holding tubes are positioned in a specific pattern on a prepared tool, the tubes being initially held by a layer of rubbery material which forms one finished face of the magazine. The interior of the shell between the tubes is then filled with foam material, applied progressively with the assembly in a special holding fixture to ensure complete filling.

5 Claims, 4 Drawing Figures
1. ASSEMBLE OUTER SHELL.
2. MOUNT DISPENSING TUBES ON LOCATING PLUGS OF BASE TOOL.
3. ATTACH SHELL TO BASE TOOL.
4. PRE-HEAT ASSEMBLY.
5. INJECT RUBBER MATERIAL.
6. TILT ASSEMBLY IN ALL DIRECTIONS TO SPREAD RUBBER EVENLY.
7. CURE RUBBER.
8. REMOVE BASE TOOL.
9. SECURE SHELL AND TUBE ASSEMBLY IN INCLINED HOLDING FIXTURE WITH FILLING PORTS UPPERMOST.
10. PRE-HEAT ASSEMBLY.
11. INJECT FOAM-IN-PLACE MATERIAL INTO LOWEST PORT.
12. CLOSE PORT.
13. REPEAT STEPS 11 AND 12 AT EACH SUCCESSIVELY HIGHER PORT.
14. CURE FOAM MATERIAL.
15. REMOVE COMPLETED UNIT FROM FIXTURE.
BACKGROUND OF THE INVENTION

In the aerial dispensation of flares, metallic chaff for radar cluttering and similar applications, standardized cartridges are usually held in a magazine type structure. Such magazines may be disposable or re-usable and are commonly metallic structures involving a considerable amount of welding, rivetting and the like. The structure must be reasonably precise, since the cartridges must align with the firing or actuating mechanism, which may be electrical contacts, pyrotechnic squibs, or other means for actuating individual cartridges. Ideally, the magazine should be simple, light in weight, with securely held and accurately positioned cartridge holding means, and require a minimum of labor to manufacture.

SUMMARY OF THE INVENTION

The magazine described herein has a simple light weight frame or shell in which cartridge holding tubes are rigidly held in a block of plastic foam material in a unitary structure. Initially the tubes are held on locating plugs fixed in the required pattern of a plate-like tool, on which the shell is mounted with the tubes properly positioned within the shell. A rubbery material is then injected to form a layer on the tool and bond all the tubes together and to the shell, the rubber layer becoming one side or face of the finished magazine with open ends of the tubes exposed therein in the proper pattern.

The entire space within the shell between the tubes is then filled with a rigid plastic foam, bonding the assembly into a firm unitary structure. To ensure complete and even distribution of the foam, the initial assembly is held in a holding fixture which substantially encloses the shell and prevents distortion when the foam is applied. The assembly is held in an inclined position and foam-in-place material is inserted through pre-formed ports in the shell starting at the lower end and working upwardly. The foam thus forms and expands progressively from the lower corner to the upper corner of the structure to fill all spaces completely.

The primary object of this invention, therefore, is to provide a new and improved magazine for an aerial dispenser.

Another object of this invention is to provide a new and improved magazine which can be made in any required size for any number of dispensable elements.

A further object of this invention is to provide a new and improved method of making such a magazine using simple tooling and requiring a minimum of skilled labor.

Other objects and many advantages of this invention will become more apparent upon a reading of the following detailed description and an examination of the drawings, wherein like reference numerals designate like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a typical magazine.
FIG. 2 is a side elevation view of the magazine.
FIG. 3 is a sectional view taken on line 3—3 of FIG. 2.

FIG. 4 shows the sequential steps in the method of making the magazine.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A typical magazine, shown in FIGS. 1 – 3, comprises an open rectangular frame or shell 10 having flat sides 12 and ends 14. The shell is conveniently made of sheet metal with the corner joints of the walls reinforced by angle members 16, but any other suitable structure and configuration may be used, to suit specific installations. Within the shell 10 are cylindrical tubes 18 in spaced parallel relation through the full depth of the shell. In the form shown there are ten tubes in two staggered rows, but any number and spacing arrangement may be used. At the upper face 20 of the shell, the tubes are held in a layer of rubbery material 22, which bonds the tubes and shell together. The remainder of the interior space of the shell between the tubes is occupied by a foam filler material 24, making the assembly into a rigid unitary structure. In the upper face 20, a shallow recess 26 is formed in the rubbery material 22 concentric with each tube 18, to receive the retaining flange of a standard cartridge to be inserted in the tube. One side 12 of the shell is provided with longitudinally spaced filler ports 28, for insertion of the foam material as hereinafter described.

In use the magazine is held in a dispenser carried internally or externally on an aircraft, with the lower ends of the tubes directed generally downwardly for dispensing the contents. The rubbery material 22 serves as a convenient support and seal for the conventional actuating or firing panel, not shown, which is secured over the loaded magazine. Any suitable brackets or fastening means may be attached to the shell for securing the magazine in place.

METHOD OF CONSTRUCTION

As shown in the sequential steps in FIG. 3, a shell 10 of the required size is assembled. The tubes 18 are positioned on a prepared base tool 30, which comprises a flat plate 32 substantially the size of the outline of the shell. Fixed to the plate 32 are cylindrical plugs 34 on which tubes 18 fit closely, the plugs being spaced in the required tube pattern. Each plug 34 has a small flange 36 at its base to form the recess 26 around the tube. Before the plugs and upper face of the plate are coated with a suitable parting agent in any well known manner, to prevent adhesion of the rubbery material.

The shell 10 is then secured to base tool 30 in any suitable manner and the assembly is pre-heated to a temperature of about 100 degrees F. Rubbery material in liquid form is then injected through a nozzle 38, in sufficient quantity to from a layer about one quarter of an inch thick on the plate 32. To ensure an even layer of rubber properly bonded to the periphery of the shell and to all of the tubes, the assembly is tilted in all directions. This can be accomplished manually, since the temperature of the assembly is not uncomfortable for handling. The rubber is then cured by heating to about 150° F for approximately 10 hours, with the plate horizontal to form an even layer of rubber. After the rubber is cured, the re-usable base tool is removed, leaving the tubes fixed in the shell by the rubber material.
The shell and tube assembly is next placed in a holding fixture 40, shown as a rectangular box. It will be obvious that portions of the holding fixture could be made detachable to facilitate insertion and removal of the shell. The side of the shell containing ports 28 is shown exposed, but at least part of that side could be enclosed if necessary to prevent distortion during the foam filling steps. Depending on the structure and fit of the holding fixture, a gasket may be desirable to seal the free ends of tubes 18 against ingress of foam material, the other ends being effectively sealed in the rubber material.

The holding fixture 40 is mounted on supports 42 and 44 in an inclined and tilted position, with ports 28 uppermost and one corner of the shell assembly low. The entire structure is pre-heated to about 100°F to assist the foaming action. Foam-in-place plastic material is well known and is usually in two parts which are mixed immediately before use and expand into a foam body in a short time. A pre-determined quantity of the material is injected through the lowest port 28, and, as soon as foaming is observed, that port is closed by any suitable means. More mixed foam-in-place material is then injected into the next highest port 28 in the inclined assembly and that port is closed, this being repeated at successively higher ports. As a result the foam material expands from the lower corner of the shell interior, progressively to the upper corner, and ensures that all spaces are filled as evenly as possible.

The foam filled assembly is then cured at a temperature of 70°–90°F for about 24 hours, after which the completed magazine is removed from the holding fixture. It should be noted that the temperatures and times stated are merely exemplary and will vary with the size of the structure and specific formable materials used.

Since the assembly is made primarily by pouring liquid materials into the parts, which are held accurately in simple re-usable tooling, the unit can be produced by relatively unskilled labor. Materials and specific configurations can be selected to suit a particular use. Having described my invention, I now claim.

1. The method of making a magazine for an aerial dispenser, comprising,
   assembling a box-like shell having sides and ends and open at opposite faces, with a plurality of filler ports spaced along one of said sides,
   attaching to the shell on one of said open faces a tool plate having thereon a plurality of spaced plugs,
   mounting on the plugs a plurality of cylindrical tubes extending to the other open face of the shell,
   injecting into the shell a rubbery material to blow and form a layer on said tool plate joining the tubes and shell,
   curing the rubbery material,
   removing the tool plate,
   and filling the remaining space within the shell and between the tubes with a foam material.

2. The method of claim 1, and including the intermediate step of pre-heating the assembly before injecting the rubbery material.

3. The method of claim 1, wherein the last mentioned step includes placing the assembly in a holding fixture substantially enclosing the shell, but leaving the filler ports exposed, and injecting the foam material through the ports,
   and removing the completed magazine from the holding fixture.

4. The method of claim 3, and including the steps of supporting the holding fixture in an inclined position with one end low and the filler ports uppermost,
   injecting the foam material through the lowest port first and then through successively higher ports,
   and closing each port in turn as the foam material is injected.

5. The method of claim 4, and including the intermediate step of pre-heating the assembly before injecting the foam material.

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