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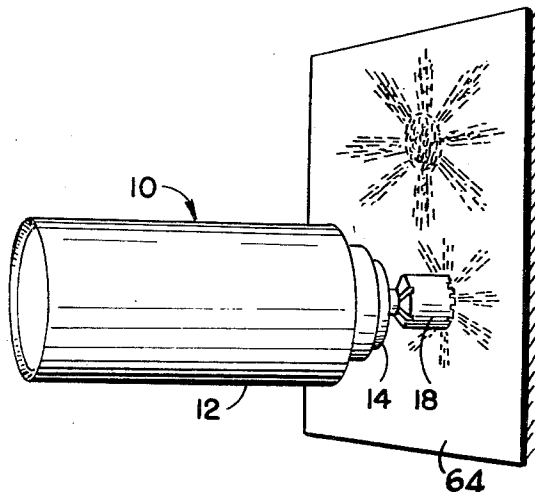
[54] **AEROSOL POWDER MARKING DEVICE**
7 Claims, 9 Drawing Figs.

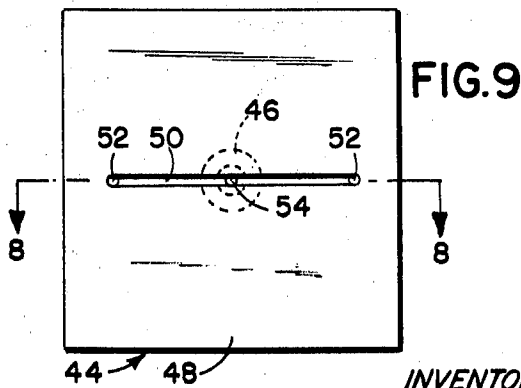
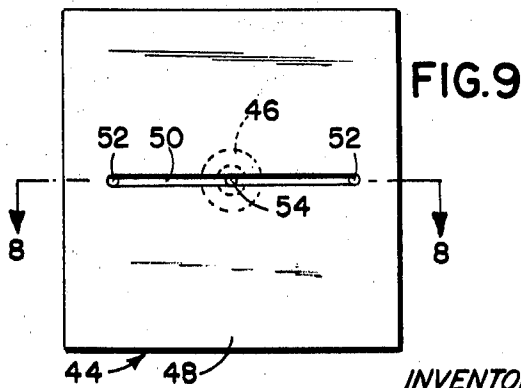
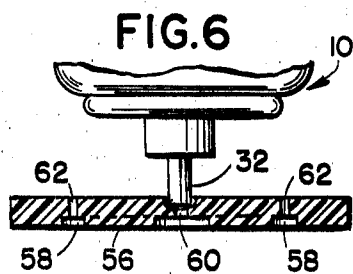
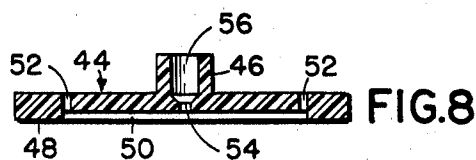
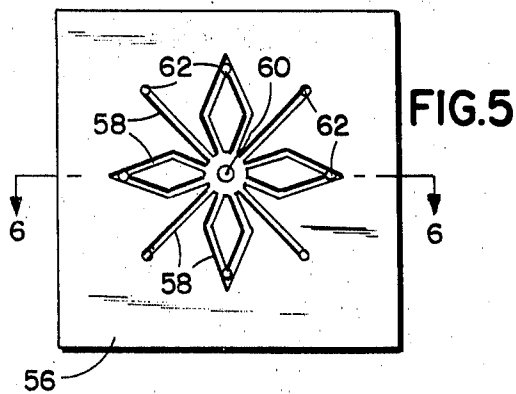
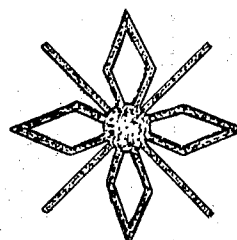
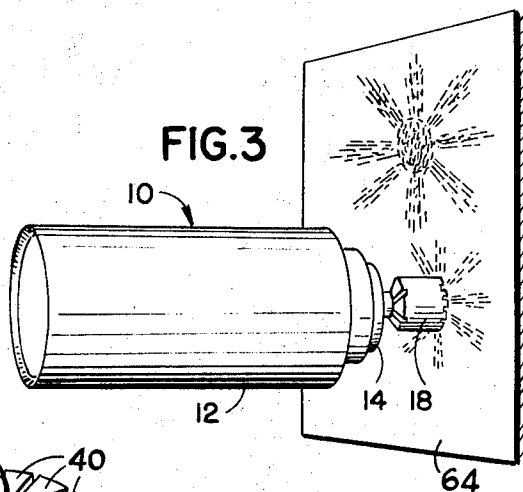
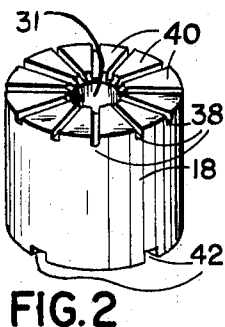
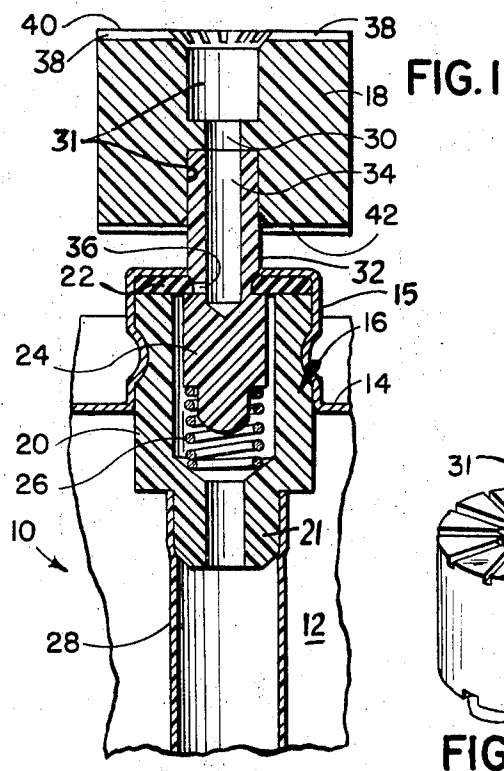
[52] **U.S. Cl.**..... **239/337,**
222/575, 239/573, 239/601, 251/353, 401/190
[51] **Int. Cl.**..... **B05b 7/32**
[50] **Field of Search**..... 239/302,
308, 337, 573, 601, 568; 401/190; 251/353;
222/478, 485, 565, 575

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ABSTRACT: A marking device comprising a valved propellant source, a source of mark-forming material, means for simultaneously discharging the propellant and mark-forming material to a pattern-forming member. The pattern-forming member has a flat upper end having one or more (usually a plurality) grooves. The grooves extend from the opening in the conduit to a venting zone, thereby producing a passageway or series of passageways for discharging propellant and mark-forming material to the surface to be marked.

To form a mark, the flat outer end of the pattern-forming member is impressed against the surface with sufficient force to activate the means for discharging the propellant and the mark-forming material.





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AEROSOL POWDER MARKING DEVICE

The present invention is a marking device which utilizes aerosol dispensing devices of the type described in U.S. Pat. Nos. 2,631,814 and 3,326,469 as sources of propellant and mark-forming material and the means for delivering said propellant and mark-forming material to a pattern-forming member disposed at the discharge end of said devices.

The pattern-forming member is a grooved flatheaded member which may have one of two general groove arrangements.

The groove may terminate at the outer edge of the mark-forming member, in which case the mark will extend outwardly from the edge in a "featherlike" pattern. Or, the groove may have its terminal portion directed away from the surface to be marked, in which case each groove will serve as a template and the mark shall be according to the design of the groove.

One object of the present invention is to provide a unitary aerosol dispenser for repeatedly applying marking material in a predetermined pattern upon a surface.

Another object is to provide a pattern-forming member for use in conjunction with an aerosol dispenser to project marking material upon a surface in a predetermined pattern.

Other objects and structural details of the present invention will be apparent from the following description when read in conjunction with the following FIG. description wherein:

FIG. 1 is a partial elevated view, in section, of the marking device of the present invention;

FIG. 2 is a perspective view of a pattern-forming member of the type shown in FIG. 1;

FIG. 3 is a perspective view of a marking device having a pattern-forming member of the type shown in FIGS. 1 and 2, disposed in operating relation to a surface to be marked; and the form of a pattern resulting from actuating the device;

FIG. 4 is a mark produced by a pattern-forming member of the type shown in FIG. 5;

FIG. 5 is a plan view of a pattern-forming member grooved and vented to produce the pattern shown in FIG. 4;

FIG. 6 is a view showing the pattern-forming member of FIG. 5 (in section along line 6-6 of FIG. 5) mounted on the valve stem of an aerosol unit.

FIG. 7 is a mark showing a straight line pattern, which mark may be applied successively to produce a continuous line of any desired length;

FIG. 8 is a pattern-forming member having a hollow boss for receiving the valve stem of an aerosol unit;

FIG. 9 is a plan view of the pattern-forming member of FIG. 8.

Referring to FIG. 1, one embodiment of the present invention comprises a conventional aerosol dispenser generally designated 10 including a container 12, a mounting cup 14, a valve unit, generally designated 16 and a pattern-forming member 18. The valve unit 16 is preferably of the design shown wherein a housing 20, a resilient sealing gasket 22, a stem 24 and a stem biasing spring 26 are secured in the pedestal portion 15 of the cup 14. A customary dip tube 28 is frictionally attached to a depending necked portion 21 of housing 20 and the entire assembly is sealed to container 12 which contains, primarily, a mixture of propellant and powdered marking material. The valve unit and the manner of attaching it to the mounting cup and the latter in turn to the container are entirely conventional and more fully described in U.S. Pat. No. 2,631,814. To use the dispenser in an inverted position, a dip tube of the type shown in U.S. Pat. No. 2,932,433 may be attached to the depending neck portion of housing 20.

Referring to FIGS. 1 and 2, the pattern-forming member 18 has an axial dispensing passage 30 which is counterbored at each end to provide a valve stem receiving socket 31, thereby enabling reversible attachment to the upstanding projection 32 of stem 24. Projection 32 has an axial passage 34 in communication at its upper end with passage 30 of pattern-forming member 18 and at its lower end with valve orifice 36 which

is sealed by gasket 22 when valve 16 is in its normally closed condition as shown in FIG. 1.

Referring to FIG. 2, a series of radially disposed grooves 38 are formed in the target contacting surface 40 of one end of button 18. They extend from the open counterbore of passage 30 through the periphery of the member 18. A different pattern of grooves 42 is provided in opposite end surface of pattern-forming member 18. Thus, by reversing member 18 on the projection 32, two different patterns are readily available.

According to another embodiment, a pattern-forming plate 56 is provided, as shown in FIGS. 5 and 6, with a plurality of interconnected grooves 58 defining a fixed closed pattern emanating from and in communication with an input passage 60 which extends through pattern plate 56. Adjacent the terminal end of the grooves and remote from passage 60 are vents 62 extending through plate 56 and directed away from the target surface to exhaust propellant gas and to enhance free distribution of the marking material. The input passage 60 is preferably tapered to facilitate receiving projection 32 of valve stem 24 of the dispenser 10. This embodiment is readily suited for effecting an infinite variety of designs and figures. The primary pattern requirement is that the grooves forming the design be appropriately vented to permit free distribution of the marking material.

Referring to FIGS. 8 and 9, a further embodiment provides an actuator pattern plate 44 substantially larger than the pattern-forming member 18 of FIGS. 1 and 2. Plate 44 has a hollow boss 46 having a valve stem receiving socket 56 adapted to resiliently engage projection 32 of valve stem 24 to provide an assembly. The target engaging surface 48 of the plate 44 has a pattern groove 50, the terminal ends of which communicate with vent passages 52. The inward portion of groove 50 communicates with an input passage 54 through which the marking material may be propelled from the dispenser 10. With this particular pattern plate, the straight line confined pattern shown in FIG. 7 will be effected because the excess marking material and propellant escape through vents 52 away from the target surface. In contrast to the pattern-forming member of FIGS. 1 and 2, the plate 44 does not produce a pattern which extends beyond the target engaging surface.

The device of the present invention can be used with a wide variety of formulations suited to the intended application. For a visible marking on porous materials such as wood, paper and the like, the following formulations are satisfactory:

Formulation A:	Parts by weight
Freon 12.....	97.00
Methyl alcohol (anhydrous).....	2.25
Cab-o-Sil M7.....	.6
Tween 80.....	15
	100.00

FORMULATION B

Methylene Chloride	79.0 to 98.0 pbw
Tween 80 (Polyoxyethylene Sorbitan Monoleate)	0.5 to 5.0 pbw
Cab-O-Sil M-5 (Pyrogenic Silica)	1.0 to 6.0 pbw
Soluble Dyes	0.1 to 10.0 pbw

FORMULATION C

Anhydrous Alcohol	50.0 to 88.0 pbw
Cab-O-Sil M-5	10.0 to 30.0 pbw
Tween 80	2.0 to 10.0 pbw
Soluble Dyes	0.1 to 10.0 pbw

Cab-O-Sil M7 is a submicroscopic pyrogenic silica made by The Cabot Corporation of Boston, Mass. Tween 80 (Polyoxyethylene Sorbitan Monostearate) is a detergent made by Atlas Chemical Inc.

These typical formulations of concentrate are prepared as follows:

The dye and then the detergent are dispersed in the alcohol or methylene chloride. The detergent is a binder for the silica, the latter being added last and the mass mixed. Formulations A and B may be used with a liquid propellant in the ratio:

concentrate 10 to 25 percent
Propellant 75 to 90 percent

Formulation C may be used with a liquid propellant in the ratio:

concentrate 1 to 5 percent
propellant 95 to 99 percent

With these formulations it has been found that best results are obtained when the total cross-sectional area of the pattern grooves of the actuator is approximately 6 times the area of the opening in the valve stem.

The colored powder of the above formulations is virtually dry upon contact with the surface and thus avoids any difficulties encountered with marking materials carried in an evaporative solvent vehicle. The particle size is small enough to result in a remarkably permanent impression.

Referring to FIGS. 1, 2 and 3, in operation the end face 40 of pattern-forming member 18 is placed in flush contact with the target surface 64 of the object to be marked. The dispenser 10 is pressed toward said surface to move stem 24 against the bias of spring 26, thereby deforming gasket 22 and exposing the valve orifice 36 in the stem. The propellant and marking powder are then driven through dip tube 28, hollow valve housing 20, orifice 36, passages 34 and 30 and through the passages formed by grooves 38 to sweep across target surface 64. The powder is deposited in trails whose direction and patterns are determined by the orientation and design of grooves 38.

According to the embodiment illustrated in FIGS. 5 and 6, the dispenser 10 is used in conjunction with a separate pattern plate 56. The plate 56 is positioned and held against surface 64 and the projection 32 of valve stem 24 is placed in the valve stem receiving recess of input passage 60. The dispenser is then pressed toward surface 64 as described above to produce a pattern defined by the grooves. Excess marking powder and propellant are exhausted through vents 62.

Operation of the embodiment illustrated in FIGS. 8 and 9 differs from the one just described only in that plate 44 is substituted for member 18 whereby the propellant carried marking material is deposited on surface 64 in a confined pattern such as shown in FIG. 7 and the excess propellant and marking material are discharged through vents 52.

The present invention may also be used to produce mark patterns for visual identification purposes. The mark need not be visible where an electrically conductive, magnetic, or radioactive substance is used for automated identification or detection. Substances which change in visual properties in response to conditions such as heat changeable dyes can be used to detect overheated mechanical parts.

In the instance where a device of the type described in U.S. Pat. No. 3,326,469 is used in a horizontal or inverted position, means for preventing propellant from passing into the product container must be employed.

5 I claim:

1. A marking device comprising a pressurized dispenser having a valve including a dispensing passage, a marking material and propellant medium within the dispenser, and a valve actuating pattern member adapted to be associated with the valve stem, said pattern member having a surface for contacting the object to be marked, said surface lying in a plane generally transverse to the direction of actuating motion of the valve and being provided with open grooves which are in communication with the dispensing valve passage.

2. The device of claim 1 wherein said pattern member is provided with an axial bore in communication with the dispensing passage and wherein said grooves in said surface extend from said bore through the periphery of said surface.

3. The device of claim 2 wherein the pattern member is provided with two surfaces transverse of said bore, each surface being provided with grooves to define differing patterns.

4. The device of claim 1 wherein the grooves are provided with vents to exhaust the propellant medium and any excess of marking material.

5. A marking device comprising in combination, an aerosol dispenser and a pattern plate, said dispenser containing a quick drying marking material and a gaseous propellant, a resiliently biased dispenser valve having a hollow stem through which said coloring material and propellant may be discharged, said pattern plate having a plurality of interconnected grooves defining a particular pattern in one face, an input passage extending from said face and adapted to communicate said grooves with said hollow stem, a plurality of vents extending through said pattern plate and in communication with said grooves at points remote from said input passage, said pattern plate being adapted to cause said marking material to be impinged on a surface to be marked in a pattern defined by said grooves when said pattern marker grooved face is placed in contact with said surface and said dispenser is pressed toward said surface to open said valve.

6. The device of claim 1 wherein the primary constituent of the marking material is powdered silica and the propellant gas is a gas which is liquified at the pressure within the dispenser.

7. A marking device comprising in combination means for storing a marking material and propellant, means for simultaneously conveying the marking material and propellant to a pattern-forming member, said pattern-forming member having grooves in a substantially flat target-contacting surface, which grooves have propellant venting apertures near their terminal ends to exhaust propellant from the grooves in a direction away from the target-contacting surface.

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