Dec. 5, 1967 J. R. BROOKS 3,355,755

ELECTROSTATIC BRUSH

Filed June 4, 1965

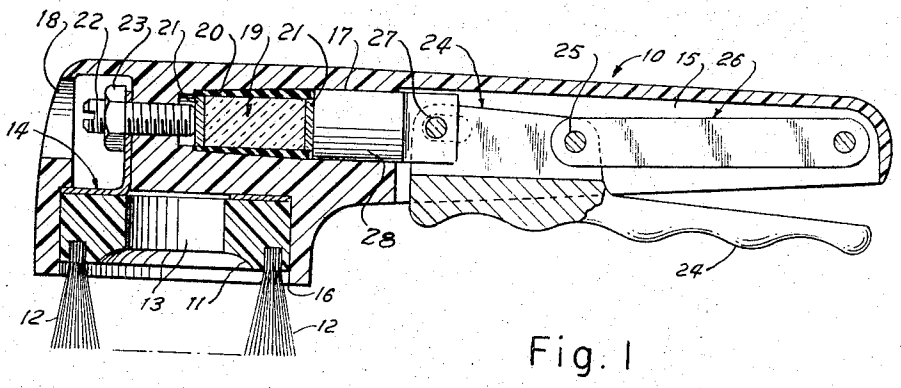


Fig. 1

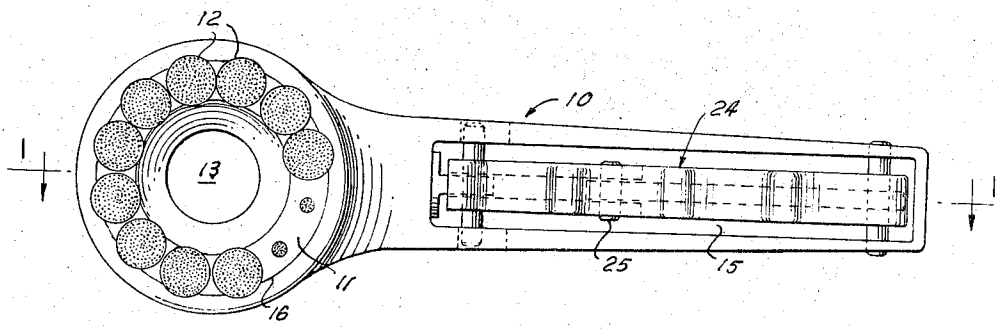


Fig. 2

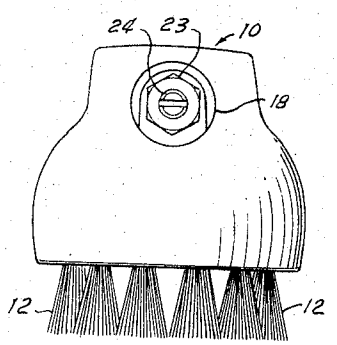


Fig. 3

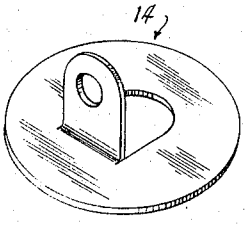


Fig. 4

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ELECTROSTATIC BRUSH

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ABSTRACT OF THE DISCLOSURE

The invention comprises a piezo-electric electrostatic brush whose embodiment consists of an elongated handle having a brush head with a plurality of bristles surrounding a central dust passage, or receptacle, opposite which is a piezo-electric ceramic crystal which extends partially into the handle in which is arranged a plunger element which, when reciprocated longitudinally of the handle, applies intermittent pressure to the piezo-electric crystal to produce an electric current to generate an electrostatic charge in a conductor arranged in relatively close proximity to the bristles and surrounds the dust cavity within the arrangement of bristles.

An electrostatic charge is generated by a hand lever pivotally connected to the handle in such manner as to enable its manipulation by holding the handle, and by the operation of the lever, the plunger is reciprocated to energize the piezo-electric crystal to produce the desired electric current.

It is well known that when certain crystals, such as quartz, are squeezed an electric current is generated. A more recent development is the piezo-electric ceramic crystal, of which the lead zirconate-titanate type, which is now available commercially, is an example.

This invention relates to a piezo-electric electrostatic brush, and it has particular reference to an electrostatically charged hand brush for the removal of lint, dust, dandruff, and other foreign particles from clothes, furniture, and other articles having incorporated therein a piezo-electric ceramic crystal and manually operable means for applying pressure to said crystal to thereby generate an electric current.

The electrostatic brush of the invention is particularly useful for removing particles of lint, dust, and the like, from modern phonograph records, for example, which are fragile and hard to clean.

The invention is also useful in cleaning photographic negatives, as in film processing. Such negatives tend, through friction, to develop and retain static electrical charges which attract dust and make handling difficult.

A prime object of the invention is that of providing a simple, economical, and completely portable device for removing both the electrical charges and the dust particles from various articles such as those above described.

A further object of the invention resides in the provision of an electrostatically charged hand brush having incorporated therein a piezo-electric ceramic crystal and manually operable means for applying pressure to said crystal to thereby generate an electric current.

Description of the drawing

While the foregoing objects are paramount, other and lesser objects will become apparent as the description proceeds, when considered in connection with the appended drawings wherein:

FIGURE 1 is a longitudinal sectional view, taken on the line 1—1 of FIGURE 2, of an electrostatic brush embodying the invention.

FIGURE 2 is a longitudinal view showing the under side of the brush as illustrated in FIGURE 1.

FIGURE 3 is an end view of the brush, and

FIGURE 4 is a perspective view showing the annular electrical conductor above-mentioned as it appears from the top thereof, showing the integral lug whereby it is connected electrically to the piezo-electric ceramic crystal.

Detailed description

The invention in its preferred form comprises a hand brush having an elongated handle, designated generally by the numeral **10**, and having an annular brush portion, indicated generally by the numeral **11**, connected to one end of the handle **10**. The brush portion **11** includes a set of circumferentially spaced bristles **12** which define between them a central dust passage **13**. An annular electrical conductor **14** overlies the brush portion **11** and communicates with the central dust passage **13**.

The handle **10**, which advantageously may be formed of molded plastic or other material, such as wood, having suitable dielectric characteristics, is hollow for a major portion of its length, beginning at one of its ends, and is open on its under side, as at **15**, as shown best in FIGURE 1.

The handle **10** has a circular recess **16** in its under side, adjacent to the end thereof opposite its hollow end portion **15**, in which the brush portion **11** and the annular electrical conductor **14** are received, and has a longitudinal bore **17** communicating with said hollow end portion **15**. The handle **10** has an end opening **18** in the end thereof opposite said hollow end portion **15** which is aligned axially with said bore **17** and communicates with said circular recess **16**, for use as hereinafter described.

A piezo-electric ceramic crystal, indicated generally by the numeral **19**, which advantageously may be of the lead zirconate-titanate type, is received in the longitudinal bore **17** of the handle **10**, immediately above the brush portion **11**. The bore **17** is tapered in the vicinity of the piezo-electric ceramic crystal **19**, which is enclosed in a soft rubber sheath **20** and has soft metal pressure pads **21** at its ends.

An adjusting screw **22**, which extends through an opening therefor in the body of the handle **10** between the bore **17** and the end opening **18**, and has a nut **23** thereon, is passed through an opening therefor in an integral lug on the annular electrical conductor **14** whereby the conductor **14** is connected electrically to the piezo-electric ceramic crystal **19**.

A hand lever **24**, which is disposed partly within the hollow end portion **15** of the handle **10** and extends partly below the handle **10**, as shown best in FIGURE 1, is pivotally connected intermediate its ends, as at **25**, to one end of a link **26** which is disposed within the hollow end portion **15** of the handle **10** and is pivotally connected thereto at its opposite end, near the extreme end of the handle **10**.

The hand lever **24** is pivotally connected at one of its ends, as at **27**, to a plunger **28** which is movable longitudinally in the bore **17** within predetermined limits. The arrangement is such that pressure is applied to the piezo-electric ceramic crystal **19**, in a longitudinal direction relative to the handle **10**, whereby an electric current is generated and an electrostatic charge is applied to the annular electrical conductor **14**, in response to a toggle action which is accomplished upon squeezing the hand lever **24** whereby its free end is advanced relative to the handle **10**.

The adjusting screw **22**, which abuts a soft metal pressure pad **21** adjacent one end of the piezo-electric ceramic crystal **19**, provides means for adjusting the toggle action as above described.

In use, particles of lint, dust, and the like, which are freed by the action of the bristles **12** will be strongly attracted to the annular electrical conductor **14** having the

electrostatic charge thereon, whereby such particles tend to be drawn into the central dust passage **13** and to collect in the passage **13** in the vicinity of the conductor **14**, and will be retained therein as long as pressure is applied to the piezo-electric ceramic crystal **19**, as by squeezing the hand lever **24** as above described.

The invention may be modified within certain limitations by persons skilled in the art without departing from the spirit and intent thereof or the scope of the appended claims.

What is claimed is:

1. An electrostatically charged hand brush for the removal of lint, dust, dandruff, and other foreign particles from clothes, furniture, and other articles having incorporated therein a piezo-electric ceramic crystal and manually operable means for applying pressure to said crystal to thereby generate an electric current.

2. An electrostatically charged hand brush having an elongated handle and having an annular brush portion connected to one end of the handle, said brush portion including a set of circumferentially spaced bristles defining a central dust passage, an annular electrical conductor coinciding with said brush portion and positioned immediately adjacent said central dust passage for engagement by dust particles entering said passage, and means in said handle for applying an electrostatic charge to said conductor.

3. The structure of claim **2**, said last mentioned means comprising a piezo-electric ceramic crystal received in a longitudinal bore formed in said handle, and manually operable means in said handle for applying pressure to said crystal to thereby generate an electric current.

4. The structure of claim **3**, said manually operable means consisting of a toggle arrangement including a hand lever and connecting linkage operable, upon squeezing said handle, to apply pressure to said crystal in a longitudinal direction relative to said handle.

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