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APPARATUS FOR SEPARATING ARTICLES

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FIG. 1

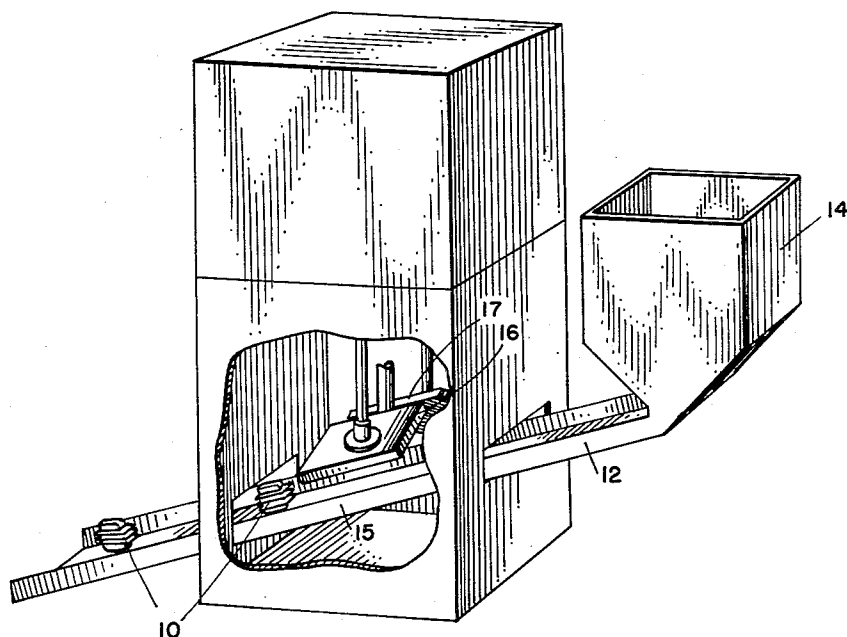
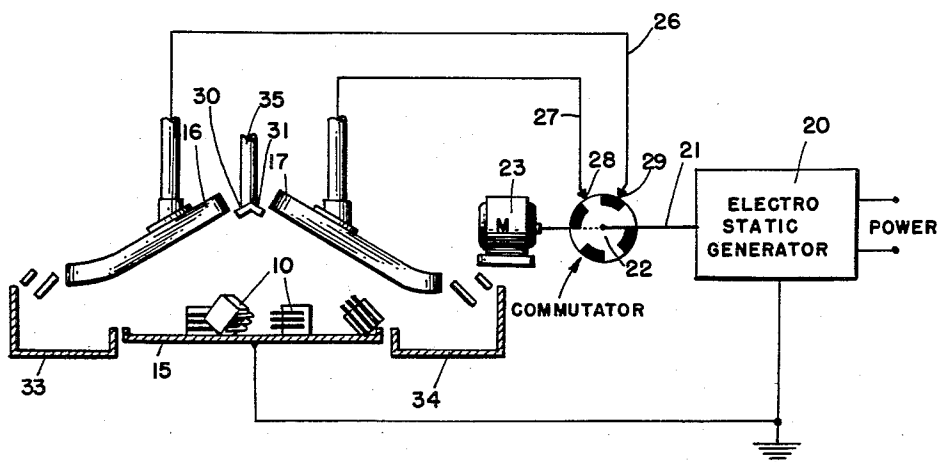


FIG. 2



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APPARATUS FOR SEPARATING ARTICLES

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3 Claims. (Cl. 15—1.5)

This invention relates to apparatus for separating articles, and more particularly to methods of and apparatus for electrostatically removing dust and dielectric particles from articles, such as, for example, relays.

In the manufacture of electrical parts, such as, for example, relays which become dusty or have dielectric particles getting between the laminations and contacts of the various cavities therein, it is necessary to clean the articles before they are placed in service. With past known methods and apparatus, this has been a very difficult thing to accomplish. Furthermore, in articles such as relays wherein cards of dielectric material are provided, often splinters stuck to the cards cannot be separated from the cards by known cleaning methods and interfere with the operation of the articles so that the articles must be discarded.

An object of the invention is to provide new and improved apparatus for separating articles.

Another object of the invention is to provide apparatus for electrostatically removing dust and dielectric particles from articles.

A further object of the invention is to provide apparatus for applying alternating electrostatic fields to articles having splinters of dielectric material thereon to flex the splinters and remove the splinters from the articles.

In an apparatus illustrating certain features of the invention, articles to be cleaned are subjected alternately to dielectric fields extending at an angle with respect to one another, whereby particles of dielectric material secured only at one end thereof to the articles are broken off of the article by flexing and are withdrawn from the articles.

In an apparatus forming more specific embodiments of the invention articles are advanced between a pair of alternately operable electrodes, which cooperate with a third electrode to alternately create electrostatic fields in directions angularly disposed with respect to one another. The two fields are created alternately at a frequency at which splinters of dielectric particles secured to the articles are flexed sufficiently to break the splinters loose from the articles and remove them from the article. The alternating fields also tend to jiggle dielectric particles positioned in otherwise non-accessible cavities and remove the particles from such cavities. Streams of air may be directed across the electrodes to which the particles are drawn to sweep the particles from these electrodes.

A complete understanding of the invention may be obtained from the following detailed description of a method and an apparatus forming specific embodiments, when read in conjunction with the appended drawings, in which

Fig. 1 is a perspective view of an apparatus for practicing the method forming one embodiment of the invention and

Fig. 2 is a fragmentary schematic view of a portion of the apparatus shown in Fig. 1.

Referring now in detail to the drawings, there is shown

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therein an apparatus for removing dielectric particles, such as dust, insulator fragments and splinters secured to insulating components of relays 10. This apparatus includes a chute 12, to which the articles are fed from a raised hopper 14 and the articles roll down the chute between plates or electrodes 15, 16 and 17. The electrode 15 is grounded and is connected to the negative terminal of an electrostatic generator 20 of a well-known type, which generates a high potential such as to create a high electrostatic field alternately between the electrode 16 and the electrode 15 at one time and the electrode 17 and the electrode 15 at another time, the fields being at an angle with respect to one another. The positive side of the electrostatic generator 20 is connected by a conductor 21 to commutator 22, driven by a motor 23 at a suitable frequency. The electrodes 16 and 17 are connected to the commutator by conductors 26 and 27, respectively, and brushes 28 and 29, respectively, so positioned with respect to the commutator that when the commutator connects the electrode 16 to the positive side of the electrostatic generator 20, the electrode 17 is disconnected therefrom. Conversely, when the electrode 17 is connected to the positive side of the electrostatic generator 20, the electrode 16 is disconnected therefrom. Thus, as the articles roll and slide slowly down the chute 12, the alternation of the electrostatic fields 16 and 17 apply alternate forces to dielectric particles positioned in the interstices of the relays and the particles are pulled from the relays and drawn to the plates 16 and 17, which remove the charge from the particles. Nozzles 30 and 31 direct sheet-like streams of a gas, such as air, for example, across the lower face of the electrodes 16 to sweep the particles from the electrodes to traps 33 and 34 so that the particles do not contaminate articles coming down the chute 12. A conduit 35 leading from a suitable source of gas under pressure (not shown) supplies the nozzles with the gas, which also keeps the electrodes free of the insulating particles to keep the effectiveness thereof high. Furthermore, the gas streams create a low pressure area over the relays to aid in drawing particles therefrom. The electrodes 16 and 17 extend beyond the electrode 15 over the traps 33 and 34 to direct the air streams to the traps. Thus, the above-described method and apparatus effectively remove dielectric particles both from inaccessible recesses in the relays and when the particles are attached at one end thereof to the components of the relays, for example, a splinter secured at one end to an edge of a fiber plate.

Certain features of the above-described method and apparatus are disclosed and claimed in copending application Serial No. 347,342, filed April 7, 1953, by A. G. Bugler and A. R. Johnson for "Methods of and Apparatus for Separating Articles," owned by the assignee of the instant application.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. An apparatus for separating material, which comprises means for advancing an article along a predetermined path, a pair of spaced electrodes on one side of said path at a predetermined position therealong, a negatively charged third electrode on the opposite side of said path, and means for applying positive potential alternately to the spaced electrodes in the pair to create alternating electrostatic fields between the pair of electrodes and the third electrode, said pair of electrodes being positioned at angles to each other and facing the third elec-

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trode to concentrate the electrostatic fields in the path of the article.

2. An apparatus for removing splinters from articles, which comprises means for advancing articles along a predetermined path, a pair of positive electrodes mounted in laterally offset positions on one side of the path, a negatively charged third electrode mounted on the opposite side of the path, and means for applying a high positive voltage alternately to each of the positive electrodes to create alternating electrostatic fields, said positive and negative electrodes being positioned in triangular relationship whereby the electrostatic fields are concentrated in the path of the articles passing through the triangle formed by the electrodes.

3. An apparatus for removing dielectric particles from articles, which comprises means for advancing articles along a predetermined path, first, second and third electrodes positioned in spaced triangular relationship around the path, an electrostatic generator for supplying a positive voltage, and commutating means for alternately connecting the first and the second electrodes to the elec-

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trostatic generator to positively charge them, said third electrode being continuously grounded whereby electrostatic fields alternately created between the first electrode and the third electrode and the second electrode and the third electrode are concentrated in the path of the articles.

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