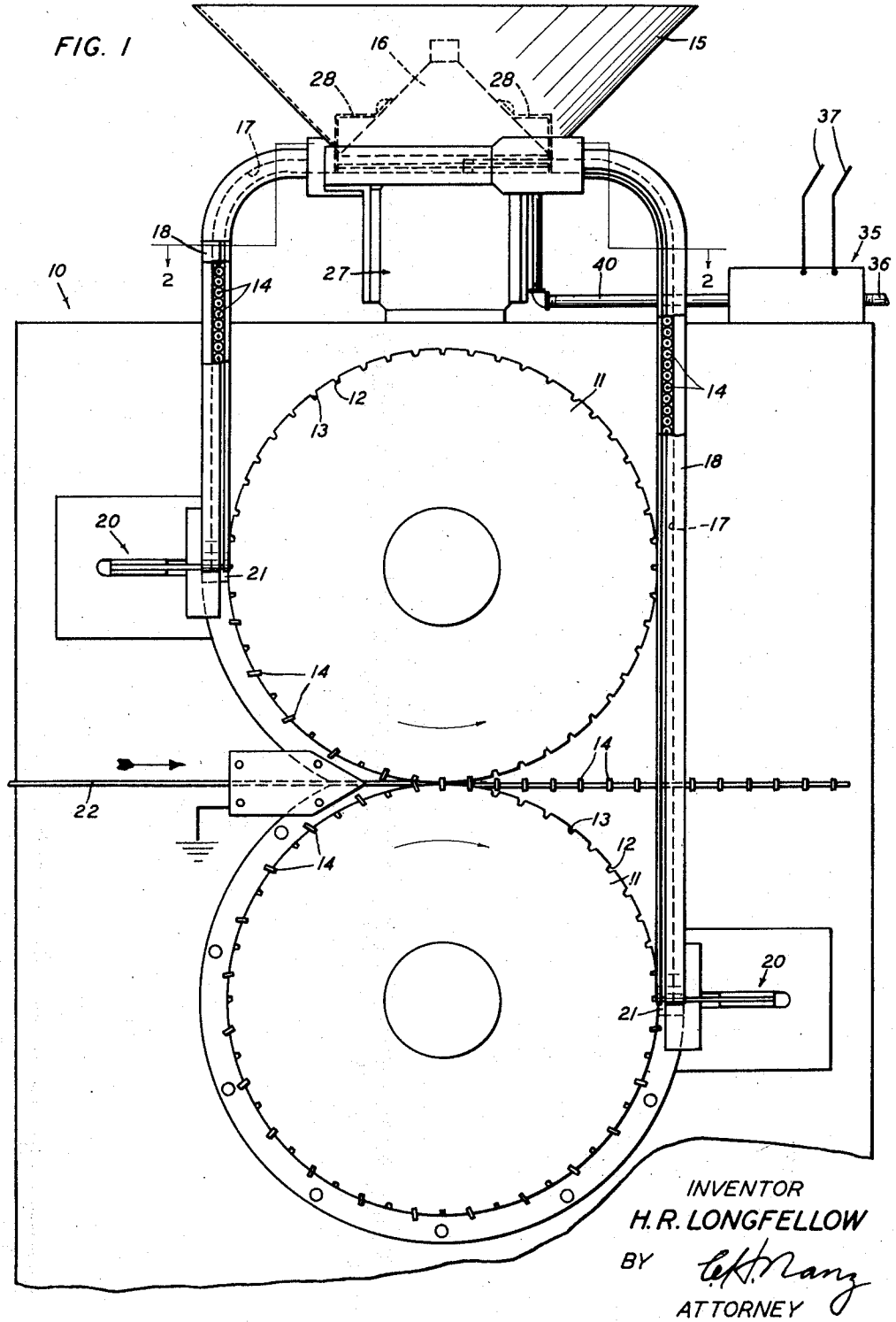
April 3, 1951 H. R. LONGFELLOW 2,547,132

APPARATUS FOR PREVENTING STATIC CHARGES FROM COLLECTING ON ARTICLES IN A DISPENSING HOPPER

Filed June 6, 1947 2 Sheets-Sheet 1

FIG. 1



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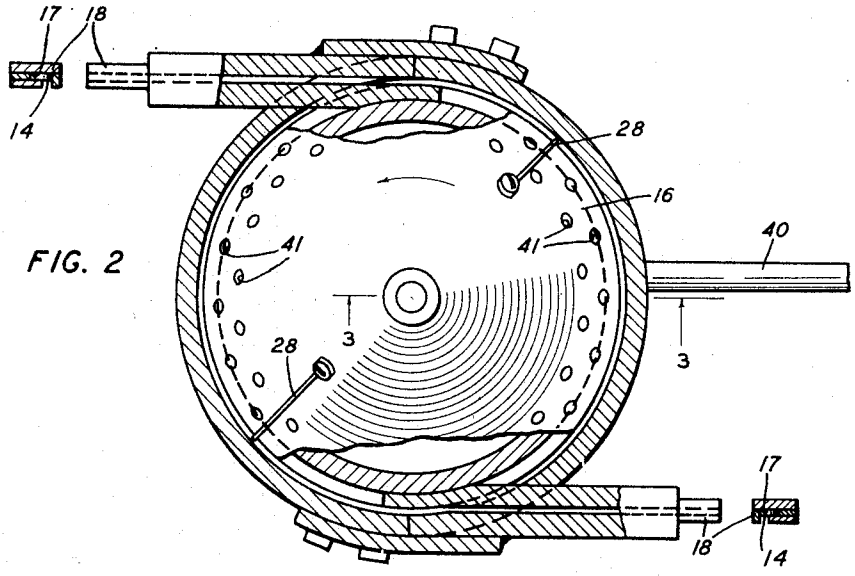

FIG. 2

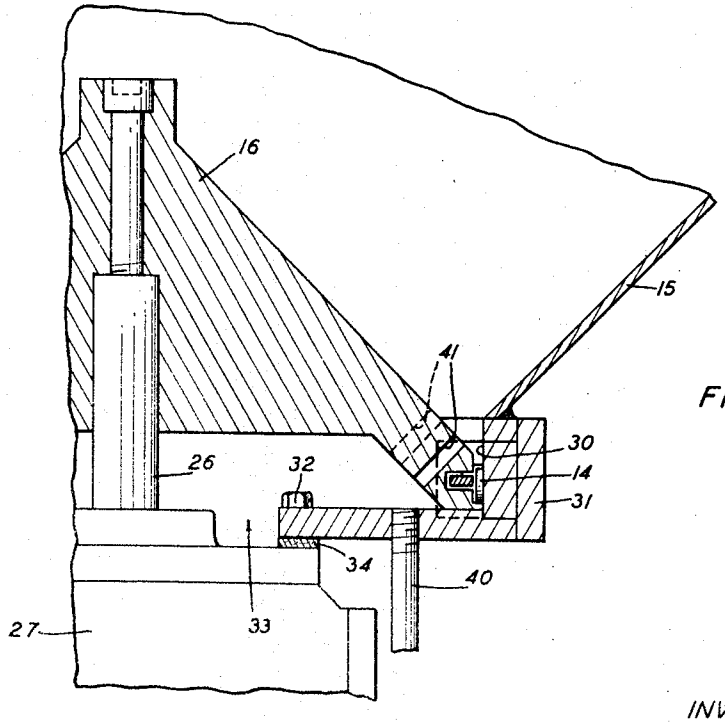

FIG. 3

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APPARATUS FOR PREVENTING STATIC CHARGES FROM COLLECTING ON ARTICLES IN A DISPENSING HOPPER

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2 Claims. (Cl. 222—9)

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This invention relates to apparatus for preventing static charges from collecting on articles capable of generating a static charge upon frictional movement therebetween, and more particularly to apparatus for preventing static charges from collecting on insulated discs used in the manufacture of coaxial cables.

Insulating discs used in the manufacture of coaxial cables are made from suitable insulating material, one of the more preferable materials being polyethylene. The discs are placed in a supply hopper having feed chutes connected thereto for conveying the discs from the hopper in a single-file manner. If an agitator is positioned in the hopper for urging the discs into the feed chutes, the frictional movement between the discs due to the agitation thereof causes static charges to be generated on the discs. Under certain atmospheric conditions, particularly when the surrounding air is dry, these static charges will accumulate on the discs. Such static charges cause the discs to cling to the sides of the hopper and the feed chutes, and prevent free movement of the discs in the feed chutes.

An object of the invention is to provide a new and improved apparatus for preventing static charges from collecting on articles.

An apparatus embodying certain features of the invention comprises the combination of a hopper for receiving a supply of insulating discs, a pair of feed chutes for conveying the discs from the hopper, a rotatable agitator mounted in the hopper for urging the discs into the feed chutes, and an ozone generator. The ozone gas made in the ozone generator is caused to circulate around the mass of discs in the hopper, whereby any static charges generated on the discs as a result of their being rubbed together by the agitator are conducted therefrom by the ozone gas, and said static charges are thereby prevented from collecting on the discs.

Other objects and advantages of the invention will be apparent from the following detailed description and from the appended drawings, in which:

Fig. 1 is a front elevational view of the disc applying apparatus of a coaxial cable unit forming machine showing a preferred embodiment of the present invention;

Fig. 2 is an enlarged, horizontal sectional view taken along line 2—2 of Fig. 1, and

Fig. 3 is an enlarged fragmentary, sectional view taken along line 3—3 of Fig. 2.

Referring now to the drawings, and more particularly to Fig. 1, the reference numeral 10 in-

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dicates generally the disc applying mechanism of a conventional coaxial cable unit forming machine. The disc applying mechanism 10 comprises a pair of disc applicators 11—11 whose peripheries are alternately provided with disc carrying slots 12—12 and disc receiving slots 13—13. A supply of centrally perforated insulating discs 14—14 (Fig. 1) are placed in a suitable funnel-shaped hopper 15 having a conical-shaped agitator 16 for urging the discs from the hopper into L-shaped slots 17—17 provided in feed chutes 18—18. The L-shaped slots of feed chutes are designed to convey the discs 14—14 from the hopper 15 in a single-file, edge-to-edge manner to their respective disc inserting mechanisms 20—20, by means of which the discs 14—14 are inserted into the disc carrying slots 12—12 of the disc applicators 11—11. Each disc applicator carries the discs inserted therein past a knife 21 positioned adjacent to the periphery thereof, which cuts a radial slit in the discs so that they may be ultimately applied on a conductor 22 in the manner described in Berggren et al. Patent 2,404,782 issued July 30, 1946.

The feed chutes 18—18 must be continuously supplied with insulating discs so that when the disc applicators 11—11 are rotated in the direction indicated, each time a disc carrying slot 12 is adjacent to its respective disc inserting mechanism 20, a disc will be available in the associated feed chute for insertion in the slot by the inserting mechanism. To maintain an adequate supply of discs in the feed chutes the agitator 16 is provided with a pair of angle-shaped resilient fingers 28—28, which are secured thereon so that the vertical legs thereof extend into an annular groove 30 formed between the periphery of the base of the agitator 16 and the annular base of the hopper 15. The agitator 16 is secured on a shaft 26 which is driven by a suitable driving means, such as a gear motor indicated generally at 27, which serves to rotate the agitator in a counterclockwise direction (Fig. 2). The base of the hopper 15 is secured to an annular cup-shaped support 31, which is secured to the housing of the gear motor 27 by a plurality of bolts, such as the bolt 32. The bottom of the agitator 16 is undercut to form a frusto-conical opening 33 therein, and an annular gasket 34 is positioned between the support 31 and the gear motor housing 27 to make the opening 33 substantially air tight.

The opening in the hopper formed by the periphery of the agitator 16 and the funnel-shaped hopper 15 is substantially V-shaped which causes

the discs positioned in the hopper to fall downwardly into the annular groove 30. As the agitator 16 is rotated by the gear motor 27, the vertical legs of the resilient fingers 28—28 riding in the groove 30 urge all the discs that have fallen into the groove into one of the feed chutes 18—18 depending on the particular portion of the groove 30 in which the discs originally rested. In this manner, the resilient fingers 28—28 of the agitator 16 are continuously collecting discs which fall into the annular groove 30 and urging them into the L-slots 17—17 of the feed chutes 18—18, thereby keeping a sufficient supply of discs in the feed chutes.

The discs 14—14 stored in the hopper preparatory to being applied to the conductor 21 are made from polyethylene, a material capable of generating a static charge on itself upon frictional engagement with a dissimilar material. The rotary movement of the agitator 16 and the fingers 18—18 within the hopper 15 containing a supply of polyethyene discs causes a continuous frictional movement between the discs themselves, between the discs and the agitator and between the discs and the hopper. This rubbing action tends to generate a static charge on the discs 14—14 and an opposite charge on the hopper 15 and agitator 16. Since the hopper and agitator are grounded, their charge will be discharged, but under certain atmospheric conditions, particularly when the surrounding air is dry and substantially non-conductive, the static charges on the discs will not be discharged to ground through the hopper 15. As a result, a substantial static charge accumulates on the discs causing them to cling to the sides of the hopper 15 and to the sides of L-shaped slots of the feed chutes 18—18, thereby causing the discs to jam up in the feed chutes. This jamming up of the discs in the feed chutes causes an erratic supply of discs to the inserting mechanisms 20—20, which results in a non-uniform application of the discs on the conductor 22.

To provide free movement of the discs down the sides of the hopper 15, over the agitator 16 and through the L-slots 17—17 of the feed chutes 18—18, it is necessary to continuously discharge the static charges and prevent a substantial charge from collecting on the discs while they are in the hopper. To prevent a high static charge from collecting on the discs and thereby obtain free movement of the discs through the feed chutes 18—18 there is provided a conventional ozone generator, indicated generally at 35, through which air under moderate pressure is directed from a suitable supply (not shown) by means of a pipe 36. The air, in passing through the ozone generator, is ionized to form ozone gas, which is well known as a good conductor of electricity. The ozone is directed from the ozone generator 35 to the opening 33 by means of a pipe 40 fitted into a tapped bore provided in the support 31 of the hopper 15. In this manner the opening 33 at the base of the agitator 16 is filled with the ozone gas produced by the ozone generator 35.

A plurality of holes 41—41 are provided around the base of the agitator 16 (Fig. 2) between the opening 33 and the tapered periphery thereof to allow the ozone gas supplied to the opening 33 to pass therefrom into the annular, V-shaped opening in the hopper 15. When the agitator is rotated the holes provided around the base project a pair of annular rotating sprays of ozone gas into the base of the hopper, thereby assuring that all portions of the hopper are supplied with the ozone gas. After being sprayed into the hopper in this manner, the ozone gas flows up through the mass of discs 14—14 positioned in the hopper and completely fills the hopper, thereby completely surrounding each individual disc therein.

When the discs are agitated in this atmosphere of ozone gas the static charges which tend to collect on the discs due to the frictional movement thereof are continuously conducted from the discs by the ozone gas, whereby the static charges are prevented from building up on the discs. Thus, the ozone gas maintains the discs at substantially ground potential, in which case the discs have no tendency to be attracted to, or attach themselves to the sides of the L-slots of the feed chutes. By so preventing the discs from becoming charged with static electricity, they will slide freely in the L-slots of the feed chutes to the inserting mechanisms 20—20.

The ozone gas was selected as a medium by means of which the static charge on the discs could be discharged because of its availability and ease of manufacture. However, it is to be understood that any of the chemically inert, conductive gases, such as helium, argon, krypton and zenon, may be used with equally satisfactory results.

It is to be understood that the above description, although directed to a method of and apparatus for preventing static charges from accumulating on polyethylene insulating discs, is purely illustrative. The invention may be employed to prevent static charges from collecting on various sizes and shapes of articles made from materials which are capable of generating a static charge upon frictional engagement with a dissimilar material.

While the above-described apparatus is particularly well adapted for use with a hopper employed for feeding polyethylene insulating discs to the applicators of a coaxial cable unit forming machine, it may be modified to suit various types of applications where it is required to prevent static charges from accumulating on a plurality of individual parts, without departing from the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. In a disc applying mechanism of a coaxial unit forming machine, a funnel-shaped hopper in which a plurality of plastic insulating discs may be placed, feed chutes for conveying the discs from the hopper, a rotating agitator operating within the hopper to urge the discs from the hopper into the feed chutes, the resulting agitation of the discs causing at least some of them to acquire static charges, an annular support secured to the base of the hopper, said agitator having a frusto-conical counterbore in the base thereof and a plurality of holes provided in an annular path around the base of the agitator for connecting the counterbore with the hopper opening containing the discs, and an ozone generator for continuously supplying ozone gas under pressure to the annular opening and through the holes in the agitator into contact with the discs positioned in the hopper, whereby the rotating agitator projects the ozone gas in rotating annular sprays against the discs so that any static charges accumulated on the discs are conducted from the discs by the ozone gas.

2. Apparatus for preventing static charges from collecting on a plurality of non-metallic articles, which comprises a funnel-shaped hopper in

which a plurality of non-metallic articles may be haphazardly positioned, feed chutes for conducting the articles from the hopper in a single-file manner, a conical agitator rotatable within the hopper for urging the articles into the feed chutes, said agitator being so positioned as to form an annular opening between itself and the hopper and having a counterbore in the base thereof and a plurality of holes provided around said base and communicating with the counterbore and the annular opening, and means for continuously supplying an electrically conductive gas to the counterbore whereby the rotating agitator in the hopper projects a rotating spray of the conductive gas into the mass of articles in the hopper, whereby the gas conducts electrostatic charges

from the articles generated by the agitation thereof in the hopper.

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