July 9, 1963 R. G. FRANK 3,096,532

TABLET DUSTER

Filed May 5, 1960

Fig. 1

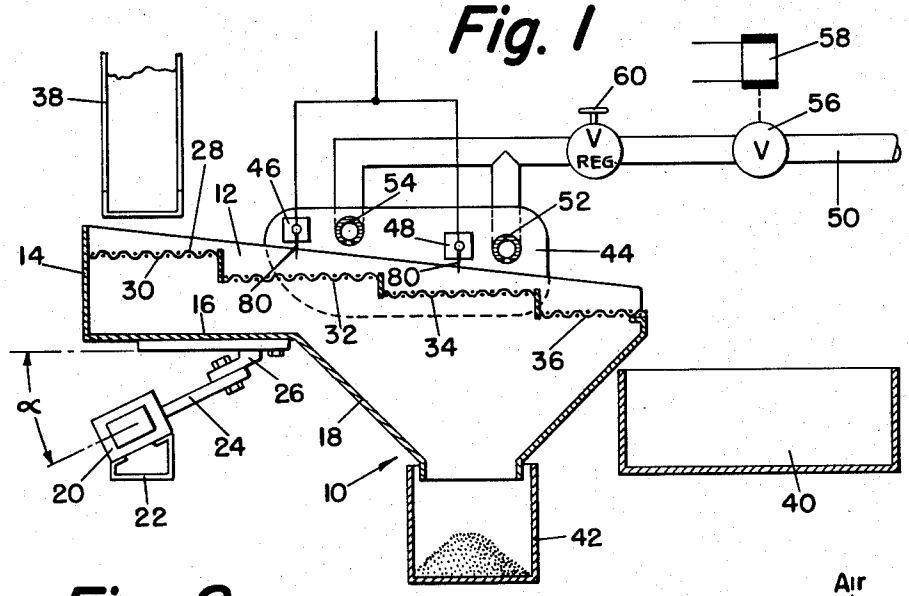


Fig. 2

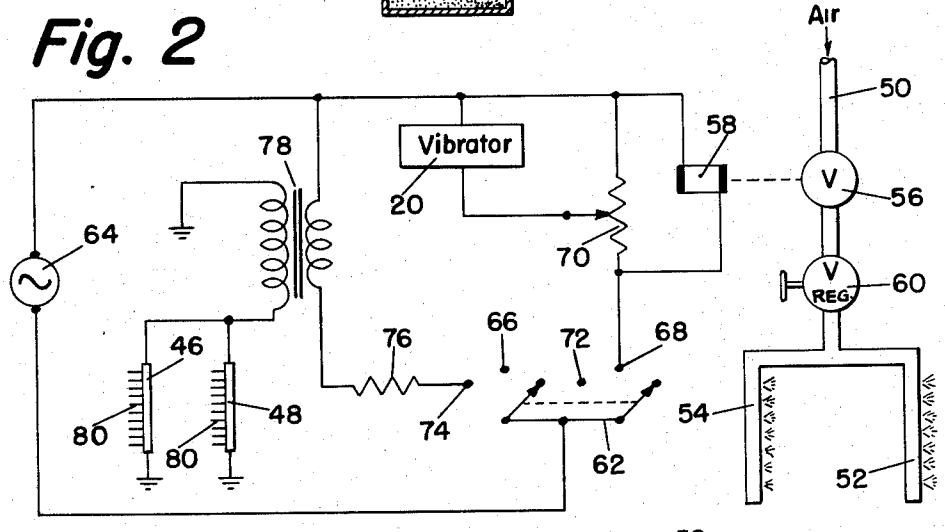
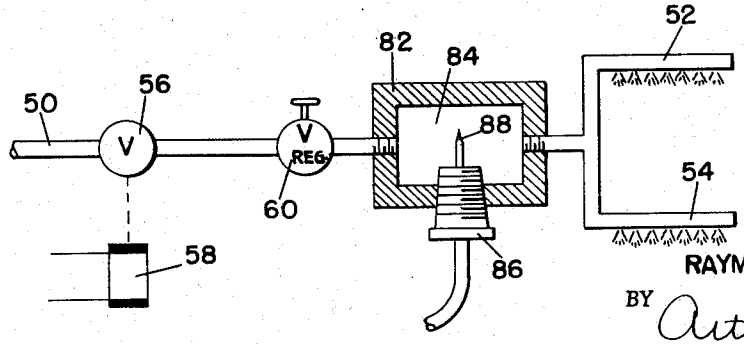


Fig. 3



INVENTOR.
RAYMOND G. FRANK
BY Arthur H. Seidel
ATTORNEY

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TABLET DUSTER

Raymond G. Frank, Ambler, Pa., assignor to F. J. Stokes Corporation, Philadelphia, Pa., a corporation of Pennsylvania

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This invention relates to a tablet duster, and more particularly, to a device for eliminating dust from tablets made on automatic machinery.

It has been found that tablets made on high speed machinery have a large amount of dust adhering to the surface of the tablets because of a static charge on the tablets. As these tablets are bottled and stored, the static charge dissipates and the dust is released into the bottle. The release of dust into the bottle clouds the inside surface of the bottle thereby making it difficult to see the tablets inside the bottle and mars the appearance of the bottle. Some of the dust on the tablets is released as the tablets go through the counting and filling machines, thus reducing the efficiency and raising the maintenance costs on these machines.

Various types of apparatus have been used in the past for removing dust from tablets. The apparatus used heretofore has not proven satisfactory since a large amount of the dust remains on the tablets. In addition, no provision was made for removing the dust from all sides of a tablet.

It is an object of this invention to provide a novel tablet duster.

It is another object of this invention to provide an apparatus for removing the dust from all sides of a tablet.

It is a further object of this invention to provide a tablet duster which eliminates the electrostatic charge on tablets and removes the dust by a combination of vibration and low pressure air.

It is a further object of this invention to provide a tablet duster which turns the tablets over and removes dust from the tablets by a combination of vibratory motion and a stream of ionized low pressure air.

Other objects will appear hereinafter.

For the purpose of illustrating the invention there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIGURE 1 is a partial cross-sectional elevational view of the tablet duster of the present invention.

FIGURE 2 is a schematic wiring diagram of the tablet duster of the present invention.

FIGURE 3 is a partial cross-sectional view of a modified embodiment of the tablet duster of the present invention.

Referring to the drawing, where like numerals indicate like elements, there is shown in FIGURE 1 a tablet dusting machine designated generally as **10**.

The tablet dusting machine **10** includes a tray **12**. The tray **12** is provided with an upright wall **14** at one end thereof, a bottom wall **16** and a hopper **18**. The hopper **18** is located at the opposite end of the tray from the upright wall **14**.

A vibrator **20** is mounted on a frame **22**. The vibrator **20** is preferably of the type having an electro-permanent magnetic drive. An output shaft **24** on the vibrator **20** is fixedly secured to a bracket **26** depending from the bottom wall **16** of the tray **12**. The output shaft **24** of the vibrator **20** is angled with relation to the longitudinal axis of the tray **12** as shown by the angle alpha. The angle alpha is an acute angle which, for example, may be twenty-five degrees.

A stepped-screen **28** is provided on the tray **12** and

extends substantially the full length of the tray **12**. The screen **28** comprises steps **30**, **32**, **34** and **36**. The steps **30** through **36** are separated by risers. Thus, step **32** is lower than step **30** and step **34** is lower than step **32**. The purpose for the riser and the steps **30** through **36** will be made clear hereinafter.

The machine **10** is preferably positioned with the screen step **30** adjacent a delivery chute **38** on a tablet making machine. Thus, tablets from a tablet making machine may be delivered by chute **38** onto screen step **30**. A collecting means **40** is positioned adjacent to and below the screen step **36**. The collecting means **40** may take the form of a container or may be a conveyor belt for delivering dusted tablets to a counting machine. An open top container **42** is positioned beneath the hopper **18**.

A pair of support plates **44** are provided. The plates **44** are positioned on opposite sides of the tray **12**, only one plate **44** is shown in FIGURE 1 for purposes of clarity. Preferably, the vibrator **20**, the hopper **18** and the container **42** are enclosed within a housing not shown. The support plates **44** are preferably fixedly secured to the housing which has not been shown in the drawing.

A pair of metal-encased static bars **46** and **48** extend over the screen **28** between the support plates **44**. As seen more clearly in FIGURE 1, the static bar **46** extends over the screen step **32** and static bar **48** extends over screen step **34**. A conduit **50** in communication with a source of low pressure dry air is provided. The conduit **50** is provided with outlet pipes **52** and **54** which extend across the screen **28** between the support plates **44**. The outlet pipes **52** and **54** are provided with a plurality of apertures along their peripheral surface so that a plurality of jets of dry air will be directed toward the screen steps **32** and **34**. The static bar **46** is positioned between the screen step **30** and the outlet pipe **54**. The static bar **48** is positioned between the outlet pipes **52** and **54**.

The conduit **50** is provided with a solenoid valve **56** which is operated by the solenoid coil **58**. A pressure regulator **60** is preferably disposed within the conduit **50**.

As seen more clearly in the schematic wiring diagram shown in FIGURE 2, the vibrator **20**, the static bars **46** and **48**, and the solenoid valve **56** are operable by a single three position switch **62**. As shown in FIGURE 2, the switch **62** is in an off position. When the switch **62** makes contact with the contacts **66** and **68**, current from the source **64** will pass through the vibrator **20** and the solenoid coil **58**. The speed of travel of the tablets along the screen **28** is varied by adjustment of the variable resistor **70**. It will be obvious to those skilled in the art that the same result may be accomplished by adjusting the frequency of vibrator **20** in any conventional manner.

When the switch **62** makes contact with the contacts **72** and **74**, current from the source **64** will pass through the vibrator **20**, the solenoid coil **58**, and the static bars **46** and **48**. A step-up transformer **78** is provided for stepping up the voltage necessary for operating the static bars **46** and **48**. A current limit resistor **76** is provided intermediate the contact **74** and the transformer **78** so as to decrease any possibility of danger to an operator. Preferably, the housing for the transformer **78** and the metal casings for the static bars **46** and **48** are grounded as shown in FIGURE 2. As shown more clearly in FIGURE 2, the static bars **46** and **48** are provided with a plurality of radially directed pins **80** having a sharp point at their extremity.

Referring to FIGURE 3, an alternative embodiment has been shown wherein the air in the conduit **50** is ionized prior to discharge through the outlet pipes **52** and **54**. A housing **82** is positioned in the conduit **50** intermediate the

pressure regulator 60 and the outlet pipes 52 and 54. The housing 82 is provided with an ionizing chamber 84. A static bar 86 is fixedly secured to the housing 82 with pins 88 extending into the ionizing chamber 84. Thus, the air being discharged to the outlet pipes 52 and 54 is ionized so that the static charge retaining dust on a tablet will be dissipated and blown off the tablet simultaneously.

In place of the static bar 86 and the pins 88, a radium or polonium cartridge may be substituted therefor. A cylindrical cartridge of polonium, radium or plutonium is positioned within the chamber 84 surrounding the flow passage and emit a radiation of alpha particles which are harmless externally. Alpha particles travel through the air very rapidly, producing in their path dense ionization which eliminates the static charge holding dust to a tablet.

The tablet dusting machine 10 is used in the following manner:

The tablet dusting machine is turned on by moving the switch 62 in a direction counter clockwise as shown in FIGURE 2. If it is desired to have vibration in combination with an air jet, the switch 62 is rotated so that it bridges the contacts 66 and 68. Proper positioning of the variable resistor 70 will cause the vibrator 20 to alternately push up and forward and then pull down and backward on the tray 12. The amplitude of the vibrator 20 should be correlated with the speed of delivery of tablets from the chute 38. Tablets from the chute 38 are delivered onto the screen step 30. Since the screen 28 is fixedly secured to the tray 12, the screen 28 moves with the tray 12. As the tray moves up and forward an upward and forward movement is imparted to the tablets on the screen step 30. This action is repeated, thereby moving the tablets on the screen step 30 in a series of small hops. When the tablets on the screen step 30 reach the riser between screen steps 30 and 32, the tablets are caused to flip over onto their reverse side.

As the tablets move along screen step 32, the jet of low pressure air from the outlet pipe 54 cooperates with the vibratory motion imparted to the tablets so as to remove dust from the uppermost surface of the tablets. When the tablets reach the riser between screen steps 32 and 34, the tablets are caused to flip over on their other side so that both sides of the tablet will be subjected to a jet of dry air. The tablets pass under the jet of air being emitted by conduit 50 and then flip over onto the screen step 36. From the screen step 36, the tablets are delivered onto the collecting means 40. Any dust which is removed from the tablets passing along the screen 28, is discharged through the hopper 18 into the container 42. The pressure regulator 60 in the conduit 50 maintains the air at a constant pressure which is adjustable from zero to one hundred pounds per square inch. Preferably, the supply of dry air should be approximately 0.05 cubic foot per minute so that the jet of air does not disturb the dust within the hopper 18 and the container 42.

At the same time that current is flowing to the vibrator 20, current will pass through coil 58 to operate the solenoid valve 56. If desired, the solenoid coil 58 and the solenoid valve 56 may be eliminated and a manual control valve substituted therefor.

If the switch 62 is rotated to a position bridging the contacts 72 and 74, the static bars 46 and 48 will eliminate the static charge on the dust adhering to tablets on screen 28 prior to the jet of low pressure air at the same time that the tablets and the screen 28 are being subjected to vibratory motion. The step-up transformer 78 steps up the voltage from the source 64 to approximately 7,500 volts. The presence of a high voltage at the sharp pins 80 on the static bars 46 and 48 ionizes the air to dissipate the static charge on the tablets. The tablets move from the screen step 30 to the collecting means 40 in the same manner as set forth above.

If the ionizing chamber is provided in the dry air supply conduit, the jet of air will simultaneously dissipate the static charge on the tablet and blow off any dust from the tablet.

The provision of the static eliminator in combination with the air jet and vibrator, provides up to 100% greater effectiveness in removing dust as compared with a jet of air and a vibrator. In addition, the provision of a static eliminator enables the dusting machine 10 to be positioned adjacent the outlet chute on a tablet making machine so that tablets may be passed from a tablet making machine directly to packaging machinery. Since a plurality of static eliminators and a plurality of outlet pipes for air have been provided, and since a step is provided on the screen 23 intermediate the sets of outlet pipes and static eliminators, both sides of a tablet will be subjected to ionized air and a jet of low pressure air. Therefore, the maximum amount of dust will be removed from tablets prior to being delivered to the collecting means 40. The control for the variable resistor 70 is preferably located adjacent to the switch 62. Once the variable resistor 70 is properly positioned and the switch 62 is moved to an operative position, the vibrator 20, the static bars 46 and 48, and the valve 56 operate without continual maintenance by an operator. Therefore, the dusting machine 10 is completely automatic.

The static bars 46 and 48 should be kept free from dust accumulation by periodically cleaning the pins 80. Accumulation of dust on the pins 80 tends to insulate them, thereby preventing their proper functioning.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. A tablet dusting machine comprising a tray, a screen on said tray, said screen having first and second steps lying in substantially parallel planes with the plane of said first step being above the plane of said second step, means including the distance between said planes for enabling a tablet on said first step to fall onto said second step in a manner so that the uppermost side of a tablet while on said first step is the lowermost side of said tablet while it is on said second step, a dust collecting portion on said tray beneath said screen, a first means above said first step on said screen for dissipating an electrostatic charge on one side of a tablet and for subjecting said one side to a jet of air, a second means above said second step on said screen for dissipating an electrostatic charge on another side of said tablet and for subjecting said other side to a jet of air, and a vibrator operatively engaged with said tray so that vibration of said tray causes tablets on said screen first step to hop along said screen first step and flip over onto said screen second step.

2. A tablet dusting machine in accordance with claim 1 wherein said first means includes a first static bar, a first outlet pipe positioned in a plane intermediate said first static bar and said second step, and said second means including a second static bar, a second air outlet pipe, said second static bar being positioned between said first step and said second outlet pipe.

3. A tablet dusting machine in accordance with claim 1 wherein said first and second means comprises an air supply conduit, a first air outlet pipe connected to said supply conduit and extending over said first screen step, a second air outlet pipe connected to said supply conduit and extending over said second screen step, an enclosed ionizing chamber in said supply conduit upstream from the connection between said supply conduit and said first and second air outlet pipes, and means in said chamber for ionizing the air passing to said first and second outlet pipes, whereby each side of tablets on said screen will be subjected to a jet of ionized air.

4. A tablet dusting machine in accordance with claim 3 wherein said means in said chamber is a plutonium cartridge.

5. A dusting machine in accordance with claim 3

wherein said means in said chamber is a static bar and sharp pins on said bar extending into said chamber.

6. A tablet dusting machine in accordance with claim 3 wherein said means in said chamber emits alpha particles.

7. A tablet dusting machine in accordance with claim 3 wherein said means in said chamber is an electrical ionization device.

8. A tablet dusting machine comprising a tray, a screen on said tray, said screen having first, second and third steps separated by upright risers, means including the height of said risers for enabling a tablet on one of said steps to fall onto the next adjacent step in a manner so that the uppermost side of the tablet while it is on said one step is the lowermost side of said tablet while it is on the next adjacent step, a dust collecting portion on said tray beneath said screen, said first screen step being adapted to be positioned beneath a delivery chute on a tablet making machine, a first means above said second step on said screen for dissipating an electrostatic charge on one side of a tablet and for subjecting said one side of said tablet to a jet of air, a second means above said third step on said screen for dissipating an electrostatic charge on another side of said tablet and for subjecting said other side of said tablet to a jet of air, and a variable amplitude vibrator beneath said tray, said vibrator having an output shaft operatively engaging said tray, the longitudinal axis of said output shaft and said tray forming an angle of approximately 25 degrees, whereby vibration of said tray causes tablets on said screen first step to hop along said screen and flip over on their reverse side each time it moves from one of said steps onto the next adjacent step of said screen.

9. A tablet dusting machine in accordance with claim 8 wherein said first and second means includes an air outlet pipe above said second and third steps of said screen, an air supply conduit connected to said outlet pipes, a solenoid operated valve in said conduit, and electrical circuitry for simultaneously supplying current to the solenoid coil in said solenoid valve and to said vibrator.

10. A tablet dusting machine in accordance with claim 9 wherein said electrical circuitry includes wires for supplying current to a step-up transformer, each of said first and second means including a static bar connected to output terminals on said transformer, and a three-way switch in said circuitry for selectively supplying current to either said vibrator in combination with said solenoid valve or said static bars in combination with said vibrator and said solenoid valve.

11. In a tablet dusting machine comprising an elongated tray, a screen on said tray, said screen having first and second ends, a dust collecting portion on said tray below said screen, a vibrator operatively engaged with said tray, said vibrator being disposed beneath said tray and forming and acute angle with the longitudinal axis of said tray so that vibration of said tray causes articles on said screen to move from said screen first end to said screen second end in a series of small hops, a static dissipator above said screen intermediate said screen first and second ends for dissipating an electrostatic charge on articles as they pass under said static dissipator, and an air outlet pipe above said screen between said static dissipator and said screen second end for directing a jet of dry air at said articles as they pass under said pipe so that dust on said articles will be blown into said dust collecting portion.

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