

Oct. 29, 1957

W. J. FRIDERICI
 APPARATUS FOR PREVENTING FLOCK BUILD-UP ON
 A FLOCKING MACHINE ELECTRODE
 Filed June 15, 1953

2,811,134

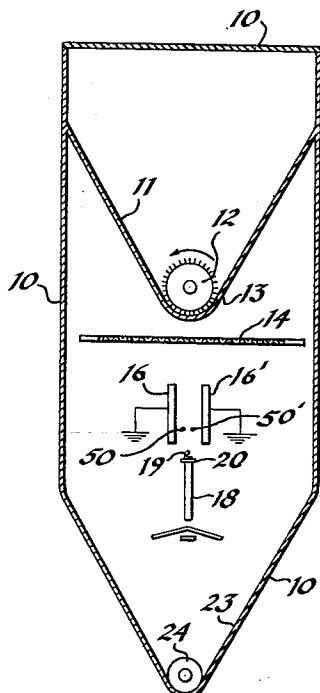


Fig. 1

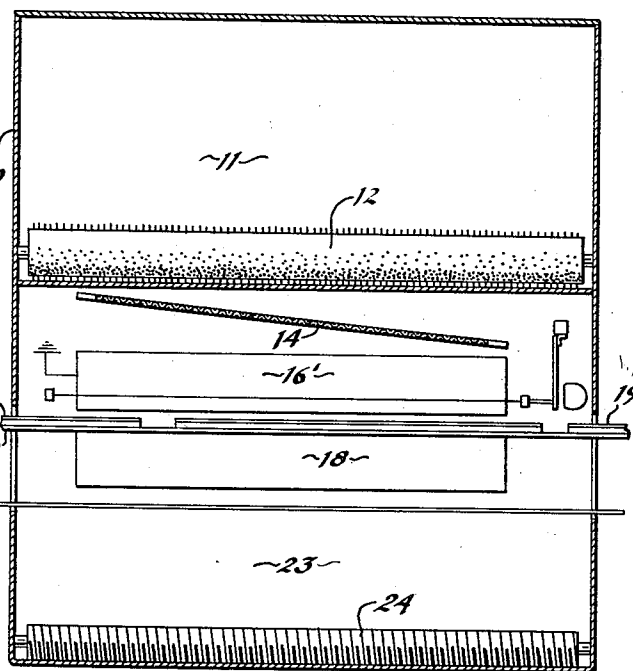


Fig. 2

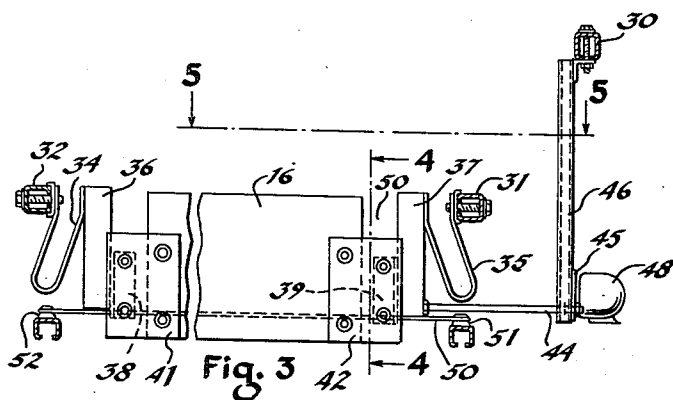


Fig. 3

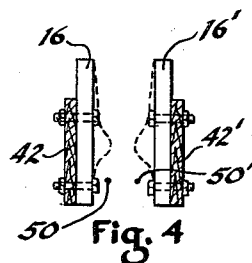


Fig. 4

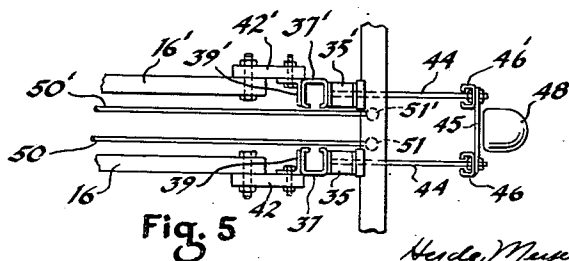


Fig. 5

INVENTOR.
 Wayne J. Friderici
 BY
 Heyde, Meyer, Baldwin & Doran
 ATTORNEYS

1

2,811,134

APPARATUS FOR PREVENTING FLOCK BUILD-UP
ON A FLOCKING MACHINE ELECTRODE

Wayne J. Friderici, Port Clinton, Ohio, assignor to The
Standard Products Company, Cleveland, Ohio, a cor-
poration of Ohio

Application June 15, 1953, Serial No. 361,791

10 Claims. (Cl. 118—636)

This invention relates to improvements in a flocking machine and more particularly to the electrodes in a flocking machine.

One of the objects of the present invention is to provide an electrode or electrodes in a flocking machine and adjacent structure thereto so constructed that the flock does not build up on the electrode or electrodes during operation.

A further object of the present invention is to provide an electrode with adjacent structure for a flocking machine characterized by the efficiency of its operation in preventing flock build-up on the electrodes, its structural simplicity and its economy of manufacture.

Other features of this invention reside in the arrangement and design of the parts for carrying out their appropriate functions.

Other objects and advantages of this invention will be apparent from the accompanying drawings and description and the essential features will be set forth in the appended claims.

In the drawings,

Fig. 1 is a vertical transverse sectional view through a flocking machine;

Fig. 2 is a vertical longitudinal sectional view through the flocking machine shown in Fig. 1;

Fig. 3 is a side elevational view of the electrodes above the article to be flocked which view is an enlargement of the upper two electrodes in Figs. 1 and 2;

Fig. 4 is a vertical sectional view of the upper electrodes taken along the line 4—4 of Fig. 3 with objectionable flock hill build-up, eliminated by this invention, shown by dotted lines; while

Fig. 5 is a top plan view of the electrodes in Fig. 3 taken along the line 5—5 of Fig. 3.

Before the flocking machine electrodes and adjacent structure thereto here illustrated are specifically described, it is to be understood that the invention here involved is not limited to the structural details or arrangement of parts here shown since flocking machine elements embodying the present invention may take various forms. It also is to be understood that the phraseology or terminology herein employed is for purposes of description and not limitation since the scope of the present invention is denoted by the appended claims.

While the present invention might be adapted to various types of machines and structures, it has been chosen to show the same as applied to a flocking machine of the conventional type that has a plurality of electrodes creating an electrostatic flocking field by a high alternating voltage for an electrostatic field of proper density for satisfactory flocking.

The flocking machine in general consists in Fig. 1 of an encasing outer wall 10, a hopper 11 for flock storage shown at the upper part of the machine, a rotating brush 12 or equivalent device located at the bottom of the hopper for dispensing the flock in a steady stream through one or more discharge openings 13 that may have a gate

2

controlled outlet for regulating the flow if desired, and a vibrating screen 14 therebelow for spreading the flock discharged from the hopper over the entire area. Inclined screen 14, grounded to the frame, vibrates horizontally so that flock particles will step along the screen for uniform distribution. A first electrical unit comprising two parallel electrodes 16, 16' straddles the useful flock flow that descends downwardly onto the work piece or article 19 to be flocked that is carried through the machine on conveyor belt 20 immediately above a second electrical unit comprising a hot, lower electrode 18 having the high potential thereon. The unused downwardly descending flock is caught in a receiving hopper 23 formed by the bottom of the outer wall 10 so that a rotating collecting screw 24 can carry the unused flock to one end of this receiving hopper 23 for reuse.

The electrodes 16, 16' and 18 are electrically connected together by an electrostatic flocking unit electrical circuit of any conventional design. Many flocking electrical circuits are well known to anyone versed in the art and any satisfactory circuit can be used. Satisfactory operation has been obtained by a 60 cycle alternating potential being impressed thereon with a 75,000 volt peak potential. The electrodes 16 and 16' are grounded to the flocking machine outer wall and frame while the hot electrode 18 has imposed thereon a high potential, alternating voltage with respect to the ground for forming an electrical field between the electrodes of proper density for satisfactory flocking.

It should also be understood that satisfactory operation will occur under some circumstances if the potentials on the electrodes are reversed with electrode 18 being grounded and with electrodes 16 and 16' being the hot electrodes and being interconnected so as to have the same potential.

It has been found in practice that the electrostatic field causes the flock descending between the electrodes 16 and 16' to form a hill of packed flock on each of the opposed inner surfaces on these electrodes, as shown by the dotted lines in Fig. 4. These hills not only disturb the electrostatic flocking field to impair the flocking performance of the machine but also break off in chunks to fall down upon the work piece 19. This invention is primarily concerned with the structure for obtaining a satisfactory electrostatic flocking field and for preventing the formation of the hills of flock on the electrodes.

The electrodes 16 and 16' are mounted on the flocking machine frame for reciprocation or relative movement with respect to the frame to prevent the build-up of the flock thereon. The flocking machine is composed of several supporting frame members secured to the outer wall 10 and forming the skeleton of the machine in general. Three of these interconnected supporting frame members are shown at 30, 31 and 32 in which each member is a substantially C-shape beam. The electrodes 16 and 16' are mounted for horizontal lengthwise reciprocation while straddling the useful downward flocking flow. Since the mounting for both the electrodes is substantially the same, only one will be described while the corresponding parts for the other will be shown by primed reference numerals. The outer arms of springs 34 and 35 are secured by bolted (illustrated), welded or other type connections to frame members 32 and 31 respectively and the inner arms are connected to the top of substantially C-shape, vertically extending beams 36 and 37 respectively by a welded or other satisfactory connection. The opposed faces of beams 36 and 37 have welded or otherwise secured thereto L-shape angle irons 38 and 39 respectively. Wood insulator blocks 41 and 42 are bolted at one end respectively to the members 38 and 39 while being bolted at the other end to opposite ends of electrode 16. Hence, parallel electrodes 16 and 16'

can reciprocate back and forth in approximately horizontal parallel lines straddling the flock flow path when the proper forces are applied thereto because each electrode will reciprocate in an approximately straight line.

Means is provided for vibrating or reciprocating both electrodes 16 and 16' back and forth at a rapid rate. As to electrode 16, a rod 44 is secured at its left end to the lower end of beam 37 and is secured at its right end to the lower end of a beam 46 with beam 46 secured at its upper end to the frame member 30 by a bolted or other satisfactory connection through a rubber mount to permit free vibration. A connecting head 45 is secured to and bridges the distance between beam 46 for electrode 16 and the corresponding beam 46' for electrode 16', as shown in Fig. 5. A vibrator 48, secured to the frame, is provided for causing the connecting head to move back and forth for reciprocating or vibrating the electrodes 16 and 16'.

For convenience and in no sense of limitation, an electromagnetic type of vibrator is shown at 48 for attracting and then releasing connecting head 45. However, it should be readily apparent that other satisfactory equivalent type vibrators, such as a rotating cam, may be used if desired. Beam 46 and its corresponding beam 46' have sufficient resiliency during deflection by the vibrator 48 for permitting the connecting head 45 to move toward the vibrator 48 and then for causing separation between the head and vibrator in the appropriate part of the vibration cycle.

It should be noted that electrodes 16 and 16' are reciprocated or vibrated lengthwise. Although transverse vibration will prevent flock hill build-up, there is always the possibility of forming one or more stationary waves thereby with no vibration at the nodes thereof so that flock build-up will occur at these nodes. This will not occur in lengthwise reciprocation. Also, in lengthwise reciprocation, the electrodes will be equidistant so that a uniform flocking field will result.

Supporting frame members 31 and 32 have secured thereto relatively stationary wires 50 and 50' extending between the electrodes 16 and 16' for creating a good electrostatic flocking field. These wires are approximately parallel to each other and to the approximately parallel electrodes 16 and 16' and are located in the flock flow path between the hopper 11 and the work piece being flocked that is shown at 19. These wires 50 and 50' are secured respectively to supporting frame member 31 by insulators 51 and 51' and to supporting frame member 32 by insulators 52 and 52'. It should now be apparent that the insulators 51, 51', 52 and 52' as well as the wood insulator block 41 and 42 provide insulator means between the electrodes 16, 16' and 18 and each of the wires 50 and 50' for preventing any induced electrical current flow between the wires and between either wire and the electrodes. However, these wires 50 and 50' may be satisfactory under some circumstances if grounded to the frame.

The operation of this portion of the flocking machine should now be readily apparent. As the flock flows downwardly on the vibrating screen 14 between the electrodes 16 and 16', the hot electrode 18, supported by the frame in the path of flock flow but downstream from electrodes 16 and 16' and the work piece or article 19 to be flocked, creates the proper electrostatic field for satisfactorily flocking article 19. The vibrator 48 reciprocates or vibrates the two electrodes 16 and 16' as a unit with each electrode moving in a plane approximately parallel to the direction of downward flock flow and in a general direction of travel approximately parallel to the stationary wires 50 and 50' and approximately perpendicular to the flock flow stream. Apparently, the flocking field, produced by the alternating high potential on electrodes 16, 16' and 18 cooperating with the stationary wires 50 and 50' and the rest of the structure in the flocking machine, prevents the build-up of hills of flock on the inwardly facing opposed

surfaces of electrodes 16 and 16', and also provides a most satisfactory electrostatic flocking field for uniform flocking of article 19. Hence, a satisfactory flocking will take place on article 19 even in the crevices therein since flock hills cannot build up to change the flocking electrostatic field and to break off under their own weight to come crashing down upon article 19 being flocked.

Various changes in details and arrangement of parts can be made by one skilled in the art without departing from the spirit of this invention or scope of the appended claims.

What I claim is:

1. In a flocking machine, a supporting frame, a pair of spaced approximately parallel electrodes mounted on said frame for relative movement with respect to said frame and straddling the flock flow path toward a work piece to be flocked, means for vibrating said two electrodes with respect to said frame, a third electrode supported by said frame in the path of flock flow but downstream from the first two electrodes and said work piece, and means operatively connecting said electrodes together with an electrostatic potential between at least two of them during at least a portion of the time for providing an electrostatic flocking field around said workpiece while flock is prevented from building up on said first two mentioned electrodes.

2. In a flocking machine, a supporting frame, a first electrical unit comprising a pair of spaced approximately parallel electrodes mounted on said frame for relative movement with respect to said frame while connected electrically together and straddling the flock flow path toward a work piece to be flocked, means for vibrating said two electrodes with respect to said frame, a second electrical unit comprising a third electrode supported by said frame in the path of flock flow but downstream from the first two electrodes and said work piece, and means operatively connecting said electrodes together with an electrostatic potential between said units during at least a portion of the time with at least one unit being grounded for providing an electrostatic flocking field around said workpiece while flock is prevented from building up on said first two mentioned electrodes.

3. In a flocking machine, a supporting frame, a first electrical unit comprising a pair of spaced approximately parallel electrodes mounted on said frame for relative movement with respect to said frame while connected electrically together and straddling the flock flow path toward a work piece to be flocked, means for reciprocating said two electrodes generally lengthwise with respect to said frame in a plane approximately parallel to the direction of flock flow and in a general direction of travel approximately perpendicular to the flock flow, a second electrical unit comprising a third electrode supported by said frame in the path of flock flow but downstream from the first two electrodes and said work piece, and means operatively connecting said electrodes together with an electrostatic potential between said units during at least a portion of the time with at least one unit being grounded for providing an electrostatic flocking field around said workpiece while flock is prevented from building up on said first two mentioned electrodes.

4. In a flocking machine, a supporting frame, a first electrical unit comprising a pair of spaced approximately parallel electrodes mounted on said frame connected electrically together to be at the same potential and straddling the flock flow path toward a work piece to be flocked, a wire located in the flock flow path and supported by said frame between said electrodes, a second electrical unit comprising a third electrode supported by said frame in the path of flock flow but downstream from the first two electrodes and said work piece, and means operatively connecting said electrodes and wire together with an electrostatic potential between said units during at least a portion of the time with at least one unit being grounded for

5

providing an electrostatic flocking field around said workpiece while a good electrostatic flocking field will be formed.

5. In a flocking machine, a supporting frame, a first electrical unit comprising a pair of spaced approximately parallel electrodes mounted on said frame connected electrically together and straddling the flock flow path toward a work piece to be flocked, two approximately parallel wires between said electrodes, each wire located in the flock flow path and supported by said frame and extending approximately parallel to said electrodes, a second electrical unit comprising a third electrode supported by said frame in the path of flock flow but downstream from the first two electrodes and said work piece, and means operatively connecting said electrodes and wires together with an electrostatic potential between said units during at least a portion of the time with at least one unit being grounded for providing an electrostatic flocking field around said workpiece while a good electrostatic flocking field will be formed.

6. In a flocking machine, a supporting frame, a first electrical unit comprising a pair of spaced approximately parallel electrodes mounted on said frame connected electrically together and straddling the flock flow path toward a work piece to be flocked, two approximately parallel wires between said electrodes, each wire located in the flock flow path and supported by said frame and extending approximately parallel to said electrodes, a second electrical unit comprising a third electrode supported by said frame in the path of flock flow but downstream from the first two electrodes and said work piece, insulator means between said electrodes and said wires for preventing electrical flow between the wires and electrodes, and means operatively connecting said electrodes and wires together with an electrostatic potential between said units during at least a portion of the time with at least one unit being grounded for providing an electrostatic flocking field around said workpiece while a good electrostatic flocking field will be formed.

7. In a flocking machine, a supporting frame, a pair of spaced approximately parallel electrodes mounted on said frame for relative movement with respect to said frame and straddling the flock flow path toward a work piece to be flocked, a wire located in the flock flow path and supported by said frame between said electrodes, means for vibrating said two electrodes with respect to said frame, and means operatively connecting said electrodes and wire together and applying an electrostatic flocking field during at least a portion of the time around said workpiece while flock is prevented from building up on said two electrodes and a good electrostatic flocking field will be formed.

8. In a flocking machine, a supporting frame, a pair of spaced approximately parallel electrodes mounted on said frame for relative movement with respect to said frame and straddling the flock flow path toward a work piece to be flocked, two approximately parallel wires located between said electrodes, each wire located in the flock flow path and supported by said frame and extending approximately parallel to said electrodes, means for vibrat-

6

ing said two electrodes with respect to said frame, and means operatively connecting said electrodes and wires together and applying an electrostatic flocking field during at least a portion of the time around said workpiece while flock is prevented from building up on said two electrodes and a good electrostatic flocking field will be formed.

9. In a flocking machine, a supporting frame, a pair of spaced approximately parallel electrodes mounted on said frame for relative movement with respect to said frame and straddling the flock flow path toward a work piece to be flocked, two approximately parallel wires located between said electrodes, each wire located in the flock flow path and supported by said frame and extending approximately parallel to said electrodes, means for reciprocating said two electrodes generally lengthwise with respect to said frame in a plane approximately parallel to the direction of flock flow and in a general direction of travel approximately parallel to the wires and approximately perpendicular to the flock flow, and means operatively connecting said electrodes and wires together and applying an electrostatic flocking field during at least a portion of the time around said workpiece while flock is prevented from building up on said first two mentioned electrodes and a good electrostatic flocking field will be formed.

10. In a flocking machine, a supporting frame, a pair of spaced approximately parallel electrodes mounted on said frame for relative movement with respect to said frame and straddling the flock flow path toward a work piece to be flocked, two approximately parallel wires located between said electrodes, each wire located in the flock flow path and supported by said frame and extending approximately parallel to said electrodes, means for reciprocating said two electrodes generally lengthwise with respect to said frame in a plane approximately parallel to the direction of flock flow and in a general direction of travel approximately parallel to the wires and approximately perpendicular to the flock flow, insulator means for preventing electrical flow between the wires and between the wires and electrodes, and means operatively connecting said electrodes together and applying an electrostatic flocking field during at least a portion of the time around said workpiece while flock is prevented from building up on said first two mentioned electrodes and a good electrostatic flocking field will be formed.

References Cited in the file of this patent

UNITED STATES PATENTS

50	2,173,032	Wintermute	Sept. 12, 1939
	2,174,328	Meston et al.	Sept. 26, 1939
	2,222,539	Meston	Nov. 19, 1940
	2,270,341	Ransburg	Jan. 10, 1942
	2,287,837	Smyser	June 30, 1942
55	2,356,489	Amstuz	Aug. 22, 1944
	2,358,227	Hiers	Sept. 12, 1944
	2,491,889	Bennett et al.	Dec. 20, 1949
	2,523,618	Gilman	Sept. 26, 1950
	2,576,276	Berglund	Nov. 27, 1951
60	2,658,472	Ransburg	Nov. 10, 1953