March 10, 1942. G. T. HART, JR., ET AL 2,275,431

CONVEYER SYSTEM

Filed Jan. 24, 1939 3 Sheets-Sheet 1

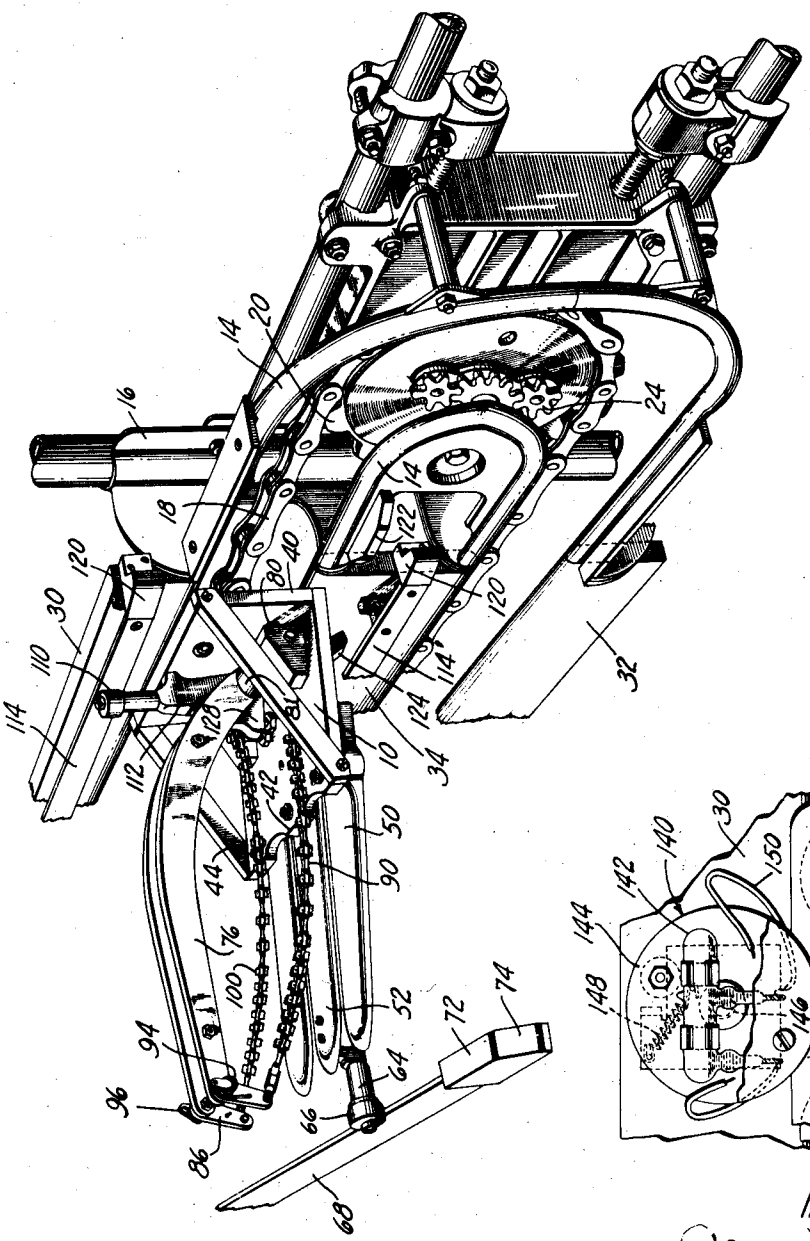


Fig. 1

Fig. 2

INVENTORS
George T. Hart, Jr.
Charles E. Winkley
By their attorney
M. Leonard Coakley

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CONVEYER SYSTEM

Filed Jan. 24, 1939 3 Sheets-Sheet 2

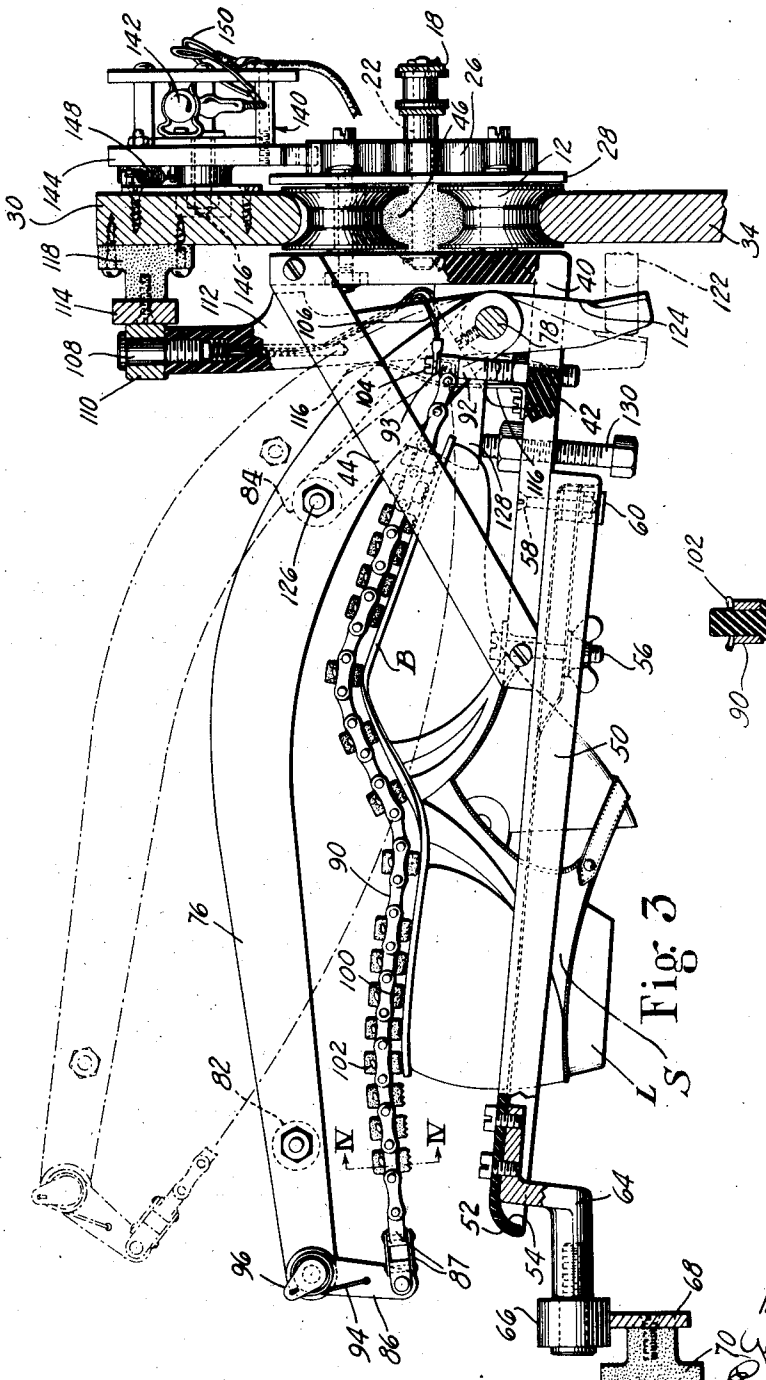


Fig. 3

Fig. 4

INVENTORS
George T. Hart, Jr.
Clarence E. Winkley
By their attorney

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CONVEYER SYSTEM

Filed Jan. 24, 1939 3 Sheets-Sheet 3

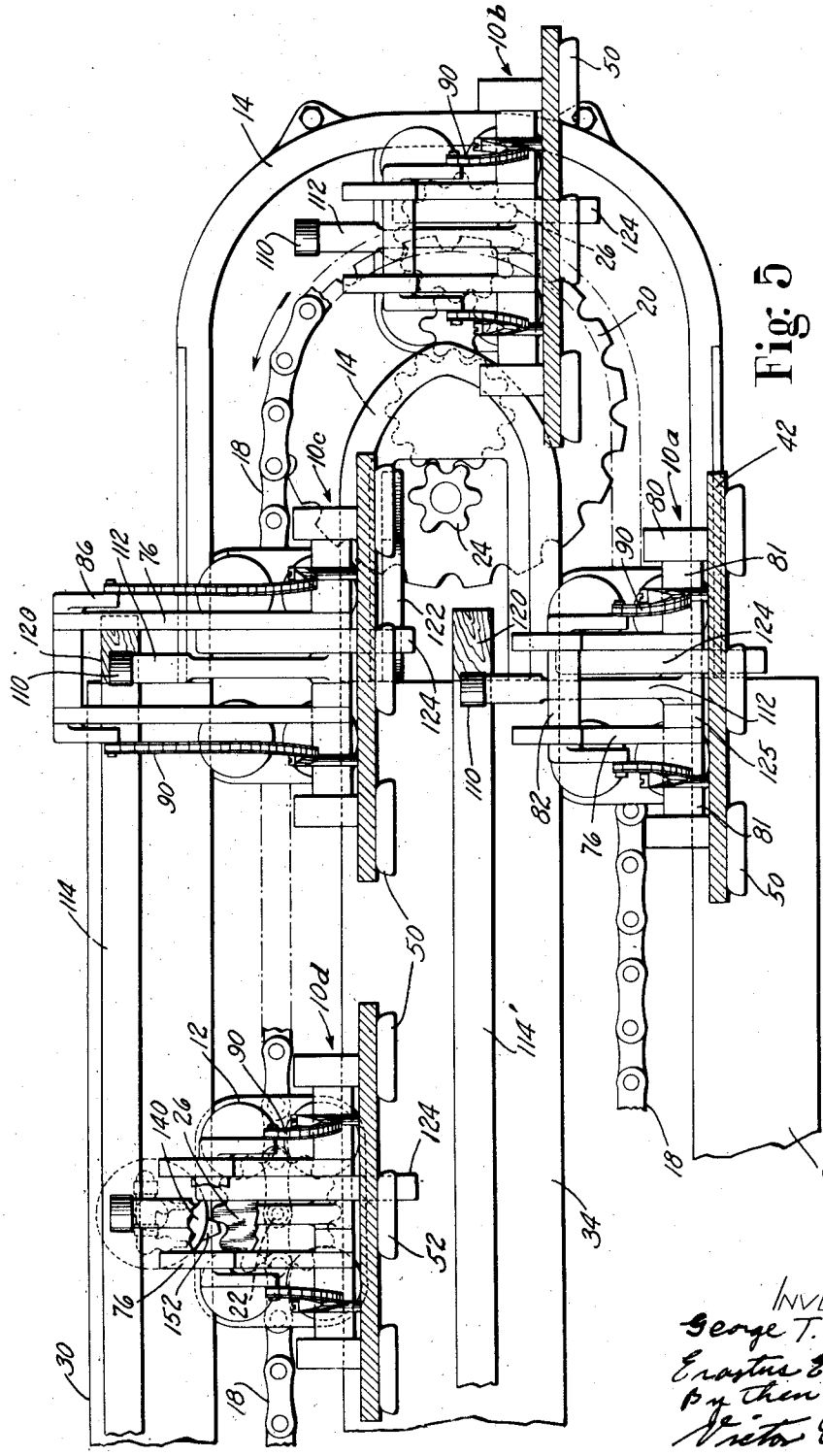


Fig. 5

INVENTOR:
George T. Hart Jr.
Erastus E. Winkley
by their attorney
Victor Cobb.

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UNITED STATES PATENT OFFICE

2,275,431

CONVEYER SYSTEM

George T. Hart, Jr., and Erastus E. Winkley, Lynn, Mass., assignors to United Shoe Machinery Corporation, Borough of Flemington, N. J., a corporation of New Jersey

Application January 24, 1939, Serial No. 252,606

6 Claims. (Cl. 34—1)

This invention relates to conveyer systems and more especially to a conveyer system in which a series of articles carried by the conveyer are subjected to the action of an electrostatic field produced by high frequency current. The embodiment of the invention, which is illustrated herein, is designed for the treatment of shoes and particularly for the drying of the soles of shoes which have been tempered in the course of manufacture, but it will be understood that the invention is not limited to use for shoe drying.

Some shoemaking operations, such as channeling and sewing, for example, require the sole of the shoe to be in temper while for other finishing operations, it is important that the sole be substantially dry. The conditioning of shoes where drying is necessary entails substantial expense in the manufacture of the shoes because of the equipment, such as shoe lasts, shoe racks and the like, which is tied up during this period and because, furthermore, a substantial amount of capital is represented in the shoes themselves and a loss is caused if any unnecessary time is required for the drying operation. On the other hand, this operation cannot be unduly hastened because of the harmful effect on the leather of the shoes if the temperature applied is too high or if the drying progresses rapidly at first and a case-hardening effect is produced on the surface of the leather.

The utilization of a high frequency electrostatic field for heating, and hence drying shoes is particularly desirable, due to the fact that the drying action of such a field starts at the inner portions of the material just as soon as it starts on the outside surface thereof. It will be understood that the larger part of the moisture is found in the sole of the shoe and it is necessary that the drying shall not harm the quality of the material in the sole, especially in view of the fact that this portion is subjected to the greatest wear. With the use of such an electrostatic field for drying shoes, the leather is not casehardened and is even more supple and in better condition than when the drying is carried out in the usual ways.

One convenient way of handling shoes, which are to be dried, is found in the use of a carrier or conveyer in which a series of shoe supports, or cars, are provided and in which suitable electrodes are associated with the cars in a manner permitting the interposition of shoes between the electrodes. The loading of wet shoes on these cars and the removal of those which have become dry is best undertaken when the connection to the source of supply of electrical current is interrupted.

Accordingly, an object of the invention is to provide an improved conveyer system which shall be efficient for use in connection with the treating of articles on the conveyer by high frequency current.

A feature of the invention will be recognized, in the illustrated arrangement, where rails on insulated supports extend along a portion of the tracks of the coveyer and where the electrodes on the cars are supplied from these rails, in a switch for interrupting the supply of current when a car is moving out of electrical connection with the rails. Preferably, the loading station will be at a point where the car has left the rails.

For convenience in loading and unloading articles such as shoes, one of the electrodes, associated with each car, is carried by a tiltably mounted arm and, in accordance with another feature of the invention, means are provided for tilting this arm away from the shoe support at a predetermined point, such as at the loading station. These and other features of the invention will now be described in the following specification, taken in connection with the accompanying drawings, in which

Fig. 1 is an angular view of a portion of a conveyer system and showing a car moving away from the observer just after it has left the loading station;

Fig. 2 is a detail, in elevation, as seen from the rear of Fig. 1, and showing the operation of an electric switch by contact with a passing car;

Fig. 3 is a side elevation of one of the cars with a shoe positioned therein and showing, in section, the rails for supporting the car;

Fig. 4 is a detail section on the line IV—IV of Fig. 3 through one of the insulators attached to a chain forming an electrode; and

Fig. 5 is a diagram of a portion of the conveyer system to show the relation of the cars to one another and to the switch.

The conveyer illustrated in the drawings is of the type shown in Letters Patent of the United States No. 2,132,362, granted October 4, 1938, on an application of J. E. Regan, to which reference may be had for a description of such parts of the conveyer as are not fully shown and described herein.

It will be understood that the invention is not limited to this particular type of conveyer but may be embodied in other shoe supporting structures of the carrier type. As in the patented construction, each car 10, provided with four

spaced grooved pulleys 12 (Figs. 2 and 3), is mounted to travel on parallel bars 14 (Fig. 1) which are carried on a support 16. The travel of the cars is effected by a driven chain 18 carried on sprockets, such as that shown at 20, this chain being connected to a pin 22 (Fig. 3) projecting from each car. It is intended that the cars shall remain in a horizontal position regardless of whether they are traveling on the straight portions of the bars 14 or are passing around the curved ends, interconnecting upper and lower runs of the endless conveyer. This is effected, as in the patented construction, by pinions 24 rotatable with the sprocket 20 and cooperating with a fixed sprocket 26 fixedly secured to a plate 28 forming part of the car. As it is desirable that a minimum of metal be employed in the conveyer construction near to the electrical fields, tracks of dielectric material 30 and 32 having their inner edges rounded and a similar track 34 having both edges rounded, have been used to form a continuation of and a substitute for portions of the bars 14.

Each of the cars has a body portion made up of a back 40, a base 42 and connecting struts 44 which are preferably of dielectric material, one common form of which is the phenol condensation product known as Bakelite. The pulleys 12 are mounted on studs interconnecting the backs 40 with the plates 28 and a spacing member 46 (Fig. 3) is employed through which extends the pin 22.

The arrangement is such that a pair of shoes may be supported in inverted position on each car 10 in the spaces formed between outer supporting members, herein termed "paddles" 50, and a center paddle 52. Each of these paddles, which may conveniently be constructed of Bakelite, with rounded outer ends and upper surfaces, is provided on its under face with an electrode 54 (Fig. 3) which may conveniently be formed of metallic foil adhesively secured in a recess in the under side of each paddle. All three paddles are attached to the base 42 of the car structure by bolts 56 (Fig. 3) having wing nuts and also by bolts 58, which latter are also employed for the retention of a metallic strip 60 (Fig. 3) interconnecting the electrodes under the three paddles. The electrodes attached to the under sides of the paddles are electrically connected to one side of a high frequency source by an arm 64 screwed to the under side of the middle paddle 52 and carrying a roller 66 which rides on one or the other of parallel rails 68, only one of which has been shown. Aside from their electrical function, the rails furnish a mechanical support to steady the cars in their travel. These rails, one for the upper and one for the lower run of the conveyer, are mounted on insulators 70 attached to a portion of the frame, which is not shown, and are electrically connected to one side of a high frequency oscillator (not shown) forming the source of electricity. Each of the rails terminates in a block 72 having an inclined end portion 74 to enable the rolls 66 to leave the rail at the bottom and to move on to the rail at the top with a minimum of disturbance to the apparatus.

Each car is also provided with a swinging carrier 76 having parallel arms mounted to pivot on a rod 78 (Fig. 3) held in brackets 80 secured in the corner between the backs 40 and bases 42 of the cars. Spacers 81 on the rod 78 position the carrier with respect to the car. The arms are held in spaced relation to one another by sleeves 82 and 84 and each arm has at its outer end a pivoted depending finger 86 to which is attached a swivel joint 87 at one end of a chain forming another electrode 90 adapted to be attached to the other side of the high frequency source. The other end of this chain has a swivel link 93 swinging on the reduced upper end of a bolt 92 mounted in the base 42 and is kept from sagging too greatly when no shoe is in position in the car by a coil spring 94 positioned between the finger 86 and a crank arm 96 attached to the carrier 76. It will be noted that the chain is of the type commonly known as a sprocket chain and that it is shape-conforming so that it may readily assume a contour substantially parallel to the contour of the sole B of a shoe S mounted on a last L and supported in inverted position between one of the outer paddles 50 and the center paddle 52. Contact of the chain electrode 90 with the sole B is not desired because of the sparking which would result and the consequent damage to the sole by this sparking. Accordingly, a series of insulating blocks 100 is provided in the links of the chain, each of these blocks having a serrated bottom portion (Fig. 3) so as to permit a free-evaporation of the moisture in the sole, and a reduced upper portion passing between the links of the chain and held therein by a cotter pin 102. A great number of insulating blocks 100 is provided near the ends of the shoe sole B than at its mid portion, thus making sure that the links of the chain will never contact with the work, as might result if the blocks were put only between every other pair of links. It will be realized that the tension provided by the spring 94 is purposely not sufficient to keep the chain rigidly extended, but only enough to keep it under control, because of the desire to have the chain li ks assume a position substantially equi-distant from the sole B.

The swivel 93 at the right end of the chain electrode 90 is held on the reduced portion at the top of the pin 92 by a screw 104 which serves also to attach one end of a wire lead 106, the other end of which is attached to a screw stud 108 forming the fulcrum for a roll 110. This roll is adapted to turn freely on the upper end of an arm 112 of dielectric material which is arranged to pivot on the cross rod 78 and the roll is held in contact with a live rail 114 by a leaf spring 116 pressing against the arm. The rail 114, which is connected to the other side of the oscillator, is mounted on insulators 118 attached by screws to the upper track 30. A similar rail 114' is mounted on the middle track 34. At the end of each of these rails is a block 120 having an inclined portion to enable the roll 110 to ride on to the rail 114 or leave the rail 114' smoothly.

In order to facilitate the loading and removal of shoes on the cars, provision is made for tilting the swinging carriers 76 which support the upper electrodes 90 and this is done automatically at a predetermined work-station by a cam 122 (Fig. 1). This cam is arranged to contact with the lower end of a lever 124 pivoted on the rod 78 immediately beside the roll carrier 112, the hub 125 of whcih (Fig. 5) occupies the remaining space between the arms. The upper end of this lever is connected to the arm 76 by a bolt 126 which also passes through the spacer sleeve 84 so that the lever constitutes in effect an extension of the arms. On the under side of this lever 124 is a lug 128. When the electrode-carrying arms 76 are in their normal and lowered position, shown in full lines in Fig. 3, the lug 128 contacts with

the top of an adjustable stop screw 130 threaded in the bottom portion 42 of the car and held in adjusted position by a lock nut. By adjusting this stop screw 130 and also adjusting the heightwise position of the screw 92 carrying the right end of chain electrode 90, it is possible to adapt the car for shoes of various sizes and styles. The cam 122 is positioned at a point, which may be called a loading station, just before the roll 110 contacts with the live rail 114 and, as a result, the upper chain electrode 90 is de-energized at the time when the carrier arms 76 are raised for the removal of one pair of shoes and their replacement by another pair.

To avoid any danger of drawing an arc between the rolls 66 and 110 associated with each car and the live rails 68 and 114 as these rolls leave or approach the rails, an arrangement has been provided for momentarily shutting off the supply of current at these times. The cars are symmetrically arranged on the conveyor and, for this reason, the shutting off of the power may be carried out by a single switch 140 which may be in the plate circuit of the input side of the oscillator by which power is supplied to the live rails. This switch 140 comprises a tube 142 partially filled with mercury, the tube being mounted in a frame 144 tiltable about a stud 146 (Figs. 2 and 3) suitably positioned on the track 30. The tube has leads 150 connected in the proper circuit. When the frame 144 is tilted against the tension of a spring 148 the mercury runs to one end of the tube and the connection is broken. The tilting of the switch frame 144 is effected by the engagement of a sprocket 26 on one of the cars with a lug 152 extending downwardly from said frame. It is unimportant whether the location of the switch on the track 30 brings it opposite to the sprocket 26 on the first or the second or some other car beyond the car 10c (Fig. 5) at the loading station. All that is necessary is that the length of chain 18 between the cars shall be such that one car 10a is brought to a point where it is leaving the rail 114', and a lower rail 68 (not shown), just after the switch is opened by another car 10d and at the same time that some car 10c is brought to a point where it is just moving on to the rails 114 and 68. The arrangement is shown diagrammatically in Fig. 5, where the car 10c is just leaving the loading station and the electrode carrier 76 is being lowered as the lever 124 passes off the cam 122. The switch 140 is about to be tilted to open the circuit before the car 10a leaves the rail 114'.

As each car reaches the loading station, the carrier arms 76 for the upper electrodes 90 will be raised by the action of the cam 122, permitting a pair of shoes to be inserted between the paddles 50 and 52. At this time, too, the rolls 66 and 110 do not contact with the live rails 68 and 114, thus removing any possibility of accidental shock or sparking during the positioning of the shoes. The conveyer chain 18 will commonly be driven at a constant, slow speed, and there will be a sufficient interval while the car is at the loading station for the removal of a pair of shoes which has been dried and the placing on the car of shoes with wet soles. The newly loaded car will then move into the active section of the conveyer, in which the electrodes will be energized from the live rails 68 and 114 and an electrostatic field passed between the electrodes 54 and 90 to effect the drying of the soles in a well understood manner.

The arrangement of electrodes which has been illustrated herein has not been claimed, because it forms the subject-matter of a copending application filed in our names, Serial No. 252,604, filed January 24, 1939, concerning improvements in Electrodes for shoe-treating apparatus.

Having thus described our invention what we claim as new and desire to secure by Letters Patent of the United States is:

1. In a conveyer system, a plurality of article-supporting cars, tracks supporting the cars, electrodes on the cars between which an electrostatic field may be produced intersecting articles thereon, insulated rails extending along only a portion of said tracks and adapted to be connected to a source of high-frequency alternating current, means for electrically connecting said electrodes to said rails, and a switch constructed and arranged to interrupt automatically the supply of current to said rails during the period when a car is moving out of electrical connection therewith.

2. In a conveyer system, tracks having straight portions connected by curved portions, a series of cars having supports for articles and mounted to travel along said tracks, said cars being symmetrically spaced along the tracks, insulated rails extending along only the straight portions of the track and adapted to be connected to a source of high-frequency alternating current, electrodes on the cars between which an electrostatic field may be produced intersecting articles carried thereby, means for electrically connecting said electrodes to said rails, and a switch for interrupting the supply of current to said rails arranged for operation by one car to break the circuit when another car is leaving a portion of the rails.

3. In a conveyer system, a plurality of article-supporting cars, tracks supporting the cars for movement past at least one work-station, electrodes on the cars between which an electrostatic field may be produced intersecting articles thereon, one of said electrodes being mounted for movement toward and away from the article on the car, means for supplying high frequency current to said electrodes, car-operated means to render said latter means ineffective at a station of the conveyer, and means for separating said movable electrode from an article on the car at said station.

4. In a conveyer system, a series of cars arranged for movement past at least one work-station and having supports, electrode-supporting arms tiltably mounted on said cars and having rigid extensions, shape-conforming electrodes on said arms and adapted to be brought into operative relation to shoes on the supports, other electrodes cooperating with said tiltable electrodes to provide, when energized, electrostatic fields intersecting said shoes, tracks for said cars, and cam means supported near said tracks at a predetermined station of the system and acting on the arm extension for a car to tilt the electrode away from a shoe-support on that car.

5. In a conveyer system, tracks for cars, a series of cars arranged to be moved consecutively past a loading station adjacent to said tracks, electrodes tiltably mounted on said cars and adapted to be brought into operative relation to articles supported on the cars, other electrodes on the cars, said electrodes cooperating to pass electrostatic fields through said articles, means for connecting said electrodes to a source of high-

frequency electric current, means operated by a car for opening said connecting means, and a cam positioned adjacent to said loading station and coacting with the tiltable electrode on the car which is passing the loading station to tilt it away from a support on the car.

6. In a conveyer system, a series of cars having supports, tracks for the cars, tiltably mounted arms on said cars having an extension, electrodes supported by said arms and adapted to be brought into coacting relation with articles on the cars, other electrodes on the cars, said electrodes cooperating to pass electrostatic fields through said articles, a connecting means common to said electrodes adapted to be joined to a supply of high-frequency electric current, switch means adapted to be operated by a car for opening said common connecting means at a predetermined time, and a cam positioned adjacent to said tracks to coact with said arm extension to lift the arm at a predetermined point in the travel of the conveyer.

GEORGE T. HART, JR.
ERASTUS E. WINKLEY.