Oct. 14, 1952 A. B. SIMON 2,613,611

REMOVING LINT BY VARIABLE-SPEED TRAVELING BLOWER

Filed April 10, 1946 2 SHEETS—SHEET 1

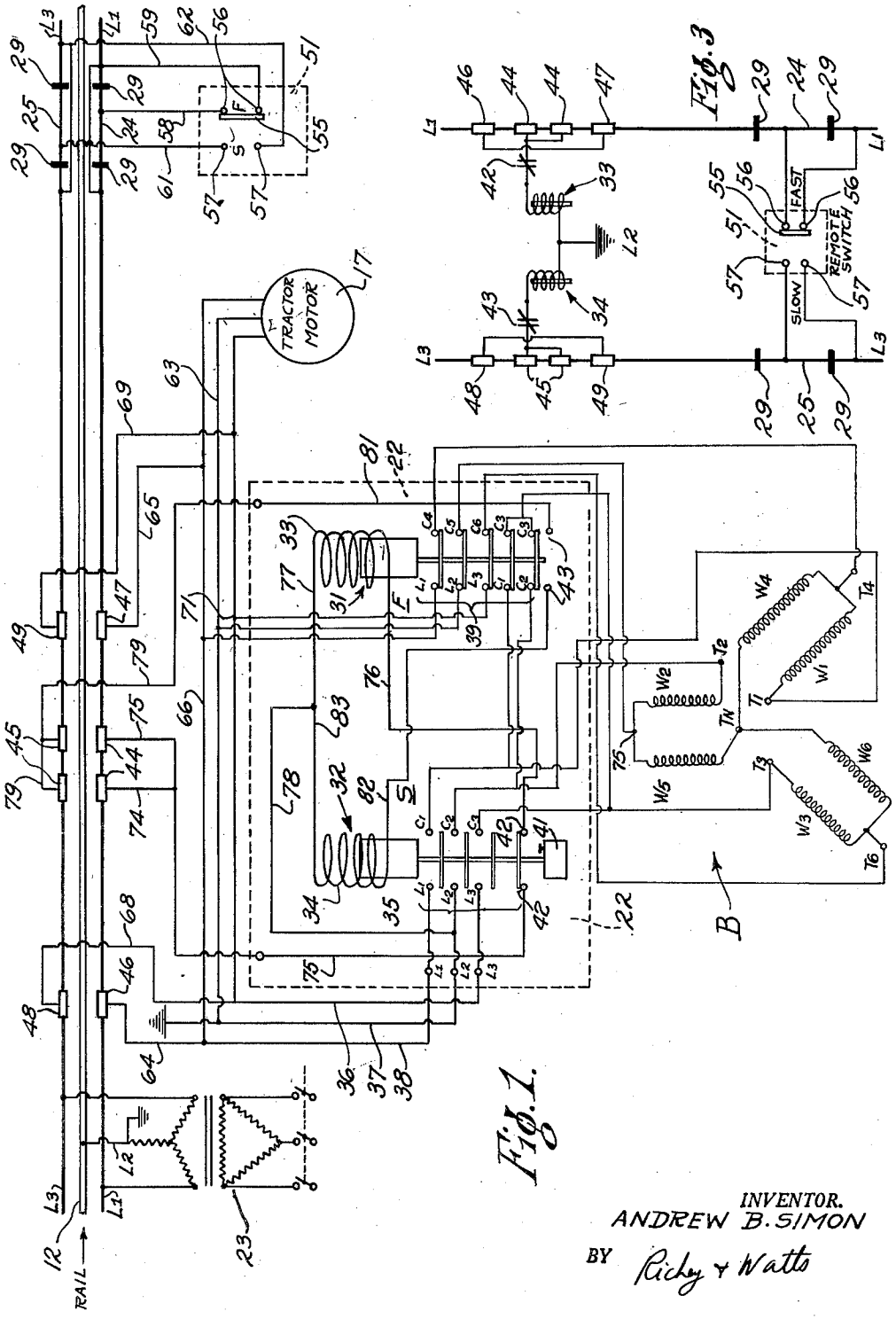


Fig. 1.

Fig. 3

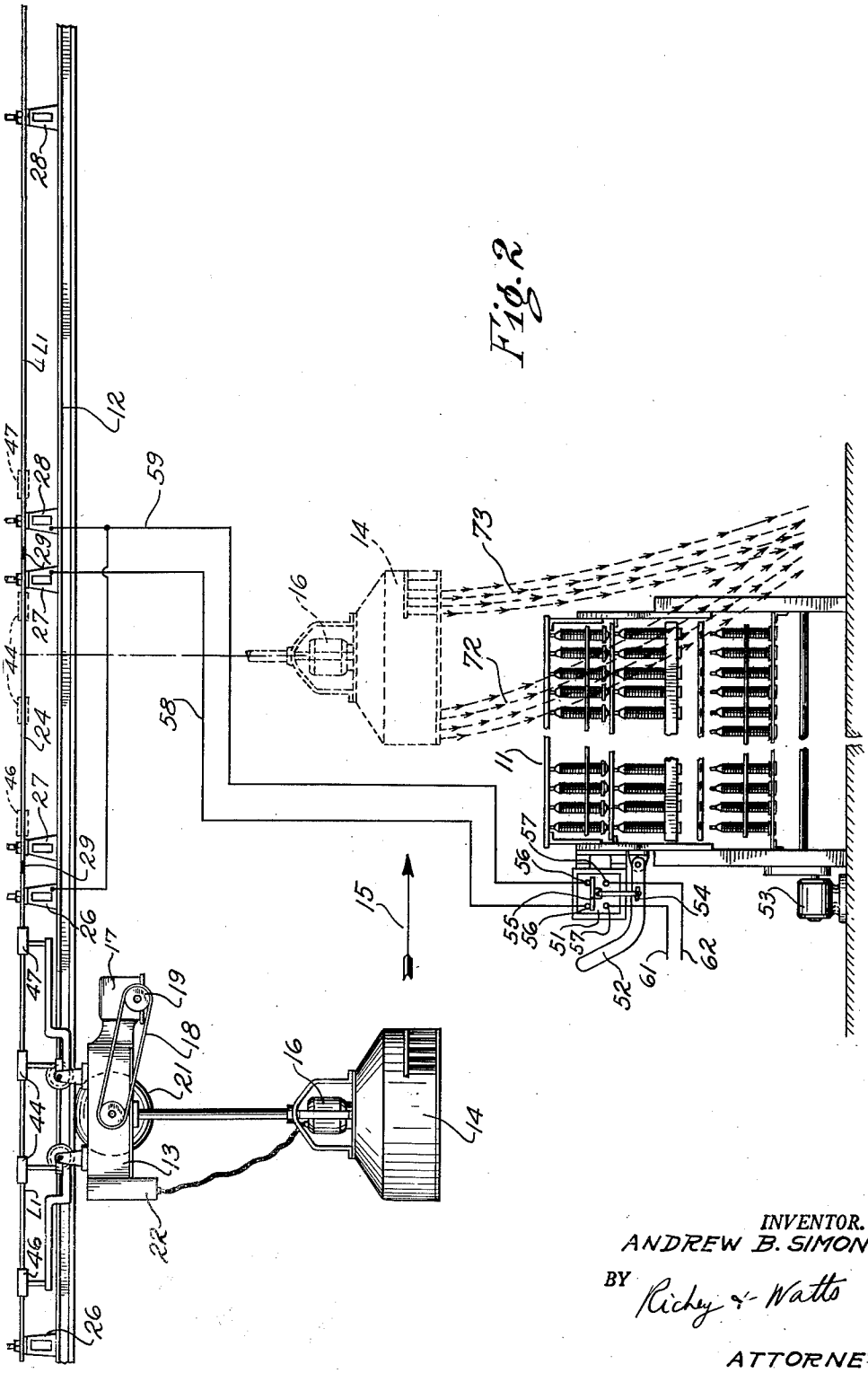
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Fig. 2



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2,613,611

REMOVING LINT BY VARIABLE-SPEED TRAVELING BLOWER

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8 Claims. (Cl. 104—150)

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My invention relates to blowers and blowing methods and concerns particularly lint blowing methods or systems and the like for keeping textile machinery, such as spinning machines, e. g., or other apparatus, free from lint and other air borne foreign material.

It is an object of my invention to keep all of the machines in a textile machinery or spinning room free from lint without damaging or breaking yarn in any machines which may be shut down.

A more specific object of my invention is to blow air across each machine in the room, one after another, with sufficient intensity to clear the running machines substantially of lint accumulated subsequent to the previous subjection of the machines to the air blast. On the other hand, it is an object to reduce the intensity of air blast whenever applied to a machine which has been shut down in order to avoid damaging the rovings or breaking the yarn in the case of spinning machines.

It is an object of the invention to cause the passage of a two-speed blower along a continuous path above a row or rows of textile machines and to cause the blower to operate at high speed or low speed according to whether the machine against which the air blast is directed is running or is idle.

A further object of the invention is to control track- or trolley-fed electrical machinery, remotely if desired, according to the position on the track of apparatus rolling thereon.

Still another object of the invention is to provide a multi-speed motor carried along a track with remote controls for causing operation of the motor at a selected speed for which the remote control is set whenever the carriage moving along the track is in predetermined segments of the track.

Other and further objects, features and advantages of the invention will become apparent as the description proceeds.

In carrying out my invention in accordance with a preferred form thereof for maintaining spinning frames clear of lint, I employ a blower of the type described in Patents 2,378,361 C. de V. Miller and 2,175,608 J. P. Lawrence and E. Szekely. The blower is mounted upon a carriage arranged to travel upon an endless track so that the blower travels along rows of spinning frames above different frames successively for directing blasts of air downwardly over the spinning frames as the carriage travels along in the manner explained in the aforesaid patents.

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In order that the intensity of the air blast may be reduced whenever the blower passes over any idle machine or spinning frame, I provide a two-speed electric motor for driving the blower and I provide a speed controller responsive to remote-control selector switches associated with the spinning frames. In order to render the speed-control responsive to selector-switch settings, trolley wires or bus bars are employed having lengths insulated from the motor-energizing electric power supply, or "dead" sections, above successive spinning frames. Each "dead" section is associated with one of the remote-control speed selector switches. The controller is provided with control windings so connected to trolley wheels or shoes that the controller is transferred to the slow-speed position whenever the trolley shoes run on to a trolley "dead" section for which the remote control switch has been set to the "slow-speed" position.

A better understanding of the invention will be afforded by the following detailed description considered in conjunction with the accompanying drawings in which

Fig. 1 is a partial circuit diagram schematically representing an embodiment of my invention;

Fig. 2 is a fragmentary side view of a continuous-track lint blower for a spinning room, embodying my invention, showing one of the spinning frames; and

Fig. 3 is an elementary circuit diagram explanatory of the principle of operation of the apparatus of Fig. 1.

Like reference characters are utilized throughout the drawing to designate like parts.

For the sake of simplifying the drawing, only one spinning frame 11 is shown and it is represented fragmentarily. Only a portion of a single-rail track 12 is shown for supporting a carriage 13, carrying a lint blower 14. It is to be understood, however, that in practice spinning machines such as the spinning frame 11 are arranged in a plurality of rows in a spinning room and the track 12 is arranged above the rows of spinning frames looping back and forth to follow each row and return to a starting point, thus forming an endless track as disclosed in the patents mentioned. The blower 14 may also be of the type having a blade-enclosing housing as disclosed in said patents, by which air currents are produced in downward and forward direction with respect to the direction of travel of the carriage 13 indicated by the arrow 15.

A multi-speed blower motor 16 is provided for rotating the fan blades (not visible) of the blower 14 and a traction motor 17 is provided for pro-

pelling the carriage 13 along the track 12. As shown, a belt drive 18 is provided for coupling the traction-motor pulley 19 to a traction wheel 21. The carriage 13 also supports a controller 22 for the blower motor 16.

For supplying power to the blowing apparatus, three-phase alternating electrical current is preferably provided. As shown in Fig. 1, there is a three-phase delta-Y connected insulating step-down transformer 23 and a three-phase trolley or bus-bar system connected to the secondary windings of the transformer 23. The trolley system, as shown, comprises the rail 12, serving as a neutral or grounded conductor, and a pair of live conductors or trolley bars or wires L_1 and L_3.

The trolley bars L_1 and L_3 have insulated segments or "dead" sections 24 and 25, respectively, to correspond to each of the spinning frames 11. Preferably the trolley bars L_1 and L_3 are composed of copper or other suitable conductor material of such dimensions as to be rigid enough to be mounted as bars on insulated supports 26, 27 and 28 carried by brackets, not shown, secured to the ceiling or to framework supporting the rail 12. Insulating pieces 29 are interposed between ends of the dead sections 24 or 25 and the remainder of the trolley bars L_1 or L_3 as shown in Fig. 2 and schematically indicated in Figs. 1 and 3.

The blower motor may be of any suitable type whereby different speeds may be obtained by changing electrical connections thereof. For example, it may be of the consequent-pole or of the separate-winding type. Such motors provide different absolute speeds without changing direction of rotation. In Fig. 1, the contactor arrangement of a speed controller suitable for consequent-pole motors has been schematically represented. The controller 22, as shown, comprises a high-speed-connection producing contactor 31 and a low-speed-connection producing contactor 32, having actuating windings 33 and 34, respectively. The low-speed contactor 32 is provided with a set of power contacts 35, shown as connected to current-supply line conductors 36, 37 and 38, the line 37 being grounded. Similarly the high-speed contactor 33 has a set of power contacts 39. The contacts 35 and 39 are normally open, leaving the motor windings de-energized unless one of the controller windings 32 or 33 is energized.

My invention is not limited to any particular type multi-speed motor or specific connections therefor. Nevertheless, for the sake of illustration, I have shown the connections for a consequent-pole type, two-speed, variable-torque induction motor, commonly used for such loads as fans and blowers, as this type of motor and connections has given satisfactory results in my apparatus. I have shown a blower motor B having six windings W_1, W_2, W_3, W_4, W_5 and W_6, grouped in pairs. The windings in each pair are adapted to be connected either in series for a given number of poles or to be connected effectively in parallel one-half the number of poles, to produce either low speed or high speed operation. Thus, the slow speed contactor S has stationary contacts C_1, C_2 and C_3 corresponding respectively to stationary contacts L_1, L_2 and L_3, being connected to end terminals T_1, T_2 and T_3 respective of the windings W_1, W_2 and W_3. The windings W_1 and W_4 are connected in series between the terminals T_1 and the neutral terminal T_N. Likewise, the windings W_2 and W_6 are connected in series between the terminals T_2 and T_N and the windings W_3 and W_5 are connected between the series T_3 and T_N. The high speed or fast contactor F also has a plurality of stationary contacts L_1, L_2 and L_3 respectively connected to the same lines as the corresponding contacts of the contactor S. Corresponding to the stationary contacts L_1, L_2 and L_3 are stationary contacts C_4, C_5 and C_6, connected respectively to motor terminals T_4, T_5 and T_6. For causing the motor terminals T_1, T_2 and T_3 to be connected together when the contactor F is energized, it is provided with additional stationary contacts C_1, C_2 and C_3, connected respectively to the motor terminals T_1, T_2 and T_3. From the diagram it would be apparent that when the winding 32 is energized and the winding 31 is deenergized, the movable contacts of the contactor S close connections from the line 38 to terminal L_1, C_1 and T_1; likewise from the line 37 to the terminals L_2, C_2 and T_2, and from the line 36 to terminals L_3, C_3 and T_3. The other terminals of the motor, T_4, T_5 and T_6 are left open owing to the fact that the contactor F is deenergized.

However, when the contactor S is deenergized and the contactor F is energized, the movable contacts of the contactor F close connections between terminals L_1 and C_4 to motor terminal T_4; and likewise close connections between terminals L_2 and C_5 to motor terminal T_5, and between terminals L_3 and C_6 to motor terminal T_6. The two lowermost movable contacts of the contactor F close a connection from the terminal C_1 to C_3 and from C_2 to C_3 thereby connecting motor terminals T_1, T_2 and T_3 together. It is to be understood that in this type of motor the windings W_1, and W_4 are so wound that when connected in parallel for high speed operation, they act aiding so as to form a smaller number of poles but when connected in series, the action of one of the windings is reversed so as to double the number of poles. A similar relation exists between the windings W_2 and W_6 and between the windings W_3 and W_5.

In order to give preference to the high-speed connection in case both windings 33 and 34 should be energized, interlocks are provided and the contactor 31 is designed or adjusted to be faster acting upon energization than the contactor 32. For example, a dash-pot 41 may be fitted to the contactor 32 for retarding closure of the contacts 35. Preferably both mechanical and electrical interlocks are provided, the former not being shown. The electrical interlocks take the form of normally closed contacts 42 carried by the armature of the contactor 32 and connected in series with the winding 33 of the contactor 31, and corresponding normally closed contacts 43 in series with the winding 34.

Suitable contact shoes are provided for electrically connecting the trolley bars or wires to the controller windings 31 and 32 and to the motor power input terminals. They include a pair of contact shoes 44 for supplying current from the trolley bar L_1 to the controller winding 33 and a pair of contact shoes 45 for supplying current from the trolley bar L_3 to the controller winding 34. Preferably pairs of shoes are provided instead of single shoes in order to avoid faulty action in case one of the shoes of a pair should drop or bounce out of contact with the trolley bar. Similarly a pair of shoes 46 and 47 is provided for connecting the trolley line L_1 to the power input terminals of the controller 22 and to the tractor motor 17. Likewise a pair of contact shoes 48 and 49 is provided for making the power connection to the trolley line L_3. The contact shoes 46

and 47 and also the contact shoes 48 and 49 are spaced further apart than the length of any "dead" section 24 or 25 of the trolley bars in order that power will always be available to the motors 16 and 17.

For the purpose of causing either high-speed or low-speed operation of the blower motor 16 when the carriage 13 enters a "dead" section of the trolley above a given spinning frame, remote speed-control switch means 51 are provided. Only one such switch is illustrated in the drawings, but it will be understood that a separate switch is provided for each trolley "dead" section corresponding to a separate spinning frame or machine. The switch 51 may be a manual switch which an operator sets to "fast" or "slow" positions marked "F" and "S," respectively, according to whether the spinning machine in question is running or shut down. Preferably, however, the operation of the switch 51 is made automatic upon shutting down or starting up a spinning machine. Such machines are customarily controlled by what is known as a "shipper bar," schematically represented for the sake of simplicity in Fig. 2 of the drawing as a lever 52, which operates a clutch or controls a separate spinner drive motor 53 by means not illustrated. For causing the remote speed control switch 51 to operate simultaneously with the shipper bar 52, a suitable connection such as a link 54 is provided.

The switch 51 comprises a movable contact strip 55 co-operating with pairs of stationary contacts 56 and 57. The stationary contacts 56 for the "F" position are connected by means of conductors 58 and 59 to the trolley dead section 24 and the live trolley bar L_1, respectively. Likewise, the stationary contacts 57 for the "S" position are connected by conductors 61 and 62 to the "dead" section 25 and the live trolley L_3.

Since the track rail 12 is grounded, connection from the line L_2 of the power source to the corresponding power terminals of the blower-motor speed controller 22 and the tractor motor 17 takes place through the grounded conductors 37 and 63. The shoes 46 and 47 are connected to the controller 22 and the motor 17 through a pair of conductors 64 and 65 and conductors 66 and 38. Likewise, the contact shoes 48 and 49 are provided with conductors 68, 69, 71 and 36.

Each pair of "dead" trolley bars 24 and 25 is preferably so located in relation to the spinning machine 11, to be protected, that the contact shoes 44 and 45 both reach the dead bar before the air blast of the blower 14 has reached the machine in question. As illustrated in Fig. 2 the blower 14 directs jets or currents of air downwardly and forwardly along paths represented by arrows 72 and 73.

As soon as power is supplied to the transformers 23, the tractor motor 17 starts. If the contact shoes 44 and 45 are on a live part of the trolley bars, both blower motor control windings are energized. Nevertheless, the contactor 31 being faster operating, picks up first and cuts out the contactor 32 by opening its control circuit through the contacts 43. When the blower 14 is in the position shown in full lines in Fig. 2 it operates at full speed regardless of the position of the switch 51. However, as it approaches the spinning frame 11, the contact shoes 44 and 45 run on to the "dead" bars 24 and 25. If the contacts 55 and 56 of the switch 51 are closed, the speed controller winding 33 for fast operation remains energized, a circuit being formed through conductors L_1, 59, 55, 56, 58, 24, 44, 74, 75, contacts 42, conductor 76, winding 33, conductors 77, 78 and 37 to ground return. The blower continues to operate at full speed as it travels over the machine 11 to and beyond the position illustrated in dashed lines.

On the other hand, if the machine 11 is shut down and the contacts 55 and 57 of the selector switch 51 are closed, the contacts 56 being open, the winding 33 loses energization. The contact 31 drops out. Thereupon the winding 34 is energized through a circuit including the conductive elements L_3, 62, 57, 55, 61, 25, 45, 79, 81, 43, 82, 34, 83, 78 and 37 to ground return. The contactor 32 closes its contacts 35. Accordingly, the blower motor 16 operates at low-speed until the idle machine 11 and the trolley "dead" sections have been passed by the blower carriage 13.

While I have described my invention as embodied in concrete form and as operating in a specific manner in accordance with the provisions of the Patent Statutes, it should be understood that I do not limit my invention thereto, since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

What I claim is:

1. A blower system comprising in combination a track, a carriage adapted to move along the track, a propelling motor in said carriage, a two-speed blower motor supported by said carriage, a pair of trolley bars along said track, a source of current connected to said trolley bars, said trolley bars having "dead" sections therein, insulated from the remainder of said trolley bars and from said current source, remote speed-control switch means for selectively connecting one or the other of said "dead" sections to the remainder of the corresponding trolley bars, a motor speed controller having alternative control windings, one serving upon energization to connect the blower motor for high-speed operation and the other serving upon energization to connect the blower motor for low-speed operation and being slower acting than the high-speed control winding, contact shoes carried by said carriage, one of said contact shoes connecting said trolley bars to said propelling motor for continuous operation thereof and to said motor speed controller, and another set of shoes connecting said trolley bars to said control windings, whereby, when the latter set of contact shoes contacts the "dead" sections of the trolley bars, speed controller operation is responsive to the setting of said remote speed-control switch means.

2. A blower system comprising in combination a track, a carriage adapted to move along the track, a two-speed blower motor supported by said carriage, a pair of trolley bars along said track, a source of current connected to said trolley bars having "dead" sections therein, insulated from the remainder of said trolley bars and from said current source, remote speed-control switch means for selectively connecting one or the other of said "dead" sections to the remainder of the corresponding trolley bars, a motor speed controller having alternative control windings, one serving upon energization to connect the blower motor for high speed operation and the other serving upon energization to connect the blower motor for low-speed operation and being slower acting than the high-speed

control winding, contact shoes carried by said carriage, one of said contact shoes connecting said trolley bars to said motor speed controller and another set of shoes connecting said trolley bars to said control windings whereby, when the latter set of contact shoes contacts the "dead" section of the trolley bars, speed controller operation is responsive to the setting of said remote speed-control switch means.

3. A blower system comprising in combination a track, a carriage adapted to move along the track, a multi-speed blower motor supported by said carriage, a plurality of trolley bars along said track, a source of current connected to said trolley bars, said trolley bars having "dead" sections therein, insulated from the remainder of said trolley bars and from said current source, remote speed-control switch means for selectively connecting one or the other of said "dead" sections to the remainder of the corresponding trolley bars, a motor speed controller having alternative control windings, each serving upon energization to connect the blower motor for operation at a predetermined speed, contact shoes carried by said carriage, one of said contact shoes connecting said trolley bars to said motor speed controller and the other set of shoes connecting said trolley bars to said control windings whereby, when the latter set of contact shoes contacts the "dead" sections of the trolley bars, speed control operation is responsive to the setting of said remote speed-control switch means.

4. A blower system comprising in combination a carriage adapted to move along a predetermined path, a multi-speed blower motor supported by said carriage, a pair of trolley bars along said path adapted to be connected to a source of current, said trolley bars having "dead" sections, therein, insulated from the remainder of said trolley bars, remote speed-control switch means for selectively connecting one or the other of said "dead" sections to the remainder of the corresponding trolley bars, a multi-speed controller having alternative control windings, each one serving upon energization to connect the blower motor for one of a plurality of different speeds of operation, interlocks for preventing the operation at a given instant, of more than one of said control windings and preventing simultaneous connection of said blower motor for more than one of said speeds of operation, contact shoes carried by said carriage, one of said contact shoes connecting said trolley bars to said motor speed controller and another set of shoes connecting said trolley bars to said control windings, whereby, when the latter set of contact shoes contacts the "dead" sections of trolley bars, speed-controller operation is rendered responsive to the setting of said remote speed-control switch means.

5. A blower system comprising in combination a carriage adapted to move along a predetermined path, a multi-speed blower motor supported by said carriage, a pair of trolley bars along said path adapted to be connected to a source of current, said trolley bars having "dead" sections therein, insulated from the remainder of said trolley bars, remote speed-control switch means for selectively connecting one or the other of said "dead" sections to the remainder of the corresponding trolley bars, a multi-speed controller having alternative control windings, each one serving upon energization to connect the blower motor for one of a plurality of different speeds of operation and each of said control windings having a different rapidity of response to energization whereby only one speed connection is formed upon energization of the control windings in the event of simultaneous energization of more than one of said control windings, contact shoes carried by said carriage, one of said contact shoes connecting said trolley bars to said motor speed controller and another set of shoes connecting said trolley bars to said control windings, whereby, when the latter set of contact shoes contact the "dead" sections of trolley bars, speed-controller operation is rendered responsive to the setting of said remote speed-control switch means.

6. A blower system comprising in combination a carriage adapted to move along a predetermined path, a plurality of trolley bars arranged along the said path and adapted to be connected to a current source for applying actuating current to the carriage along the path of travel of the carriage and each bar including conductors and dead sections interposed between the conductors for interrupting current flow along the bars, a multi-speed blower-motor and a controller therefor supported by said carriage, contact shoes secured to said carriage adapted to connect said trolley bars to said motor controller, the controller including a plurality of windings connected to the contact shoes, each winding having a set of contacts associated therewith, and each set of contacts being operatively connected between the contact shoes and the motor, excitation of a winding serving to determine a speed of the motor, and means for controlling the currents in the bars to actuate said controller comprising switch means connected to the conductors and to the associated dead sections of the bars.

7. A motor control system for a device which is moving along a predetermined path comprising in combination a carriage supporting the device, a track along said predetermined path adapted to support the carriage, a plurality of trolley bars arranged along the said track and adapted to be connected to a current source for applying actuating current to the carriage along the path of travel of the carriage and each bar including conductors and dead sections interposed between the conductors for interrupting current flow along the bars, a multi-speed motor having a plurality of speeds in the same direction; and a speed controller therefor supported by said carriage, contact shoes secured to said carriage adapted to connect said trolley bars to said motor controller, the controller including a plurality of windings connected to the contact shoes, each winding having a set of contacts associated therewith, and each set of contacts being operatively connected between the contact shoes and the motor, excitation of a winding serving to determine a speed of the motor, and means for controlling the current in each of the bars to actuate said controller comprising switch means connected to the conductors and the associated dead sections of each of the bars.

8. A speed control system comprising in combination a track, a carriage adapted to move along the track, a multi-speed motor supported by said carriage, said motor having a plurality of speeds in the same direction, a plurality of trolley bars along said track, said trolley bars having "dead" sections therein, insulated from the remainder of said trolley bars and from said current source, remote speed-control switch

means for selectively connecting one or the other of said "dead" sections to the remainder of the corresponding trolley bars, a motor speed controller having alternative control windings, each serving upon energization to connect the motor for operation at a predetermined speed, contact shoes carried by said carriage, one of said contact shoes connecting said trolley bars to said motor speed controller and the other set of shoes connecting said trolley bars to said control windings whereby, when the latter set of contact shoes contacts the "dead" sections of the trolley bars, speed control operation is responsive to the setting of said remote speed-control switch means.

ANDREW B. SIMON.

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