

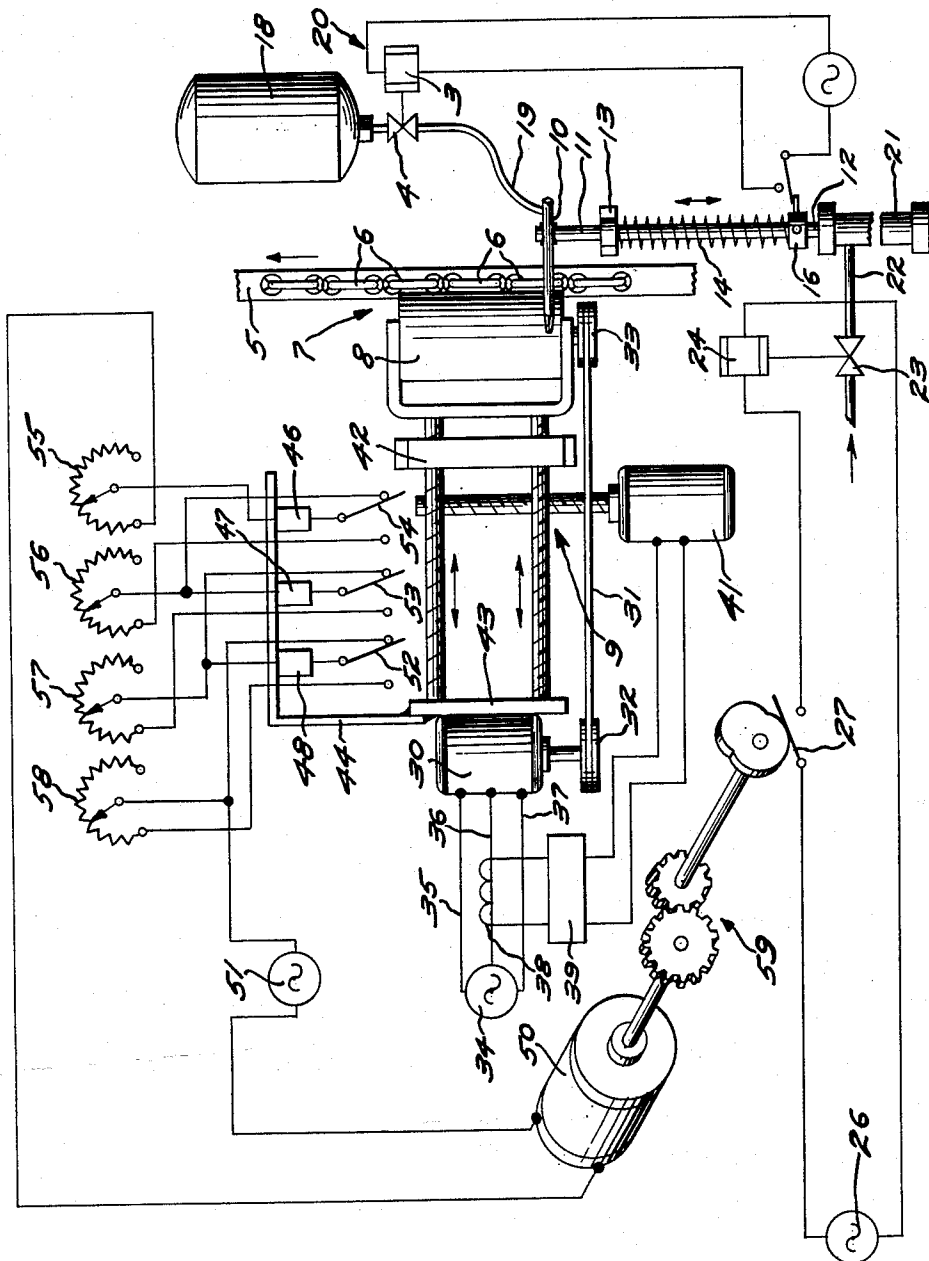
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BUFFING APPARATUS CONTROL SYSTEM

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1

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BUFFING APPARATUS CONTROL SYSTEM

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This invention relates to a buffing apparatus control system and more particularly to a system to control the cyclic period of operation of a buffing compound applicator device in accordance with an advance of a buffing wheel to compensate for the wearing down of the buffing wheel.

In the use of buffing wheels, it is necessary to supply a uniform amount of buffing compound during buffing operations. This is accomplished by the use of an applicator such as a gun or a solid bar of buffing compound that cyclically moves over the buffing wheel at periodic intervals. As buffing operations are continued, the wheel wears down consequently presenting less peripheral area to receive the buffing compound. Manifestly, if a uniform amount of buffing compound is to be periodically applied, then it is necessary to reduce the frequency of operation of the applicator gun.

It is a prime object of this invention to provide a new and improved control system for a buffing apparatus.

Another object of this invention is to provide a control system for a buffing apparatus having a plurality of rheostats which are selectively introduced into the field circuit of a control motor that functions to increase the time interval between periods for applying buffing compound to a buffing wheel to compensate for the wear on the wheel.

A further object of this invention is to provide a current-sensitive device that functions to advance a buffing wheel to compensate for the wear on the wheel and simultaneously render electrical apparatus effective for reducing the frequency of operation of a device which is utilized to apply buffing compound to the wheel.

With these and other objects in view, the present invention contemplates a control system that simultaneously compensates for wear on a buffing wheel and reduces the frequency of application of buffing compound to the decreased peripheral area of the buffing wheel. The control system contains a plurality of rheostat control switches that are secured to an L-shaped support member which is in turn mounted on the buffing wheel control apparatus. As the entire buffing wheel apparatus is automatically advanced to compensate for wear on the wheel, the several rheostats are successively introduced into the field circuit of a motor which functions to control the operation of the applicator gun. These rheostats are introduced into the field of the motor by switch closures resulting from the engagement of the rheostat control switches with a stationary buffing apparatus supporting member. As the rheostats are successively introduced into the motor circuit, the speed of the motor is reduced thereby increasing the intervals between successive operations of the buffing compound applicator gun.

Other objects and advantages of the invention will be apparent from the detailed description when considered in conjunction with the accompanying drawing wherein the single figure is a schematic view of a buffing appa-

2

ratus control system forming one embodiment of the invention.

Referring to the drawing, there is disclosed a conveyor 5 that is provided with a plurality of evenly spaced fixtures for transporting telephone handset handles or other parts 6 through a buffing station generally designated by the numeral 7. The buffing station comprises, among other things, a buffing wheel 8 secured to a drive screw apparatus 9 operating in conjunction with frame member 42 and a buffing compound applicator gun 10. The applicator gun 10 is mounted on a rod 11 for reciprocating movement with a piston rod 12. A bearing 13 is stationarily mounted to provide a support means for and through which the rod 11 can freely pass and to further provide an abutment against which a return spring 14 is compressed during advancement of the rod 11 and a member 16 secured thereto. The apparatus which advances the applicator gun 10 along the periphery of the buffing wheel 8 includes a pneumatic cylinder 21, a supply line 22, a valve 23 and a solenoid 24. Pneumatic pressure is supplied to the cylinder 21 through the supply line 22 upon actuation of the valve 23. The valve 23 is rendered effective by the energization of the solenoid 24. Energizing current is supplied to the solenoid 24 from a source 26 upon closure of the cam-operated switch 27.

Buffing compound applied to the wheel 8 by the gun 10 is supplied from a tank 18 through a supply line 19. The rate of advancement of the gun across the periphery of the wheel 8 due to the application of pneumatic pressure to the cylinder 21 is approximately equal to the rate at which the gun 10 is returned to an initial position due to the resilient action of the spring 14. A switch-solenoid-valve arrangement generally designated by the numeral 20 insures that the buffing compound is applied to the wheel 8 at a uniform rate and precludes the discharge of compound when the gun 10 returns to an initial position by opening the energizing circuit for the solenoid 3 that functions to control the operation of the valve 4.

The buffing wheel 8 is rotated at a uniform rate by a motor 30 in cooperation with a belt 31 and pulleys 32 and 33. Three-phase power is supplied to the motor 30 from a source 34 through a plurality of conductors 35, 36 and 37. The amount of pressure that is applied to a handset handle 6 being buffed by the wheel 8 is reflected in the amount of current drawn from the source by the motor 30. In order to compensate for the wearing down of the buffing wheel 8, a pick-up coil 38 which encompasses the conductor 36 is provided. As the buffing wheel wears down, the current drawn by the motor 30 will be decreased; consequently, the energy induced in the pick-up coil 38 is reduced. Reduction in the amount of energy induced in the pick-up coil 38 is reflected in a control device 39 which functions to selectively operate a motor 41. The device 39, which is utilized to selectively control the motor 41, is of the type disclosed in the patent to P. B. Belcourt, No. 2,386,649. Upon actuation by the control device 39, the normally inoperative motor 41 renders the drive screw arrangement 9 effective to advance the buffing wheel 8 toward the handsets 6 on the conveyor 5. The advance of the entire apparatus, including the wheel 8, the drive screw arrangement 9 and the motor 30 which is mounted on the support member 42, will be precluded when the buffing wheel pressure is sufficient as reflected in the amount of current drawn from the source 34. When this occurs, the amount of energy induced in the pick-up coil 38 will be of sufficient magnitude for rendering the control device effective to preclude further operation of the motor 41.

A member 43, which is interposed between and has secured thereto the motor 30 and the drive screw arrangement 9, has an L-shaped support member 44 mounted

thereupon. The support member 44 has a plurality of switches 46, 47 and 48 secured thereto. These switches 46, 47 and 48 are positioned within the field circuit of a series universal motor 50 that functions to control the operation of the cam-operated switch 27. A source 51 supplies power to the motor 50. The circuit may be traced from the source through a contact 52 of the switch 48, the switch 48, a contact 53 of the switch 47, the switch 47, a contact 54 of the switch 46, the switch 46, a rheostat 55 and through the motor 50 to the other side of the source. The series universal motor 50 rotates at a speed determined by the amount of resistance in the field circuit thereof; consequently, the rheostat 55 is utilized to control the initial speed of the motor. If the amount of resistance in field circuit is increased, the speed of the universal motor 50 tends to decrease. As the buffing wheel 8 wears down and is advanced toward the handsets 6 due to the operation of the motor 41, the member 44 similarly advances and results in the successive operation of switches 46, 47 and 48 to successively introduce into the field circuit of the motor 50 an increasing amount of resistance in variable rheostats 56, 57 and 58. The introduction of this additional resistance to the field circuit of the motor 50 tends to decrease the speed at which the motor is operated. This decrease in speed is reflected directly in the cam-operated switch 27 through a gear network 59. As a result, the cam-operated switch 27 is less frequently closed and the operation of the solenoid 24 is similarly affected resulting in less frequent passes of the applicator gun across the decreasing periphery of the wheel.

Mode of operation

As a plurality of telephone handset handles is moved through the buffing station generally designated by the numeral 7 on the conveyor 5, the handles are buffed by the wheel 8. Buffing compound is supplied to the wheel 8 as the applicator gun 10 is cyclically moved axially of the wheel. After numerous handles have passed through the buffing station 7, the wheel 8 has worn down to a point that necessitates the actuation of compensating means to advance the wheel 8 closer to the workpieces on the conveyor.

As illustrated in the accompanying drawing, the wheel 8 is secured to the drive screw apparatus 9 and is in turn mounted on the member 42. The wheel 8 is driven at a constant speed by the motor 30 through the pulley-belt arrangement 31-33. As the wheel wears down and the amount of pressure exerted on the wheel by the handles passing through the station is decreased, the amount of current drawn by the motor 30 is reduced. This reduction in current flow is reflected directly in the motor-control apparatus 39 that functions to operate the drive screw apparatus drive motor to advance the wheel 8 closer to the advancing handsets.

This periodic compensating advancement of the wheel 8 also results in the advancement of the L-shaped supporting member 44 to which are secured a plurality of rheostat control switches 46, 47 and 48. Further advancement of the buffing wheel apparatus will bring the switches 46, 47 and 48 successively into contact with the stationary mounting member 42. Upon closure of the switch 46, a rheostat 56 is inserted into the field circuit of the series universal driving motor 50 that functions to control the time interval between each operation of the buffing compound applicator gun. Similarly, the rheostats 57 and 58 are introduced to the field circuit of the motor 50 upon closure of switches 47 and 48. Since the motor 50 is of a series universal type, an increase in resistance in the field circuit results in a corresponding decrease in the speed at which the motor 50 operates. This speed reduction is directly transmitted to the gearing 59 and subsequently to the cam-operated switch 27.

The time interval between successive closures of the cam-operated switch 27 having increased will directly

result in increased intervals of time between successive energizations of the solenoid 24. Since the solenoid 24 directly controls the operation of the valve 23, this will result in fewer applications of pneumatic pressure to the cylinder 21 to advance the applicator 10 across the decreasing periphery of the wheel 8.

It is to be understood that the above-described arrangements are simply illustrative of the application of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A control system for a buffing apparatus having a buffing wheel moved in accordance with buffing pressure and a cyclically-operated buffing compound applicator gun for spraying the buffing wheel which comprises a motor having a control circuit, means operated by the motor for cyclically operating said applicator gun, a bank of selectively connected rheostats in said control circuit, and means operated by the advancing buffing wheel for selectively connecting said rheostats in said control circuit.

2. In a buffing apparatus control system that simultaneously compensates for wear on a buffing wheel and reduces the frequency of application of buffing compound to the decreased peripheral area of the buffing wheel, a buffing wheel advancing means, a buffing compound applicator device having a control circuit, a bank of selectively connected control elements in said applicator control circuit, and means actuated by said advancing means for selectively connecting said elements in said control circuit for reducing the frequency of operation of said compound applicator device.

3. In a control system for a buffing apparatus having a buffing wheel moved in accordance with buffing pressures and cyclically operated buffing compound applicator for spraying the buffing wheel which comprises a first motor for driving said buffing wheel, means cooperable with said first motor and responsive to variations in said buffing pressure for advancing said buffing wheel, a second motor, and means rendered effective by the buffing wheel advancing means cooperable with said second motor for controlling the cyclic operation of said applicator gun.

4. A control system for a cyclically-operated applicator cooperable with a buffing wheel moved in accordance with buffing pressures which comprises power-supply means, cyclically operable applicator-actuating means, switch means connecting said power-supply means to said applicator-actuating means, a motor having a control circuit, a bank of selectively connected rheostats, a buffing-wheel advancing means, means actuated by said advancing means for successively introducing said rheostats into said control circuit for reducing the speed of said motor, and mechanical means under the control of said motor for periodically operating said switch means.

5. In combination with a buffing wheel apparatus having a buffing wheel moving toward and away from a workpiece in accordance with buffing pressure and an applicator gun for cyclically applying compound to said buffing wheel, a control circuit for initiating the cyclic operation of said applicator gun which comprises a control solenoid, pneumatic means responsive to the energization of said control solenoid for advancing said applicator gun, means rendered effective by the advancement of said applicator gun for supplying compound to said wheel, resilient means for returning said applicator gun to an initial position to render said supply means ineffective, periodically-operated switch means for cyclically energizing said control solenoid, and means rendered effective by the movement of said buffing wheel for varying the periodic operation of said switch means.