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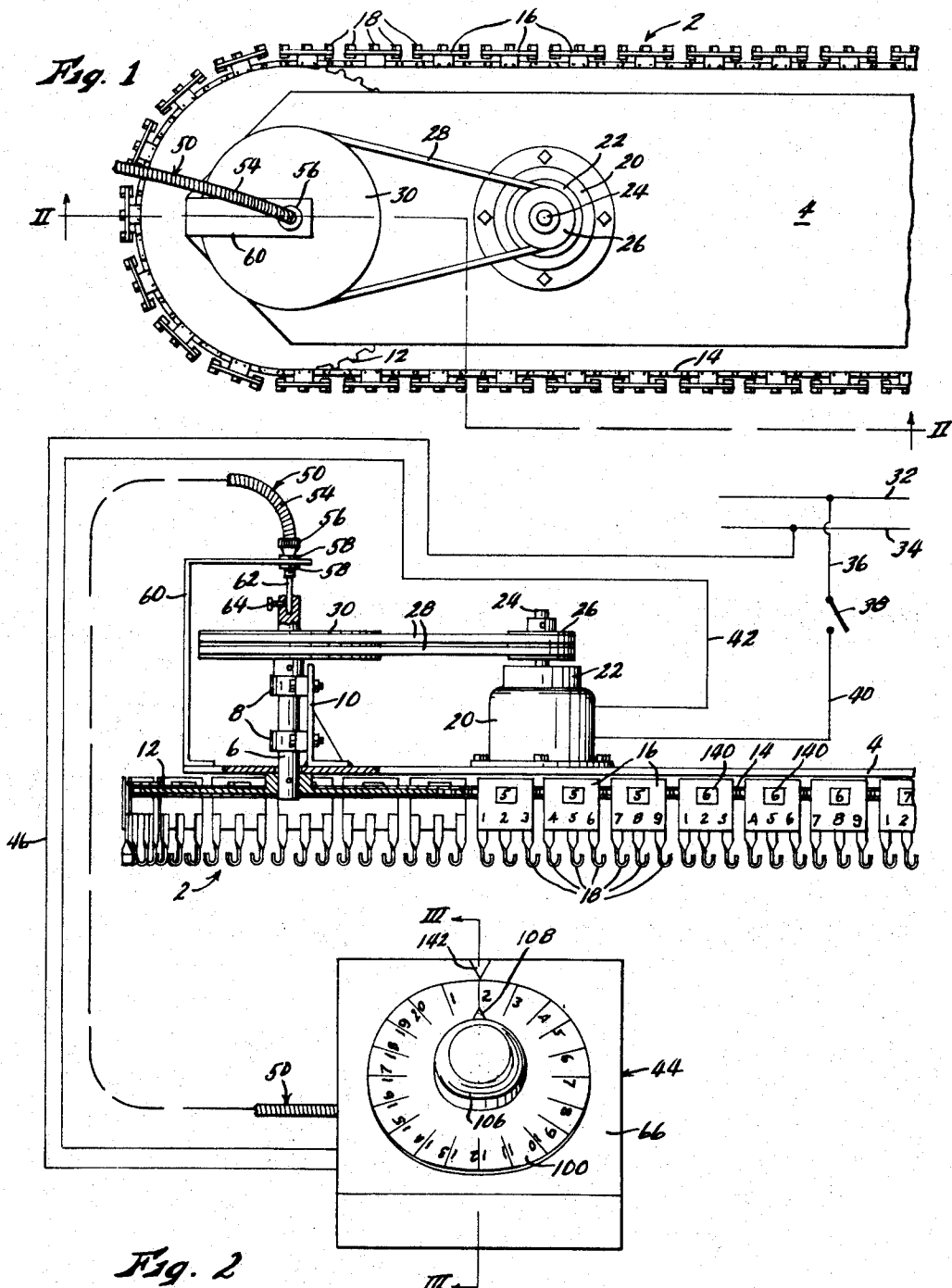
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REMOTE CONTROL DEVICE

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REMOTE CONTROL DEVICE

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This invention relates to new and useful improvements in remote control devices, and has particular reference to devices of a type adapted to initiate operation of a power-driven apparatus from a remote control station and to terminate operation after said apparatus has performed some desired function depending upon the period of operation thereof. An exemplary use of the device is in connection with conveyors, whereby any of a large number of objects supported along said conveyor may be moved to some key position. For example, in a drycleaning establishment, garments ready for pickup by customers may be hung by the usual garment hangers from hooks carried by a lengthy conveyor, with one point of the conveyor directly adjacent the clerk's normal station. The hooks may be numbered according to their position on the conveyor, and the hook number of each garment may be noted on the sales slip of the customer to whom that garment belongs. The clerk, when a customer arrives, may then simply set a dial to a number corresponding to that customer's hook number, and the conveyor will operate to move that hook to the key position directly adjacent the clerk. The clerk may thus serve the customer without leaving his station, thereby effecting a valuable saving of time and effort.

The provision of a remote control device operable to perform the above described function is the primary objective of the present invention. The remote control device will, for the purposes of convenience, be described herein in connection with a conveyor system as noted above, although it will be readily apparent that it is capable of many other uses.

Other objects are extreme simplicity and economy of construction and operation, efficiency and dependability of operation, the provision of a remote control device which at all times indicates the position of the controlled apparatus and which at all times renders the apparatus subject to instant control of the operator in the event of emergencies, and which is readily adaptable for use in many different applications.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the drawing, wherein:

FIG. 1 is a fragmentary top plan view of a conveyor system adapted for control by a remote control device embodying the present invention,

FIG. 2 is a somewhat irregular sectional view taken on line II—II of FIG. 1, with parts left in elevation and partially broken away, showing a partially schematic layout of a remote control device embodying the present invention and including a front elevational view of the control station cabinet,

FIG. 3 is an enlarged sectional view of the control station cabinet taken on line III—III of FIG. 2, with parts left in elevation and partially broken away,

FIG. 4 is a fragmentary sectional view taken on line IV—IV of FIG. 3, and

FIG. 5 is a fragmentary sectional view taken on line V—V of FIG. 4.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies generally to a conveyor shown fragmentarily in FIGS. 1 and 2. Said conveyor includes an elongated, horizontally disposed base plate 4 which may be supported by any suitable means, not shown, such as floor-engaging standards or

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ceiling hangers. Adjacent one end of said base plate, a vertical shaft 6 is supported rotatably in bearings 8 carried by a bracket 10 affixed to said base plate, and a large toothed sprocket wheel 12 is affixed to said shaft. An endless sprocket chain 14 is trained about said sprocket wheel, and extends along said base plate. It will be understood that the opposite end of said chain loop, not shown, is trained about a sprocket wheel similar to wheel 12, carried at the opposite end of the base plate. Mounted on the chain, in any suitable manner so as not to interfere with the movement of said chain over the sprockets, are a series of brackets 16, to each of which is secured three depending hooks 18, from which may be suspended garment hangers or any other objects. Let it be assumed that the portion of the chain passing about sprocket 12 is directly adjacent the clerk of the drycleaning establishment and that this therefore is the "key" position to which any of hooks 18 must be conveyed as desired. It will be understood that various structural details of the conveyor, such as roller supports for chain 14 intermediate the sprocket wheels, are not pertinent to the present invention and are not here shown.

The conveyor is driven by an electric motor 20 mounted on base plate 4, said motor acting through a speed reducer 22 to drive a shaft 24 on which is fixed a pulley 26. Said pulley is operably connected by belts 28 to a pulley 30. Motor 20 is powered from electric line wires 32 and 34 by an operative circuit including, in series, wires 32 and 36, main switch 38, wire 40, motor 20, wire 42, switching means to be described contained in control station cabinet 44, and wires 46 and 34. It will thus be apparent that so long as main switch 38 is closed, operation of motor 20 will depend entirely on the switching means contained in cabinet 44. The wires 42 and 46 to the cabinet may of course be enclosed in a flexible cable 48, and the cabinet may be disposed at any desired location remote from the conveyor such as on the counter behind which the clerk works.

Conveyor shaft 6 is connected to cabinet 44 by a flexible drive member 50. Although such drive members are standard and well known, it comprises essentially a flexible cable 52 (see FIG. 3) capable of delivering rotational motion from one end thereof to the other even though it may be curved and looped, enclosed in a flexible sheath 54. At the conveyor end of the drive member, said sheath is secured to an end fitting 56 which is fixed by lock nuts 58 in a bracket 60 fixed to base plate 4. Carried rotatably in said end fitting is a shaft 62 affixed to cable 52 and extending outwardly from said fitting. Said shaft is coaxial with conveyor shaft 6, engaging in a socket formed in the end of said conveyor shaft and being secured non-rotatably therein by a set screw 64.

Control cabinet 44 is hollow and formed of sheet metal, having an inclined front wall 66, top wall 68, bottom wall 70, side walls 72, and a removable rear wall 74 secured in place by screws 76. Flexible drive member 50 and electric cable 48 enter said cabinet through a hole 78 formed in said rear wall. Within said cabinet, sheath 54 of the drive member is attached to an end fitting 80 which is affixed by lock nuts 82 in a bracket 84 extending between and welded or otherwise affixed to top wall 68 and bottom wall 70. Cable 52 is affixed to a shaft 86 rotatably mounted in end fitting 80 and extending outwardly therefrom, the extended end of said shaft being retained rotatably in a hole 88 formed in front wall 66, a gear pinion 90 is fixed on said shaft intermediate said front wall and end fitting 80.

A bearing sleeve 92 extends centrally through front wall 66, being affixed therein by a lock nut 94. Said sleeve has a bronze bearing bushing 96 fitted therein. Carried rotatably in said bushing is a tubular shaft 98. To the outer end of said shaft, externally of the cabinet, is

affixed a planar circular dial 100, and to the inner end of said shaft, within the cabinet, is affixed a gear wheel 102 which is meshed with pinion 90. Carried rotatably in tubular shaft 98 is a shaft 104. Affixed to the outer end of shaft, externally of the cabinet, is a knob 106 having a radial pointer 108 which by rotating the knob may be moved relative to the calibrations of dial 100. Within the cabinet, a planar friction disc 110, is affixed to shaft 104. Said friction disc normally engages the planar face of gear wheel 102. The extreme rearward end of shaft 104 is journaled in a hole 112 formed in bracket 84. The friction disc is normally held against the gear wheel by a coil spring 114 disposed about shaft 104, bearing at one end against bracket 84 and at its opposite end against the hub of said friction disc, whereby said friction disc is caused to rotate with the gear wheel.

Mounted fixedly on the rearward face of friction disc 110, adjacent the periphery thereof, is a rearwardly projecting rounded cam 116, which is adapted to operate a micro-switch 118. Said switch includes a housing 120 affixed by screws 122 to a bracket 124 affixed to bottom wall 70 of the cabinet, said screws extending through elongated slots 126 of said bracket, whereby said housing may be adjusted toward and from the friction disc. Such switches are common and well-known, but it will be understood that housing 120 encloses a normally closed switch, not shown, the members of which are connected respectively to external terminals 128 and 130 of the housing. Wires 42 and 46 of the motor circuit are connected respectively to said terminals, so that whenever said switch is closed, motor 20 will be caused to operate. The switch is provided with an operating button 132 extending outwardly from housing 120, it being understood that while the switch is normally closed, inward pressure on button 132 will cause said switch to be opened. Button 132 is operated by a resilient arm 134 pivoted at one end to housing 120, as at 136, bearing against the outer end of button 132, and having a roller 138 rotatably mounted at its opposite end, said roller engaging the rearward face of friction disc 110. The switch is so spaced from the friction disc that so long as said disc is pressed firmly against gear wheel, and is turned so that cam 116 does not engage roller 138, switch 118 will remain closed. When the friction disc is then turned by gear wheel 102 so that cam 116 passes under roller 138, switch arm 134 is pivoted to press inwardly on switch button 132, thus opening the switch. It will be seen also that friction disc 110 may be moved to the right as viewed in FIG. 3, against the pressure of spring 114, and hence out of contact with gear wheel 102, by pressing inwardly on knob 106. This is possible since shaft 104, on which the friction disc and knob are mounted, is axially slidable in tubular shaft 98. When the knob is pressed inwardly in this manner, friction disc 110 engages roller 138 and holds switch 118 open even though cam 116 is not engaging said roller.

In the actual installation shown, the ratio of the number of teeth in pinion 90 to the number of teeth in gear wheel 102 is the same as the ratio of the number of teeth in conveyor sprocket 12 to the number of links in conveyor chain 14, whereby gear wheel 102 will make one full revolution for each complete cycle of the chain. In FIG. 2 it will be seen that the conveyor hooks 18, although only three hooks are carried by each bracket 16, are numbered from 1 to 9 in continuously repeated cycles, and that the three brackets containing one cycle of numbers also carry an identifying number as indicated at 140. Thus each hook may be identified by a composite number containing the bracket number and the hook number. The dial 100 is correspondingly calibrated, although in the interest of simplifying the marking of the dial only the bracket numbers are shown thereon, not the numbers of the individual hooks. Obviously, however, any other suitable numbering system desired or useful could be employed. In setting up the control system,

the bracket number at the key station of the conveyor, say at a position midway around sprocket 12, is noted. Then dial 100 is loosened on its shaft 98, turned on said shaft till the corresponding dial number is directly opposite an index pointer 142 imprinted on the face of the cabinet, and then fixed on said shaft. Thereafter, the number of said dial opposite index 142 will at all times indicate the hook bracket of the conveyor which is at the key station. Also, knob 106 is loosened on shaft 104, turned on said shaft so that pointer 108 thereof is directly opposite index 142 when cam 116 is holding switch 118 open, and then fixed on said shaft. The device is then ready for use.

In use, the clerk first notes the number of the hook on which a particular customer's garments are located, from that customer's sales slip, or some other index. He then presses inwardly on knob 106 and turns said knob till pointer 108 thereof indicates on dial 100 the bracket number of that hook, and releases the knob. Pressing inwardly on the knob moves friction disc 110 away from gear wheel 102, so that the former may turn independently of the latter as knob 106 is turned. The initial turning of the knob moves cam 116 away from switch roller 138, but the switch still does not close since the friction plate at this time is displaced rearwardly against spring 114 to a sufficient degree to hold the switch open. When knob 106 is released, plate 110 is moved forwardly by spring 114 to engage gear wheel 102 frictionally, and allows the switch to close. This actuates motor 20 to drive the conveyor, and sprocket shaft 6 of the conveyor acts through flexible drive unit 50 and pinion 90 to rotate gear wheel 102 and friction disc 110. Operation continues in this manner until cam 116 again engages switch roller 138 and opens switch 118, thereby shutting off motor 20. At this time, the bracket 16 corresponding to the original setting of pointer 108 on dial 100 will be at the key station directly adjacent sprocket 12, and the clerk may remove the garments suspended therefrom without moving from his normal position.

While I have shown and described a particular embodiment of my invention, and a particular application thereof, it will be readily apparent that many minor changes of structure and operation of the apparatus, and numerous applications thereof, could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. In combination with a power-operated apparatus having an electric motor for driving said apparatus and an operative electric circuit including said motor, a remote control device comprising a cabinet, an operating member carried rotatably in said cabinet, means interconnecting said apparatus to said operating member whereby the latter is rotated in synchronization with the former, a second operating member carried rotatably in said cabinet, means interconnecting said operating members whereby said second operating member is normally rotated by said first operating member but being manually disengageable to permit independent rotation of said second operating member, an electric switch included in the electric circuit of said motor and mounted in said cabinet, and a switch operating member carried by said second operating member and positioned to engage and open said switch at one point in the rotation of said second operating member.

2. The structure as recited in claim 1 wherein said first operating member is fixed on a shaft rotatably mounted in said cabinet and extending externally thereof, and with the addition of a dial affixed to said shaft externally of said housing whereby to rotate with said first operating member, said dial being calibrated according to a function of said controlled apparatus and readable in conjunction with a fixed index on said cabinet to indicate the condition of said apparatus relative to the calibrated function.

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3. The structure as recited in claim 1 wherein said second operating member is fixed on a shaft rotatably mounted in said cabinet and extending externally thereof, and with the addition of a dial mounted externally of said housing coaxially with said shaft, means interconnecting said dial to said first operating member so as to rotate therewith and being calibrated according to a function of the controlled apparatus, and a pointer affixed to said shaft and being rotatable therewith, whereby said pointer may be turned to any desired position relative to said dial whenever the means interconnecting said first and second operating members is disengaged.

4. The structure as recited in claim 3 wherein said means interconnecting said first and second operating members constitutes resilient means urging said members into frictional engagement with each other, whereby said second operating member may be rotated relative to said first operating member by application to said second operating member of torque sufficient to overcome said frictional engagement.

5. The structure as recited in claim 1 wherein said first operating member constitutes a wheel having a planar face at right angles to its axis, and said second operating member constitutes a second wheel coaxial with said first wheel and having a planar face at right angles to its axis and confronting the planar face of said first wheel, and wherein said means interconnecting said operating members constitutes resilient means biasing said wheels axially toward each other to urge said planar faces into frictional engagement.

6. The structure as recited in claim 1 wherein said first operating member comprises a planar-faced wheel fixed on a tubular shaft rotatably mounted in said cabinet and extending externally thereof, and said second operating member constitutes a second planar-faced wheel fixed on a second shaft carried in said tubular shaft for rotation and axial sliding movement therein, and extending externally of said cabinet, and wherein said means interconnecting said operating members constitutes a spring urging said second shaft outwardly in said tubular shaft to urge the planar faces of said wheels frictionally together, whereby said second wheel may be moved against said spring out of engagement with said first wheel by inward pressure on said second shaft.

7. The structure as defined in claim 6 wherein said switch is mounted adjacent the inner face of said second wheel and said switch operating member constitutes a cam affixed to said second wheel and extending therefrom in a direction parallel to its axis, whereby to engage and open said switch at one position in the rotation of said second wheel.

8. The structure as defined in claim 6 wherein said

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switch is mounted adjacent the inner face of said second wheel and said switch operating member constitutes a cam affixed to said second wheel and extending therefrom in a direction parallel to its axis, whereby to engage and open said switch at one position in the rotation of said second wheel, the extension of said cam from said second wheel being less than the axial movement of said second wheel provided by inward pressure on said second shaft, whereby said second wheel will engage and open said switch whenever said second shaft is pressed inwardly, regardless of the angular position of said cam.

9. The structure as recited in claim 6 with the addition of a dial fixed to said tubular shaft externally of said cabinet, said dial being calibrated according to a function of the controlled apparatus and being readable in connection with an index mark on said cabinet to indicate the condition of said apparatus in relation to said function, and a knob fixed to the outer end of said shaft, said knob having a pointer thereon adapted to be rotated to any desired calibration on said dial.

10. A remote control device adapted for controlling the positioning of a device having a prime mover comprising a first rotatable member, means for driving said first member in timed synchronization with a device to be controlled, a second rotatable member, means interconnecting said first and second rotatable members whereby the latter is normally rotated by the former and which permits independent manual rotation of said second member, an actuating device having an operative state and a nonoperative state and adapted to effect operation of such prime mover when in such operative state, and operating means carried by said second member and operable at one point in the rotation of said second member to operate said actuating device to its nonoperative state.

11. A remote control device as in claim 10 wherein said actuating device is an electric switch.

12. A remote control device as in claim 11 wherein said operating means is a cam on said second member, said switch including an operator in the path of said cam.

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