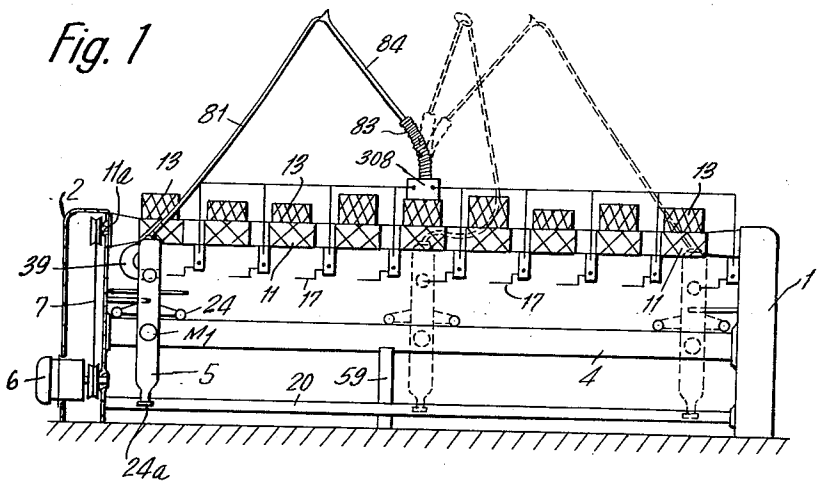
Dec. 11, 1962 S. FÜRST 3,067,962

APPARATUS FOR SERVICING MULTI-STATION FABRICATING MACHINES, PARTICULARLY YARN WINDING MACHINES

Filed Oct. 8, 1959 3 Sheets-Sheet 1

Fig. 1



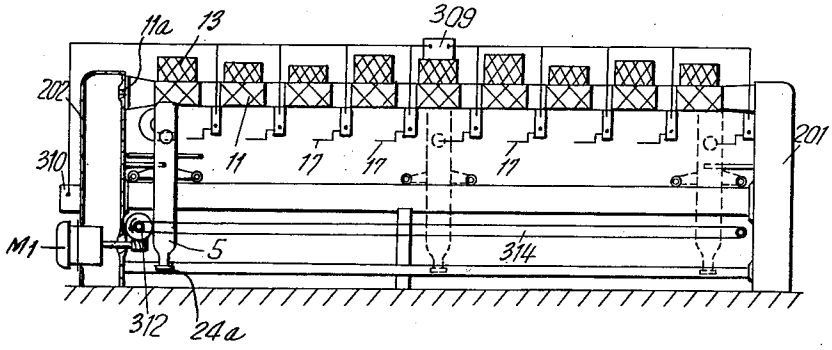


Fig. 4

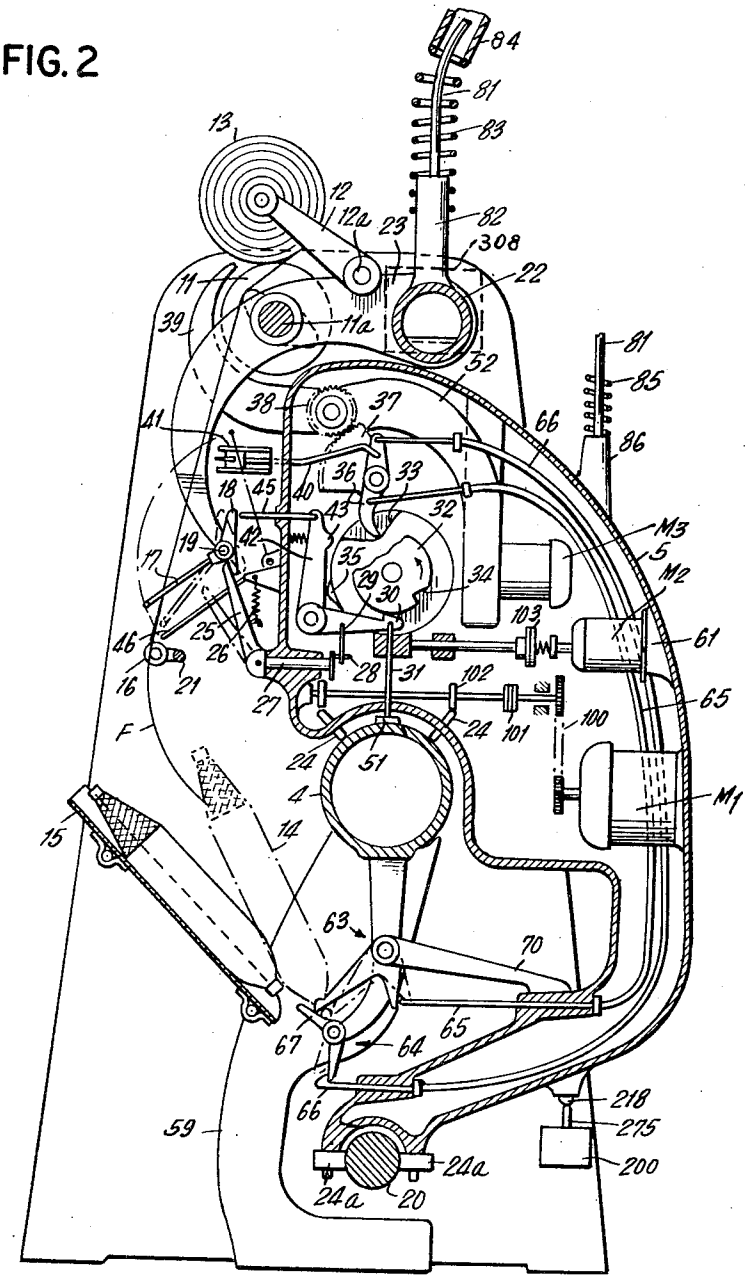
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3 Sheets-Sheet 2

FIG. 2

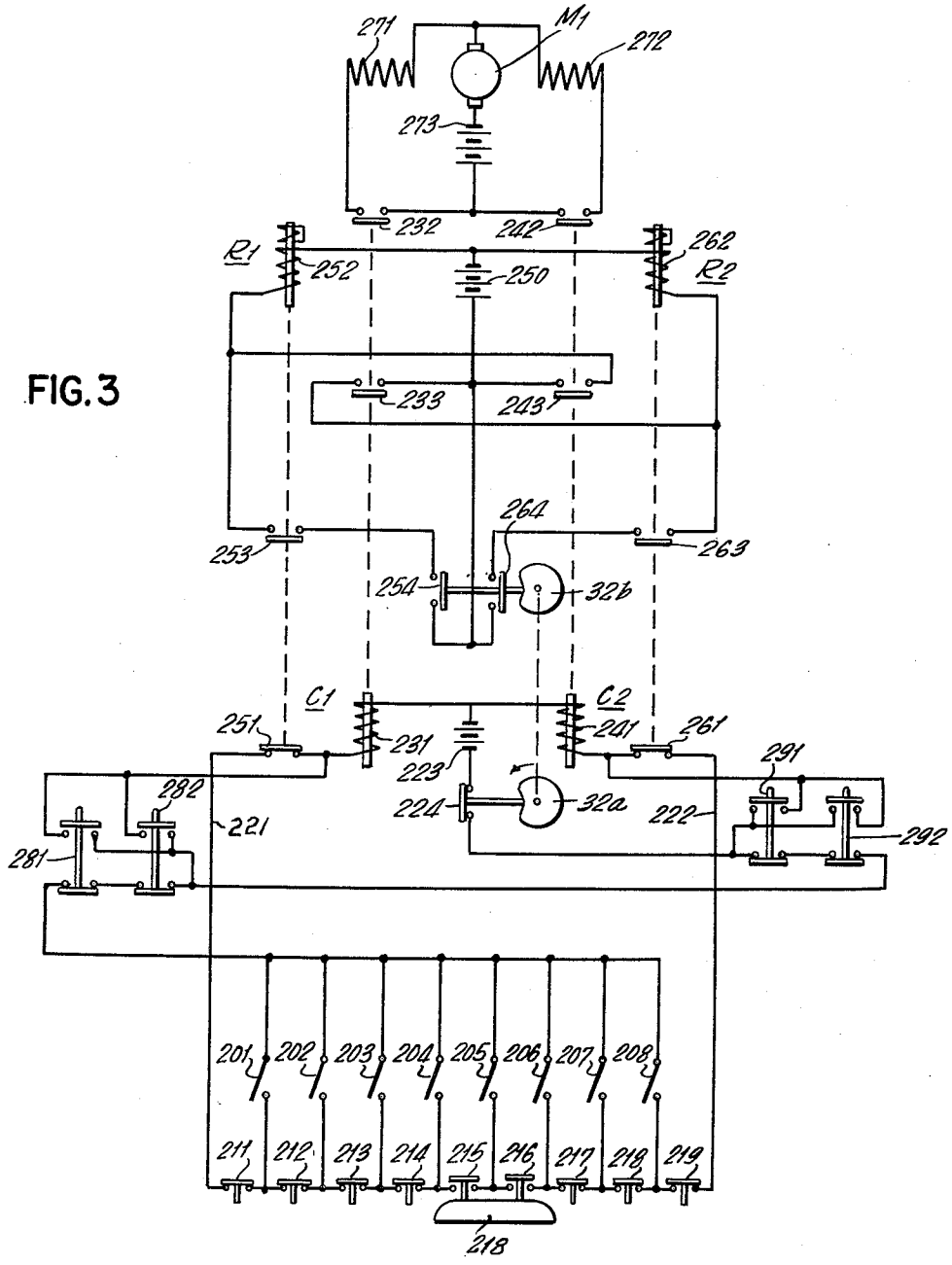


Dec. 11, 1962 S. FÜRST 3,067,962

APPARATUS FOR SERVICING MULTI-STATION FABRICATING MACHINES, PARTICULARLY YARN WINDING MACHINES

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FIG. 3



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APPARATUS FOR SERVICING MULTISTATION FABRICATING MACHINES, PARTICULARLY YARN WINDING MACHINES

Stefan Fürst, Monchen-Gladbach, Germany, assignor to Walter Reiners, Monchen-Gladbach, Germany

Filed Oct. 8, 1959, Ser. No. 845,259
Claims priority, application Germany Oct. 10, 1958
3 Claims. (Cl. 242—35.5)

My invention relates to means for the elimination of fault and stoppage in machines equipped with a multiplicity of fabricating stations of the same design and performance. In a more particular aspect the invention is preferably applicable to textile fabricating machines, such as yarn-coil winding machines in which relatively small yarn packages, for example spinning cops as they come from the spinning machine, are re-wound into larger yarn packages of a particular size and shape desired for further fabrication of the yarn. A machine of this type may comprise a large number of individually operating winding stations, for example 80 such stations.

In a further aspect, my invention relates to the sequential servicing of the fabricating stations by means of a mobile servicing unit or "tender" whenever it becomes necessary to eliminate stoppage conditions in a station as may be caused in a winding machine by yarn breakage or depletion of the yarn supply coil.

Such multi-station machines with a servicing unit or tender common to a number of stations have previously been disclosed in my copending application Serial No. 728,139, filed April 14, 1958, assigned to the assignee of the present invention; and the invention also relates to improvements in machines of the type disclosed and claimed in that application. My invention is also related to that disclosed in the copending application of W. Reiners and M. Rühl, Serial No. 845,257, filed October 8, 1959, also assigned to the assignee of the present invention.

The traveling tender, for cooperating with the individual winding stations, is provided with servicing mechanisms which, in the event of yarn breakage or depletion of a supply coil, locate the respective yarn ends of the take-up spool and yarn-supply coil, then pass both yarn ends to a knotter which ties them together, whereafter the winding station is again placed into operation. According to prior proposals the tender always travels along the row of winding stations in a uniform cyclical sequence, for example in such a manner that the tender passes along the row from the left to the right and thereafter from the right to the left. During each forward and return travel the tender is automatically stopped at any individual winding station requiring a servicing operation at that time. The knotting or coil-exchanging mechanisms of the tender then become active to eliminate the fault, whereafter the winding station continues its winding operation and the tender continues traveling along the machine in accordance with its fixed travel sequence. With such a regular program of travel the tender often requires a relatively long traveling time, and an individual winding station in which a fault may occur just after the tender has passed by will remain stopped and inactive for a correspondingly long interval of time.

It is an object of my invention to reduce the idle traveling time and to thereby improve the efficiency of the automatic servicing operations or to make a single servicing tender economically applicable for a greater number of individual winding stations.

Another object is to provide for this purpose a travel control system of improved reliability, as compared with those disclosed in said application Serial No. 845,257, filed October 8, 1959, which, in the event of any number of simultaneously troubled stations, will make the tender

reach any one of these stations within a limited period of time, regardless of any number of stations as may simultaneously call for servicing at any locations of the group.

According to my invention, I provide the drive for the servicing unit or tender of the multi-station machine with a control system which actuates and reverses the propulsion drive of the tender in response to call signals from any troubled stations and which, in the event of a plurality of calls are simultaneously in effect, performs a discriminating control sequence in accordance with a given economical preference generally in the manner known for automatic passenger elevators.

In a system according to the invention, any incoming travel calls may be stored and then made effective upon the propulsion drive of the servicing tender in the time sequence of their occurrence. However, the control system may also effect a selection or regrouping of the incoming calls and then perform the called-for traveling operations in accordance with a given directional preference. In such control systems, preference may be given particularly to operating the propulsion motor of the tender in accordance with those stored calls that require merely the stopping of the tender at a station located between the traveling tender and a station whose earlier call has been responded to, whereas any calls that require traveling of the tender in the opposite direction are executed only after the previous call or series of calls have been completely responded to.

Suitable for this purpose are control systems generally as known for self-service elevators that sequentially respond to any number of waiting calls but in the event of simultaneous calls from above and below, will first travel in the previous traveling direction before responding to calls requiring travel in the opposite direction.

Such control systems can also operate with call signals that denote respectively different degrees of urgency. For example, a special emergency switch or key may be provided for clearing any stored calls and causing the tender drive to respond to a newly given command. Such a device is of particular advantage with multi-station winding machines, for example when maintenanue or resetting work by an attendant requires immediate activity of the servicing tender at a particular winding station.

The above-mentioned and more specific objects, advantages and features of my invention, said features being set forth with particularity in the claims annexed hereto, will be apparent from, and will be mentioned in, the following with reference to the embodiments shown by way of example on the accompanying drawings, in which—

FIG. 1 is a schematic and simplified front view of a multi-station coil-winding machine with a servicing tender controlled in accordance with the invention.

FIG. 2 is a cross-sectional view of the servicing tender.

FIG. 3 is a schematic circuit diagram of a control system for the propulsion drive of the tender.

FIG. 4 is a front view of another multi-station winding machine designed and controlled in accordance with the invention.

In the machine illustrated in FIGS. 1 and 2, two lateral standards 1 and 2 of the machine frame or carrier structure are connected with each other by a tubular horizontal carrier 4. Mounted on the carrier 4 are a number of individual coil winding stations along which a servicing tender 5 may travel. The tender 5 carries the servicing devices required for eliminating faults and stoppages of the coil winding operation in the respective winding stations. A motor 6 drives, by means of a gear transmission 7, a shaft 11*a* common to a number of yarn guiding drums 11.

Each individual winding station is provided with a take-up spool 13 which rests against the yarn guiding

drum 11. The spool 13 is journalled in a frame 12 pivoted at 12a so that sufficient entraining friction obtains between spool 13 and guiding drum 11 under the weight of the spool and the frame. The yarn guiding drum 11 passes the yarn F onto the spool 13 while reciprocating the yarn in the axial direction of the spool for the purpose of producing a cross-wound yarn package. The yarn F comes from a supply coil 14 and passes through a yarn tensioner 16 to the yarn guiding drum 11.

In FIG. 2, the supply coil 14 is shown by dot-and-dash lines in the position occupied when the coil is being unwound. The supply coil 14 is carried by a pivotally mounted thorn 67 which can be turned about its pivot so as to be located in the end portion of a trough 15. In this position of thorn 67, a supply coil 14 arriving from above in the trough 15 is automatically speared up on the thorn. Thereafter, the thorn 67 returns to the unwinding position. Located between the yarn tensioner 16 and the yarn guiding drum 11 is a yarn guard 17 which continuously tests the operation for presence of the yarn F and which turns clockwise in the event of yarn failure. A double-armed lever 18 is fastened to the yarn guard 17 in the vicinity of its pivot 19. The fault-responsive pivoting motion of guard 17 in the clockwise direction causes the winding station to be stopped in known manner by lifting the take-up spool 13 off the guiding drum 11. Since the mechanism required for such stopping operation is known as such it is not illustrated in order not to obscure the other components. Lever 18 forms a switching segment, and also serves for resetting the yarn guard 17.

Each yarn guard 17 is connected or provided with an electric signal contact. These contacts, not shown in FIGS. 1 and 2, are denoted by 201 to 208 in the circuit diagrams illustrated in FIG. 3. They serve to control the travel of the tender along the winding stations as will be explained below.

The lateral standards 1 and 2 of the machine frame structure are connected with each other not only by the tubular carrier 4 but also by a bottom rail 20 (FIGS. 1, 2), a horizontal carrier 21 for the tensioners 16, and an upper tubular rail 22 (FIG. 2). Mounted on the upper rail 22 in each winding station is an arm 23 extending downward in a vertical plane. A supporting member 59 serves for bracing the tubular carrier 4. The tender 5 has running wheels 24 which roll along the carrier 4. Rollers 24a journalled on the tender 5 serve to guide the tender along the bottom rail 20.

Mounted on tender 5, at the servicing side thereof, is a switch arm 25 which is kept in approximately vertical position by a pull spring 26. Switch arm 25 is fastened to a shaft 27 which carries a crank 28. Rotating motion of switch arm 25 thus causes the crank 28 to entrain a linking rod 29 and a stop pawl 30 in the upward or downward direction. The motion of stop pawl 30 is also imparted to a latch 31. When latch 31 is thus moved downwardly, it can slide into a center recess of a boss 51 on carrier 4, thus arresting the tender and latching it to the tubular carrier 4. The pawl 30 and the latch 31 cooperate with a cam assembly 32 which has a cam notch 34 into which the pawl 30 can enter, whereby the pawl arrests the cam disc. Cam assembly 32 also has a cam groove 33 and a dog 35. In a given rotational position of groove 33, a control lever 36 carrying a spur-gear segment 37 can enter into the groove. Segment 37 meshes with a pinion 38 which is connected with a suction tube 39 for conveying the yarn end to be found and seized.

The cam assembly 32 comprises two cams 32a and 32, separately shown in FIG. 3, for the control of switches that form part of the travel control system described below.

Linked to the control lever 36 (FIG. 2), is a driving link 40 for controlling a knotting device 41. The dog 35 of cam disc 32 cooperates with a projection 43 of a control lever 42 so that, during passage of dog 35, the lever 42 is shifted counterclockwise about its pivot and then pushes a reset tappet 45 in opposition to a pressure spring against the lever 18. When dog 35 passes beyond the projection 43, the control lever 42 returns to its illustrated position.

Schematically shown at 46 (FIG. 2), is a conveying arm which is pivoted on the tender 5. At the start of the yarn-end finding operation, the arm 46 turns from the uppermost position, shown by a dot-and-dash line, downward toward the yarn tensioner 16 in order to thereafter convey the yarn end, then located in the tensioner 16, upwardly to the knotter 41. Such devices are known as such, and for that reason are not shown and described herein in further detail.

The tender 5 has a suction conduit 52 which communicates with suction tube 39 and whose lower end communicates with the suction side of a blower driven by an electric motor M3. The suction conduit 52 provides vacuum pressure for the suction tube 39 of the yarn-end finding device.

Another motor M1 on the tender serves to drive the running wheels 24 through a transmission 100, a slip clutch 101, and two friction gears 102 engaging the respective wheels 24. The cam assembly 32 is driven through another slip clutch 103 from a motor M2 also mounted on the tender. Motor M1 is reversible, whereas motors M2 and M3 are unidirectional. Motors M2, M3 may be kept running continuously as long as the machine is in operative condition. Motors M2 and M3 are connected to a power source by means of cable 81. Specifically, electrical connection is accomplished by one or more of the separately insulated electrical lines (not shown) in the cable 81. The cable 81 electrically connects the electrical apparatus of the machine frame structure 1 with the tender and is kept taut at the frame structure by means of a tubular part 82 on which is mounted a helical spring 83 carrying a tubular rod 84. Cable 81 is kept taut at the tender by a tubular part 86 carrying a helical spring 85. The rod 84 assumes an inclined position toward one or the other side depending upon whether the tender is located toward the left or right of the machine center. When motor M1 is in operation and causes the tender 5 to travel along the winding stations, the switching arm 25 of the tender checks whether the yarn guard 17 in each station has turned into the fault-responsive position shown by full lines in FIG. 2, thus signalling that a knotting or coil-exchanging operation is needed. The fault-responsive movement of yarn guard 17 has the effect of turning its arm 18 into the traveling range of the switch arm 25 on the tender so that when the tender arrives either from the left or the right, the arm 18 turns the switch arm 25 in one or the other direction. Such turning movement of arm 25 is transmitted through shaft 27 to crank 28 which, irrespective of the direction of rotation, turns the pawl 30 and the latch 31 downward. Now, latch 31 can enter into the centering recess of boss 51 and thus arrest the tender 5 in front of the winding station. The control lever 36 drops into cam groove 33 and entrains the spur gear segment 37 counterclockwise, thus rotating the pinion 38 clockwise. The suction tube 39 fastened to pinion 38 now turns from its lowermost (not illustrated) position upwardly. Since at this time the suction blower is being driven by motor M3, a current of air enters into the nozzle end of suction tube 39 and sucks the free yarn end from take-up spool 13 into the tube 39. For this purpose, the take-up spool 13 is preferably turned slowly in the reverse direction by known means (not illustrated).

During further rotation of cam assembly 32, the control lever 36 again turns back in the clockwise direction, and the suction tube 39 of the yarn-end finder device again turns downwardly, thus entraining the seized yarn end from the take-up spool 13 into the immediate vicinity of the knotter 41. At the same time the conveying arm 46 has passed from its uppermost (dot-and-dash)

position to the lowermost (full-line) position 46 where it seizes the yarn end coming from the supply coil 14 During the next following return travel in the upward direction of arm 46, the latter yarn end is also placed against the knotter 41 which now ties both yarn ends together.

In the meantime, the cam assembly 32 has turned to the position where its dog 35 presses against the projection 43 of control lever 42 and thus pushes the return tappet 45 toward the left for a short interval of time. The tappet movement acts upon the lever arm 18 of the yarn guard 17 and resets the guard so that the winding station is ready for further operation. When the knotting operation is satisfactorily performed, the winding station now continues the winding-up of the take-up spool 13. If the knotting oepration failed, the yarn guard 17 does not remain in its lowermost position and thus initiates a repetition of the above described servicing operation.

Immediately after the dog 35 has passed beyond projections 43, the stop pawl 30 enters into notch 34 of cam 32. This releases the latch 31 from the boss 51, and the tender 5 can then travel to another winding station where, if needed, the servicing operation is initiated and performed in the same manner as described above.

As mentioned, the tender, in response to certain conditions, must discharge an empty supply coil from a winding station being serviced and must substitute a full supply coil. The servicing mechanism for performing such exchanging operations in the above-described embodiment comprises two Bowden wires 66 and 65. The Bowden wire 65 controls the spearing-up device for thorn 67 generally designated by 64. The Bowden wire 66 controls a doffer generally designated by 63 for lifting an empty supply coil off the supporting thorn. Since these devices are not essential for explaining and understanding the present invention, they are not further described herein. If desired, however, an illustration and description of further details is available in the above-mentioned copending application Serial No. 728,139.

The control system shown in FIG. 3 comprises the above-mentioned fault-responsive and normally open contacts 201 through 208 which are controlled by or connected with the respective yarn guards 17 to close whenever a winding station stops operating due to yarn breakage or depletion of the yarn-supply coil. The signal contacts 201 to 208 are all connected in parallel relation to each other. A number of normally closed switches 211 to 219, positionally correlated to the winding stations, are all connected in series with each other and are controlled by the slider 218 mounted on the tender or otherwise controlled thereby to travel along the switches in proportion to the travel of the tender. The slider 218 engages two adjacent ones of the switches 211 to 219 at a time. The respective outer terminals of switches 211 and 219 are connected through respective leads 221 and 222 with one pole of a current source 223 whose other pole is connected through a normally closed switch 224 with all signal contacts 201 to 208. The switch 224 is opened by cam 32*a* only after the servicing tender has come to standstill at a winding station and has commenced its servicing operations. Only when these operations are completed is the switch 224 closed. As mentioned, the cam 32*a* forms part of the cam assembly 32 described above with reference to FIG. 2.

The source 223 may consist of any suitable current supply, such as a rectifier energized from an alternating current line. It should be understood that the same current source is preferably used for energizing the other component circuits of the control system described below although separate sources 250, 273 are shown for simplicity of illustration.

Connected between source 223 and lead 221 is the control coil 231 of a contactor C1 which has a normally open main contact 232 and a normally open auxiliary contact 233. Analogously connected between source 223 and lead 222 is the control coil 241 of another contactor C2 with a main contact 242 and an auxiliary contact 243. Connected in lead 221 is further a normally closed contact 251 of a lock-out relay R1 whose coil 252 also controls a self-holding contact 253. Analogously, a normally closed contact 261 is connected in lead 222 and forms part of another lock-out relay R2 whose coil 262 also controls a normally open self-holding contact 263. The coils 252, 262 are energized from the current source 250 under control by the above-mentioned respective contacts 243 and 233 of contactors C2, C1 but can also be energized through respective switch contacts 254 and 264 which are normally open and are controlled by a cam 32*b* to close only during performance of a servicing operation by the tender. As mentioned, the cam 32*b* forms part of the cam assembly 32 described above with reference to FIG. 2. When such servicing operation commences, the switches 254, 264 close slightly ahead of the opening of switch 224. When the servicing operation is terminated, cam 32*b* opens the switches 254 and 264 slightly after switch 224 is closed by cam 32*a*.

The above-mentioned main contacts 232 and 242 of respective contactors C1 and C2 selectively energize the two field windings 271 and 272 of the propulsion motor M1 from the current source 273, thus causing the motor M1 to run the tender in one or the other traveling direction. It is assumed that the slider 218, traveling in dependence upon the travel of the tender, will run to the left when the winding 271 is energized, and to the right when winding 272 is energized.

Also shown in FIG. 3 are a set of urgency switches 281, 282 and another set of urgency switches 291, 292. Only two switches for each set are shown, although it will be understood that one switch of each set may be located at each individual winding station for the purpose of permitting the attendant at the station to override the automatic control performance and to cause immediate travel of the servicing tender to that particular station. The two urgency switches at one and the same locality, such as switches 281 and 291 should be mutually interlocked so that only one of them can be closed at a time.

Assume that the slider 218 is in the illustrated position and the control system deenergized as shown in FIG. 3. When now a call signal is issued in a station at the left of slider 218, for example by closing of contact 202, the coil 231 of contactor C1 is energized from source 223 through closed contact 202. Contactor C1 closes its contacts 232, 233. Motor winding 272 is energized and causes motor M1 to shift the tender to the left so that slider 218 also travels to the left. This continues until the slider 218 opens the switch 212 which deenergizes the contactor coil 231 so that the motor M1 stops and the servicing tender is locked in the proper position to perform its servicing operation as described above.

When a call signal is issued at the right of slider 218, the coil 241 of contactor C2 becomes energized and causes contact 242 to pass current through motor windings 272, thus driving the tender toward the right up to the position of the station in which the call originated.

Now assume again that the slider 218 is traveling toward the left and that contactor C1 is picked up. The contact 233 then energizes the coil 262 of relay R2 which opens its contact 261 thus preventing the control system from responding to any call that may originate at the right of slider 218. Consequently, no such call can interrupt the previously initiated travel of the tender to the left. When the tender commences its servicing operation, the cam controlled switch 224 opens and remains open until the servicing operation is completed. Consequently, no call signal can interfere with the completion of the servicing work. Also during servicing operation, the contacts 254 and 264 are closed by cam 32*b*. The closing of contact 264 completes the self-holding circuit of relay R2 through contact 263 so that the relay R2 remains picked

up and keeps contact 261 open even though the contactor C1 is now dropped off and has opened its contact 233.

When the servicing work of the tender is completed, there is a short interval of time in which the switch 224 has just closed, and the contact 264, still closed, is about to open. Consequently, if during the preceding period of time, any signal contacts have closed on the right side as well as on the left side of slider 218, those on the right side cannot yet have any effect upon the control performance because, with relay R2 still picked up, the contact 261 is open and prevents excitation of coil 241 in contactor C2. However, any call signal then in effect on the left side of the slider 218 will cause the contactor C1 to again pick up with the result that relay R2 continues to stay picked up and the motor M1 is energized to shift the servicing tender and the slider 218 further to the left. Only if all calls on the left side of the tender are satisfied, will the relay R2 drop off after the moment when the contact 264 opens, so that the system can now respond to any call signals originating in stations on the right side of slider 218.

Analogously, when the tender, in response to a call from the right side has commenced traveling to the right, it will perform and complete any servicing operation called for and will thereafter travel to the left only when all calls at the right have been satisfied.

Actuation of any one of the emergency contacts 281, 282, 291, 292 overrides the automatic control and causes the tender to travel as long as the urgency button is kept depressed by the attendant, it being understood that the machine is preferably provided with limit switches that prevent the tender from traveling beyond a given point at the left and at the right. Manually operable signal contacts, such as push-button switches, may also be connected in parallel relation to the respective signal contacts 201 through 208 for actuation by the attendant.

It will be apparent from the foregoing that in the described machine control system the call signals issuing from the various machine stations are kept stored before they are responded to by the tender in a properly regrouped sequence generally comparable to that of an automatic passenger elevator. However, the means for storing the signals in the system according to the invention are greatly simplified because they are inherent in the particular combination of the drive control with the fault-responsive sensing means, namely the yarn guards 17 (FIG. 2) of the winding stations. Each yarn guard stays deflected as long as the yarn is slack or absent and thus keeps its signal contact 201 to 208 closed until the fault is removed by the servicing operation of the tender which results in again tautening the yarn thus automatically forcing the yarn guard and signal contact back to normal position. In the same manner, a call signal stored but not yet executed by the tender is automatically cleared, for instance if the fault is eliminated by manual intervention of an attendant.

The contactors and relays as well as other components of the directional control system for the propulsion drive may be located in a stationary unit mounted on the frame, as shown at 308 in FIG. 1.

The control unit 309 in FIG. 4 receives the call signals and operates substantially in the same manner and by means of the same component as described with reference to FIG. 3, except that the contactors for reversing the drive motor M1 are mounted in a stationary housing 310. The motor M1 drives a worm gear 312 which operates an endless chain 314 to entrain the servicing tender 5 toward the left or right. In other respects, the machine according to FIG. 4 corresponds to that described above with reference to FIGS. 1, 2 and 3. The chain mechanism for driving the tender may be similar to the one more fully illustrated and described in my above-mentioned copending application Serial No. 728,139.

It will be apparent to those skilled in the art, upon studying this disclosure, that the invention permits of various modifications and may be given embodiments other than particularly illustrated and described herein without departing from the essential features of my invention and within the scope of the claims annexed hereto.

I claim:

1. A fabricating machine comprising a multiplicity of individually operable fabricating stations arranged in a serial group and having respective working mechanisms of substantially the same design and fabricating performance and each having a stoppage-responsive sensing means, a mobile tender common to said group of stations and having a given travel path along said group, said tender having servicing mechanisms engageable with one of said respective stations at a time for removing stoppage conditions therein, in combination with a travel control system for said tender comprising a reversible propulsion drive connected with said tender for moving it along said path upon call by said sensing means, two directional drive control means connected with said reversible drive for controlling it to run said tender in one and the other direction respectively, interlocking means connected between said two control means to permit operation of only one of them at a time, an electric network having current supply means and having two circuit branches connected with said two control means respectively, a number of normally closed switches positionally correlated to said series of respective stations and all electrically connected in series between said two circuit branches, said switches being sequentially controllable to open in dependence upon the travel of said tender so as to electrically separate said two branches from each other at a location corresponding to that of said tender, said multiplicity of sensing means having respective normally open signal contacts connected parallel to each other between said current supply means and respective circuit points intermediate said series of switches, whereby closing of any one of said signal contacts due to stoppage condition in a station causes said drive to move said tender toward said station.

2. A coil-winding machine comprising a multiplicity of serially grouped and independently operable winding stations each having coil-rewinding means and sensing means responsive to stoppage conditions, a mobile tender common to said group of stations and having a travel path along said group, said tender having servicing mechanisms engageable with one of said respective winding stations at a time for removing stoppage conditions therein, a reversible propulsion drive connected with said tender for moving it along said path upon call by said stoppage-responsive sensing means, two directional drive control means connected with said reversible drive for controlling it to run said tender in one and the other direction respectively, interlocking means connected between said two control means to permit operation of only one of them at a time, an electric network having current supply means and two circuit branches connected with said two control means respectively, a number of normally closed switches positionally correlated to said series of respective stations and all electrically connected in series between said two circuit branches, said switches being sequentially controllable to open in dependence upon the travel of said tender so as to electrically separate said two branches from each other at a location corresponding to that of said tender, said multiplicity of sensing means having respective normally open signal contacts connected parallel to each other between said current supply means and respective circuit points intermediate said series of switches, whereby closing of any one of said signal contacts due to stoppage condition in a station causes said drive to move said tender toward said station, and manually operable emergency switch means connected with each of said directional drive control means for overriding the latter to thereby move said tender.

3. A coil-winding machine comprising a multiplicity of serially grouped and independently operable winding stations each having coil-rewinding means and sensing means responsive to stoppage conditions, a mobile tender common to said group of stations and having a travel path along said group, said tender having servicing mechanisms engageable with one of said respective winding stations at a time for removing stoppage conditions therein, a reversible propulsion drive connected with said tender for moving it along said path upon call by said stoppage-responsive sensing means, two directional drive control means connected with said reversible drive for controlling it to run said tender in one and the other direction respectively, interlocking means connected between said two control means to permit operation of only one of them at a time, an electric network having current supply means and two circuit branches connected with said two control means respectively, a number of normally closed switches positionally correlated to said series of respective stations and all electrically connected in series between said two circuit branches, said switches being sequentially controllable to open in dependence upon the travel of said tender so as to electrically separate said two branches from each other at a location corresponding to that of said tender, said multiplicity of sensing means having respective normally open signal contacts connected parallel to each other between said current supply means and respective circuit points intermediate said series of switches, whereby closing of any one of said signal contacts due to stoppage condition in a station causes said drive to move said tender toward said station, said travel control system comprising time delay means connected with said two drive control means so as to maintain one of said two drive control means inactive in dependence upon actuation of the other for a given interval of time after operation of said servicing mechanisms, whereby the tender is driven in the direction of its immediately preceding travel in the event of simultaneous calls from signal contacts at both sides of the tender.

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