SWITCH MECHANISM FOR CONVEYING SYSTEMS

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This invention relates to new and useful improvements in switch mechanisms for conveying systems, and more particularly to such apparatus of the type set forth in my co-pending application, Serial No. 604,380, filed April 11, 1932.

An object of this invention is to provide a reliable and efficient switch mechanism adapted to receive articles such as, for example, metal sheets, either singly or in packs, bundles, packages, boxes, or various other articles which are to be conveyed from two or more separate sources of supply to a suitable receiving means. For instance, the invention has been found very useful in the manufacture of sheet metal, where sheet packs are heated in a double heating furnace and are subsequently passed back and forth through a rolling mill to reduce the sheets to the desired thickness. When thus used, the switch mechanism is interposed between the furnace and the rolling mill to quickly transport the hot sheets, or packs of sheets from either side of the furnace to the rolling mill, which may be positioned some distance from the discharge end of the furnace. Conveying apparatus designed for use in the manufacture of sheet metal to convey the sheets or packs of sheets from the furnace to the rolling mill, and back and forth through the latter, should be capable of being operated at a very high rate of speed, in order that the metal may be worked as much as possible while sufficiently hot to be rolled into thin sheets, and it is an important object of this invention to provide a switch mechanism which is applicable for the above purpose, and which will perform its various functions in a minimum length of time.

A further object of the invention is to provide an improved automatically operable gravity switch mechanism adapted for a broad and diversified range of applications, such as the transportation of metal sheets, packs of sheets, composition sheets, boards, bundles, packages, boxes, and various other articles.

A further object is to provide a switch mechanism incorporating a motor driven roller at the receiving end thereof adapted to withstand the high temperatures of the hot sheets or packs of sheets received from a heating furnace.

A further object is to provide a switch mechanism incorporating anti-friction wheels as a means for carrying the articles, whereby the articles may be conveyed over the mechanism with the least possible resistance, thereby providing for the transportation of articles at a greater speed than has heretofore been possible with conveyers using ordinary rollers as a conveying means.

A further object is to provide a switch mechanism, the construction of which may be modified to adapt it to a wide variety of conditions, for instance, in steel mill work the length of the switch may be varied according to the distance between the discharge of the furnace and the rolling mill; the curvatures of the movable switch sections may be varied from the symmetrical design shown in the drawings to an asymmetrical form as, for example, when the rolling mill is aligned with one side of the furnace the switch section between that side of the furnace and the rolling mill may be made substantially straight, and the switch section leading from the other side of the rolling mill may be curved inwardly to meet the straight switch section at the junction point adjacent to the mill.

A further object is to provide a wheel type switch mechanism incorporating movable switch sections comprising spaced-apart and aligned rail members each having attached thereto a plurality of anti-friction load-carrying wheels over which the articles are conveyed, said wheels being arranged so as to give a differential rotation during the conveyance of articles thereover, whereby the articles will follow the irregular or curved path of the switch sections.

Other objects of the invention reside in the provision of a wheel type conveyor switch mechanism of the gravity type, adapted to be automatically operated by articles traveling thereover, and comprising a plurality of hinged conveyor switch sections each arranged to receive articles from a separate source of supply and all leading to a single receiving means; in the power operated means provided for alternately raising and lowering said switch sections so that when one is in a raised operative position, the other will be in a lowered inoperative position, out of the plane of travel of articles being conveyed; in the construction of the switch mechanism, wherein the switch sections may be moved into and out of registration with their respective sources of supply and the common or single receiving means; in the particular arrangement of the elements or the combination of elements comprising the control means, including limit switches, magnetic switches, motors, and a solenoid brake and its operating mechanism; and in the general construction of the entire switch mechanism, whereby it may be readily moved from place to place by a suitable crane or other carrying device.
Other objects of the invention will appear from the following description and accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings, there has been disclosed a structure designed to carry out the various objects of the invention, for it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a plan view of my Improved switch mechanism:

Figure 2 is a side elevation of Figure 1;

Figure 3 is a similar view, with some of the parts omitted, showing the switch section on the near side in registration with the discharge section leading to the rolling mill;

Figure 4 is a vertical cross sectional view looking along the line 4--4 of Figure 1, showing one of the switch sections in raised operative position and the other in lowered inoperative position;

Figure 5 is an end elevation of the receiving end of the switch mechanism, showing the disc live rollers and the control means provided therefor adapted to be actuated by articles traveling over the switch to automatically control the operation of the switch sections;

Figure 6 is a wiring diagram showing the electrical connections between the various control devices;

Figure 7 is a diagrammatic plan view showing articles being delivered over the switch mechanism;

Figure 8 is a vertical sectional view on the line 8--8 of Figure 1, showing the means for supporting the intermediate portions of the live rollers; and

Figure 9 is a detail sectional view on the line 9--9 of Figure 1, showing the clearance slots provided in certain of the rails of one of the switch sections adapted to receive the rails of the other switch section.

The gravity switch mechanism featured in this invention is illustrated, for purposes of disclosure, as consisting of two hinged conveyor sections 2 and 3. Section 2 is shown comprising longitudinal side rails 4 and 5 and three intermediate rails 6, which may be formed from flat or strap metal. The upper or receiving ends of the side rails 4 and 5 and the intermediate rails 6 of the switch section 2, are shown pivotally supported upon a cross member 8, the rails being held in spaced relation by being welded or otherwise secured to the cross member 8. The member 8 is shown circular in cross-section.

The opposite or swinging ends of the rails 4, 5, and 6 are secured in spaced relation to a cross member 7, secured to the extremities of the rails by welding or other suitable means. Intermediate the ends of the switch section 2, there are suitably secured a plurality of cross rails 10 and stiffener members 11 for rigidly bracing together the rails of the section.

The conveyor section 3 comprises side rails 12 and 13 and three intermediate rails 14, all of which are shown relatively wider, vertically, than the corresponding rails 4, 5, and 6 of the conveyor section 2, as will be readily noted by reference to Figure 3. The rails 12, 13 and 14 of the switch section 3 have secured to their lower portions suitable channel members 15 which extend lengthwise thereof. A transverse member 15' of similar cross section, is welded to the lower ends of the side rails 12 and 13 and the intermediate rails 14 and to the longitudinal members 15 for rigidly securing the side and intermediate rails in spaced relation. The upper ends of the rails of section 3 are pivotally mounted on a cross member 9. The intermediate portion of the rails of section 3 are rigidly braced together by cross rails 16, secured to the bottom flanges of the longitudinal members 15.

In Figures 1, 2, and 7, I have shown my Improved switch mechanism interposed between a conventional furnace having heating compartments A and B, and a rolling mill C. Sheets or packs of sheets discharged from the furnace chambers A and B are delivered onto a live roller conveyor section 12 interspersed between the receiving ends of the two switch sections 2 and 3 and the furnace. The live roller conveyor section 12 is shown comprising a plurality of tubular members or rollers 17, each having a series of load-supporting disks 18 suitably secured thereto as by welding. These disks are arranged in spaced overlapping relation, as best shown in Figure 1. The conveyor section 16 is power driven, as will subsequently be described, and functions as a feeder to quickly feed the sheets from the furnace chambers A and B onto the switch sections 2 and 3, whereby the sheets will be quickly passed from the furnace to the rolling mill. It will be noted that the sheets are discharged from the rolling mill to the furnace chambers, when said chambers are open to discharge sheets therefrom.

The means provided for driving the rollers 17 is best shown in Figure 1, and comprises a motor 20 operatively connected to a speed reducer 21 by a suitable coupling 22. A motor drive 23 connects the speed reducer to the adjacent roller 17, and the remaining rollers 17 of the conveyor section 12 are driven by suitable chain drives 25. In operation, the rollers 17 are continuously rotated by the motor 20. The motor 23 and speed reducer 21 may be supported upon the frame structure supporting the pivoted switch sections 2 and 3. A plurality of anti-friction rollers 33 are mounted in the supporting frame 27 of the live roller conveyor section 12 adapted to support the intermediate portions of the rollers 17 to prevent said rollers from deflecting or sagging when a heavy load passes thereover.

The pivoted switch sections 2 and 3 converge to a stationary straight conveyor section 13, as best shown in Figure 1. This section is shown comprising side rails 33 and intermediate rails 34, all of which may be supported upon a suitable structural frame 32. Suitable anti-friction load-carrying wheels 23 are mounted upon the rails 29 and 31 of the stationary section 13, and similar wheels 23 are mounted upon the rails 4, 5, and 70 of the intermediate portion upon the rails 4, 5, 11, and 13, and 16 of the switch section 3.

The vertically movable ends of the switch sections 2 and 3 are adapted to be elevated to positions wherein the tops of the anti-friction wheels 75.
23 will be substantially aligned with the tops of the anti-friction wheels of the stationary conveyor section 19, means must be provided whereby the longitudinally extending rails of the switch sections will not interfere with one another when the sections are alternately raised and lowered. To avoid interference between the rails of the two switch sections 2 and 3, a plurality of notches 37 are provided in the upper portion of the rails 12 and 14 of the switch section 3. These notches are adapted to receive the longitudinally extending rails 5 and 6 of the switch section 2, as clearly illustrated in Figures 4 and 8. It will also be noted by reference to Figure 1 that some of the anti-friction wheels of the switch sections 2 and 3 are arranged in staggered relation upon the side rails in order to prevent the wheels from interfering with one another during operation of the switch sections.

Means are provided for alternately moving the switch sections 2 and 3 into and out of alignment with the stationary section 19 and, as shown in Figures 1, 2, and 4, each means may consist of a cable 41 secured to a hub member 41, groove rollers 42 are rotatably supported between the outer ends of the side members 41. These rollers are adapted to engage track members 43 provided on the side rails 4 and 5 of the switch section 2, and on the side rails 12 and 14 of the switch section 3, to thereby support the weight of said movable sections. The two arm assemblies 38 for the switch section 3 are secured in alignment on the shaft 38' and are in right angular relation to the corresponding arm assemblies of the switch section 2. By thus arranging the arm assemblies 38 upon the shaft 38', the switch sections 2 and 3 will alternately move into and out of registration with the stationary conveyor section 19, thereby providing a continuous path from one of the furnace chambers to the rolling mill C. From the above, it will be seen that the weights of the vertically movable end portions of the switch sections 2 and 3 are carried upon the peripheries of the rollers 42, so that when the arm assemblies 38 are rotated, the switch sections will be vertically moved up and down into and out of alignment with the stationary conveyor section 19. It will be further noted that when the shaft 38' is rotated ninety degrees, the one section will be lowered from alignment with the stationary section 19, and the other section will be raised from its lowered position to its raised position in alignment with said section 19.

The means provided for rotating the shaft 38' is best shown in Figures 1 and 4, and may consist of a gear 44 keyed to the shaft 38'. The gear 44 is shown meshing with a pinion 45 secured to the slow speed shaft of a speed reducer 47 connected to a motor 48 by a suitable coupling 49. The motor 47 and reducer 45 are mounted upon suitable supports secured to the frame structure of the switch mechanism, as best shown in Figures 1 and 2. From the foregoing, it will readily be understood that when the motor 47 is operating, the shaft 38' will be driven to alternately move the switch sections 2 and 3 into and out of alignment with the stationary conveyor section 19.

The novel switch mechanism herein disclosed is adapted for automatic operation and, as shown, comprises a pair of limit switches 49 and 56 positioned over the receiving ends of the switch sections 2 and 3, respectively, and adapted to be actuated by articles delivered onto said switch sections from the furnace chambers A and B. The limit switches 49 and 56 are shown supported upon suitable supports 51 secured to the structural frame 27 which supports the live roller conveyor section 16 at the receiving end of the apparatus. The switches 49 and 50 are of the normally open type, and are adapted to be actuated by cams 52' secured to pivoted arms 52 and 53, each carrying a roller 54 positioned to be engaged by articles traveling over the conveyor sections, as clearly indicated by the dotted lines in Figure 2. A second pair of switches 55 and 56 are located at the discharge end of the apparatus adjacent to the gear wheel 44, and are adapted to be actuated by cams 57 and 58, respectively, secured to the shaft 38'. These latter switches are provided with arms carrying rollers 59 which are adapted upon being engaged by the cams 57 and 58, to thereby cause the switch sections 2 and 3 to be alternately raised and lowered. In other words, the cams 57 and 58 are arranged in right angular relation upon the shaft 38' so that when one of the switches 49 or 55 is open, the other switch always will be closed. These switches are of the normally closed type. Actuation of the limit switches 49, 50, 55, and 56 controls the operation of the motor 47 which rotates the shaft 38'.

In the wiring diagram, Figure 6, I have shown the motor control as comprising two main electrically operated control switches 59 and 60. The switch 60 comprises the usual fixed contacts 62, 63 and 64, connected to the main line conductors 65, 66 and 67 by suitable wires 68, 69 and 70. The fixed contacts of the switch 60 are adapted to be electrically engaged by a plurality of movable contacts 71, 72 and 73 having wires 74, 75 and 76 leading therefrom to the motor 67. An actuator 77 is operatively connected to the movable contacts of the switch 66 and is adapted to be actuated by a solenoid coil 78 having wires 79 and 80 connecting one end thereof to a movable contact 30 of the limit switch 49. A wire 81 connects the other end of the coil 78 to the fixed contact 32 of the limit switch 55. The movable contact 33 of the limit switch 55 has a wire 84 connecting it to the main line conductor 65. The fixed contact 55 of the limit switch 49 is connected by a wire 89 to the main line conductor 67, and a wire 87 leads from the movable contact 30 of the limit switch 49 to a fixed contact 85 adapted to be engaged by a movable contact 89 which is operatively connected to the actuator 77, as shown. A wire 90 connects the movable contact 93 with the movable contact 73 of the motor switch 68.

The other motor switch 61 is shown comprising fixed contacts 81, 82 and 83, having wires 84, 85 and 86 connecting them respectively to the wires 68, 69 and 70 of the motor switch 60. The fixed contacts of the motor switch 61 are adapted to be electrically engaged by movable contacts 97, 98 and 99, having wires 100, 101 and 102 connecting them to the wires 74, 75 and 76 leading from the motor switch 68 to the motor 47.
An actuator 103 is operatively connected to the movable contacts of the motor switch 61 and is adapted to be actuated by a solenoid coil 104 having a wire 105 connecting one end thereof with the movable contact 105 of the limit switch 56. A wire 107 connects the opposite end thereof to the movable contact 108 of the limit switch 55. The fixed contact 109 of the limit switch 55 is connected by a wire 110 to the main line conductor 66. The limit switch 56 has a fixed contact 111 which is electrically connected by a wire 112 to the main line conductor 61, and the movable contact 115 of the switch 56 has a second wire 113 connecting it to a fixed contact 114 adapted to be engaged by a movable contact 115, shown electrically connected to the movable contact 97 of the motor switch 61 by a wire 116. The movable contact 115 is adapted to be actuated by the actuator 103. To prevent over-running of the motor when the supply of current thereto is interrupted, a suitable magnetic brake is engaged by the numerical 118 is operatively associated with the motor 47 and is adapted to be actuated by a spring 117 and a solenoid coil 119 having wires 120 and 123 connecting it to the wires 75 and 76 of the motor circuit. The brake 119 has an arm 121, to the outer end of which is connected an armature 122 adapted to be actuated by the solenoid 118. The brake 119 is normally set by the action of the spring 117 and is released when the solenoid 118 is energized, as will subsequently be described. The brake 119 may be suitably supported upon the motor by a bracket 116 attached to an end bearing thereof.

Operation

When the novel switch mechanism herein disclosed is employed for transporting sheet metal plates from two or more furnaces to a rolling mill, as illustrated in the drawings and as hereinafter described, it is interposed between the discharge ends of the furnace chambers A and B and the receiving end of the rolling mill C, as diagrammatically illustrated in Figure 7. When a sheet is discharged from furnace A, as shown in Figure 7, it will, upon reaching the switch actuating arm 53 of the limit switch 49, engage the roller 54 of said arm, whereupon said arm will be actuated to cause the cam 55 thereof to actuate and close the limit switch 49. When this limit switch is closed, a circuit is completed through the solenoid 78 as follows: wire 86, closed limit switch 49, wire 79, solenoid 77, wire 81, normally closed limit switch 55 and wire 54, the wires 34 and 85 being connected to the main line conductors 65 and 67, as hereinafter stated. When the solenoid 78 is thus energized, the actuator 77 will be operated to close the motor switch 61, whereupon the motor will operate to rotate the shaft 38', provided, of course, that the limit switch 55 is in a closed position, as when the switch section 2 is in its lowered position. Should the switch section 2, however, be in an elevated position and the switch section 3 in a lowered position, then the circuit through the solenoid 78 cannot be completed, because the limit switch 55 will then be held open by the cam 57 secured to the shaft 53. If, on the other hand, the switch section 2 is in a lowered position and the switch section 3 is in its raised position, the circuit through the solenoid 78 will then be completed because of the limit switch 55 being closed, whereupon said solenoid will be energized and close the motor switch 60. As soon as the shaft 38' has been rotated ninety degrees the cam 57 will engage and open the limit switch 55, whereupon the supply of current to the solenoid 78 will be cut off, causing the motor switch 60 to return to its normal open position, with the resultant interruption of the motor. The movable contacts of the motor switch 60 may be returned to their normal open position by means of gravity or by suitable springs, not shown.

It will thus be seen that if the sheets continue to discharge from furnace A, the motor 47 will remain at rest and the switch section 2 will be returned to its closed position by the withdrawal of the solenoid 78, and its registration with the stationary conveyor section 15. Closing of the limit switch 49 by an article engaging the roller 54 of the arm 52 thereof, will therefore have no effect upon the motor 47 unless the limit switch 55 is in closed position, which occurs only when the switch section 2 is in its lower inoperative position. When the switch section 2 is thus positioned, the solenoid 78 will be energized to close the motor switch 60 and thereby cause the motor to rotate the shaft 38' and return the switch section 2 to its elevated operative position.

Should a sheet be discharged from furnace B onto the switch section 3, then the limit switch 53 over said switch section will be closed because of the sheet oscillating the limit switch actuating arm 51. The closing of the limit switch 53 will complete a circuit to the solenoid 103, if the limit switch 55 is in closed position, as when the switch section 3 is in its lowered inoperative position. The cams 57 and 55 are arranged in timed relation with the up-and-down movement of the switch sections 2 and 3, so that when the switch section 3 is in its lowered position, the actuating surfaces of the cam 58 are disengaged from the wheel of the limit switch 56, whereupon the switch 56, being of the normally closed type, will return to its closed position. In the wiring diagram and in Figure 4, the limit switch 58 is shown in open position, the position assumed when the switch section 3 is in its raised position and the cam 58 is out of engagement with the roller 49 of the limit switch 55. Should the switch section 3 be in its lowered position, then the limit switch 55 will be closed so that when the switch 50 is closed by a sheet discharged from the chamber B, a circuit through the solenoid 104 will be closed as follows: from the main line conductor 67, through the wire 112, limit switch 50, wire 105, solenoid 104, wire 107, through the closed contacts of the limit switch 56, and hence through the wire 110 to the main line conductor 66. At the instant that the solenoid 104 becomes energized, the actuator 103 of the motor switch 61 will operate and close said switch, whereupon the motor 47 will be operated until the cam 61 and the shaft 38', to which the said cam is secured, have rotated approximately ninety degrees, at which time an operating surface of the cam 57 will engage and open the limit switch 55, thereby breaking the circuit to the solenoid 104 and permitting the actuator 103 to open the motor switch 61, interrupting the circuit to the motor 47. It is to be understood that the magnetic brake 116 is released when the solenoid 118 is energized and pulls the arm 121 downward. When current flow through the solenoid 118 is interrupted, the brake will automatically be released due to the action of the spring 117, as is well known.

It will thus be seen that the operation of this novel conveyor switch mechanism is automatic,
and the arrangement of the limit switches is such that if the sheets or articles are alternately delivered to switch sections 2 and 3 from the separate sources of supply, the motor will continuously operate to raise and lower the switch sections, so that whenever an article is fed from one side of the furnace A or B onto one of the switch sections 2 or 3, the particular switch section connected therewith will automatically raise into registration with the stationary section 19 so that the sheets may pass uninterruptedly over the switch mechanism from the furnace to the rolling mill. It will also be noted that if the sheets are continuously delivered to one conveyor section, as for example section 2, then that switch section will be retained in alignment with the stationary section 18 to present an unbroken path to articles traveling over the apparatus from the furnace A to the rolling mill.

While the switch mechanism of this invention has been illustrated for the specific use of transferring sheets or rolls of sheets from a double heating furnace to a rolling mill, it is to be understood that many modifications may be made to adapt the switch for the transportation of other articles or materials. Experience with a number of installations of switch mechanism has proven that the dimensions may be varied greatly. For instance, the center to center distance at the receiving end of the movable switch sections may be increased and the longitudinal length of the switch sections may be decreased, with a resultant greater curvature in the switch sections; and with such increased curvature the sheets will still follow very accurately the curved path presented by the switch sections, and upon reaching the end of the stationary switch section the sheets will be aligned substantially at right angles to the longitudinal length of the stationary switch section so that the sheets will be in position to enter the mill.

The action of the sheets in accurately following the curved path of the conveyor sections results from the use of the wheels 12 provided upon the rails of the switch sections 2 and 3, whereby a differential rotation is obtained between the various wheels carrying the sheet; that is, the wheels attached to the inside frame rails will not rotate as rapidly as those attached to the outside frame rails at those portions of the switch sections in which the curvature of the rails is formed from a single radial point. Modifications may be made in the grate of the switch sections—that is, in the amount of drop from the receiving to the discharge end of the switch mechanism. The anti-friction type wheels used as the carrying means have a very low coefficient of friction and offer very little resistance to the travel of sheets thereover. For this reason, they are adapted for the transferring of articles or sheets made of very light weight material. It will be obvious that in a gravity type of switch mechanism of the character herein disclosed, that the speed at which articles will travel thereover is governed by the slope or grade of the switch sections. The anti-friction wheels may be made from any suitable material applicable to the particular installation.

In the drawings I have shown the switch sections 2 and 3 as being symmetrical in form, but it is to be understood that this is not essential to the operation of the apparatus, for in some installations the rolling mill C may be aligned with one of the heating chambers of the furnace as, for example, with the heating chamber A. In such installations, the switch section 2 would be made substantially straight while the switch section 3 would be curved so as to lead from the heating chamber B to the stationary section 19 which is aligned with the rolling mill C as now shown in Figure 1. It is also to be understood that instead of pivotally mounting the switch sections 2 and 3 as herein disclosed, they may be mounted for straight up-and-down movement.

In such installations, the switch sections 2 and 3 would always be returned in parallel relation and will be alternately moved up-and-down into and out of alignment with the stationary conveyor sections 1 and 19, provided at the ends of the switch sections. In lieu of the chain drive 29 and 30, the rollers 17 may also be driven by suitable gears operatively connecting them together, and also connecting them to the speed reducer 31. In the drawings I have shown the apparatus adapted for use to convey articles in one direction, or from two separate sources to a single receiving means. It is to be understood, however, that by slightly modifying or rearranging some of the parts of the apparatus, and reversing the inclination of the switch sections, the apparatus may be used for transporting articles in the opposite direction from a single source to two separate receiving means.

Because of the cams 51 and 53 being arranged in right angular relation, as shown in Figure 6, the motor 47 which operates the switch sections 2 and 3, may be rotated in either direction. In Figure 6, I have shown a reversible motor but it is to be understood that a non-reversible motor may be used in lieu of the reversible motor shown without affecting the operation of the apparatus.

The motor 28 is adapted for continuous operation and does not operate in timed relation with the motor 47 nor the up-and-down movements of the switch sections 2 and 3. This motor is provided with an independent control switch, not shown in the drawings.

1. Claim as my invention:

1. In an apparatus of the class described, a plurality of conveyor switch sections spaced apart at one end of the apparatus and converging to a single conveying means positioned at the opposite end thereof, means for pivotally supporting the spaced-apart ends of said sections, operating means for raising and lowering the converging ends of said switch sections from the development of articles passing thereover, and a control means for said operating means comprising a plurality of interconnected control elements, certain of which are positioned to be engaged by articles delivered onto said switch sections, and others being operatively associated with said operating means and dependent upon movement thereof to become operative and render said operating means operable.

2. In an apparatus of the class described, a plurality of conveyor switch sections spaced apart at one end of the apparatus and converging to a single conveying means positioned at the opposite end thereof, means for pivotally supporting the spaced-apart ends of said sections, actuating means at the opposite ends of said sections for raising and lowering said ends to guide articles over the apparatus without interference automatic control for said actuating means comprising a plurality of control elements, certain of which are positioned to be engaged by articles delivered onto said switch sections, and others being operatively connected with said actuating
means and adapted to be actuated thereby to become operative and render said actuating means operable.

3. In an apparatus of the class described, a plurality of conveyor switch sections spaced apart at one end of the apparatus and converging into a single conveying means positioned at the opposite ends thereof, means for pivotally supporting the spaced-apart ends of said sections, a cross-shaft at the converging ends of said switch sections, means on said shaft for alternately raising and lowering said switch sections when the shaft is rotated, and a control means associated with said shaft and adapted to be actuated by rotation thereof to control the movement of articles passing over said switch sections.

4. In an apparatus of the class described, a plurality of conveyor switch sections spaced apart at one end of the apparatus and converging into a single conveying means positioned at the opposite ends thereof, means for pivotally supporting the spaced-apart ends of said sections, a cross-shaft at the converging ends of said switch sections, means on said shaft for alternately raising and lowering said switch sections when the shaft is rotated, means for driving said shaft, and a control means for said driving means comprising a plurality of control elements, some of which are positioned to be actuated by articles delivered onto said switch sections, and others being influenced by rotation of said shaft to control the operation of said driving means.

5. In an apparatus of the class described, a plurality of movable switch sections adapted to receive articles from separate sources of supply, said switch sections converging to a single conveying means whereby all articles received by said sections may be delivered to said receiving means, means for pivotally supporting said switch sections at their receiving ends, an operating means for automatically raising and lowering the discharge ends of said switch sections, and a control means for said operating mechanism, comprising a plurality of control elements, certain of which are positioned to be actuated by articles traveling over the apparatus, and others of which are adapted to be actuated by movement of said operating mechanism.

6. In an apparatus of the class described, a plurality of movable switch sections adapted to receive articles from separate sources of supply, said switch sections converging to a single conveying means whereby all articles received by said sections may be delivered to said receiving means, a plurality of control means spaced apart at the receiving end of the apparatus and converging to a single conveying means at the opposite end thereof, means for pivotally supporting the receiving ends of said switch sections, some of said limit switches being adapted to be actuated by articles delivered onto said switch sections.

7. In an apparatus of the class described, a plurality of conveyor switch sections adapted to receive articles from separate sources of supply, said switch sections converging to a single conveying means whereby all articles received by said means, a plurality of power driven disks at the receiving ends of said switch sections for positively feeding the articles thereto, means for alternately raising and lowering said switch sections to provide a continuous and unobstructed path for articles passing thereover, and a plurality of elements associated with said raising and lowering means and positioned in the path of articles delivered onto said switch sections whereby they may be actuated thereby and control the operation of said raising and lowering means.

8. In an apparatus of the class described, a plurality of switch sections adapted to receive articles from separate sources of supply, said switch sections converging to a single conveying means whereby all articles received by said sections will be delivered to said receiving means, a plurality of power driven conveyor sections at the receiving ends of said switch sections for positively feeding the articles thereto, operating means for raising and lowering said switch sections to control the movement of articles passing thereover, and means for automatically controlling the operation of said operating means, comprising a plurality of limit switches electrically associated with said operating means and positioned to be engaged by articles delivered onto said switch sections to thereby control the operation of said operating means.

9. In an apparatus of the class described, a plurality of switch sections adapted to receive articles from separate sources of supply, said switch sections converging to a single conveying means whereby all articles received by said sections will be delivered to said receiving means, a plurality of power driven conveyor sections at the receiving ends of said switch sections for positively feeding the articles thereto, operating means for raising and lowering said switch sections to control the movement of articles passing thereover, and a plurality of limit switches for controlling the operation of said operating means, certain of said limit switches being positioned to be actuated by articles delivered onto said switch sections.

10. In an apparatus for automatically transferring articles from different sources of supply to a single receiving means, a plurality of switch sections spaced apart at the receiving end of the apparatus and converging to a single conveying means at the opposite end thereof, means for pivotally supporting the receiving ends of said switch sections, means for alternately raising and lowering the conveying ends of said switch sections to provide continuous and unobstructed paths for articles passing over the apparatus, and a plurality of power driven feed rolls at the receiving ends of said switch sections for positively feeding the articles thereto.

11. In an apparatus for automatically transferring articles from different sources of supply to a single receiving means, a plurality of switch sections spaced apart at the receiving end of the apparatus and converging to a single conveying means at the opposite end thereof, means for pivotally supporting the receiving ends of said switch sections, electrically operated means positioned to be selectively actuated by articles being transferred over the apparatus thereby to raise and lower the conveying ends of said switch sections to provide a continuous and unobstructed path for articles passing over the apparatus, and a plurality of power driven feed rolls at the receiving ends of said switch sections for positively feeding the articles thereto.

12. An apparatus adapted to transfer hot-metallic sheets from a plurality of furnaces to a rolling mill, said apparatus comprising a plurality...
of switch sections, each having one end aligned with one of the furnaces and having their opposite ends converging to the single intake of the rolling mill, said switch sections being mounted for vertical movement, operating means for raising and lowering said switch sections to provide continuous and unobstructed paths for sheets being transferred over the apparatus from the furnaces to the rolling mill, means for controlling the operation of said operating means, and a plurality of continuously operating power driven feed rolls interposed between the receiving ends of said switch sections and said furnaces for quickly and positively delivering the hot sheets onto said switch sections from the furnaces.

13. An apparatus adapted to transfer hot metallic sheets from a plurality of furnaces to a rolling mill, said apparatus comprising a plurality of switch sections, each having one end aligned with one of the furnaces and having their opposite ends converging to the single intake of the rolling mill, said switch sections being mounted for up-and-down movement, operating means for raising and lowering said switch sections to provide continuous and unobstructed paths for sheets being transferred over the apparatus from the furnaces to the rolling mill, control means positioned to be actuated by sheets traveling over said switch sections to automatically control the operation of said operating means, and a plurality of continuously operating power driven feed rolls interposed between the receiving ends of said switch sections and said furnaces for quickly and positively delivering the hot sheets onto said switch sections from the furnaces.

14. In a transfer mechanism adapted for use in connection with a plurality of furnaces and a rolling mill to transfer hot metallic sheets from the furnaces to the mill, said transfer mechanism comprising a plurality of switch sections having their receiving ends aligned with the furnaces and having their opposite ends converging to the single intake of the rolling mill, means pivotally supporting the receiving ends of said switch sections, operating means at the converging ends of said switch sections for raising and lowering said ends to provide continuous and unobstructed paths for sheets being transferred over the apparatus from the furnaces to the rolling mill, means for automatically controlling the operation of said operating means comprising a plurality of control elements, certain of which are positioned to be actuated by sheets delivered onto said switch sections from said furnaces, and others being associated with said operating means and adapted to be actuated by movement thereof, and a plurality of power driven feed rolls interposed between the receiving ends of said switch sections and said furnaces for quickly and positively delivering the hot sheets onto said switch sections from the furnaces.

15. A portable transfer mechanism comprising a plurality of switch sections adapted to receive commodities from separate sources of supply and deliver them to a suitable receiving means, said switch sections converging to a single conveyer means connected to said receiving means, means movably supporting said switch sections, operating means at the converging ends of said switch sections for raising and lowering said switch section into and out of operative relation with said conveyer means to provide continuous and unobstructed paths for commodities being transferred over the apparatus from said separate sources of supply to the receiving means, and means for automatically controlling the operation of said operating means, comprising a plurality of control elements, certain of which are positioned to be actuated by commodities delivered onto said switch sections from said separate sources of supply, and others being associated with said operating means and adapted to be actuated by movement thereof.

16. In an apparatus for transferring articles from separate sources of supply to a single receiving means, a plurality of switch sections spaced apart at the receiving end of the apparatus and converging to a single receiving means at the discharge end thereof, said sections being substantially aligned laterally at all times with said receiving means, means for pivotally supporting the receiving ends of said sections, operating means for alternately raising and lowering the converging discharge ends of said switch sections to vertically align the same with said receiving means and to provide continuous and unobstructed paths for articles passing over the apparatus, said operating means comprising an electrically operated device, and switch means for controlling the operation of said device.

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