

June 1, 1937.

M. O. FROST ET AL

2,082,052

SHOE DRIER

Filed June 20, 1932

3 Sheets-Sheet 1

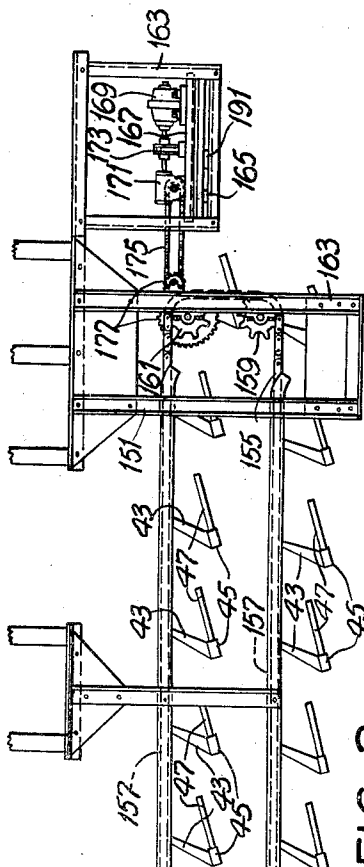


FIG. 2.

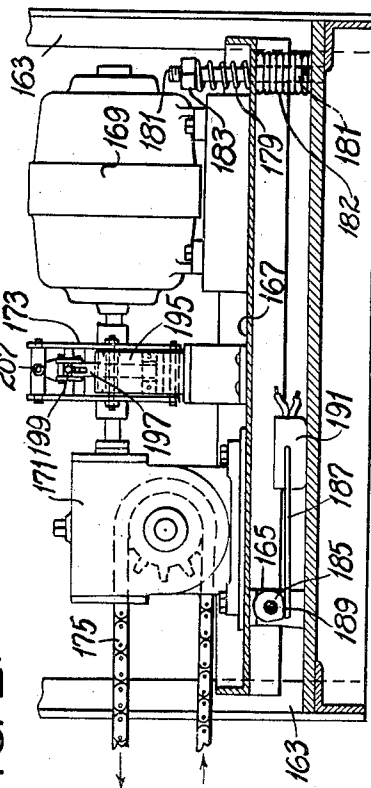
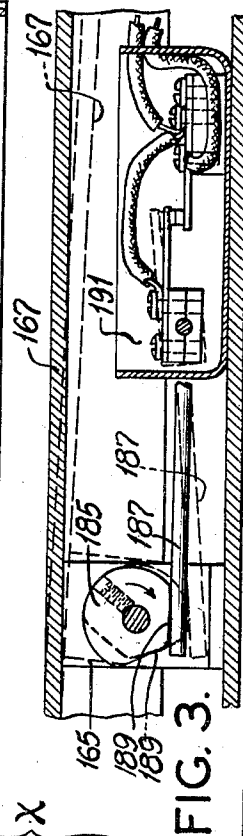


FIG. 3.

FIG. 1

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FIG. 8.

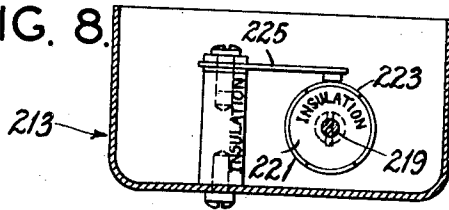


FIG. 9.

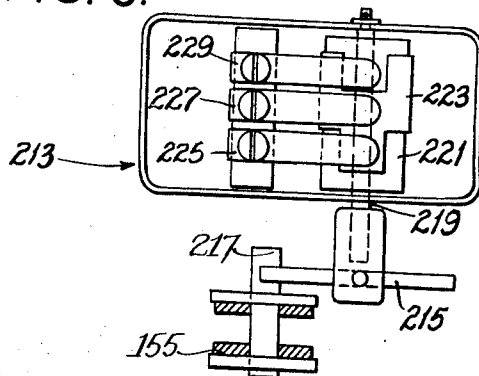


FIG. 7.

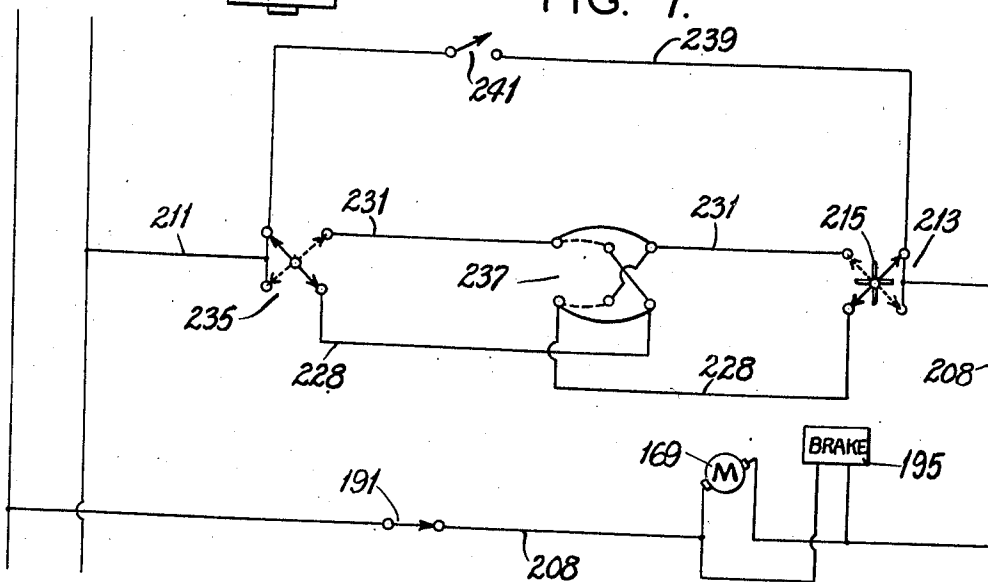
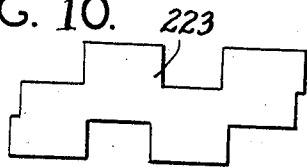


FIG. 10.



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UNITED STATES PATENT OFFICE

2,082,052

SHOE DRIER

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Application June 20, 1932, Serial No. 618,250

7 Claims. (Cl. 192—150)

This invention relates to shoe driers, and with regard to certain more specific features to automatic driers for shoe factories.

This application is related to the co-pending application of Myron O. Frost, Serial No. 530,266, filed April 16, 1931, for System of manufacturing shoes, in that the present application refers to the drier shown therein.

The present application is also related to the co-pending application of Myron O. Frost, Serial No. 558,922, filed August 24, 1931, and which has eventuated into Patent 1,863,557, dated June 21, 1932.

The primary object of this invention is to provide in a conveyor means responsive to the load on the conveyor for controlling the operation of the conveyor drive mechanism more particularly by so mounting the motor support that when the conveyor is overloaded the motor circuit will be opened automatically. A further object of this invention is to provide means which act automatically to stop the travel of the conveyor after it has advanced a predetermined distance.

In the accompanying drawings, in which is illustrated one embodiment of the invention, Fig. 1 is a side elevation of an L-shaped drier; Fig. 2 is a detail side elevation of the drive of Fig. 1;

Fig. 3 is an enlarged sectional view showing an alternative position of certain parts of Fig. 2;

Fig. 4 is a plan view of Fig. 2, but extended to show more parts;

Fig. 5 is a cross section taken on line 5—5 of Fig. 4;

Fig. 6 is a cross section taken on line 6—6 of Fig. 4;

Fig. 7 is a wiring diagram for the drier of Fig. 1;

Fig. 8 is a cross section of a drum switch;

Fig. 9 is a plan view of Fig. 8; and

Fig. 10 is a developed view of a switch contact used in the switch shown in Figs. 8 and 9.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

The illustrated form of this invention comprises an L-shaped frame 151 having a vertical portion and a horizontal portion extending from the upper end of the vertical portion. The frame rotatably supports sprockets 153 over which travel a pair of parallel endless chains 155. Suspended from the chains are racks comprising brackets 43, crossbars 45 and pairs of shoe-carrying pins 47, each rack being adapted to support a plurality of shoes as for example twelve.

The chains 155 have, besides their substantially vertical reaches, substantially horizontal reaches 157 leading over sprockets 159 and 161. While the frame 151 stands upon the floor of the shoe factory, frame work 163 for supporting the sprockets 159 and 161 at the outer end of the horizontal portion and other parts to be hereafter described, is suspended from the ceiling or elsewhere. As shown in Figure 1, this provides an inverted L-shaped drier which permits of maintaining the shoes on the drier for a longer period of time, by lengthening the passage through the drier without using excessive head room. Such a construction is particularly advantageous when it is not desired to accelerate the drying by means of heat, the ordinary room atmosphere being used for drying purposes. However, it should be understood that heating means may be associated with this form of the invention.

The ceiling frame work 163 is extended to provide support for a bearing 165 by means of which a motor platform 167 is pivoted, said motor platform 167 carrying the motor 169, a speed reducer 171 associated therewith, and a solenoid brake 173. A chain drive 175 from the speed reducer 171 passes to a gear reduction arrangement 177 associated with the sprocket 161. The platform 167 has a tendency to rotate clockwise due to the weight of the motor 169, brake 173 and speed reducer 171. A spring 182 is used to counterbalance the weight at a predetermined point, this point being such that the chain 175 is in proper running tension. It will be understood that other means of placing the chain 175 in the proper running tension may be used, such as by eliminating the spring 182 and reducing the tendency of the platform 167 to rotate clockwise by placing the motor 169 next to the speed reducer 171.

Thus the action of gravity due to the weight of the motor 169, solenoid brake 173, speed reducer 171 and associated parts causes a tendency to clockwise motion of the platform 167 on the pivotal bearing 165 (Fig. 2) and puts the chains 155 into proper tension. However, under normal driving conditions, the normal slack in the upper reach of said chain is increased by the tendency of the spring 182 to raise the platform 167 against said action of gravity. The raising is resisted by the gravitational load and by a spring 50 179 reacting from a nut 183 threaded on a bolt 181, the latter being fastened to the frame 163. The nut 183 permits of adjusting the spring reaction so that under normal driving conditions, a cam 185 movable on the pivot shaft 165 with 55

the platform 167 does not depress a switch lever 187. However, if an overload or emergency load, such as induced or incurred by injury to an operator in the apparatus, then the reaction on the lower reach of the chain 175 is greater and coacts with the spring 182 to raise the platform 167 against the spring 179 and thus bring into action the toe 189 of said cam 185, so as to depress said switch lever 187, thereby opening the switch 191 and breaking the circuit to the motor 169 and stopping the drive.

In order that the switch 191 will not be re-closed before the abnormality is corrected and under conditions to be described, there is provided a solenoid brake 173 on a brake drum 193 on the shaft between the motor 169 and the speed reducer 171. This brake 173 is operable to effect braking when the solenoid coil 195 thereof is de-energized. Said coil is positioned across the motor circuit and when the motor is on, the coil 195 is energized and the brake is off.

Whenever the motor circuit is broken, the circuit of the solenoid coil 195 is also broken, thus relieving pull on the armature 197. This releases the arm 199 so that spring 201 may come into action to set the brake. Under energized conditions of the coil 195, said coil holds the brake in "off" position, against the action of brake spring 201. As soon as the coil 195 is de-energized (whenever the motor is de-energized) the spring 201 reacts between the brake arm 203 and brake rod 207 reaching to arm 205 to apply the brake.

Thus whenever the motor circuit is broken as by the switch 191, or otherwise, the solenoid brake is applied to prevent any movement of the drier under its unbalanced load. This also prevents the platform 167 from returning to cause closing of the switch 191 after the platform has once raised to cause opening of said switch 191, that is, until the overloaded condition has been relieved by means to be described.

It will be understood that if the horizontal reaches of the inverted L-shaped drier are very long, that the braking feature may not be required because of the excessive drag of the horizontal reach.

Another feature of this invention is illustrated at Figs. 1 and 7 to 10. In Fig. 7 is shown the wiring diagram for the motor 169 and solenoid 195. The limb 208 of the circuit, which includes the motor and solenoid in parallel has the overload safety switch 191 therein which, when an overload occurs as above described, opens and remains opened while rectification is being effected.

For the mechanical operation of the invention, there is provided a limb 211 of the circuit having therein several switches, one of which is an automatic switch 213. This switch is detailed at Fig. 9 and comprises a four-lugged star wheel 215, the lugs of which are adapted to be engaged by suitably located pins 217 on the chain 155. The lugs 217 are stationed at intervals on said chain 155 equal to the intervals of the racks supported on said chain.

Referring to Fig. 9, it will be seen that the stem 219 of the wheel 215 turns a drum 221 on which is a contact plate 223, shown developed in Fig. 10. This plate, as the quarter revolutions of the wheel 215 and drum 221 occur, is adapted to make contacts from a finger 227 to a finger 229 and at this time, the circuit through a finger 229 is broken. This energizes a line 228 of the circuit. At the next quarter turn, the

circuit through the finger 229 is made, thereby energizing the line 231 of said circuit, whereas the current over said line 227 is broken.

Another three way switch 235 is used at the other end of a line 228 and 231, which is manually operated.

A reversing switch 237, also manually operable, is used to reverse the lines 228 and 231 between the switches 235 and 213, so that after a quarter turn of the drum 221 under influence of a pin 217 and a consequent turning off of the motor, the motor 169 may be re-energized. The operation is as follows:

Consider the motor 169 to be operating, the solenoid 195 to be energized, and the brake 173 off. Assume that the emergency stop switch 235 is set at the solid-line position shown, so that the line 228 may carry current. The reversing switch 237 is in the solid-line position shown. Then when a pin 217 advances so as to turn the wheel 215 a quarter revolution, the switch 213 takes up the dotted line position, having been at the solid line position, thereby breaking the circuit over the line 228. This energizes the line 231, but inasmuch as this is not at this time in connection with the limb 211 of the circuit, the motor is deenergized, as is the coil 195. The motor therefore stops and the solenoid brake 173 serves to hold the apparatus wherever it is positioned.

Whenever the operator wishes to cause an advance of the next rack of shoes into the position, he throws the reversing switch 237 into the dotted line position shown. This causes the now energized line 231 to supply current to the line 228 and through the solid-line position of switch 235, current passing to said limb 211. This effects a re-starting so that a pin 217 advances until the switch 213 again opens the circuit to the line 231 to complete the cycle. The operator can repeat the throwing of the four pole switch 237 as often as desired. Thus, for each throw of the switch 237, the mechanism advances one step, that is, to advance each rack of shoes to the position previously occupied by an anterior rack.

Whenever it is desired to effect an emergency stop, after the switch 213 has started in operation, the switch 235 may be used, regardless of which position the switch 213 happens to be in. After stoppage by said switch 235 a start may again be effected at will by throwing the reversing switch 237, leaving the switch 235 in the position that it happens to be, inasmuch as the switches 213 and 237 will work as above described in either position of switch 235.

For purposes of providing continuous operation, when desired, a by-pass circuit 239 is used having a switch 241 therein.

The operation of the described form of the invention is as follows:

An operator receiving shoes at X for operation thereon (such as by treatment with a material which is required to be dried) loads the drier rack directly ahead of him with the shoes. When it is full he operates the reversing switch 237 which causes the now stationary switch 213 to feed current through the switch 235. This causes the motor to start and the solenoid 195 to release the brake 177. The by-pass switch 241 is open and emergency switch 191 closed.

After the drier has advanced the distance between successive steps of shoe supporting racks, one of the pins 217 comes in contact with the wheel 215 to rotate said wheel a quarter turn

and thus to reset the switch 213, thereby causing said switch to throw current (in view of the unaltered position of switch 237) to the then open side of switch 235, thus breaking the motor circuit and de-energizing the solenoid 195 to permit the brake to be set by the spring 201.

Conditions remain thus until the four pole switch 237 is again reset which is after the next loading of shoes has been completed, whereupon the switch 213 becomes effective to supply current to the switch 235 over its closed pole. Thus for each normal throw of the switch 237 in either direction, a start and automatic stop of the apparatus is made.

Whenever it is desired to stop the operation in any condition of switches 213 and 237, the switch 235 is thrown. Re-starting may then be effected by means of reversing switch 237. Or, whenever it is desired to continuously operate the device, the switch 241 is closed.

The advantage of the inverted L-shape form of the invention is that the drying time is increased without use of an excessive amount of head room.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. In conveying apparatus, a conveyor, a drive for the conveyor, said drive comprising a movable support, a motor drive on said support, said drive connecting with the conveyor, said support being movable during driving of the conveyor in proportion to the loading of the conveyor, and a switch responsive to said movement adapted to open the motor circuit after a predetermined movement according to a predetermined conveyor loading, and means for loading the motor drive in a given position after the circuit has opened to prevent reclosing of said circuit.

2. In a power transmission, the combination of a pivotally mounted frame, a motor on said frame, yieldable torque resisting means operatively connected with the frame, a power transmitting element operatively connected with the motor and adapted to be driven thereby, and means including a circuit breaking device operatively associated with said motor supporting frame and being operable to interrupt the operation of the motor upon the frame exceeding a predetermined pivotal movement relative to its support.

3. In a power transmission, the combination of a pivotally mounted frame, a motor on said

frame, yieldable torque resisting means operatively connected with the frame to permit of a limited pivotal movement of said frame in response to variations in the torque transmitted by said motor, a power transmitting element operatively connected with the motor and adapted to be driven thereby, and means including a circuit breaking device operatively associated with said motor supporting frame and being operable to interrupt the operation of the motor upon the torque exceeding a predetermined limit.

4. In a power transmission, the combination of a drive means, means to support said drive means so as to be angularly movable with respect to a certain axis, said means including a yieldable restraining means tending to maintain said drive means in a relatively stationary position, and means operative to interrupt the operation of said drive means upon the angular movement thereof exceeding a predetermined limit.

5. In a power transmission, the combination of a motor, means to support said motor so as to be angularly movable with respect to a certain axis, said means including a yieldable restraining means tending to maintain said motor in a relatively stationary position, a power transmitting element operatively connected with the motor and adapted to be driven thereby, and means operative to stop said motor upon the angular movement thereof exceeding a predetermined limit.

6. In a power transmission, the combination of a motor, means to support said motor so as to be angularly movable with respect to a certain axis, said means including a yieldable restraining means tending to maintain said motor in a relatively stationary position, a power transmitting element operatively connected with the motor and adapted to be driven thereby, and means operative by the angular movement of the motor that is produced incident to its torque reaction against the action of the restraining means for stopping the motor upon the angular movement thereof exceeding a predetermined amount.

7. In a power transmission, the combination of a motor, means to support said motor so as to be angularly movable with respect to a certain axis, said means including a yieldable restraining means tending to maintain said motor in a relatively stationary position, a power transmitting element operatively connected with the motor and adapted to be driven thereby, a trip actuated switch operative to interrupt the operation of the motor upon the angular movement thereof exceeding a predetermined limit incident to its driving torque reaction against the action of the restraining means.

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