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3,411,780

AUTOMATIC PINSETTER CIRCUIT

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2 Sheets-Sheet 1

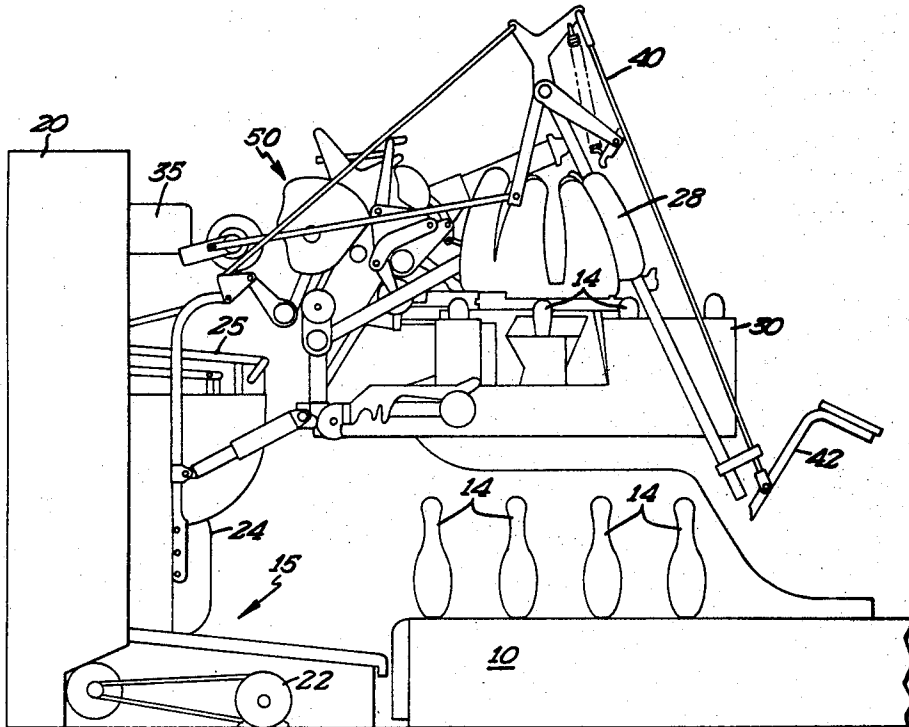
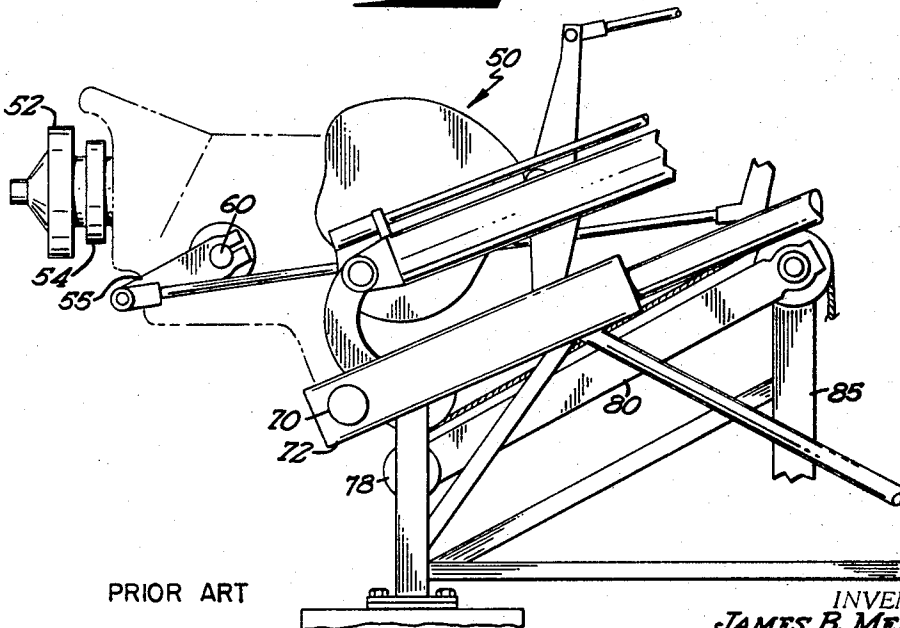


Fig 1

PRIOR ART



PRIOR ART

Fig 2

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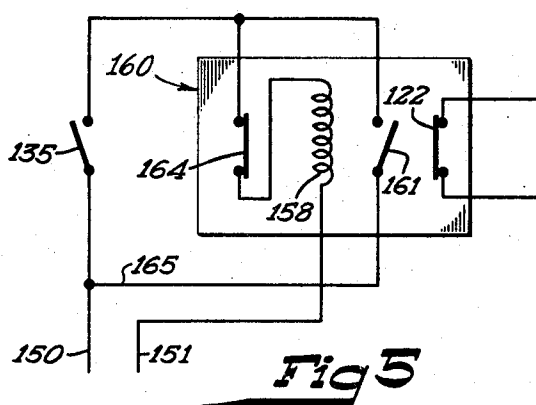
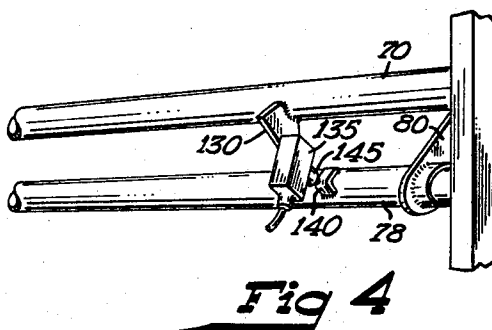
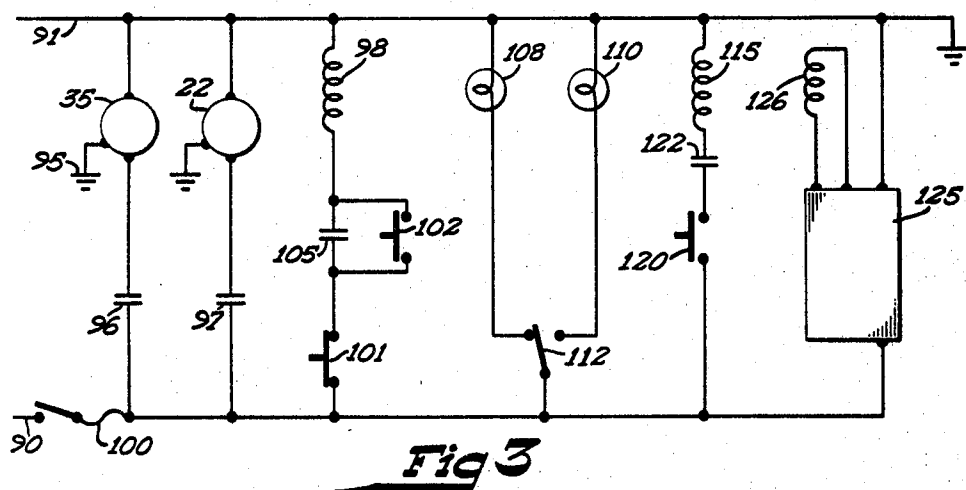
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AUTOMATIC PINSETTER CIRCUIT

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ABSTRACT OF THE DISCLOSURE

This invention and disclosure relates to automatic pinsetting apparatus for bowling alleys and is directed to an improved circuit which will eliminate unwanted cycling of the pinsetting apparatus and more particularly in the tenth frame of bowling when a manually operating control switch under the direction of the bowler is operated to reset the alley. If such a switch is operated with the present equipment at a particular period of time in the movement of the pinsetting apparatus, the structure will recycle the complete cycle introducing an undesired time delay in preparing the alley for the next bowler. This particular invention is directed to an improved control circuit incorporated into such automatic pinsetting apparatus as is shown in the patent to W. F. Huck et al., No. 2,949,300 on "Automatic Pinsetters" dated Aug. 16, 1960, which will temporarily disable the manual control to prevent such undesired operation. The improved circuit adds a separate relay of the time delay type with contacts in the pinsetter control circuit wherein the manual control initiates a recycling operation. This circuit is initiated by an additional cam operated switch which is operative only during a predetermined portion of the pinsetter cycle wherein initiation of manual control would permit the undesired recycling. The switch circuit controls the time delay relay to disable the operation of the manual control switch for a predetermined period thus preventing the unwanted sequence of operation.

This invention relates to pinsetting apparatus for bowling alleys and more particularly to an improvement in automatic pinsetters which are primarily mechanically controlled to remove an undesirable operation of the same.

In present day pinsetting apparatus of the automatic type, operation of the ball and pin handling mechanisms incorporated therewith are normally controlled mechanically in response to a ball striking a portion of the apparatus to initiate operation of the same. Initiation of the operation of the motors within the mechanical mechanism is effected by means of control switches placed at various locations about the bowling alley. Under certain sequences of operation of such apparatus, particularly in connection with operation of the apparatus on the tenth frame of a bowling game, the apparatus must be initiated or operated through a manual control under the direction of the bowler. As such, the mechanical apparatus has associated therewith a manual control which will also initiate operation of the apparatus under certain conditions. A typical structure of this type is shown in the patent to W. F. Huck et al., 2,949,300, entitled, "Automatic Pinsetters," dated Aug. 16, 1960. This apparatus discloses and describes an automatic pinsetter manufactured by the Brunswick Automatic Pinsetter Corporation of Paramus, New Jersey which is identified as the A-1 type pinsetter. In this type of apparatus, it is possible for the pinsetter to be manually initiated by the bowler under certain phases of its operation which will produce an undesired continuing sequence of operation in the pinsetter to normally delay a bowling game. The present invention is directed to an improved automatic pinsetter with a control circuit which prevents such undesired operation by preventing additional sequencing of the pinsetting apparatus beyond that normally required for the proper operation of the same. Thus the

improved invention is directed to an additional control circuit combined with a pinsetting apparatus of the type shown in the Huck et al. Patent 2,949,300 which effects a time delay on the operation of the manual control under the influence of the bowler to prevent initiation of the pinsetting apparatus whenever the pin holding deck is in a pin release position. It is at this particular period of time that the apparatus will continue to sequence unnecessarily should it be manually operated. The improved control circuit provides a time delay relay with an override control on the normal manual control which prevents further operation of the pinsetter during a predetermined period of its normal operating cycle.

Therefore it is the principal object of this invention to provide an improved automatic pinsetter of the mechanically controlled type.

A further object of this invention is to provide in an automatic pinsetter an override control circuit which will prevent unnecessary manual initiation of the pinsetting operation under a normal sequence of operation of the pinsetter.

A still further object of this invention is to provide an improved time delay override control in an automatic pinsetter to prohibit undesired operation of the same.

These and other objects of this invention will become apparent from a reading of the attached description together with the drawings wherein:

FIG. 1 is an outline drawing of the automatic pinsetter shown in side elevation with parts removed to indicate the principal components of the apparatus.

FIG. 2 is a schematic view of a portion of the improved automatic pinsetting apparatus.

FIG. 3 is a schematic circuit diagram of the control circuit operating the automatic pinsetting apparatus.

FIG. 4 is a schematic diagram of the installation of a control switch in the automatic pinsetting apparatus; and

FIG. 5 is a schematic diagram of an additional time delay control circuit added to the automatic pinsetting apparatus.

The improved automatic pinsetting apparatus is shown herein as an addition to automatic pinsetting apparatus of the type shown in the W. F. Huck et al. Patent 2,949,300. Thus in FIG. 1, a portion of this apparatus is included to disclose the overall components and the general relationship of parts. FIG. 2 shows schematically a portion of this apparatus for the same purpose. In the improved automatic pinsetting apparatus, the numeral 10 shows the end of the alley with pins positioned thereon. The ball and pin conveyor of the automatic pinsetter is shown generally at 15 with the elevating mechanism for the pinsetter shown generally at 20. The ball and pin conveying apparatus includes a drive motor indicated at 22 and an impact cushion, indicated at 24, which cushion operates through suitable linkages to control a clutch for operating the mechanical pinsetter. The ball and pins are picked up by the conveying apparatus 15 and moved to the elevating mechanism 20 with the ball being returned through a return guide structure indicated at 25 and the pins being directed from the elevating mechanism to the pin holding portion 28 of the pinsetter from whence they are moved to the pinsetting deck 30. A motor 35 included in the pinsetter operates to move the pins from the elevating mechanism into the pin holding mechanism and onto the pin deck and further pivots the pin deck through suitable linkages and shafts toward and away from the alley. In addition, motor 35 operates through suitable linkage mechanism indicated at 40 to move a rake 42 which is pivoted toward the alley. The rake 42 moves the pins on the alley back into the conveying section or pit. The details of this overall structure and its operation are clearly set forth in the above identified patent which discloses and describes an Automatic Pinsetter identified as a

Brunswick A-1 type unit. In FIG. 2, a portion of the internal structure of the pinsetter is shown which is generally identified as the control center, such as is indicated at 50. This includes a clutch mechanism 52 and brake 54 which are driven from the drive motor 35 through a suitable gearing structure 55. The rake structure 42 is operated through the linkage mechanism 40 which includes the pawl 55 and an operating shaft 60 leading to the gear structure or box 55.

Included in this structure is a tubular shaft or support member 70 extending between a pair of supporting arms 72 which pivot many of the operating linkages controlling and stabilizing the pinsetting deck 30. The actual pivot structure operating generally from the motor 35 through the gearing 55 is a pivot support rod 78 which mounts and pivots a pair of arms 80 connected to a suitable supporting structure 85 carrying the pinsetting deck. The pinsetting deck has a plurality of operating positions, one being the retracted position in which the pins are held above the alley and clear of the same preparatory to a spotting operation. The deck is pivoted toward and away from the alley through a linkage system which rotates with the shaft 78 for a pin spotting operation and a still lower position in which the pins are actually released from the pin deck. The shaft 78 thus rotates to move the deck from the elevated or pin holding position to the pin spotting and pin releasing positions in an oscillating manner. It is disposed adjacent and in proximity with the tubular structure 70 which mounts a portion of the supporting mechanism but is relatively fixed with respect to the shaft 78.

This apparatus is basically mechanically operated with the elevating or conveyor motor 22 and the main drive motor 35 for the pinsetting mechanism being continuously energized and running whenever the machine is in operation. Movement of the motors is transmitted through clutches to various cams, levers, pulleys, and cables to operate the pinsetter components in the performance of the pinsetting function, the sweeping function, the elevation of the ball for return and the elevation of the pins to the pin holding deck. Actual sequencing is determined by varying cam structures, only some of which are shown in FIGS. 1 and 2 to operate the various components of the pinsetter. The actual details of the pinsetter and this drive mechanism are set forth in detail in the above identified patent. The pinsetter is operated primarily by the bowling ball striking the cushion 24 to release a clutch mechanism (not shown) which causes the conveying apparatus to move and the elevating section to move. In a predetermined sequence thereafter, the deck is lowered to pick up the standing pins, the rake is moved down and backwards to remove the fallen pins and the deck is again lowered to respot the standing pins. Suitable sequencing apparatus determines whether the ball thrown is first or second ball in a frame and whether a strike has been previously made to determine whether an entire new set of pins are to be spotted or the standing pins respotted.

In this automatic pinsetting mechanism, a certain undesirable operation is obtained through the use of a manual initiating switch under the control of the bowler. This switch is used to operate a clutch mechanism in the same manner as the cushion operates the clutch mechanism for initiating a resetting cycle of the mechanism. Under normal sequences this switch will not effect the operation of the pinsetting mechanism in that it is normally cycled by the engagement of the bowling ball with the cushion. However, when the apparatus is manually initiated at a predetermined time in the pin spotting cycle, the apparatus will continue through the pin spotting cycle and perform an unnecessary resetting operation. This takes place if the pinsetting deck is in a pin release position at the time the manual switching function is initiated, as will be hereinafter identified.

In FIG. 3, the basic control circuit for the automatic pin spotter is shown. This circuit includes input conduc-

tors or supply conductors 90 and 91 across which are connected the drive motors 35 and 22 of the deck moving and conveyor drive portion of the pin spotter. The motors include ground connections 95 and the conductor 91 is grounded. In series with these motors are control contacts 96, 97 of a start relay 98. The control circuit includes a suitable fuse 100 in the conductor 90, and suitable stop and start push-buttons, such as is indicated at 101 and 102 respectively, are included in the energizing circuit for the start relay 98. Also included in this circuit is a hold contact 105 of the relay which performs a normal holding function around the start push-button 102 and is in series circuit with the stop push-button 101. The control circuit also includes indicator lights 108, 110 representing the first and second ball indicator lights with a suitable reversing switch 112 in series therewith, this circuit being connected across the supply conductors 90, 91. Also included in this circuit is a reset solenoid 115 which permits manual operation of the deck setting mechanism to effect the same operation as the ball cushion 24. Under normal circumstances, this resetting circuit includes several push-buttons 120 used for manually initiating the same. In series with this circuit is a control contact 122 which forms the primary feature of the present invention in a combination of the automatic pin spotter previously described to eliminate the undesirable operation of the same. Also included in the electrical control circuit is a photoelectric type foul indicator 125, shown in block, with a suitable sensing coil 126 whose function is normal to the operation of the pinsetter.

The present invention is directed to an improved time delay circuit which is connected into a pinsetting mechanism of the type described above to prevent operation of the manual reset switch 120 and the operation of the reset solenoid 115 during predetermined periods in the operation of the pinsetting mechanism. As shown schematically in FIG. 4, the tubular stationary shaft 70 in the pinsetting deck structure has mounted thereon through a flange 130 a suitable control switch 135. This control switch 135 is operated by a cam 140 positioned on the rotating deck shaft 78 which carries the pivoted arms 80 and operates to move the pin deck toward and away from the alley in the pin holding, pinsetting or spotting and pin release functions. Whenever the pinsetting deck is moved to a pin release position, that is closest to the alley 10, the cam 140 will engage a switch operating feeler member 145 of switch 135 to operate the switch. This switch is included in and initiates the time delay circuit operating the contact 122 in the reset solenoid 115 energizing circuit. Such switch operation takes place momentarily and only during the period of time when the pinsetting deck is in a pin release position. This is the period of time in which operation of the manual reset switch 120 will cause the unwanted cycling in the Brunswick automatic pinsetting apparatus.

The time delay circuit for this improved automatic pinsetter is shown in FIG. 5 as including supply conductors 150, 151 leading to a coil 158 of a relay indicated generally at 160. Relay 160 has instantaneous contacts 122 and 161 and a time delay opening contact 164. In this control circuit, the conductor 150 is connected through the switch 135 on the operating shaft or deck shaft 78 and the relay contact 164 to the relay coil 158 leading back to the supply conductor 151. Thus the switch 135 is momentarily closed at a time when the pinsetting deck is in a pin release position and the relay 160 will be energized. The contact 164 will remain closed for a given period of time delay, and the normally open instantaneous contact 161 of the relay will connect through a conductor 165 to the time delay opening contact 164 and the coil 158 to effect a shunt holding circuit around the contact 135. This will maintain the relay 160 energized for the period of time delay opening of the contact 164. During this period of time the instantaneous contact 122 of the relay 160, which is normally closed, will be opened. This contact

122, as previously indicated, is in series circuit with the pin reset solenoid 115 to prevent operation of this circuit. After the period of time delay in the operation of the contact 164, the relay 160 will be deenergized and the contact 122 will again be closed permitting normal operation of the pin spotting apparatus. My improvement in the Automatic Pinsetting Apparatus is particularly applicable to the Brunswick type Automatic Pinsetters identified as types A-1, A-2 and A-1 Converted. The difference in application of the invention to these various types is only in the length of time delay in the operation of the relay circuit to insure against the improper operation of this equipment. These Automatic Pinsetters operate primarily through mechanical linkages and continuously operated motors which are connected by virtue of camming sequences to operate the various components of the pin spotting. The principal feature of this invention resides in the direction of the pin deck movement and operation of a switch at a predetermined time during this pin deck movement which will initiate the time delay circuit and prevent manual operation of the resetting apparatus. Under normal operation, the pin spotter will be energized and operated through operating switches but the actual movement of the pin deck and the various other components of the pin spotting apparatus will be controlled by the engagement of the bowling ball with the cushion portion of the apparatus in the pit. Thus when the bowler throws the ball the machine will cycle. The operation of the machine is basically that of a 360 degree procedure with respect to a master timing cam. The pin deck 30 will move from a raised position down toward the alley to pick up standing pins or to determine whether there has been a strike made. During this procedure, the timing cam will have moved approximately 90 degrees and at the 180 degree point the pin deck will be back in a raised position. Continuing with this sequence, which is uninterrupted, the rake 42 will clear the alley and the pin deck 30 will continue down to reset or release the pins. This action takes place at the 270° point on the master cam. At this time, the deck 30 is at its lowest position with respect to the alley and hence the supporting shaft or deck shaft will have rotated to a predetermined point which will occur only at a time when the pins are being reset and released. At this point, the standing pins will have been resotted or ten new pins will have been resotted. After that period, the pin deck 30 returns to the raised position ending the normal 360 degree sequence of the timing cam. It is during the period of time when the pins are being spotted and released that operation of the manual switch at the bowler's end of the alley for energizing the reset solenoid 115 will cause an unwanted recycling of the machine. This switch is normally used only in the tenth frame to reset the bowling apparatus for a new bowler. If the switch is operated during this period, the machine will recycle stopping at the 180 degree point. In order for normal sequence to continue, it is necessary to recycle the machine or respot pins to get it back on to the first ball cycle. In the improved pinsetting apparatus of the present invention, I employed a cam on the deck shaft cooperating with a switch which is relatively fixed to operate the switch at the time when the pins are being spotted and released. This occurs at the 270 degree point in travel of the master timing sequence. This switch will initiate a time delay action of a relay circuit which is incorporated into the conventional Brunswick pinsetting apparatus with the present invention. Operation of this switch will energize the relay 160 having a time delay dropout contact 164 in series with the energizing circuit for the relay coil 158. The remaining contacts of the relay are of the instantaneous type, one effecting a holding circuit on the deck switch so that the relay will remain energized and under control of the time delay dropout contact for a given timing period. With operation of the relay, one of its instantaneous contacts located in the master control circuit for the pinsetting apparatus in series with the reset solenoid, will disable the same during the

period of time that the relay remains energized and the time delay contact of the relay is under control. This will prevent the bowler from effecting a resetting operation of the pinsetting apparatus by operating the bowler's switch for this purpose. The time delay period will vary with various types of Brunswick pinsetting apparatus with which the present invention is particularly adapted to be used. Thus in the A-1 pinsetter, the time delay period is approximately five seconds and in the type A-2 and type A-1 Converted machines, the time delay period is from two and a half to three seconds. The timing relay must hold the reset solenoid disabled during the period of time it takes for the master timing cam to go from the 270 degree or released position up to the standing or top rest position at the 360 degree point of the master timing cam.

While I have explained this invention in connection with the Brunswick pin spotting apparatus with which the same is particularly adapted to be used, it will be recognized that it may be applied to other pin spotters where the same problem exists. Therefore in considering this invention it should be remembered that the present disclosure is intended to be illustrative only and the scope of the invention should be determined by the appended claims.

What is claimed is:

1. A pinsetting apparatus comprising a frame, a pin holding deck, a deck operating shaft extending transversely of the frame and movably supported thereon, a pair of arms mounting the pin holding deck on the deck operating shaft, means for rotating the deck operating shaft to move the pin holding deck sequentially through a plurality of positions including a pin release position, means including a ball operated means and a manually operated means for initiating rotation of the deck operating shaft to move the deck through said plurality of positions, switch means connected in part to the deck operating shaft and in part to the frame to be operated to a closed position whenever the pin holding deck is moved to a pin release position, a time delay relay including an operating coil and a normally closed switch contact, circuit means adapted to be connected to an energizing electrical source and including the energizing coil of the relay and said switch means in a series circuit to energize the relay whenever the pin holding deck is in a pin release position to open the normally closed contact of the relay, an additional circuit means including the normally closed contact of the relay connected in controlling relationship with the manually operated means and the means for initiating rotation of the deck operating shaft to render operation of the initiating means by the manually operated means ineffective whenever the deck is in a pin release position.

2. The pinsetting apparatus of claim 1 in which the manually operated means is a remotely positioned manually operated switch and the normally closed contact of the relay is connected in a series circuit therewith to be effective to disable the operation of the means for initiating rotation of the deck shaft for a period of time delay or the relay following the movement of the pin holding deck to the pin release position.

3. A pinsetting apparatus comprising a frame, a pin holding deck, a deck operating shaft extending transversely of the frame and movably supported thereon, a pair of arms mounting the pin holding deck on the deck operating shaft, means for rotating the deck operating shaft to move the pin holding deck sequentially through a plurality of positions including a pin release position, means including a ball operated means and a manually operated means for initiating rotation of the deck operating shaft to move the deck through said plurality of positions, switch means connected in part to the deck operating shaft and in part to the frame to be operated to a closed position whenever the pin holding deck is moved to a pin release position, a relay having an operating coil with a pair of instantaneous contacts and a normally

closed time delay opening contact associated therewith, first circuit means connected to a source of electric power and including the normally closed time delay opening contact of the relay and the coil of the relay in a series circuit, said first circuit means including the switch means 5 with operating means therefore being mounted in part on the deck operating shaft and operated thereby to initiate operation of the first circuit means, one of the instantaneous contacts of the relay being connected in parallel circuit with the switch means to effect a holding 10 circuit operation for the first circuit means during the timing of the time delay opening contact, and a second of the instantaneous contacts of the relay being connected in a series circuit with the manually operated 15 means to prevent operation of the means for initiating ro-

tation of the shaft during the time period of the time delay of opening contact of the relay.

4. The pinsetting apparatus of claim 1 in which the relay is of the time delay dropout type.

References Cited

UNITED STATES PATENTS

1,190,645	7/1916	Hedenskoog	273—43
2,949,300	8/1960	Huck et al.	273—43
2,991,078	7/1961	Hedenskoog et al.	273—43
3,153,538	10/1964	Rogers	273—43
3,189,348	6/1965	Keahey	273—43
3,219,345	11/1965	Rogers	273—43
3,276,686	10/1966	Rogers et al.	273—54 X

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