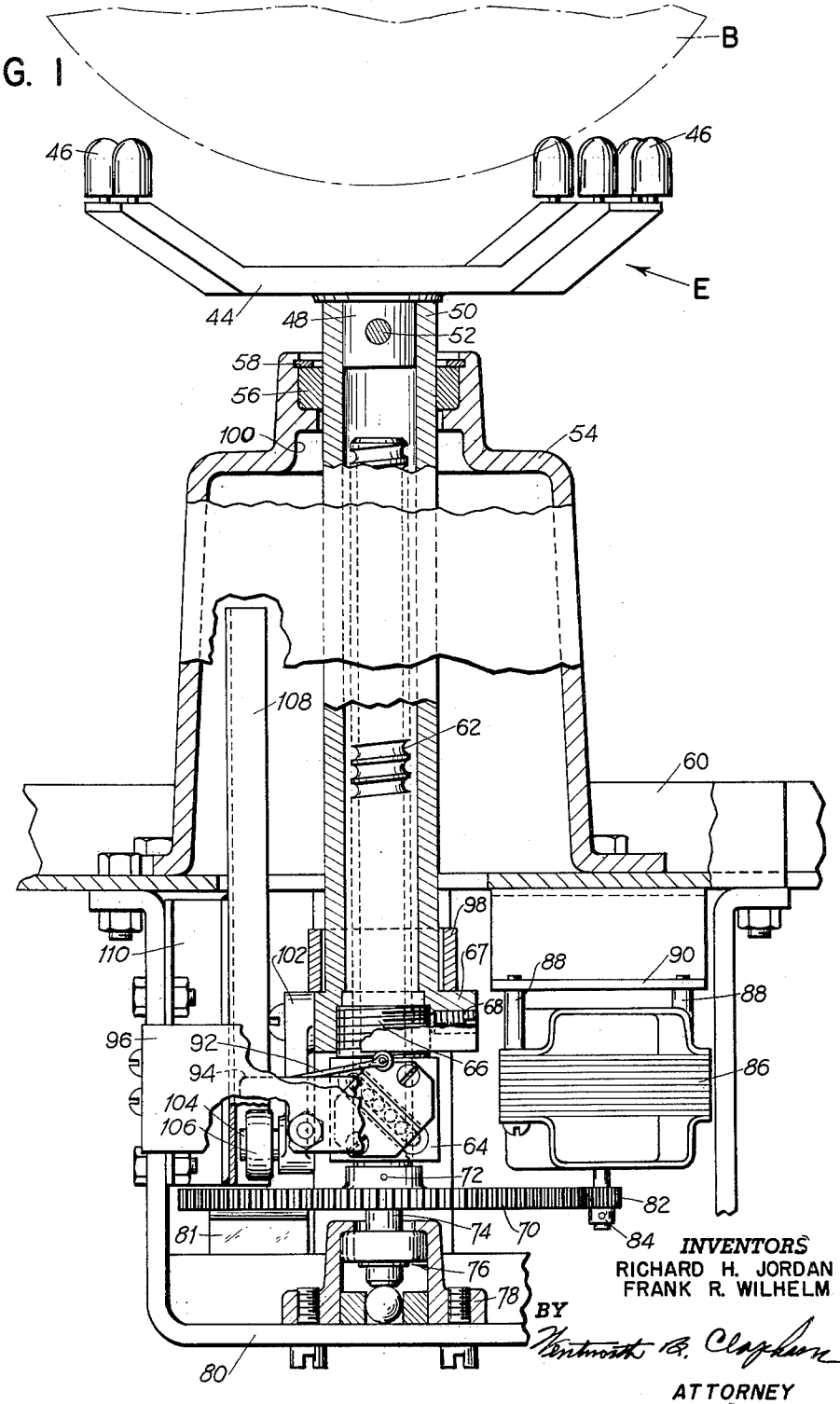
Jan. 16, 1962 F. R. WILHELM ET AL 3,016,553

BOWLING BALL CLEANING AND POLISHING APPARATUS

Filed Dec. 16, 1958 4 Sheets-Sheet 1

FIG. 1



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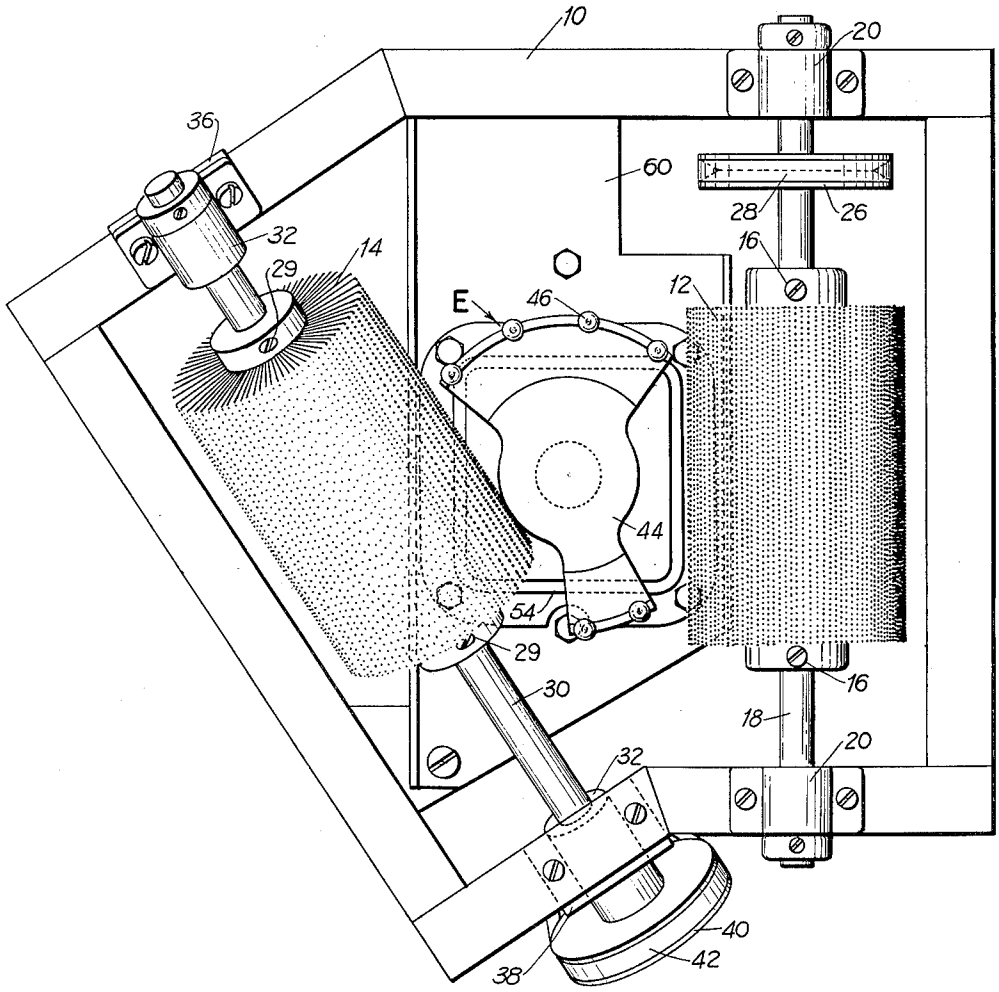
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BOWLING BALL CLEANING AND POLISHING APPARATUS

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FIG. 2



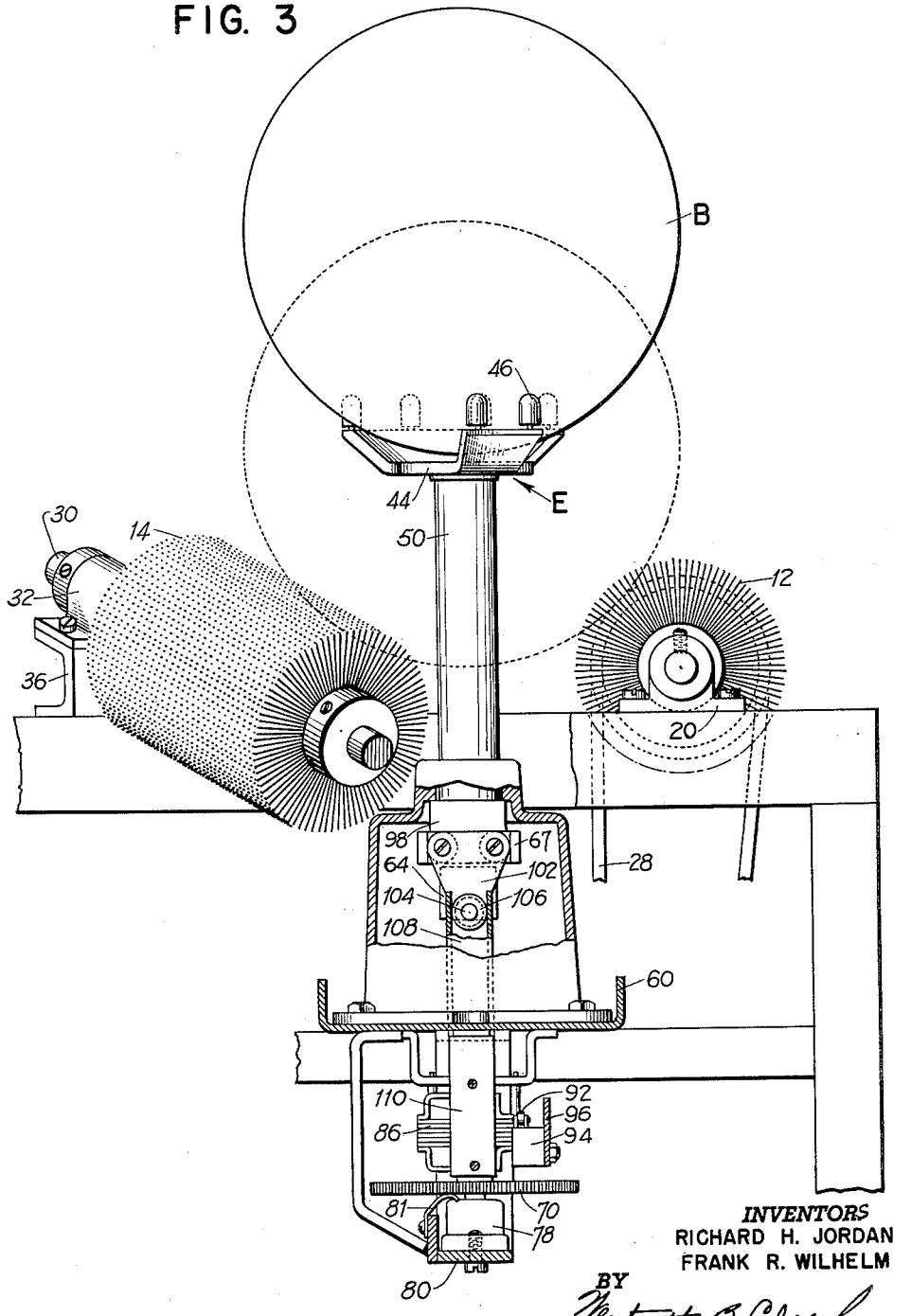
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BOWLING BALL CLEANING AND POLISHING APPARATUS

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FIG. 3



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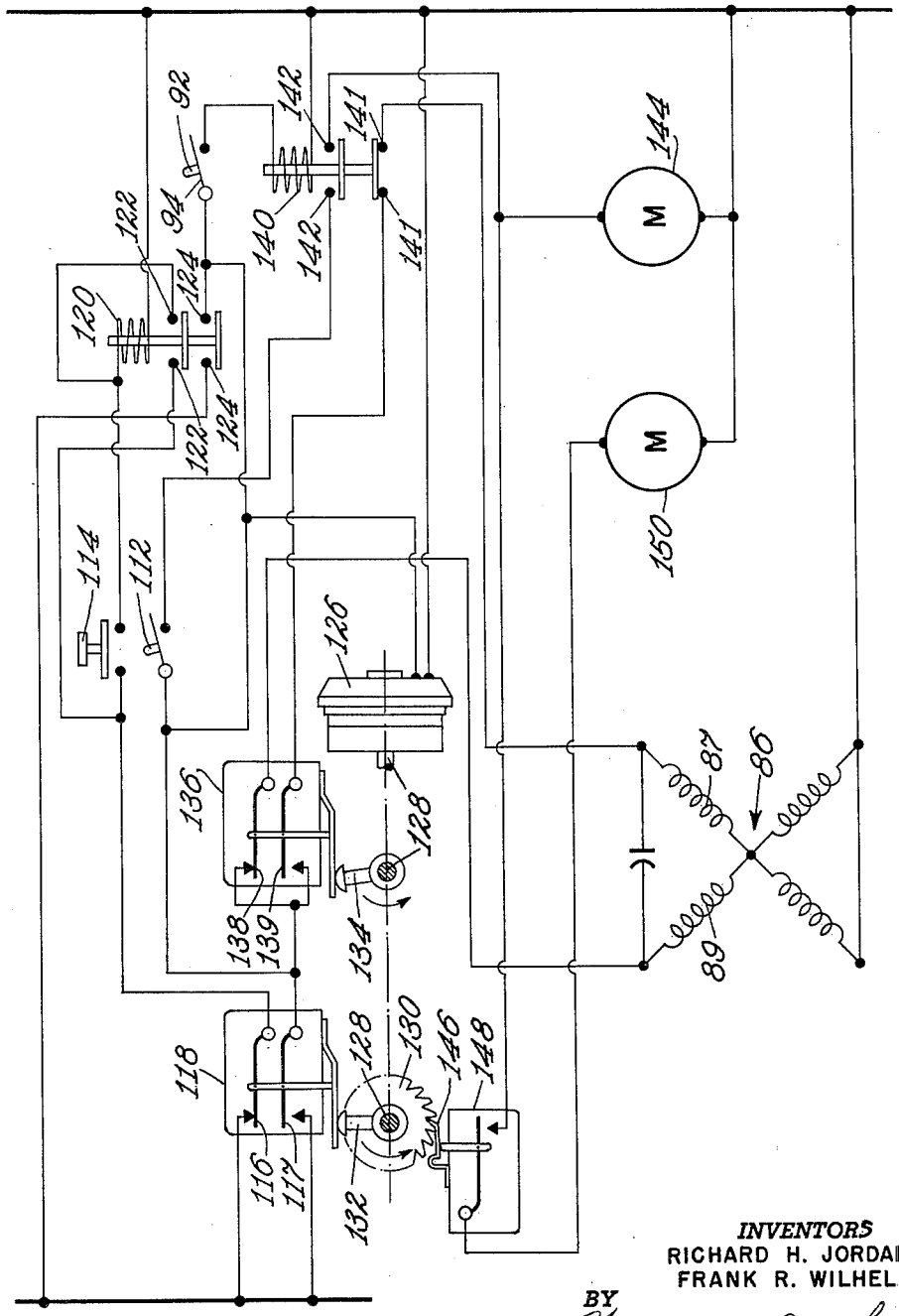
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BOWLING BALL CLEANING AND POLISHING APPARATUS

Filed Dec. 16, 1958 4 Sheets-Sheet 4

FIG. 4



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3,016,553
BOWLING BALL CLEANING AND POLISHING APPARATUS

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Filed Dec. 16, 1958, Ser. No. 780,705
14 Claims. (Cl. 15—21)

The present invention relates to mechanism for cleaning and polishing spherical objects and more particularly to an improved mechanism for cleaning and polishing a bowling ball wherein the ball is automatically moved into and out of engagement with the cleaning and polishing devices.

In a machine constructed in accordance with the invention there is provided an elevator mechanism upon which a bowler places his bowling ball to be cleaned and polished. Upon actuation of the machine, the elevator mechanism is operative to move the ball into engagement with a pair of elongated rotatable cleaning and polishing brushes, upon which the ball is freely supported. One of the brushes rotates continuously; the other rotates intermittently. As a result of the continuous rotation of one brush, the balls being cleaned and polished are also rotated continuously, but at a slower rate than it is when both brushes are rotating in unison. When the intermittently operated brush is rotated for a predetermined period of time, it turns the rotating ball being cleaned and polished slightly, shifting it relative to the axis of the continuously driven or rotating brush. The intermittently driven brush is operated for a plurality of sequences during each ball cleaning and polishing period to ensure that the surface of each ball subjected to the rotating action of the two brushes, will be completely cleaned and polished at the end of the cycle of operations. At the end of the cleaning and polishing cycle, the elevator mechanism is then raised to engage the polished ball freely resting on the brushes. The elevator mechanism continues its upward movement, moving the ball out of contact with the brushes and toward the top of the machine, from whence it is extracted by a player.

It is an object of the invention to provide an improved ball cleaning and polishing apparatus wherein two rotatable cleaning and polishing brushes support and rotate a bowling ball for cleaning and polishing and wherein the ball is automatically delivered into and out of engagement with the brushes by an elevator mechanism.

Another object of the present invention is to provide a novel spherical object cleaning and polishing apparatus having a pair of elongated brushes mounted angularly in different planes and driven to effect complete cleaning and polishing of an object supported thereon and wherein the spherical object is freely deposited on the brushes on the downward movement of an elevator mechanism and is lifted therefrom on the return upward movement of the elevator mechanism.

It is a further object of the invention to provide a novel spherical object cleaning and polishing apparatus having two generally cylindrical brushes mounted angularly in different planes with one of the brushes continuously driven and the other intermittently driven in order to insure that the entire surface of a spherical article supported by the brushes and rotated thereby will be completely cleaned and polished and wherein the spherical article is freely deposited on the brushes on the downward movement of an elevator mechanism and is lifted therefrom on the return upward movement of the elevator mechanism.

It is an added object of the invention to provide a ball cleaning and polishing apparatus where two angularly mounted elongated brushes coact to support a ball and

to effect such movement thereof relative to the two brushes that the entire surface of the ball is cleaned and polished according to a prescribed cleaning and polishing pattern and wherein a player deposits his ball on a novel elevator device for delivery to and from the brushes.

An added object of this invention is to provide a novel bowling ball cleaning and polishing apparatus having a novel delivery device for moving a ball downwardly into engagement with a pair of co-acting elongated cleaning and polishing brushes which freely support the ball and wherein the ball is continuously rotated at one rate of speed by the supporting brushes when both brushes are rotating to ensure that the entire surface of the ball is cleaned and polished.

Other objects and features of the invention will appear as the description of the particular physical embodiment selected to illustrate the invention progresses. In the accompanying drawings, which form a part of this specification, like characters of reference have been applied to corresponding parts throughout the several views which make up the drawings.

FIGURE 1 is a sectional side elevation of the invention, parts broken away.

FIGURE 2 is a plan view of a cleaning and polishing machine provided with the present invention.

FIGURE 3 is a side elevation partly in section of the device shown in FIGURE 2.

FIGURE 4 is a schematic wiring diagram of a suitable control circuit for a cleaning and polishing machine provided with the present invention.

With reference to the drawings, which illustrate a preferred embodiment of the invention, the bowling ball cleaner and polisher consists of a support frame 10 on which are mounted a pair of elongated, preferably cylindrical, rotating brushes 12 and 14. Brush 12, designated the driving brush, is adjustably secured by means of a pair of set screws 16 on horizontal shaft 18 rotatably supported in suitable bearings brackets 20 mounted on frame 10. Mounted on one end of shaft 18 is a pulley 26 which by means of a belt 28 is continuously driven from a suitable power source; such as, a split phase motor 144.

Brush 14, designated the pattern brush, is adjustably secured by set screws 29 on an angularly mounted shaft 30. This shaft is rotatably supported at its ends by suitable bearing brackets 32. One bearing bracket 32 is attached to channel 36 mounted on frame 10. The other bearing bracket 32 is fastened to angularly mounted bracket 38 attached to support frame 10 as shown in FIGure 2. Secured to one end of shaft 30 is a pulley 40 which by means of a belt 42 is driven intermittently from a suitable power source; such as, a capacitor start motor 150.

Brushes 12 and 14 can be formed of any suitable materials or combination thereof as long as they have the capability of supporting a ball, and can exert sufficient cleaning and polishing action necessary to clean and polish a ball in a minimum of time. It has been found that brushes composed of a combination of vegetable tampico fibre and hard steel wire give excellent results. Other suitable combinations of cleaning and polishing materials can be used. Frame 10 and brushes 12 and 14 and their driving mechanisms which drive them in opposite directions may be similar in construction and operation to that described and disclosed in the copending William R. Bogard et al. application, Serial Number 626,000, filed December 3, 1956, for Bowling Ball Cleaning and Polishing Apparatus, now Patent 2,980,935, granted April 25, 1961. Therefore only so much thereof, as is necessary for a complete understanding of the present invention is included herein in the interest of brevity.

Referring to FIGURE 1, elevator mechanism, designated generally E, comprises a ball receiving tray 44 having upwardly extending bumpers 46 and provided with a lower extension piece 48. Extension 48 is inserted in and secured to the upper end of a hollow vertical tube member or sleeve 50 by means of pin 52. Sleeve 50, in turn, is movably supported adjacent its upper end in housing 54 by bearing 56 and retaining ring 58. Housing 54 is mounted on channel 60 fixed to support frame 10. An elongated screw 62 is positioned inside sleeve 50, and a ball nut 64 is mounted for travel therealong. Ball nut 64 is provided with a threaded collar 66 which is screwed into the threaded flange portion 67 at lower end of sleeve 50 and secured therein by set screw 68. It will be understood that by this arrangement, sleeve 50 with tray 44 thereon can be moved along screw 62 by ball nut 64. Ball nut 64 may be similar in construction and operation to that commercially known as a Saginaw b/b screw, manufactured by the Saginaw Steering Gear Division, General Motors Corporation, Saginaw, Michigan.

To apply rotary motion to screw 62 whereby ball nut 64, tube 50 and tray 46 may be moved therealong, there is provided a gear 70 secured to the lower end of screw 62 by pin 72. Gear 70 has a lower downwardly extending shaft 74 rotatably supported in ball bearing assembly 76 mounted in housing 78. Housing 78, is in turn secured to bracket 80 fixed to channel 60 beneath housing 54 as shown in FIGURE 1. Gear 70 is driven by means of a pinion 82 fixed to rotating shaft 84 of reversible motor 86. Motor 86 is mounted by means of spacers 88 to support member 90 fixed to channel 60. A friction brake 81, secured to bracket 80, is positioned against the undersurface of gear 70, as shown in FIGURES 1 and 3, to provide a drag thereagainst, insuring positive stopping of gear 70 upon de-actuation of motor 86.

In operation, a player places his ball B on tray 44 in the position shown in FIGURE 3. Upon actuation of the starting switch 114 which may be similar to the starting switch disclosed in the above referred to Bogard application, motor 86 is actuated, as described in detail hereinbelow, rotating shaft 84 and pinion 82. Pinion 82 in turn drives gear 70 to rotate screw 62. The rotation of screw 62 moves ball nut 64, sleeve 50 and tray 44 downwardly on screw 62. This downward movement of tray 44 moves ball B downwardly toward the position shown in dotted lines on FIGURE 3. Motor 86 continues to drive pinion 82 and gear 70 to move sleeve 50 into its fully retracted position shown in FIGURE 1. It will be understood that ball B will be freely deposited on brushes 12 and 14 as elevator E is moved into its completely retracted position (see FIGURE 1).

When elevator E has been moved to its fully retracted position shown in FIGURE 1, the bottom flange portion 67 of sleeve 50 contacts operating arm 92, closing normally open switch 94 carried on support 96 secured to bracket 80. The closing of switch 94 interrupts the operation of motor 86, and completes a circuit to energize motors 144 and 150. Brushes 12 and 14 are thus driven as described hereinbelow to clean and polish ball B deposited thereon. At the end of the cleaning and polishing cycle brushes 12 and 14 are de-actuated, at which time motor 86 is re-energized and its direction of rotation reversed to reverse the rotation of shaft 84 thereby changing the direction of drive of pinion 82 and the direction of rotation of gear 70.

This in turn reverses the direction of rotation of screw 62 thereby causing ball nut 64 and sleeve 50 to now move upwardly, raising tray 44 and bumpers 46 back into engagement with ball B resting on brushes 12 and 14. Motor 86 remains energized, rotating pinion 82 and gear 70, to raise sleeve 50 and tray 44. Sleeve 50 will be raised until ball B has returned to the starting position shown in solid lines in FIGURE 3. When ball B has reached this position, a spacer 98 freely supported on the top of flange 67 of sleeve 50 (see FIGURE 1), engages the under-surface of housing 54 at the top thereof, fitting into recess 100 formed therein. In this position spacer 98 will prevent further upward movement of elevator mechanism E until motor 86 is de-energized. Thus, the cleaned and polished ball is returned to the player and the apparatus de-activated until it is reactivated by the next player desirous of having his ball cleaned and polished.

To prevent rotation of sleeve 50 about screw 62 as sleeve 50 is raised and lowered therealong, there is provided a wedge shaped bracket 102, fixed to the lower end of sleeve 50 on flange 67 as shown in FIGURES 1 and 3. The lower end of bracket 102 supports a stud shaft 104 on which is mounted roller 106. Roller 106 is positioned for travel in vertical channel 108, secured by bracket 110 to bracket 80.

The adjustable mounting of brushes 12 and 14 on their respective shafts 18 and 30 insures long operating life. When the cleaning efficiency of brushes 12 and 14 has decreased due to use, it is only necessary to loosen the set screws 16 and 29, respectively securing them to their operating shafts, and either slide one or both brushes a short distance along its shaft, or remove one or both brushes and reverse them on their shafts and then tighten the set screws. This adjustment provides a new contact area on the brushes exposed to balls to be cleaned and polished.

FIGURE 4 shows a suitable wiring diagram which may be used to effect the sequence of operations of the ball cleaner and polisher.

Referring to FIGURES 1, 2 and 4, after a ball B is placed on tray 44 of the machine, the operator closes the cover thereof (not shown) which causes switch 112 to be closed. Switch 112 thus acts as a safety interlock, preventing operating of the machine while the protective cover is in open position. In order to start the machine the operator then depresses start button switch 114. Start button switch 114 may be replaced by a coin operated switch if desired.

The momentary closing of start button switch 114 completes a circuit through the closed contactor arm 116 of switch 118, causing the energization of relay 120 which, after the release of start button switch 114 is held in by means of a circuit through its own contacts 122. Relay 120 also completes a circuit through its contacts 124 energizing a conventional timing motor 126, such as a Hansen Manufacturing Company, "Cycle Timer," model 610.

As timing motor 126 starts, its output shaft 128 is rotated in the direction of the arrows, FIGURE 4. Shaft 128 is provided with a saw-toothed cam 130 and two switch-operating arms 132 and 134. As shaft 128 is rotated, arms 132 and 134 are each moved out of contact with the operating arms of their respective associated switches 118 and 136. As will be noted in FIGURE 4, arm 134 and is positioned on shaft 128 so as to move out of contact with the operating arm of switch 136 slightly before switch 134 disengages the operating arm of switch 118. Upon actuation of timing motor 126, arm 134 is immediately moved out of contact with switch 136, opening contactor arm 138 and closing contact arm 139. A circuit is thus completed through contacts 124 of relay 120, contactor arm 139, and the normally closed contacts 141 of a second relay 140, energizing the down winding 87 of reversible motor 86. It will be understood that the term "down winding" and "up winding" of motor 86 are employed solely in the interests of simplicity and refer to the particular winding of motor 86 which rotates shaft 84 in the direction to accomplish the downward or upward movement of tray 44.

Motor 86 is thus energized to rotate its output shaft 84 to move tray 44 with a ball B thereon downwardly on screw 62. As tray 44 is being moved downwardly, arm 132 is moved out of contact with switch 118, opening contactor arm 116 and closing contactor arm 117. This operates to interrupt the hold-in circuit for relay 120, de-energizing relay 120 and re-opening its contacts 122 and

124. However, motor 86 will remain energized by a circuit through now-closed contactor arms 117 and 139, moving tray 44 in a downward direction. Motor 86 will thus remain energized until tray 44 contacts operating arm 92, closing normally open switch 94 which remains closed until the ball cleaning and polishing operations have been completed and tray 44 is moved upwardly as described more in detail hereinafter. Likewise timing motor 126 remains energized by a circuit through contactor arm 117.

When switch 94 is closed, a circuit is completed through contactor arm 117 and switch 94, actuating relay 140, opening contacts 141 and closing contacts 142 thereof. This interrupts the circuit energizing the "down" winding of reversible motor 86 and completes a circuit through contacts 142, energizing motor 144 which operates drive brush 12.

In addition cam 130, rotating with shaft 128 contacts arm 146, alternately opening and closing switch 148 which, in turn, controls the starting and stopping of capacitor start motor 150 by a circuit through contacts 142 of relay 140, thus intermittently rotating pattern brush 14.

At the end of the cleaning and polishing cycle, contactor arm 134 on shaft 128 is rotated back into engagement with the operating arm of switch 136, opening contact arm 139 and closing contact arm 138 thereof. This operates to complete a circuit energizing the "up" winding 89 of reversible motor 86, starting tray 44 from its "down" position upwardly to deliver a cleaned and polished ball to the operator. As tray 44 moves out of engagement with arm 92 of switch 94, switch 94 is re-opened, breaking the circuit relay 140, de-energizing relay 140, opening contacts 142 thereof and interrupting the circuit energizing motors 144 and 150.

Tray 44 continues to move upwardly as the "up" winding 89 of motor 8 remains energized until collar 98 enters recess 100 of housing 54. This physically prevents further upward movement of tray 44. As tray 44 reaches its limit of upward travel, contactor arm 132 on shaft 128 is rotated back into engagement with the operating arm of switch 118, opening contact arm 117 and closing arm 116, thereby interrupting each of the circuits energizing motors 86 and 126. Arm 132 is positioned on shaft 128 such that tray 44 reaches its full "up" position before arm 132 engages the operating arm of switch 118, de-energizing motors 86 and 126. When tray 44 reaches its full "up" position, gear 70 and pinion 82 and shaft 84 are physically prevented from further rotation. Motor 86 thus merely remains energized without further output until arm 132 effects the de-energization thereof. This "stallout" feature ensures that tray 44 and ball B will reach its original fully "up" position before motors 86 and 126 are de-energized. When arm 132 engages the operating arm of switch 118, the cleaner and polisher is completely deactuated until it is reactivated by the next bowler.

Thus there is provided a novel and effective bowling ball cleaner and polisher having an automatic device for delivering a ball into and out of engagement with a pair of cleaning brushes and wherein one brush is driven continuously and the other intermittently to progressively clean the entire surface of the ball delivered thereto.

What we claim is:

1. In a cleaning and polishing apparatus for spherical objects a pair of spaced angularly related elongated cleaning and polishing members, means mounting said members in spaced apart relationship less than the maximum diameter of a spherical object to provide a support for said object to be cleaned and polished, means for rotating said members to clean and polish said object supported thereby, a receiving and delivering device for receiving spherical objects to be cleaned and polished, means mounting said device for movement substantially vertically between said members to deliver said objects thereon into and out of cleaning and polishing position on said members, and operating means for said receiving device to position said device beneath a ball being cleaned and polished by said members, and above and out of the range of operation of said members when receiving or delivering a ball.

2. The invention as defined in claim 1 wherein one of said members is rotated continuously and the other of said members is rotated intermittently whereby the entire surface of said spherical object is cleaned and polished by said members.

3. In a ball cleaning and polishing apparatus, a pair of spaced cleaning and polishing members, means mounting said members in spaced apart relationship to provide a support for a ball to be cleaned and polished, means for rotating said members to clean and polish a ball freely supported thereon, means for controlling the actuation of said rotating means, means for continuing the rotating of said members for a predetermined period of time to ensure that the entire surface of said object has been cleaned and polished, a ball receiving and delivery member, means mounting said receiving member to deliver a ball placed thereon into freely supported position on said pair of cleaning and polishing members, operating means for said receiving member and said cleaning and polishing members, said receiving member mounting means and operating means being constructed and arranged to move said receiving member out of engagement with a ball supported on said cleaning and polishing members and means for selectively actuating said operating means.

4. The invention as defined in claim 3 wherein said operating means is operative, at the end of said predetermined cleaning and polishing period, to move said receiving member back into engagement with said cleaned and polished ball whereby said receiving member with said ball thereon is returned to original ball receiving position.

5. In a ball cleaning and polishing apparatus provided with a frame and a ball supporting and rotating device including a pair of spaced brushes, a shaft mounting each of said brushes, means for rotating one of said shafts and the brush thereon continuously in one direction, means for rotating the other of said shafts and the brush thereon intermittently in the opposite direction whereby a ball on said brushes is turned on said brushes relative to said continuously driven brush to ensure complete cleaning and polishing of said ball, a ball receiving and delivering member comprising a movable support, means mounting said support for substantially vertical movement, means for moving said support downwardly to deliver a ball received on said support for cleaning and polishing into freely supported position on said brushes, said last-named means being operative to move said support out of engagement with a ball deposited on said brushes, and means for moving said support with a ball upwardly to return said support with a cleaned and polished ball thereon from freely supported position on said brushes to its original ball receiving position.

6. The invention as defined in claim 5 wherein said ball support includes a tray, a tubular substantially vertical member supporting said tray, a rotatable elongated screw positioned within said tubular member, said tubular member being adapted for travel therealong and means for rotating said screw whereby said tubular member with said tray thereon is moved vertically on said screw.

7. In a ball cleaning and polishing apparatus having a frame and provided with a pair of rotatable spaced cleaning and polishing members providing a support for a ball to be cleaned and polished and means for rotating said members, a ball receiving and delivering device positioned for movement between said members comprising a movable ball support, a substantially vertical tubular member mounting said support, an elongated screw positioned within said tubular member, means adapting said tubular member for travel along

said screw, a rotatable gear sector, means securing said screw to said gear sector, a pinion for driving said gear, means for rotating said pinion first in one direction and then in the other whereby a ball received on said ball support is moved vertically into and out of freely supported position on said cleaning and polishing members.

8. The invention as defined in claim 7 including means on said tubular member for preventing rotation of said tubular member about said screw as said tubular member travels therealong.

9. In a bowling ball cleaning and polishing apparatus, a pair of spaced angularly related elongated cleaning and polishing members, said members providing a support for a bowling ball to be cleaned and polished, means for rotating one of said members in one direction, means for rotating the other of said members in a direction opposite to said other driven member, a ball receiving and delivering member including a ball support, means mounting said support for movement in a vertical plane to deliver a ball into and out of cleaning and polishing position on said elongated members, said receiving and delivering member mounting means being operative to move said receiving and delivering member out of engagement with a ball positioned onto said elongated members, operating means for said ball receiving and delivering member, and a timing device for selectively controlling the operating of said operating means whereby a ball is delivered from an original ball receiving station by said receiving member into position on said elongated members, cleaned and polished by said elongated members in a pre-determined sequence and for a predetermined period of time and returned by said receiving member to said ball receiving station.

10. A spherical object cleaning and polishing apparatus comprising a frame, a substantially horizontal shaft mounted in said frame, an elongated brush mounted on said horizontal shaft, a second shaft mounted in said frame and spaced from said horizontal shaft and at a vertical angle relative thereto, an elongated brush mounted on said inclined shaft, said shafts mounting said brushes to support and clean and polish a spherical object placed thereon, means for rotating said shafts to drive said brushes to clean and polish said object, a spherical object support member, means mounting said support member for vertical movement between said brushes and operating means for said support member to move said support member and an object placed thereon downwardly from an object receiving station whereby said object is delivered onto said brushes for cleaning and polishing, said operating means being adapted to move said support member upwardly to deliver said cleaned and polished object back to said receiving station.

11. A bowling ball cleaning and polishing mechanism comprising a frame, a substantially horizontal shaft mounted in said frame, a generally cylindrical brush mounted on said horizontal shaft, a second shaft mounted in said frame and spaced from said horizontal shaft less than the maximum diameter of a bowling ball and at a vertical angle relative thereto, a generally cylindrical brush mounted on said inclined shaft, said shafts mounting said brushes to form a support for said ball, means for rotating said shafts to drive said brushes to clean and polish a ball supported thereon, a ball receiving and delivering device including a ball support, means mounting said support for vertical movement between said brushes, means for moving said support to deliver a ball received thereon into and out of freely supported position on said brushes, and operating means for said shaft rotating means.

12. The invention as defined in claim 11 wherein said brush on said horizontal shaft is rotated continuously and said brush mounted on said inclined shaft is rotated intermittently while a ball is in freely supported position thereon.

13. A bowling ball cleaning and polishing apparatus comprising in combination a frame, a substantially horizontal shaft mounted in said frame, a generally cylindrical brush mounted on said horizontal shaft, a second shaft mounted in said frame and spaced from said horizontal shaft and at a vertical angle relative thereto, said brushes forming a support for a bowling ball placed thereon, a motor for rotating each of said shafts, said horizontal shaft being adapted for rotation in one direction and said inclined shaft being adapted for rotation in the opposite direction, a ball receiving and delivering mechanism including a ball support tray, a movable substantially vertical member positioned between said brushes and supporting said tray, gear and pinion means for moving said vertical member to move said tray vertically to deliver a ball placed thereon into and out of freely supported cleaning and polishing position on said brushes, a reversible motor for driving said last-named means in alternate directions to alternately lower and raise said vertical member whereby said ball is moved into and out of position on said brushes, an operating circuit connecting said motors, selective means for actuating said motors and a timing device for controlling the period of operation of said motors in accordance with a predetermined time cycle of operation.

14. The invention as defined in claim 13 wherein said brush on said horizontal shaft is rotated continuously and said brush on said inclined shaft is rotated intermittently after a ball has been freely deposited thereon whereby the entire surface of said ball is cleaned and polished.

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