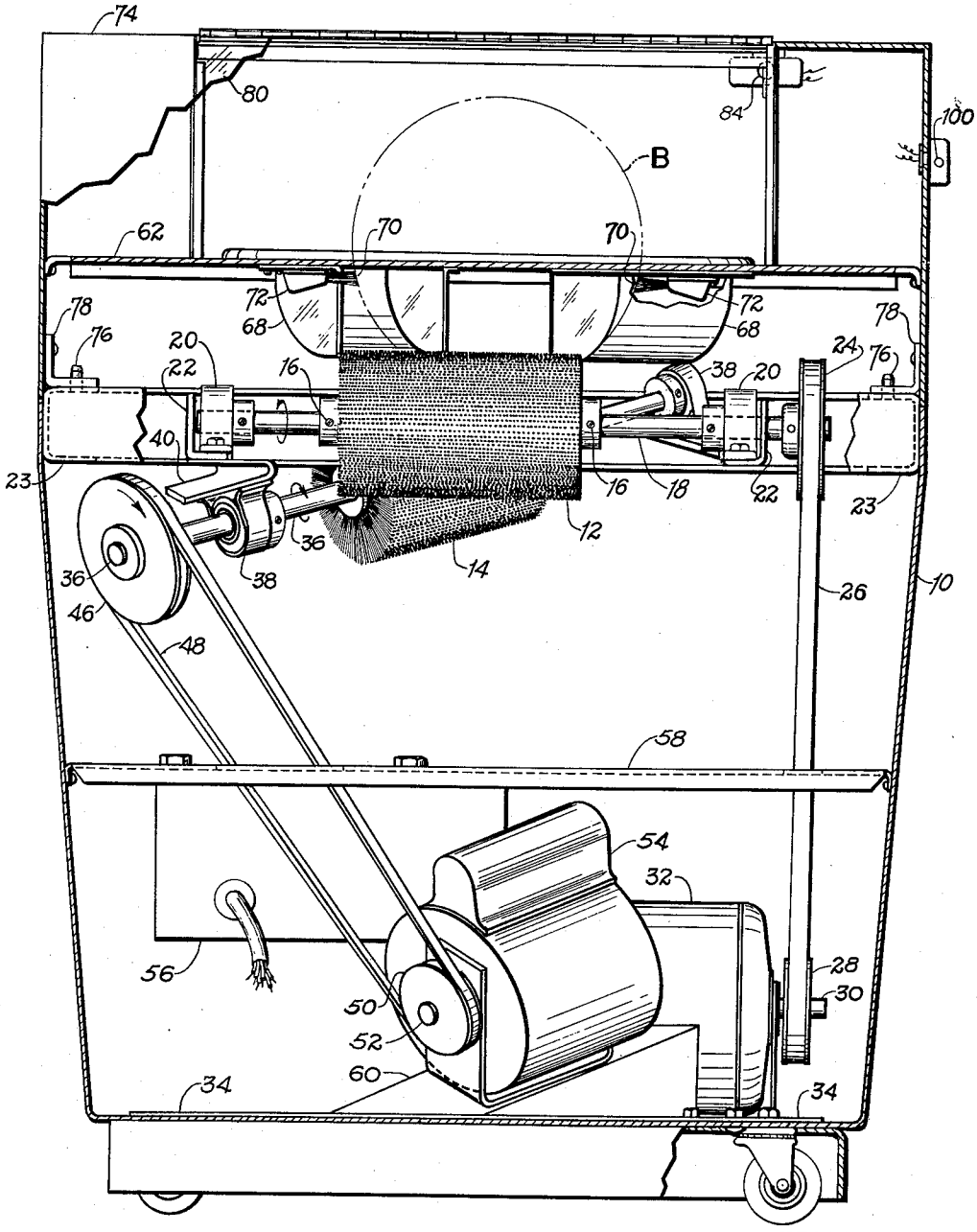
April 25, 1961 W. R. BOGARD ET AL 2,980,935

BOWLING BALL CLEANING AND POLISHING APPARATUS

Filed Dec. 3, 1956

3 Sheets-Sheet 1

FIG. 1



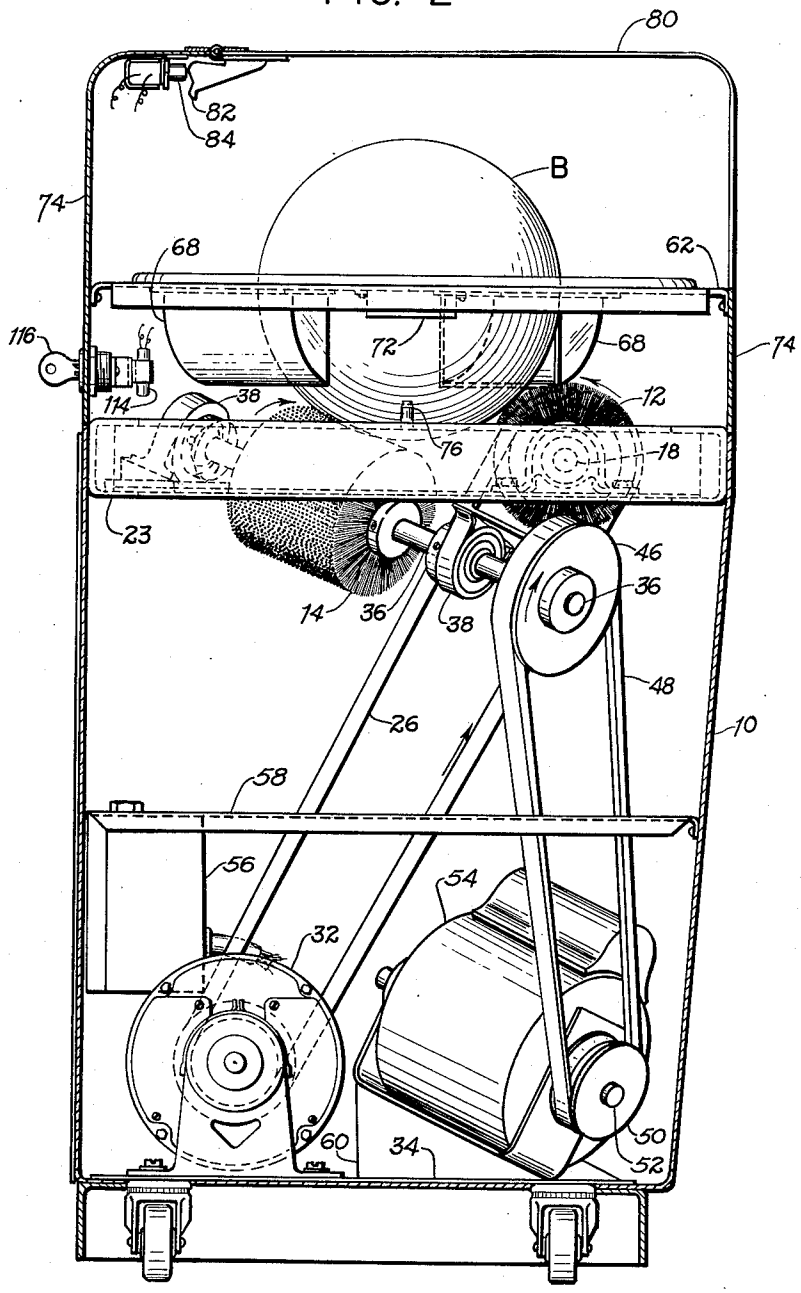
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Filed Dec. 3, 1956 3 Sheets-Sheet 2

FIG. 2



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April 25, 1961 W. R. BOGARD ET AL 2,980,935

BOWLING BALL CLEANING AND POLISHING APPARATUS

Filed Dec. 3, 1956 3 Sheets-Sheet 3

FIG. 3

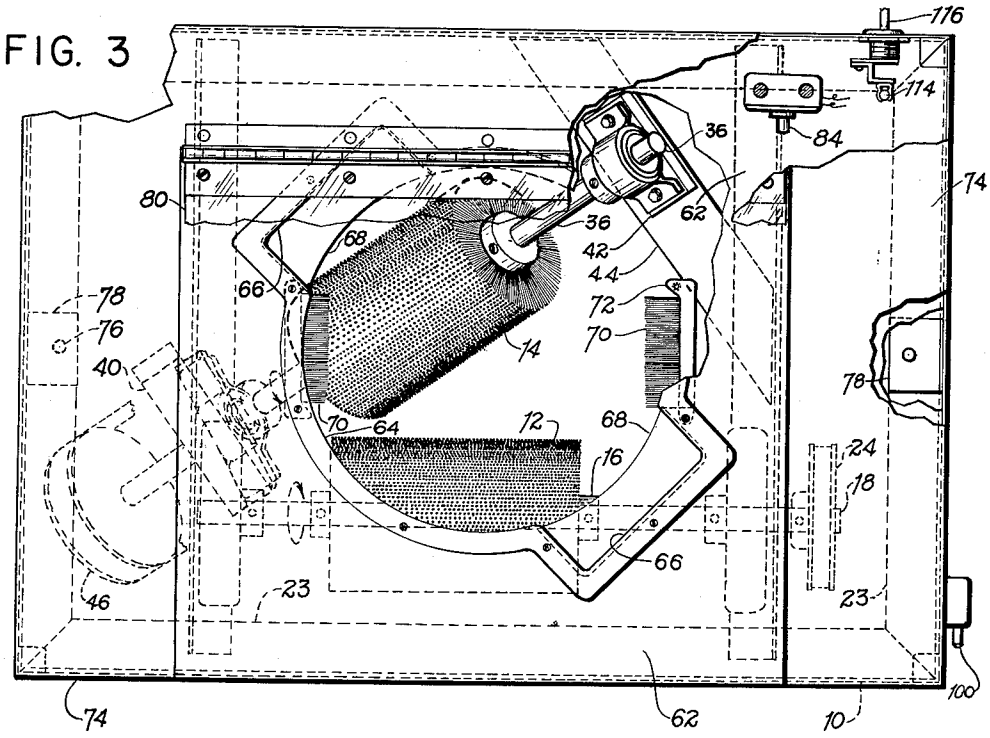
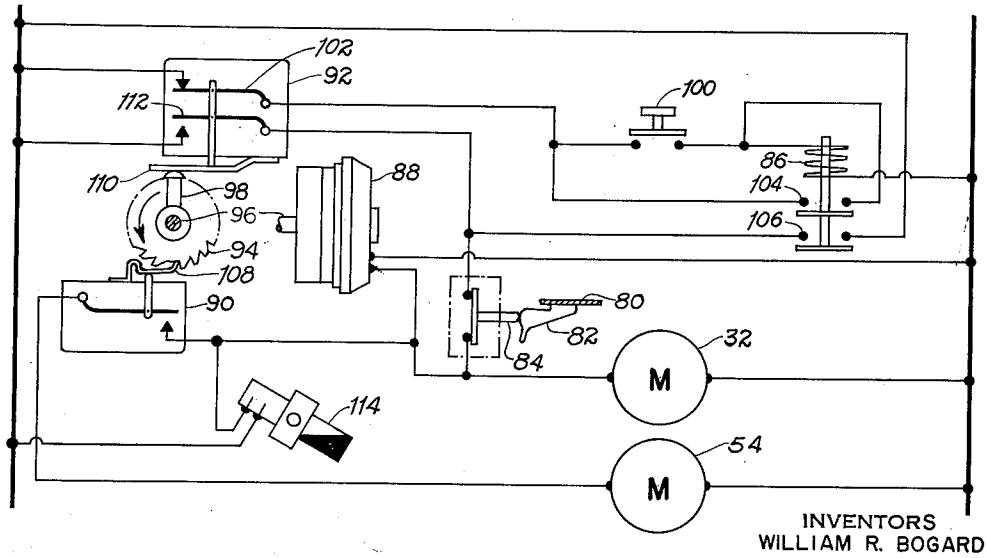


FIG. 4



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United States Patent Office 2,980,935 Patented Apr. 25, 1961

2,980,935

BOWLING BALL CLEANING AND POLISHING APPARATUS

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Filed Dec. 3, 1956, Ser. No. 626,000

10 Claims. (Cl. 15—21)

This invention relates to apparatus for cleaning and polishing spherical objects, and more particularly to an improved apparatus for rapidly and efficiently cleaning and polishing bowling balls.

In a machine constructed in accordance with the invention, there are provided two cleaning and polishing brushes which rotatably support a spherical object such as a ball and also clean and polish it. One of the brushes rotates continuously; the other rotates intermittently. As a result of the continuous rotation of one brush, the object being cleaned and polished is 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 a few degrees, or shifts it relative to the axis of the continuously driven or rotating brush. Since the intermittently driven brush is operated for a plurality of sequences during each ball cleaning and polishing period, it will be seen 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.

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 spherical object, such as a bowling ball, for cleaning and polishing and wherein during a prescribed cleaning and polishing period, one of the brushes is continuously rotated and the other is intermittently driven in order that all the entire surface of the ball may be completely cleaned and polished.

It is a further object of the invention to provide a novel spherical object cleaning and polishing apparatus having two cylindrical brushes mounted angularly in different planes and wherein one of the brushes in continuously driven and the other is 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.

It is a further object of the invention to provide a ball cleaning and polishing apparatus where two angularly mounted cylindrical 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.

The invention further consists in the provision of a novel and simple ball cleaning and polishing apparatus wherein two brushes support and clean and polish a ball, and means are included for maintaining a ball to be cleaned properly positioned on the brushes so that the desired cleaning and polishing of the ball will proceed according to a prescribed pattern and be completed in a predetermined timed cycle of operations.

The invention also consists in the provision of two coacting elongated cleaning and polishing brushes, which support a ball and clean and polish the surface thereof,

and wherein the ball in continuously rotated at one rate of speed by one of the supporting brushes and at a different rate of speed by the supporting brushes when both brushes are rotating, in order that the entire surface of the ball may be cleaned and polished.

It is an added object of the invention to provide a ball cleaning and polishing apparatus having two opposed elongated ball supporting, cleaning and polishing brushes, one of which is intermittently driven while the other is continuously driven, and ball positioning brushes spaced from the first-named brushes operative to center a ball to be cleaned and polished on the cleaning and polishing brushes in order that, as the result of the continued rotation of one of the brushes, and the controlled intermittent operation of the other, the entire surface of a ball may be cleaned and polished according to a prescribed pattern of operations.

With these and other objects of the invention not specifically mentioned in view, the invention consists in certain combinations and constructions which are described fully hereinafter, and then set forth in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same or like parts:

Figure 1 is a front elevation of the bowling ball cleaning and polishing apparatus with the front cover removed.

Figure 2 is a side elevation of the same with the side cover removed.

Figure 3 is a plan view of the bowling ball cleaning and polishing apparatus with the hinged top cover partly broken away, and

Figure 4 is a wiring diagram illustrating the control circuit of the bowling ball cleaning and polishing apparatus.

With reference to the drawings, which illustrate a preferred embodiment of the invention, the bowling ball cleaner and polisher consists of a housing **10** in which are mounted a pair of cylindrical rotating brushes **12** and **14**. Cylindrical 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 **20** mounted on a pair of spaced cross-frame members **22** held by a channel frame **23**. Mounted on one end of shaft **18** is a pulley **24** which by means of a suitable belt **26** is continuously driven by pulley **28** secured to shaft **30** of split phase motor **32** mounted on platform **34** of housing **10**.

Cylindrical brush **14**, designated the pattern brush, is adjustably secured on an angularly mounted shaft **36**. This shaft is rotatably supported at its ends by suitable bearings **38**. One bearing **38** is secured to bracket **40** attached to one of the cross frames **20**. The other bearing **38** is fastened to a block **42** secured to angularly mounted bar **44** attached to channel frames **23**. Secured to one end of shaft **36** is a pulley **46** which by means of a suitable belt **48**, is driven intermittently from pulley **50** mounted on shaft **52** of a capacitor start motor **54**. This motor as described more in detail hereinafter, is intermittently and automatically turned on for suitable periods of time, say 2½ seconds, and 3½ seconds off throughout the ball cleaning and polishing cycle, which may be of any suitable duration, such for example as two minutes.

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.

The cycle timing mechanism for the apparatus is located in control box 56 secured to frame 58 within housing 10. Capacitor motor 54 is mounted on an angle block 60 secured to platform 34 in the bottom of housing 10. This housing is mounted on suitable casters or rollers which allow the apparatus to be moved around as desired in a bowling alley. The top portion of housing 10 is provided with a plate 62, the center portion of which has an opening 64, preferably circular, employed for the purpose of allowing a bowling ball B to be placed correctly on the cylindrical brushes 12 and 14 and at the same time, providing means for maintaining the ball in centered position during cleaning and polishing operations. Plate 62, as shown, is suitably secured to the inner walls of housing 10.

Circular opening 64 also is provided with two rectangular cut-outs 66 which are 180° opposed from each other. These cut-outs form the openings for two quarter circular downward projecting cowl-shaped guards 68 provided for the purpose of permitting the ball to be placed on the brushes 12 and 14 and at the same time providing means to prevent the hands of the person who inserts the ball in opening 64 from coming in contact with the mechanism and thus constituting a safety guard. The adjustable mounting of brushes 12 and 14 on their respective shafts 18 and 36 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 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.

In order to assist in maintaining a ball centered on the cleaning brushes during the cleaning and polishing operations and prevent the ball from contacting the rim of circular opening 64 in plate 62, the latter is provided with two bumper brushes 70 which are mounted opposite each other and extend horizontally partway in the opening 64. Each bumper brush 70 is held by a suitable mounting bracket 72 secured to the underside of plate 62 so that said brushes may easily be adjusted or replaced in case of wear.

The top portion of housing 10 consists of a removable dome 74 which rests on the housing and is interlocked therewith by means of a pair of upright studs 76 projecting upwardly from the frame 23. These studs engage with suitable holes in a pair of brackets 78 secured to the inner walls of dome 74. The latter is also provided with a curved hinge mounted plastic glass cover 80 which is lifted to insert the ball into the machine, but due to its transparency, permits viewing of the cleaning and polishing process. Cover 80 is provided with a lug 82 which, when cover plate 80 is closed, depresses a switch button 84 which closes the operating circuit and starts the machine. When cover 80 is open, switch 84 is inoperative and the machine cannot be started until it is closed again.

As mentioned heretofore the apparatus embodying the invention is provided with two motors 32 and 54. Motor 32 preferably is a split phase and is referred to as the drive or cleaning motor. It is connected in the operating circuit of the machine in such manner as to run continuously during the selected cleaning cycle which is usually about two minutes. Motor 54 preferably is a capacitor start motor and is referred to as the pattern motor. Motor 54 is intermittently driven during the cleaning cycle. As an example of its operation it may be turned on for 2½ seconds, and off for 3½ seconds throughout the selected cleaning cycle.

The cycle timing mechanism which controls the cleaning and polishing operation of brushes 12 and 14 is mounted in control box 56 mentioned hereinabove. The components enclosed in box 56 consist of a hold-in relay 86 and a suitable conventional timing motor 88, such as a Hansen Mfg. Co., "Cycle Timer," model 610 (Fig. 4), adjacent which are mounted two cam operated switches 90 and 92. Switch 90 is the pattern motor control switch and is actuated by means of a phenolic condensation product and over cam 94 cut in a saw tooth fashion. Cam 94 is mounted on output shaft 96 of timing motor 88 by means of set srew 98. The latter, provided with a rounded head, is long enough so that the head contacts and actuates the switch 92 once in each revolution of timer shaft 96. Switch 92 controls the starting and stopping of the operating cycle of cleaning motor 32.

With reference to the wiring diagram shown in Fig. 4 of the drawings the sequence of operation of the ball cleaner and polisher is as follows:

After a ball B is placed on the brushes 12 and 14 in the machine the operator closes the hinge mounted cover 80 which as mentioned heretofore causes switch 84 to be closed by lug 82 mounted inside cover 80. In order to start the machine the operator then depresses start button 100 which is conveniently secured to the exterior of dome 74. Start button switch 100, may be replaced by a coin operated switch if so desired.

The momentary closing of starter switch 100 permits current to flow through the closed contactor arm 102 of switch 92 and cause the energization of relay 86 which, after the release of button 100, is held in by means of its own contacts 104. Since the energization of relay 86 also caused the closing of relay contacts 106 and switch 84 was closed when the cover 80 was closed by the operator, current now flows to the cleaning motor 32 which starts running and thus drives cleaning brush 12. Closed switch 84 also permits current to flow to the timing motor 88 which starts it. The starting of timing motor 88 effects the rotation of cam 94 which in turn through arm 108 opens and closes switch 90 which controls the starting and stopping of pattern motor 54.

In order to prevent the cleaning and pattern motors 32 and 54, respectively, from starting at the same time which would cause an excessive inrush of current, one of the teeth of saw tooth shaped cam 94 is removed so that closing of switch 90 and thus starting of pattern motor 54 is delayed for a suitable period, say about six seconds. The rotation of cam 94 also causes the head of the set screws 98 on cam 94 to disengage from arm 110 of switch 92 causing contactor arm 102 to open and interrupt the current flow to relay 86 which at the same time another contactor arm 112 in switch 92 closes and permits current to flow through a relay bypass circuit directly to motors. The opening of contactor arm 102 effects the disenergization of relay 86 and the saw-toothed cam 94 causes the intermittent starting and stopping of the pattern motor 54. When, after one revolution of cam 94 the head of set screw 98 contacts and depresses switch arm 110 of switch 92 contactor arm 112 in swith 92 opens and interrupts all current flow to the motors and thus effects the stopping of the machine.

In order to provide means to enable the operator to run the machine continuously the latter is provided with a switch 114 which may be turned by a key 116 (Fig. 2) and thus supply operating current even if the cover 80 and cover switch 84 are open.

It will be apparent that in an apparatus embodying the invention we have provided a novel method of cleaning and polishing spherical objects, such as bowling balls, wherein the object is placed on two supporting cleaning and polishing brushes and one brush is rotated continuously while the other is rotated intermittently in the opposite direction to progressively clean and polish the entire surface of the object in accordance with a timed program of operation.

What we claim is:

1. In a ball cleaning and polishing apparatus, in combination, a frame, a ball supporting and rotating device comprising a pair of spaced generally cylindrical brushes, said brushes being constructed and arranged to support

a ball resting thereon for cleaning and polishing, a shaft mounting each of said brushes, means mounted on said frame and spaced from said brushes constraining a ball supported on said brushes in substantially linearly stationary position thereon, means for rotating one of said shafts and the brush mounted thereon continuously in one direction and means for rotating the other of said shafts and the brush mounted thereon intermittently in the direction opposite to the rotation of said continuously rotated shaft, the intermittent rotation of said last-named brush being operaitve to turn a ball supported on said brushes relative to said continuously driven brush and thereby insure complete cleaning and polishing of said ball.

2. The apparatus defined in claim 1 wherein said constraining means include spaced bumper brushes mounted in said frame above said pair of brushes and operative to center a ball to be cleaned on said pair of brushes.

3. In a cleaning and polishing apparatus for spherical objects, a pair of spaced angularly related, vertically displaced elongated cleaning and polishing members, said members providing a support for a spherical object to be cleaned and polished, means for rotating one of said members continuously whereby said spherical object supported by said members is rotated in the direction opposite to the direction of rotation of said continuously driven member, means for intermittently rotating the other of said members whereby the axis of rotation of said object resting on said members is shifted into a different plane, control mechanism for intermittently actuating said means for rotating said other of said members, and a timing device for continuing the cleaning and polishing of said members for a predetermined period of time until the entire surface of said object has been cleaned and polished.

4. In a ball cleaning and polishing apparatus, in combination, a frame, a ball supporting and rotating device comprising a pair of spaced brushes, a shaft mounting each of said brushes, a motor for rotating one of said shafts and the brush mounted thereon continuously, a second motor for rotating the other of said shafts and the brush mounted thereon intermittently, the intermittent rotation of said last named brush being operative to turn a ball supported on said brushes relative to said continuously driven brush to insure complete cleaning and polishing of said ball, an operating circuit connecting said motors, selective means for intermittently actuating said motor which drives said intermittently driven shaft, and timing mechanism for controlling the period of operation of both of said motors in accordance with a pre-determined timed cycle of operations.

5. In a ball cleaning and polishing apparatus, in combination, a frame, a ball supporting and rotating device comprising a pair of spaced brushes, a shaft mounting each of said brushes, means for rotating one of said shafts and the brush mounted thereon continuously, means for rotating the other of said shafts and the brush mounted thereon intermittently, the intermittent rotation of said last named brush being operative to turn a ball supported on said brushes relative to said continuously driven brush to insure complete cleaning and polishing of said ball, spaced bumper brushes, means mounting said bumper brushes in a cover plate attached to said frame above said pair of brushes and operative to center a ball to be cleaned on said pair of brushes, said cover plate being provided with an opening allowing a ball to be placed on said first named brushes and removed

therefrom and hand guards carried by said cover plate adjacent said opening for guiding the positioning of a ball on said brushes and preventing injury to the hands of a person when placing the ball upon or removing it from said first named brushes.

6. The apparatus defined in claim 4 including an operating circuit for said motors, a timing motor connected to said circuit, means operated by said timing motor for intermittently making and breaking the circuit to one of said motors, whereby said one of said motors is intermittently driven while the other of said motors is continuously driven, and for stopping the operation of both motors at the conclusion of a pre-determined timed period.

7. The apparatus defined in claim 6 wherein said means operated by said timing motor includes a cam mounted on the shaft of the timing motor and a switch in the circuit of said intermittently operated motor engaged by said cam for making and breaking said circuit in accordance with the high and low pattern of said cam.

8. A spherical object cleaning and polishing apparatus 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, the axis of said second shaft being angularly displaced vertically relative to the axis of said first shaft, a cylindrical brush mounted on said last-named shaft and cooperating with said first-named brush to support and clean and polish a spherical object placed on said brushes, and mechanism for driving said brushes to rotate and clean and polish said spherical object.

9. The apparatus defined in claim 8 wherein said mechanism includes a source of power for said substantially horizontal shaft, and a source of power for said angularly mounted shaft, and selective means for actuating said sources of power to rotate one of said shafts continuously, and the other of said shafts intermittently to rotate said spherical object and clean and polish it according to a predetermined operating pattern.

10. The method of cleaning and polishing a spherical object comprising supporting two elongated rotatable cleaning and polishing members in position angularly displaced vertically to receive and hold a spherical object to be cleaned and polished, continuously rotating one of said members in one direction while preventing movement of said other member, whereby said ball is rotated and subjected to the cleaning and polishing action of said rotating supporting member and said stationary member, intermittently rotating said other member in a direction opposite to the rotation of said continuously rotating member to cause said object to be turned on its axis of revolution, and continuing said intermittent rotation of said other member until the entire surface of said object has been progressively cleaned and polished.

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