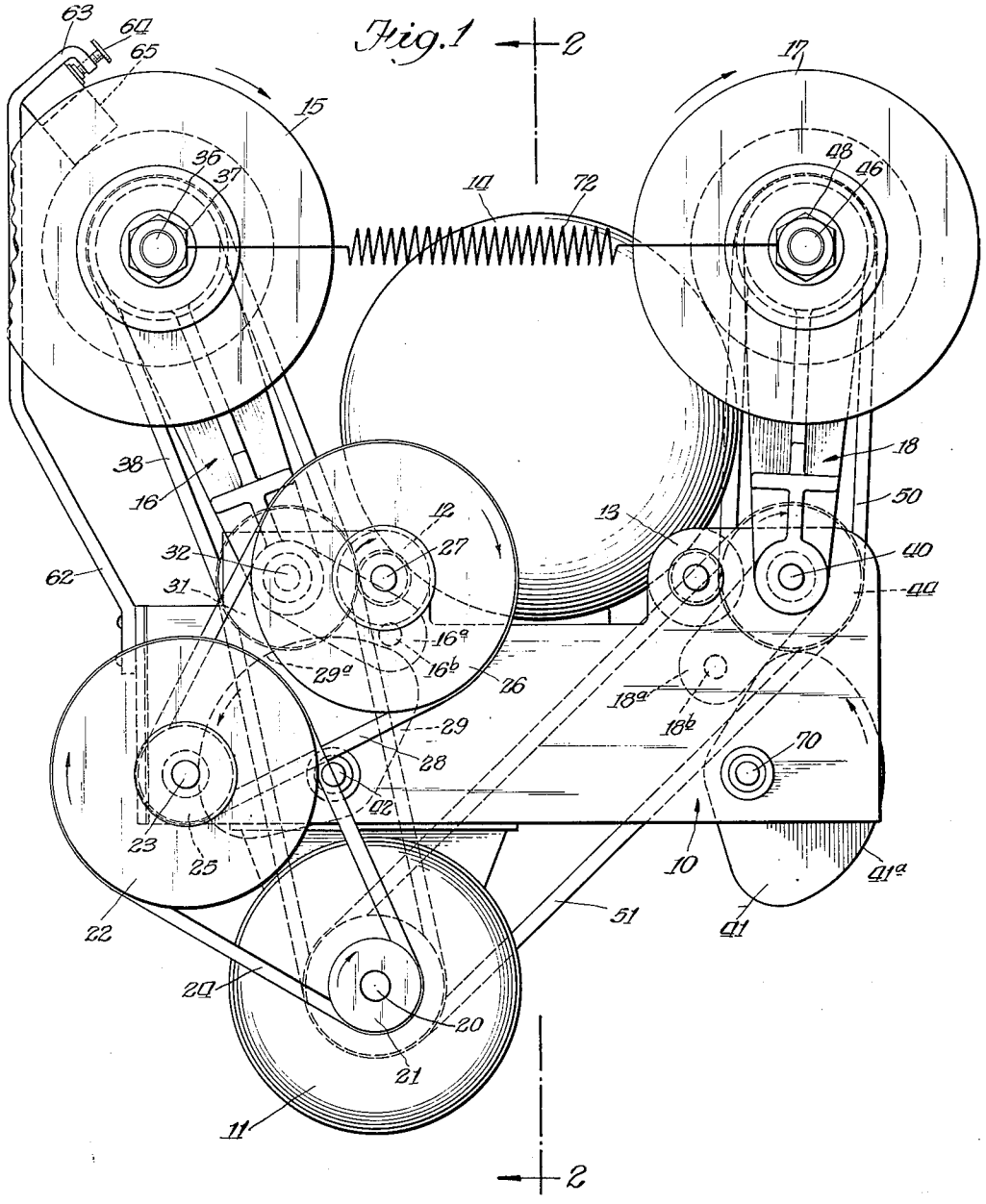
March 11, 1952 L. M. FLEMING 2,588,714

BALL CLEANING AND POLISHING APPARATUS

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Fig. 1



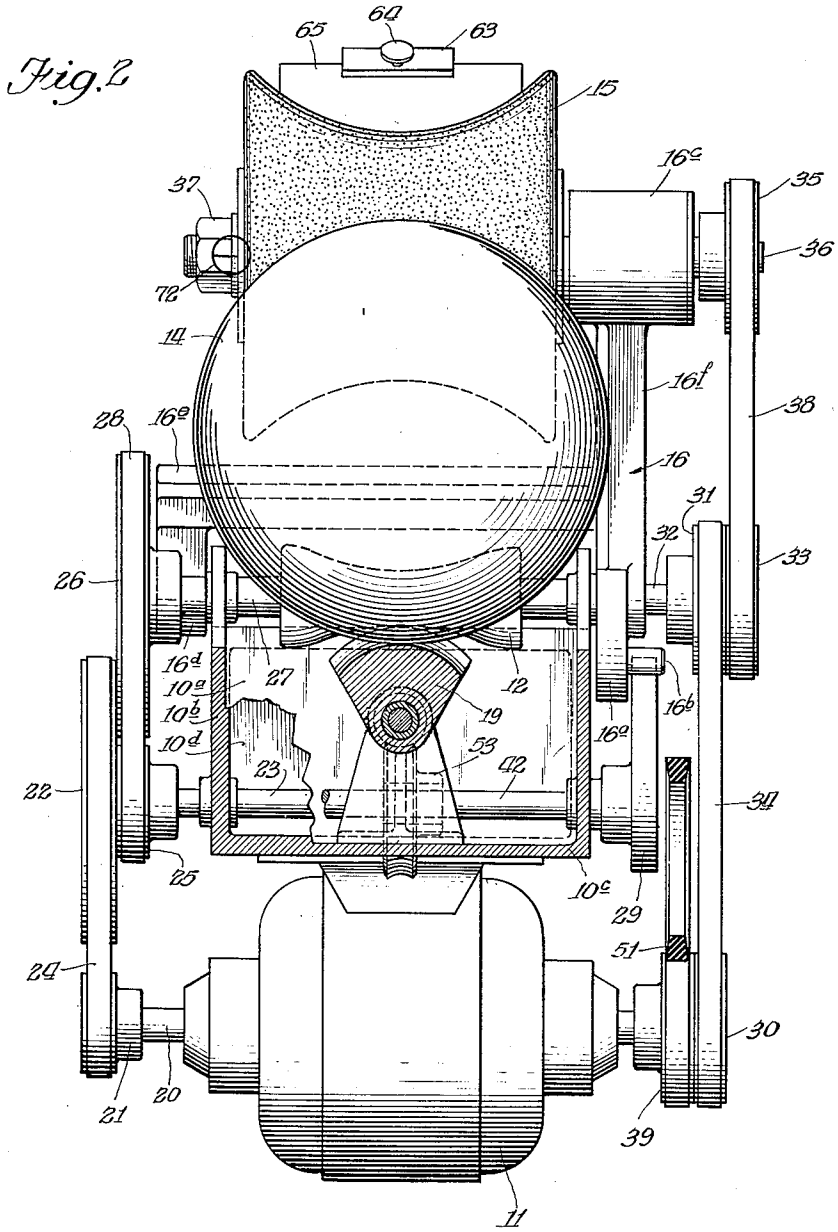
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BALL CLEANING AND POLISHING APPARATUS

Filed May 22, 1947 6 Sheets-Sheet 2

Fig. 2



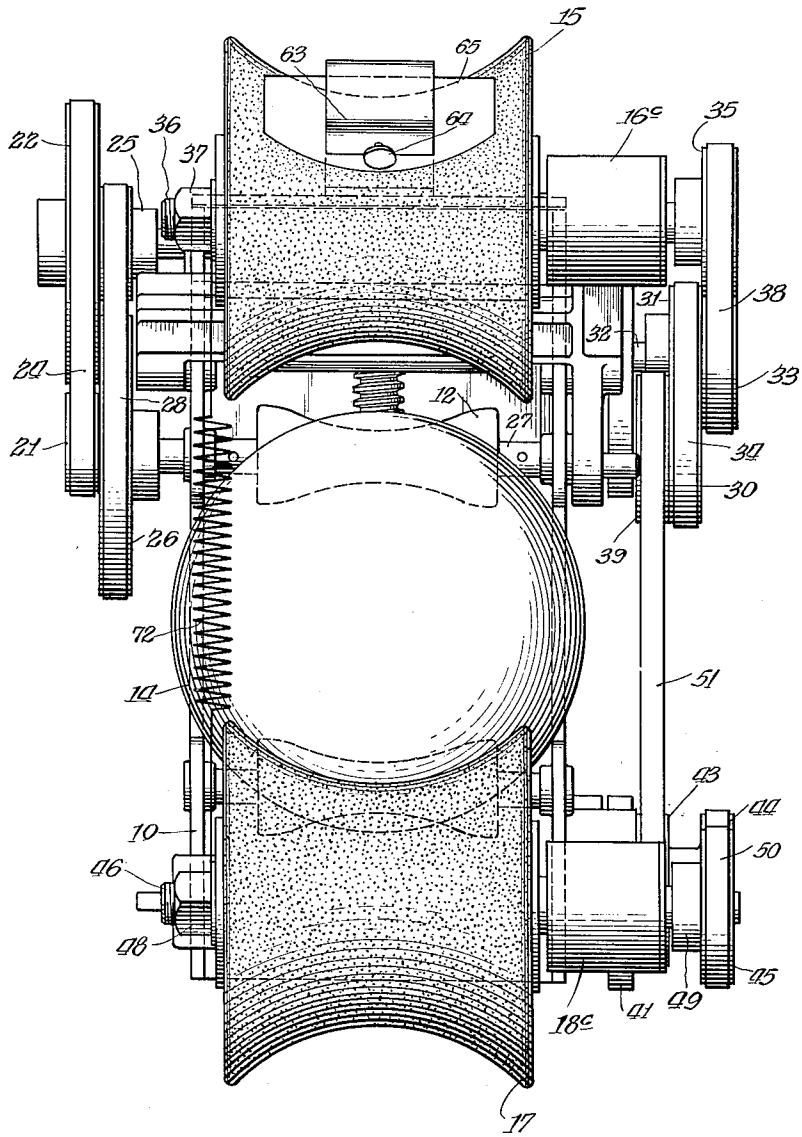
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BALL CLEANING AND POLISHING APPARATUS

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Fig. 3



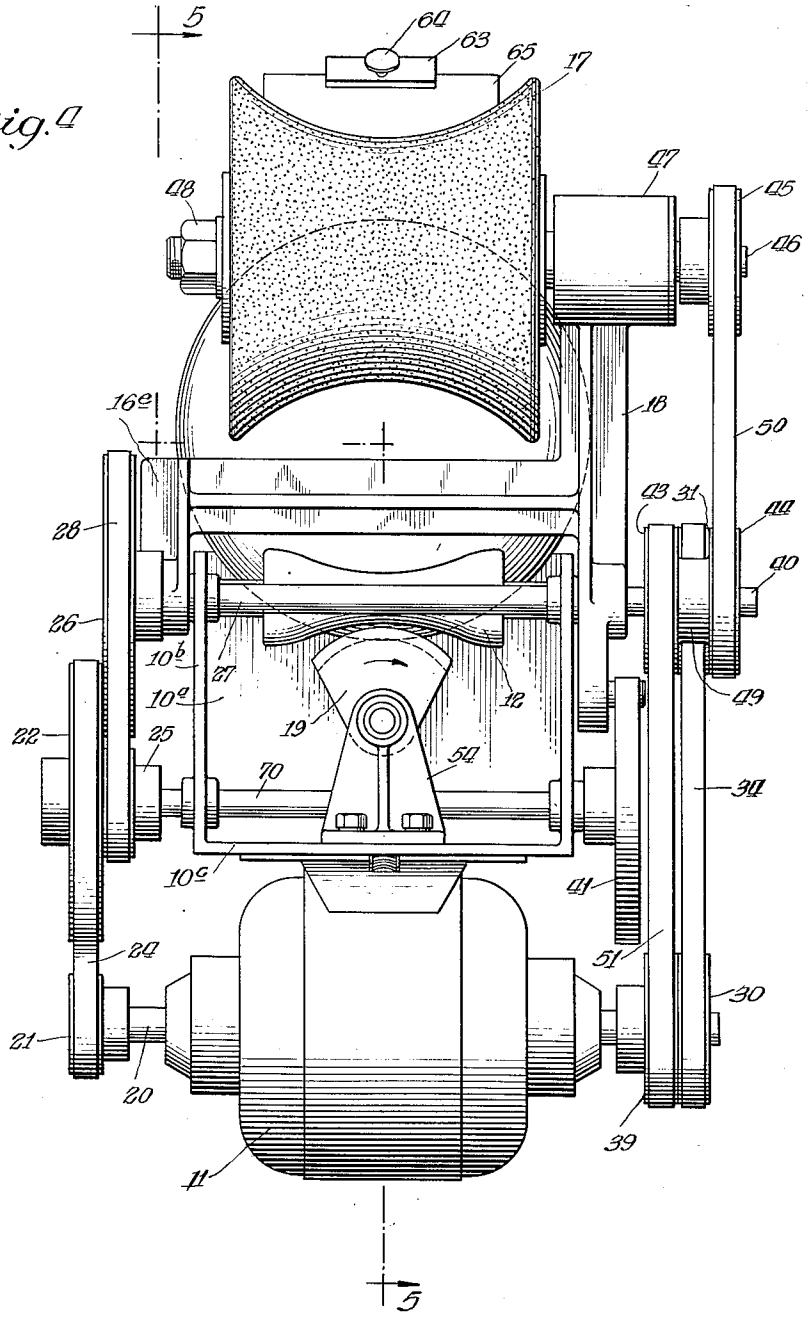
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BALL CLEANING AND POLISHING APPARATUS

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Fig. 4



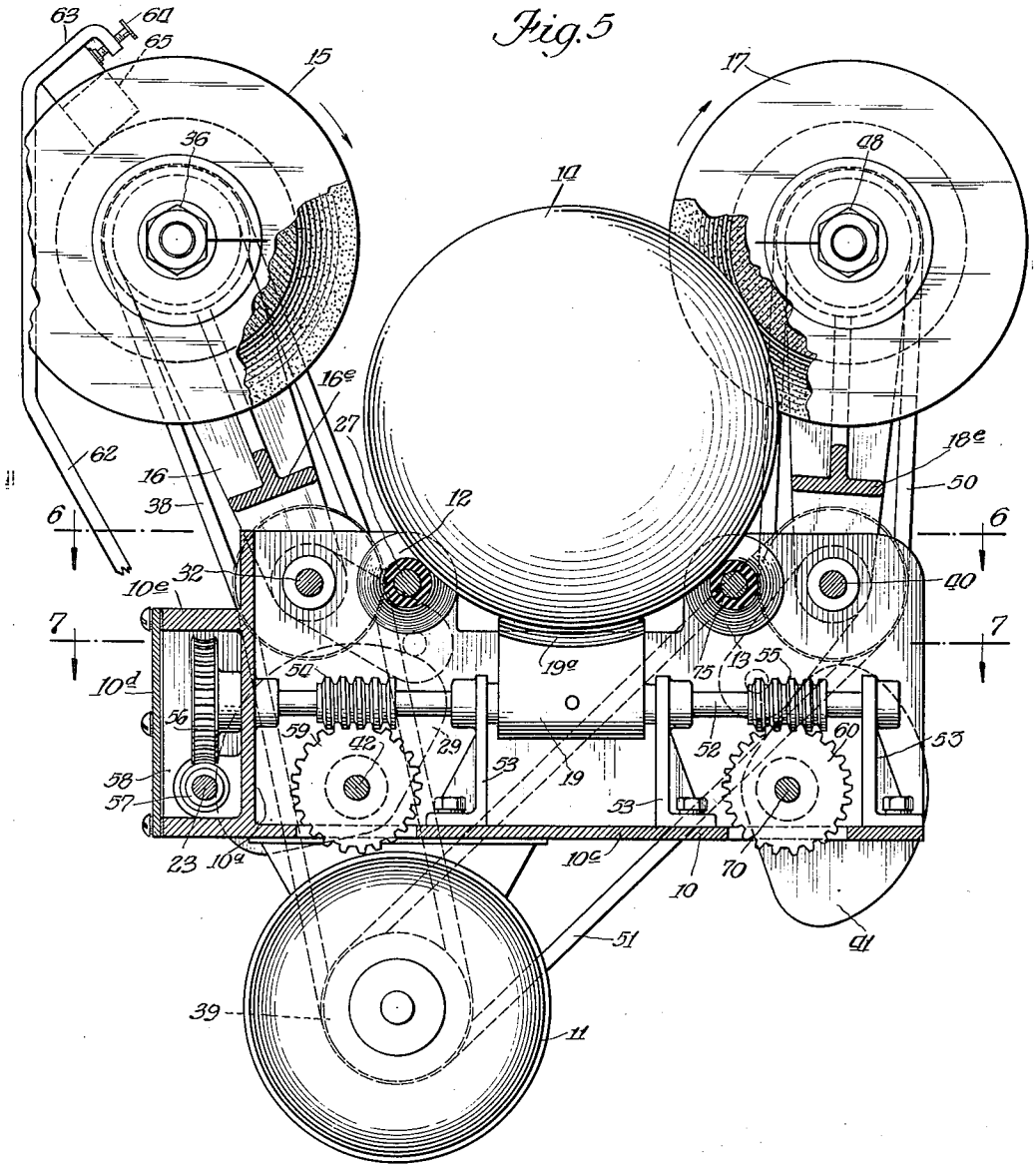
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BALL CLEANING AND POLISHING APPARATUS

Filed May 22, 1947 6 Sheets-Sheet 5

Fig. 5



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March 11, 1952 L. M. FLEMING 2,588,714

BALL CLEANING AND POLISHING APPARATUS

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Fig. 6

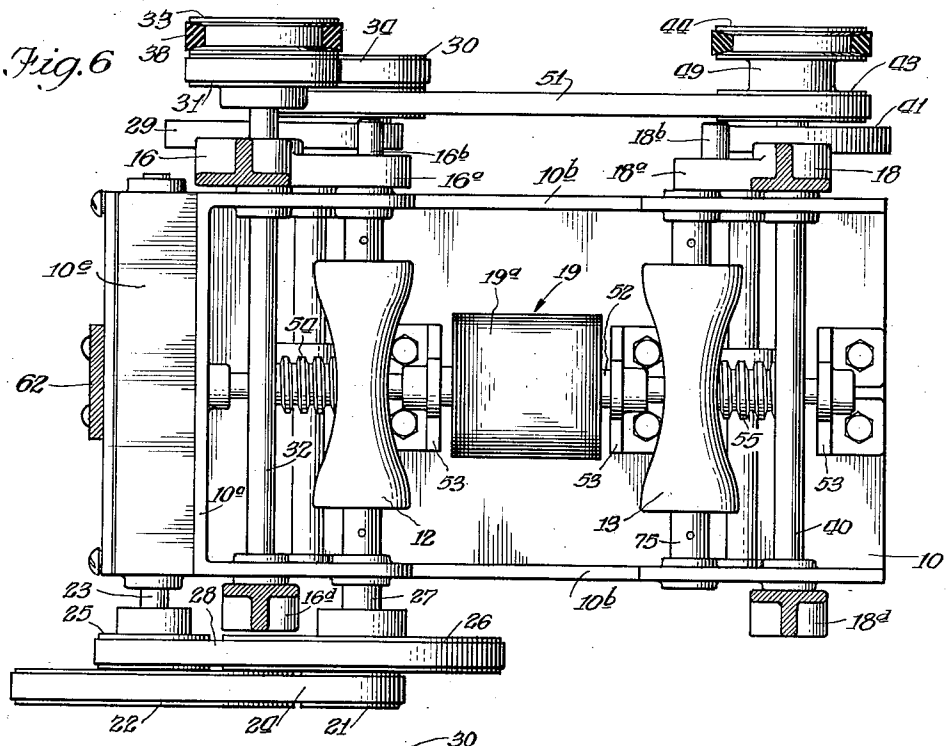
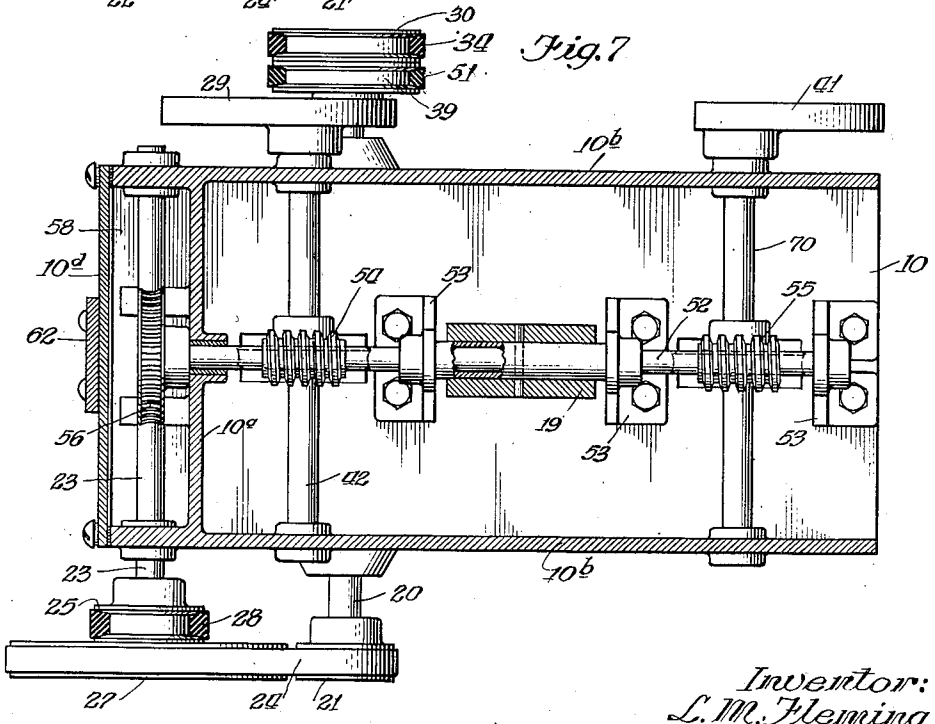


Fig. 7



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UNITED STATES PATENT OFFICE

2,588,714

BALL CLEANING AND POLISHING APPARATUS

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Application May 22, 1947, Serial No. 749,623

22 Claims. (Cl. 51—4)

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This invention relates to a ball cleaning and polishing apparatus, and particularly to such an apparatus for use in cleaning and polishing bowling balls or other balls of relatively large diameters.

One of the objects of this invention is to provide an improved apparatus for automatically cleaning and polishing balls wherein the entire surface of the ball is treated without requiring manual manipulation of the ball during the cleaning and polishing operation.

Another object of the invention is to provide such an apparatus which employs two rotating buffers and has means for alternately bringing the buffers into contact with the ball.

Still another object of the invention is to provide such an apparatus in which the ball is continuously rotated on one axis and is periodically shifted on an axis different from the first axis so that the entire surface of the ball may be contacted by the buffers.

Yet another object of the invention is to provide such an apparatus having means by which cleaning composition may be applied to the ball.

A further object of the invention is to provide such an apparatus wherein one buffer rotates toward the ball to serve as a cleaning buffer and the other buffer rotates away from the ball to serve as a polishing buffer, and a cleaning composition is supplied to the surface of the cleaning buffer.

Other objects and features of the invention will become readily apparent from the following detailed description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of one embodiment of the invention, with one buffer partly broken away;

Fig. 2 is a section taken along line 2—2 of Fig. 1;

Fig. 3 is a plan view of the apparatus;

Fig. 4 is an end elevation thereof;

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

Fig. 6 is a section taken along line 6—6 of Fig. 5;

Fig. 7 is a section taken along line 7—7 of Fig. 5.

While I have shown in the drawings and shall herein describe in detail one embodiment of the invention, it is contemplated that various changes may be made by those skilled in the art without departing from the spirit and scope of the invention as set out in the appended claims.

The invention consists generally of a frame

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adapted to carry the various elements; a pair of spaced rotatable ball supports, one of them driven so as to rotate on a predetermined axis a bowling ball carried thereon; a driven rotatably eccentric shifter mechanism adapted to make periodic contact with the ball and shift it on an axis different from the axis of rotation; a pair of pivotally mounted arms provided with driven rotatable buffers which are adapted to rub the surface of the ball; a pair of driven, rotatable, eccentric cams arranged to pivot the arms so as to permit the buffers to contact the ball alternately; a cleaning composition which is supplied to one of the buffers when the buffer is out of contact with the ball; and a motor having appropriately geared connections with all the driven elements.

In the particular embodiment illustrated, a deep, rectangular box-like frame 10 is constructed with an end wall 10*a*, side walls 10*b*, and a bottom 10*c*, the bottom and side walls extending beyond the end wall. Suspended from the bottom 10*c* is a motor 11 which has a motor shaft projecting from both of its ends; the shaft 20 being provided at one end with a small pulley 21 which has driving connection with the ball support, shifter, and cams (as will be described later), and having at its other end a pair of larger identical pulleys 30 and 39 which have driving connection with the buffers (as will be described later). The motor 11 is secured with its shaft 20 disposed transversely of the frame 10.

A ball support shaft 27 extends through the side walls 10*b* and is journaled therein, and has at its central portion a ball support 12. An idler shaft 75 is likewise journaled in the side walls 10*b*, in spaced relation to the shaft 27, and has at its central portion a ball support 13. The ball supports 12 and 13 are of a concave, cylindrical shape and are so spaced as to be adapted to support a bowling ball 14.

The shaft 27 has at one of its ends a pulley 26 by means of which it may be drivingly connected with the motor 11. The driving connection from the pulley 21 on the motor shaft 20 to the pulley 26 on the ball support shaft 27 is through a worm shaft 23 which extends through and is journaled in the side walls 10*b* where they project beyond the end wall 10*a*, the shaft 23 being provided with a large pulley 22 which is aligned with the pulley 21 on the motor shaft and a small pulley 25 which is aligned with the pulley 26 on the ball support shaft. A belt 24 furnishes driving connection from the pulley 21 to the pulley 22, and

a belt 28 furnishes driving connection from the pulley 25 to the pulley 26.

A housing 58 for the worm shaft 23 is formed by a top member 10e formed integral with the end wall 10a, and a housing closure plate 10d.

The worm shaft 23 is provided at its central portion with a worm 57. A longitudinal shaft 52 is journaled in the end wall 10a and in a plurality of mounting brackets 53 which are secured to the bottom 10c, and has at one of its ends a gear 56 which meshes with the worm 57 to furnish a driving connection for the longitudinal shaft 52. Secured to the shaft 52 at a position beneath, and equidistant from the ball supports 12 and 13, is an eccentric shifter member 19 which is adapted to make periodic contact with the ball 14 and shift it on an axis disposed at right angles to the axis of rotation of the ball. The longitudinal shaft 52 is likewise provided with a worm 54 and a worm 55, the purpose of which will be described hereafter.

Extending through the side walls 10b, and journaled therein near their upper edges, is a rockshaft 32 which has journaled on one of its ends a pair of locked pulleys 31 and 33, the pulley 31 being aligned with the pulley 30 on the motor shaft 20 and connected thereto by a belt 34. In a corresponding position at the opposite end of the frame 10 is a second similar rockshaft 40 which has journaled on one of its ends a pair of locked pulleys 43 and 44 separated by a spacer 49, the pulleys 43 being aligned with the pulley 39 on the motor shaft 20 and connected thereto by a belt 41. A bell crank 16 is mounted on the rockshaft 32, the bell crank being provided with a transvere extension 16e which bridges the frame 10 and has a downward extension 16d which is secured to the opposite end of the rockshaft 32. The bell crank 16 has a long upper arm 16f which is provided at its upper end with a housing 16c. A buffer shaft 36 is journaled in the housing 16c and has at one of its ends a pulley 35 which is aligned with the pulley 33 on rockshaft 32 and is connected therewith by a belt 38. Secured to the shaft 36 by means of a nut 37 is a buffer 15 which is preferably composed of a relatively hard cotton fabric and has a concave cylindrical surface whose longitudinal curvature is substantially the same as that of the ball 14. A bell crank 18, identical to the bell crank 16, is similarly mounted on the rockshaft 40, and has journaled at its upper end a buffer shaft 46, the shaft 46 being provided with a pulley 45 which is aligned with the pulley 44 on the rockshaft 40 and is connected therewith by a belt 50, the buffer shaft 46 being provided with a buffer 17 secured by a nut 48 which is identical with the buffer 15.

It will be observed from the foregoing description that buffer 15 is driven off the motor pulley 30, through the belt 34 to the pulley 31 on the rockshaft 32, thence from the pulley 33 on said shaft 32 through the belt 38 to the pulley 35 on the buffer shaft. Similiarly, buffer 17 is driven from the motor pulley 39 through the belt 51 to the pulley 43 on the rockshaft 40, thence from the pulley 44 on said shaft 40 through the belt 50 to the pulley 45 on the buffer shaft 46. Thus the buffer 15 is driven so its top moves toward the ball 14, and the buffer 17 is driven oppositely. Thus the buffer 15 is most suitable for a cleaning buffer, and the buffer 17 is most suitable for a polishing buffer.

Journaled in the side walls 10b below the worm 54 on the longitudinal shaft 52 is a cam shaft 42 which has a gear 59 meshing with the worm 54. The cam shaft 42 carries at one of its ends, and spaced outside the box, an eccentric cam 29 which has a working surface 29a in the form of an arc of a circle. The cam 29 is so positioned that its working surface 29a may contact a projecting stud 16b on the lower arm 16a of the bell crank 16 and cause the bell crank and rockshaft 32 to pivot in the side walls 10b. Thus the action of the cam 29 upon the stud 16b serves to move the buffer 15 away from the ball 14.

A similar cam shaft 70 is mounted in the side walls 10b beneath the worm 55, from which it is driven by a gear 60, the cam shaft 70 being provided with a cam 41 having a working surface 41a which is in the form of an arc of a circle, the cam 41 being positioned to contact a stud 18b on the lower arm 18a of the bell crank 18. Thus the cam 41 acting upon the stud 18b serves to move the buffer 17 away from the ball 14. The cams are so disposed that buffers 15 and 17 are alternately moved out of contact with the ball 14 and so that one of the buffers is always contacting the ball. A tension spring 72 is secured to the buffer shafts 36 and 46, so that when one buffer is moved out of contact with the ball 14 it draws the other buffer into contact with the ball.

It will be seen that the drive for the cams is from the pulley 21 on the motor shaft 20, through the belt 24 to the pulley 22 on the worm shaft 23, through the worm 57 to the gear 56 on the longitudinal shaft 52, and through the worms 54 and 55 on the longitudinal shaft to the gears 59 and 60 on the cam shafts.

Preferably a ball cleaning compound is provided for application to the buffer 15, and this is accomplished by securing a bracket 62 to the housing plate 10d, the bracket 62 having a clamp 63 at its upper end provided with a set screw 64 by which a block of cleaning composition may be clamped in spaced relation to the buffer shaft 36 in such a position that when the buffer 15 is moved out of contact with the ball 14 it will be in contact with the block 65 and receive a supply of cleaning composition.

The motor 11 is preferably operated at 1725 R. P. M. and the gearing of the mechanism is such that the buffers also operate at 1725 R. P. M.; the ball support 12 operates at 200 R. P. M., so that the ball rotates at that speed; the shifter member 19 operates at 15 R. P. M., and the cams 29 and 41 operate at ½ R. P. M.

The device is adapted to be placed in a bowling alley where it may be put into operation by the closing of any suitable type switch in the motor circuit. Thus, it may have a coin operated switch for use by the customers of the bowling alley, and a second locked manual switch for the use of the proprietor. When the ball, as 14, is placed in the apparatus on the ball supports 12 and 13, closing of the switch in the motor circuit will start the motor 11. Rotation of the ball support 12 by means of its driving connection with the motor causes the ball to rotate on an axis parallel to the axes of the ball supports and buffers. The cleaning buffer 15 contacts the ball with the cleaning compound for a predetermined period, at the end of which time the cams 29 and 41 act upon the bell cranks 16 and 18 to move the cleaning buffer 15 out of contact with the ball and move the polishing buffer 17 into contact with the ball. In the meantime, the shifter 19 has periodically shifted the ball on an axis perpendicular to its usual axis of rotation so as to bring

a different circumferential portion of the ball into line with the buffers. In a cleaning cycle of 2½ minutes all portions of the surface of the ball are thoroughly cleaned and polished by the buffers 15 and 17.

I claim:

1. Ball cleaning and polishing apparatus comprising, a plurality of spaced ball supports, means for rotating about a predetermined axis a ball resting on said supports, a pair of buffers arranged on opposite sides of the ball, each of said buffers being adapted to rub a portion of the ball, means for bringing the buffers alternately into contact with the ball, and means for intermittently shifting the ball about an axis different from said first named axis.

2. Apparatus as set forth in claim 1 wherein each buffer has a concave cylindrical surface whose longitudinal curvature is substantially the same as the curvature of the surface of the ball.

3. Ball cleaning and polishing apparatus comprising, a plurality of spaced axially rotatable ball supports, means for rotating at least one of said supports to cause rotation of a ball resting thereon, a pair of rotatable buffers arranged on opposite sides of the ball, each of said buffers being adapted to rub a portion of the ball, means for bringing the buffers alternately into contact with the ball, and means for intermittently shifting the ball about an axis substantially at right angles to the axes of the ball supports.

4. Ball cleaning and polishing apparatus comprising, a pair of spaced axially rotatable ball supports, means for rotating at least one of said supports to cause rotation of a ball resting thereon, a pair of rotatable buffers arranged on opposite sides of the ball with axes substantially parallel to the axes of the supports, each buffer having a concave cylindrical surface whose longitudinal curvature is substantially the same as the curvature of the surface of the ball, means for moving the buffers alternately into contact with the ball, at least one of the buffers being in contact with the ball at substantially all times, means for rotating the buffers, and means for periodically shifting the ball about an axis substantially at right angles to the axes of the ball supports.

5. Apparatus as set forth in claim 4 wherein spring means are provided urging the buffers toward the ball.

6. Apparatus as set forth in claim 4 wherein both buffers are constantly rotated.

7. Apparatus as set forth in claim 4 wherein the shifting means comprises a rotatable member having a portion only of its surface adapted to contact the ball, and means for rotating said member.

8. Apparatus as set forth in claim 4 wherein means are provided for coating the surface of one of the buffers with a cleaning composition during its movement.

9. Apparatus as set forth in claim 8 wherein a cake of cleaning composition is positioned to be contacted by the buffer when the buffer is moved out of contact with the ball.

10. Ball cleaning and polishing apparatus comprising, a pair of spaced rotatable ball supports, means for rotating at least one of said supports to cause rotation of a ball resting thereon, a pair of rotatable buffers arranged on opposite sides of the ball with axes substantially parallel to the axes of the supports, each buffer having a concave cylindrical surface whose longitudinal curvature is substantially the same as the curvature of the surface of the ball, means for bringing the buffers alternately into contact with the ball, at least one of the buffers being in contact with the ball at substantially all times, means for constantly rotating the buffers, a rotatable eccentric member positioned to periodically shift the ball about an axis substantially at right angles to the axes of the ball supports, means for rotating said member, and a cake of cleaning composition positioned to be contacted by one of said buffers when the buffer is moved out of contact with the ball.

11. Ball cleaning and polishing apparatus comprising a frame, a motor supported thereon, a pair of spaced rotatable substantially parallel ball supports mounted on said frame, a driving connection between said motor and at least one of said supports for rotating the support, a pair of arms pivotally mounted on the frame, each arm being provided with a rotatable buffer, a driving connection between the motor and each buffer for rotating the buffers, rotatable cam means to alternately pivot the arms so as to alternately move the buffers into contact with the surface of a ball carried by said supports, a driving connection between said motor and said cam means for rotating the cam means, an eccentric shifter member rotatably mounted on said frame and adapted to periodically shift the ball so as to bring a different circumferential portion thereof in line with said buffers, and a driving connection between said motor and said shifter member.

12. Apparatus as set forth in claim 11 wherein one buffer is rotated so that the top portion thereof turns toward the ball and the other buffer is rotated oppositely.

13. Apparatus as set forth in claim 12 wherein a cleaning composition is positioned to be contacted by said one buffer while the buffer is out of contact with the ball.

14. Apparatus as set forth in claim 11 wherein said shifter member is located beneath the ball with its axis substantially at right angles to the axes of said ball supports.

15. Apparatus as set forth in claim 11 wherein each arm is provided with an integral angular extension which has a projecting stud positioned to be contacted by the cam means.

16. Ball cleaning and polishing apparatus comprising a frame, a motor supported thereon, a pair of spaced rotatable ball supports mounted on said frame, a driving connection between said motor and at least one of said supports for rotating the support, a pair of bell cranks pivotally mounted on the frame, one arm of each bell crank being provided with a rotatable buffer, rotatable cam means positioned to contact alternately the other arms of said bell cranks so as to bring the buffers alternately into contact with a ball carried by said supports, spring means urging said buffers toward the ball, a driving connection between the motor and said cam means for rotating the cam means, a driving connection between said motor and each of said buffers adapted to rotate one buffer so that its top portion moves toward the ball and to rotate the other buffer oppositely, a cleaning composition positioned to be contacted by said one buffer while the buffer is out of contact with the ball, an eccentric shifter member rotatably mounted on the frame beneath said supports and adapted to periodically shift the ball so as to bring a different circumferential portion thereof in line with the buffers, and a driving connection between said motor and said shifter member.

17. Apparatus as set forth in claim 16 wherein the axes of the motor supports, buffers, bell cranks, and cam means are substantially parallel to each other and the axis of the shifter member is substantially at right angles to said axes.

18. Ball cleaning and polishing apparatus comprising, a plurality of spaced ball supports, means for rotating about an axis a ball resting on said supports, a pair of buffers arranged adjacent the ball, each of said buffers being adapted to rub a portion of the ball, means for bringing the buffers alternately into contact with the ball, and means for shifting the ball about an axis different from said first named axis.

19. Ball cleaning and polishing apparatus comprising, a pair of spaced rotatable ball supports, means for rotating at least one of said supports to cause rotation of a ball resting thereon about an axis, a pair of rotatable buffers arranged adjacent the ball, each of said buffers being adapted to rub a portion of the ball, means for bringing the buffers into and out of contact with the ball, and means for shifting the ball about an axis different from said first named axis.

20. Ball cleaning and polishing apparatus comprising, a frame, a motor supported thereon, a pair of spaced rotatable substantially parallel ball supports mounted on said frame, a driving connection between said motor and at least one of said supports for rotating the support, a pair of buffers mounted on said frame adjacent said ball, a driving connection operably connecting the motor and each of said buffers for rotating the buffers, means operated by said motor for alternately bringing said buffers into contact with said ball, and a shifter member rotatably mounted on said frame and adapted to shift the ball periodically so as to bring a different peripheral portion thereof in position to be contacted by a buffer.

21. A ball cleaning and polishing apparatus comprising a rotatable ball driving member, means for rotating said driving member to cause

rotation of a ball in contact therewith, a pair of rotatable buffers arranged on opposite sides of said driving member and with their axes substantially parallel to the axis of the driving member, each buffer having a concave cylindrical surface, means for causing engagement between the ball and one and then the other of said buffers, means for rotating the buffers, and means for periodically shifting the ball angularly in a direction transverse to its rotational movement by the driving member and while the ball is driven in engagement with a buffer to cause the buffer with which it is engaged to buff successively different annular portions of the surface of the ball.

22. A ball cleaning and polishing apparatus comprising a rotatable ball driving member, means for rotating said driving member to cause rotation of a ball in contact therewith about an axis substantially parallel to the axis of the driving member, a pair of rotatable buffers arranged on opposite sides of said driving member and with their axes substantially parallel to the axis of the driving member, means for rotating the buffers, means for periodically shifting the ball angularly in a direction transverse to its rotational movement by the driving member and while the ball is being driven to cause the buffer with which it is engaged to buff the entire surface of the ball, and means for causing engagement between the ball and one of said buffers.

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