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Gustafson et al.

[11] **3,820,183**

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[54] **BALL WASHER**

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[52] **U.S. Cl.** ..... **15/21 A,** 15/3.2, 198/128

[51] **Int. Cl.** **A63b 47/04**

[58] **Field of Search** ..... 15/21 A, 97, 3.13, 3.16, 15/3.19, 3.2, 3.21; 198/128

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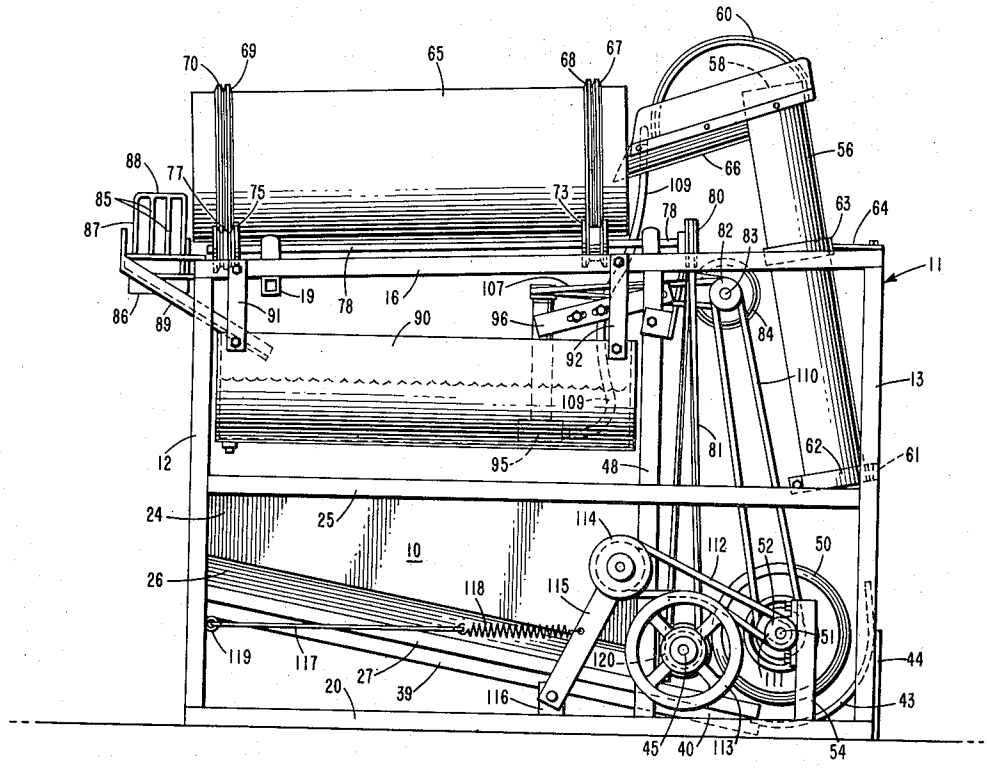
Primary Examiner—Edward L. Roberts

Attorney, Agent, or Firm—Clelle W. Upchurch

[57] **ABSTRACT**

An apparatus for washing golf balls or the like has an elevated scrubbing drum, a hopper below the drum, a chute for golf balls to roll from the hopper, a wheel over the chute for propelling golf balls upwardly towards the drum, a pipe for intercepting the balls while in flight and means for diverting the golf balls into the drum.

8 Claims, 10 Drawing Figures



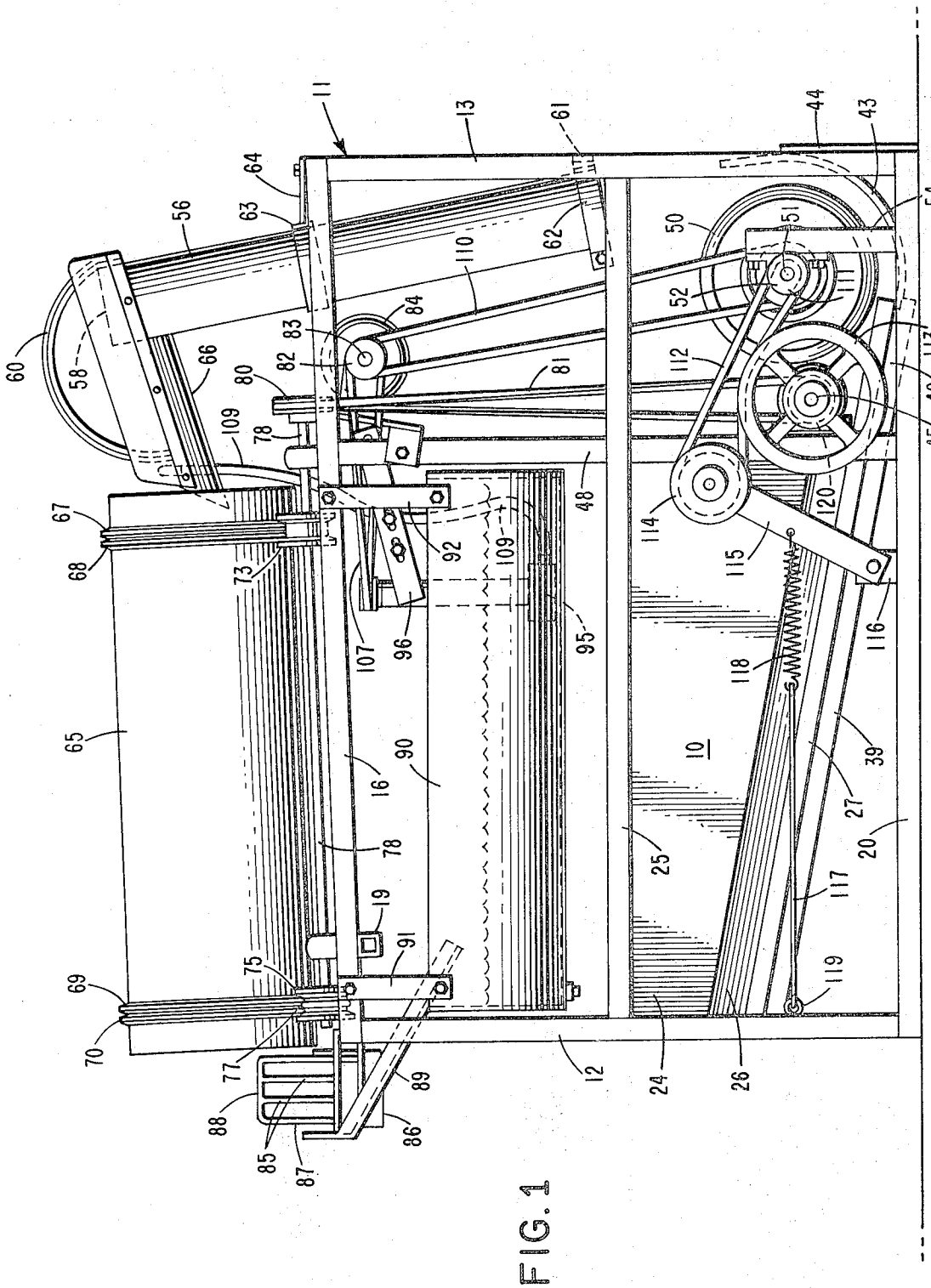

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FIG. 1

FIG. 2

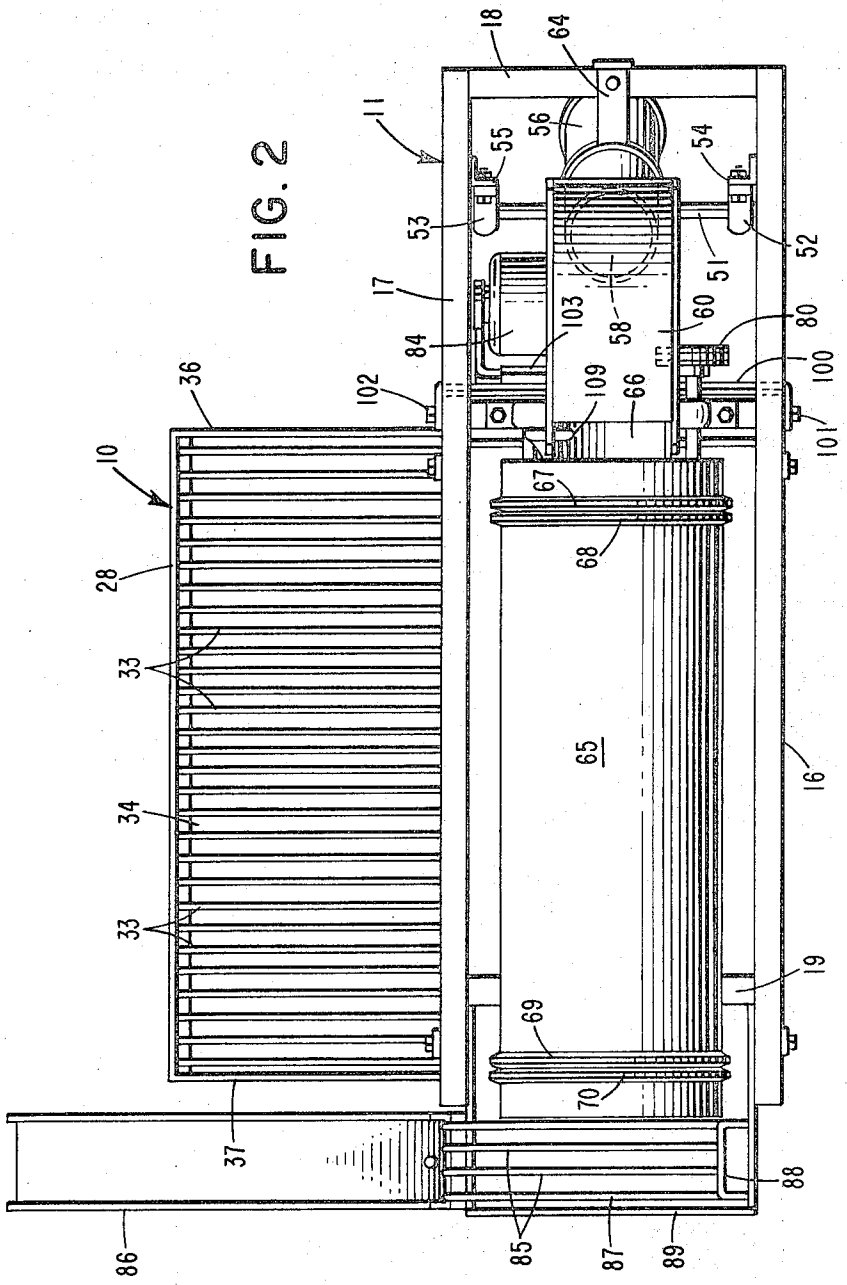
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FIG. 3

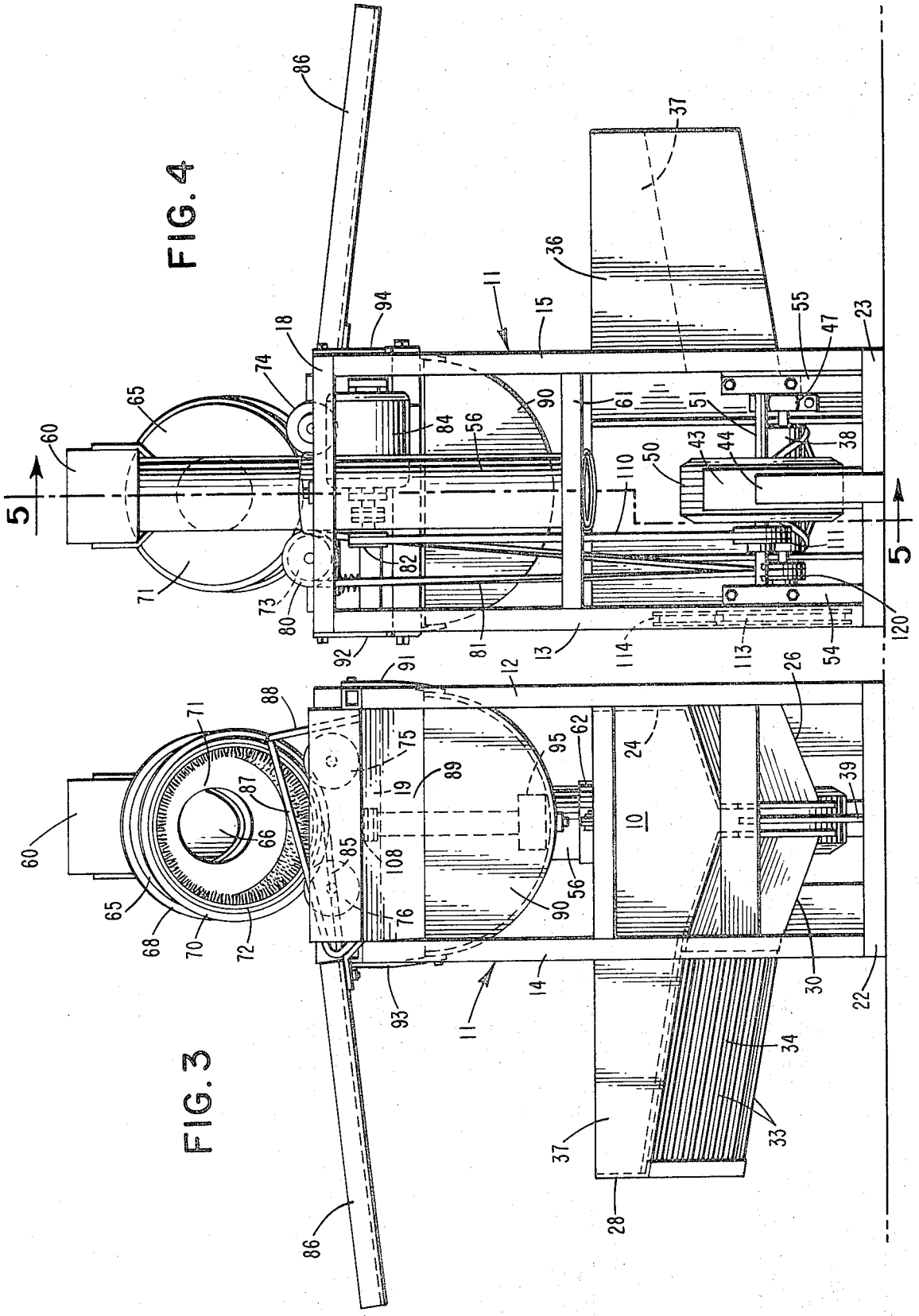

FIG. 4

FIG. 5

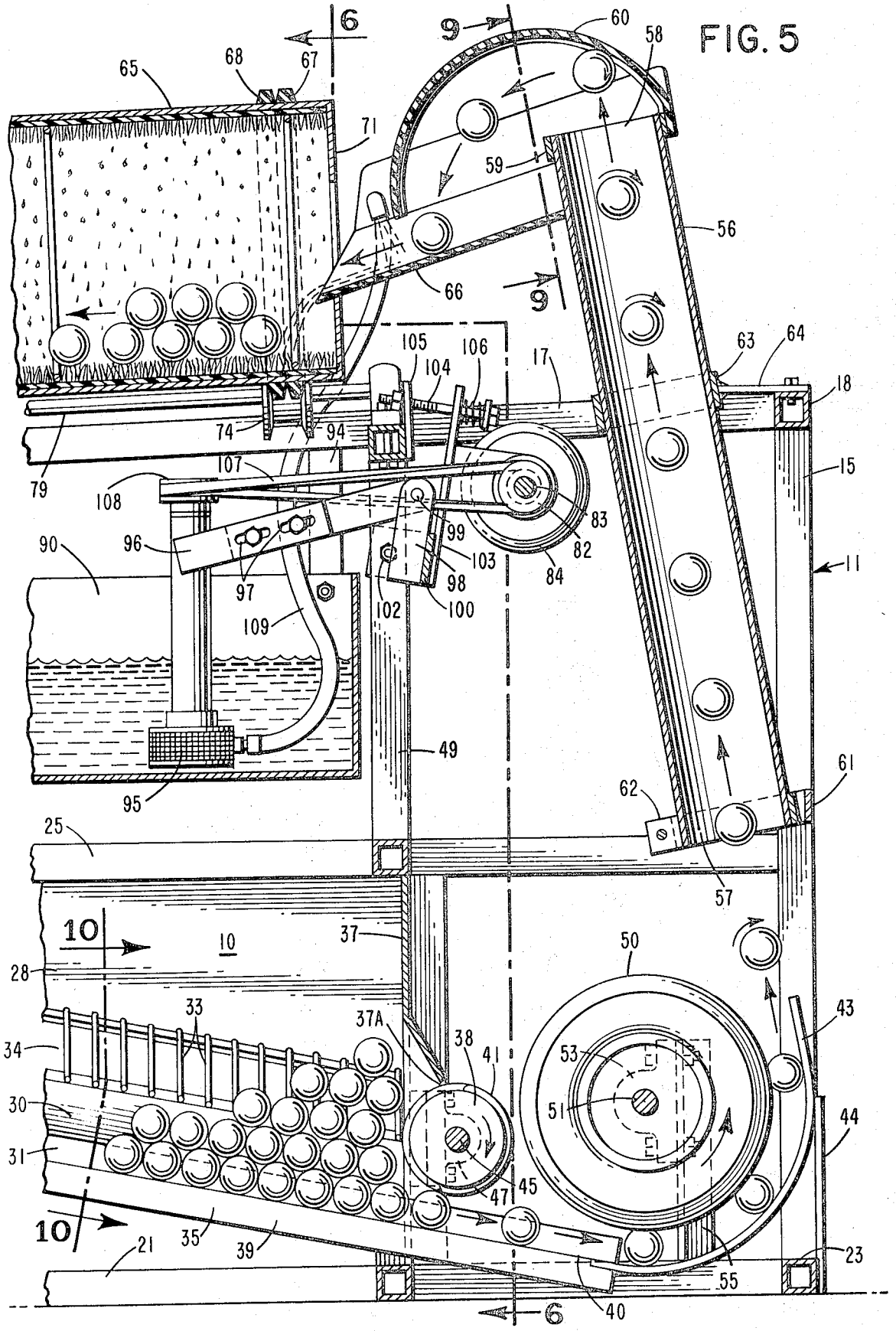
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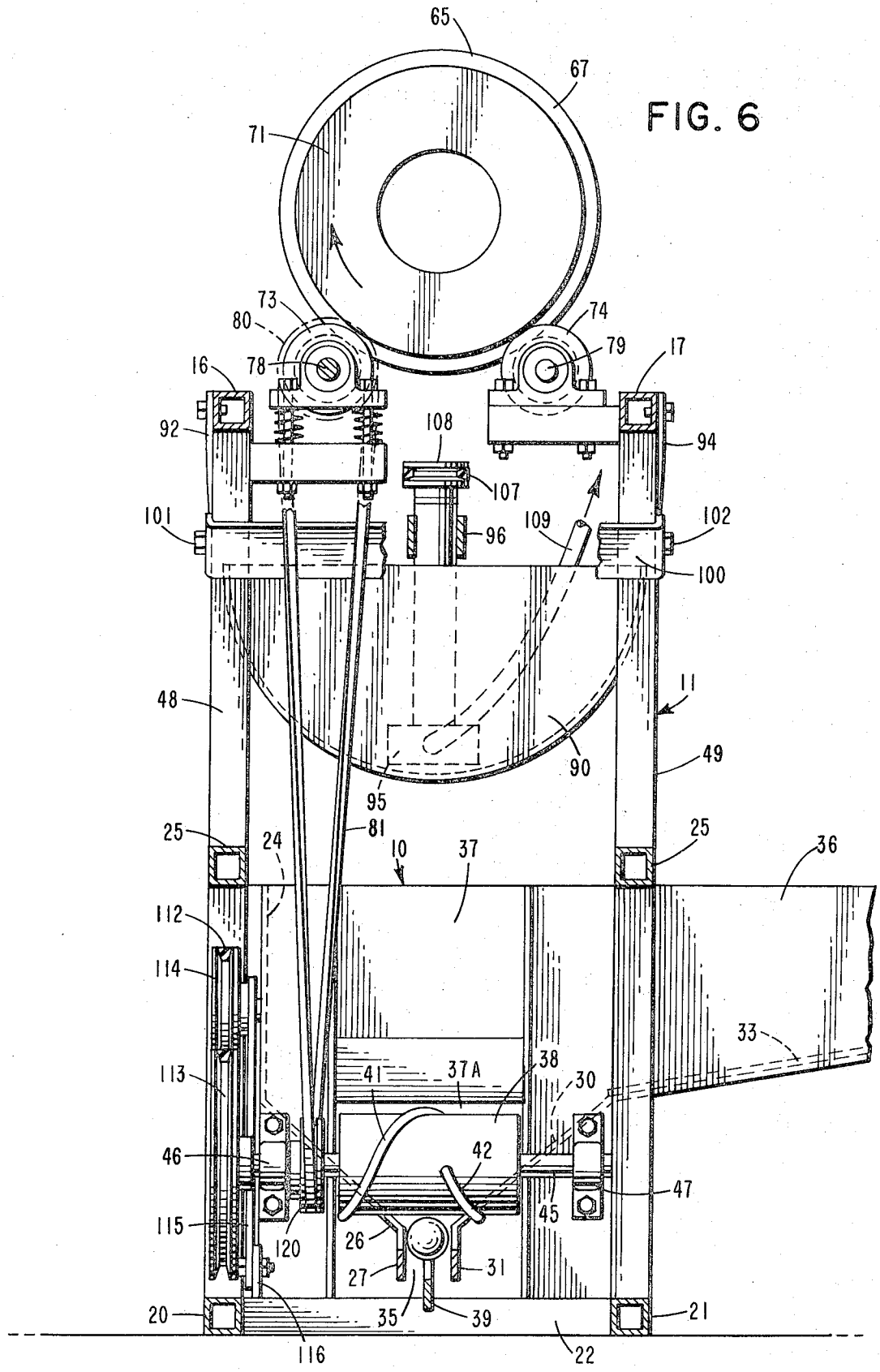
FIG. 6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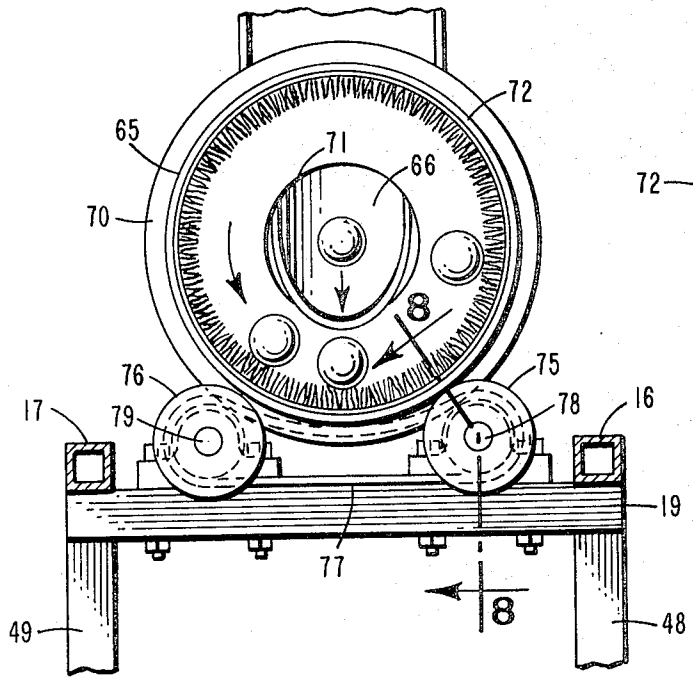

FIG. 7

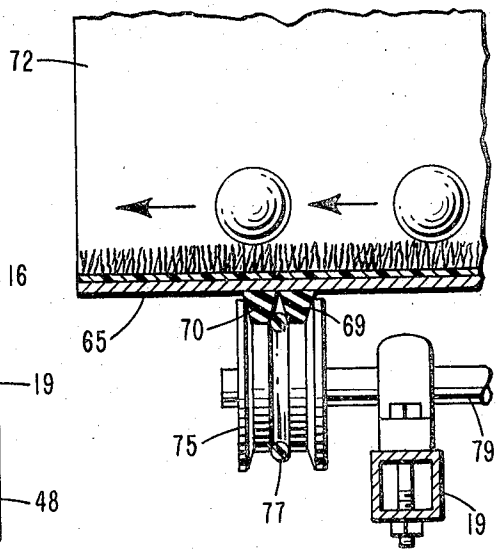

FIG. 8

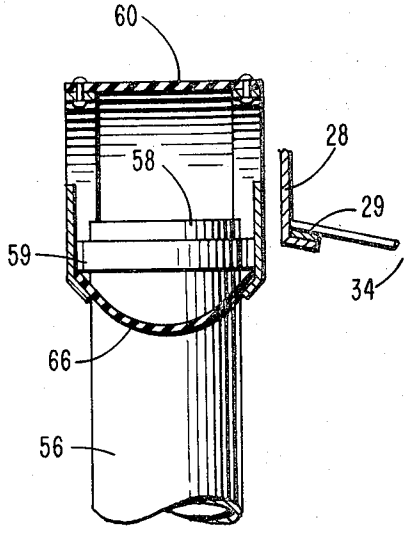

FIG. 9

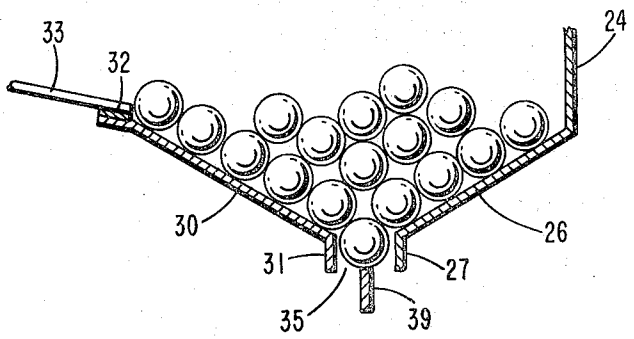

FIG. 10

BALL WASHER

This invention relates generally to ball cleaning apparatus and more particularly to an improved apparatus adapted for cleaning golf balls or the like in large quantities with a minimum of physical exertion by the operator.

The heretofore available golf ball washing apparatuses have the disadvantage that the hopper from which the balls move to the washing unit is elevated so the balls can roll from the hopper. Consequently, the operator must often lift heavy containers of balls to uncomfortable heights while charging the hopper with balls to be cleaned. Such an arrangement of hopper and washing unit also frequently limits the size of the container to avoid an excessively heavy container of balls.

It is an object of this invention to provide a ball washing apparatus which has a hopper for balls to be cleaned and a washing unit or scrubber which can be operated without lifting containers of the balls to uncomfortable or dangerous heights. Another object of the invention is to provide an apparatus having a hopper for dirty balls disposed below a scrubbing or washing drum and mechanical means for elevating the balls from hopper to drum in single file one after the other. A further object of the invention is to provide an apparatus for cleaning golf balls having a scrubbing drum which does not have interior moving parts. Still another object of the invention is to provide a ball washer having a hopper for dispensing balls which embodies a means for agitating the balls in the hopper to avoid bridging above the discharge channel through which the balls roll one after the other. A still further object of the invention is to provide an apparatus for washing golf balls or the like which is adapted to reject stones, half balls and the like between the hopper and the washing drum.

A more specific object of the invention is to provide an apparatus for cleaning golf balls at a reduced cost in handling the golf balls before and after they are cleaned.

Other objects will become apparent from the following description with reference to the accompanying drawing wherein

FIG. **1** is a side elevation of one embodiment of the invention;

FIG. **2** is a plan view of the embodiment of FIG. **1**;

FIG. **3** is an elevation of the discharge end of the embodiment of FIG. **1**;

FIG. **4** is an elevation of the entrance end of the embodiment of FIGS. **1** through **3**;

FIG. **5** is a fragmentary longitudinal section of the entrance end of the embodiment of FIGS. **1** through **4**;

FIG. **6** is a section taken along the line **6—6** of FIG. **5**;

FIG. **7** is a fragmentary enlarged view illustrating the driving mechanism for the scrubbing drum at its discharge end;

FIG. **8** is a section taken along the line **8—8** of FIG. **7**;

FIG. **9** is a section taken along the line **9—9** of FIG. **5**; and

FIG. **10** is a section taken along the line **10—10** of FIG. **5**.

The foregoing objects and others are accomplished in accordance with this invention, generally speaking, by

providing an apparatus for washing golf balls or the like having a rotatable drum with a brush-like lining disposed over a hopper with a means for elevating the balls from the hopper to the washing drum by centrifugal force. More specifically, the invention provides an apparatus having a scrubbing drum, means for wetting the balls as they enter the drum, a hopper under the drum for storing balls to be cleaned and a means for transporting the balls from the hopper to the drum having an open chute or passageway over which the balls roll from the hopper in single file one after the other, a wheel disposed above the passageway adapted to engage the balls as they roll on the track and carry them in an arcuate direction as it rotates and to propel them upwardly towards an open end of the drum, and means for diverting the upwardly moving balls into the drum. A tube or pipe is disposed with a bottom open end above the wheel adapted to intercept the balls while they are in flight upwardly from the wheel. An arcuate shaped padding is disposed over the top end of the pipe to stop the vertical movement of the balls and cause them to drop on a trough-like tract which slopes downwardly into the scrubber. A tank for water or other cleaning fluid may be supported by the frame of the apparatus between the hopper and scrubbing drum. Means is provided for pumping water from the sump over the balls as they enter the scrubbing drum. In a preferred embodiment, two belts secured around the periphery of the drum adjacent to each end thereof act as cushions and guides for the drum as it is rotated by pulleys driven by an electric motor. A discharge trough-like guide is provided at the exit end of the scrubber which carries the cleaned balls to a container which may be resting on the floor. Hence, it is not necessary to lift containers of balls before or after washing.

Referring now to the drawing (FIGS. **1, 3, 5** and **6**), a hopper **10** is supported near the floor on a parallelepiped shaped tubular metal frame **11** having four end upright struts **12, 13, 14** and **15,** welded at the top to the ends of upper side members **16** and **17** and top end cross members **18** and **19,** and welded at their lower ends to bottom side members **20** and **21** and bottom end members **22** and **23.** One side panel **24** of hopper **10** is bolted to intermediate horizontal side member **25** welded at one end to upright strut **12** and at the other end to upright strut **13.** Side panel **24** is substantially vertical and integral with a downwardly sloping bottom panel **26** which terminates in a downwardly extending substantially vertical flange **27.** As illustrated in FIG. **10,** a second side panel **28** of hopper **10** is welded to a longitudinal strap **29.** A sloping bottom panel **30** which also terminates at one side in a downwardly extending substantially vertical flange **31** is welded to a longitudinal strap **32** spaced laterally from strap **29** to leave a rectangularly shaped opening **34** therebetween. Rods **33** are secured at one end to strap **29** and at the other end to strap **32** and are spaced longitudinally from each other less than the diameter of a golf ball to close opening **34** against loss of golf balls. Flanges **27** and **31** are laterally spaced from each other about one-fourth inch greater than the diameter of a golf ball to provide a longitudinally extending channel **35** in the bottom of hopper **10.** A longitudinally extending bar **39** supported on cross-members **22** and **23** is disposed below channel **35** and centered between flanges **27** and **31** to support golf balls in channel **35.** End panels **36** and **37** complete the

enclosure of hopper **10**. Hopper **10** extends outwardly from frame **11** so that opening **34** is external of the frame in order that the hopper is easily accessible for charging golf balls therein. The bottom slopes towards channel **35** so golf balls will roll towards the channel. The bottom also slopes towards the front end of the apparatus so golf balls in channel **35** will roll in single file towards the exit end of hopper **10**. Hopper **10** is closed at its elevated end and has an opening **37A** in its lower end (FIG. **5**) closed by a roller **38**.

A trough-like passageway **40** is inclined downwardly from the open end of channel **35** (FIGS. **1** and **5**). Roller **38** is substantially cylindrical and carries on its surface spiral ribs **41** and **42** which extend partially around its periphery and urge balls towards the center of the hopper over channel **35**. Roller **38** rotates clock-wise when viewed from the side of the apparatus shown in FIG. **1** and from the end of the roller as seen in FIG. **5**. The cylindrical body of roller **38** and ribs **41** and **42** may be metal and the positioning of roller **38** in the opening **37A** is such that ribs **41** and **42** strike golf balls and tend to break-up bridging of the balls above channel **35**. The outwardly bent portion of end panel **37** acts as a baffle to keep the balls in hopper **10**, (FIG. **5**). The end of trough **40** is welded to an arcuate shaped trough-like guide member **43** secured by strap **44** to cross-member **23**. Shaft **45** of roller **38** is journaled at each end in bearings **46** and **47** supported on front end panel **37** of hopper **10**.

A wheel **50** which may be conveniently an automobile wheel with a pneumatic tire mounted thereon is carried by shaft **51** which is journaled in bearings **52** and **53** on struts **54** and **55**. Wheel **50** is disposed above arcuate shaped trough **43** and in such spaced relationship therewith that a golf ball in trough **43** will be engaged by wheel **50** and rotated therewith through arcuate shaped trough **43** as illustrated in FIG. **5**.

As best illustrated in FIGS. **1** and **5**, an elongated tube or pipe **56** has an open bottom end **57** disposed above arcuate member **43** and an opposite elevated open end **58**. A collar **59** secures arcuate shaped rubber guide member **60** over the elevated end **58** of tube **56**. Tube **56** is secured in a slightly inclined position to strap **61** by clevis **62** and to cross-member **18** by clevis **63** and strap **64**.

Cylindrical drum **65** is dispoed above hopper **10**. An inclined trough **66** extends from the elevated open end of tube **56** below rubber guide member **60** to carry golf balls into an open end of drum **65**. Drum **65** has longitudinally spaced belts **67** and **68** secured to the outer peripheral surface thereof at one end and belts **69** and **70** secured to the surface at the other end. The inner surface of drum **65** is lined with a plastic material having a backing a protruding filaments such as, for example, an artificial grass sold by Monsanto Company under the trade mark "Astroturf." As illustrated in the drawing, drum **65** has end members **71** and **72** each having an opening therein for passage of golf balls.

Drum **65** is supported on belts **67** and **68** secured to its surface in pulleys **73** and **74** at one end and belts **69** and **70** in pulleys **75** and **76** at the opposite end. A round belt **77** is looped about pulley wheels **75** and **76** at the discharge end of drum **65** to transfer rotary motion from shaft **78** to shaft **79**. Pulley wheels **73** and **75** are fixed to shaft **78** for rotation therewith while pulley wheels **74** and **76** on the opposite side of drum **65** are fixed for rotation with shaft **79**. A pulley wheel **80** fixed on the end of shaft **78** for rotation therewith has belt **81** looped thereabout. Belt **81** is also looped about a pulley wheel **120** fixed on the shaft **45** of roller **38**.

That end of drum **65** adjacent to trough **66**, the entrance-end thereof, is elevated above horizontal so that golf balls entering from trough **66** tend to roll to the exit end of the rotating drum **65** onto three longitudinally spaced arcuate rods **85** which form a grating (FIG. **2**) which extends across and below the opening in the exit end of drum **65** to a downwardly sloping discharge chute **86**. As shown in FIGS. **1** and **3** a sloping horizontal rod **87** prevents the golf balls from rolling over the side of the grating and U-shaped rod **88** supports the elevated end of rods **85**. An inclined trough **89** is disposed under rods **85** and carries water dripping form the balls back into a tank **90**.

Tank **90** is disposed intermediate drum **65** and hopper **10**. Tank **90** is secured to the upper side frame members **16** and **17** by straps **91, 92, 93** and **94**. Tank **90** is semi-cylindrical. Pump **95** is supported in tank **90** by an adjustable strap **96**. Strap **96** is composed of two pieces which are bolted together through longitudinally spaced openings **97**. That end of strap **96** spaced from pump **95** is pivotally mounted on a vertically disposed strap **98** by pin **99**. The opposite end of strap **98** is welded to a generally U-shaped cross-bar **100** which is pivotally secured to struts **48** and **49** by bolts **101** and **102**.

Motor base plate **103** is bolted to cross-member **100** (FIG. **5**). A bolt **104** extends through an opening in upstanding strap **105** and through an opening in base plate **103**. Strap **105** is welded to strut **49**. Compression spring **106** on bolt **104** urges motor base plate **103** towards strap **105** and tends to elevate motor **84**. A belt **110** looped about double drive pulley **82** on shaft **83** of motor **84** and pulley wheel **110** of pump **95** drives the pump. As belt **107** wears spring **106** lifts motor **84** and automatically keeps belt **107** taut. A hose **109** carries water from pump **95** to above trough **66** where water is sprayed over balls just before they enter drum **65**. Excess water flows into drum **65**.

Referring now to FIGS. **1** and **4**, a belt **110** is looped about the double pulley wheel **82** on motor shaft **83** and about one of double pulley wheels **111** fixed on shaft **51** of wheel **50** to rotate wheel **50** counterclockwise as viewed in FIG. **5**. A belt **112** is looped about pulley wheel **111** over pulley wheel **113** and about idler wheel **114**. Belt **112** imparts rotation to pulley wheel **113** and causes shaft **45** and roller **38** to rotate clockwise as viewed in FIGS. **1** and **5**. Idler wheel **114** is journaled on vertical strap **115** pivotally secured at its other end to a bracket **116** welded to side member **20**. A rod **117** secured in an eyelet **119** on strut **12** at one end and a spring **118** secured to its opposite end urge strap **115** to the left as viewed in FIG. **1** to keep belt **112** taut.

In operation, motor **84** is started after tank **90** is filled with water and hopper **10** contains golf balls. Loosely clinging grass, dirt and other foreign material mixed with or clinging to the balls as they are poured into hopper **10** fall through the opening between rods **33** across opening **34**. Rotation of motor shaft **83** rotates belt **110**, shaft **51** and wheel **50** fixed thereto. Belt **112** rotates pulley wheel **113** and the shaft **45** of roller **38**. Wheel **50** is turned counter-clockwise and roller **38** is turned clockwise (FIG. **5**) in the open end **37A** of hopper **10** to stir up the golf balls and encourage them to flow into channel **35**. Rotation of shaft **45** causes belt

81 to rotate pulley 80 fixed on shaft 78. Rotary motion is imparted to pulleys 73 and 75 and through belt 77 to pulleys 74 and 76 fixed to shaft 79. Rotation of pulley wheels 73, 74, 75 and 76 rotates drum 65 in a counterclockwise direction as shown in FIG. 7.

Golf balls roll through trough 40 until they are picked up by wheel 50 which carries them around arcuate member 43 and throws them through tube 56. At the top of tube 56 the balls strike rubber pad 60 and drop into trough 66. The balls then roll into rotating drum 65 where they are scrubbed by the grass-like plastic lining therein. The balls are carried by sloping drum 65 to the exit end and are discharged on rods 85 where water drips therefrom into trough 89 which carries it back to tank 90. The balls roll through a discharge chute 86 into a suitable container.

It can be seen from the foregoing that the invention realizes its objectives. The balls are charged to a hopper near the floor so lifting of heavy containers full of balls is avoided. The discharge chute 86 carries the cleaned balls to a basket or other container which may also be near or on the floor so lifting of containers full of balls to undesirable heights is again avoided. At most driving ranges the golf balls are picked-up from the ground in relatively large baskets. The operator must bucket or shovel the balls into small buckets or hoppers at the top of the washing device. As is apparent from the foregoing description, a cart used to transport the golf balls can be backed-up to hopper 10 and the balls dumped directly into the hopper. The washed balls may be transferred by chute 86 directly to a storage bin for clean balls. Hence, the invention provides an apparatus for washing golf balls or the like which eliminates extra equipment and extra handling by receiving the balls near the floor level and discharging them from the apparatus into a chute sufficiently elevated that the balls will roll to a storage bin or other container.

Although the invention has been described in detail for the purpose of illustration, it is to be understood that such detail is solely for that purpose and that those skilled in the art can make changes therein without departing from the spirit and scope of the invention except as it may be limited by the claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An apparatus adapted for cleaning golf balls and the like comprising a rotatable drum having a brush-like lining, a hopper below the drum, and means for moving balls from the hopper to the drum comprising a rotatable wheel disposed on a shaft above a passageway for balls rolling from the hopper, the distance between the wheel and passageway being less than the diameter of the balls, said passageway terminating in an arcuate shaped member which is substantially concentric with the periphery of the wheel and extends upwardly about the wheel to above the shaft, an elongated tube having a first open end positioned above the wheel to receive balls discharged from between the wheel and the end of the arcuate shaped member and a second elevated open end adjacent to an end of the drum, means for diverting balls emerging from the elevated end into the drum, means for rotating the drum and the wheel, said drum sloping downwardly from its entrance end to its opposite end, and means for conveying balls emerging from the drum to a receptable below the drum.

2. The apparatus of claim 1 wherein the hopper has an opening in the bottom thereof closed against passage of balls therethrough by spaced rods through which dirt and other foreign material mixed with the balls can fall from the hopper.

3. The apparatus of claim 2 wherein the hopper and drum are mounted on a frame and that side of the hopper having said rods projects outwardly from the frame for easy access to the hopper.

4. The apparatus fo claim 1 comprising means for wetting the balls before they enter the drum.

5. The apparatus of claim 1 wherein said hopper is inclined towards the wheel, the end of the hopper adjacent to the wheel has an opening therein, the bottom of the hopper has a channel extending longitudinally therethrough adapted to receive balls in single file and a roller having a pair of ribs thereon closes the opening above the channel, said roller being adapted to rotate in a direction whereby the ribs move upwardly in the opening and strike balls in the hopper from below to break up bridging of the balls, and means for rotating the roller.

6. The apparatus of claim 1 wherein said hopper is inclined towards the wheel, the end of the hopper adjacent to the wheel has an opening therein, the bottom of the hopper has a channel extending longitudinally therethrough adapted to receive balls in single file and a roller having a pair of ribs thereon closes the opening above the channel, said roller being adapted to rotate in a direction whereby the ribs move upwardly in the opening and strike balls in the hopper from below to break up bridging of the balls, means for rotating the roller, an arcuate shaped means attached to the elevated end of the tube to stop upward flight of the balls and a trough under the said arcuate shaped means for carrying the balls into the drum, a tank between the drum and hopper, means for delivering water from the tank above the trough and over balls thereon, and means for diverting water emerging from the drum with cleaned balls into the tank.

7. In a golf ball or the like cleaning apparatus having a source of golf balls and a ball washing drum thereabove, means for elevating the balls from the hopper to the drum comprising a trough-like means for golf balls to roll over in single file, a rotatable wheel spaced above the trough less than the diameter of the ball, said trough terminating in an arcuate shaped member substantially concentric with the wheel, a tube disposed above the trough to intercept balls thrown from between the arcuate shaped trough end and the wheel by centrifugal force as the wheel rotates and to convey the balls to a point adjacent to an open end of the drum, and means for conveying the balls into the drum.

8. The apparatus of claim 7 wherein a trough means is provided at the exit end of the drum to convey balls to a suitable container below the drum.

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