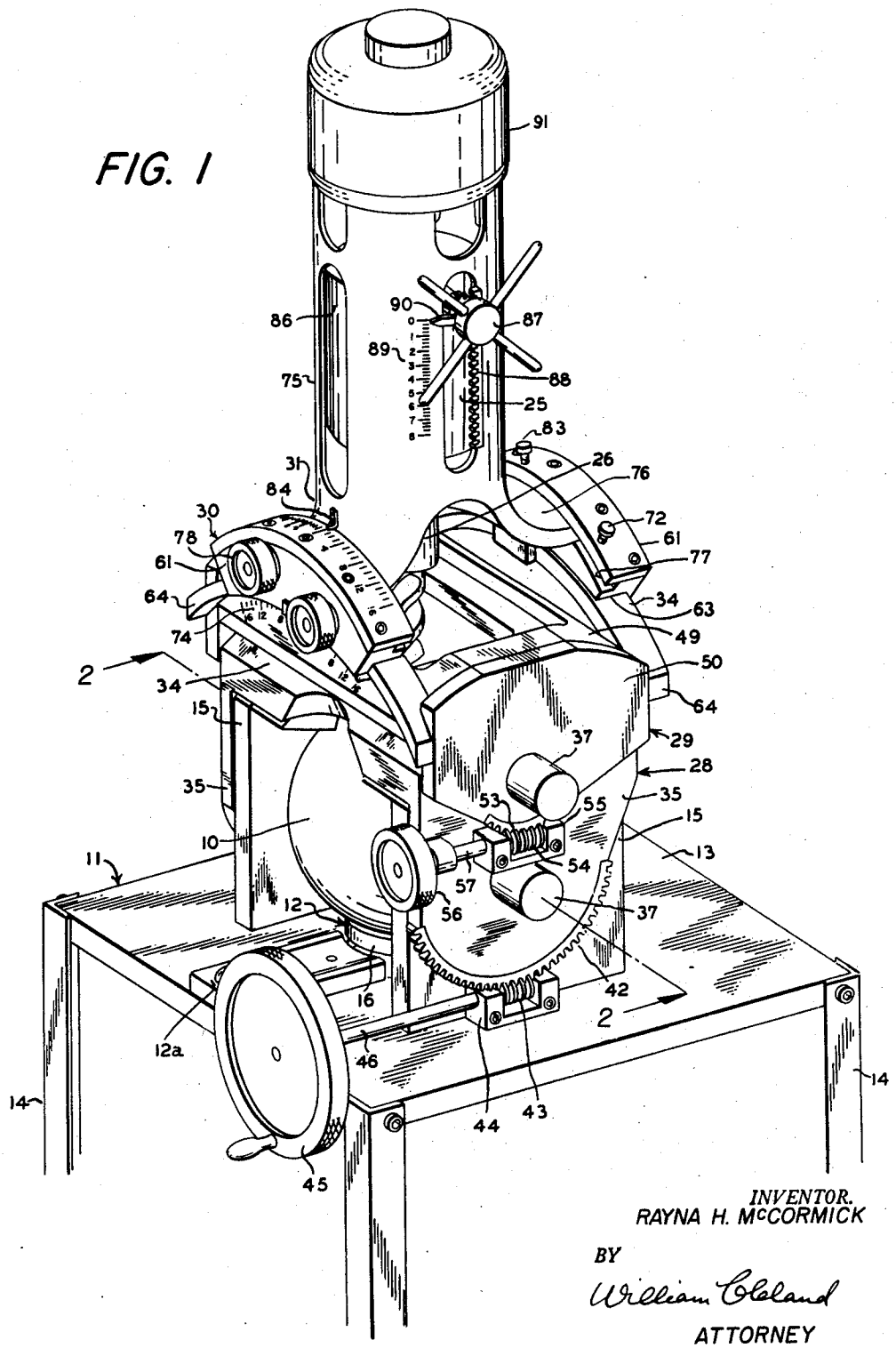
Aug. 9, 1960 R. H. McCORMICK 2,948,168

MACHINE FOR DRILLING FINGER HOLES IN BOWLING BALLS

Filed June 24, 1958 4 Sheets-Sheet 1

FIG. 1



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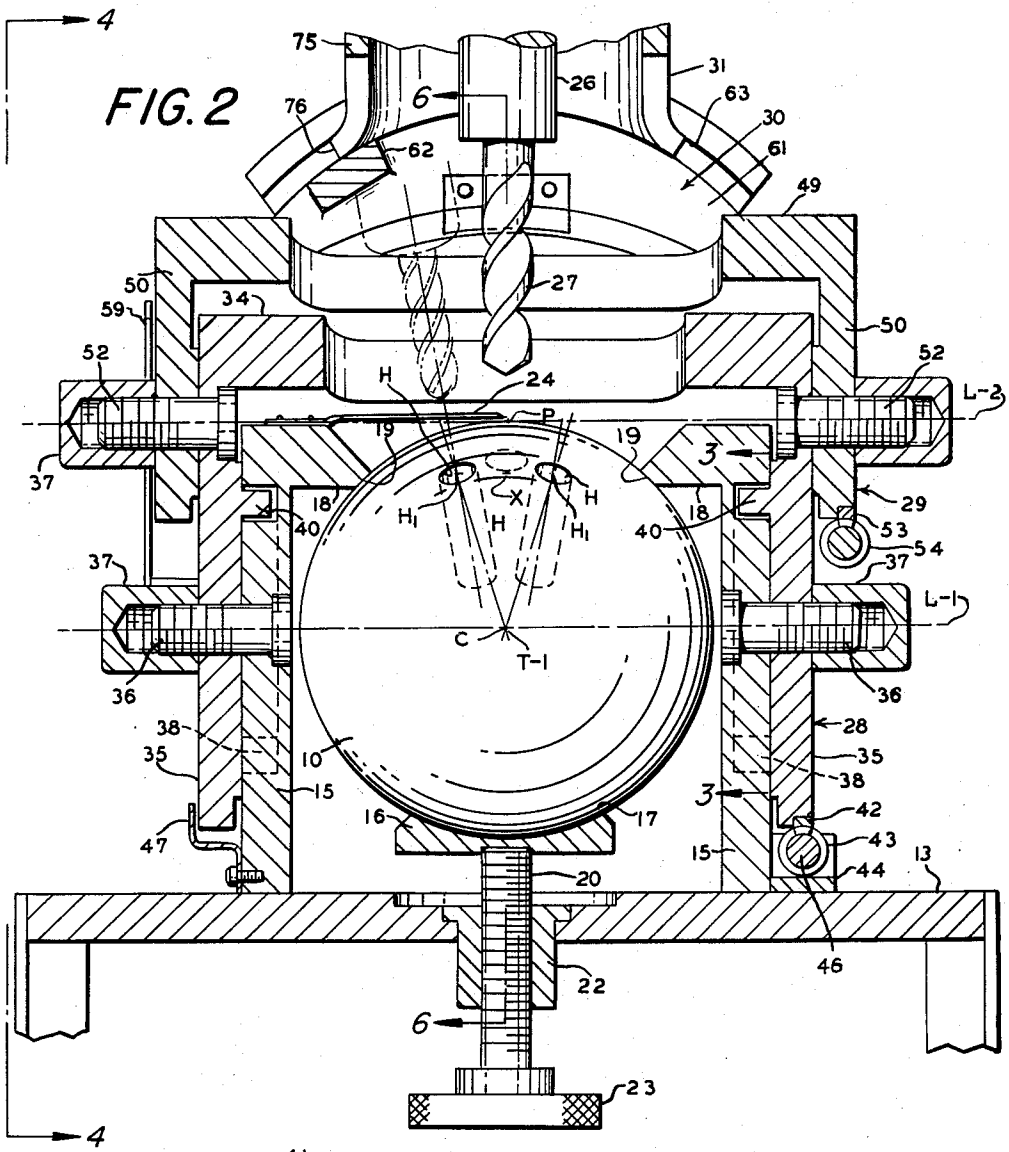
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MACHINE FOR DRILLING FINGER HOLES IN BOWLING BALLS

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FIG. 2



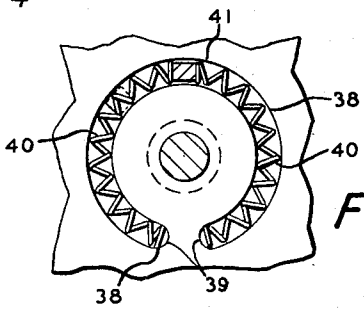


FIG. 3

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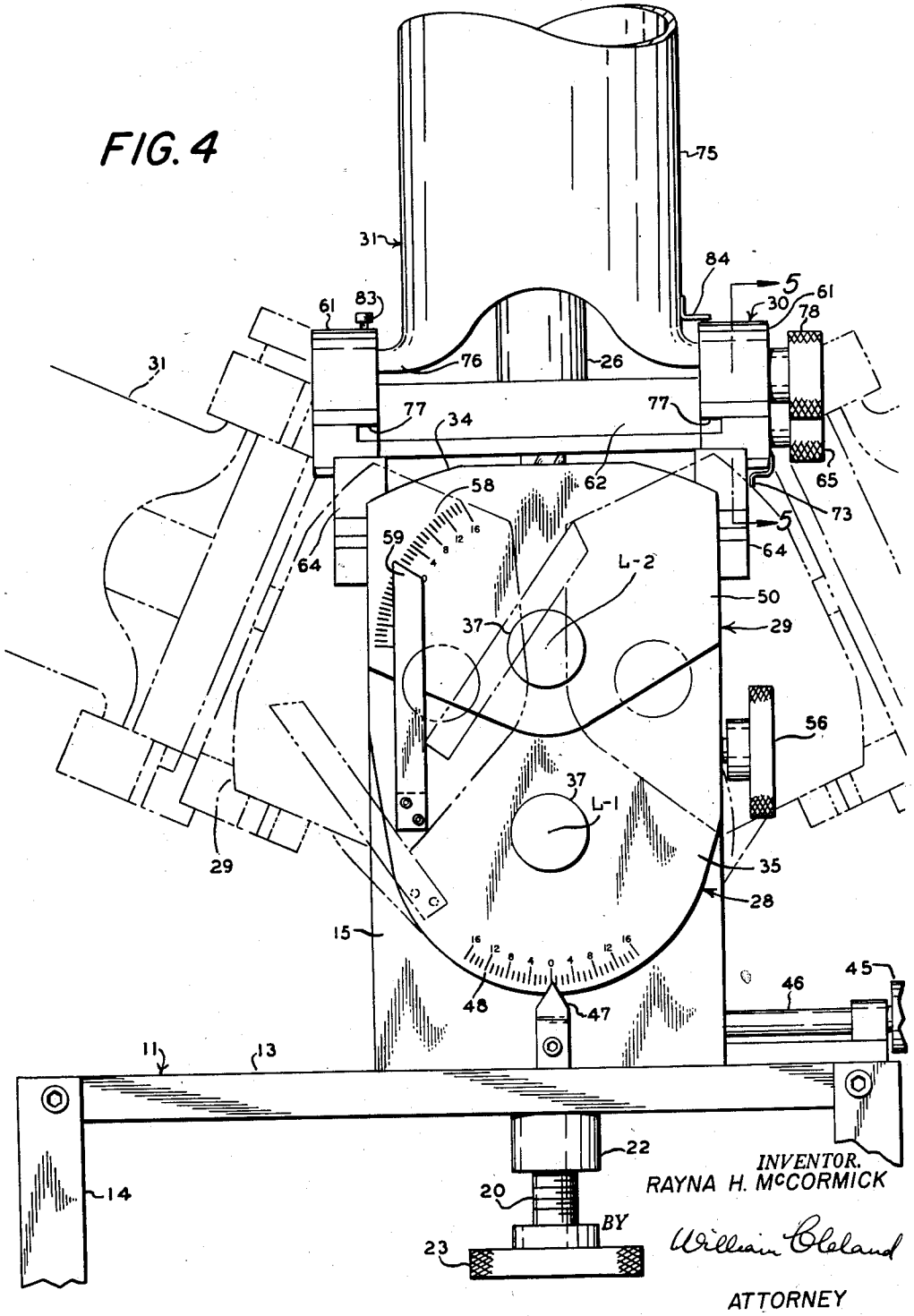
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MACHINE FOR DRILLING FINGER HOLES IN BOWLING BALLS

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FIG. 4

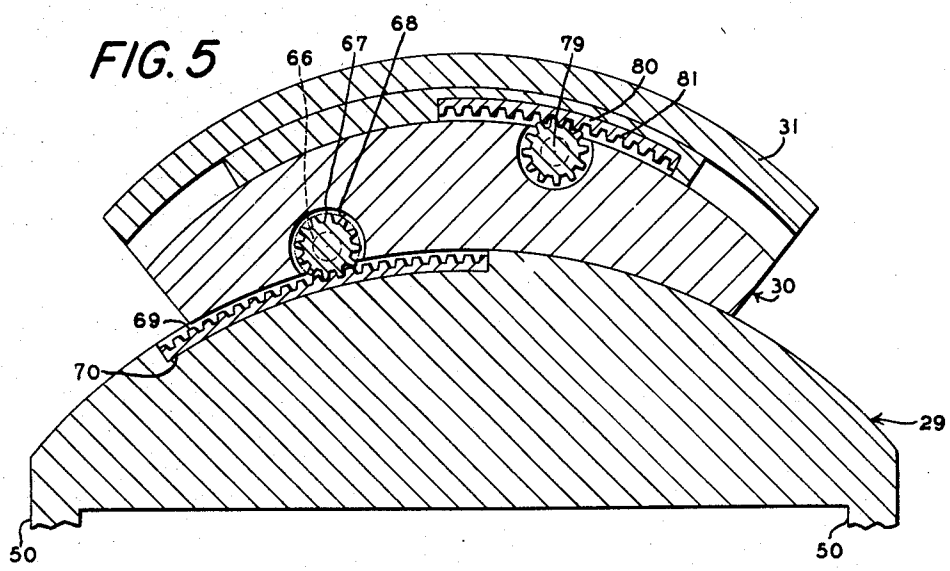


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MACHINE FOR DRILLING FINGER HOLES IN BOWLING BALLS

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FIG. 5



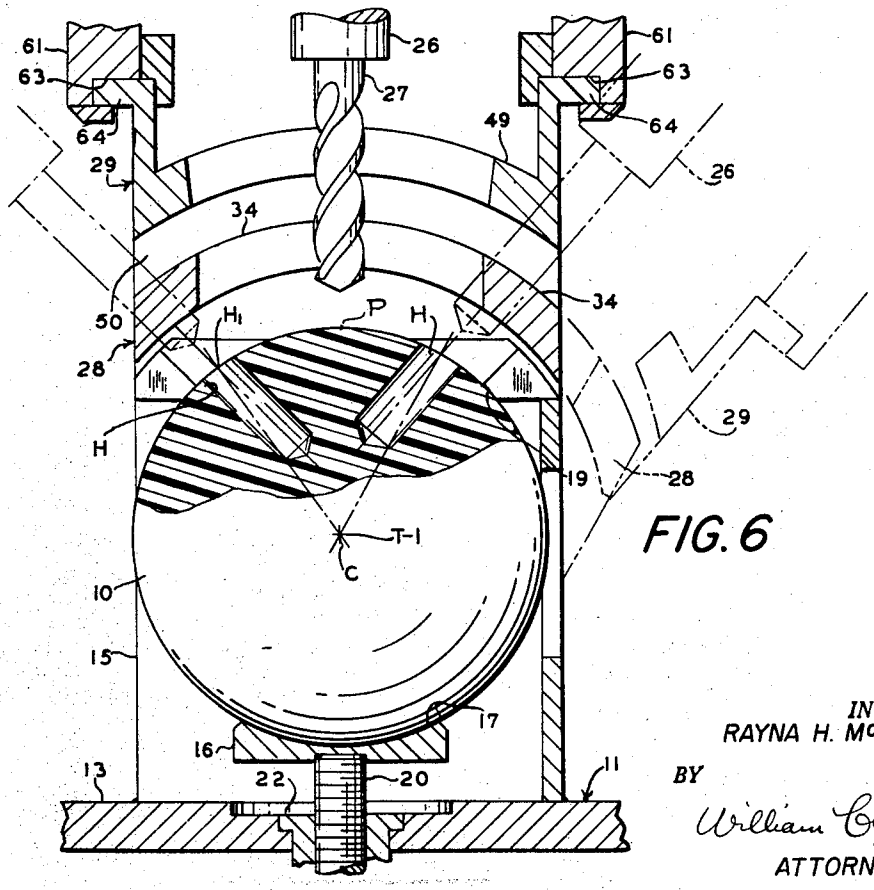


FIG. 6

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United States Patent Office 2,948,168 Patented Aug. 9, 1960

2,948,168

MACHINE FOR DRILLING FINGER HOLES IN BOWLING BALLS

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Filed June 24, 1958, Ser. No. 744,130

19 Claims. (Cl. 77—31)

This invention relates to a machine for drilling holes in spherical objects, and in particular relates to a machine for drilling finger holes in bowling balls.

Ten-pin bowling balls, of known type, are usually provided with three fingers holes, and sometimes two, depending on particular individuals or different locations where the game is played. These holes may extend in closely spaced relation radially of the center of the ball, but generally they are angled with respect to a radial axis through the center of the ball and the hole center at the surface of the ball, in various directions, to provide undercuts to suit the requirements of particular individuals with respect to the size of the hand and the shape and sizes of the fingers which engage in the holes.

Heretofore such finger holes have been drilled by mounting the ball on a holding device and marking the hole centers on the surface of the ball, in predeterminately spaced relation to each other, on the basis of an arbitrary measuring point provided on the surface of the ball by the manufacturer. After the hole centers were marked the holes were drilled by use of a separate drill press. Great skill was required, not only to drill the holes in the marked positions, but to drill them in proper angular relation to provide undercuts specified to suit the many requirements of bowlers. Due to difficulty in maintaining the drill at proper angle under such conditions the holes were frequently drilled with the wrong spacing and/or the undercuts in the wrong places.

One object of the present invention is to provide a unitary machine which not only supports the ball in a given fixed position, but which is provided with universally adjustable means for accurately drilling the finger grip holes, in accurately spaced relation, and with properly located undercut portions, to suit the specifications for a particular person.

Another object of the invention is to provide apparatus of the character described in the preceding parafraph, including improved means for quickly setting the position of a reciprocating rotary cutter with respect to an arbitrary measuring point on the surface of the ball, whereby the rotary cutter is reciprocably operable to drill a hole in the exact location required, and with a specified angle to provide requisite finger gripping undercuts.

Another object of the invention is to provide a machine for drilling holes in spherical objects, wherein is eliminated the necessity for marking the hole centers on the surface of the same.

Another object of the invention is to provide a machine of the character described including means for presetting reciprocal movement of the rotary cutter, for automatically providing a hole of predetermined depth.

Another object of the invention is to provide a machine of the character described including improved means for guiding the ball toward and from a position for drilling the holes therein, without damaging the ball.

Still another object of the invention is to provide a machine of the character described having improved means for fixedly positioning the ball therein, with the

manufacturer's measuring point on the surface of the ball in proper location for preadjusting the machine, and improved means for drilling all of the finger holes while the ball is in a single fixed position.

These and other objects of the invention will be manifest from the following brief description and the accompanying drawings.

Of the accompanying drawings:

Figure 1 is a combined front and end perspective view of a machine for drilling bowling balls, in accordance with the invention.

Figure 2 is an enlarged fragmentary cross-section, taken in a vertical plane substantially in the direction of the line 2—2 of Figure 1, and illustrating ten-pin bowling ball fixedly clamped in position for a complete drilling operation.

Figure 3 is a fragmentary cross-section, on reduced scale, taken substantially on the line 3—3 of Figure 2, and illustrating spring-pressed means for yieldingly maintaining certain parts of the machine in a neutral or zero position of adjustment.

Figure 4 is an end view of the machine as viewed from the left of Figure 2, parts of the machine being shown in full line and dotted lines to show different adjustments for drilling operations.

Figure 5 is an enlarged fragmentary cross-section, taken substantially on the line 5—5 of Figure 4, and illustrating means for adjusting portions of the machine in lateral directions.

Figure 6 is a fragmentary cross-section, taken substantially on the line 6—6 of Figure 4, portions being illustrated in full and chain-dotted lines to illustrate adjustment of parts of the machine for drilling holes in different locations and at varying angular directions.

Referring to the drawings generally, and to Figures 1, 2, and 4 in particular, the numeral **10** designates a ten-pin bowling ball of known type usually made of molded plastic material such as hard rubber, or synthetic resin plastic, fixedly clamped on a support **11** by means of a releasable ball mounting device indicated generally at **12**. The support **11** may include a horizontal platform or table **13**, supported on legs **14**, **14**, and having laterally spaced, parallel uprights or walls **15**, **15** integrally secured on the upper face thereof.

The ball mounting means **12** may include a vertically movable disc **16** having an upwardly presented concave seat **17**, for complemental reception of the lower portion of the ball **10**, and oppositely inturned flanges **18**, **18** at the upper ends of the wall **15** providing laterally spaced arcuate seats **19**, **19** for complemental seating engagement with the upper portion of the ball as best shown in Figure 2. For urging the plate **16** toward clamping engagement of the ball with the seats **19**, the same may be affixed to the upper end of the vertical screw **20**, threaded in a sleeve **22** affixed in platform 13. A suitable handle **23** is provided on the lower end of the screw **20** for turning the same to apply clamping action to plate **16**, or to release the clamping action.

A narrow pointer **24** is provided on one of the uprights **15** to locate an arbitrary measuring point P, provided on the surface of the ball by the ball manufacturer, to be at the uppermost portion of the ball through which a vertical axis of the machine passes.

A rotary cutter or drill unit **25**, including a reciprocable chuck or holder **26** for a twist drill **27**, may be mounted above the upper surface portion of the ball which is substantially freely exposed between the fixed ball seats **19**, to be universally adjustable to reciprocate the drill to predetermined extent into the ball at various selected points on said exposed portion thereof, and at preadjusted angles of the drill in a manner and for the purposes to be described. Accordingly, for such universal

adjustment there is provided as follows: a first member **28** pivotally adjustable on the fixed uprights **15**, to swing in a series of lateral planes about a first lateral axis **L–1** (see Figure 2), substantially through the center C of the ball to either side of a zero condition of the machine shown in Figures 1, 2, 4, and 6; a first element **29** pivotally adjustable on the member **28**, to swing thereon in a series of lateral planes about a second lateral axis **L–2**, parallel to axis L–1 and substantially tangent to the outer periphery of the ball, which would be at point P in the zero condition of the machine, said axes L–1 and L–2 being included in an angularly variable lateral plane; a second member **30** mounted on said first element to be pivotally adjustable thereon to swing in a series of transverse planes about a first transverse axis **T–1** (see Figure 6), passing through the center of the ball and substantially at right angles to the first lateral axis L–1 to either side of a vertical or zero transverse plane, as shown in full and chain-dotted lines in Figure 6; and a second element **31** pivotally adjustable on said second member **30** to be swingable in a series of transverse planes about a second transverse axis **T–2**, parallel to said first transverse axis T–1, and substantially tangent to the periphery of the ball, which would be at point P in said zero condition of the machine, said transverse axes T–1 and T–2 being in one said transverse plane in each angularly adjustable position of the drill. The arrangement is such that the member **28** and the element **29** may be swung on the axes L–1 and L–2, respectively, to swing the drill **27** generally in a selected vertical plane through the center C of the ball to points transversely forwardly or rearwardly of the point P (see Figure 2), and the second member **30** and second element **31** are similarly pivotable about the axes T–1 and T–2, respectively, thereof to swing the drill **27** in selected laterally extending planes, to either side of zero point P, as viewed in Figure 2, thereby to align the axis of the drill with a hole center **H–1**, as best shown in chain-dotted lines at the left of the ball center in Figures 2 and 6, wherein the drill axis passes through the center H–1 in a plane which is at an undercutting angle to a plane passing through said center H–1 and the axis T–1 through the center C of the ball. Thus, reciprocation of rotating drill **27** to desired extent will drill a suitably undercut hole H of desired depth and angularity. A similar hole H may be drilled as indicated at the right of the ball center in Figure 6, but to have a different size and drilling angle according to specific requirements. In other words, holes may be drilled at substantially any point in the upper portion of the ball and in any direction with respect to an axis through a hole center H–1 and the center C of the ball but in each instance the drill axis will pass exactly through the given hole center H–1.

The first member **28** may be in the form of a U-shaped bracket, including a transversely arcuate centrally open top wall **34** and downturned, laterally spaced walls **35, 35**, which embrace the fixed uprights **15, 15**, pivot pins **36, 36** being received outwardly through the uprights **15** to extend in axial alignment through said walls. Outward extensions of the pins **36** are threaded to receive locking nuts **37**, which may be tightened against the walls **35** to clamp the same firmly against the uprights **15** and thereby lock the member **28** in a given position of angular adjustment about the axis L–1.

As best shown in Figures 2 and 3, the outer face of each upright **15** may be provided with an arcuately grooved portion **38**, having terminal ends **39, 39** from which separate compression springs **40, 40** extend upwardly toward engagement with a protuberance **41** which extends from the respective wall **35** of bracket **28** into the upper portion of the groove. The springs **38** tend to urge the first member **28** toward the zero upright position thereof best shown in Figures 1, 2, and 4, when the locking nuts **37** are loosened on the pins **36**.

For angularly adjusting the member **28** about the axis

L–1, the lower end of one side wall **35**, at the right of Figure 1, may have affixed thereto a semi-circular toothed rack **42** for engagement with a worm gear **43**, journalled in a suitable bracket **44** attached to the upper face of fixed platform **13**. Worm gear **43** may be turned by means of a hand-wheel **45** on the outer end of a shaft extension **46** on the worm. The amount of pivotal adjustment of the member **28** about the axis L–1 may be accurately preset, by means of a pointer **47** affixed on the left hand upright **15**, as viewed in Figure 2, to indicate measurements on a scale **48** at the lower edge of the corresponding wall **35** (see Figure 4). Such measurements may be in inches and fractions thereof, marked on both sides of a zero mark indicated by the pointer **47** when the bracket or member **28** is in zero vertical position, as translated to the surface of ball **10**.

The first element **29** similarly may be a U-shaped bracket having a transversely arcuate, centrally open, top wall **49** and laterally spaced downturned walls **50, 50**, which embrace upper portions of the walls **35** of bracket **28**. Headed pivot pins **52, 52**, similar to pivot pins **36, 36**, extend outwardly in axial alignment through the walls **35** of bracket **28**, and the respective walls **50** of bracket **29**. Threaded outer extensions of these pins **52** have nuts **37** thereon which are operable against the walls **50**, thereby to clamp or lock the bracket **29** on bracket **28** in any given position of angular adjustment about the lateral pivotal axis **L–2**.

For said angular adjustment of bracket **29** on bracket **28**, the right hand wall **35** thereof, as viewed in Figure 2, may have an arcuate toothed rack **53** at the lower edge thereof, in meshing engagement with a worm gear **54** on a bracket **55** affixed to the corresponding wall **35** of U-shaped bracket **28**. By turning a hand-wheel **56** on a shaft extension **57** of worm **54**, the U-shaped bracket **29** may be pivoted through the aforementioned series of lateral planes about axis **L–2**, to either side of a zero point indicated on a scale **58** on the left-hand wall **50** by a pointer **59**, affixed on the corresponding wall **35** of bracket **28** (see Figure 4). Here the measurements may be in terms of degrees and fractions thereof.

The laterally pivotally adjustable member **30** may include transversely spaced arcuate blocks **61, 61**, integrally connected to each other by a rigid cross-member **62** (see Figure 2). These blocks are provided with oppositely inwardly presented arcuate grooves **63, 63**, slidably receiving outwardly presented arcuate flanges **64, 64** affixed on the U-shaped element **29**. As previously described, the element **30** is arcuately adjustable on radius about an axis passing through the center C of the ball **10** in clamped position thereof, as best shown in Figure 2. Angular adjustment of element **30** about such axis may be accomplished by turning a hand wheel **65** on the forward block **61** to rotate a stem **66**, journalled in the forward block **61**, and having keyed thereon a pinion **67** in a recess **68** in the block (see Figure 5). Pinion **67** is in meshing engagement with an arcuate toothed rack **69**, affixed in a groove **70** on the arcuate upper face of flange **64** of the element **29**, whereby rotation of the pinion will cause the same to travel along the rack and swing the element **30** on a radius from said ball center C, and in a given lateral plane through the axis of drill **27**, according to the adjusted position of the member **29** on axis **L–2**.

Member **30** may be locked in angularly adjusted position on member **29** by turning a set screw **72**, suitably threaded in a rear block **61**, toward clamping engagement with the upper surface of flange **64** of said element **29**. Angular adjustment of the element **30** may be indicated in inches or fractions of an inch, as translated to the periphery of ball **10**, from the zero condition shown in full lines in Figures 1, 2, 4, 5 and 6, in either direction laterally as shown in Figure 2, as by means of a pointer **73** on the forward block **61**, and a scale **74** on the forward face of element **29** (see Figure 1).

The laterally pivotable second element **31** may comprise a cylindrical housing **75**, upstanding from integral arcuate flange portions **76**, **76** thereof, arcuately slidably received in oppositely inturned arcuate grooves **77**, **77** in the blocks **61** of element **30**. The element or housing **75** is adjustably shiftable in the arcuate groove **77** to move the drill laterally in a series of lateral planes which pass through the lateral axis **L2**, which is tangent to the surface of the ball, according to the angular adjustment of element **29** on member **28**.

The element **31**, including housing **75**, is angularly adjustable, as described, in the grooves **77**, by turning an adjusting wheel **78**, thereby to turn a pinion **79**, rotatably mounted in a recessed portion of the forward member block **61**. Pinion **79** meshes with a curved rack **80**, secured in a recessed portion **81** of the forward flange **76** of element **31**. Thus, rotation of the pinion **79** will swing the element **31** on the axis tangent to the surface of the ball **10**. The element **31** may be locked in any such position of angular adjustment with reference to member **30**, by means of a set screw **83**, threaded in block **61**, for clamping engagement with a corresponding flange portion **76**.

Angular adjustments corresponding to degrees and fractions thereof may be indicated by a pointer **84** affixed on housing **75** to indicate such adjustments on a scale **85** on the upper face of the forward block **61** (see Figure 1).

Referring to Figure 1, the rotary cutter device **25** may be of a type including a casing **86** vertically adjustable within the housing **75**, by means of a hand wheel **87** and rack and pinion means **88** of known type, and by which vertical adjustment of the casing is indicated on a scale **89** on housing **75**, and a pointer **90** carried by the casing **86**. Rotary cutter unit **25** may include therein known automatic means for reciprocating the drill chuck **26** with drill **27** thereon for a predetermined stroke, automatically with operation of an electric motor **91** affixed on the upper end of housing **75** to rotate the chuck **26** through the unit **25**. That is, when motor **91** is operated to rotate the chuck **26** it will be reciprocated toward and from ball **10** in any of the various angularly adjusted positions of the drill, to drill the hole H of predetermined depth, as adjusted by means of the handle **87** and as indicated on the scale **89**.

Manual movement of the ball toward and from seating position on the recessed seat **16** is facilitated by provision of a grooved track or guide **12***a* mounted on platform **13**, at the front of the machine. The top of guide **12***a* is adapted to be substantially flush with the top of plate **16** when the latter is in retracted position against the platform.

In operation or use of the improved machine described above, as for drilling each one of the usual peripherally spaced finger holes H in a standard ten-pin bowling ball **10**, the ball is fixedly positioned as shown in Figures 1 to 6 as previously described, to be clamped between the clamping disc **16** and laterally spaced arcuate seats **19** on the fixed uprights **15**. The ball is so adjusted to have the manufacturer's measuring mark P on the uppermost portion of the ball in alignment with the central axis of the machine, which will be the same as the axis of the drill, in the zero position of the machine indicated on measuring scales **48**, **58**, **74** and **85** (see Figures 1 and 4).

It is to be assumed that the machine operator has been furnished with a sketch or other data for determining the spacing and undercutting for drilling three finger holes in the ball, in terms of linear measurements on the ball surface with respect to point P, and undercutting angles of the holes, to suit the desired finger grip of the particular bowler.

Ordinarily the ball surface would be marked in some way to locate a hole H forwardly of point P, and to the left of the vertical centerline of ball **10**, as viewed in Figure 2, by measuring distances along arcs P*x* and *x*H–**1** in

right-angularly disposed planes, as for example distances of 1½" and 1", respectively. With use of the present machine, however, no markings other than the measuring point P are necessary. The operator simply loosens the nuts **37** on the pins **36** and turns hand wheel **45**, thereby through the worm **43** and rack **42** to swing the member **28** forwardly about the lateral axis L–**1** until pointer **47** indicates 1½" from the right of the zero point (see Figure 4), at which point the nuts **37** are tightened on the pins **36** to affix the member **28** on the supporting uprights **15**. All other pivotal parts at this time being in aforesaid zero positions on the respective indexing scales, the axis of drill **27** will now be in a position somewhat as indicated in dotted lines at the left of Figure 6, except that the axis of the drill would extend through the hole center H–**1** and the ball center C. Next, the operator, after releasing locking screw **72** on member **30**, turns the adjusting wheel **65** to swing member **30** about the variable transverse axis T–**1** extending through the center C of the ball, to a particular angle of the member at which the pointer **73** indicates a measurement of 1" to the left of the zero point, as viewed from the front of the machine (see Figure 1), after which the set screw **72** is again tightened to lock the member **30** in the resultant angularly adjusted position thereof with respect to member **29**. In the condition accomplished by the two angular adjustments just described, the axis of the drill will pass through the center H–**1** of hole H being drilled and the center C of the ball. The operator now may adjust the drill to an undercutting angle in any direction laterally, as shown in Figures 2 and 6, by loosening the set screw **83** and turning the knob **78** thereby to rotate pinion **67** on a rack **69**, and thereby swing the member **30** laterally to the left as viewed in Figure 5, for example, to an undercutting angle of the drill with respect to the line H_1C (see Figure 6), and as indicated in degrees by the pointer **84** on the scale **85** (see Figure 1). This angular adjustment may be fixed by tightening the locking screw **83**. Similarly, the drill may be angularly adjusted either forwardly or rearwardly of the ball, by loosening the nuts **37** on the pins **52**, to permit turning the knob **56** and to swing the element **29** in desired direction on the axis L–**2** to an angular degree indicated by the pointer **59** on the scale **58** (see Figure 4). When the latter adjustment has been accomplished the nuts **37** are again tightened on the pins **52**.

When all four of the above angular adjustments have been accomplished the drill **27** will have its axis extending substantially as indicated in dotted lines at the left of Figures 2 and 6. Accordingly, the operator may now operate the motor **91** through the rotary cutter device **25** to reciprocate the drill through one axial stroke, during which the drill will enter the ball at hole center H_1 and accurately drill the hole H to requisite depth. The hole H to the right of the centerline of the ball, as well as the hole H rearwardly of the point P may similarly be drilled to have any desired size, depth, location and undercut angle, all without use of marks on the ball. When all holes have been completely drilled the ball **10** is easily removed by turning the wheel **23** to lower the clamping plate **16** to a point where the ball may be rolled outwardly on the grooved guide plate **12***a*.

Thus has been provided a unitary device which is easily adjusted and operated to drill holes accurately as required in each instance, without necessarily requiring a particularly high degree of mechanical skill.

Modifications of the invention may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. A machine as for drilling a hole in a bowling ball or the like, comprising a relatively fixed support, mounting means on said support for releasably mounting the ball in relatively fixed position, a rotary cutter, means for mounting said rotary cutter on said support to be

movable toward and from cutting engagement with the ball, said mounting means including a relatively fixed part having downwardly presented ball seat means and a vertically relatively movable part having an upwardly presented ball seat means, and means for urging said movable part from a retracted ball-receiving position upwardly to a position in which the ball is clamped between said means of the fixed and movable parts.

2. A machine as set forth in claim 1, including guide means for rolling the ball onto said upwardly presented seat means in the retracted position of said relatively movable part.

3. A machine as for drilling a hole in a bowling ball or the like, comprising a relatively fixed support, ball mounting means on said support for releasably mounting the ball in relatively fixed position thereon, a rotary cutter, universally adjustable means on said support for mounting said rotary cutter thereon to be adjustable to various angularly adjusted positions of the rotary cutter with respect to the ball in said fixed position of the same, and means for reciprocating said rotary cutter toward and from the fined ball in said various angularly adjusted positions thereof.

4. A machine as set forth in claim 3, means being provided on said support for indicating where an arbitrary point furnished on the ball is intersected by the axis of the rotary cutter in a zero position of the mounting means therefor in which said cutter axis passes through said arbitrary point and the center of the ball.

5. A machine as for drilling a hole in a bowling ball or the like, comprising a relatively fixed support, ball mounting means on said support for releasably mounting the ball in relatively fixed position thereon, a rotary cutter, universally adjustable means on said support for mounting said rotary cutter thereon to be adjustable to various angularly adjusted positons of the rotary cutter with respect to the ball in said fixed position of the same, means for releasably locking said universally adjustable means in variously adjusted positions on said support, and means for reciprocating said rotary cutter toward and from the fixed ball in said various angularly adjusted positions thereof.

6. A machine as for drilling a hole in a bowling ball or the like, comprising a relatively fixed support, mounting means on said support for releasably mounting the ball in relatively fixed position thereon to have a given hole center on the surface of the ball freely exposed, a member adjustable on said support to swing in an arc about the center of the ball, an element carried by said member and adjustable thereon to be swingable about an arc about a point on the periphery of the ball, locking means for affixing said member and said element in various said selected positions of said adjustment with respect to each other, to said support, and to said given hole center on the surface of the ball, cutter means mounted on said element including an axially reciprocable rotary cutting tool, whereby upon reciprocation of said rotary cutting tool a hole will be made inwardly of the surface of the ball in predetermined direction with respect to a radial line through said hole center and the center of the ball.

7. A machine as set forth in claim 6, wherein resilient means is provided for yieldingly tending to urge said member toward a given position of adjustment with respect to said support when said member is free to swing with respect to the same.

8. A machine as for drilling a hole in a bowling ball or like spherical object, comprising a support, mounting means on said support for releasably mounting the ball in relatively fixed position to have a given hole center on the surface of the ball freely exposed, a first member pivotably adjustable on said support to swing about a first lateral axis substantially through the center of the ball, a first element pivotally adjustable on said member to swing about a second lateral axis parallel to said first lateral axis, said second lateral axis being substantially tangent to the outer periphery of the ball and being in a lateral plane including said first lateral axis, a second member mounted on said first element to be pivotally adjustable thereon to swing about a first transverse axis through the center of the ball substantially at right angles to said first lateral axis, a second element pivotally adjustable on said second member to be swingable about a second transverse axis parallel to said first transverse axis, said second transverse axis being substantially tangent to the periphery of the ball and being in a transverse plane including said first transverse axis, locking means for affixing said members and said elements in various said selected positions of said pivotal adjustment with respect to each other, to said support, and to said given hole center on the surface of the ball, cutter means mounted on said second element including an axially reciprocable rotary cutting tool, the axis of said cutting tool being at the intersection of planes passing through said second lateral axis and said second transverse axis, respectively in selected positions of pivotal adjustment, whereby upon reciprocation of said rotary cutting tool a hole will be made inwardly of the surface of the ball in predetermined direction with respect to a radial line through said hole center and the center of the ball.

9. A machine as set forth in claim 8, wherein said locking means includes separate releasable devices for locking said members and elements against pivotal adjustment about the respective said lateral and transverse axes.

10. A machine as set forth in claim 8, means being provided on said support for indicating where an arbitrary point furnished on the ball is intersected by the axis of the rotary cutter in a zero position of the mounting means therefor in which said cutter axis passes through said arbitrary point and the center of the ball, wherein said locking means includes separate releasable devices for locking said members and elements against pivotal adjustment about the respective said lateral and transverse axes.

11. A machine as set forth in claim 8, wherein said ball mounting means includes relatively fixed and movable clamping parts, and means for clamping said parts together against opposite portions of the ball.

12. A machine as set forth in claim 8, wherein said ball mounting means includes a relatively fixed part having downwardly presented ball seat means, and a relatively movable part having upwardly presented ball seat means, means for urging said movable part from a retracted position toward a clamping position in which said ball seat means are clamped against opposite portions of the ball.

13. A machine as set forth in claim 8, wherein said ball mounting means includes a relatively fixed part having downwardly presented ball seat means, and a relatively movable part having upwardly presented ball seat means, means for urging said movable part from a retracted position toward a clamping position in which said ball seat means are clamped against opposite portions of the ball, guide means for rolling the ball onto said upwardly presented seat means in the retracted position of said relatively movable part.

14. A machine as set forth in claim 8, wherein said locking means includes separate releasable devices for locking said members and elements against pivotal adjustment about the respective said lateral and transverse axes, and guide means is provided for guiding the ball toward and from said ball mounting means in the released condition thereof.

15. A machine as for drilling a hole in a bowling ball or the like, comprising a support, ball mounting means on said support for releasably mounting the ball in relatively fixed position to have a given hole center on the surface of the ball freely exposed, a first member pivotably adjustable on said support to swing about a first

lateral axis substantially through the center of the ball, a first element pivotally adjustable on said member to swing about a second lateral axis spaced from said first lateral axis, said second lateral axis being substantially tangent to the outer periphery of the ball, a second member mounted on said first element to be pivotally adjustable thereon to swing about a first transverse axis through the center of the ball at an angle to said first lateral axis, a second element pivotally adjustable on said second member to be swingable about a second transverse axis spaced from said first transverse axis, said second transverse axis being substantially tangent to the periphery of the ball, locking means for affixing said members and said elements in various said selected positions of said pivotal adjustment with respect to each other, to said support, and to said given hole center on the surface of the ball, cutter means mounted on said second element including an axially reciprocable rotary cutting tool, the axis of said cutting tool being at the intersection of planes passing through said second lateral axis and said second transverse axis, respectively, in selected positions of said pivotal adjustment, whereby upon reciprocation of said rotary cutting tool a hole will be made inwardly of the surface of the ball in predetermined direction with respect to a radial line through said hole center and the center of the ball.

16. A machine as for drilling a hole in a bowling ball or the like, comprising a relatively fixed support, mounting means on said support for releasably mounting the ball in relatively fixed position to have a given hole center on the surface of the ball freely exposed, cutter means including a cutting tool reciprocable along an axis, means for adjustably mounting said cutter means on said support to be movable to various fixed angular positions in which said cutting tool axis passes through said given hole center, said adjustable mounting means being operable to selected fixed angular positions of said cutter means with respect to said given hole center on the surface of the ball, whereby upon reciprocation of said rotary cutting tool a hole will be made inwardly of the surface of the ball in predetermined angular direction of said cutting tool axis with respect to a radial line through said hole center and the center of the ball.

17. A machine as set forth in claim 16, said adjustable mounting means including visible indicator means for presetting the angle of said cutting tool axis with respect to said radial line.

18. A machine as set forth in claim 17, means being provided on said cutter means for automatically limiting reciprocation of said cutting tool to provide a said hole of predetermined depth in the ball.

19. A machine for drilling holes in bowling balls or like spherical objects, comprising a housing, means for releasably supporting a said object in relatively fixed position in said housing to have a given spherical portion of the object freely outwardly exposed, a hole boring device including a boring tool shiftable longitudinally of an axis thereof, means for universably adjustably mounting said device on said housing to center said boring tool to have said axis passing through a hole center on said exposed portion and to have said axis at selected angles with respect to a radial centerline through said hole center and the center of the object.

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