Sept. 13, 1966 D. P. BLAKER ETAL 3,271,870

BOWLING BALL HOLE GAUGING DEVICE

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Fig. 2

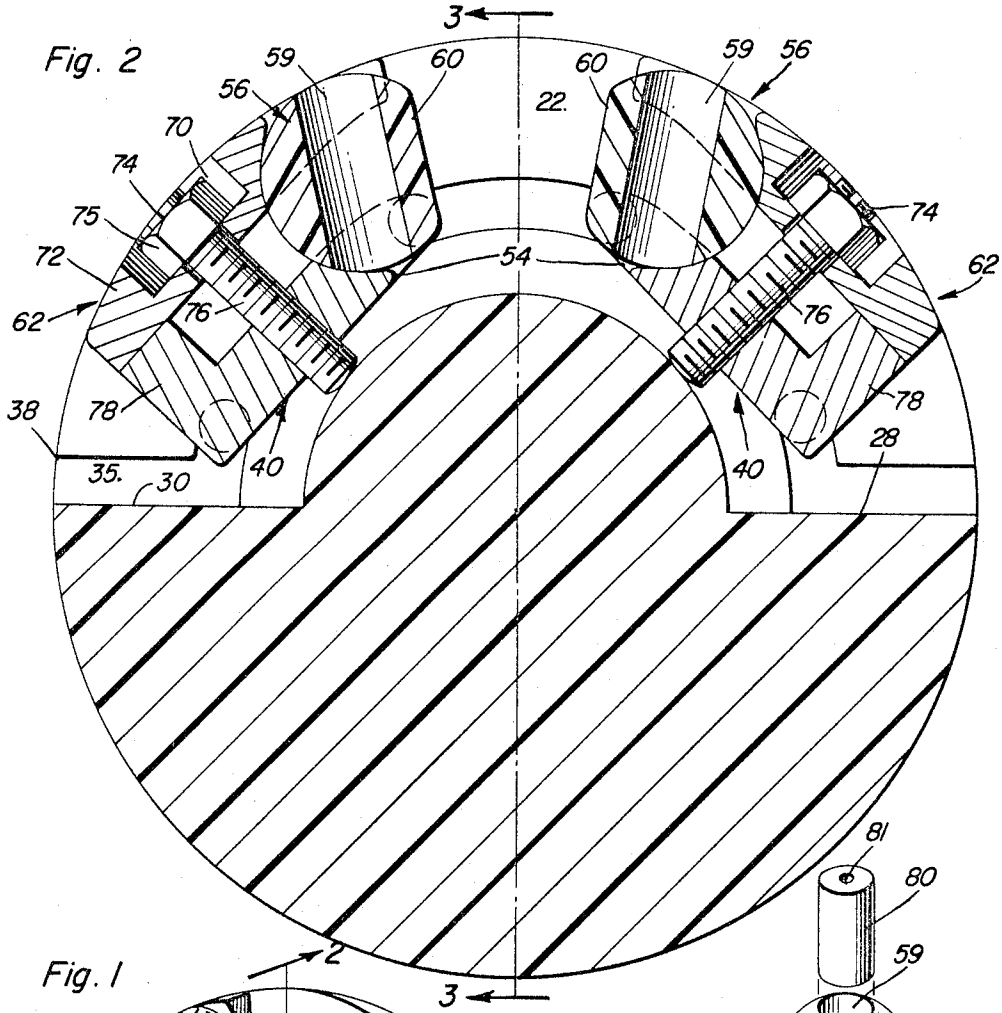


Fig. 1

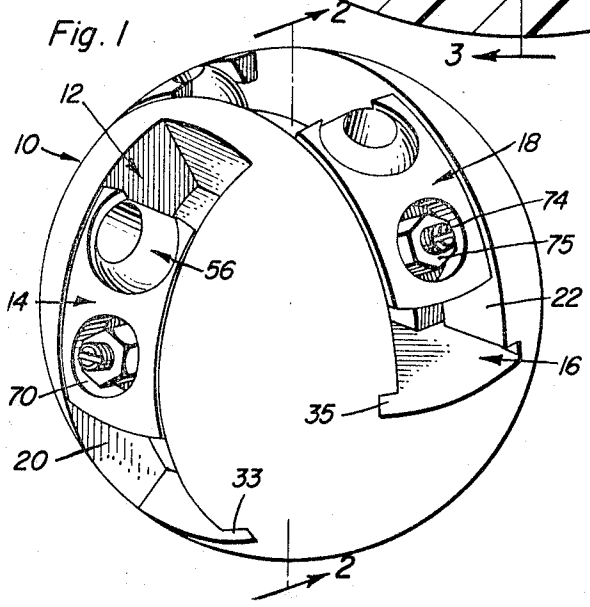


Fig. 6

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Fig. 3

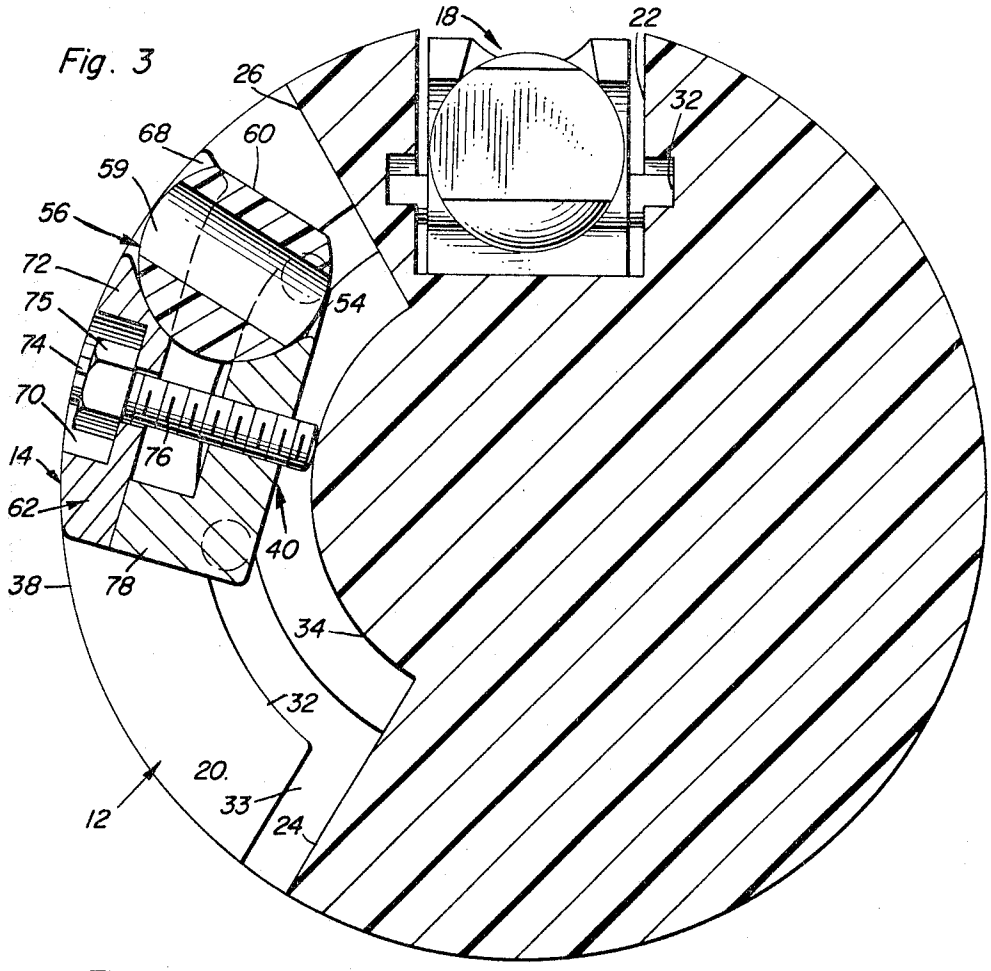


Fig. 4

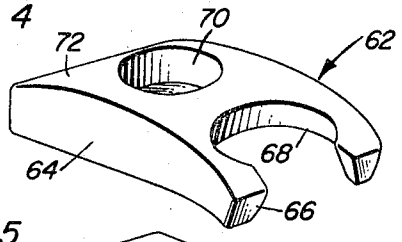
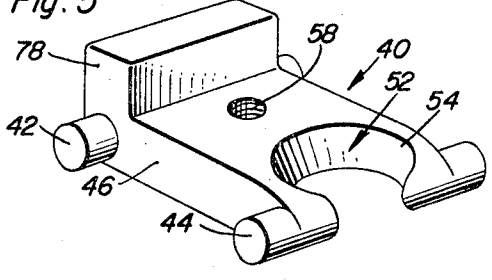


Fig. 5



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Fig. 7

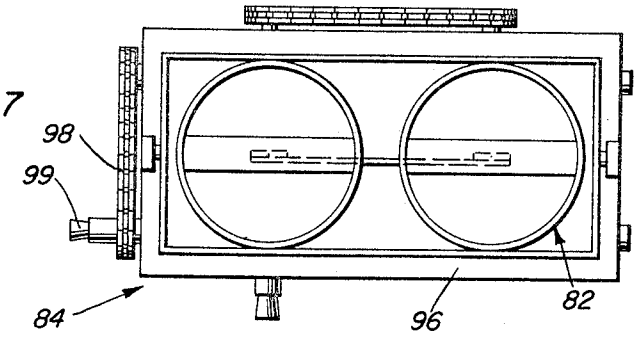


Fig. 8

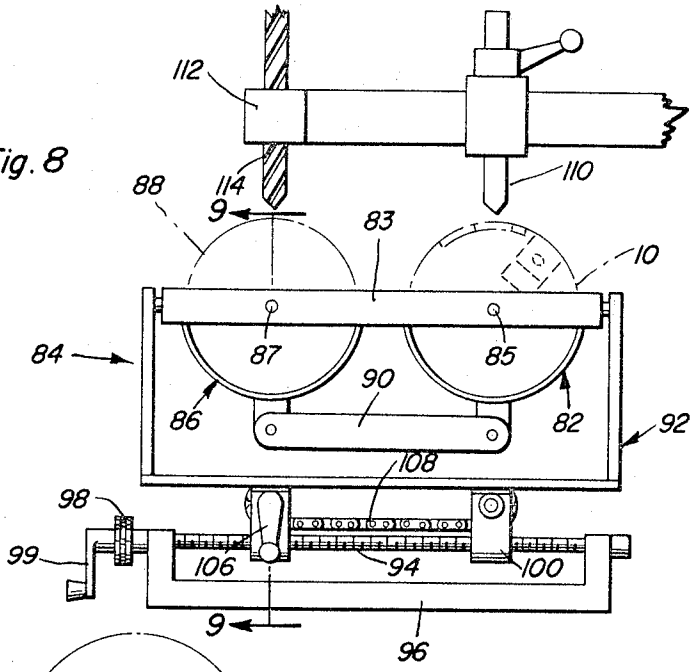
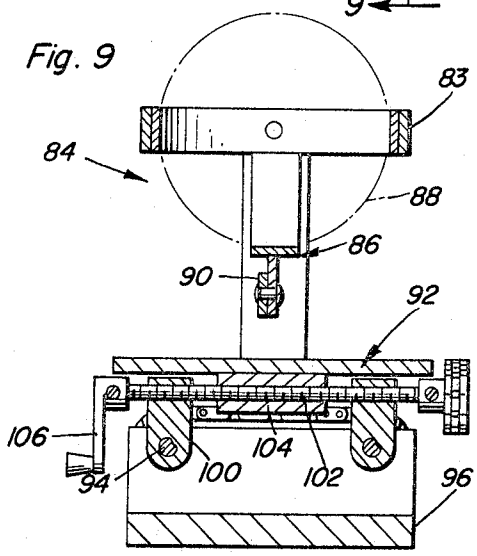


Fig. 9



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BOWLING BALL HOLE GAUGING DEVICE

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Filed Mar. 17, 1964, Ser. No. 352,450
10 Claims. (Cl. 33—174)

This invention relates to a method and apparatus for measuring the handgrip of a bowler to drill the holes in a bowling ball in accordance with the individual natural grip of a bowler.

It is therefore a primary object of the present invention to provide a dummy bowling ball of novel construction whereby the pitch, angle and span associated with the bowler's fingers during natural grip of a bowling ball, may be reproduced and utilized to drill a bowling ball in a most accurate and facile manner.

In accordance with the foregoing object, the present invention involves a novel method which eliminates recording of measurements and scaled adjustments of drilling apparatus. The method and apparatus furthermore, does not impose any limitations or constraint on the bowler when attempting to position the fingers in a natural grip pattern.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of a dummy bowling ball constructed in accordance with the present invention.

FIGURE 2 is a sectional view through the dummy bowling ball taken substantially through a plane indicated by section line 2—2 in FIGURE 1.

FIGURE 3 is a partial sectional view taken substantially through a plane indicated by section line 3—3 in FIGURE 2.

FIGURE 4 is a perspective view of the clamping member associated with one of the adjustable fingerstall assemblies.

FIGURE 5 is a perspective view of the insert seating element associated with one of the fingerstall assemblies.

FIGURE 6 is a perspective view of the replaceable insert and plug associated with each of the fingerstall assemblies.

FIGURE 7 is a top plan view of a drilling jig associated with the method of the present invention.

FIGURE 8 is a side elevational view of the drilling jig of FIGURE 7.

FIGURE 9 is a transverse sectional view taken through a plane indicated by section line 9—9 in FIGURE 8.

Referring now to the drawings in detail, it will be observed from FIGURES 1, 2 and 3, that the dummy bowling ball generally referred to by reference numeral 10 simulates the usual bowling ball and is of a diameter equal to the diameter of the bowling ball to be drilled for a bowler. The dummy ball is however, formed with a span adjustment slot 12 within which a single thumbstall assembly 14 is adjustably positioned and a finger span slot 16 within which a pair of fingerstall assemblies 18 are adjustably positioned. The slots 12 and 16 are spaced from each other and disposed generally along perpendicular planes which intersect at the center of the dummy ball. Accordingly, the slot 12 as more clearly seen in FIGURE 1, is formed between spaced side walls 20 disposed parallel to one of the perpendicular planes while the slot 16 is formed between the side walls 22 disposed parallel to the other perpendicular plane aforementioned. The slots 12 and 16 extend a predetermined circumferential distance along their respective planes and are of a

predetermined depth so as to receive the fingerstall assemblies 14 and 18 therewithin. The slot 12 extends between the end walls 24 and 26 and is of a shorter circumferential length than the slot 16 which extends between the end walls 28 and 30. Accordingly, the greater length of slot 16 will accommodate the two fingerstall assemblies 18. Formed within the side walls 20 and 22 of the slots, are arcuate grooves 32 more closely spaced from the bottoms 34 and 36 of the slots than from the outer surface 38 of the dummy ball.

Each of the fingerstall assemblies 14 and 18 is similar in construction so as to be adjustably positioned between the side walls 20 or 22 of the slots. Referring therefore to FIGURES 2, 3, 4 and 5 in particular, it will be observed that each of the stall assemblies includes a seating element 40 having spaced projections 42 and 44 extending laterally from opposite longitudinal sides 46. The width of the seating element 40 is dimensioned between the sides 46 so as to be slidably movable within the slots. Projections 42 and 44 extend from the seating element adjacent the opposite ends for reception within the grooves 32. The seating elements 40 may therefore be inserted into the slots 12 and 16 through end grooves 33 and 35 so as to assemble the fingerstall assemblies 14 and 18 therein. It will be noted from FIGURES 1 and 3 that the slot 16 is of a width to receive the fingerstall assemblies 18 with lateral clearance.

Formed at one end within the seating element, is a circular seating recess 52 having beveled sides 54 to form a seat for a spherical finger insert 56. Also formed in the seating element spaced from the recess 52, is an internally threaded aperture 58. It will therefore be apparent, that the seating element 40 may be slidably displaced within the slot and thereby carry a finger-receiving insert 56 to any adjusted position in order to accommodate the span between the bowler's fingers. Each fingerstall assembly 18 may also occupy different lateral positions in the slot 16 because of the clearance therein so as to accommodate differences in the span between the thumb and the joints of the fingers received in the stall assemblies 18.

The finger-receiving insert 56 as more clearly seen in FIGURES 2, 3 and 6, is spherical so that it may be angularly adjusted within its seating recess 52 in order to permit the bowler's finger to assume any natural pitch and angle. The insert is therefore provided with a finger-receiving bore 59 which extends therethrough along an axis parallel to a flat 60 formed on each insert 56. Inserts having different diameter bores 59 will therefore be available so as to accommodate fingers of different sizes, these inserts being replaceably mounted in the fingerstall assemblies 14 and 18.

In order to hold the finger-receiving inserts in their associated stall assemblies and clamp them in adjusted position, locking means is provided including an insert locking member 62. As more clearly seen in FIGURES 2, 3 and 4, each of the clamping members 62 is dimensioned between the longitudinal sides 64 thereof equal to the lateral dimension of the associated element 40 between the sides 46. One end 66 of the clamping member is provided with a circular engaging recess 68 adapted to be aligned with the seating recess 52 of the seating element 40 with which it is associated in the stall assembly. A recess opening 70 is formed in the outer portion 72 of the clamping member spaced from the engaging recess 68 so as to receive the slotted head portion 74 of a locking screw member 76. The locking screw member is therefore threadedly engaged in the threaded aperture 58 of the seating element in order to lock the seating element in an adjusted position by engagement with the bottom 34 of the slot. The insert 56 is then locked in its angularly adjusted position by

the clamping member engaging a bearing portion 78 which extends radially outwardly from the end of the insert element 40 opposite the recess 52. Thus rotative torque applied to the nut 75 threadedly mounted on the locking screw 76 within opening 70 will clamp the insert 56 between the recesses 52 and 68, in order to lock the insert in its adjusted pitch and angle position after the stall assembly has been locked in its adjusted span position within the slot.

Each of the stall assemblies 14 and 18 may therefore be held loosely assembled so that it is slidable within the slot and the replaceable insert 56 thereof is angularly adjustable in pitch and angle. A bowler may therefore insert the thumb in the stall assembly 14 and the two fingers in the stall assemblies 18 within the slot 16 and assume a natural grip on the dummy ball. The grip pattern so established may then be preserved by locking each stall assembly as aforementioned through the locking screws 76 and nuts 75. The bowler's fingers may then be withdrawn from the fingerstalls and into each finger-receiving bore 59, a plug 80 may be inserted as illustrated in FIGURE 6. The axis of the bore 59 will then pass through the target marking or indentation 81 formed on the exposed end of the plug. With the bowler's grip pattern so reproduced in the dummy ball 10, the dummy ball may be placed in the gimbal structure 82 of a drilling jig generally referred to by reference numeral 84 illustrated in FIGURES 7, 8 and 9. The gimbal structure 82 is rotatably mounted by gimbal ring 83 about a horizontal axis through pin 85, the ring 83 also rotatably mounting the gimbal structure 86 within which an undrilled bowling ball 88 is received. The pins 87 rotatably mounted the gimbal 86 in the ring 83. The ball-receiving gimbals 82 and 86 are also pivotally interconnected by a link 90 and the gimbal ring 83 is rotatably mounted by the gimbal frame 92 about an axis perpendicular to the axes through pins 85 and 87. The gimbal frame 92 may also be adjustably mounted with respect to the base 96 in one horizontal direction by a pair of adjustment screws 94 rotatably mounted by the base and drivingly interconnected by sprocket chain 98 for simultaneous rotation by hand crank 99 connected to one of the screws. A pair of supporting brackets 100 threadedly receive the screws 94 for shifting the frame 92 connected thereto by the adjustment screws 102 rotatably mounted between the brackets. The adjustment screws 102 are threadedly received in the nut portion 104 which is secured to the underside of frame 92 for shifting the frame in a horizontal direction perpendicular to the adjustment screws 94. One of the screws 102 is therefore provided with a crank 106 and is drivingly connected by sprocket chain 108 to the other screw for simultaneous movement. It will therefore be apparent, that the dummy ball 10 and undrilled ball 88 may be placed in the jig 84 and adjusted so as to bring the axes of the finger bores 59 as defined by the targets 81 of the plugs 80 into axial alignment with the reference locator 110 fixedly spaced from the drill bit guide collar 112. When so orientating the dummy ball 10 within the drilling rig 84, the undrilled ball 88 will be similarly orientated with respect to the guide drill collar 112 so that the drill bit 114 may drill a hole in the ball 88 corresponding to the position of the plug 80 aligned below the reference locator 104. In this manner, each of the fingerholes may be drilled in the ball 88 corresponding exactly to the position of the plugs 80 in the dummy ball 10 which reproduce the natural grip pattern of the bowler.

From the foregoing description, the construction and utility of the dummy bowling ball as well as the ball-drilling method associated therewith, will be apparent. It will therefore be appreciated, that the dummy bowling ball will permit a bowler to reproduce the natural grip pattern of the fingers without any restraint imposed thereon and said natural grip pattern then preserved by locking the fingerstall assemblies in place. Placement of the dummy ball in the drilling jig together with an undrilled ball for simultaneous orientation of the balls will then permit drilling of the ball to suit the individual bowler without recording scaled information and without scaled adjustment of the drilling jig.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A handgrip measuring device comprising a dummy bowling ball, a pair of spaced slots formed in said ball having walls parallel to perpendicular planes intersecting at the center of said ball, each of said walls being formed with arcuate grooves, finger stall assemblies adjustably positioned in said slots, each finger stall assembly including a seating element slidably mounted by the arcuate grooves between the walls of the slot, a replaceable insert seated on said seating element, and locking means mounted on said seating element for both locking the insert in position on the seating element and holding the seating element in adjusted position within the slot, said locking means comprising, an insert clamping member having an outer portion engaging the insert in spaced relation to the seating element and a bearing portion engaging the seating element spaced from the insert, and screw means contacting the bottom of the slot and operatively engaged with the clamping member and the seating element for drawing the seating element toward the clamping member.

2. The combination of claim 1 wherein one of said slots positions one of said fingerstall assemblies in accordance with the natural span of a bowler's hand, the replaceable insert of said one fingerstall assembly having a thumb-receiving opening therein, the other of said slots positioning a pair of the fingerstall assemblies with the replaceable inserts thereof having finger-receiving openings adjustable in pitch and angle to the natural grip of the bowler.

3. The combination of claim 2 wherein said seating element includes spaced projections received within the arcuate grooves and a beveled seating recess formed at one end thereof.

4. The combination of claim 3 wherein said outer portion of the insert clamping member includes, a beveled engaging recess aligned with the seating recess in the seating element at one end spaced from the screw means and on a side thereof remote from the bearing portion.

5. The combination of claim 1 wherein said outer portion of the insert clamping member includes, a beveled engaging recess at one end, spaced from the screw means and on a side thereof remote from the bearing portion.

6. The combination of claim 5 wherein said seating element includes spaced projections received within the arcuate grooves and a beveled seating recess aligned with the engaging recess of the insert clamping member.

7. The combination of claim 6 wherein each replaceable insert comprises a spherical element having one flat formed thereon and a finger-receiving bore extending therethrough parallel to said flat.

8. A handgrip measuring device comprising a dummy bowling ball having a slot formed therein, said slot being defined by an arcuate bottom surface and spaced side walls, and a fingerstall assembly adjustably positioned within said slot including a seating element having a bearing surface portion, guide means mounted on said seating element and the side walls of the slot for constraining movement of the seating element through the slot in fixed spaced relation to the bottom surface thereof, a clamp member mounted on the seating element hav-

ing a bearing surface portion radially spaced from the bearing surface portion of the seating element within the slot, an insert rotatably supported by said bearing surface portions of the seating element and the clamp member, said insert having a finger receiving bore extending therethrough externally exposed through the slot, and threaded lock means operatively engageable with the seating element and the clamp member for clamping the insert in an angularly adjusted position between said bearing surface portions, said lock means having an engaging end portion projecting from the seating element into engagement with the bottom surface of the slot cooperating with the guide means to lock the seating element in an adjusted position within the slot.

9. The combination of claim **8** wherein said threaded lock means includes an elongated screw threadedly mounted within the seating element, said screw having a tool receiving end portion projecting through said clamp member opposite the engaging end portion that projects from the seating element, and a clamping nut threadedly mounted by the screw in abutting relation to the clamp member, said clamp member having a recess within which the nut is received and through which the tool engaging end portion of the screw is exposed externally of the dummy ball.

10. In combination with a handgrip measuring ball having an arcuate slot formed therein, a fingerstall assembly adjustably positioned within the slot comprising a seating element, means slidably mounting the seating element within the slot for movement along a fixed path, a clamp member mounted on the seating element, screw means threadedly mounted by the seating element and projecting through the clamp member for engagement with the ball tending to displace the seating element from said fixed path whereby the seating element is locked in an adjusted position within the slot, a finger receiving insert, bearing surface means formed on said seating element and the clamp member for rotatably mounting the insert therebetween, and clamping nut means threadedly mounted by the screw means in abutting relation to the clamp member for locking the insert in an angularly adjusted position between the bearing surface means.

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