

May 23, 1944.

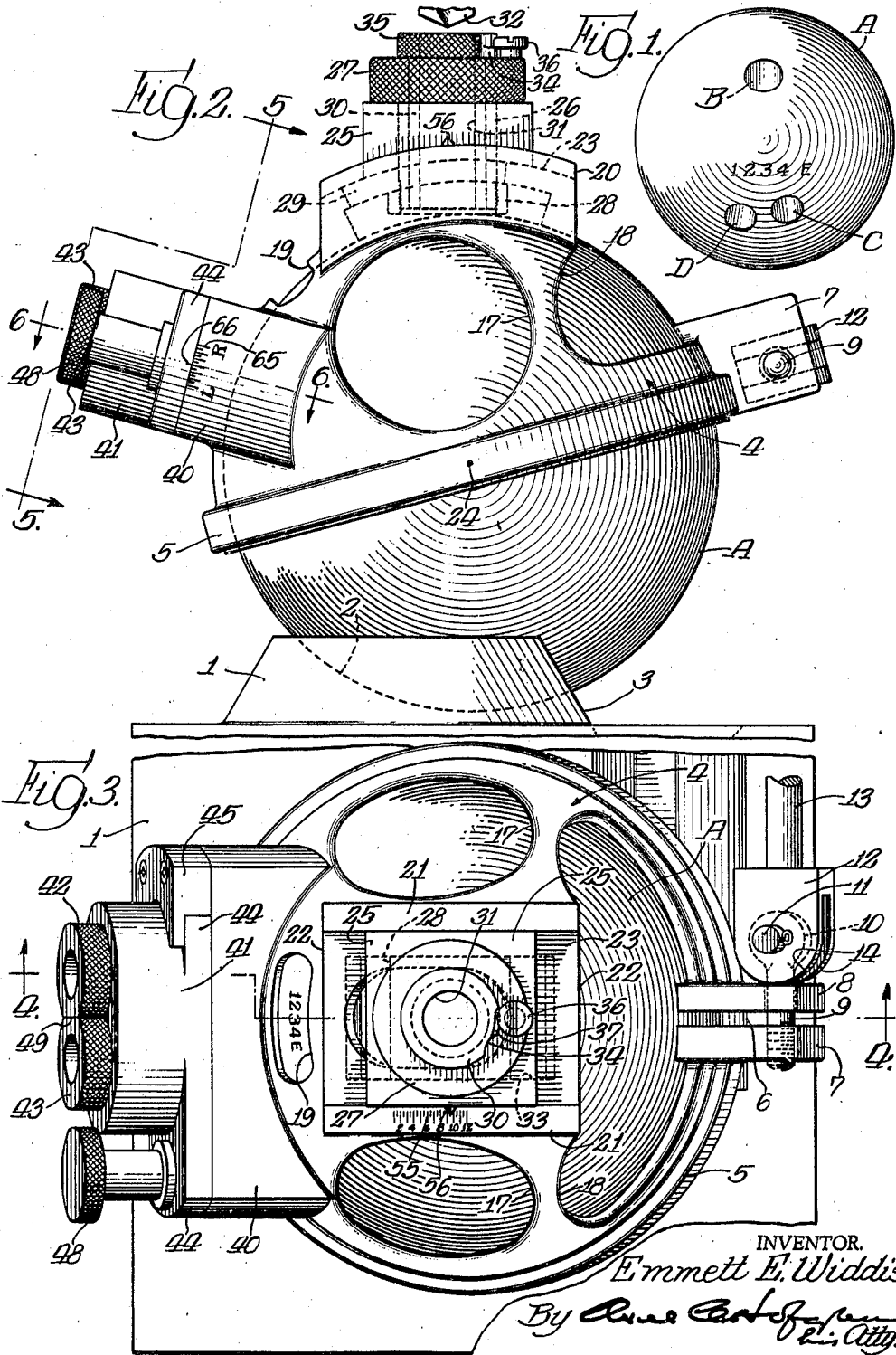
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BOWLING BALL DRILLING FIXTURE

Filed Dec. 12, 1941

2 Sheets-Sheet 1



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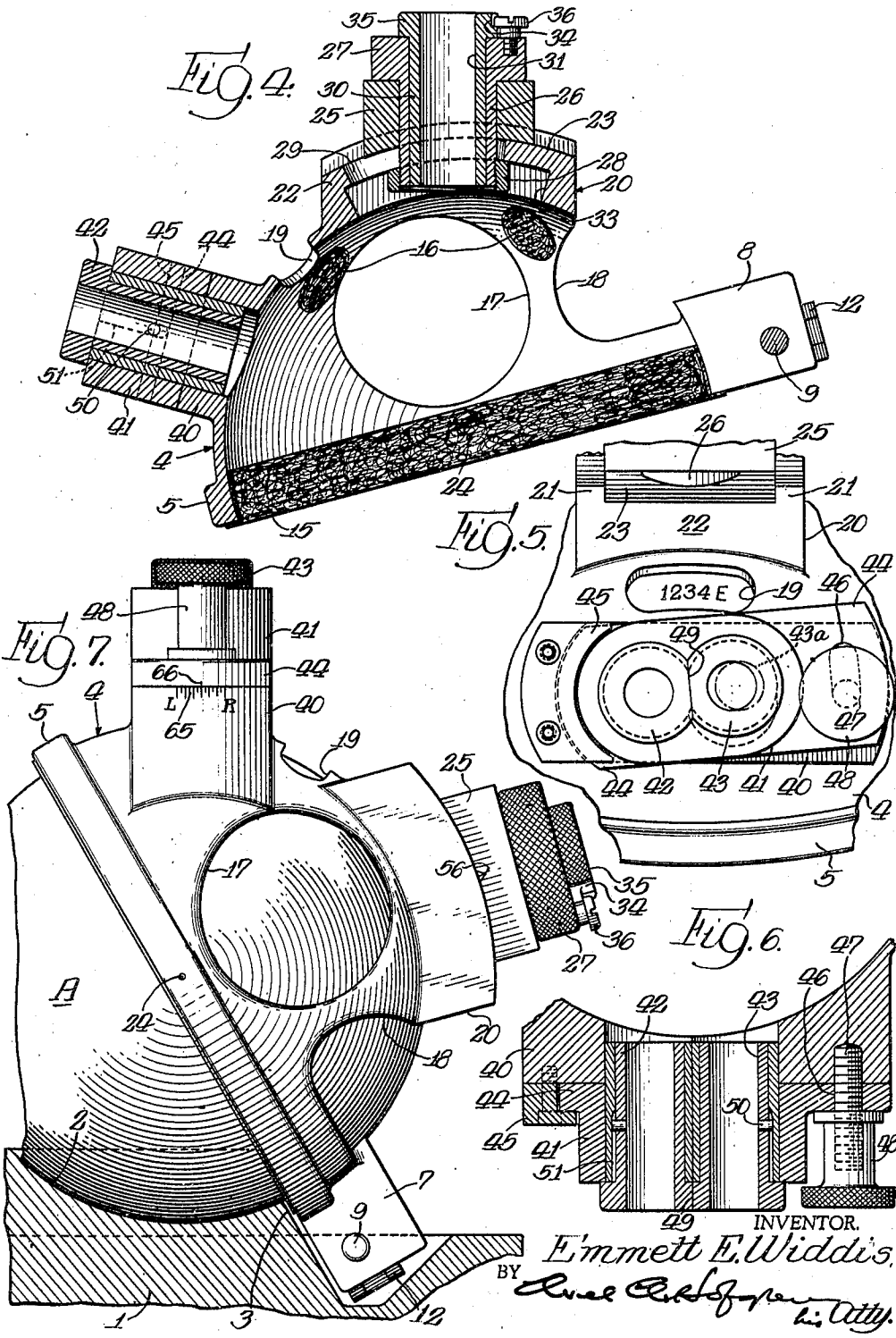
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2 Sheets-Sheet 2



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BOWLING BALL DRILLING FIXTURE

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14 Claims. (Cl. 77—62)

This invention relates to a fixture to facilitate the drilling of the finger holes in a bowling ball.

One object of the invention is to provide a portable fixture which can be readily applied to a bowling ball for guiding a drill or drills in the formation of the finger holes and determining the location of the holes with relation to each other.

Another object of the invention is to provide a portable fixture having means for guiding a drill or drills in the formation of the finger holes in a bowling ball, said means being adjustable in the fixture in order to vary the location of the holes with respect to each other to suit the requirements of different users.

It is also an object of the invention to provide a portable fixture having frictional clamping means by which it may be secured to a bowling ball and including means for guiding a drill or drills in the formation of finger holes in the ball, together with a support on which the ball may be rotatably adjusted to bring each of the holes into vertical alignment with the spindle of a drill press by which the drills are operated.

Other objects and advantages of the invention will appear from the following description taken in conjunction with the drawings, in which:

Figure 1 is a side view of a bowling ball showing the finger holes as customarily located therein;

Figure 2 is a side elevation of a fixture embodying this invention, showing the same applied to a bowling ball and positioned in readiness for the drilling of the thumb hole;

Figure 3 is a plan view of the fixture positioned as shown in Figure 2;

Figure 4 is a vertical sectional view taken substantially as indicated at line 4—4 on Figure 3;

Figure 5 is a face view of the finger hole bushings and adjacent parts, taken substantially as indicated at line 5—5 on Figure 2;

Figure 6 is a transverse detail section taken as indicated at line 6—6 on Figure 2;

Figure 7 is a side elevation similar to Figure 2 but showing the ball and the drilling fixture rotated to a position for the drilling of the finger holes.

While the invention is susceptible of various modifications and alternative constructions, the embodiment shown in the drawings and described hereinafter is by way of preferred illustration only, and it is not intended that the invention be limited thereto or thereby, but it is the intention to cover all modifications and alternative constructions falling within the scope of the appended claims.

The bowling ball shown at A in Figure 1 is provided with three holes; the large hole B accommodates the thumb of the bowler; the hole C is spaced from the thumb hole B to receive the middle finger, and the hole D receives the ring finger of the bowler's hand. To insure that the ball shall be comfortable for a particular person and that the finger holes shall not interfere with or impair his delivery of the ball these holes must be accurately spaced to fit his own hand; accordingly it is customary to determine the measurements of the hand of the person intending to use the ball before the finger holes are drilled. It is also important that the holes be accurately directed in the drilling and that they be substantially radial in the ball.

Figure 2 shows a fixture which includes a base or cradle block 1 and having a spherically formed, upwardly exposed cavity or recess 2 of a proper radius of curvature to fit a standard bowling ball. Such a ball is indicated at A resting on the cradle block 1. A shell 4, preferably formed as a casting, has a substantially hemi-spherical interior surface adapted to fit snugly over the ball A, and the lower margin of the shell adjacent a great circle of the ball is formed as a flange 5 which is split or rifted at 6 and provided with lugs 7 and 8 engageable by any suitable tightening or clamping device for securing the shell 4 firmly and frictionally to the ball during the drilling operation. In the drawings the clamping means consists of a bolt 9 threaded at one end to engage screw threads in the lug 7 and extending with clearance through an aligned opening in the lug 8. The head of the bolt is in the form of an eye 10 pivotally engaged with a cross-pin 11 in the head 12 of the clamping handle 13. This head 12 has curved edges 14 which are eccentric with respect to the pivot 11 so that swinging the handle 13 through a limited arc operates to press the lug 8 toward the lug 7 and thus tighten the flange 5 of the shell 4 about the ball A. Initial adjustment of the clamp is effected by the threaded engagement of the bolt 9 in the lug 7, and thereafter a limited swing of the clamp handle 13 is all that is necessary to tighten or loosen frictional grip of the shell on the ball.

If desired, the internal surface of the flange portion 5 and a few bearing points on the inner surface of the shell 4 may be lined with cushioning material such as chamois or rubber to avoid marring the surface of the ball by contact therewith. Such lining and cushioning elements are indicated at 15 and 16, respectively, in Figure

4. To avoid unnecessary weight, some portions of the hemi-spherical shell are cut away or cored out, forming openings 17 and 18, and a special window-opening 19 is positioned to register with the serial number usually stamped on the ball, so that, as a matter of convenience, the finger holes may be located in standard relation to this number or other identifying data.

The shell 4 is provided with an integral up-standing boss 20, which is of rectangular form and includes side walls 21 and end walls 22. The upper surface 23 of the boss 20, between the side walls 21, is of cylindrical contour concentric with the axis of the ball A, such axis being indicated at 24 on Figure 2. A guide block 25 has a curved under-surface formed to bear firmly upon the curved surface 23 of the boss, and the block is dimensioned for slidable adjustment between the upstanding side walls 21. Rotatably secured in the block 25 is a bushing 26 having a head or flange 27 which bears against the upper surface of the block 25 and having its lower end threaded to engage a nut 28. The side walls 21 are undercut to form mutually opposed arcuate ribs 29, and the nut 28 is correspondingly curved to ride under said ribs and to be drawn up into frictional engagement therewith by the threads of the bushing 26 when the head of the bushing is rotated to tighten the nut. The nut 28 is preferably square or rectangular so that it is held against rotation between the side walls 21 of the boss 20. Thus the block 25 may be slidably adjusted in an arcuate path of limited extent.

Within the bushing 26 there is co-axially secured a drill bushing 30 which, it may be understood, is inter-changeable with several similar bushings differing only in the size of the bore 31 which is to accommodate and guide a drill employed in forming the thumb receiving hole, such as the hole B in the ball A in Figure 1. With the parts disposed as shown in Figure 2, the base block 1 may be supported on the table of a drill press, not shown, so that the axis of the bushing 30 is substantially vertical and is in alignment with a drill in the spindle of the drill press, the point of such drill being shown at 32 in Figure 2. The reason for making the block 25 and the drill bushing 30 adjustable, as described, will presently appear. Within the boss 20 the wall of the shell 4 is cut away, forming an elongated opening 33 which registers with the bore 31 of the bushing 30 at all positions in this range of adjustment.

To render the bushings 30 readily inter-changeable, each of them has a notch 34 formed in its head flange 35, so that as the bushing is placed in position the notch 34 will just clear the head 36 of a stud set in the flange 27 of the bushing 26. Thus by slight rotation of the bushing 30, an inclined surface 37 adjacent the notch 34 will be brought under the head 36 with sufficient wedging action to secure the bushing 30 temporarily in position. Reverse rotation of the bushing will, of course, release it by bringing its notch 34 again into registration with the head 36 of the stud, allowing withdrawal of the bushing.

Spaced circumferentially from the boss 20 there is provided on the shell 4 a second boss 40 which supports bushings for the drills which are to form finger holes such as those shown at C and D in Figure 1. An adjustable block 41 is secured to the boss 40 and inter-changeable drill bushings 42 and 43 are inserted in suitable holes in said block 41. A base flange 44 of the block 41 is

concentrically curved about the axis of the hole which carries the bushing 42 and it fits under the retaining plate 45 secured on the boss 40. At the opposite end of the block 41 the flange 44 is formed with an arcuate slot 46 to accommodate a threaded stud 47 projecting from the boss 40. A clamping nut 48 on the stud bears against the flange 44 for securing the block 41 at any desired position in the range of swing permitted by the length of the slot 46.

With this arrangement the fixture can be readily adjusted for properly spacing the holes B, C, and D, in the ball. The distance between the hole B and the hole D will depend upon the adjustment of the block 25, which is movable with respect to the axis of the bushing 42 in the boss 40. Then the correct distance between the hole B and the hole C can be secured by swinging the block 41 through its limited range of movement and clamping it by means of the knurled nut 48. To provide for differences in the distance between the holes C and B, some of the inter-changeable bushings 42 and 43 may have their bores eccentrically located in the bushings as indicated by the dotted circle 43^a in Figure 5. As shown, the head of each of these bushings is formed with a flat side at 49 insuring that the bushings will always be inserted in a definite and predetermined relation to each other. In addition, if desired, each bushing may have a radially projecting guide pin 50 engageable in a longitudinally extending slot 51 in the wall of the bore in block 41 which receives the bushing.

In practice a sample ball is made up with several sets of drillings, having the holes C and D positioned at different distances from the hole B, and from each other, and this ball is submitted to the prospective customer so that he may determine just which arrangement of holes best fits the proportions of his own hand. Preferably the sample ball is marked with dimensions and those dimensions applying to the customer's choice are then noted. The boss 20 is provided with a scale 55 and the block 25 carries an index 56 which traverses the scale 55 in the arcuate adjustment of the block. The scale marks will correspond to distances between the thumb hole B and the finger hole D, these holes being drilled through bushings 30 and 42, respectively. The boss 40 is provided with a scale 65 and the flange 44 of the block 41 carries an index mark 66, so that adjustment of the mark 66 over the scale 65 will position the bushing 43 for locating the hole C at the proper distance from the hole B in the ball A. Figure 2 shows the block 41 adjusted at a middle position in its range. When shifted in one direction, toward the end of the scale marked R, it will provide a series of positions suitable for a right-handed bowler, and when shifted in the opposite direction, toward the end of the scale marked L, it will provide that the distance between the thumb hole B and the finger hole C shall be greater than the distance between the thumb hole B and finger hole D, as required for a left-handed bowler.

Actually it is common practice to state the distances between the holes as the distances between their adjacent edges measured along the spherical surface of the ball, and not as the distances between centers of the holes. Furthermore, the scale 55 is not at the surface of the ball, but is located on the boss 20 at a considerably greater radius; and the scale index 66 is on the swinging end of a lever. Thus the subdivisions of the scales 55 and 65 are not in actual di-

mensions of the critical distances as measured on the ball, but are proportional and can be denoted by any arbitrary system of numeration properly interpreted by an accompanying chart or instruction book, from which the correct setting of the block 25 and of the block 41 can be determined for any given set of dimensions specified for the location of the holes in the ball.

When the thumb hole has been formed by the drill, such as that shown at 32, guided in the bushing 30, the drill will be withdrawn and ordinarily a smaller drill will be substituted for making the finger holes. Then the ball A will be rotated in the recess 2 of the cradle block 1 to bring one of the bushings 42 or 43 into substantially vertical alignment with the axis of the drill press spindle, and if necessary the block 1 may be shifted slightly on the drill press table to perfect such alignment. To permit rotation of the ball through this angle, with the shell 4 clamped fixedly on it, the cradle block 1 is cut away at 3, as shown in Figure 2 and in Figure 7.

I claim as my invention:

1. A bowling ball drilling fixture comprising a shell fitted snugly over the bowling ball and supported thereby, a drill guide carried by said shell, a cradle block having an upwardly exposed recess of spherical contour with substantially the same radius of curvature as the ball, and means adjustable to secure the shell in fixed relation to the ball.
2. A bowling ball drilling fixture comprising a shell fitted over a bowling ball and supported thereby, and a drill guide slidably engaged with said shell and adjustable thereon in an arcuate path concentric with the ball to which the shell is fitted.
3. A bowling ball drilling fixture comprising a shell formed to fit over the bowling ball, said shell having a pair of opposed arcuate guideways spaced apart, and a guide block disposed between said guideways having a bore directed toward the surface of the ball to which the shell is fitted, said block being adjustable along said guideways in an arcuate path concentric with said ball, and means to lock the block against such movement at a desired position of adjustment.
4. A bowling ball drilling fixture comprising a shell formed to fit over the bowling ball, said shell having a pair of opposed arcuate guideways spaced apart, and a guide block disposed between said guideways having a bore directed toward the surface of the ball to which the shell is fitted, said block being adjustable along said guideways in an arcuate path concentric with said ball, and means to lock the block against such movement at a desired position of adjustment; the shell having an elongated opening dimensioned to register with said bore throughout the range of adjustment of the block.
5. A bowling ball drilling fixture comprising a shell formed to fit over a bowling ball, said shell having a pair of opposed arcuate guide ribs spaced apart, a block lodged upon said ribs for sliding adjustment along them in an arcuate path concentric with said ball, a curved nut slidably engaging the under-surfaces of the ribs, a flanged bushing extending through the block with threads engaging the nut and with its flange bearing against the block for clamping the ribs between the block and the nut at any desired position in the range of said sliding adjustment.
6. A bowling ball drilling fixture comprising a shell formed to fit over a bowling ball, a drill guide having two guide bores spaced apart, and means pivotally securing said guide to the shell for adjustment about the axis of one of said bores.
7. A bowling ball drilling fixture comprising a shell formed to fit over a bowling ball, a drill guide having a single bore and a drill guide having two guide bores spaced apart, said guides being secured to the shell at circumferentially spaced positions, the first guide being adjustable toward and from the other guide to vary the distance of its bore from one of the bores of the other guide, and said other guide being pivotally secured to the shell for adjustment about the axis of said one bore to vary the distance of its other bore from the bore of the first guide.
8. A bowling ball drilling fixture comprising a shell formed to fit over a bowling ball with means to secure the shell in fixed relation to the ball, a drill guide on the shell having a single bore and a drill guide on the shell having two guide bores side by side, the second guide being pivotally mounted for adjustment through a range to position either of its guide bores nearer than the other to the bore of the first mentioned drill guide.
9. In a bowling ball drilling fixture as defined in claim 8, the axis of pivotal adjustment of said second guide being coincident with the axis of one of its two guide bores.
10. In a bowling ball drilling fixture as defined in claim 5, a drill guide bushing coaxially and removably carried in said flanged bushing.
11. A bowling ball drilling fixture comprising a shell formed to fit over a bowling ball, with a drill guide having two bores side by side directed toward the surface of the ball, and a plurality of interchangeable bushings for said bores, the bushings for one bore having guide bores coaxial with said one bore and certain of the bushings for the other bore having their guide bores eccentrically disposed with relation to said other bore.
12. In the bowling ball drilling fixture defined in claim 11, said other bore and its bushings having inter-engaging, non-circular features requiring each bushing to be inserted in the bore with its eccentricity always in the same direction.
13. A bowling ball drilling fixture comprising a shell with means to clamp it into a bowling ball, said fixture including a drill guide having a single bore and a drill guide having two guide bores spaced apart, said guides being circumferentially spaced from each other and relatively adjustable on the shell, and a cradle block having an upwardly exposed recess of spherical contour with substantially the same radius of curvature as the ball, said ball being rotatably adjustable on said cradle block to align any of said bores with a drill of a drilling machine.
14. A bowling ball drilling fixture comprising a shell with means to clamp it to a bowling ball, said fixture including a plurality of drill guides carried by the shell in predetermined relation to each other, and a cradle block having an upwardly exposed recess of spherical contour with substantially the same radius of curvature as the ball, said ball being rotatively adjustable on said cradle block to align a selected drill guide with the drill of a drilling machine.

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