Sept. 4, 1951 J. J. BASSI 2,566,511

MEASURING DEVICE FOR BOWLING BALLS

Filed Jan. 27, 1948 2 Sheets-Sheet 1

Fig. 1.

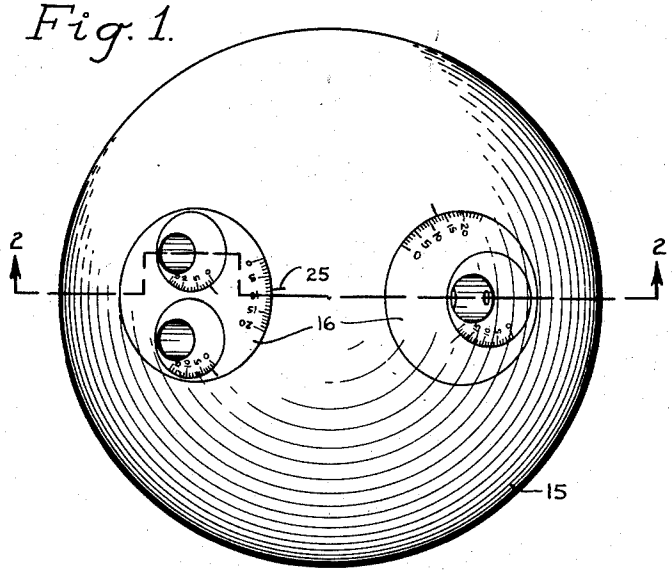
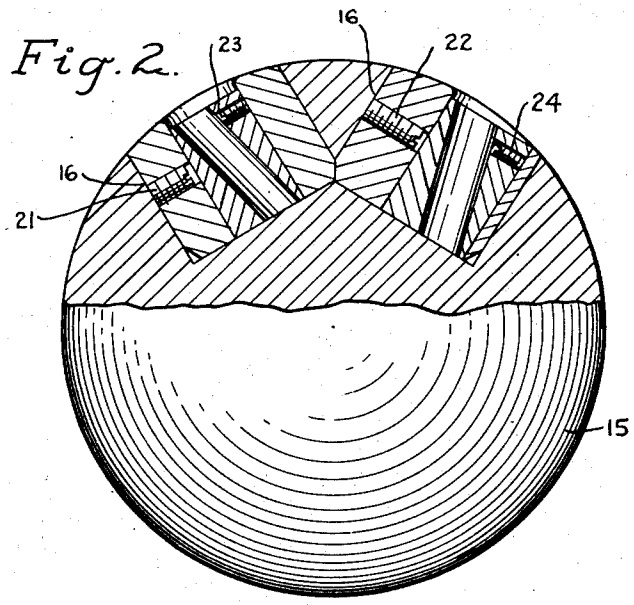


Fig. 2.



INVENTOR.
JULIUS J. BASSI
BY
Jerome W. Paxton
AGENT

Sept. 4, 1951 J. J. BASSI 2,566,511

MEASURING DEVICE FOR BOWLING BALLS

Filed Jan. 27, 1948 2 Sheets-Sheet 2

Fig. 3.

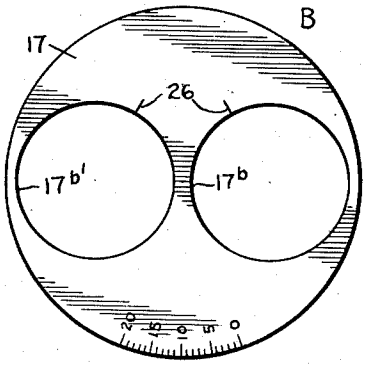


Fig. 4.

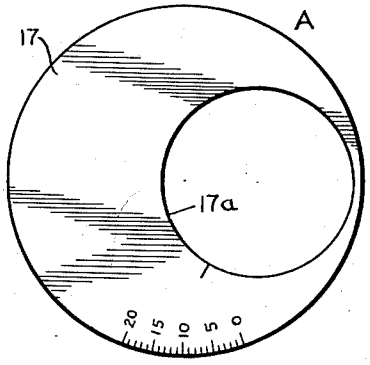


Fig. 5.

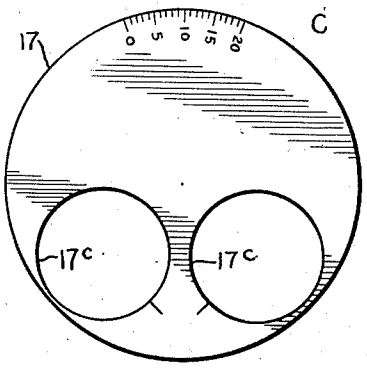


Fig. 6.

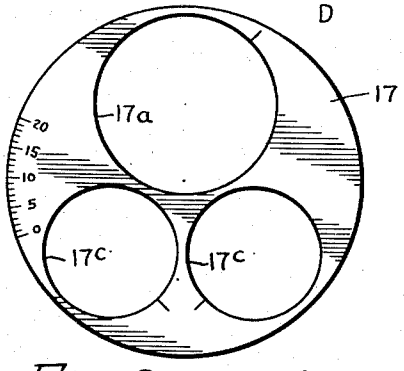


Fig. 7.

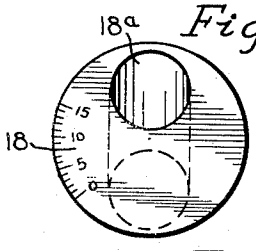


Fig. 9.

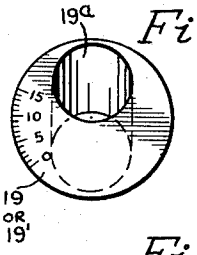


Fig. 11.

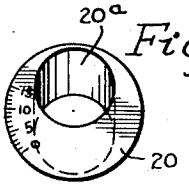


Fig. 8.

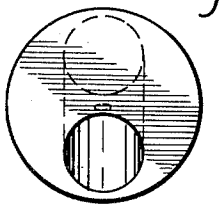


Fig. 10.

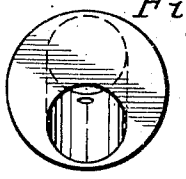
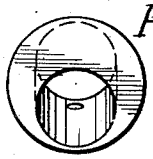


Fig. 12.



INVENTOR.
JULIUS J. BASSI
BY
Jerome W. Paxton
AGENT

Patented Sept. 4, 1951

2,566,511

UNITED STATES PATENT OFFICE

2,566,511

MEASURING DEVICE FOR BOWLING BALLS

Julius J. Bassi, Monrovia, Calif.

Application January 27, 1948, Serial No. 4,633

8 Claims. (Cl. 33—174)

1

This invention relates to the art of "tailoring" bowling balls and pertains more particularly to balls of this type which utilize gripping holes; balls of this type are generally used for bowling the game of ten pins with the ball having a circumference of not exceeding 27 inches and generally having a diameter of approximately 8½ inches.

Bowling balls of these dimensions are generally equipped with gripping holes or openings which may be simply a pair of openings, one for the thumb and the other for one of the fingers, or the finger holes may be in the form of a pair of holes, these holes being used for the purpose of delivering the ball as well as for exercising the control of it during the delivery to obtain a desired movement of the ball down the alley; some bowlers deliver the ball to provide a straight run, while others prefer to develop a "hook," these being developed more particularly by the manner in which the ball is delivered to the alley.

The space between the thumb and the finger hole or holes is known as the "grip" or "span." Due to the fact that it is rare that two bowlers have hands and fingers of exactly the same dimensions, and the fact that the devotee of the ten pin game utilizes the balls supplied by the alley keeper, who necessarily provides a limited assortment, proficiency of the devotee may be affected by being required to use a ball in which the gripping holes do not properly fit his bowling hand; bowling alley keepers provide an assortment of balls, but could not possibly carry a range of gripping dimensions such as would provide a proper fit for each user. As a result, bowlers who desire to obtain desired proficiency have developed the practice of having their preferred ball especially prepared for them. This involves more or less of a "tailoring" procedure, and involves generally the use of a ball especially prepared for the purpose of providing the fitting or "tailoring" dimensions, from which the actual service ball is then prepared with the grip or span presented in accordance with the measurements, etc. provided by the fitting or tailoring operation.

The present invention pertains to an operation such as that described, and is a development which makes it possible for an alley keeper to have at hand the structural features that form the invention and thus enables a bowler to obtain the grip or span measurements, etc. which will most successfully produce a desired action of the ball as the result of his delivery.

A number of structures for this purpose have heretofore been contemplated and while some of

2

these have reached commercial practice, they are of various types, but all or a majority of them carry the condition that the ball used for the tailoring operation is not properly fitted to permit the ball to receive a true exemplification of the ball in actual service conditions. This is due to the fact that in such prior devices the arrangement is such as to materially affect the balance of the ball, so far as the weight factor is concerned, the result being that in attempting to use the "dummy" ball, by delivering it down the alley, the action becomes more or less of the order of a "loaded ball," viz: a ball which has its weight unequally distributed therein, a condition which tends to aid in producing a deeper "hook."

Under modern practice, most bowling balls are made of a composition material, and the gripping holes then bored therein; if the manufacturer has an accurate knowledge of the particular dimensions required, he can fashion the gripping holes to the exact conditions that are required.

The present invention is designed to give these dimensions, and by an assembly such that the "dummy" ball can be used on the alley with practically the proper weight conditions, in that the "loaded" effect is practically eliminated. The operator is thus able to deliver the dummy ball down the alley under conditions approximating those in actual service, thus making it possible to not only test the gripping conditions, but also to note the effect of his delivery in observing the path of travel of the ball over the alley; the delivery need not be made with the ten pins in position, since the path of the ball traveling toward the position of the head pin can be accurately observed and determination made as to whether the particular grip then present produces the ball travel path that the user desires.

These conditions are produced in the present invention by setting up within the dummy ball, conditions that are analogous to those present within the service ball, but with the conditions in such form that adjustments can be made in the grip or span, the relative location of the holes and also the angularity of the holes, such adjustments being provided without materially changing the weight distribution factor that is needed if the dummy ball is to set up replica characteristics of the service ball.

The dummy ball is itself a service ball provided with a pair of spaced apart circular openings, each of which is of greatly increased diameter as compared with the gripping holes, a condition

which would normally disturb the balanced weight conditions. Each of these openings is designed to receive a primary plug which fits the opening and which is provided with one or more openings therethrough in the direction of the plug axis, so that, in effect, the plug has the characteristics of a cylinder, the opening or openings of which are circular in contour but generally positioned eccentric with respect to the axis of the plug or cylinder. One of the plugs may represent the thumb hole portion of the grip while the other may carry the finger hole or holes, as the case may be; since the plugs can be rotated about the plug axis, the openings therein can be shifted angularly and thus provide for variations as to the distance of the span. Each of the plug openings is designed to receive a secondary cylindrical plug, with the latter carrying a hole which is assumer to become the gripping hole of the service ball. In other words, the content of each of the major openings of the ball is formed of a secondary cylinder or cylinders within a primary cylinder, thus filling the major hole with the exception of the hole or holes which represent the gripping holes; and since each cylinder is adjustable about its own axis, it is possible to not only provide for the adjustment of either cylinder, but of one cylinder relative to another, so that a very accurate gripping hole location can be developed and located to provide for an exact positioning of the holes which is best fitted to suit the needs and the desires of the user, with the result obtained by substantially leaving the ball under practically normal conditions with respect to weight distribution.

With proper calibration of the several cylinders employed to enable the larger primary cylinder to have its calibrations cooperate with a major calibration carried by the ball, and with the primary cylinders also carrying a major calibration for each of its openings to cooperate with calibrations on the secondary cylinders, it is possible to provide an accurate record of the selected grip assembly such as will enable the manufacturer to duplicate the set-up in a similarly-equipped assembly, and thus have a definite and accurate model of the ball he is to produce.

Since it is possible to provide a plurality of the secondary plug formations differing slightly one from another, but all designed to fit an opening within the primary cylinder, it is possible, through the use of a set of cylinders, to provide the proper measurement characteristics for practically any particular grip or span, with the latter practically "tailored" to the bowling hand of the user. In practice, an assembly such as this is readily employed, the salesman first testing out the secondary cylinders to obtain the best suited specific gripping hole formation, with the selected secondary cylinder then introduced into the larger primary cylinder, after which the latter is introduced into the opening in the ball. Then by adjusting one or more of the cylinders relative to each other and to the ball, the dimensions of the selected span may be accurately obtained, after which each of the cylinders is tightened by a screw so as to preserve its position. When this is done, the user can then test the ball as by swinging the latter, and can even roll the ball down the alley to observe its course to thus test the results of the previous grip-developing action. If not satisfied with the course, it is possible to change the setting of a cylinder or cylinders and provide a new test and in this way gradually produce the completely "tailored" effect. On completion of the testing, a record is made of the calibrated results, and the record then forwarded to the manufacturer for the production of the ball.

To these and other ends, therefore, the nature of which will be better understood as the invention is hereinafter further disclosed, said invention consists in the improved constructions and combinations of parts hereinafter more fully described, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views—

Figure 1 is a plan view of the bowling ball shown as equipped with selected formations embodied in the present invention.

Figure 2 is a side elevation, partly in section, the latter being taken on line 2—2 of Fig. 1.

Figure 3 is a plan view showing one form of a primary plug cylindrical insert, the view showing a pair of openings to receive secondary inserts.

Figure 4 is a view similar to Figure 3, the view showing but a single opening.

Figure 5 is a view similar to Figure 3, but with the openings eccentrically positioned relative to the plug axis.

Figure 6 is a view similar to Figure 3 with the view showing three openings, the view combining the openings of Figures 4 and 5.

Figures 7 and 8 are, respectively, top and bottom plan views of a secondary cylindrical insert having dimensions to fit, for instance, in the opening of Figure 4.

Figures 9 and 10 are views similar to Figures 7 and 8, but with dimensions such as would fit within the openings of Figure 3.

Figures 11 and 12 are views similar to Figures 7 and 8, but dimensioned to fit within the openings shown in Figure 5.

Owing to the nature of the service to be provided by the invention, the question of specific dimensions of parts is of importance. However, the dimensions to be indicated herein are illustrative only, since the invention may be varied or expanded within certain limits to enable a greater and more detailed tailoring action in obtaining the exact grip conditions for fitting the individual hand formations of an individual bowler. The dimensions given will provide an assemblage of elements such as will enable "tailoring" to be provided in a large majority of tailoring activities, but it will be understood that, if desired, certain variations, which will be referred to hereinafter, may be added to increase the range so as to practically include all of such activities.

While the "tailored" assemblage is so designed as to permit delivery of the ball "down the alley," even with the pins in proper position, the assembly is not designed for regular bowling purposes, since the conditions set up by the impact of the ball with the pins during regular bowling would tend to disturb the adjustments that are provided. Hence, the assembly referred to is designed more particularly for use as a "tailoring" assemblage, from which it is possible to obtain the accurate dimensions needed in order to produce a service ball with the exact dimensional characteristics developed through the tailoring operation. In practice, the service ball manufacturer will presumably provide the assembly for distribution to agencies—who may be bowling alley keepers—to be used for the purpose of obtaining the desired accurate dimensions, recording the

same and supplying these to the manufacturer for use in producing the "tailored" service ball; the information can be given in any desired way, a simple arrangement being to calibrate parts of the assembly, enabling the agent, when giving the information to refer to the coacting calibrations, thus permitting the manufacturer to duplicate the desired setting, and from this fashion the service ball.

The ball, indicated at **15**, is, in effect, a replica of a service ball with the exception of the gripping holes of the latter. Instead of the gripping holes, the ball **15** is provided with a pair of oversize circular openings **16**, each of which has a diameter of 2¾ inches, and a depth of 2¼ inches, the openings being of uniform diameter throughout the depth. The axis of the openings extends radially of the ball, as indicated, for instance, in Figure 2, and, in practice, the position of the openings is such that on the surface of the ball, the opposing contours are spaced apart a distance of approximately 1¾ inches. These dimensions are illustrative only. As indicated in Figure 2, these dimensions will cause a lower zone of each of the openings to overlap; in practice, this condition is met, as presently indicated.

Each opening **16** is designed to receive a plug, the contour dimensions of which are similar to those of the openings. The inner end of the plug is planar with the face extending normal to the axis of the opening, while the opposite or outer end has a surface of spherical type with its curvature conforming to that of the ball itself; hence, when the plug is in position, it serves not only to fit within the opening **16**, but also forms a part of the spherical surface of the ball. The inner ends of the primary plugs are champfered as in Figure 2 to prevent interference.

In practice, the assembly includes a plurality of such primary plugs, four being shown as usable within the assembly, these being shown in Figures 3 to 6, inclusive. These plugs are each provided with one or more openings extending in the general direction of the plug axis, the arrangement of the opening or openings varying as between plugs. These plugs are indicated generally at **17**, with the form shown in Figure 4 being designated as A; that in Figure 3 indicated as B; the form of Figure 5 is indicated as C and the form shown in Figure 6 is indicated as D; as will be apparent, the form D is practically a combination of the openings of forms A and C.

In practice, the diameter of the opening in form A is 1½ inches, and extends through the cylinder with its axis preferably extending on a radius of the ball. The single opening therein, indicated at **17***a* is arranged eccentric to the axis of the plug so that its contour extends substantially $\frac{1}{16}$ inch from the plug periphery, the opening thus extending slightly beyond the axis of the plug. This plug, when completed, is primarily designed to produce the grip hole for the thumb of the bowler; it will be understood, of course, that if this plug **17** be rotated arcuately about its axis within an opening **16**, the opening **17***a* will be shifted, the arrangement permitting a shifting action sufficient to bring opening **17***a* diametrically opposite to the position shown in Figure 4, or any position therebetween, each shift thus varying the distance between the axis of this opening **18***a* and the axis of the other opening **16**.

It will be understood, of course, that while opening **17***a* is being shifted through the arcuate path and thus apparently varies the relation set up by the axes of the two openings **16**, this shift, in actual fact, does not provide a change such as this in the completed ball assembly, since the particular position of the axis of opening **17***a* relative to the axis of the other opening **16** is immaterial, the shifting simply varying the distance between the two axes.

In form B, two openings **17***b* and **17***b'* are shown, the axes of these openings being located on a diameter of the plug and extending in parallelism to each other and to the axis of the plug; the openings are practically separated a distance of ⅛ inch between contours, with the contour of an opening approaching but spaced from the plug contour by about $\frac{1}{16}$ inch; opening **17***b'* may be about $1\frac{7}{32}$ inch and opening **17***b* about $1\frac{9}{32}$ inch in diameter, respectively, or may be of similar diameter—about 1½ inch—in which case a lesser number of secondary plugs will be needed, the openings extending through the plug and being of uniform diameter from end to end. This plug is designed more particularly for use in providing a finger grip which utilizes two fingers of the hand; the difference in dimensions of the openings, when present, enables finer tailoring by permitting ready selection of secondary plugs to meet the fact that the two fingers employed are generally of different size, and thus permit of differentiation in this respect; in addition, the possibility of selection permits closer tailoring when form B is being used with form D, as presently explained. As with form A, the plug of form B may be shifted angularly, although, generally, in practice, the range of shift would be small and more or less dependent upon the characteristics of the hand of the bowler.

The form C, as in form B, is provided with a pair of openings **17***c*, these openings, however, while having their axes on a plane which extends parallel with a diameter of the plug, are thus more or less eccentrically disposed relative to the plug axis; like openings **17***b*, the axes of openings **17***c* extend in parallelism to each other and to the axis of the plug. Openings **17***c* are $1\frac{1}{16}$ inch in diameter and do not extend completely through the plug, having a depth of substantially 2 inches; the two openings are spaced a short distance apart as between contours and have their respective contours extending to practically $\frac{1}{16}$ inch from the periphery of the plug. This form, like form B, can be shifted angularly, but the range of shift is, in practice, short, since this form is to provide accommodations for a pair of fingers of the hand and especially of a small or large hand, it being apparent, of course, that the openings **17***c* may be shifted to a position diametrically opposite that shown in Figure 5 by a simple angular movement of the plug within its opening **16**.

Form D practically combines the holes of forms A and C, thus providing a three-hole plug formation, all of the openings, of course, being eccentric relative to the axis of the plug. This form is an optional combination form, designed to be used with other forms to meet specific conditions. The dimensions of the openings are similar to those of **17***a* and **17***c*, respectively. For instance, the opening **17***a* may be used alone in combination with one or both openings of form B to meet a particular condition; or the openings **17***c* of form D may be used with an opening **17***b* or **17***b'* of form B, with the latter forming the thumb hole setting for a lady's ball tailoring. Form D may be omitted from the supplied tailoring assembly.

The openings of these forms, as indicated by

their dimensions are circular and have their axes extending parallel with the axis of the plug which provides the form, excepting the opening 17*a*, as previously explained. As indicated by the dimensions, the opening do not serve as the gripping holes of the ball. Instead, they are designed to receive smaller plugs each of which carries a gripping hole. In the tailoring assembly, through which is made active the invention, there are a large plurality of these smaller plugs, with these formed in series, each series being designed to fit within one of the openings of the four forms shown, so that each of these smaller plugs is of circular contour and of uniform diameter from end to end and with a length sufficient to reach to the bottom of the opening in which they are positioned. The three series are indicated in Figures 7 to 12, inclusive, the forms shown in Figures 7 and 8 being adapted to be used with the opening 17*a* of form A, the plugs of Figures 9 and 10 being adapted to be used with the openings 17*b* or 17*b'* of form B, and the plugs of Figures 11 and 12 being designed to cooperate with the openings 17*c* of form C. Of the pairs of plugs shown, the first mentioned of a series presents a top plan view of the plug with the second member of the series presenting a bottom plan of the same plug. These smaller or secondary plugs have a characteristic in common in that each includes an opening which extends diagonally from top to bottom on a diameter of the plug, with the opening of uniform diameter. The plugs in question are indicated, respectively, at 18, 19, 19' and 20, with the openings thereof indicated, respectively, at 18*a*, 19*a* and 20*a*. As indicated, the openings are of uniform diameter from end to end and each has its open end contour reaching to within a short distance of the periphery of the plug, and since the opening extends diagonally through the plug, it will be understood that this nearness of the contour at the top of the plug is diametrically opposite the similar zone on the bottom face of the plug; Figures 7 and 8 will illustrate the condition.

This diagonal direction of length of the openings is being referred to as the "pitch" of the opening, and since the opening itself provides a gripping hole, it will be understood that each of the gripping holes is fashioned with this pitch characteristic. To illustrate, the pitch may extend at an angle of approximately five degrees relative to the axis of the plug itself.

Considering the plug 18 which refers to the plug designed for use as the thumb grip, the assembly will be made up, so far as this series is considered, of eleven plugs, which differ from each other in that the opening 18*a* varies in diameter as between each of the plugs. For instance, the diameters of the openings of this series will range in dimensions from $^{7}0/_{64}$ to $^{8}0/_{64}$ inches, the plugs thus differing from each other as to the diameter of the openings at the rate of $1/_{64}$ of an inch. As will be understood, the particular plug of the series which is selected, will be that in which the diameter of the opening provides the desired fitting relation with the thumb of the user; since the plugs distinguish by variations of such small amount, it is apparent that it is practically possible to fit the thumb of the bowling hand of practically all bowlers—if deemed essential, the range may be increased by the addition of additional plugs to the series with the diameter dimensions either increased or diminished relative to the dimensions noted.

The secondary cylinders shown in Figures 9 and 10 are arranged in two series if openings 17*b* and 17*b'* differ in diameter—if of same diameter, a single series is sufficient—the views being illustrative of both series, and bear the reference characters "19 or 19'," the two series differing from each other generally in the diameter of the plug, to thereby fit the openings 17*b* and 17*b'* which differ from each other slightly as to the diameter of the openings, 19 indicating the plug for opening 17*b* and 19' indicating the plug for opening 17*b'*. The series of plugs 19 are five in number, and have the opening 19*a* formed respectively with diameters of $^{6}5/_{64}$ to $^{6}9/_{64}$ of an inch, inclusive. The series 19' is eight in number, with the diameter range of the openings of the series extending from $^{5}7/_{64}$ to $^{6}4/_{64}$ of an inch, respectively; the greater number of dimensions of the latter series is due to the fact that selection may be made between several fingers of the hand, so that a greater range is needed. Where openings 17*b* and 17*b'* are of equal diameter, the range of the single series then required would include the ranges of both series 19 and 19'.

The secondary cylinders shown in Figures 11 and 12 are designed for use with the openings 17*c* of forms in Figures 5 or 6, these cylinders having their opening diameters as ranging from $^{3}2/_{64}$ to $^{5}6/_{64}$ of an inch so that the series includes practically twenty-five of the cylinders, the range being large to accommodate for various sized fingers.

As will be understood, the specific dimensions given are more or less illustrative, and the assemblage which produces the various setting may have a greater or less number of members than those indicated above. In fact, the invention contemplates the possibility that the dimensions of openings 16 may be increased in diameter, a condition which would enable the use of secondary cylinders having an increased pitch angle, an increase of diameter of opening 16 by about .4 inch coupled with corresponding changes in the diameters of the plugs and their openings, will enable a considerable variation in the pitch of the openings of the secondary cylinders; if desired, the assemblage may be increased by the addition of other series of plugs presenting different pitch conditions.

In practice, the secondary cylinders shown in Figures 7 to 12 are first considered, through try-out methods, by selectively fitting the thumb to one of the thumb series in which the opening 18*a* best fits the thumb of the bowling hand; the same type of try-out is provided for the finger holes to be fashioned, a selection being made from the single or two series which will best provide a set up for the desired grip by the customer. This, of course, involves a determination as to the preferred type of grip—two holes or three holes—which the customer desires, the selection of primary cylinder then being made to provide for the proper setting for the ultimate arrangement. The selected form or forms are then positioned within the openings 16 of the ball, and the selected secondary cylinders then introduced into the openings of the selected primary cylinders. When thus positioned, it will be possible to set up the exact gripping span that is desired by simply arcuately adjusting the positions of the primary cylinders relative to each other, the secondary cylinders being properly positioned by adjustment within the positioned primary cylinders.

When a tentative fit is secured in this manner, the cylinders may be locked in their adjusted

positions by the use of suitable set screws, each primary cylinder carrying threaded openings 21 which extend practically perpendicular to the axis of the cylinder, each opening 21 being provided with a suitable adjusting screw 22 which can be readily tightened against the perpihery of the ball opening to thereby lock said cylinder against angular movement. In addition, each of the secondary cylinders is provided with a laterally extending threaded opening 23 which carries a set screw 24; in practice, the set screws 22 and 24 can be adjusted from the interior of the opening of the plug, with screw 22 tightened against the wall of the ball opening and with the screw 24 tightened against the wall of the primary plug opening within which the secondary plug is mounted, thus securing both primary and secondary cylinders against angular movement relative to each other and to the ball. The assembly thus produced can be swung by the user or even delivered down the alley. If not completely satisfactory, the securing screws can be loosened and further angular adjustment made to so change the gripping factors as to enable a better fitting action, after which tightening of the screws will permit the re-testing of the prepared ball.

If desired, and such condition is preferred, suitable calibrating indicia may be provided on the different members. For instance, the ball may carry a major indication 25 at a desired point relative to each of the openings 16. The peripheral zone of aech of forms A to D may then be provided with a selected type of calibration by which it is possible to differentiate different angular positions relative to the major indication 25; at the same time, each of these forms may also have a major indication 26 arranged relative to the opening or openings of the plug, said major indications being adapted to cooperate with a particular type of peripheral zone calibration carried by each of the secondary cylinders. All calibrations, of course, will be on the external face of the different members. Obviously after the selected cylinders have been properly positioned and anchored, it will be possible to produce a brief statement showing the particular registrations provided by the calibrations and by providing individual indications for the series members; a statement such as this forwarded to the manufacturer equipped with a duplicate tailoring assembly will enable the latter to place his assembly in exactly the relation indicated by the statement and thus enable him to fashion the service ball with the exact gripping conditions that are desired by the customer.

As will be undersood, many different combinations and arrangements can be provided from the various plugs shown and described.

For instance, if a two-hole service ball is to be provided, one of the openings 16 may utilize the form A type of primary cylinder to produce the thumb hole, while either of the openings of form B may be used to provide the other hole, the selected opening being dependent upon the particular member of the series of Figures 9 and 10 which will supply the proper finger grip. Cylinders A and B can be moved arcuately to provide the proper span, after the selected secondary cylinders have been placed in the primary cylinders, thereby enabling the desired span to be accurately produced between the pair of selected secondary cylinders. In addition, the arcuate shifting of the secondary cylinders will permit of any desired pitch condition with respect to and after the span dimensions have been properly

obtained. Instead of using form B, one of the openings of form C may be used as the second primary cylinder; the selection between forms B and C in this respect will, of course, be dependent upon which of the secondary cylinders presents the proper diameter to fit the finger which is being used for the grip, so that if the B and C forms are being used, the secondary cylinder will be from the series indicated in Figures 11 and 12. When so used, the primary cylinder can be moved arcuately to produce the desired span dimensions; the selection as between the B and C forms obviously will depend upon the dimensions of the opening of the secondary cylinder which will best properly fit the finger of the user.

Where the ball is to be of the three-hole type, form B or form C may be utilized with form A to provide the proper arrangement, the arcuate adjustment for the span dimensions being mainly with the form A cylinder, the adjustments of forms B and C in such case being more or less limited, due to the fact that the two finger openings would be located side by side to conform with the arrangement of the fingers of the hand. With a very small hand—such as a lady's hand—form D (openings 17c) may be used with form B (with either opening acting as the thumb hole) as above indicated. The same combination may be used where the hand of the male is too small to come within the general practice.

Where in such tailoring only one of a plurality of openings of a primary cylinder is used, the unused opening may be filled with a secondary cylinder appropriate to the dimensions of the opening for the purpose of reducing the weight variations to a minimum. This action is taken in order to permit the ball to be given the actual try-out through delivery to and traversing the bowling alley. It will be understood, of course, that when reporting the tailoring dimensions to the manufacturer, only the active cylinders will be included.

As will be understood, the members of the assemblage may be given an individual designating indication of suitable type, thus enabling the agent to readily identify the particular cylinders and elements which may be used in producing the active assembly; any particular identification means may be employed in this respect, it being understood, of course, that the agent and the manufacturer have knowledge of the meaning of the indication. Similarly, the particular form which the calibration means may take may be of any desired type, the specific form indicated above and disclosed in the drawings being simply illustrative of one form which may be utilized. It will be understood that when the tailoring operation has been completed and the selected cylinders properly positioned in the ball, the member indications, plus the registering calibration means indications, will be used in producing the statement that is supplied by the agent to the manufacturer and from which the latter can readily assemble a similar active assemblage, if desired, to give accurate dimensional characteristics that are needed for the production of the tailored service ball.

While the assemblage is made up of a large number of individual units, each of which is distinguished in some way from the remaining members of the assemblage, thus enabling selection of members to produce the individual personalized gripping zone which is to become the actual gripping zone of the service ball, the in-

dividuality of the members is such as to produce a cooperative relationship amongst the members, in that each may serve as an active member of a tailored ball through the selection activities which first considers the actual dimensions of the thumb or fingers of the customer to permit of the proper fitting of the gripping holes to the individual digits of the hand, this information being secured from the series of secondary cylinders described, then using these for the proper selection of the primary cylinders which are to be employed as the mountings for the secondary cylinders, and then obtaining the gripping span dimensions by relative adjustment of the primary cylinders with any needed adjustment of secondary cylinders to provide the accurate desired form and relation of the gripping holes within the gripping zone of the proposed service ball.

The cooperative relationship of the members is made manifest through the fact that while only a few of the individual members of the assemblage are used actively in the tailored formation, yet each is a potential member of such active assemblage, although it may be for a different customer. The assemblage thus has characteristics similar to those presented in any of the well known arts, such, for instance, as a font of type, in that the primary cylinders are of similar dimensions, and that the secondary cylinder elements of a series also have similar dimensional characteristics, thus permitting selectivity to provide for the proper complete assemblage of the selected members for active use in the specific tailoring operation.

The underlying purpose for the particular form of the assemblage and its many members is to permit the openings in the ball to be equipped in such manner as to practically produce a similar weight factor condition in the ball, regardless of the particular selection which may be used in producing the final tailored assemblage. Hence, it is possible to utilize the active assemblage in a manner similar to that of a service ball which carries the gripping zone formation as developed by the assemblage, and enables the customer to make any necessary tests of the ball other than actual service conditions—as by delivering the tailored assemblage over the bowling alley, but preferably without the pins being present, since the impact of the ball with the pins could possibly disturb the adjusted positions; since the customer is able to determine the probable effect of the assemblage delivery by the course taken during its traversing passage over the alley, the equivalent of actual service conditions is presented as a "try-out" activity.

As will be understood, the elements composing the assemblage are of simple form, and yet provide the material which sets up the non-loaded character of the ball, being formed of the ball material; they are readily manufactured, and, serve more in the nature of gauges than for actual service conditions, thus enabling the assemblage to provide a true and accurate tailoring development operative in simple manner and yet capable of producing extremely accurate results in connection with the service ball.

While I have herein shown and described an assemblage for this particular purpose, it will be understood that changes and/or modifications therein may be found desirable or essential in meeting the exigencies of service and/or individual preferences of the user for which the assemblage is being tailored; I therefore reserve the right to make any and all such changes

and/or modifications therein as may be found desirable or essential insofar as the same may fall within the spirit and scope of the invention as expressed in the accompanying claims, when broadly construed.

I claim:

1. In tailoring assemblages for obtaining the grip characteristics for custom-made bowling balls, a grip ball having a pair of spaced openings of similar diameter and each extending inward in radial direction of the ball with each opening of circular contour and of uniform diameter, each opening being dimensioned oversize as compared with gripping hole dimensions, said openings forming individual zones within which tailoring of the gripping hole is developed, a plurality of individual primary plug members for and having the contour and dimensions of said ball openings and each having at least one circular opening oversize as compared with the gripping hole dimensions with the opening extending in the direction of length of and eccentric to the plug axis to constitute each member as a primary plug cylinder, and a plurality of individual secondary plug elements of circular peripheral contour for each primary cylinder opening and each dimensioned to fit within its primary plug cylinder opening, each secondary plug element being formed with an opening extending lengthwise therethrough and eccentric to the axis of the plug element and adapted to serve as a gripping hole to thereby constitute the secondary elements as individual secondary cylinders adapted to be mounted interchangeably within primary plug cylinder openings, each of the primary and secondary cylinders being mountable for rotatable adjustment about its axis, said primary and secondary plug cylinders each having marginal calibration indications cooperative with complemental indications carried by the margins of the openings for receiving the cylinders to thereby provide tailoring indication data for the production of the service ball, whereby the grip ball may be prepared for "try-out" conditions by selectively equipping the ball openings each with a primary plug cylinder with the latter selectively equipped with a secondary plug cylinder to thereby produce the try-out gripping holes and their characteristics with the grip ball approximately simulating the weight, dimensions and balance of the service ball being tailored.

2. A tailoring assemblage as in claim 1 characterized in that the primary plug cylinders comprise a cylinder of constant dimensions and having an oversize circular opening the axis of which extends in the direction of a radius of the ball and is displaced relative to the axis of the plug, with the contour of the opening approaching but spaced from the contour of the plug.

3. A tailoring assemblage as in claim 1 characterized in that the primary plug cylinders each comprises a cylinder of constant dimensions and having a pair of spaced apart circular openings, the axes of which extend parallel with the plug cylinder axis and each displaced from such plug cylinder axis a distance sufficient to locate the periphery of each of the openings as approaching but spaced from the peripheral contour of a cylinder.

4. A tailoring assemblage as in claim 3 characterized in that the axes of the openings lie on a plane parallel to a diameter of its plug cylinder.

5. A tailoring assemblage as in claim 1 characterized in that the number of secondary plug

elements is such as to provide a plurality of series of elements in which the plug elements of an individual series are of uniform diameter with the plug elements of one series differing in diameter from those of the remaining series.

6. A tailoring assemblage as in claim 5 characterized in that the length of the diameter of the openings of each of the elements of a series differs from the length of the similar diameters of each of the remaining elements of the series.

7. A tailoring assemblage as in claim 1 characterized in that the opening of each of the secondary elements is of uniform diameter from end to end of the element with the direction of length of the opening extending diagonally relative to the element axis and with the axis of the opening crossing the element axis, the opposite ends of the opening each having its contour approaching but spaced from the contour of the element and with the axis of the opening traversing a diametrical plane which includes the axis of the element to thereby permit arcuate adjustment of the element to additionally provide for pitch tailoring.

8. A tailoring assemblage as in claim 1 characterized in that the primary plug cylinders each

comprises a cylinder of constant dimensions and having a pair of spaced apart circular openings the axes of which extend parallel with the plug cylinder axis and displaced from such plug cylinder axis a distance sufficient to locate the periphery of each of the openings as approaching but spaced from the peripheral contour of a cylinder, and further characterized in that the axes of the openings lie on a plane extending through a diameter of the plug cylinder.

JULIUS J. BASSI.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,080,307	Sondheimer	Dec. 2, 1913
2,188,868	Shepard	Jan. 30, 1940
2,207,404	Hinklyey	July 9, 1940
2,372,958	Keith	Apr. 3, 1945
2,372,959	Keith	Apr. 3, 1945
2,393,026	Dietz	Jan. 5, 1946
2,423,164	Williams	July 1, 1947