June 16, 1964 A. JESONIS 3,137,074

GRIP FITTING BALL GAUGE

Filed Sept. 7, 1962 2 Sheets-Sheet 1

Fig. 1

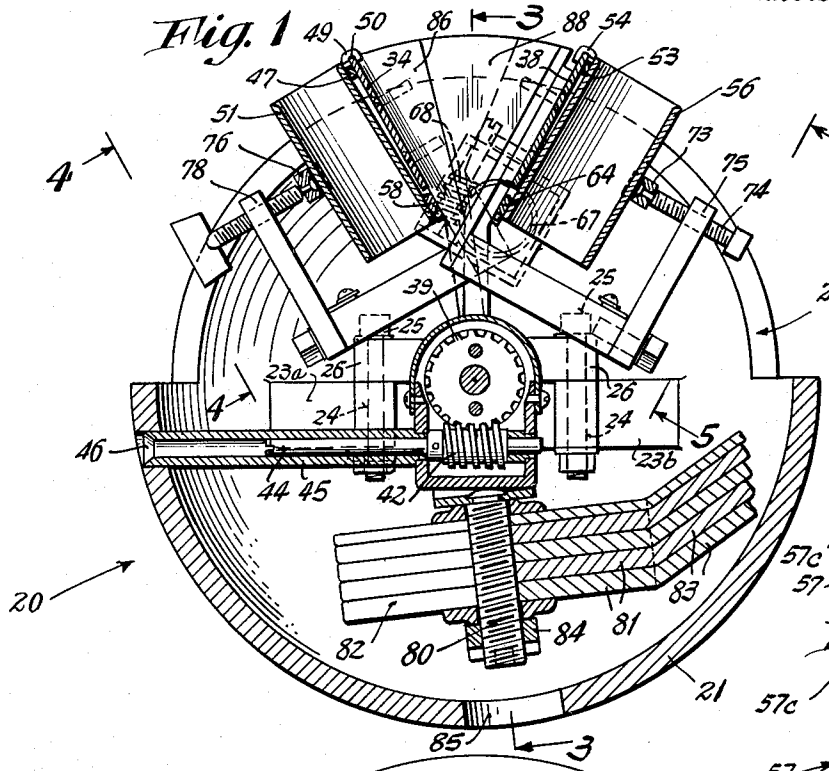



Fig. 12

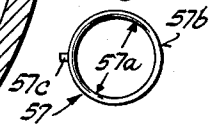



Fig. 13

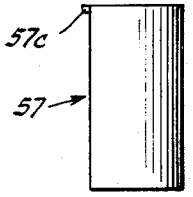
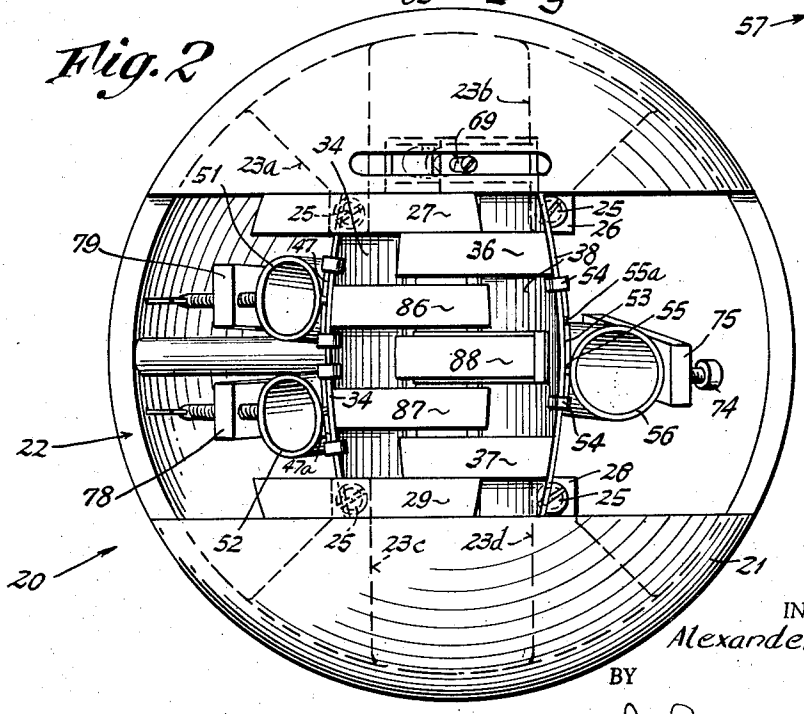



Fig. 2




INVENTOR.
Alexander Jesonis
BY
Johnson and Kline
ATTORNEYS

June 16, 1964 A. JESONIS 3,137,074

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Fig. 3

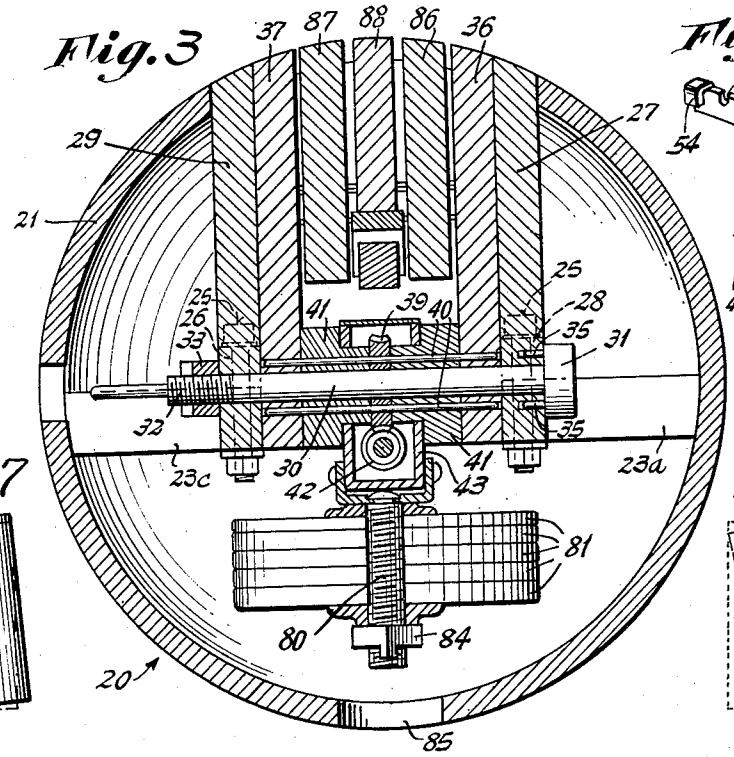



Fig. 10

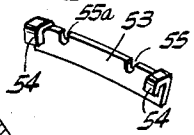



Fig. 11

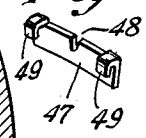



Fig. 7

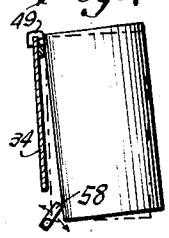



Fig. 9

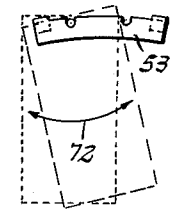



Fig. 4

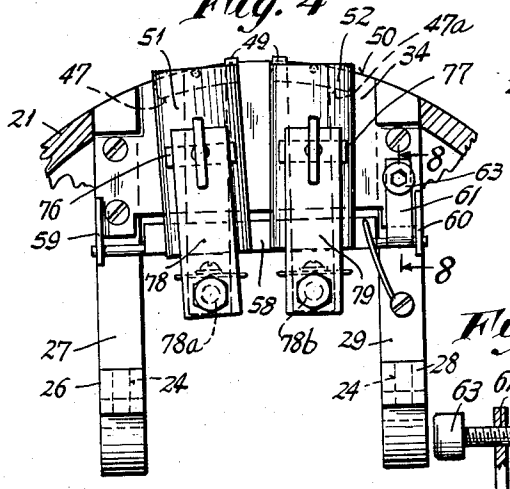



Fig. 5

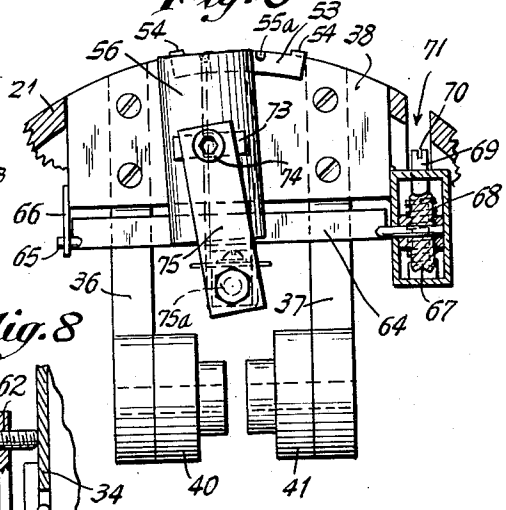



Fig. 8

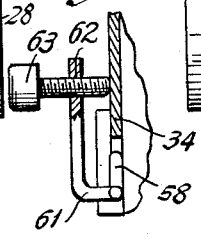
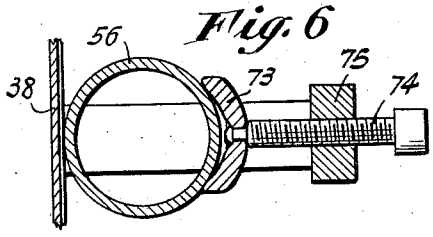



Fig. 6




INVENTOR.
Alexander Jesonis
BY
Johnson and Kline
ATTORNEYS

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3,137,074

# GRIP FITTING BALL GAUGE

Alexander Jesonis, 1105 Ewing Ave., Clearwater, Fla.

Filed Sept. 7, 1962, Ser. No. 222,124
8 Claims. (Cl. 33—174)

The present invention relates to a ball gauge that simulates a bowling ball having finger holes for gripping the ball and more particularly to a ball gauge in which the finger holes are adjustable to fit an individual's grip so that the grip may then be duplicated in an actual bowling ball.

While the use of a ball gauge has heretofore been proposed for determining the finger holes in order to properly fit a bowling ball to an individual's grip, such heretofore devices have not been found completely satisfactory. One difficulty is that the prior devices have been unable to provide sufficient adjustability of the finger holes in order that the best grip may therefore be determined. While another problem is that the finger holes could not be adjusted while the individual's fingers were in the holes. In determining the proper grip, numerous factors should be considered and these include, first, the span, i.e. the distance between the finger holes and particularly on a three finger grip, the thumb finger hole and the ring and middle finger holes, secondly, the diameter of each finger hole, thirdly, the pitch of the finger holes, i.e. the tilting of the axis of the thumb finger hole towards the other finger holes and vice versa, and fourthly, the side angle, the tilting of the axis of each finger hole perpendicularly to the pitch tilting. Moreover, it is also desirable that the ball gauge be adjustable in weight so that the proper weight may be determined and in addition have a spherical shape with no protrusions so that the individual, when being fitted, may actually throw the ball gauge without damage thereto.

It is accordingly an object of the present invention to provide a ball gauge that achieves the above objects and has substantially infinitely adjustable finger holes in order to effectuate the proper determination of an individual's grip.

A further object of the present invention is to provide a ball gauge in which the finger holes may be adjusted while an individual's fingers are positioned therein in order to facilitate the proper selection of the best position and angles of the finger holes.

Another object of the present invention is to provide in a ball gauge of the above type for a substantially spherical surface of the gauge with no protrusions beyond the sphere of the ball and in which the gauge is constructed to be able to be thrown without harm thereto.

In carrying out the present invention, there is provided a substantially spherical hollow casing in which is mounted a pair of finger thimble supports. From a plurality of finger thimbles, each being substantially tubular but with a different internal diameter, a finger thimble of a size to fit the individual's thumb is selected and mounted on one support while a finger thimble of a size selected to fit the middle finger and/or a thimble sized to fit the ring finger is mounted on the other support. According to the present invention, each thimble is mounted on its respective support in a manner to be pivoted at approximately the periphery of the spherical arc of the casing in a direction which enables the pitch to be determined. Also the pivoted mounting of each thimble is such as to enable each thimble to be movable about an axis transverse to the pitch tilting axis so that the side angle may thus be determined. With the thimbles mounted on the supports, the supports are moved relative to each other to select the proper span between the thumb finger thimble and the other finger thimbles and then the pitch and side angle selections are made for each finger thimble. After



these adjustments have been made and the proper grip is thus selected, the thimbles are clamped with the plates remaining stationary and by employing a bowling ball drilling machine, such as disclosed in my copending U.S. application, Serial No. 110,018, filed May 15, 1961, now Patent No. 3,095,767, granted July 2, 1963, the finger holes may be exactly duplicated in an actual bowling ball.

Other features and advantages will hereinafter appear.

In the drawing:

FIGURE 1 is an axial section of the grip fitting ball gauge of the present invention.

FIG. 2 is a top view thereof.

FIG. 3 is a section taken on the line 3—3 of FIG. 1.

FIG. 4 is a detail view taken on the line 4—4 of FIG. 1 showing the ring and middle finger thimbles on their support.

FIG. 5 is a detail view taken on the line 5—5 of FIG. 1 showing the thumb finger thimble on its support.

FIG. 6 is a detail in section of the thimble clamping structure.

FIG. 7 is a detail, partly in section, of the pitch determining structure for a finger thimble.

FIG. 8 is a section taken on the line 8—8 of FIG. 4 showing pitch adjusting structure.

FIG. 9 is a detail of the thumb finger thimble mount with a thimble shown in dotted lines in two positions and with an indication of the movability of the thimble on the support.

FIG. 10 is a perspective view of the thumb finger thimble mount.

FIG. 11 is a perspective view of a mount for either the middle or ring finger thimble.

FIG. 12 is a top view of a finger thimble.

FIG. 13 is a side view of a finger thimble.

Referring to the drawing, the grip fitting ball gauge of the present invention is generally indicated by the reference numeral **20** and includes a spherical casing **21** preferably cast of metal, such as aluminum, to be hollow and formed with an opening **22** having the substantial extent shown. Within the casing **21** there are located four inwardly projecting bosses **23***a*, **23***b*, **23***c* and **23***d* with each having an aperture **24** through which passes a bolt **25**. The bolts **25** secure ears **26** to the bosses **23***a* and **23***b*, with the ears **26** being formed on an outwardly extending plate **27** while the bosses **23***c* and **23***d* have secured thereto by similar bolts **25**, ears **28** formed on another outwardly extending plate **29**.

The plates **27** and **29** have a shaft **30** extending therethrough with the shaft having a head end **31** and a threaded end **32** on which is threaded a nut **33**. The shaft is made fast to the plates **27** and **29** by the nut and also by pins **35** extending from the head end **31** into the plate **29**. The plates **27** and **29** are thus fixed to the casing **21** and secured thereon to extend therebetween adjacent the periphery of the casing is a substantially flat finger thimble support **34**. Also mounted on the shaft **30** but for relative rotation thereon, is a pair of spaced outwardly extending plates **36** and **37** which carry a thumb finger thimble support **38**. The two supports **34** and **38** are movable with respect to each other by the support **38** being able to pivot with the plates **36** and **37** on the shaft **30** while the support **34** is fixed.

For effecting said pivotal movement but preventing pivotal movement unless so effected there is provided a gear **39** rotatably mounted on the shaft **30** and connected by pins **40** to the plates **36** and **37** while bushings **41** cooperating therewith maintain the plates **36** and **37** in axially spaced relation. For rotating the gear **39** to pivot the support **38**, there is provided a worm **42** mounted in a housing **43** depending from the bearings **41** and having a slotted drive shaft **44** that extends through a tube **45**

and access is had to the drive shaft **44** through an opening **46** formed in the casing. Accordingly, a screw driver for example when inserted through the opening **46** to engage the shaft **44** will effectuate rotation of the gear **39** causing pivotal movement of the thimble support **38** to thereby adjust the span between the two thimble supports **34** and **38**. It will be appreciated that the shaft **30** is substantially on the center of the casing and hence the support **38** will pivot about an arc that corresponds to the arc of the spherical casing.

Referring to FIG. 11, there is shown a finger thimble mount **47** having a slot **48** and spaced hooks **49**. The finger thimble support **47** is mounted on the edge of the finger thimble support **34** by the hooks **49** overlying the arcuate edge portion **50** of the support. Moreover, the mount **47** may be adjusted on the support **34** at the most desirable position thereof. In addition, the support **34** has mounted thereon, when the grip to be determined is a three finger grip, i.e. thumb, ring and middle finger, another finger thimble mount **47***a* of identical construction to mount **47**. Thus, as shown in the particular embodiment herein described, the support **34** carries a ring finger thimble **51** and a middle finger thimble **52** by the mounts **47** and **47***a* respectively. It will be understood that the two mounts **47** and **47***a* are adjustably positionable on the arcuate edge portion **50** and hence the distance between the two finger thimbles **51** and **52** may thus be adjusted for the individual's grip.

A thumb thimble mount **53** is shown in perspective in FIG. 10 and it has hooks **54** for overlying the arcuate edge portion of the thumb finger thimble support **38**. Moreover, in view of the ball gauge of the present invention being employed to determine the grip for either a right or left hand, there are provided slots **55** for the former and **55***a* for the latter, with each slot being similar to the slot **48**. A thumb finger thimble **56** is mounted on the mount **53** in a manner hereinafter set forth.

As shown in FIGS. 12 and 13, each finger thimble **51** and **52** including the thumb finger thimble **56** is essentially a tube **57** having an internal diameter **57***a* and an external periphery **57***b* with a pin **57***c* extending outwardly from the top edge portion of the thimble.

In carrying out the present invention it is anticipated that there will be a numerous size of finger thimbles available each having a different internal diameter **57***a* so that the individual may select the internal diameter most suited for each finger, however each will have the pin **57***c* and be of a substantially constant height. Each of the finger thimbles **51**, **52** and **56** is mounted on their respective mounts **47**, **47***a* and **53** by the pin simliar to **57***c* of each being positioned within the respective slots **48** or **55** for a right-handed grip or **55***a* for a left-handed grip.

With the thimbles thus supported in their mounts on the supports **34** and **38** it will be appreciated, as shown in FIG. 8, that each finger thimble may be pivoted about its pin on an axis perpendicular to the support to set the side angle and in addition by reason of the pin being relatively small, the thimble may be pivoted about an axis parallel with the support to set the pitch with both pivotal movements being about the pin which is at the entrance of the finger thimble and substantially on the spherical arc of the casing. It will be appreciated that the pin of the thimble thus has substantially only a single point contact between said thimble and said support and thus the axes of both pivotal movements are substantially about this same point contact. The pivotal movement about an axis parallel to the plate, as shown in FIG. 7, is effected by a pitch determining bar **58** for the thimbles **51** and **52** that is pivotally mounted on a pair of flanges **59** and **60**, the latter being formed on the support **34** adjacent the plates **27** and **29** respectively. The pitch bar **58**, referring to FIG. 8, includes an angle **61** having a threaded aperture **62** in which an adjustment screw **63** is threaded to bear against the support **34**. Thus by rotation of the adjustment screw **63**, the pitch bar **58** may be pivoted, as shown in FIG. 7, to engage the bottom portion of each of the finger thimbles to set the position for the pitch of the thimbles that is most desirable for the individual's grip. The movement caused by the pitch bar **58** of each thimble is about the pin of each thimble.

Similarly, the thumb finger thimble **56**, as shown in FIG. 5, also has a pitch determining bar **64** pivoted as at **65** on a flange **66** depending from the support **38** while its other end carries a gear **67** driven by a worm **68** with the worm being fast on a shaft **69**. Entrance of a screw driver or other tool for effecting rotation of the shaft **69** by means of an end slot **70** formed therein is gained through an opening **71** in the casing. Thus rotation of the shaft **69** will determine the pitch for the thumb finger thimble **56**.

The side angle for each finger thimble is determined by the pivotal movement of the thimble about an axis perpendicular to its support as graphically illustrated in FIG. 9 by the arrow **72**. After such determination, the thimble is locked against the support and its associated pitch bar by an arcuate clamp **73** carried by a bolt **74** threaded in an angle bracket **75**, as particularly shown in FIG. 6. It will be appreciated that there is a clamp **73** for the thumb finger thimble **56** and a clamp **76** and **77** for the ring and middle finger thimbles **51** and **52** respectively, the latter two being mounted on individual angle brackets **78** and **79** secured to the support **34** while the former is mounted on the support **38** for movement therewith. Moreover, in order to mate the clamp with its associated thimble, each angle bracket includes a pivot between its two legs as indicated by the reference characters **75***a*, **78***a* and **79***a*.

With the above structure of a grip fitting ball gauge, it will be appreciated that rotation of the shaft **44** provides for adjustment of the span of the grip between the thumb and the finger thimbles, that pivoting of the pitch bars by the adjustment screw **63** or shaft **69** provides for pitch adjustment of the thimbles while the mounting of the pin of each thimble in the slot of its respective mount enables the side angle to be adjusted. After the selection of these factors to provide the desired grip, the finger thimbles are locked in position by their associated clamps **73**, **76** and **77**.

As bowling balls differ in weight, the present invention of a ball gauge also provides for adjusting the weight of the ball gauge to permit selection of the weight desired. To this end, there is provided a threaded rod **80** mounted to depend from the housing **43** and having positioned thereon a plurality of weights **81**, each being a substantially circular disk and provided with a slot **82** and a handle **83**. A nut **84** accessible through an opening **85** in the casing clamps the weights on the rod yet permits the releasing of the weights on the rod for addition or removal of weights.

In order to maintain the spherical arc of the casing in the areas of the opening **22** to aid in the determination of the proper grip, the support **34** has secured thereto additionally spaced parallel plates **86** and **87** while support **38** has secured thereon plate **88**. The plates **27**, **36**, **86**, **88**, **87**, **37** and **29** (FIG. 3) are alternately intermeshed and are formed to have their exterior surface curved to conform with the spherical arc of the casing, thus forming a spherical surface between the supports **34** and **38** irrespective of the span between the supports.

Referring to FIGS. 4 and 5, it will be appreciated that the supports **34** and **38** also have their exterior edge portion arcuate to conform with the spherical arc of the casing and in addition the mounts **47** and **53** likewise are arcuately curved. Moreover, the adjustments in the ball gauge of the present invention are all located within the spherical arc of the casing and hence there is no minimized distortion of the settings of the finger thimbles

or damage to the ball gauge when the ball gauge is thrown to aid in determining the proper grip as there are no protruding parts.

It will accordingly be appreciated that there has been disclosed a ball gauge by which each of the finger holes may be adjusted in order to provide the most desirable grip for an individual. The finger holes are formed in finger thimbles which may be adjusted as to span and the thumb and finger thimbles may also be adjusted for pitch and side angle and thereafter locked in position so that the holes in the thimbles may be subsequently duplicated in a bowling ball.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. A grip fitting ball gauge comprising a hollow spherical casing having at least one opening formed therein, a pair of supports, means mounting the supports within the casing in the opening thereof for adjusting movement relative to each other whereby the arcuate span between the supports may be adjusted, a tubular finger thimble, means for pivotally mounting the thimble on one support for movement about a first axis and a second axis transverse to the first axis, said means including substantially only a single point contact between said thimble and support with the axes of both movements being substantially about said single point contact, a second tubular finger thimble, means for pivotally mounting the second thimble on the other support for movement about a first axis and a second axis transverse to the first axis, said means including substantially only a single point contact between said second thimble and other support with the axes of both movements being substantially about said single point contact, both of said single point contacts being substantially on the arc of the spherical casing, and means for clamping both thimbles to their respective supports after pivotal adjustment on the first axis for side angle and the second axis for pitch for each of the thimbles.

2. A grip fitting ball gauge comprising a hollow spherical casing having at least one opening formed therein, a pair of supports, means pivotally mounting the supports within the casing in the opening thereof for adjusting movement relative to each other about an axis extending substantially through the center of the spherical casing whereby the arcuate span between the supports may be adjusted, a tubular finger thimble, means for pivotally mounting the thimble on one support for movement about a first axis and a second axis transverse to the first axis, said means including substantially only a single point contact between said thimble and support with the axes of both movements being substantially about said single point contact, a second tubular finger thimble, means for pivotally mounting the second thimble on the other support for movement about a first axis and a second axis transverse to the first axis, said means including substantially only a single point contact between said second thimble and other support with the axes of both movements being substantially about said single point contact, the single point contacts of both thimbles being substantially on the arc of the spherical casing, and means for clamping both thimbles to their respective support after pivotal adjustment on the first axis for side angle and the second axis for pitch for each of the thimbles.

3. The invention as defined in claim 2 in which the means for pivotally mounting each thimble on its respective support includes forming a slot on one and a pin on the other with the pin and slot forming the single point contact for each thimble.

4. The invention as defined in claim 2 in which each finger thimble is elongated, the single point contact is adjacent one end of the thimble, and the means for adjusting the movement of the thimble about the second axis includes a bar pivotally mounted on the support to be movable against the other end of the thimble.

5. The invention as defined in claim 2 in which the means for clamping includes a member engageable with the thimble, and means for movement of the member against the thimble to contain the thimble between the support and the member.

6. The invention as defined in claim 2 in which the means for pivotally mounting the supports includes a shaft, one of said supports being fast on said shaft and the other support being pivotally supported, and adjusting means connected to the other support and including a gear connected to the support and a worm gear cooperating therewith.

7. The invention as defined in claim 2 in which there are weight means and means with the casing for releasably holding the weight means.

8. The invention as defined in claim 2 in which there are three finger thimbles, means for independently pivotally mounting two finger thimbles on one support, said means being movable on the support with respect to each other whereby the space between the two finger thimbles may be adjusted.

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