

120,980

PATENT



SPECIFICATION

Application Date, Nov. 29, 1917. No. 17,665/17.

Complete Left, May 29, 1918.

Complete Accepted, Nov. 29, 1918.

PROVISIONAL SPECIFICATION.

**Improvements in or appertaining to Watches, Aneroid Barometers
and other Dial Instruments,**

I, WILLIAM EASTWOOD, of 181, Old Road, Stanningley, near Leeds, in the County of York, M.I.M.E., A.M.I.C.E., do hereby declare the nature of this invention to be as follows:—

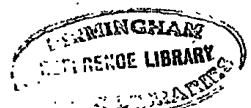
5 This invention relates to watches or like instruments such as aneroid barometers, and has for its object the combination with same of a circular logarithmic slide rule or calculator whereby a single instrument is provided which while serving as an ordinary watch or the like, admits of the use thereof for calculating purposes.

10 Circular logarithmic slide rules of known construction are of two classes, namely:—(a) those in which two concentric logarithmic scales are movable relatively to each other and are ordinarily provided with a cursor or the like, one of the scales in some instances having an equally spaced non-logarithmic scale thereon, and (b) those in which one movable logarithmic scale is used
15 along with a stationary pointer and a cursor, the scale often being also provided with an equally divided non-logarithmic scale.

My invention consists in applying to a watch or the like to form a combined part thereof parts to form a circular logarithmic slide rule adapted to be used for the general class of calculations for which the usual pocket circular slide
20 rules above mentioned, or ordinary pocket slide rules, are employed, the watch or the like according to one embodiment of my invention being provided with a revoluble glass holding ring or frame mounted on the watch case in place of the usual hinged ring, or suitably connected to such a ring, the method of mounting the revoluble ring avoiding shaking or vibration thereof. The
25 glass holding ring is preferably milled on the ridge or periphery thereof to enable it to be easily rotated and it carries a glass disc which is revoluble in a groove therein independently of the glass holding ring or in a ring secured to the glass holding ring. To an extension of the glass holding ring or a part secured thereto I apply concentrically with the time indicating numerals on the dial plate a circular logarithmic scale the outer edge of which has a second
30 scale thereon divided by radial lines into equal parts of say 100 and subdivided as may be convenient.

Integral with or secured to the dial plate intermediate the time indicating numerals thereon and the logarithmic scale carried by the glass holding ring

[Price 6d.]



is a second logarithmic scale upon which the radial lines on the outer scale may be continued the said scale being level with or slightly below the level of the outer concentric scale.

The glass disc has a radially drawn cursor line thereon or it may be provided with a magnifying lens provided with a cursor line, the lens enabling the scales to be more easily read. The parts described can be applied to the watch or clock or aneroid barometer without enlarging the overall depth of the instrument.

The two concentric logarithmic scales, one revoluble with the glass holding frame or ring and the other stationary, allows, by the use of the revoluble glass with cursor or lens thereon, multiplication and division to be performed rapidly and accurately, the outer scale permitting expressions involving fractional roots and powers to be also solved.

In an alternative arrangement the outer equally divided scale is dispensed with and the minutes of the dial scale utilised for the same purpose, these being sub-divided as required.

The glass may be fixed and a finger, movable by a button secured to the glass or by any other control means and gear connections provided in place thereof, the said finger acting as a cursor or carrying a magnifying lens. If the rotating finger is not used as a cursor it can be shortened and used in conjunction with digits 1 to 10 or more engraved or marked on the glass disc as a counter for determining the position of the decimal point. A cursor line could be marked on the glass disc either in a position continuous with the cursor or on any other part of the glass so that either the cursor on the glass disc or on the lens may be used as preferred.

The watch glass employed could be constructed to magnify the scales, or a magnifying ring of glass may be located intermediate the scales and the glass disc for the same purpose.

The revoluble logarithmic scale with a pointer and cursor may be used together with the equally divided scale and the fixed logarithmic scale may be replaced by one showing squares, cubes or other special scale readable in connection with the revoluble scale.

The back of the watch and the inside of the watch case may be engraved or otherwise marked with useful data or instructions for using the slide rule.

It will be understood that the details of construction or adaption of the watch and parts may be varied without departing from the spirit and scope of my invention.

Dated this 28th day of November, 1917.

BARRON & LEWIN,
Palatine Chambers, Market Street, Halifax,
Agents for the Applicant.

COMPLETE SPECIFICATION.

Improvements in or appertaining to Watches, Aneroid Barometers and other Dial Instruments.

I, WILLIAM EASTWOOD, of 181, Old Road, Stanningley, near Leeds, in the County of York, M.I.M.E., A.M.I.C.E., do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to existing or new watches or like instruments such as

aneroid barometers, and has for its object the combination with same of a circular logarithmic slide rule or calculator whereby a single instrument is provided which while serving as an ordinary watch or the like, admits of the use thereof for calculating purposes.

5 Circular logarithmic pocket or office slide rules of known construction are of two classes, namely:—(a) those in which two concentric logarithmic scales are movable relatively to each other and are ordinarily provided with a cursor or the like, one of the scales in some instances having an equally spaced non-
10 logarithmic scale thereon, and (b) those in which one movable logarithmic scale is used along with a stationary pointer and a cursor, the scale often being also provided with an equally divided non-logarithmic scale. It has previously been stated in reference to one construction of circular slide rule for office use that a watch or like instrument could be applied on the side of the trigono-
15 metrical dial of said slide rule.

My invention consists in applying to a watch or other portable instrument such as a pedometer, volumeter, or aneroid barometer, to form a combined part thereof, parts specially constructed and adapted to form a circular logarithmic slide rule adapted to be used for the general class of calculations for which the
20 usual pocket circular slide rules above mentioned or ordinary pocket rules are employed.

My invention will be fully described with reference to the accompanying drawings, in which:—

Fig. 1 is an edge view, partly in section, of one form of application of the invention to a watch;

25 Fig. 2 is a partial plan view of a circular logarithmic scale and a concentric equally divided scale; the use of which parts are hereinafter described;

Fig. 3 is a partial plan view of a watch face having combined therewith an outer circular and concentric logarithmic scale;

Fig. 4 is an edge view, partly in section, and

70 Fig. 5 is a plan view of a watch case having certain parts necessary to one embodiment of my invention applied thereto;

Figs. 6 and 7 show, in section, certain alternative constructions hereinafter described;

35 Fig. 8 is a plan view of a form of construction in which the glass of the watch or instrument carries a lens provided with a cursor line, and also a wire cursor or pointer;

Figs. 9, 10 and 11 show, in section, modified forms of construction hereinafter described;

40 Figs. 12, 13 and 14 show a method of applying the invention to a watch of the "hunter" type or to the back of an ordinary watch.

Fig. 15 shows in section, a further modified construction;

Figs. 16 and 17 illustrate a construction according to which a magnifying lens is carried by links in such a manner as to be capable of being folded up, when not in use, within the outer back lid of a watch;

45 Fig. 18 illustrates a mode of application of the invention to a barometer, and

Fig. 19 illustrates a constructional detail hereinafter referred to.

Referring firstly to the embodiment of my invention shown in Figs. 1, 2, and 3, the case 1 of a watch is provided with a revoluble bezel 2 in which a
50 glass 4 is revolubly carried, the said glass being retained in position by a split ring 7. A shelf 2¹ on the bezel 2 carries a logarithmic scale 5 and an equally spaced scale 6, the scales 5 and 6 being shown in plan in Fig. 2. The bezel 2 is formed with a slight internal bevel so that it will be retained when sprung over a corresponding ridge on the watch case in the usual manner, but will
55 still be free to revolve without shake. Milling 3 is formed in the bezel to facilitate its rotation.

The glass 4 carries a lens 9 with a radial cursor line 10 marked on it, see

Fig. 8, and said glass also carries a wire cursor or pointer 11 for alternative use instead of the lens 9, or for use in conjunction with it. Instead of the pointer 11, there may be provided a flat piece of glass attached to the glass 4 with a cursor line on it, as close to the scales 5 and 6 as possible, so as to avoid parallax. In the centre of the glass 4 is a revoluble button 12 carrying a finger 13 which as shown in Fig. 3, protrudes beyond a scale 14, which said scale 14 is itself attached to the glass 4 and is independent of the finger 13. As an alternative to fixing the lens 9 and pointer 11 or substitute to the glass 4, the finger 13 suitably lengthened, may be used to carry them, in which case the glass 4 need not be revoluble and the scale 14 could be dispensed with. Another alternative would be to fix the glass 4 and provide a finger to carry the cursor glass or lens or pointer, such finger being mounted on a central pivot on the watch independent of the glass, which said finger may be moved by means of a knob and suitable gears.

14 is a digit scale carried by the glass and which may be used in conjunction with the finger 13 to determine the position of the decimal point. In the last mentioned alternative construction, that is to say in which the glass is fixed and a cursor glass carried by a movable finger, the digit scale 14 and finger 13 may be retained or not, as may be preferred.

In Fig. 2, the logarithmic scale 5 and equally divided scale 6 are shown in plan, the circle of the latter being divided into 100 parts and subdivisions. If the decimal point be placed before the divisions of scale 6, they will give the logarithms of the numbers up to 10 of the figures on the logarithmic scale 5. Thus, the logarithm of 6 is .778; of 8 it is .903, and so on.

Fig. 3 shows a logarithmic scale 8 corresponding with the scale 5, and the minute circle 15 of an ordinary watch, each minute being subdivided into fifths of a minute. By means of this scale logarithms can be obtained in the following manner:—7 on scale 8 corresponds to 50.7 minutes of scale 15, and 50.7 divided by 60 gives .845, the logarithm of 7. Similarly 9 corresponds to 57.25 minutes of scale 15, and 57.25 divided by 60 gives .954, the logarithm of 9. By utilising the scale 15 instead of the scale 6, the latter may be dispensed with, and thus allow the scales 5 and 8 to be larger for a given diameter of watch, the advantage of which will be apparent.

Referring to Figs. 4 and 5, a ring 16 may be fixed to the dial of the watch or instrument to carry the scales 5 and 6 and raise them closer up to the glass with just sufficient clearance for a pointer 31 carried by the bezel 2. The glass 4 is, in this instance, provided with a radial cursor line, by means of which in conjunction with pointer 31 distances (values) can be measured on the scale 5 and added to or subtracted from values on the latter, so that the one scale can be used for calculations, as is well known. Instead of mounting the scale 5 on the ring 16 the said scale or the scales 8 and 15, may be placed on the dial of the instrument and a lens or a flat glass utilised to avoid parallax as previously described.

Figs. 6 and 7 show revoluble bezels 2 carried by non-revoluble bezels 17, the latter being hinged in the ordinary manner to the casing. The scales 8 and 15 in conjunction with scale 5, with or without scale 6, may be used.

Fig. 8 shows the glass 4 and retaining ring 7 in plan, the glass carrying the lens 9 with radial cursor line 10 and a wire cursor or pointer 11, which parts may be placed in any position and may, if preferred, be replaced by a plain flat glass as previously mentioned with reference to Fig. 1.

In the arrangement shown at Fig. 9, a bezel 18 is fixed immovably in a non-revoluble bezel 17 hinged to the casing, the glass 4 being in this instance revoluble and carrying the logarithmic scale 5 and also a wire cursor or pointer 11 whose position is adjustable by means of the button 12. The scales 8 and 15 are carried by a shelf 18¹ on the bezel 18. The minute hand 19 of the watch is carried close up to the shelf 18¹ as shown, whilst the hour hand 20 lies close to the dial. The arrangement shown in this figure avoids

wear of the groove in the bezel of an existing watch. An alternative to the arrangement would be the provision of a new hinged bezel having a shelf as 18¹ and the other parts.

5 A lens such as described with reference to Fig. 1, or such as is hereinafter to be described with reference to Fig. 17, may be provided.

10 Fig. 10 shows a method of fixing a bezel 2 to ensure great durability, and also a method of fixing the glass to avoid or reduce shake. According to the method of fixing the bezel here shown, a split ring 26, slidable in a groove in the bezel, can be tightened against the bezel by three or more screws such as 25. The scale 5 is attached to the bezel by being pressed in and pinned in position. The glass holding ring 7 is split so as to be capable of being sprung in over the glass, and it is formed with a bevel as shown which, in conjunction with an opposing bevel on the bezel 2, automatically takes up wear of the glass or of the ring or of the seating on which the glass rests. Screws may, if 15 desired, be provided in the rim of the bezel as shown at 25¹ in Fig. 18 to restrain the ring from pressing outwardly too much. Instead of providing restraining screws as just suggested, the ring 7 may be provided with a flange 7¹ see Fig. 19, which flange can be partially filed away or otherwise removed when the glass becomes slack, to allow the ring to expand sufficiently to take 20 up the wear.

25 Fig. 11 shows an alternative method of securing the bezel 2. A split ring 26 is machined to fill a groove in the case, and is adapted, when the bezel is passed over it, to spring out and enter a groove in the bezel and prevent the latter from being pulled off. In order that the bezel may be removed when necessary, three or four screws 25 are provided by the screwing in of which the ring can be forced wholly into the groove in the watch case 1 and thus leave the bezel free.

30 Figs. 12, 13 and 14 show an application of the invention to a watch of the "hunter" type or it may be to the back of an ordinary watch. In this instance, in addition to the scales 5, 8 and 15 there are provided two additional scales 33 and 34 which show the square roots of numbers up to 10, and between 10 and 100 respectively, the squares themselves being read on the scale 5 by means of the cursor. The scales 5, 15, 33 and 34 are fixed on the shelf 2¹ of the revoluble bezel 2, and the scale 8 is fixed on the glass 4 which is itself 35 revoluble in the bezel. The dial is visible through the glass 4 and through the central hole in the shelf 2¹. The cursor 11 in this instance is a wire carried by an arm 27 hinged to the lid 1¹ of the watch and arranged to point to the centre of the scales. The lens 9 is carried by an arm 28 also hinged to the lid. Both the arms 27 and 28 are arranged to fold within the lid, as shown in 40 Fig. 14, when not in use. As the cursor and lens are in this arrangement not movable rotatively, all the scales are revoluble so that readings can be brought under the lens. When minutes are to be read in conjunction with the hour hand to ascertain the time, the scale 15 is brought into the correct position by moving the mark 36 into coincidence with the mark 37. An arrangement such 45 as has just been described with or without the magnifying lens, may be used (without the dial) in the back of a watch in addition to or in substitution for one on the face.

50 In the construction shown at Fig. 15, the scales 8 and 15 are carried by a shelf 38¹ on a ring 38 immovably fixed to a non-revoluble hinged bezel 17, and the ring 38 carries a modified form of bezel 2 adapted to revolve on said ring, and being retained in position by screws such as 25 projecting into a groove formed around the ring. The bezel 2 carries the scale 5, the glass 4 and the glass retaining ring 7. The later and the screws 25 and groove may be replaced 55 by any of the forms of retaining rings shown in the other figures.

In the arrangement shown at Figs. 16, and 17, the lens 9 is carried by hinged links 39, 40 and 41 of which one end of link 41 is attached to the inner lid of the back of a watch. The arrangement permits of the lens being swung

out over the face of the watch as shown in Fig. 17 to enable readings to be taken or the links and lens fold up as in Fig. 16 and can be covered by the outer lid. Where the watch has no inner lid the parts may be fixed in the inside of the outer lid.

Fig. 18 shows an application of the invention to a barometer, 42 and 43 being the usual barometer scales carried by a revoluble bezel 2 and 44 an annular glass through which the barometrical readings are visible. The glass 44 is retained in position by a ring 45 which also supports the glass 4. The logarithmic scale 5 is carried by the glass 44 and scales 8 and 15 are carried by a disc 46 having a central stem secured to the button 12. The glass 4 carries a reading lens 9, and is retained by split ring 7 restrained from undue outward pressure by screws such as 25¹.

Modifications other than those illustrated and above described may be made; for instance the scale 5 may be placed in the revoluble glass of an ordinary watch having an immovable bezel and the scales 8 and 15 may be placed on the dial or in a ring to raise them close to the glass, the cursor being as in Fig. 9. The scales in any of the embodiments referred to may be made of any suitable metal or material.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The combination with a watch, barometer or like portable pocket instrument, of two logarithmic scales one secured to or marked on the dial plate and the other secured to or marked on a revoluble bezel so that one logarithmic scale can be adjusted rotatively with respect to the other, a divided scale secured to or marked on the revoluble bezel carrying the watch glass, so as to be readable in conjunction with the logarithmic scales, a cursor glass or lens with cursor line thereon, and a revoluble cursor finger or pointer secured to an enclosing glass revoluble within the bezel or to a revoluble finger, all arranged in the manner and for the purposes substantially as herein shown and described.

2. The combination with a watch, barometer or like portable pocket instrument, having logarithmic scales carried on different parts of the instrument and one revoluble with relation to the other and a minute scale appropriately located with respect to the said logarithmic scales and attached to the same part as one of said scales or forming a part thereof, said minute scale having each minute subdivided into fifths of a minute, of a digit scale marked on or applied to the glass of the instrument and a revoluble pointer to coact therewith, said pointer being adapted to carry a cursor glass and cursor finger if these are not provided on the glass of the instrument, substantially as herein shown and described.

3. In watches of the "hunter" type or in the back of an ordinary watch, the combination with two logarithmic scales and minute scales and parts to form a circular logarithmic slide rule according to Claims 1 and 2; of additional circular scales showing the square roots of numbers up to 10 and between 10 to 100 respectively, of which the squares are ascertained on the inner logarithmic scale by means of a cursor, substantially as herein described with reference to Figs. 12, 13 and 14.

4. The general arrangement, construction and combination of watches or the like instruments with two circular logarithmic scales, a circular divided scale which with one of the said logarithmic scales is adjustable rotatively with respect to the other logarithmic scale, and means co-acting therewith to form a circular slide rule or calculator, substantially as described with reference to Figs. 1 to 8.

5. The modified constructions of circular slide rule or calculator applied to watches or like instruments substantially as described with reference to Figs. 9 to 17.

6. The combination with barometers or like portable instruments of circular scales and parts forming a slide rule or calculator, substantially as described with reference to Fig. 18.

Dated this 27th day of May, 1918.

5

BARRON & LEWIN,
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Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1918.

ERRATA.

SPECIFICATION No. 120,980.

Page 3, line 16, *for* "volumeter" *read* "voltmeter"

„ 5, „ 33, *for* "shalf" *read* "shelf"

„ 5, „ 53, *for* "later" *read* "latter"

PATENT OFFICE,

January 12th, 1920.

[This drawing is a reproduction of the Original on a reduced scale.]

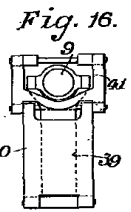
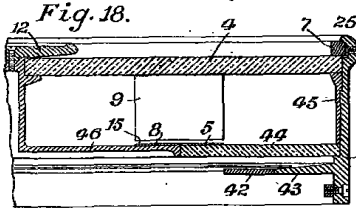
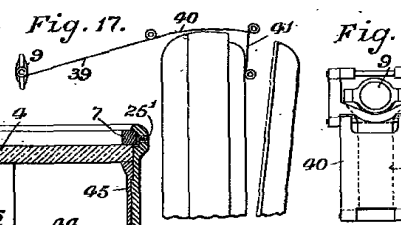
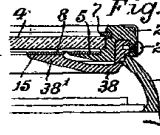
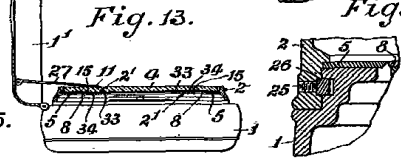
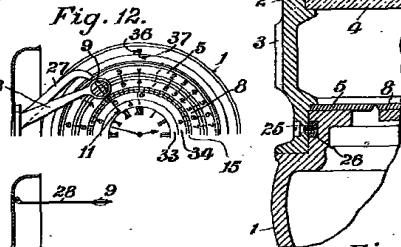
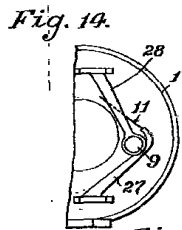
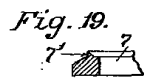
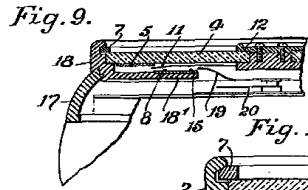
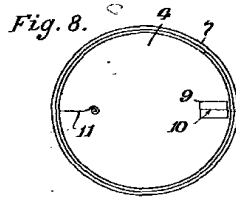
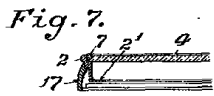
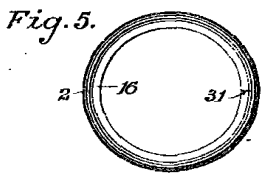
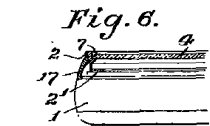
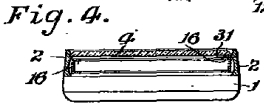
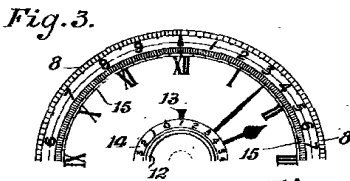
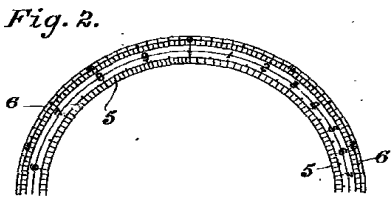
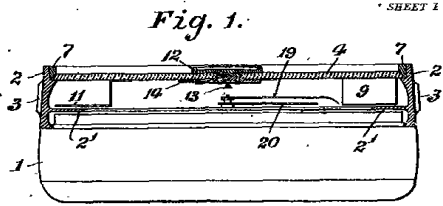


Fig. 1.

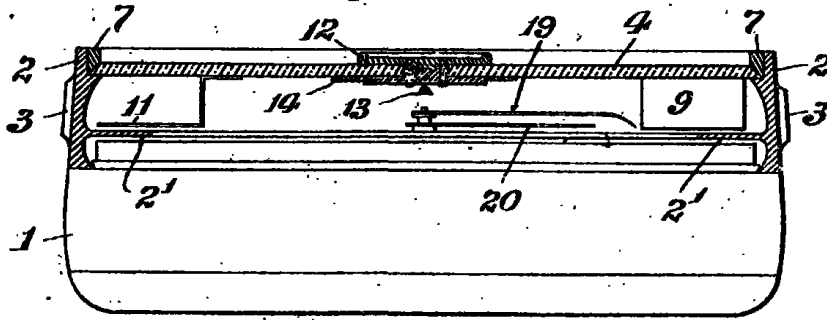


Fig. 2.

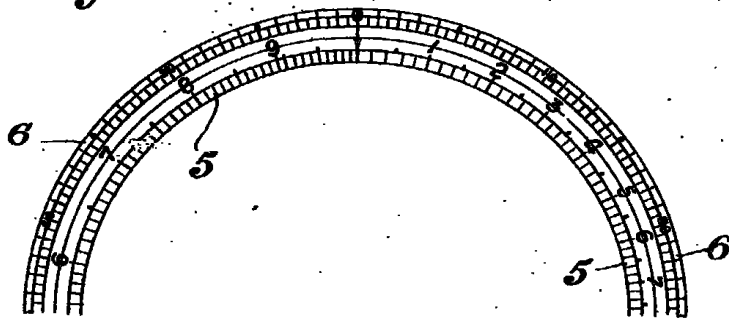


Fig. 3.

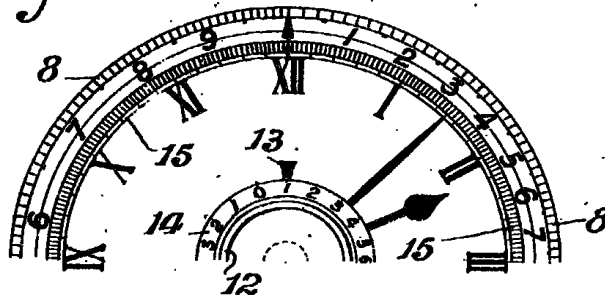


Fig. 4.

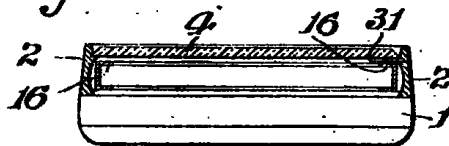


Fig. 6.

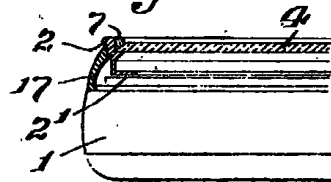


Fig. 5.

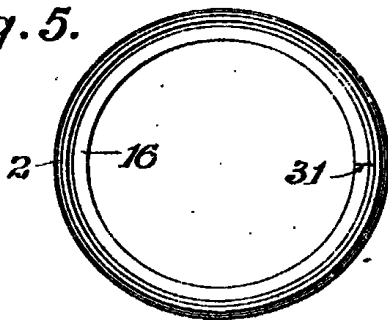
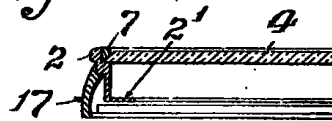


Fig. 7.



[This Drawing is a reproduction of the Original on a reduced scale.]

Fig.

Fig. 7

Fig

4

15

Fi

12

