Jan. 29, 1946. J. H. SPIRA 2,393,939

APPARATUS FOR POLISHING OR FORMING FACETS ON GEMS, DIAMONDS, OR THE LIKE

Filed March 31, 1942 2 Sheets-Sheet 1

Fig. 2.

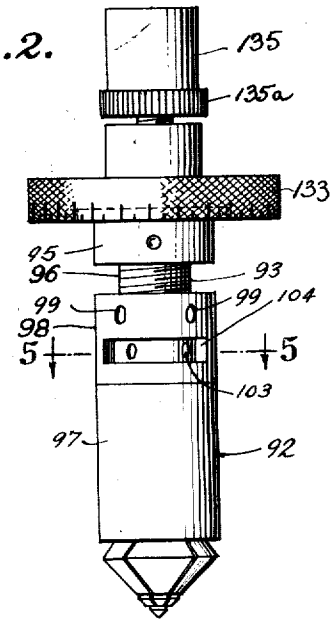


Fig. 1.

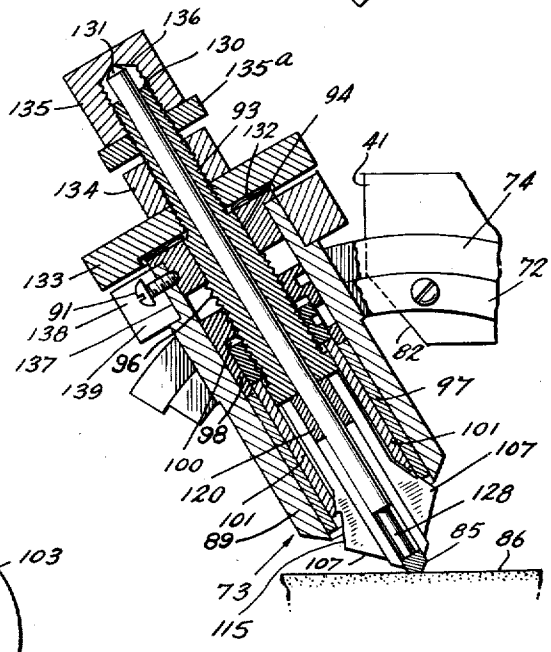
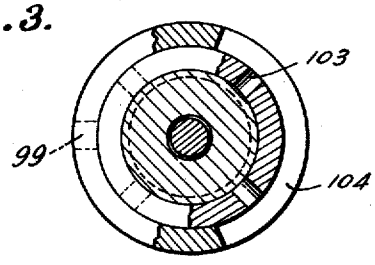


Fig. 3.



INVENTOR.
Josef Hillel Spira
BY
J. J. Basseches
his ATTORNEY

Jan. 29, 1946. J. H. SPIRA 2,393,939

APPARATUS FOR POLISHING OR FORMING FACETS ON GEMS, DIAMONDS, OR THE LIKE

Filed March 31, 1942 2 Sheets-Sheet 2

Fig. 6.

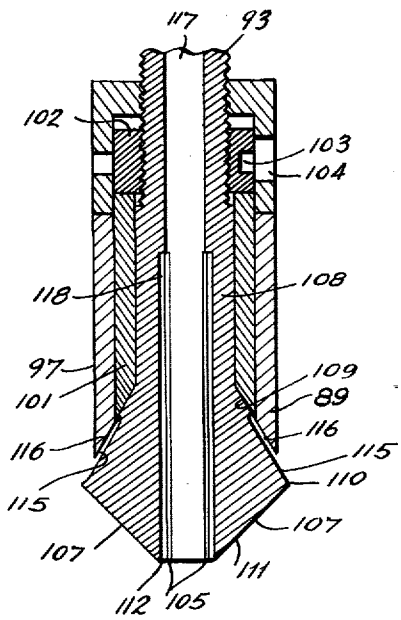


Fig. 8.

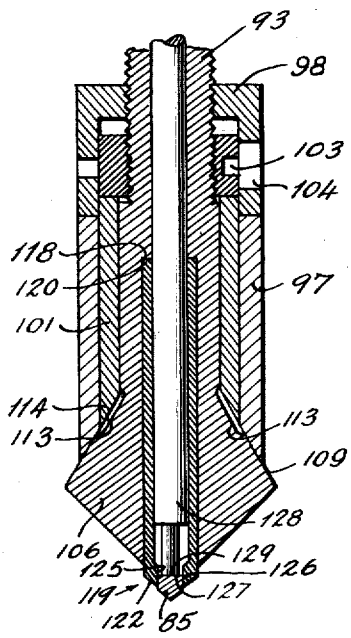


Fig. 5.

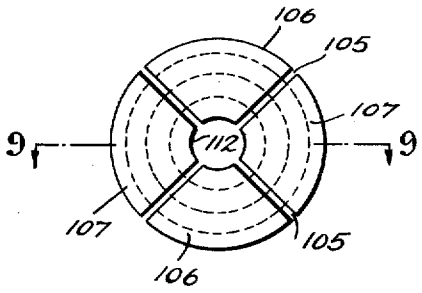


Fig. 7.

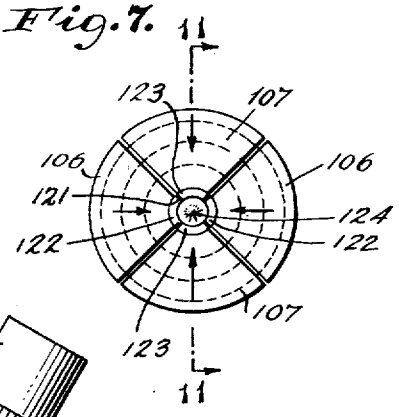
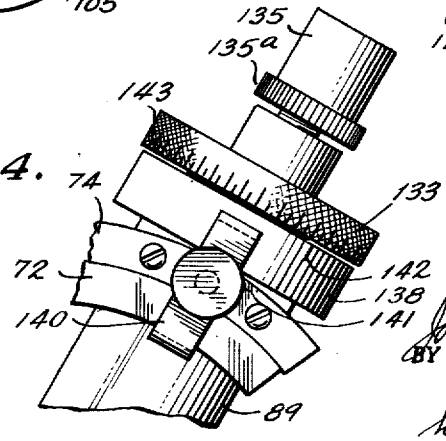


Fig. 4.



INVENTOR.
Josef Hillel Spira
BY
J. F. Bassecheas
his attorney

Patented Jan. 29, 1946 2,393,939

UNITED STATES PATENT OFFICE

2,393,939

APPARATUS FOR POLISHING OR FORMING FACETS ON GEMS, DIAMONDS, OR THE LIKE

Josef Hillel Spira, New York, N. Y.

Application March 31, 1942, Serial No. 437,056
In Brazil March 31, 1941

8 Claims. (Cl. 51—229)

This invention has as its object the provision of apparatus for grinding or cutting the facets upon gems, or what is generally referred to as the polishing of gems, particularly diamonds, which hitherto largely have been worked successfully only by manual labor, which required unusual skill and experience.

The present invention has for its object the grinding or polishing of the facets on gems by semiautomatic means which minimizes the extraordinary skill heretofore necessary, and the provision of a new and novel method.

The present invention makes possible a faster production of the operations for finishing these gems, requiring less skill than the heretofore known methods, and makes possible the effecting of considerable economies involved in carrying out these hitherto highly expensive and laborious operations.

Heretofore the method of forming the facets upon gems has been under the strict supervision of a skilled worker who ascertained the accuracy of his work by constant inspection, which was dependent upon the skill acquired through many years of experience.

In the present invention, in order more economically to increase production and largely to eliminate the element of unusual skill, and provide semi-automatic devices for accomplishing the desired end, I have departed from the age-old and obvious procedure in polishing gems, particularly diamonds, with a consequent simplification of this laborious procedure.

More particularly, my invention contemplates the provision of a dop for facetting or polishing the pavilion facets by merely mechanically clamping the bezel forming portion of the bruted stock in its unfinished state, eliminating the necessity for using cement, solder, or the release of the diamond in progressing from one facetting position to another.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, I make reference to the accompanying drawings, forming a part hereof, in which:

Figure 1 is an enlarged fragmentary sectional view of the work holder or dop, and the mounting assembly therefor;

Figure 2 is a front elevation thereof;

Figure 3 is a section taken on the line 3—3 of Figure 2;

Figure 4 is a fragmentary side elevation of the reverse side of Figure 1;

Figure 5 is a plan view of the disassembled work holder or dop;

Figure 6 is a fragmentary sectional longitudinal view thereof, taken on the line 6—6 of Figure 5;

Figure 7 is a face view of the work holder or dop, with an adapter, and the gem in position;

Figure 8 is a fragmentary sectional view taken on the line 11—11 of Figure 7.

It is contemplated by my invention to provide the raw stock with a table section and a pavilion or base section. The base section is mounted in a work holder or dop to expose the pavilion or base. This pavilion or base is first formed with the facets arranged pyramidally thereon, in sufficient number to provide an axially accurate system in respect of the table so that the facets of the pavilion are symmetrical to the table and the axial line through the pyramidal section is at right angles to the table. Thereupon, the pyramidally facetted pavilion serves as the means for axially rotating the gem to expose the crown or bezel, and polish the crown or bezel with the requisite facets.

The sequence of steps in accordance with my method enables me quickly and facilely to perform the polishing or facetting operations more economically and by semi-automatic apparatus, thereby to minimize the requirement to use unusually skilled operators.

I will now make reference to the drawings forming a part hereof in which novel apparatus has been devised by me to facilitate the practice of my method.

The circumferential formation of the facets about the work will more clearly appear in connection with the description of details of the work holder 73, by reference to Figures 1 to 8, which represent the work holder or dop for polishing the pavilion facets.

The work holder or dop 73 constitutes a cylindrical shell 89, to which is affixed the spaced arcuate bearing 74 adjustably supported by a corresponding bearing 72 of the machine. Adjacent the end 90, a set screw 91 serves to releasably engage the revoluble assembly 92 shown in Figure 2.

Referring now to Figure 2, there is provided a tubuar element or sleeve 93, having a bearing portion 94 carrying a collar 95. Beyond the bearing portion 94 the sleeve 93 is screw threaded at 96. A shell 97, having a flange 98, is screw threaded to engage the screw threaded section 96. Pin wrench holes 99 are used to rotate the sleeve 97 about the member 93.

The sleeve 97 is recessed at 100. Within this recess there is mounted an inner sleeve 101, having a screw threaded section 102, adapted to

engage the screw threaded section 96 previously mentioned.

The section 102 is formed with pin wrench orifices 103. The pin wrench orifices 103 are accessible through the slot 104 formed in the flange 98 abutting the sleeve 97. The tubular element or sleeve 93 is slitted at 105 to provide oppositely faced sections 106—106 and 107—107, see Figures 5 and 7. These sections form resilient segments 108 of generally cylindrical contour, merging into conically shaped protuberances 109, the base of which may freely enter the sleeve 89.

Beyond the base 110, the sections 106 and 107, respectively, are tapered to form the nose 111, receding from the orifice 112. The sections 106, adjacent the shank 108 thereof, are formed with clearance slots 113 opposite to the edges 114 of the inner sleeve 101. The sections 107 are formed with clearance slots 115 adjacent the rim 116 of the outer sleeve 97.

Since the rims 114 and 116 are conically shaped, it will be appreciated that withdrawal of the tubular section 93 in relation to the sleeves 97 and 101 will serve to bring the sections 106—106 toward each other, and bring the sections 107—107 towards each other, to reduce the size of the aperture 112.

Where, as in the preferred embodiment, the sleeve 101 bears against the sections 107, and the sleeve 97 bears against the sections 106, it will be understood that independent movement of these sectionalized elements is obtained to secure accommodation to any irregularity in size of any work which may be placed in the orifice 112. The tubular section 93 is formed with a boring 117 which has a shoulder 118, thereby providing the enlarged boring corresponding to the opening 112. Within the opening 112 there may be disposed an adapter shell 119, one end whereof 120 abuts the shoulder 118.

The shell 119 is slitted at 121 for a portion of its length to provide pairs of sections 122, 123. When the adapter is placed in position, the slits 121 are arranged to be coincident with the slits 105. In this position segments 106—106 will move segments 122—122, and segments 107—107 will move segments 123—123.

The segments 122—122 and the segments 123—123 are nosed substantially to correspond to the taper of the nose 111. The work 85 may be held by the adapter shell 119 by the nosed portions 122—122 and the nosed portions 123—123. The adapter shell may be made with an orifice 124 to take care of the size of the work. Graded sizes of these adapters may be provided, each fitting within the orifice 112 but having the nosed portions varied, to vary the size of the orifice 124.

The side walls 125 defining the orifice 124 are preferably cylindrically formed to correspond to the cylindrical section 126 of a bruted work piece 85. This work piece has the table section 127 directed within the orifice 124. Into this orifice there is extended a backing rod 128, the diameter of which at the point of contact with the table face 127 of the work 85 corresponds closely to the diameter of the orifice 124 of any selected adapter. Thus, with graded sizes of adapters as above mentioned, there is provided for each adapter an appropriate backing rod having the face 129 thereof dimensioned to suit the size of the associated adapter orifice 124.

The face 129 of the backing rod 128 is in contact with the table face 127 of the work 85, thereby effectively preventing the work 85 from tilting, and cooperates with the cylindrical portions 125 which define the opening 124 to hold the work 85 in accurate axial alignment, with the table face 127 perpendicular to the axis running through the work holder.

The rod 128 extends into the boring 117 beyond the upper end 130 of the sleeve 93. The rod 128 has its upper end 131 preferably tapered.

With the assembly as provided, I first dispose a spring washer 132 over the collar 95 and then affix a cap 133 in screw threaded position thereover. A threaded collar 134 serves to lock the cap in relatively fixed engagement with the sleeve 93. Sleeved over the end 130 of the section 93, I provide an adjusting cap 135, which is screw threaded and has a tapered bearing 136 bearing against the end 131 of the rod 128.

It will thus be seen that rotation of the adjusting cap 135 will serve micrometrically to feed the backing rod 128, and therefore micrometrically feed the work 85 within the orifice 124 held between segments 122—122, 123—123. A lock nut 135a is provided for the cap 135. The entire assembly 92 illustrated in Figure 2 may then be sleeved within the sleeve 89, whereupon the set screw 91 is driven home to engage the collar 95.

The upper edge 137 of the sleeve 89 is cylindrically shaped to receive the collar 138, which is sectionalized at 139 to receive the set screw 91, previously referred to. The collar 138 may be rotated or it may be given a fixed position by the footed member 140, held in position by the set screw 141. The collar 138 carries a reference or zero marking 142 in close proximity to the periphery of the cap 133, which carries a series of graduation marks 143 for indexing the work. These graduation marks are designed to indicate a fraction of a complete rotation. The number of graduations correspond to the number of facets which it is desired to form upon the work. Graduations of eight and sixteen are those customarily employed. They may be increased in number for brillianteering.

To begin the work the zero marking 142 is first adjusted after releasing the set screw 141, after which adjustment, until the particular gem is completed, the reference marking 142 is held stationary or fixed by tightening the screw 141.

In operation, in connection with the formation of the facets on the pavilion or base, one facet is formed and at the completion thereof, the work holder is re-set by turning the cap 133 to the new position.

The work holder illustrated in the drawings is employed to form the bottom corner and pavilion and culet facets below the girdle of the gem, as an initial operation, by the adjustment provided by the arcuate suspension for the work holder 73 and the revoluble adjustment of the work holder within the sleeve 89.

Upon the completion of the facets below the girdle, a truly pyramidal arrangement of the facets is secured in relation to the axial line through the gem, perpendicular to the table forming portion 127. The gem may thereupon be removed to the dop or work holder for forming the crown or bezel facets.

In this construction, a sleeve 150 is provided with spaced arcuate bearings 151—151, corresponding exactly to the spaced arcuate bearings 74 in the preceding views for reception upon the arcuate guides 72—72 carried by the block 37.

The sleeve 150 is formed with a boring 152,

which is screw threaded at 153 adjacent the end 154. I thereupon provide a shaft 155, adjacent one end 156 whereof there is formed a cup 157 defining a rim 158, which is provided with a sharp edge 159. The cup 157 is arranged to receive the pavilion engaging adapter 160, which comprises a shank 161 of cylindrical contour, making a close fit with the cup 157. A flange 162 engages the pointed rim 159. The pavilion engaging adapter 160 is of conical form, and terminates at its apex 163 adjacent an axially formed orifice 164, defining a seat 165 where the walls of the orifice 164 merge with the apex 163.

The slope of the conically formed adapter 160 is calculated to be less than the angle of any bezel facet which terminates at the girdle of a gem, in relation to the axial line through the gem, thereby providing adequate clearance in the formation of the facets above the girdle in the crown or bezel forming portion of the gem.

It will thus be observed that I have provided novel apparatus for minimizing the labor and unusual skill in connection with the gem polishing or facet forming art, whereby these steps may be performed by semi-automatic procedure. It will also be observed that apart from the features included in utilizing all of the assembly, I have provided apparatus, details whereof have utility independently of the entire assembly, as will be appreciated by those skilled in the art, and accordingly, the invention should be broadly, as well as specifically, evaluated.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is:

1. In a device for forming facets upon gems, a pavilion dop therefor to hold the gem angularly to a skeif surface and for positioning said gem for forming the pavilion facets by holding the cylindrical bezel forming portion of the gem in an unfinished state before imposing the bezel facets comprising a stem having adjacent one end at least three jaws grouped radially to provide an interior bezel engaging surface substantially of cylindrical contour, said jaws having at their exterior terminal portions conical protuberances merging into tapered sections cooperating to form a tapered nose, an axially disposed backing rod adjustable in said stem to provide a variably positionable seat within said cylindrically contoured portion of said jaws and a sleeve about said jaws for engaging the conical protuberances of said jaws, means for adjusting the sleeve longitudinally of said jaws to draw them together radially to clamp the gem, a holder for the dop, indexing means for said stem cooperating with said holder to index said dop in different faceting positions.

2. In a device for forming facets upon gems, a pavilion dop therefor to hold the gems angularly to the skeif surface for forming the pavilion facets by engaging the cylindrical bezel forming portion of the gem in an unfinished state before making the bezel facets, comprising a tubular stem having at one end at least three integrally formed, resilient, stone-engaging fingers, grouped radially to provide an interior bezel engaging surface substantially of cylindrical contour, a sleeve having camming action on said fingers to cause the fingers to be flexed to bring them toward one another, means for moving said sleeve for adjustment in relation to said fingers on the stem, and an axially disposed backing rod, one end of which is positioned adjustably between said fingers and forms a seat for said gem by engaging the table portion thereof and being encircled by said fingers to clamp the cylindrical bezel forming portion of the gem stock against displacement wholly to one side of the girdle of the gem, a holder for the dop, indexing means adjacent the opposite end of said stem, cooperating with said holder to index said dop in different faceting positions whereby all of the facets of said pavilion forming portion of the gem may be polished successively simply by indexing from one facet to another, without disengaging the gem from the fingers or the dop.

3. In a device for forming facets upon gems, a pavilion dop therefor to hold the gems angularly to the skeif surface for forming the pavilion facets by engaging the cylindrical bezel forming portion of the gem in an unfinished state before making the bezel facets, comprising a stem having more than two integrally formed, resilient, stone-engaging fingers, grouped radially to provide an interior bezel engaging surface substantially of cylindrical contour, a sleeve having camming action on said fingers to cause the fingers to be flexed to bring them toward one another, means for moving said sleeve for adjustment in relation to said fingers on the stem, and an axially disposed backing rod, the end of which is positioned adjustably axially of said fingers and forms a seat for said gem engaging the table portion thereof and being encircled by said fingers to hold the cylindrical portion of the gem stock against displacement wholly to one side of the girdle of the gem, a mounting member for rotation of said assembly including indexing means whereby all of the facets of said pavilion forming portion may be polished successively simply by indexing from one facet to another, without disengaging the gem from the fingers or the dop from the mounting member therefor.

4. In a device for forming facets upon gems, a pavilion dop therefor to hold the gem angularly to a skeif surface, and for positioning said gem for forming the pavilion facets by holding the cylindrical bezel forming portion of the gem in an unfinished state before imposing the bezel facets comprising a stem having adjacent one end at least two pairs of opposed jaws grouped radially to provide an interior bezel engaging surface substantially of cylindrical contour, said jaws having at their exterior terminal portions conical protuberances merging into tapered sections cooperating to form a tapered nose, an axially disposed backing rod adjustable in said stem to provide a variably positionable seat within said cylindrically contoured portion of said jaws and separate sleeves about said jaws, each sleeve having means for engaging independent pairs of the conical protuberances of said jaws, means for independently adjusting the sleeves longitudinally of said jaws to draw them together radially to clamp the gem, and a holder for the dop, indexing means cooperating with said holder to index said dop in different facetting positions.

5. In a device for forming facets upon gems in accordance with claim 1 wherein said backing rod extends through said stem rearwardly to said opposite end, and is provided with means adjacent said latter end to feed the backing rod axially between said jaws.

6. In a device for forming facets in accordance with claim 1 wherein said jaws carry an adapter comprising a slotted spring sleeve divided into sections formed with tapered ends substantially corresponding to the tapered sections of said jaws.

7. In a device for forming facets in accordance

with claim 4 wherein said jaws carry an adapter comprising a sleeve slotted to provide at least two pairs of opposed jaws, actuated to clamp said gem by said first jaws.

8. In a device for forming facets upon gems, a pavilion dop therefor to hold the gem angularly to a skeif surface and for positioning said gem for forming the pavilion facets by holding the cylindrical bezel forming portion of the gem in an unfinished state before imposing the bezel facets comprising a stem having clamping jaws adjacent one end, grouped radially, said jaws each having a camming portion, a sleeve having camming action on said jaws to cause said jaws to be brought toward one another, means for moving said sleeve for adjustment in relation to said jaws on the stem, an adapter carried and clamped by said jaws comprising a slotted spring sleeve divided into at least three sections, with tapered ends to form a tapered nose, providing resilient stone engaging fingers, grouped radially to provide an interior bezel engaging surface substantially of cylindrical contour, an axially disposed backing rod adjustable within said adapter to provide a variably positionable seat within said cylindrically contoured portion of said adapter, a holder for said dop and indexing means cooperating with said holder to index said dop in different facetting positions whereby all of the facets of said pavilion forming portion of the gem may be polished successively simply by rotating the dop from one facet to another without disengaging the gem from the fingers or the dop.

JOSEF HILLEL SPIRA.

Certificate of Correction

Patent No. 2,393,939. January 29, 1946.

JOSEF HILLEL SPIRA

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 46, for "tubuar" read *tubular*; page 2, second column, line 70, beginning with 'In this construction" strike out all to and including the word and period "gem.", page 3, first column, line 20; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of May, A. D. 1946.

[SEAL]

LESLIE FRAZER,
First Assistant Commissioner of Patents.

with claim 4 wherein said jaws carry an adapter comprising a sleeve slotted to provide at least two pairs of opposed jaws, actuated to clamp said gem by said first jaws.

8. In a device for forming facets upon gems, a pavilion dop therefor to hold the gem angularly to a skeif surface and for positioning said gem for forming the pavilion facets by holding the cylindrical bezel forming portion of the gem in an unfinished state before imposing the bezel facets comprising a stem having clamping jaws adjacent one end, grouped radially, said jaws each having a camming portion, a sleeve having camming action on said jaws to cause said jaws to be brought toward one another, means for moving said sleeve for adjustment in relation to said jaws on the stem, an adapter carried and clamped by said jaws comprising a slotted spring sleeve divided into at least three sections, with tapered ends to form a tapered nose, providing resilient stone engaging fingers, grouped radially to provide an interior bezel engaging surface substantially of cylindrical contour, an axially disposed backing rod adjustable within said adapter to provide a variably positionable seat within said cylindrically contoured portion of said adapter, a holder for said dop and indexing means cooperating with said holder to index said dop in different facetting positions whereby all of the facets of said pavilion forming portion of the gem may be polished successively simply by rotating the dop from one facet to another without disengaging the gem from the fingers or the dop.

JOSEF HILLEL SPIRA.

Certificate of Correction

Patent No. 2,393,939. January 29, 1946.

JOSEF HILLEL SPIRA

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 46, for "tubuar" read *tubular*; page 2, second column, line 70, beginning with 'In this construction" strike out all to and including the word and period "gem.", page 3, first column, line 20; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of May, A. D. 1946.

[SEAL]

LESLIE FRAZER,
First Assistant Commissioner of Patents.