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LENS POLISHING

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Fig. 1.

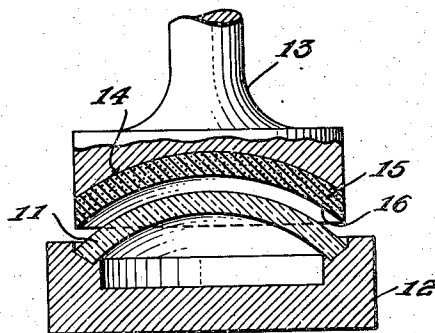
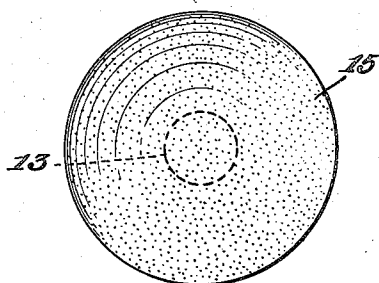


Fig. 2.



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LENS POLISHING

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2 Claims. (Cl. 51—305)

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This invention relates to lens polishing and is particularly concerned with lens polishing apparatus, compounds and methods wherein abrasant material is uniformly dispersed in a solid binder.

The art of polishing glass and plastic lenses is well developed, and the use of ordinary hard black pitch as a polishing compound is commonly known. It is customary to polish a lens by providing a body of hard polishing pitch on a movable tool which works over the surface of a fixedly mounted lens to be polished while at the same time flowing a stream of water containing suspended abrasant particles such as rouge (Fe_2O_3) onto the surface. It is also known to provide an abrasant tool for lens polishing comprising a body of pitch having abrasant particles pressed into its polishing surface.

The present invention contemplates improvement in the above methods, compounds and devices for polishing lenses, and has for its major object a novel solid wear resistant and long life lens polishing compound wherein fine abrasive particles are uniformly dispersed within a solid body of hard lens polishing grade pitch or like binder material having a polishing surface preferably shaped in accord with the lens surface to be polished.

It is a further object of the invention to provide a novel lens polishing material comprising a body of pitch, rosin or like normally solid polishing and binder material containing uniformly dispersed cerium oxide particles, and a lens polishing device mounting such a body.

It is a further object of the invention to provide a novel lens polishing device comprising a tool having fixed to a portion thereof a body of hard thermoplastic binder material containing uniform dispersed fine abrasant powder of the kind normally suspended in water and fed onto the lens surface during usual lens polishing operations.

Further objects of the invention will presently appear as the description proceeds in connection with the appended claims and annexed drawings wherein:

Figure 1 is an elevation partly in section illustrating a preferred embodiment of the invention wherein a body of pitch is mounted on the end of a movable tool illustrated as separated from a stationarily mounted lens adapted to be polished by the tool; and

Figure 2 is a bottom elevation of the tool illustrating its polishing surface.

Referring to Figure 1, a lens 11, suitably fixedly mounted in a holder 12, has mounted above it a

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movable polishing tool 13 having a concave surface 14 to which is fixed a body 15 of thermoplastic binder material. Body 15 contains therein a uniform dispersal of abrasant particles such as fine, powdered dry cerium oxide of a polishing grade and has its arcuate lens contacting face 16 shaped substantially to the curvature of the lens surface which is to be polished. The invention of course is equally applicable to arrangements wherein the polishing block is stationary and the lens is moved.

Preferably body 15 consists of a block of some hard lens polishing grade pitch material which is normally used for lens polishing. However, for varying the hardness of body 15, rosin or some similar equivalent and compatible thermoplastic material may be mixed with the pitch.

Following are examples of composition of pitch compounds made according to the invention:

	Pounds
(a) Hard white polishing pitch:	
Burgundy pitch	4
Rosin	4
Cerium oxide	5
(b) Medium white polishing pitch:	
Burgundy pitch	6
Rosin	2
Cerium oxide	5
(c) Soft white polishing pitch:	
Burgundy pitch	8
Cerium oxide	6

From the above it is seen that any desired hardness of the polishing pitch body can be obtained by varying the relative proportions of the Burgundy pitch and rosin, and in general the more rosin the harder the pitch compound.

In manufacture of pitch body 15 containing the dispersed abrasant according to Example a, I place the four pounds of Burgundy pitch and four pounds of rosin in a vessel and heat until the contents become liquid. Care must be taken not to let this liquid come to a boil, so to prevent removal of some of the natural oils required to give the pitch its polishing characteristics. Then, for safety, the hot liquid is strained to remove all foreign particles. This can be done by an ordinary filter cloth, but in commercial manufacture a thermostatically controlled filter pump is used.

With the contents of the vessel maintained liquid and hot, the five pounds of powdered dry cerium oxide is poured in slowly and the mixture is stirred to insure thorough intermixture and dispersal of the cerium oxide particles in the

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liquid. The stirring operation is continued until a smooth, even mixture or suspension of the abradant particles within the liquid is acquired. The pitch is now ready to be molded on or in the polishing tool or device and this is done in some manner usual in the art for attaching solidified bodies of pitch to polishing tools and holders. The same procedure is followed for making the pitch compounds of Examples b and c.

While I have described the use of pitch, or a mixture of pitch and rosin, as a binder it will be appreciated that any other hard polishing plastic compounds used for lens polishing and which are capable of sustaining a uniform suspension of fine abradant particles may be used for the purpose.

Furthermore, while cerium oxide has proven most advantageous in the preferred embodiment of the invention, I have found it possible to use powdered oxides of tin, chromium and iron, the latter being the usual red polishing rouge which is the most commonly used in the industry, for some purposes.

To my knowledge this is the first time that abrasive particles have ever been incorporated within a solidified polishing binder compound for lens grinding. Previously, it had been considered satisfactory to heat the exposed polishing surface of the solid pitch block slightly, and then press in or similarly apply one of the above-mentioned abrasives to that polishing surface. In such devices, only the polishing surface of the pitch contains the abradant, and the manner in which it is applied is not calculated to provide for uniform dispersal of the abradant particles over the polishing surface. According to my manner of mixing the pitch compound with abradant particles, a uniform dispersal of the particles within the pitch body is obtained which insures that there will be uniform dispersal of abradant particles over the entire polishing area, even as the pitch compound block wears down during polishing. This results in uniform non-spotty polishing action.

When the fine abradant particles are mixed into the pitch or other binder according to my invention, they are retained substantially in colloidal suspension therein, and there is no settling out especially after the pitch hardens.

In use, my new polishing compound actually saves considerable polishing time, amounting to about forty per cent of the usual lens polishing time heretofore considered as the practical minimum. The compound pitch body of the invention containing uniformly dispersed abradant is substantially more wear resistant than previously known polishing compound binders, and lasts from two to three times as long as the body of ordinary pitch provided with a pressed-in layer of abrasive at its polishing surface, for example. Furthermore, once used, the pitch compound body of the invention can be remelted and cleaned if necessary and used over again without losing any of its polishing properties.

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Should the curvature at 16 be different from the curvature of the lens surface to be polished or should face 16 have high or low spots, initial polishing action will soon shape face 16 to conform smoothly to that lens surface, and a polishing surface 16 having uniform abradant characteristics is contacted with the lens surface.

In using a lens polishing tool equipped with a body of my pitch compound, a stream of abradant suspended in water is directed over the surface of the lens being polished, as is usual in lens polishing operations, and in the preferred embodiment, I use a mixture of about twelve parts of water to one part of cerium oxide for this purpose.

In conclusion, the major observed advantages of the present invention over polishing compounds known heretofore are that the same amount of polishing compound lasts a great deal longer and the actual polishing time may be reduced as much as forty per cent. Also, considerable time is saved in breaking in new polishing surfaces. The invention is also usable in polishing other glass or like surfaces than lens surfaces.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. An article of manufacture comprising a body of pitch or like solidified binder material containing a uniform dispersal of cerium oxide particles.

2. The method of polishing a lens surface which comprises arranging the lens surface in rubbing contact with a body of thermoplastic binder material containing a substantially uniform dispersal of abradant particles, while supplying a liquid containing suspended abradant particles between said lens surface and said body.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,223,846	Bachman et al. -----	Apr. 24, 1917
1,693,598	Gamble -----	Dec. 4, 1928
2,246,554	Twynning -----	June 24, 1941

OTHER REFERENCES

Amateur Telescope Making, published by Scientific American Publishing Co., 24 W. 40th Street, New York city, N. Y.