

Memo Report C-90

CHEMISTRY RESEARCH DEPARTMENT

Research Laboratory

May, 1952

A SHORT REPORT OF A DIAMOND-BUYING TRIP

H. Tracy Hall

Mechanical Investigations Section

Abstract: This is a short report of a trip to Acme Diamond Tool Company of New York City to purchase some diamonds for Project "Superpressure".

This is a Class 4 technical report. Its distribution in the General Electric Company is highly restricted. It may not be sent outside the United States.

At the suggestion of A. J. Merad, I record here a short report of a trip on May 16 to the Acme Diamond Tool Company, 15 Maiden Lane, New York City, New York. The object of the trip was to purchase about \$1000 in diamonds for use in the work on "superpressure". It was hoped that a personal visit to the firm would make it possible to select diamonds that have outside natural faces. In addition, we hoped to learn something more of the diamond trade and something more about diamonds than is available in the literature. At one time all of the diamond business was centered around Maiden Lane. Some firms are now located in other parts of the city. Acme Diamond Tool is located on the 19th floor at 15 Maiden Lane. Apparently the whole building is concerned with the diamond business.

The office has an inner and outer door. The inner door is somewhat like that of a bank teller's. When I arrived I had to talk through the little hole in the glass, stating that I wished to see Mr. Stecker. It had previously been arranged that I would see Mr. Stecker of that firm. Behind the locked doors of Acme Diamond Tool, Mr. Stecker spread on the table what I would estimate to be \$100,000 worth of diamonds. We spent most of the day looking at these diamonds and talking about diamonds.

In the diamond tool business there seem to be five types of diamonds used. There is the regular crystalline diamond that approximates gem quality, maybe yellow or off color. There is what is known as boart that seems to be a regular type diamond except for a great deal of impurity included within the crystal. Another type is known as points. Diamond points are the fragments of material that are obtained from chipping the diamond away; that is, a diamond of gem quality. A fourth type is known as "carbon". Mr. Stecker believes that this "carbon" is composed of minute diamond crystals oriented in every direction, imbedded in a natural type of cement. This carbon has wide use in industrial tools because it has no grain. Its fracture is not definite as is the fracture in crystalline diamond. Mr. Stecker described this carbon as being nature's equivalent of Carboloy. Carboloy consists of crystals of tungsten carbide cemented together with cobalt. Another type of diamond used in industrial tools is known as ballas. This diamond is supposed to be built like an onion, that is, one spherical shell surrounded by another. These diamonds are found only in Brazil. Incidentally, "carbon" is found only in Brazil. The ballas can be peeled apparently as an onion can be peeled.

One surprising aspect of the trip was the fact that Mr. Stecker would occasionally leave the room to take care of other business, leaving me with all the diamonds spread on the table. Actually, I would have felt much more comfortable if he had been present all of the time. This situation caused a little embarrassment later on. Mr. Stecker had one package of diamond points. I wished to purchase the entire lot. Apparently this had previously been weighed and had 19 carats marked on the package. For some reason this just didn't look like 19 carats

to me, so before closing the deal I asked if he would mind checking the weight of this particular package. Of course, he was perfectly willing to do so, but in view of the fact that he had left me alone with so many thousands of dollars of diamonds, it required a little nerve to ask him to weigh this one particular package. The package did weigh 19 carats.

The principal product manufactured by Acme Diamond Tool is a diamond pointed tool for dressing silicon carbide or other types of grinding wheels. They have developed quite an art of mounting these diamonds. I asked what the particular material was that they used for mounting. It looked like a type of silver solder such as "Easy-Flow". Stecker hedged on this question but did state that this material contained a high proportion of silver. A hollow cavity is made in the steel rod where the diamond is to be mounted. The diamond is held in place, and then this molten metal is poured around the diamond. There is no actual bond to the diamond-- apparently the whole thing is of a mechanical nature. In using diamond tools to dress grinding wheels, one turns the tool about 10° down from off center so that the diamond point drags along the surface. If the tool is used as an ordinary lathe-cutting tool, then it is subjected to repeated hammer blows, and a diamond cannot stand this type of treatment. However, a diamond tool used in this 10° down position will cut away a good many cubic inches of grinding wheel made of such material as silicon carbide without showing any detectable wear on the diamond.

Before the last World War, when the industrial diamond people would receive shipments of industrial diamonds there would occasionally be a diamond of gem quality in the shipment. They would always look the diamonds over and sort these out. Mr. Stecker did have several of these diamonds. Most of these were beautiful little octahedra. One could hardly believe that they came out of the ground this way. They are formed so perfectly, the surfaces are so smooth and they reflect the light in such a beautiful manner. He has not been able to get a single gem quality diamond out of a shipment of industrial diamonds, though, since the period before this last World War. These particular gem quality diamonds were somewhat yellowish and cost in half carat sizes about \$20.00 each. I could talk him into parting with only one of these diamonds. It would be more profitable for him to eventually have them cut and mounted.

I was shown several pieces of "carbon" almost as big as your fist. These were black rounded stones and I'm sure if one happened across such a thing, he would pass it by for being a piece of gravel. Speaking of gravel, they had one very interesting specimen, about the size of two of your fists. On one side, a diamond about 1/2" across was firmly imbedded. It might be of interest to see the type and price of the diamonds that were purchased. These are shown in the table that follows:

Diamond points	19 carats at \$22 per carat	\$418.00
2 Ballas	.20 carats at \$50 per carat	10.00
1 Crystal octahedra (rather perfect)	.53 carats at \$40 per carat	21.20
2 Large Imperfect octahedras	3.08 carats at \$52.50 per carat	161.70
11 Natural Fragments of "Carbon"	3.15 carats at \$26 per carat	81.90
106 Small Boart	18.87 carats at \$16 per carat	<u>301.92</u>
		\$994.72

Many factors influence the price of the diamonds. One of the important factors of course is the size. For instance, the rather small ballas diamonds weighed a tenth of a carat each. These cost \$5 apiece. (\$50/ct. in this size) In 0.5 ct. size they would be priced near \$150/ct.

H. Tracy Hall

Distribution List for Memo Report C-90

A.L. Marshall
A.J. Nerad
A.E. Newkirk
H.A. Liebhafsky
J.H. Holloman
J.C. Fisher
D. Turnbull
F.H. Horn
G.W. Sears
F.P. Bundy
H.M. Strong
H.T. Hall (6 copies)
R.H. Wentorf
B.W. Nordlander
Department Office
Publications Office