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A METHOD FOR COMPARISON OF TOOL MARKS

David L. Cowles and James K. Dodge

Superintendent David L. Cowles is in charge of the Bureau of Scientific Identification of the Cleveland Police Department. In 1927 Mr. Cowles established within the Cleveland department one of the first municipal firearms identification laboratories which laboratory has steadily grown to include today photographic, fingerprinting and laboratory functions. As State Vice President of the International Association for Identification he serves as a member of the Science and Practice Committee of that body.

Sergeant James K. Dodge graduated from Ohio State University in 1929 and in 1940 received a degree in law from the Cleveland Law School. He joined the Cleveland Police Department in 1937 and with the exception of about one year has been on the staff of the laboratory where he handles problems in firearms identification and chemistry.—EDITOR.

This article presents a new method for use in criminal investigations for the comparison of tool markings on metal or other hard surfaces. Other methods have been tried by the writers and found to be less satisfactory than the method outlined here. Among these other methods is the use of Plasticene, a material similar to modeling clay, with subsequent positive cast using plaster of Paris. This method is rapid and easily handled in the field but has the disadvantage of the lack of retention of microscopic detail necessary to identify a particular tool as the one used. It is still a convenient method where the general shape and size of the tool is to be shown as for example on soft wood surfaces. The use of agar moulage shows detail but is cumbersome to apply and does not readily lend itself to close comparison of microscopic markings. Methods using foil either tin or aluminum are effective where large defects can be found on the surface of the tool in question, but special training and technic are essential to the successful use of this method.

The method now outlined can be used by untrained personnel with limited practice. It is rapid and little equipment is needed. It shows microscopic markings clearly and with patience good comparisons can be secured with suspected tools. This material and instrument was originally designed to test machined metal parts for the quality and fineness of the finish thereon. It is now being so distributed to manufacturers and fabricators under the trade name of Faxfilm.

The procedure in making the test is to apply a solution of cellulose acetate in acetone and other solvent materials to the tool mark in question. If the tool mark is on a vertical surface, the solution may be applied directly to a strip of cellulose acetate tape and then applied to the tool mark. In the first instance the strip of tape is applied to the solution on the tool mark. The tape is held in place with pressure of the fingers, or in small, deep

impressions with a rubber eraser, for about forty-five seconds. The vehicle dries in the time noted and pressure may be released. The transparency is then lifted and has the exact engraving of the mark on it. It is then mounted in special cardboard folders designed especially for the purpose, and having a half-inch hole cut in the center to permit subsequent projection of the image of the markings. The company makes two styles of projectors for this purpose. One style projects the image singly and does not lend itself to ready comparison. The other style projects two images side by side from two transparencies, both magnified thirty times. The latter style is recommended for tool mark comparisons.

It is suggested that men responding to the scene of a crime carry a kit of materials for the making of these films. Whenever such marks are found and films made they can be filed with information as to the type of tool suspected of having made the mark as for example chisel, bar, pliers, etc., with measurements and other descriptive facts with regards to the tool if possible. When suspected tools are found in possession of thieves, comparison markings can be made and checked against the file. In order to compare such marks a smooth piece of metal without extraneous marks is used, and a mark is made with the suspected tool on such metal. Another impression is made from test mark and mounted in one projector of the comparator, and suspected marks compared against it by placing them in the other projector. Both transparencies should be aligned in the same direction much as bullets must be mounted pointed in the same direction for ballistics comparison. The engraving on the metal caused by the tool will then show as fine lines which can be made to flow from one projection to the other as is done with bullets from the same gun. When such a comparison can be secured it can be stated that the same tool made both marks. The entire unit can be taken to court to show comparison or a photograph can be made.

The authors have found that polished aluminum is a good test metal for making trial marks with suspected tools. They have also found that the angle at which a tool is held may vary the marking greatly and several tests may be required from a single tool. Complete information about the mark made in the field helps to limit the number of tests required.

Due to the difficulty of securing good films on deep markings the method cannot be used in every case. Deep chisel marks and deep screw driver marks for example result in bubbles in the solution that cannot always be eliminated. A rubber eraser cut

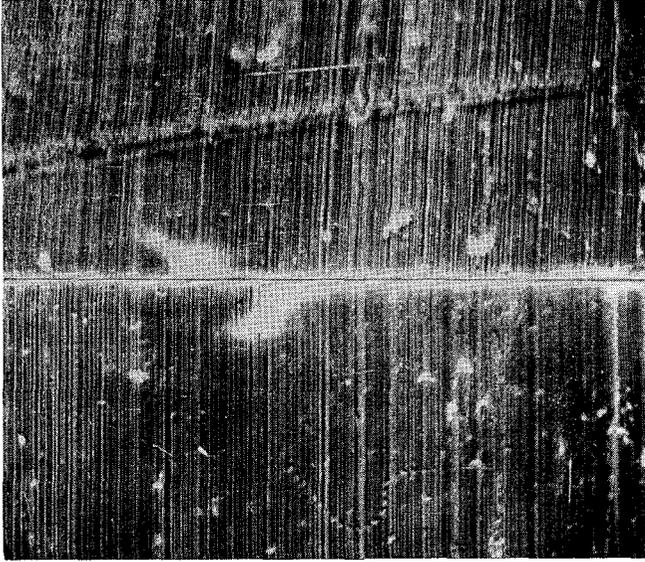


Figure 1.

Comparison of a Tool Mark Made with the Faxfilm Process.

to a fine edge can be used sometimes to reach such marks where the fingers cannot supply pressure.

Where the scratches of a tool are in lacquer or other paints soluble in the vehicle the tool marks are lost when the solution is applied. The Faxfilm Company is now working on other solvents that would lend the method to usage on painted surfaces of this type also.

The holes cut in the folders as supplied by the company are one-half inch in diameter. Where larger marks are to be compared the transparencies can be mounted between glass slides. When mounted between glass the film should be allowed to dry for several minutes to prevent the glass from flattening the markings.

The method had been useful on two occasions in Cleveland (Fig. 1). In one instance a new style all-metal building, similar to a quonset hut, was burglarized. Marks on the door which was forced to gain entrance were evidently made by a pinch bar. Impressions were made of the markings and a comparison was made with a bar found in the car of a man suspected of having entered the building. These markings were identical, and the crime was solved. In another instance a lock was forced with a pair of pliers. A comparison made against a pair of pliers used on the premises disclosed that these were the pliers used. The authors have not as yet presented the method in court but feel that it will be accepted when properly presented.