A 'cyanoacrylate case' for developing fingerprints in cars

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A portable case has been developed by which cyanoacrylate (super glue) fuming can be used inside a vehicle suspected of being involved in serious crime. The car itself serves as a fumigation chamber and the cyanoacrylate vapours are fed into the car via a hose. Connected to the hose and suspended inside the car is a vapour diffuser. The cyanoacrylate originates from a portable case where there is a sealed heater and also a command panel with hygrometer and thermometer for a technician to control the process. There is also space inside the case for other necessary equipment.

Une valise portable a été développée pour permettre la vaporisation de cyanoacrylate à l'intérieur d'un véhicule suspecté d'avoir été utilisé dans la commission d'un crime. La voiture sert de chambre de fumigation et les vapeurs cyanoacryliques sont introduites dans la voiture par un tuyau. Accroché à l'intérieur de la voiture et connecté au tuyau, il y a un diffuseur de vapeurs. Le cyanoacrylate provient d'une valise portable qui contient un corps de chauffe scellé et un tableau de contrôle avec un hygromètre et un thermomètre pour permettre aux techniciens de contrôler le processus. Un espace est réservé dans la valise pour d'autres équipements nécessaires.

Es wurde ein transportabler Koffer entwickelt, mit dessen Hilfe Cyanacrylatdämpfe im Inneren von Fahrzeugen zum Einsatz gebracht werden können. Der Koffer ist ausgestattet mit einer geschlossenen Heizkammer zur Erzeugung der Cyanacrylatdämpfe. Die Kammer kann über ein mit Hygro- und Thermometer ausgestattetes Kontrollbord reguliert werden. Das Fahrzeug selbst fungiert als Dampfraum, in den die Cyanacrylatdämpfe über einen Schlauch eingeleitet werden. An dem Schlauch ist im Inneren des Fahrzeugs ein Dampfdiffusor angebracht. Im Koffer ist außerdem genügend Platz, um andere Ausrüstungsgegenstände zu transportieren.

Se ha desarrollado un maletín portátil mediante el cual se pueden usar vapores de cianocrilato (super glue) dentro de un vehículo. El propio automóvil sirve como cámara de fumigación y los vapores de cianocrilato se introducen en el coche a través de una manguera. Conectado a la manguera y suspendido dentro del coche se encuentra un difusor de vapor. El cianocrilato se origina desde un maletín portátil donde hay un calentador cerrado y un panel de control con higrómetro y termómetro para que un técnico pueda controlar el proceso. También hay sitio dentro del maletín para otros equipamientos que se puedan necesitar.

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Introduction

Cyanoacrylate fuming is a well known method for developing latent fingerprints on non-porous surfaces [1]. It consists of fuming with super glue (methyl-, ethyl- or propyl-cyanoacrylate) by heating in a chamber under conditions of controlled humidity [2,3].

Items to be treated with cyanoacrylate need to be placed in a sealed fumigation chamber. Transportable devices, such as wands, exist but can only be used for localised application by hand [4].

The authors have developed a system to treat motor vehicles involved in serious crimes by using the vehicle itself as a fumigation chamber after biological and other contact trace evidence has been preserved.

Application

The 'cyanoacrylate case' consists of a box with the following dimensions: length 57 cm, breadth 37 cm, thickness 37 cm, weight 20 kg. This case allows the storage of the different accessories which are necessary for development (Figures 1 and 2). In the left side of the case are various cyanoacrylate doses, syringes (to stop the fumigation of the super glue) and tools (screw-driver, pliers, etc.).

The right side of the case is composed of a command panel and a heating chamber. The command panel (Figure 1) is where different command indicators allow the user to control the development process. On the command panel is a hygrometer and a thermometer. Ambient temperature and relative humidity cannot be modified unless the humidity is too low, when a container of warm water can be put inside the vehicle to be processed. A timer allows the technician to record the fumigation time, a toggle switch controls the device regulating the dispersion of vapour in the vehicle and two pilot lamps indicate the working of the heating chamber and spreader. Finally an emergency stop button allows the immediate shutdown of the system, which is connected to a 220V/4A electrical supply.

Cyanoacrylate is put in an aluminium cup and the cup is placed in a heating chamber surrounded by Nylon™ (Figures 1 and 2). From 5 to 10 grams of cyanoacrylate are necessary in order to perform the processing on an average car interior. At the bottom of the heating chamber, which is closed by an airtight cover, is a fan which propels the cyanoacrylate vapour through a plastic hose. This can be cut to a length of 1.5 metres to 3 metres long, depending on the vehicle or the site on which processing has to be performed. More cyanoacrylate may be added to the chamber without interrupting processing.

The car doors and windows are sealed with self-adhesive rubber strips and the vapour spreader is hung inside the closed vehicle on a telescopic rod/handle (Figure 3 and 4). The spreader comprises two parts (Figures 2 and 3). The upper part consists of a fan connected to the AC supply on the case, which draws the cyanoacrylate through the plastic

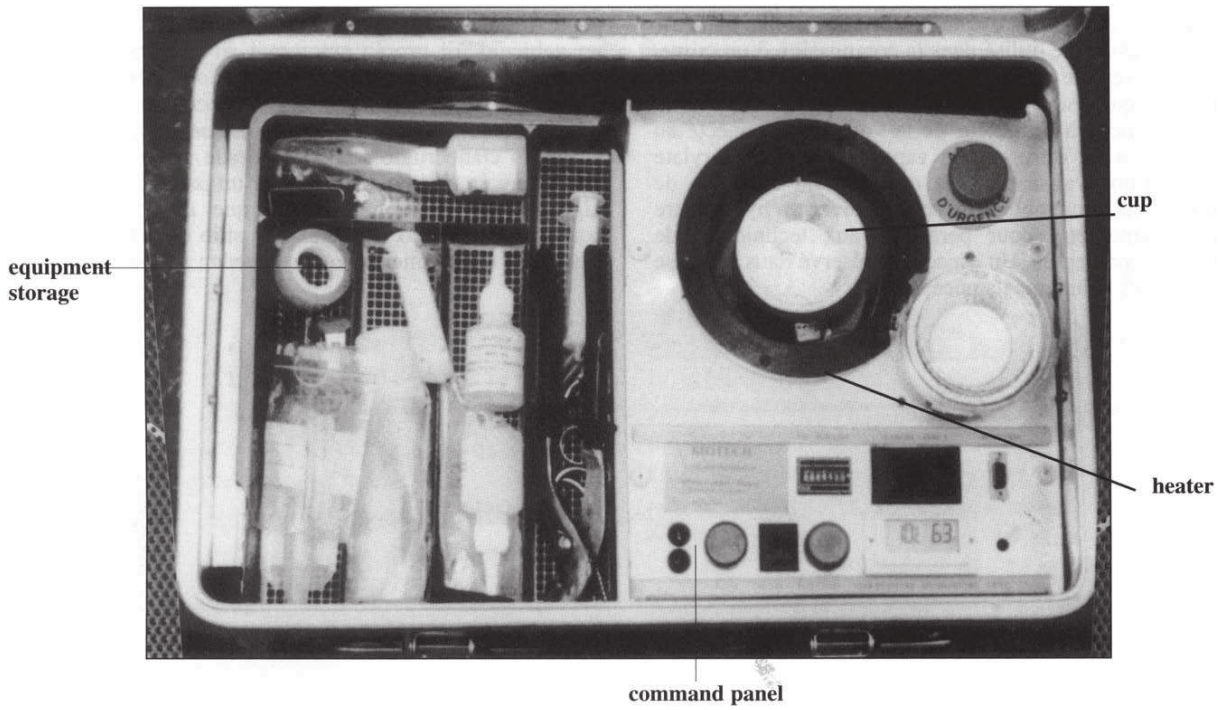

FIGURE 1 Contents of cyanoacrylate case.

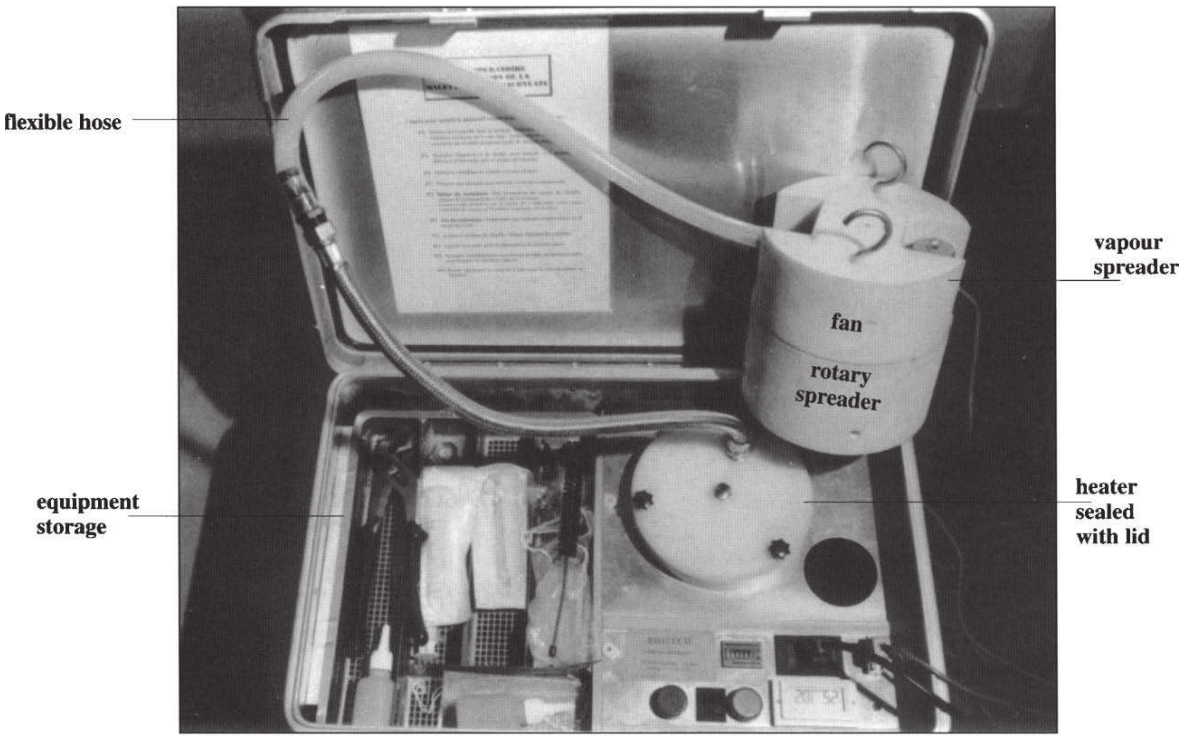

FIGURE 2 Contents of cyanoacrylate case and vapour spreader.

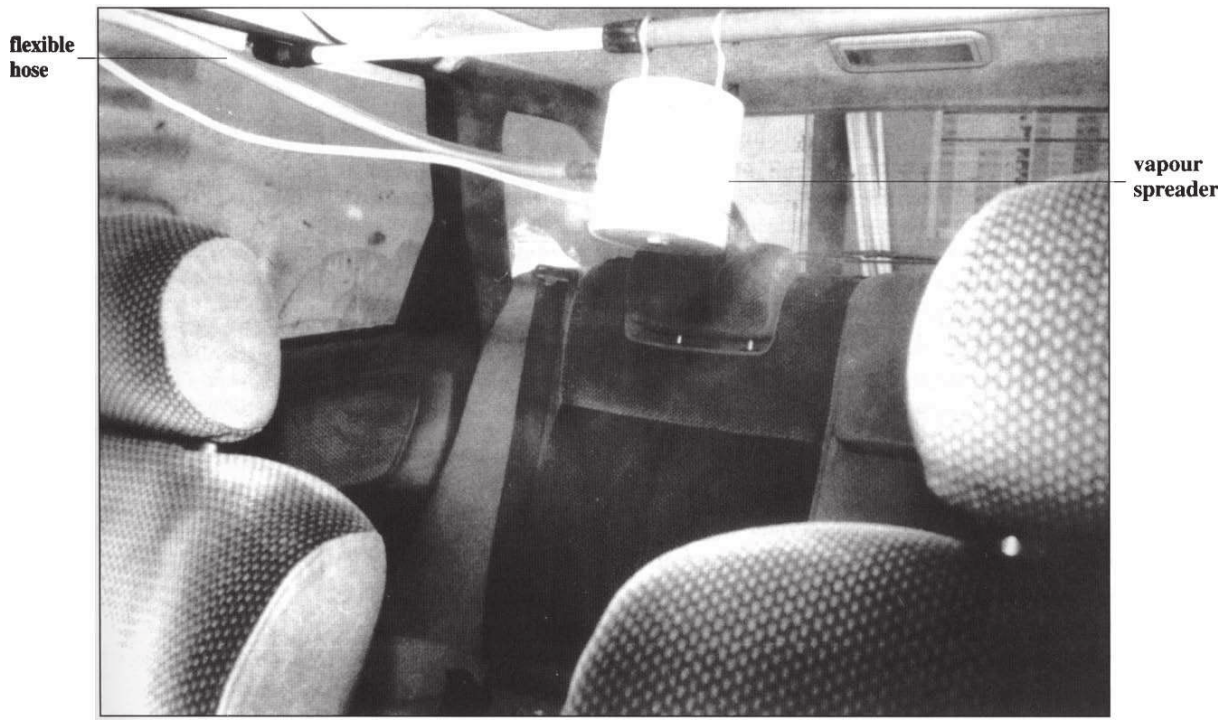

FIGURE 3 Cyanoacrylate vapour spreader suspended inside vehicle from telescopic handle.

FIGURE 4 Arrangement of cyanoacrylate case outside of vehicle with hose to vapour spreader inside.

hose when the temperature reaches 110°C. The lower part is a rotary spreader (operated by the 450 Pa / 60 revolutions per minute pump) which diffuses the cyanoacrylate fumes.

Development is controlled by observing latent fingermarks left on a known place. At the optimum development, cold water is injected through a septum into the cyanoacrylate cup to stop fumigation, and the fan is stopped. Because development is generally done outside, ventilating the vehicle simply requires opening the doors.

Discussion

Different tests and case studies have allowed the authors to validate this process, including the development of latent fingermarks on non-portable items in houses using a plastic tent. In such cases, before the development can take place, ventilation has to be provided through a pipe connected to the outside. The process takes longer this way.

Earlier, with the idea of equipping a scene of crime technician with a case connected to a fumigation chamber [5,6], the authors looked into trapping cyanoacrylate vapour in water. This project was abandoned because of pressure differences between the case and the fumigation chamber, but it allowed further study of the safety of trapping cyanoacrylate vapour with water. The authors did this using gas chromatography/mass spectrometry analysis.

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