the face. The projection error is the average distance between facial and cranial landmarks once the SFO has been performed. This measures the quality of the overlay, and its value (score) is used as evidence for the computation of the LR.

Following the person-generic approach, the opposing propositions are:

Hs: the skull belong to the same subject of the facial photograph

Hd: the skull belong to a different subject from that of the facial photograph

As for the relevant population, we considered the sex estimated from the facial photograph, together with the overall pose of the face. Same-source and different-source scores are obtained by performing SFO over data from the same or different subject. To this end, once the compatible subjects have been selected, multiple photographs are simulated from each model, SFOs are carried out and the corresponding scores are computed. Once the two score sets have been calculated, the underlying distribution is estimated using Kernel Density Estimation. Finally, the two likelihood values are computed, followed by a division operation delivering the LR value.

The materials involved in the study are a set of 78 head CT scans of different subjects with at least 6 visible landmarks. There are 50 men and 28 women, aged from 18 to over 80 years. These materials were collected directly from French hospitals and medical center archives in 2008 and 2009.

The experimental study involved the calculation of 100 LR values for positive cases and other 100 LR values for negative cases. These test scenarios were created by simulating photographs as well. The median LR value for positive cases was 190.3, while for negative cases the value was 0.0. Computation time was close to 1 minute per computation.

The introduced LR framework is practical and sound. The main limitation of the approach is due to the use of simulated photographs from 3D models. Computed LR might not be reliable for photographs showing facial expressions beside neutral, occlusions and other unfavorable photographic conditions that cannot be simulated adequately.

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Interference in the construction of gas meters through the action of foreign objects: features

Oksana Zakovyrko,
Dnipropetrovsk Research Institute of Forensic Expertise, Dnipro, Ukraine,
ORCID: https://orcid.org/0009-0000-9318-4109, email: dniprondise@ukr.net
Maksym Kovzel,
Candidate of Technical Science, Associate Professor, Dnipropetrovsk Research Institute of Forensic Expertise, Dnipro, Ukraine, ORCID: https://orcid.org/0000-0001-5720-1186, email: dniprondise@ukr.net
Alona Bila,
Dnipropetrovsk Research Institute of Forensic Expertise, Dnipro, Ukraine,
ORCID: https://orcid.org/0000-0002-8271-8539, email: dniprondise@ukr.net

Methods of unauthorized disclosure and interference in the operation of gas meters are considered, and the most characteristic changes introduced when interfering with the design of the measuring and counting mechanisms of the metering devices are described.

Keywords: gas meter construction, trasological research, measuring and counting mechanism of metering devices, gas meters of the membrane type, unauthorized interference in the operation of the gas meter.

Втручання в конструкцію лічильників газу шляхом дії сторонніх предметів: особливості

Оксана Заковирко, Максим Ковзель, Альона Біла

Розглянуто способи несанкціонованого розкриття та втручання в роботу лічильників газу та описано найхарактерніші зміни, що вносяться під час втручання в конструкцію вимірювального та лічильного механізмів приладів обліку.

Ключові слова: конструкція лічильника газу; трасологічне дослідження; вимірювальний та лічильний механізм приладів обліку; газові лічильники мембранного типу; несанкціоноване втручання в роботу лічильника газу.

Manufacturers of gas meters are constantly improving the design features of these devices, but the increase in the cost of energy carriers led to the spread of cases of theft of natural gas by consumers, as a rule, by interfering with the operation of metering devices.

The relevance of the chosen topic lies in the fact that the methods of unauthorized disclosure and interference in the operation of gas meters are not only improved in today's conditions, but also quite often videos of the disclosure and interference process are published on the Internet.

Despite the constant modernization of the design features of gas meters, they increasingly become objects of expert traceological research. We have described the most characteristic changes made when interfering with the design of measuring and counting mechanisms of accounting devices.

Expert (forensic) investigation of membrane-type gas meters is carried out in accordance with the following stages:

1) preliminary research of objects;
2) detailed study of objects:
   - separate study;
   - a comparative study (if necessary, depending on the tasks assigned to the expert);
   - expert experiment (if necessary, depending on the tasks set before the expert);
3) evaluation of the results of the conducted research and formulation of conclusions;
4) drawing up an expert's opinion and drawing up an illustrative table.

When carrying out trasological research, membrane-type gas meters are often submitted for expert research. Their research requires knowledge about the design of these metering devices, the principle of operation, possible options for interfering with the operation of membrane-type gas meters and changing their design.

Design features of membrane-type gas meters: the meters consist of three main components: a metal case, a measuring mechanism, and a counting mechanism.

The metal case consists of two parts: upper and lower, which are hermetically connected to each other. The measuring mechanism is placed in the middle of the case. On the upper part of the housing there are connecting pipes (input and output) for installation to the pipeline.

To protect against unauthorized interference with the operation of the gas meter by penetrating the inside of the meter through the inlet nozzle (gluing magnetic materials to the valves or other actions to change the design of the gas meter) and to protect against contamination of the working surfaces on the inlet nozzle, a deflector (a device to protect against pollution and interference) [1].

The measuring mechanism of the counter consists of: 2 hermetic chambers; the internal volume of the chambers is divided into two parts by a gas-tight membrane. The middle of each membrane is connected to the valves of the distribution system and the shaft of the metering device through a system of levers. The valve seat of the distribution system (spool pair) is hermetically attached to the inlet/outlet openings of the chambers. The outlet of the meter and two valves (Fig. 1, item 1) are installed on the valve seat, which are connected to the lever system (crank-lever mechanism) and can move on the seat along a given trajectory (Fig. 1, item 2). When gas is supplied to the meter, gas is alternately displaced from one working chamber to another. Their movement turns into a rotary one, which is then transmitted to the counting mechanism.

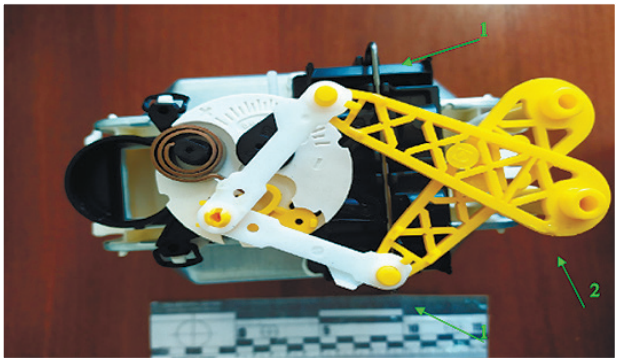

Fig. 1. Image of the measuring mechanism of a membrane-type gas meter (top view), where:
1 – valves, 2 – crank-lever mechanism

Parts and units of measuring mechanisms for membrane-type gas meters are usually made of plastics. Meter manufacturers note that the use of plastic measuring mechanisms significantly reduces the cost of production, increases resistance to the action of chemical gas components, significantly reduces the coefficient of friction in the moving parts of the mechanisms, and prevents interference with the operation of the meter by means of magnetic influence.

The counting mechanism of gas meters is a mechanical drum one, attached to the upper part of the meter body, usually contained in a plastic case with an inspection glass and sealed with seals. The counting mechanism consists of a system of gears and rollers.

The rotational movements of the gears (gear wheels) are transmitted through the teeth to the rollers of the eight-roller block of the counting mechanism. The eight-roller block consists of 5 black rollers and 3 red rollers and 7 transfer rollers located between them. That is, the movements of the measuring mechanism are transformed into rotary movements of the eight-roller block of the counting (counting) mechanism by means of gear transmission.

Indicators are displayed in m3 using 5 reels before the comma and three reels after the comma.

Therefore, the gas passing through the meter causes the membrane of the measuring mechanism to verbally move gradually. A system of levers and a distribution system transforms the verbal-gradual movement of the membranes into the rotary movement of the counting mechanism.

That is, the work of the counting mechanism is carried out in such a way that it can calculate gas consumption for a specific period of time. The counting mechanism processes these calculations into a digital equivalent. The digital indicator is displayed on the panel of the housing of the meter's counting mechanism.

In some models of gas meters, the use of a low-frequency pulse generator is provided, which is mounted in a special socket on the body of the meter mechanism.

Thus, in order to improve the protection of meters against unauthorized interference in their operation, during the introduction of the meter into operation, not only the metering mechanism, but also the gas pipeline to which the meter is mounted, must be sealed with the seal of the gas supply or operating organization.

Recently, during the study of gas meters, the expert is most often faced with the task of detecting changes in the design of the measuring mechanism by pasting a permanent magnet on the valve surface of the distribution mechanism and making changes in the design of the counting mechanism by removing the supporting part of the counting disk.

As expert practice has shown, changes in the design of the measuring mechanism of accounting devices are made by damaging or removing seal stickers, seals of the manufacturing plant or state trustee, access through the inlet pipe of the upper part of the case to the mechanisms of the measuring mechanism of the meter with subsequent installation of additional equipment (magnet).

Changes to the design of the counting mechanism are made by removing the seals of the manufacturer or state trustee, damaging the integrity of the sticker seal (if any), removing the plastic housing of the counting mechanism with an inspection glass. After that, the axis of the counting rollers is dismantled, to remove the supporting part of the roller, etc.

Despite the improvement of methods of theft of energy carriers, traces of interference in their work are always displayed on the external and internal surfaces of metering devices. The full and scientifically substantiated evidence of interference in the operation of accounting devices is precisely the conclusion of the experts, which is based on the results of a traceological study conducted in expert institutions using modern forensic equipment.

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Traces of violence on the corpse

Elżbieta Żywucka-Kozłowska,
Dr. h.c. Universitas Ateneo Tradizionale Mediterrano, Italy, assoc. prof., Department of Criminal Procedure and Executive Criminal Law, Faculty of Law and Administration, University of Warmia and Mazury in Olsztyn, Goleniów, Poland, e-mail: malerude@poczta.onet.pl

The paper outlines the definitional difficulties of violence. It is defined both as "a single or repeated intentional act or omission that violates the rights or personal rights of persons" and "something what includes three measurable aspects, namely affect (anger), behavior (e.g. physical damage) and intention (harm)". It is stressed that forensic-medical assessment of such traces is of great importance for the legal qualification of the act. Biological and material traces are distinguished and considered within the scope of criminology and forensic medicine.

Keywords: traces of violence, corpse, sexual freedom, damage to physical or mental health, forensic-medical assessment, biological traces, material ojects, post-mortem imaging

Сліди насильства на трупі

Елжбієта Живуцка-Козловська

У науковій праці окреслено труднощі визначення поняття насильства. Воно визначається як «одноразова або повторювана навмисна дія чи бездіяльність, яка порушує права чи особисті права осіб», так і «щось, що включає в себе три вимірні аспекти: афект (гнів), поведінка (наприклад, фізична шкода) і намір (шкода)». Наголошується, що судово-медична експертиза таких слідів має велике значення для правової кваліфікації діяння. У рамках криміналістики та судової медицини виділяють і розрізняють біологічні та матеріальні сліди.

Ключові слова: сліди насильства, труп, статева свобода, шкода фізичному чи психічному здоров'ю, судово-медична експертиза, біологічні сліди, матеріальні об'єкти, посмертна зйомка.

The traces of violence on the corpse are nothing revealing. They have been known to humanity for thousands of years, although probably in those distant times no attention was paid to them. The essential fact was the death of a man, and how he died was of secondary importance, if at all. Today the view is different. Violence of human against human is a reprehensible phenomenon, punishable under the applicable law. It is also punishable to desecrate human corpses and remains.

Considering violence, it is impossible not to emphasize the definitional difficulties of this term, which is pointed out in many scientific works [1]. The Act on Counteracting Domestic Violence of July 29, 2005 defines violence as "a single or repeated intentional act or omission that violates the rights or personal rights of persons, in particular exposing these persons to the risk of loss of life and health, violating their dignity, bodily integrity freedom, including sexual freedom, causing damage to their physical or mental health, as well as causing suffering and moral harm to people affected by violence" [2]. Violence defined in this way has a wide scope. Anna Seredyńska recalls the definition of Kevin Browne and Martin Herbert, emphasizing its three measurable aspects, namely affect (anger), behavior (e.g. physical damage) and intention (harm) [3].