



## TEST BENCH FOR IMAGERY RESEARCH OF GAS EXPLOSIONS

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### Summary of the invention

Knowing the evolution of the flame front of the explosion, from the initiation, along the path of the transparent explosion chamber, to the exhaust of the combustion gases into the atmosphere, as well as the pressures developed by the explosion, provides extremely useful information for researching explosion phenomena, for understanding the mechanisms of their ignition and propagation in controlled environments (at various gas concentrations, in quiescent or turbulent state of the explosive mixture), as well as for calibrating computer simulations of flammable gas explosions.

The invention refers to a stand for the imaging research of explosions of flammable air-gas mixtures, which allows recording the phenomena of ignition and evolution of combustion (development of the flame front) with the help of a high-speed camera (more than 30000 frames per second). The system uses a transparent parallelepiped explosion chamber, interspersed in a special montage of planar mirrors, mechanically deformed in a controlled horizontal and vertical plane, respectively, to obtain the focal distances required for the use of the Schlieren technique. The system uses a cylindrical incandescent light source, internal pressures are monitored, and the explosion is initiated by an electrical spark (inductive or capacitive).

The advantages of using the stand are as follows:

- ensures the complete imaging research of gas explosions, from the ignition initiation phase, during the evolution of combustion, until the exhaust in the atmosphere;
- easy achievement of optical effects similar to fixed parabolic mirrors, by using plane mirrors, deformable mechanically controlled, with the possibility of adjusting the focal distances;
- the use of a cylindrical light source with filament, with the possibility of adjusting the light intensity by means of an autotransformer, for the visualization of the Schlieren effect at speeds higher than 30000 frames per second of the video camera;
- monitoring the pressure developed by the explosion.

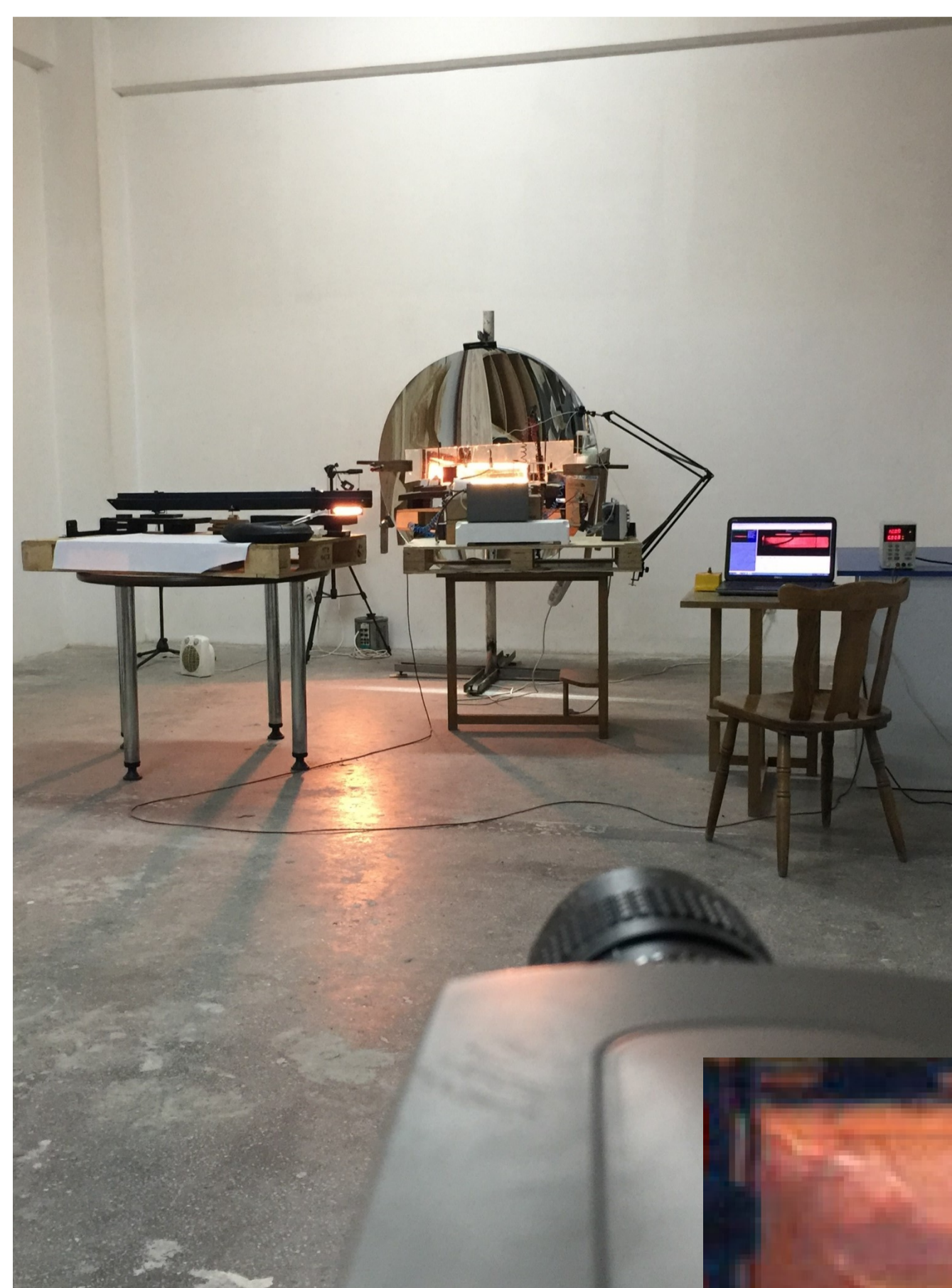


Fig. 1. Stand for the imaging research of explosions

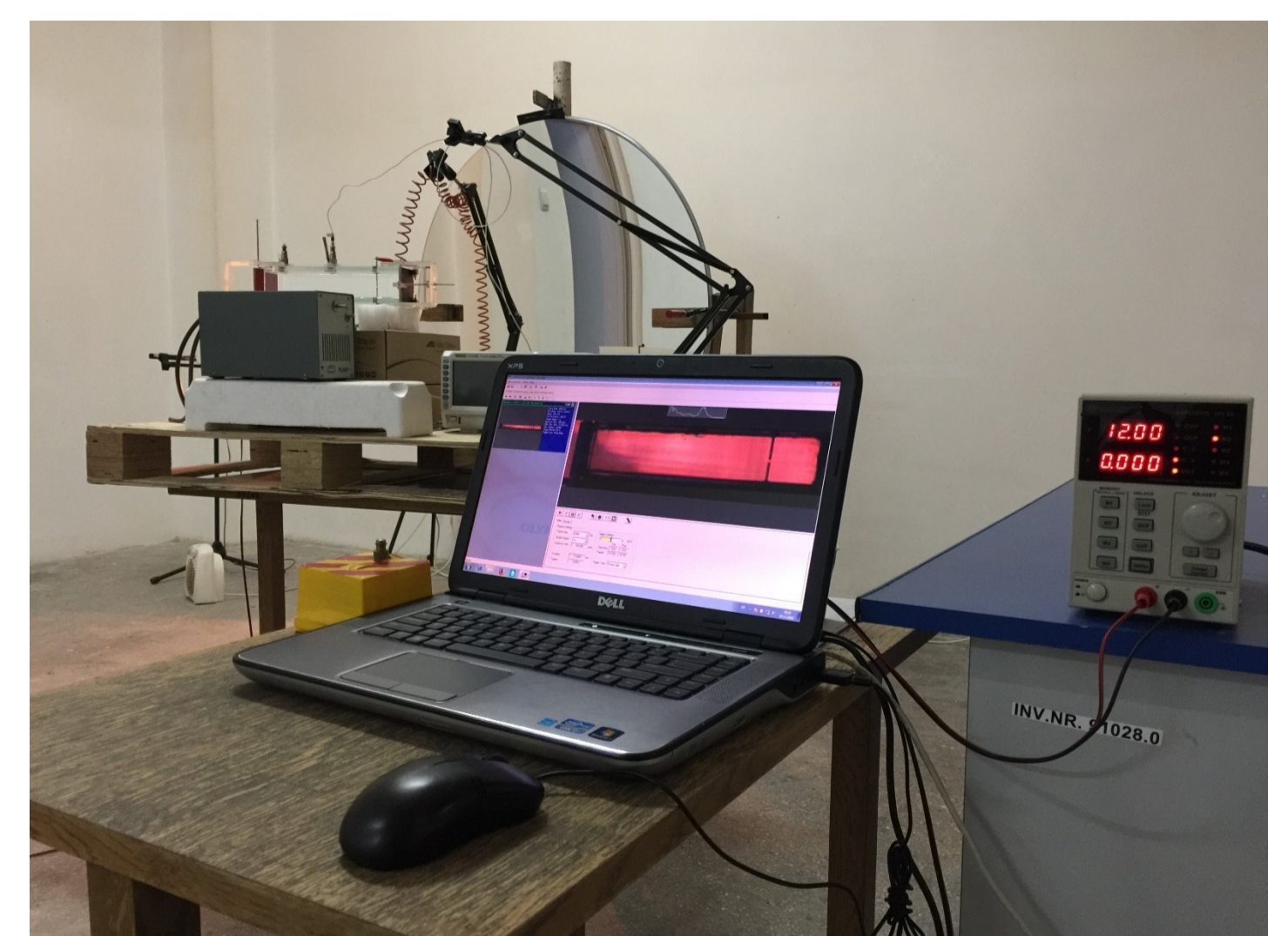


Fig. 2. Recording the explosion parameters



Fig. 3. Image of the flame front, obtained by using the stand

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