An instrument comprising a contact force sensor device

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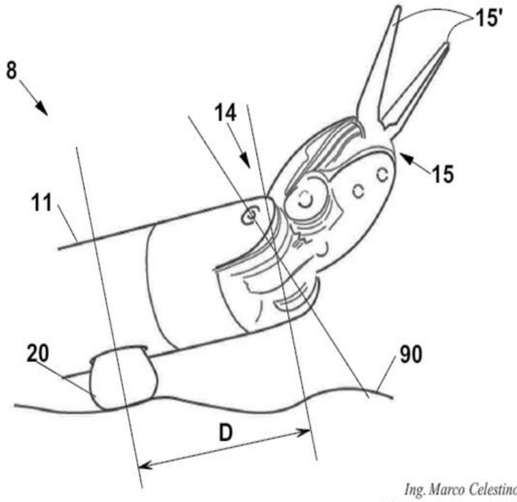
Invention

The technology consists of a contact force sensor comprising an inflatable balloon, a processing unit receiving a signal of changes in pressure or deformation in the balloon and a device for notifying the operator of the contact force signal (compliance of fabrics) calculated by the processing unit. Current surgical robots are not equipped with force sensors since these are not yet adaptable to laparoscopic surgical instruments due to the small size of the entry holes in the human body, they are expensive and difficult to biocompatible and/or sterilizable. In addition, any visual estimation algorithms of the contact force do not always have a reference image of the patient's organs/tissues that are not deformed. The present technology overcomes these limits as the biocompatible and elastic membrane (latex) of the inflatable balloon, the only portion in contact with the human body, is disposable and separable from the electronic part of the system (the pneumatic sensor can be positioned at a distance from the point of contact). Once deflated after measurement, the membrane can be withdrawn inside the working tool. The system can be miniaturized for compatibility with minimally invasive surgical instruments such as forceps, scalpels and others of the Da Vinci robotic system.

Drawings & pictures



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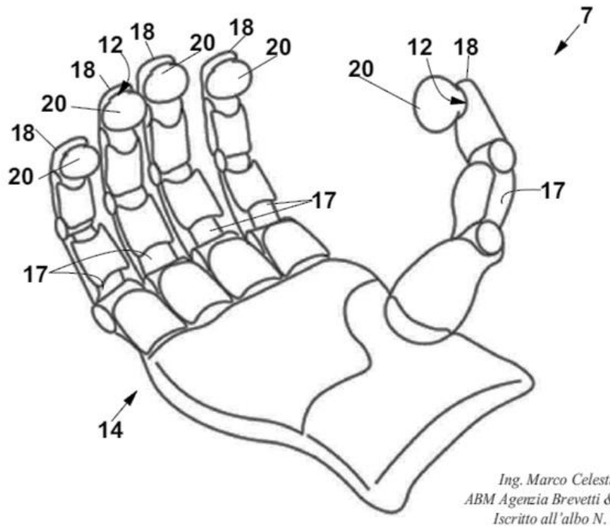

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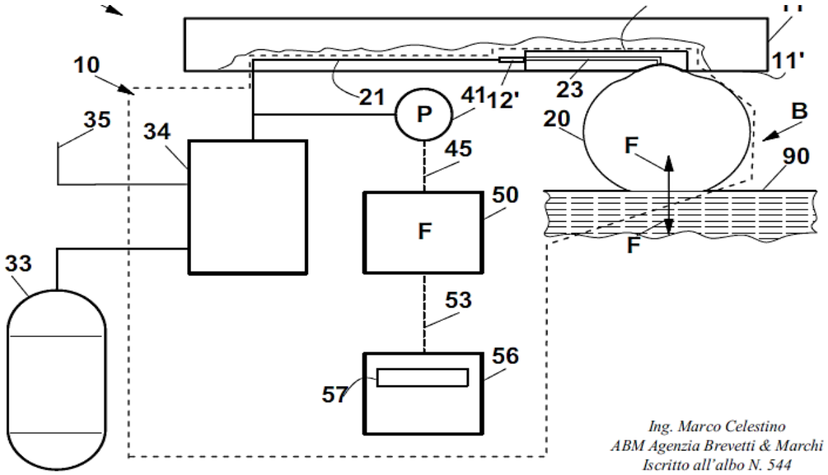

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Industrial applications

The technology can be applied to Health and Life Sciences, in particular within the medical devices and ICT domains for health, diagnostic, therapeutic or surgical purposes. It is applicable to surgical or diagnostic robotic instruments or hands for evaluating the consistency of blood vessels surrounding the operation site.

Possible developments

The research group is looking for industrial partners operating in the field of medical devices and/or ICT for medicine interested in collaborating for the technological development of the invention, improving the prototype and its adaptability to instruments for microinvasive laparoscopic operations. The University of Siena is available to negotiate specific agreements for the technological maturation, license or option of the patent title linked to the invention.

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