

## **Boeing gets patent for a shockwave attenuation system**

March 23 2015, by Nancy Owano



Credit: USPTO

In science fiction, force fields act as a defense against enemy fire. This month, Boeing got a patent for generating force fields that keep shockwaves from harming military vehicles. The Boeing Company's patent, "Method and system for shockwave attenuation via electromagnetic arc," was filed in May 2012.

The patent said "A <u>shockwave</u> attenuation system is proposed. It has a sensor for generating a detection signal based on at least one of detecting



an explosion capable of producing a shockwave traveling through a first fluid medium to a protected region, and estimating a location and time of the explosion, and detecting an explosive device and estimating a location and time of an explosion from the explosive device that is capable of producing the shockwave traveling through the first fluid medium; and an arc generator in communication with the sensor for receiving the detection signal therefrom, and in response thereto heat a selected region of the first fluid medium rapidly to create a second, transient medium, different from the first medium, interposed between the shockwave and the protected region such that the shockwave contacts the second, transient medium and is attenuated in energy density before it reaches a protected asset in the protected region. "

The patent said "Explosive devices are being used increasingly in asymmetric warfare to cause <u>damage</u> and destruction to equipment and loss of life. The majority of the damage caused by explosive devices results from shrapnel and shockwaves." While shrapnel is problematic in and of itself, shockwave damage has been even more difficult to prevent. "Damage from shrapnel may be prevented by, for example, physical barriers. Shockwaves are traveling discontinuities in pressure, temperature, density, and other physical qualities through a medium, such as the ambient atmosphere. Shockwave damage is more difficult to prevent because shockwaves can traverse an intermediate medium, including physical barriers." Damage from shockwaves may be lessened or prevented by interposing an attenuating material between the shockwave source and the object to be protected. The patent filing said the "need exists for a shockwave attenuation device that is capable of dynamically interposing a medium between an explosion source and a protected asset. There is also a need for an intermediate medium that effectively attenuates the energy from a shockwave and that allows for protection of a protected asset in a marine environment."

Steve Dent, associate editor, Engadget, translated their concept: "The



idea is to harness electrical energy to stop or slow down the shockwaves created by <u>explosions</u>, which can do just as much damage as shrapnel." Boeing's plan, he said, would be to "marry a rapid explosion sensor with an arc generator to protect targets like <u>military vehicles</u>, buildings or groups of troops or civilians." The result would be a buffer zone different temperature, air density and other characteristics would reflect, refract, absorb and deflect at least a portion of the shockwave.

As part of a *PatentYogi* video, "Boeing patents force fields from Star Wars," the notes described the system: "An armored vehicle in a war region needs to be <u>protected</u> from shockwaves. An explosive detonates near the vehicle, releasing shrapnels and shockwaves. Sensors on the vehicle detect the explosion and determine the direction of the explosion, based on the light generated by the explosion. Immediately, the anti-shockwave system is deployed. Laser sources send out highintensity laser pulses in the direction of the <u>explosion</u>. The laser pulses ionize the air to form a laser-induced plasma channel." The channel differs from the ambient air in density, temperature and composition. The channel causes some of the shockwave to be reflected, refracted, absorbed and deflected, saving the vehicle from damage. The technique may be used to protected fixed structures too, such as buildings, marine vessels and aircraft.

*CNET* noted that as described, "the system is not designed to prevent direct impact from shells or shrapnel; rather, it is designed to protect a target—such as a vehicle or building—from the damaging effects of shockwaves from a <u>nearby</u> impact."

## More information: Patent 8,981,261

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