

MODERN TECHNOLOGIES WITH MILITARY APPLICATIONS: THE OPTOELECTRONICS CONCEALMENT IN THE MODERN BATTLEFIELD

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Abstract: With the ever increasing importance of the vertical component in modern warfare, in the context of the technical and scientific revolution (and accordingly, the revolution in military affairs) have emerged and consecrated the improved means of concealing designed for the flying machines, which use the technique of holography or optoelectronics technologies that enable the minimizing or even the cancellation of aircraft surface interaction with the light beams. Along with these optoelectronics technologies they have also been developed the MHD (magneto hydrodynamic) technologies which allowed not only to improve the performances of speed and altitude, but also to reduce the shock wave (sonic boom) and the radar footprint.

Keywords: stealth / infiltration / electronic countermeasures / magneto hydrodynamic.

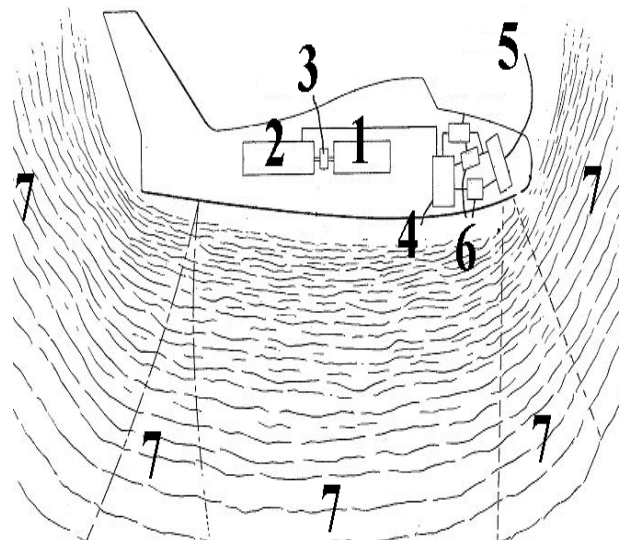
Once published the first informations on *stealth*¹ technique (in the early 90th) it has become increasingly clear that one of the preferred directions of development of the modern aircraft technology will be the related to ensuring the aircraft invisibility against the action of the enemy detection equipment. Therefore, the military aircraft for strategic bombardment have gained the tendency to be primarily *infiltration flying machines*.

1. INTRODUCTION

In the context of the contemporary technological developments, the military aerospace vehicles designed for strategic actions can be better protected against radars using their own MHD/electrokinetic sustentation and propulsion system. Such an aerospace MHD/electrokinetic vehicle could be protected with an active concealment system which uses a shell of electrons and ionized particles.

1 *Stealth* refers to the so-called LO technology (low observable) based on the use of active or passive countermeasures for the protection of combat personnel and combat equipment by turning them into objects difficult to observe by the equipment enemy type radar or infrared, thermal imagers, sonar or other methods of detection.

We remind on this occasion that, according to historian Valeriu Avram, the origin of this idea would belong to the Romanian inventor Vasile Dimitrescu, during World War I, around that time when the theoretical basis of geophysical weapons were made by Constantin Văideanu. According to information released by the historian V. Avram, the inventor Dimitrescu predicted (during 1910-1914) the using of the electromagnetic radiations for the detection (the radar of today) of aircraft but he also would have designed a protection mean consisting in an electron and ionized gas (air) cloud which was supposed to surround the aircraft.



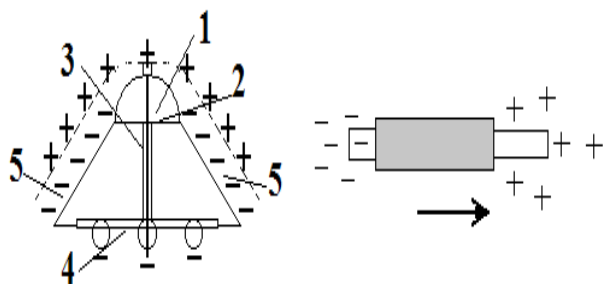


Fig. 1 Above, the aircraft with anti-radar protection using electron beams, according the patent US3127608: 1- the engine; 2- electric generator (motor-driven); 2- transmission mechanism between the motor and the electric generator; 4- modulator; 5- particle accelerator; 6- klystron; 7- layers of charged particles formed around the aircraft. On left, the general scheme of an aerospace electrokinetic vehicle and the Tesla coil application in the field of aerospace propulsion: 1- Tesla coils; 2- alternator; 3- Tesla transformer; 4- electrostatic generator; 5- vacuum. On the right, an example of Biefeld-Brown effect² application by the appearance of forces between the asymmetric electrodes during the action of high potential supply: the force is exerted from the cathode to the anode.

2 Thomas Townsend Brown (1905-1985) was an American physicist and the author of some experiments achieved by applying high voltage to the electrically conductive and dielectric materials. In 1921, during some experiences he highlighted the phenomenon of an occurrence of forces which were applied to a certain direction when using the capacitors with asymmetric armatures, supplied at high voltage, this phenomenon would be later called *the Biefeld-Brown effect*. This name refers to Dr. Paul Alfred Biefeld (1867-1943) who was a German-American engineer, astronomer and professor with whom Brown claimed to have made the experiments mentioned above. After 1930, T. T. Brown entered in the United States Navy and realized researches in fields such as the electromagnetism, gravity, spectroscopy etc. It is known for the correlation which he tried to do between electromagnetism and gravity but also for its many patents on electrokinetic propulsion systems.

As at the end of XIXth Century the inventor and scientist Nikola Tesla had already developed the high frequency and high voltage generators, almost simultaneously occurred in his mind the possibility of using the electricity for the aerospace sustentation and propulsion systems³.

Unfortunately, when Tesla has stated⁴ about these conclusions of his research, he was derided and considered eccentric or mad.

Even much before that time, Tesla predicted the using of the electromagnetic waves for the remote control⁵ of the aircraft.

However, in the coming decades (between the world wars) all the research undertaken by other scientists and inventors, generally arrived at the same results as Tesla... From this perspective it should be mentioned a series of pioneers of the electrokinetic propulsion technology, such as : Th.T. Brown (1905-1985), Agnew Bahnson (1886-1966), Hector Serrano, Alexander DeSeversky (1894-1974), Henry Dudley, Robert Baker, Henry Wallace (these latter two, made among others, certain researches on creating the artificial gravitational waves) etc. To achieve an electrokinetic aerospace vehicle is required the boarding of a generator capable of providing high power, but also of working at high voltages. In the interwar period like the present moment, only⁶

3 Nikola Tesla, *New York Herald Tribune*, the article *Tesla's New Monarch of Machines*, 15.10.1911.

4 Nikola Tesla talked about an envisaged work entitled *Dynamic Theory of Gravity* in his discourses from 10. 07. 1937 and 12. 05. 1938; this work was never real achieved or published but his statements were recorded.

5 The patent US 613809 granted in 1898 to Nikola Tesla for „*Method of and Apparatus for Controlling Mechanism of Moving Vessels or Vehicles*”.

6 When the author makes this statement, he refers not only to the technological capacity but also the relationship between power and total weight of the device or between the voltage and total weight, because if the device has a too big weight (or dimensions), it could not be airborne.

the Tesla systems (the so-called *Tesla coils*⁷) were capable of such performances. Note that Tesla has developed this technology since the late of XIXth Century and during interwar period certain advanced experiments were conducted (especially by the Germans) using this technology.

2. THE TECHNOLOGY OF INVISIBLE PLANES

As it is well known today, the radar⁸ is an apparatus which sends and receives electromagnetic waves, usually focused within a cone, through which it make the bombardment of the atmosphere with radio emissions of a given frequency, therefore if it is an aircraft within that region of the atmosphere, it should reflect the electromagnetic waves such as to be received by the radar device.

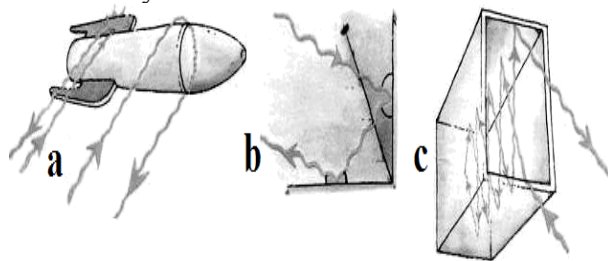


Fig. 2 The ways of reflection of the radar waves into the surface of the flying machines⁹.

For a better understanding of these technologies, we'll briefly present some aspects of the physical phenomena involved in the formation of optical imaging and radar image of an aircraft, and obviously, how we can partially or completely blurred these images. An aircraft capable of being invisible for radar but even optically (invisible to the human eye and to the usual photo/video cameras equipment) would be *an almost perfect infiltration vehicle*.

7 The patent US512340 granted in 1894, the same technology of the subsequent patent US593138 from 1897, but the main idea started since 1891.

8 The name comes from the acronym Ra.D.A.R. (**R**adio **D**etection and **R**anging).

9 Fig. 2, 3 and 4, after the drawings published in *Science et Vie* nov. 1987, pp. 58-62.

Some of the technologies that could be applied in this regard have been already tested by the USA since the onset '50s and '90s, and already there were released some information about the radar invisible (*stealth*) aircraft designed both for reconnaissance and strategic bombardment. The aircraft capable of silent flying are also those designed by Henri Coanda, by applying the improved variants of the silent nozzles invented by him, for example the patent US2173549 for a muffler for jet engines, or a silent nozzle for jet engines (for which he was granted with the patent US2173550), and also the patent US2187342 for another type of silent nozzle, the US2907357 and US2920448 for an accelerator capable to achieve the propagation with high speed of a fluid jet but also in terms of quietness, the patent US2990103 for an improved nozzle and finally the US3685614 for a muffler are just a few examples. Coandă technology is generally simple and effective, reducing the thermal footprint and ensuring a quiet operation.

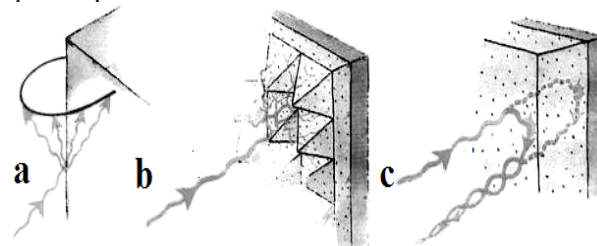


Figure 3 Posibile structures on the aircraft surface, designed for absorption of the radar waves.

If the air-depression technology (Henri Coanda) or the vacuum-propulsion¹⁰ technology (Rudolf Liciar) would be properly hybridized with the MHD and/or electrokinetic technology, we can say that we are facing the technologies that may already allow the creation of some military flying machines (for reconnaissance and bombardment, also jet fighters - who may face an enemy that he even cannot see!?) who can fly without being noticed by the usual radars, without being seen by the human eyes or the usual photo/video equipment, but without making noise.

10 Lucian Ștefan Cozma, *The vacuum-propulsion technology- concept and applications*, in the Air Forces Academy Review no. 3/2014, pp. 43-52.

Such flying machines may fly whenever above any country, without anyone to see nor the presence neither the activity they perform.

As it can be seen in the Fig. 2 the interaction between the aircraft surfaces and the electromagnetic radiation is such that the images of radio waves are well reflected, in particular by the sharp surfaces but also by the round ones (Fig. 2a) which have the advantage to disperse to some extent the electromagnetic radiation; reflected also by the edges (fig. 2b) and by the various cavities (resonant) or chambers (holes, slots etc.) located on the surface of the aircraft (fig. 2c). Such interactions result in the formation of the back scatter beam of the electromagnetic radiation, finally captured by the radar.

To make the signal picked up by the radar to decrease even until its disappearance, it was taken the measure of rounding the edges in order to break the wave (Fig. 3a), but also to make an special arrangement on the surface of the aircraft using certain geometric shapes capable to break completely the radar waves (Fig. 3b), or even by achieving walls which have a sandwich structure (Fig. 3c) and capable to absorb the radio waves.

Most often, however, these methods are used in combined form, plus special anti-radar paints and the applying other types of exterior anti-radar treatments which are able to significantly reduce the radar foot-print.

Over time, at these technologies has been added the technology of holography, which allowed that the aircraft surface could become almost invisible optically (by holographic camouflage techniques or capturing the environmental images and projecting them on textile screens¹¹), not only invisible just for radars.

Based on the general analysis of the contemporary technological level, we can say that at present these technologies are not only developed but even properly improved, compared to models which have already been released in the early XXIth Century.

The work of researchers has revealed in time and a number of unexpected ways and means that could contribute decisively to achieving the almost perfect stealth flying machines. Among them, Dr. Robert Birge, who moreover has some of the most prestigious results, internationally recognized in the field of technologies for aircraft invisibility.

Otherwise, R. Birge obtained a number of patents and from his public work we could cite for instance the patent US6461594 for *photo chromatic materials that absorb radiation*, or the patent WO9621228 for *an optical memory device*, also the patent US5253198 for *a three-dimensional optical memory*. Finally, during his research, R. Birge discovered at a time that it can be used in the stealth technique a number of molecular derivatives of the chromophore 11-cis which is within the retina of the human eye. Note that a *chromophore* is a group of atoms which once introduced in the molecule of an organic substance, they color this substance, like a microscopic pigment. One of these molecular derivatives which was been called the ATRSBS (*All-Trans-Retinal Schiff Base-Salf*) is obtained artificially, representing a molecular chain longer than that of the natural retinal rhodopsin, but having similar photo chromatic properties. It is worth mentioning at the same time that the rhodopsin from the human retina is concentrated within a cell membrane which is a part of the retinal cells (the retina is a nerve membrane sensible to light and located in the backside of the eye, which is made up of several layers of specialized cells, which form the visual image of the eye) and this rhodopsin is in fact the overall albumin present in the retina of the eye tissue.

The rhodopsin is normally closed within the cell membrane of the retina and it has the faculty to absorb the light reacting photo chromic to its action, i.e. translating the chromatic message of the light.

11 Takumi Yoshida, Sho Kamuro, Kouta Minamizawa, Hideaki Nii and Susumu Tachi, *RePro3D: Full-parallax 3D Display for Superimposing 3D Images onto the Real World using Retro-reflective Projection Technology*, The journal of the Institute of Image Information and Television Engineers, Vol.66, No. 4-2012, pp. 1-7

In the rhodopsin operates a derivative of the vitamin A, i.e. the retinal compound 11-cis, able to isomerization (*the isomerism* is the property of some substances with the same chemical composition, to have different properties and characteristics because of the different positions of the atoms into the molecule; the substances that have this property are called *isomers*, while *the isomerization* is the property of a substance to be transformed into an isomer). The chain of specialized protein molecules it is wrapped in seven parallel loops (helicoidal) as shown in the Fig. 4; in obscurity (the absence of the light) the retina rests while the atoms of hydrogen and carbon are arranged on the same side of the protein chain, while under the action of the light, if it is a light radiation with a wavelength between 300 and 600 nanometers (approximately the visible spectrum), this compound retinal protein is isomerized, that changes the shape arrangement of its atoms in the protein chain, gaining also completely different characteristics, namely the two hydrogen atoms are separated and therefore the protein chain had the tends to go up, as shown in fig. 4b.

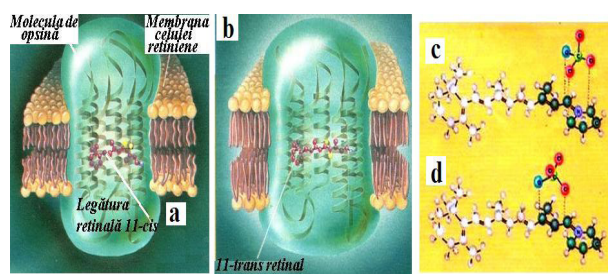


Fig. 4 On the left side, the molecule of rhodopsin in the retina of the human eye is artificially modified to be used in the actual stealth (optical invisibility) technology of the modern aircraft. In the center, the change of the rhodopsin molecule that has yielded a photo chromic material designed to absorb the light rather than to reflect/refract it.

By absorbing the impact photons and not reflecting the incident light, it is achieved an body which is invisible to the human eye. On right, the natural molecular chain of rhodopsin (c) and the modified one (d).

Therefore, the 11-cis retinal needs only a small input of energy to pass from the *cis* form (with hydrogen atoms within the molecule) into the form *trans* (with atoms of one side and the other of the molecule). These two forms are some real light traps.., because they absorb the photons without any heat dissipation into the environment. This is exactly the property that is wished for the surface of an aircraft that would be optically invisible, not only invisible for the radar. The molecule that dr. R. Birge extracted and studied, can be artificially reproduced, even with improving its photochromatic properties, for this reason he added a supplementary cycle in the chain, therefore the artificial molecule became longer than the natural one (Fig. 4d). To stabilize it, R. Birge added a perchlorate ion which he arranged above the molecule in question and the ion was connected to the molecule through the weak electrostatic bonds. The result was that the completely stabilized molecule shall be capable of absorbing the light without reflecting it, without refraction, without producing and dissipation of heat. This process occurs as shown in Fig. 4d, by ion movement between the two groups of atoms in the chain, without mention about any isomerization because the position of the atoms remains the same, only the perchlorate ion from outside the molecule is moving, improving in this way the phenomenon of photons absorption and the full light capture. To understand how an object could become invisible, we must first study some general information on the structure and functioning of the human eye.

Regarding the known radar waves, they are usually in the range of centimeters so it could be absorbed by the molecule above mentioned; however, the civilian and military researchers were and currently are able to link to each other the retinal molecules with other molecular compounds capable to absorb the electromagnetic radiations from the radar spectrum. Accordingly, we should specify that any image, therefore the visibility of a certain object is formed through the light emission of the light sources or by reflection and refraction of light, according to the refractive index of each substance and of the propagation medium.

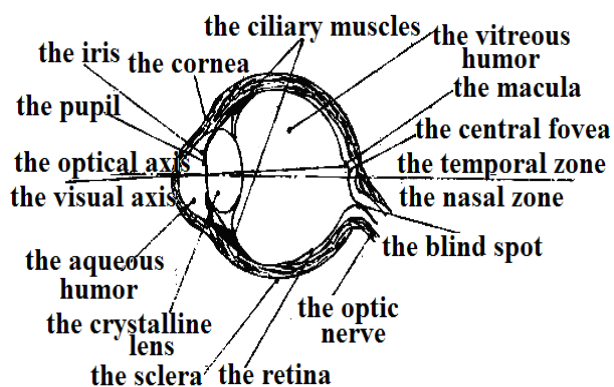


Fig. 5 The structure of the human eye.

Therefore, the human eye (fig. 5) as well the photo/video camera receives a photon beam that is reflected/refracted by the body which is exposed to light; if the same body will not be anymore the lighted area of any source of light nor it has its own light, then it will no longer be seen, therefore it become invisible... It is known long ago that the professor of anatomy Werner Spalteholz¹² from the Institute of Anatomy at the University of Leipzig has done interesting research on the skin of animals, trying to achieve invisibility of the skin, which he started from trying to make a transparent substance, that it can be easy traversed by light and thus the substance becomes difficult to see for the human eye. For this, he took the experimental substance and processed it such that it became white, then he washed and treated it with the methyl ether of salicylic acid, which has a high refractive index.

By introducing the treated object into a vessel with methyl ether, it becomes almost transparent. Such experiments have inspired the famous science-fiction writer H. G. Wells, who published in 1897 a famous science fiction novel on the subject, entitled *The Invisible Man*¹³.

12 Werner Spalteholz (1861-1940) was a German professor and anatomist from the University of Leipzig. He made and published (in 1895) the atlas of human anatomy, a very detailed work for that time.

13 H. G. Wells, *The Invisible Man*, published first time as a serial story in *Pearson's Weekly*, 1897.

However, Wells was wrong interpreting the experiments of transparency as solutions for invisibility... Transparency is one thing and the invisibility is quite another thing! Not to mention that if *Griffin* (the invisible man, the hero of the Wells's book) should had been transparent... he would be completely blind because the light would not have stopped on his retina and therefore he could see nothing of what was around him. For an object to be invisible is necessary either to absorb completely the light and let no longer any photon to leave its surface, in which case it cannot be observed, or it to absorb partially the light but to have a refractive index equal to that of ambient or which does not differ from that of the environment (air) with more than 0.05. Eventually it was kept the idea to absorb completely the light and also the idea to form a virtual image that could deceive the visual perception of the observer, in this case being applied, for example, the technique of holography.

Finally, there are also the method of using the nanomaterials based on liquid crystals which are made as thin films and work like a flexible monitor screen, which coated the surface of the stealth body in an attempt to make it virtually transparent within the medium through which it moves.

Until now, the most advanced methods of invisibility (optical, not radar) are based on completely capturing of the light without any heat dissipation and deflecting the photons so that the light beam will bypass the shielded object.

There was thus obtained a *stealth* flying machine which is imperceptible to the human eye and to photo/video cameras, also to the thermal visors and infrared tracking heads. But it could be observed by certain means which can translate the light signals from the infrared and ultraviolet register, and which might observe the body of the stealth aircraft as a kind of black spot, ie a screen in the way of IR and UV emissions which come from the environment to the camera lens.

Of course, the principle would be able to be applied to clothes to achieve such a total photons (light) capture.

Against these technologies there are objectors who say that if there is a body that absorbs the light it would be observed as a dark region, a black zone. The author does not subscribe to this theory because we must not confuse the regions of shadow with those regions that absorb the light, therefore the regions which not reflect and have a very small refractive index, as it is that of air. But on this occasion it would be appropriate to remember briefly the terms of reflection and refraction: the reflection is the phenomenon that occurs at the surface separating two optical media characterized by different refractive indices and which manifests by turning the light back into the environment where it originated; the refraction is a phenomenon that occurs in the separation surface between the two transparent optical media but which have different refractive indices and may be observed to a certain degree the penetration of light from the medium of origin in the second optical medium.

As we can see, the refraction theory concerns two transparent optical media, in which a good part of the light passes from the emitter medium in the target medium. A classic example is that of air and water refraction happening on the water surface, where some of the light that passes through the air will enter in the liquid mass and transparent/translucent of water. Hence, the water absorbs some of the light, according to its different refractive index (a bigger one) than the very small refractive index of the air. If the photon-absorber surface of the stealth flying machine fully absorbs the light it is like there would be no difference between the air medium and the body of the aircraft, so it behaves as if the refractive index would be equal to that of air.

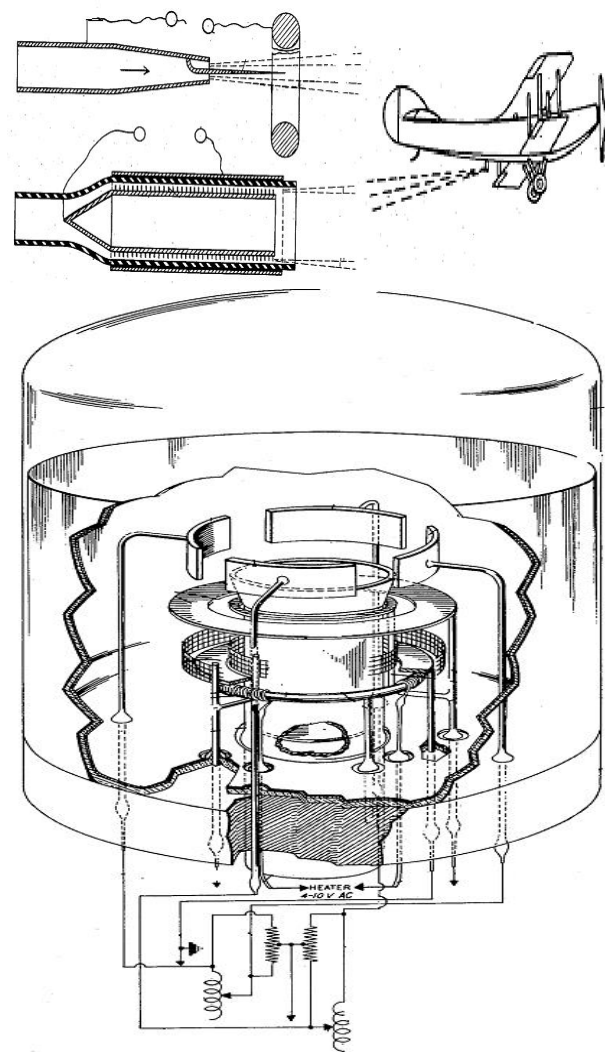
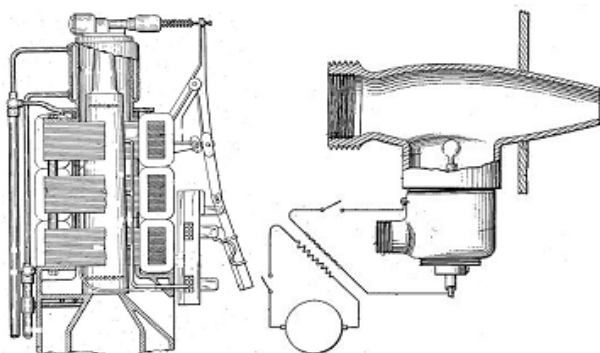


Fig. 6 The installation of spray the electrically charged vapors, according the patent US1530468 (above) and a similar device according the patent US1854475. On left, the airborne installation designed to make the electrification of fluid particles and their fine spray into the atmosphere, according the patent US1928963. On the right, a device for creating an electronic cloud for protection against radar emission and against the electronic aggression made with high or low frequency emissions, according to the patent US7203882.

Finally, we mention the fact that they have been also invented devices (for electronic counter measures) that can degrade the recording magnetic films audio/video, so these films can not record images or sound from the protected device.

The invisible aircraft could be used in modern atypical and unconventional (non-NBC) confrontations for the following types of missions:

1- the scattering in the atmosphere of certain micro particles in order to achieve mirrors for the electromagnetic radiation, these mirrors are in turn used to reflect the special radio emissions, such as for example the special secured transmissions, or the radio beams of the electromagnetic aggressions which can work at very high or very low frequencies;

2- the collecting of the micro particles clouds used for the above-mentioned mirrors and also to delete any traces they would leave the atmosphere;

3- the infiltration missions into enemy territory, also reconnaissance missions and the aerial surveillance of certain perimeters;

4- the realization of complex aerial relays into the radio-electronic confrontation including the electromagnetic aggressions; to be really effective such a scheme, it must have at least three main relays along with the secondary relays.

In addition to these main relay it is necessary the intervention of a variable number of auxiliary relays or other devices, including aircraft designed to create in the atmosphere mirrors for the electromagnetic radiation. In turn these flying machines must be protected against the enemy interception, which means that it must be undetectable radar and optical. In short terms, *invisible*. Aircraft image is captured nor by radar, neither by human eye or even by the optical and optoelectronics devices (for thermal or infrared images), so that it can evolve unimpeded in the enemy airspace.

To achieve such mirrors in order to reflect the electromagnetic radiation there have been invented installations which are able to electrify liquid substances in order to spray them under the form of mist or clouds. Such artificially fog or clouds could be highly electrically conductive and would have good reflective properties for the electromagnetic radiation.

They are most often used installations which work with a mixture which consists of air, water and aerosols.

In rare situations there are adopted special working agents, such as micro spheres of cesium hydrate, of lithium, sodium etc.

In fact, the technology of these installations is based on that used by the civilian installations which produce the artificial fog (widely used in show business and cinema) or used for dissipation of the natural fog.

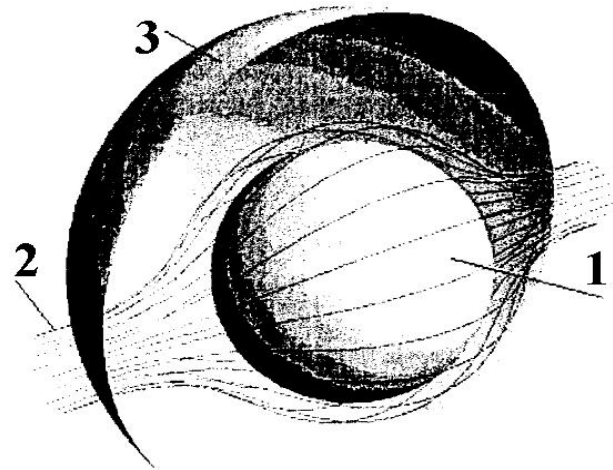


Fig. 7 An object optically concealed: 1- the body under optoelectronics concealment; 2- the light source; 3- the shield formed by the electromagnetic field which deflects the light, that practically bypassing the concealed object. According to the patent US2008024792 granted in 2008 to J. Pendry.

Such installations can be airborne embarked by planes or on aerial platforms held by special balloons (based on modern technologies and built with composite materials which can resist to extreme temperatures, from fibers and fabrics based on nanotechnology, possibly equipped with magneto hydrodynamic or electrodynamic layers which play a role in the field of lifting/propulsion etc.), they serve not only in electronic confrontation but also in the case of the geophysical aggression, for instance by spreading the substances that can alter the ozone layer, by spraying cryogenic liquid (these by detente can absorb a lot of heat, causing the brutal cooling of the underlying layers of air, close to the ground) or other forms of physico-chemical intervention.

The use of automated or manned aerospace vehicles in order to achieve support actions for the electronic weapons systems, raised the additional issue of their camouflage or concealment, so that their presence and action to be completely invisible: *the stealth technology*.

As mentioned before, such means of aerial warfare designed to achieve the electrically charged clouds or mist, in turn are adequately protected so as not to be detected by the enemy radars and be seen neither by the naked eye nor by the photo/video cameras. For anti radar protection purposes and often to avoid the use of the electromagnetic fields (which give a specific footprint which can be detected under certain conditions) it is used the method to create near the protected device a cloud of electrons. As we mentioned before, this method (according assoc. prof. dr. Valeriu Avram) was invented by a romanian in the early XXth Century, on the eve of World War I, namely Vasile Dimitrescu, apparently the author of the first project (and patent) regarding the aircraft invisibility using surrounding clouds of electrified particles which can interact with the electromagnetic waves, including the light, in order to conceal the aircraft. Much later, however, after the year 2000, under the auspices of DARPA¹⁴ (the same agency that controls the HAARP program) the British physicist and inventor John Pendry was to make the first unclassified in order to achieve the invisibility of objects by using in special schemes the high frequency electromagnetic radiation. In the patent US2008024792, John Pendry determined a method of achieving the invisibility of objects using a very high frequency electromagnetic field, which manages to deflect the light radiation. It is known that an image is formed by the interaction of the objects with the light radiation and also the birth of certain phenomena of interaction such the reflection and refraction of light.

14 *DARPA* is the acronym of the name *Defense Advanced Research Projects Agency*, an agency from the US Defence Department, founded in 1958 and responsible with the research-development activities in the field of frontier technologies.

This, of course, not if that objects are the sources of light, but only for the objects which have not their own light.

J. Pendry simply used the idea of achieving such electromagnetic interactions in order to obtain *the bypassing of the body by the light beams*. Well, at Pendry it is applied exactly the opposite of the method (mentioned before) proposed by Robert Birge (the light absorption), namely the body surface not even interact with the light but must be completely bypassed by the photons. There are advantages and disadvantages:

- the case the light absorption method is used, this absorption must be done completely, so very close to a yield of 100%, but this value cannot be reached, the organic photon-absorber material being expensive and fragile under the action of the aggressive atmospheric factors; moreover, under the continuous action of light, this material degrades slowly, which is why despite the invisibility is preferred the nighttime launch of the vehicles treated with that photon-absorber layers; therefore the properly periodically recovery is required for the treatment of the surface in order to cover the traces of degradation which occurred;
- the use of the treatment substances or photon-absorber materials (fabrics, nano-organic fibers) still has the advantage of technical simplicity, because it doesn't need for any kind of device, the method operating permanently as long as the material has not been damaged;
- the use of the light beams deflecting method has the advantage of allowing the maximum efficiency of optical concealment and the equipment does not degrade over time through the simple contact with the corrosive physico-chemical agents from the environment, as was the case of photon-absorber substances;
- it doesn't need permanent maintenance and rehabilitation and does not involve an expensive technology;
- its work is optional and it can be connected or disconnected as needed, while the photon-absorbing substances work permanently and have a quite fast decay;
- however, it has the disadvantages of requiring relatively complex auxiliary devices (high frequency sources) and an energy consumption quite important;

-another disadvantage is that by creating an electromagnetic field around the vehicle, that could be identified other than optically, because its electromagnetic field could betray its existence and its position in space;
-moreover, an important disadvantage is that during the operation of installation which electrify and spray the fluid in the environment for the ionized cloud formation, the concealment device should be stopped because of its electromagnetic field can interact with the ionized fluid generated by the installations of the same vehicle.

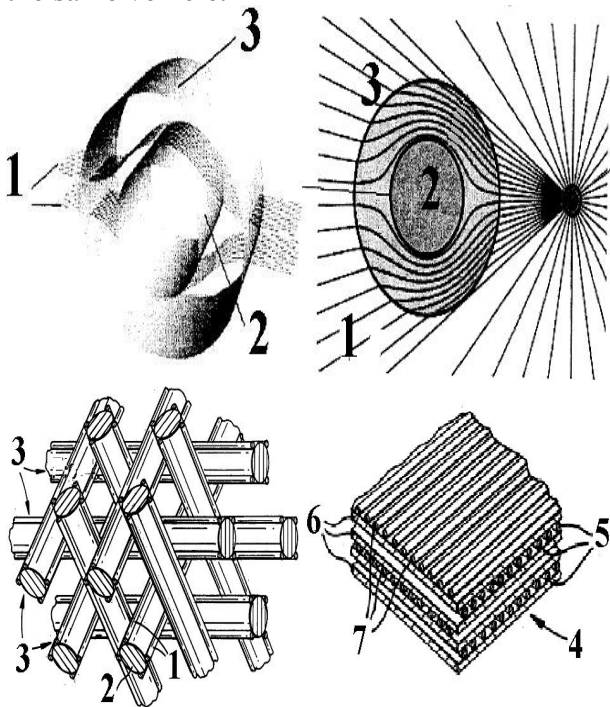


Fig. 8 Other schematic drawings (above) on the optical concealment of objects using the electromagnetic field: 1- radiation of light; 2- the concealed body; 3- the electromagnetic shield.

The patent GB2433842 (1995) granted to John Pendry on fabrics composed of fibers made of electrically conductive material (center-right) and of dielectric: 1- the electrically conductive fibers; 2- the dielectric fibers (eg glass fibers); 3- the composite fiber (the dielectric in center and the conductive fibers on the outside, four each dielectric fiber); the anti-photoelectric cell (right): 4- sandwich structure consisting of wire with diam. 20 micron made from copper plated with gold and spaced at 5 mm from the plates 6 and separated from the polymeric fibers 5 which have a diameter of 3 mm, similar to the fibers 7, which, however, are located at right angles to 6.

To achieve the layers used for the invisibility, Pendry has established certain structures of conductors and dielectrics, forming micro-fabrics that act as conductors supplied at high-frequencies. Pendry established to the so-called *anti-photoelectric cell* which unlike the photocell that is made to interact with the light in order to transform its energy into electricity (which is correlated to a magnetic field), acts contrary: the electrical conductors reject the light using the action of an high frequency electromagnetic field. Such a cell is made of several layers each of which is composed of electrically conductive micro-fibers arranged at some distance between them. The layers are separated by dielectric material. Such cell has the dimensions 5 x 5 x 6 mm and is supplied at a frequency between 2 and 18 GHz.

But this idea is not entirely new... In 1971, an inventor named *Sven Goran Johansson* proposed to use a so-called *honeycomb shell* which actually represented a network of electric micro-wire separated by dielectric and supplied at the frequency between of 2 and 20 Gigahertz. The patent GB1314624 was granted by S. G. Johansson in 1973 and the system has been applied perhaps since the mid-70s.

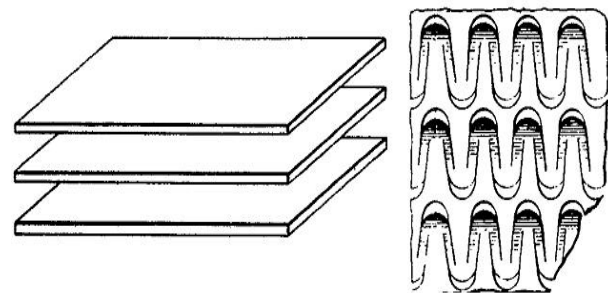


Fig. 9 The sandwich anti-radar casing proposed by the patent GB1314624 in 1973.

It had previously been mentioned a number of general issues regarding the means of optoelectronics countermeasures designed to achieve the invisibility of objects.

Thus we can get an idea about the technologies that are probably currently used by the armed forces of the major military and economic powers.

Those aircrafts with special characteristics may evolve even at low altitudes without being seen or heard, even without being seen by the radars.

There are perhaps vehicles that can appear and disappear. Meanwhile, within the media is often maintained the story of aliens who visit the Earth, but with no real purpose.

Without the intention to refute the idea of the extraterrestrial civilizations existence in this universe, the author just wants to draw attention to the disinformation campaign that uses the UFO story just as a cover for a series of activities that really have not the slightest connection with other civilizations than the human civilization.

During the atypical and/or hybrid confrontations as well as in the special character warfare, perhaps the special aerospace vehicles are often used. With the official withdrawal of the hypersonic apparatus type SR-71 Blackbird (in 1999) made by Lockheed Martin, and also the American Space Shuttle retirement (in 2011), it becomes increasingly obvious the need to complete the empty seats by introducing into production and service of some new and far more improved flying machines.

The aerospace vehicles are flying machines capable of take off and landing with their own means and that can fly both within the earth's atmosphere at all its levels, and within peri-terrestrial outer space, therefore having eventually the capability of insertion on the low circum-terrestrial orbit.

Such aerospace vehicle are therefore able to achieve high flight speeds, but also they are not too large nor have an huge mass like a classic rocket-launcher or spacecraft. Therefore, these vehicles shall be designed in order to have a very low aerodynamic drag and even to use the environmental energy¹⁵ for lifting and propulsion.

However, such an aircraft must be properly equipped for navigation in the radar invisibility conditions and even for the optical invisibility and silent flying.

15 Viorel Sălăgean, *The high speeds aerodynamics*, Military Academy Publishing, Bucharest, 1987, pp. 342-345.

We therefore keep our attention on a few categories of such flying machines, which are probably used in special, atypical, hybrid actions:

- the aircrafts for relatively short range reconnaissance missions, manned or unmanned, designed for espionage flights or for offensive combat missions (the high altitude interception, bombardment etc.);

- the hypersonic long range reconnaissance aircrafts used also for the strategic warfare, such as the intercontinental bombardment missions; usually they are unmanned aircraft which are subject to high levels of acceleration force (g) which are inadmissible for human personnel;

- the magneto hydrodynamic aerospace and electrokinetic vehicles that can be manned and are a very adaptable, virtually able to execute any mission under any kind of speed and altitude; Note that the category of special aerospace vehicles also includes the following types of flying machines:

- the flying vehicles based on the technology of vacuum propulsion¹⁶/electrokinetic invented since the interwar period and made since 1943-1944; they are generally unmanned, small, usually designed for reconnaissance but also for combat missions, under certain conditions;

- the hybrid aircraft, autonomous or airborne, or launched by a carrier, they are often designed for missions achieved at high speed and high altitude; usually they have combat payloads and are not reusable;

- the flying vehicles based on the air depression lifting and propulsion (*the Coanda effect*¹⁷, applied according the Coanda's patents) which cover a wide range of sizes and scope of applications;

16 According to the patent RO24293 from 1933, granted to Rudolf Liciar.

17 According to Lucian Miclăuș, *Coanda effect is an aero- and hydrodynamic phenomenon highlighted by the Romanian scientist Henri Coanda and manifested by the tendency of a fluid jet to attach at a convex wall which is in its proximity*, Aviation Glossary, Marineasa Publishing House, Timișoara, 2010, p. 83.

- the flying vehicles designed for hypersonic flight and the partially using of the shockwave energy, created by the interaction of the vehicle with the upper atmosphere; it is about the particularly case of *waverider*¹⁸ type of flying machines, ie vehicles for high-speed flight in the upper atmosphere, that use the energy of the shock waves formed around the vehicle in the hypersonic flight regime, these shock waves can be used to give lift and propulsion¹⁹ for the vehicle.

18 The *WaveRider* is that type of hypersonic vehicle designed to use the shock wave formed around its fuselage

19 Viorel Sălăgean, *The high speeds aerodynamics*, Military Academy Publishing, Bucharest, 1987, pp. 346-350.

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