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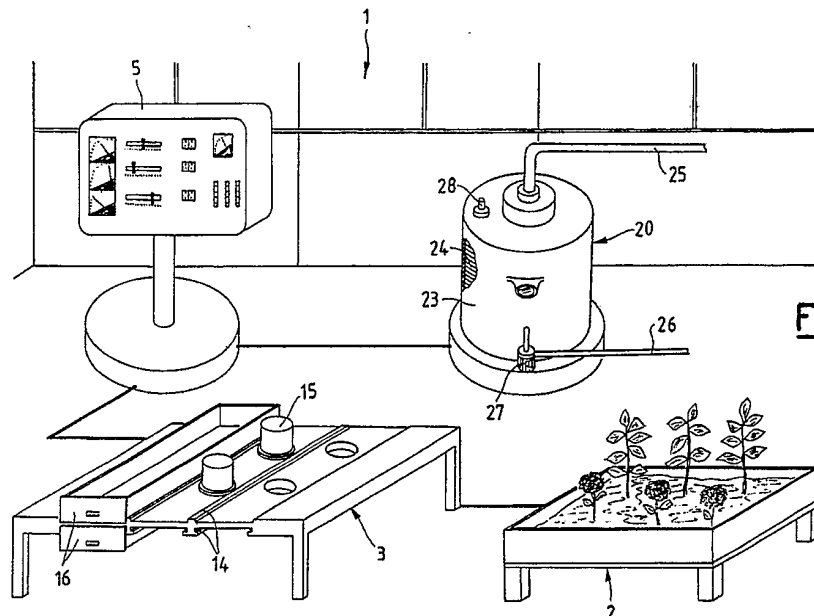
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(54) **Method and equipment for accelerating the growth of, and developing better vital qualities in, vegetable organisms.**

(57) For accelerating the growth of, and develop better vital qualities in, vegetable organisms, these latter are submitted to the action of a magnetic field. According to the method, a polarized pulsating electromagnetic field is caused to act according to different extents, generally correlated with one another,

onto the cultivation earth, the seeds, the plants and the irrigation water. The equipment essentially comprises solenoids subjected to pulsating currents and arranged within units (2) for the treatment of earth and of plants, units (20) for the treatment of water, and units (3) for the treatment of seeds.



**Fig.1**

The present invention relates to a method and an equipment for accelerating the growth of, and developing better vital qualities in, vegetable organisms.

In the agricultural sector, continuous efforts are carried out aiming at improving the cultivation systems, in order to increase the profitability thereof.

Heretofore, such efforts have been above all so directed, as to take advantage of the knowledge offered by chemistry for that purpose. The development in this direction made it possible more and more effective substances to be used, which unfortunately showed severe limits as to their capability of integrating in the ecosystem in which they operate, with negative consequences on same ecosystem.

It should be furthermore said that the presently known methods, used until now to treat vegetables with magnetic fields, proved to be expensive, both owing to the techniques used -- only possible in the laboratory --and to their "energy cost"; as well as difficult to be scaled-up to produce apparatuses suitable for being marketed, to be manufactured at low cost at an industrial level.

Furthermore, the methods known from the prior art submit to the magnetic field just one stage of the biological cycle of the vegetable organism, and do not interact on the environment inside which said organism develops, i.e., water, soil, air.

The purpose of the instant invention is of obviating the above mentioned drawback, i.e., of increasing the profitability of vegetable organisms cultivation, favouring the growth of cultivated vegetable species, without anyway disturbing the ecosystem of cultivations.

Such purposes are achieved by: a method for accelerating the growth of, and developing better vital qualities in, vegetable organisms, characterized in that it comprises at least one step during which said vegetable organisms are at least temporarily immersed in a polarized pulsating magnetic field; and by an equipment for practicing the above said method, characterized in that it comprises at least one solenoid for generating the magnetic field, with said at least one solenoid being connected with a central control unit capable of programming the operating cycles of said at least one solenoid, which is so positioned that at least the vegetable organisms, at least the irrigation water, at least the cultivation earth are immersed in the magnetic field generated by said solenoid.

The equipment for practicing the method according to the present invention is illustrated for merely exemplifying, non-limitative, purposes in the figures of the hereto attached drawing tables, in which:

Figure 1 shows a perspective view of a type of equipment for accelerating the growth of, and

developing better vital qualities in, the vegetable organisms according to the present invention;

Figure 2 shows a partially sectional perspective view of the unit for the treatment of the earth and of the small plants during their growth stage;

Figure 3 shows a partially sectional perspective view of the unit for the simultaneous and differentiated treatment of a plurality of types of bulbs or seeds;

Figure 4 shows a perspective view of a unit for the treatment of seeds in bulk.

The method according to the present invention has its starting-point in the scientific observation that in the presence of changes in the magnetic field, which concern the earth (due, e.g., to storms, moon phases, solar magnetic storms), an increase results in the growth of the vegetable organisms.

The method according to the present invention reproduces, for industrial purposes, conditions favourable to the growth and to the development of vegetable organisms by means of the exposure of these latter to a magnetic field, and therefore to the magnetic flux which generates said field, which preferably is of pulsating, low-frequency polarized type, and with a half-sinusoidal wave shape (elf signals).

Said magnetic field is generated by a unidirectional pulsating electrical current flowing through one or more helical coils in air. Said coils have their turns wound on a plane perpendicular to the axis of the same plane.

The reaserches and tests carried out enabled us to define and select the polarized, low-frequency, semi-sinusoidal-wave pulsating magnetic field, as the most suitable magnetic field to be applied to vegetable organisms both owing to the quality of the results obtained (in the absence of contraindications for the same eatability of horticultural produces) and thanks to the simple applicability of said method in any kinds of treatments (seed, plant, water, earth).

The use of a polarized, low-frequency, semi-sinusoidal-wave pulsating magnetic field makes it possible a magnetic field to be obtained with the use of small amount of electrical energy (voltages which may even be of a small volts, even less than 10 in pulsating current), and low intensity currents (even of a few milliamperes). Also from these elements one may infer the low "energy cost" of the present method.

Said magnetic field can be obtained by means of simple-to-produce, easy-to-use apparatuses.

Said polarized, low-frequency, semi-sinusoidal-wave pulsating magnetic field makes it possible a magnetic field to be obtained, whose force lines are orientated in north-south direction, an essential feature for a correct growth of vegetable organisms

to be achieved, within the respect of the same polarities of terrestrial magnetic field.

For that purpose, the spiral-shaped coils are wound in air, with their turns being perpendicular to the plane of the same coil.

Some studies enabled the instant Applicant to observe that in the absence of a terrestrial magnetic field, even human beings are struck by several diseases, which affect different parts of their organism (Scherf). Observations performed on seeds submitted to the action of a magnetic field have shown a sex difference in their germination, due to the polarity the seeds were submitted to. The same physical characteristics of the liquids can be modified by the polarized, low-frequency, semi-sinusoidal-wave pulsating magnetic field ("Campi magnetici in medicina [Magnetic Fields in Medicine]", publisher: Minerva Medica).

Finally, careful studies have evidenced differences in behaviour between different magnetic fields; for example, the polarized, low-frequency, semi-sinusoidal-wave pulsating magnetic fields cause an acceleration in cell respiration and a better use of oxygen, whilst stationary magnetic fields may even prevent cells from using oxygen (Lyu B.N. *Izvestia Akademii Nauk SSSR, Seriya Biologicheskaya*, 3, 414-424, 1980) (Lenzi: *Rivista di Medicina Aeronautica e Spaziale*, 29th year, vol. 29, 1, January-March 1966).

According to the present method, seeds, small plants deriving from said seeds, the earth in which said plants are cultivated, and the irrigation water, or one only, or more than one of said elements, are exposed to the flux of said magnetic field.

The value of the intensity of a magnetic field for the main horticultural, floricultural and cereal species, is mainly selected from within the following ranges: intensity: peak values of from 20 to 1,000 Gauss, corresponding to approximate average values of from 4 to 400 Gauss, as detected by means of a gauss-meter equipped with a Hall sensor and for a magnetic field with frequencies preferably of 50 or 100 Hz.

Of course, the detected average values are different from the peak values, owing to the characteristics of response speed shown by the commonly used instruments.

The intensity of the magnetic field is measured on the turns of the coil, and inside said coil, and the reported values are expressed as ampere-turns, divided by the thickness of coil winding.

The value of the time of exposure to the magnetic field can be comprised within the range of from a few hours, up to several days; in this latter case, the exposure to the action of the magnetic field can be carried out by means of periodical exposures, separated by time periods during which the intensity of the magnetic field is reduced to a

small value or is reduced down to zero. The general rule is that to tendentially high values of the intensity of the magnetic field, tendentially short exposure times correspond, and vice-versa, so as to prevent saturation levels from being reached, which may even result in effects which are the contrary of the desired outcome.

The values of intensity of the magnetic field, and of time of exposure to it, which cause an optimum growth of the vegetable organisms vary as a function of the species to be treated, of the conditions under which the growth of the plants takes place, and of whether to the magnetic field one or more of said elements: earth, seeds, plants and irrigation water, are exposed. The optimum values for each species can be determined by those skilled in the art by means of selective experimental investigations, which should take into account the influence which each one of the following parameters may have on the other parameters: the intensity of the magnetic field, the time of exposure to the same magnetic field, the exposure to the action of the magnetic field of one or more of the following elements: the seed, the cultivation earth, the plant, the irrigation water.

In determined situations (e.g., in order to reduce the costs of building of large-size water units, or when the need exists of putting vegetable organisms and earth between two linked and unidirectional force fields), the solenoids are positioned by aligning along one single vertical straight line their axis, with their north pole being orientated towards the same direction.

When said solenoids are arranged according to the above disclosed pattern, the intensity and density of the magnetic field in the space between them will increase due to synergy at a predetermined distance. Some tests evidenced the usefulness in some treatments, of the insertion in the cultivation earth, irrigation water, in the plane of polarization of the vegetable organisms, of permanent magnets or of fragments thereof, such as: ferrite, samarium-cobalt, neodymium-iron-boron, plasto-ferrite, then submitting them to the action of the polarized, low-frequency pulsating magnetic field.

Due to the effect of the magnetic resonance, the intensity and density of induced magnetic field per  $\text{cm}^2$  increases. The permanent magnets are positioned with all their polarities being orientated in the same direction (preferably with the north pole being directed upwards), anyway always with their polarities being perpendicular to the support plane (horizontal line).

For merely indicative purposes, the time of exposure of irrigation water to the magnetic field, having an intensity comprised within the above mentioned values, can be of from 4 to 24 hours,

although these times can be extended without that any substantial consequences arise, that may be detrimental to the results.

As regards the bulbs or the seeds, the time of exposure to the magnetic field having intensity values comprised within the above mentioned value, can be of from 6 hours to 20 days, although these times can be extended without that any substantial consequences arise, that can be limitative of the results, with said exposure being carried out before the sowing.

As regards the earth on which the vegetable species are planted, the treatment substantially lasts throughout the time of growth of the planted species, possibly with time intervals. In this regard, the present Applicant was able to observe that in such circumstances the magnetic field exerts its action above all on the chemical compounds contained in cultivation earth.

In fact, the magnetic field to whose action the earth is exposed, accelerates the normal electrochemical reactions which normally are already taking place inside said earth. The magnetic field appears to be particularly active as regards iron and copper, and as regards all of those substances which are consequently converted at a faster rate into useful substances for plant metabolism. In winter season, the magnetic field is beneficial to earth also through the heating caused by the Joule effect. In winter season, between earth submitted to the action of the magnetic field, and earth not submitted to such an action, differences in temperature may exist, which can be as high as 2 or 3 degrees Celsius.

On water, the magnetic field tends to have an ionizing and polarizing effect, with the chemical substances which are least useful, if not even harmful, to plants, being decomposed -- and hence neutralized. Moreover, inasmuch as they are characterized by a higher specific gravity, these substances will decant. Additionally, a change in the values of pH and of the non-volatile residue was observed; and finally, it was observed that when it is submitted to the action of the magnetic field, exposed water shows a tendency to evaporate more slowly.

The influence of the magnetic field on the plants was observed through the sensitization of the photosynthetic pigments, which show a high level of sensitization to the magnetic field. Chloroplasts, in an aqueous suspension are orientated by an external magnetic field. The molecules of chlorophyll are so orientated as to show a diagrammatic anisotropy. When correctly metered, the magnetic field favours the circulation of the liquids. Of considerable importance is the effect of the magnetic field on oxygen; such an effect increases with increasing temperatures of the element sub-

mitted to the action of the magnetic field.

For exemplifying purposes, some cases of bulbous plants are illustrated, which are submitted to the treatment before being buried inside pots according to the directions supplied by the producer thereof.

- \* Narcissus: 280 Gauss and 50 Hz (40÷50 Gauss at the Hall sensor) for 7 days;
- \* Tulip : 280 Gauss and 50 Hz (40÷50 Gauss at the Hall sensor) for 15 days;
- \* Hyacinth : 280 Gauss and 50 Hz (40÷50 Gauss at the Hall sensor) for 2 days.

The plants are sown in late Fall, the emergence of the small plants from earth takes place at an earlier time in case of treated bulbs as compared to non-treated bulbs, cultivated under identical conditions. Such an earlier emergence takes place from a few days in advance in some cases, up to 30÷40 days in advance in other cases (e.g., in case of tulip).

Approximately two months after being sown, all the bulbs which were previously submitted to the action of the magnetic field give rise to a perfectly developed plant; the growth of the other plants, from non-treated bulbs, is limited to one third only.

Irrigation water is submitted to a treatment with a peak intensity of about 200 Gauss, for 24 hours.

The earth in which tulips are cultivated is treated with a peak intensity of 300 Gauss throughout its growth time, including blooming time.

In case of narcissus and hyacinth, the earth was not treated; however, the possibility of such a treatment, in order to further enhance the growth, is not excluded.

In the following, some examples are reported of vegetables submitted to the treatment by means of the magnetic field.

\* Winter spinach:

The seeds are treated by being exposed to a magnetic field of (peak) intensity of 280 Gauss and 50 Hz (40÷50 Gauss at the Hall sensor) for 20 days. The treatment of water takes place with a peak intensity of about 200 Gauss, for at least 24 hours.

The growth of treated spinach was about 2 or 3 days in advance as compared to other spinach plants growth under the same conditions, but not submitted to the action of the magnetic field. After a few days, the stem of the treated spinach plants have already emerged from earth; the stems of the other plants are not yet emerged at that time. The cultivation takes place in winter time, inside a cold greenhouse, i.e., with a temperature comprised within the range of from 0 to 4 °C. The ratio of growth of treated spinach to non-treated spinach is

of 2:1 to the advantage of the first ones; the density ratio (i.e., the ratio of the relevant numbers of plants emerged approximately one month after sowing) is of 3:1.

Strength, resistance delayed decay are considerably better in treated than in non-treated spinach.

Also in case of spinach, a treatment of earth is not necessary in order to obtain appreciable results: such a matter of fact renders the invention an economically practicable one; however, a treatment of earth makes it possible the phenomena of growth to be further enhanced, as demonstrated by the following experimental test.

Spinach plants were submitted to the action of a magnetic field throughout their growth time, until they reached their complete development stage. The seed where previously submitted to the action of a magnetic field of 200 Gauss of peak intensity, with a frequency of 50 Hz, for a time of 96 hours. Water used in order to irrigate the plants was submitted to the reaction of a magnetic field of 200 Gauss and 50 Hz for at least 12 hours.

A first group of plants were submitted to the action of a magnetic field having a peak intensity of 100 Gauss at 50 Hz; a second group of plants were submitted to the action of a magnetic field of 160 Gauss of peak intensity at 50 Hz; and a third group of plants were exposed to a magnetic field of 140 Gauss of peak intensity, at 100 Hz. The results were satisfactory in all cases.

\* Green-leaf chicory; mixed salad ("misticanza"), cutting lettuce ("da taglio"), garden cress, garden rocket, "erba stella" (lion's foot, *Alchemilla vulgaris* var. Linn.), endive "riccia" (*Chicorium endivia* var. crispum), chicory "spadona verde da taglio" (*Chicorium intybus* var. Spadona), "giant" parsley ("gigante d'Italia"), green core chicory ("a grumo verde").

The treatment of seeds takes place by exposure to a magnetic field which, for indicative purposes, has a peak intensity of 300 Gauss and 50 Hz (50÷60 Gauss at the Hall sensor). The exposure time is of 15 days. Cultivation earth is watered with water submitted to the action of a magnetic field with a peak intensity of about 200 Gauss, for a 48-hours exposure time.

Vegetable species are sown between May and June. The ratio of growth and amount of treated vegetables to growth and amount of non-treated vegetables is of from 20 to 50%, in favour of the first ones. Their blooming is richer and earlier, they show a higher resistance to heat and to drought, and their colour is brighter (thanks to the optimization of the photosynthetic process).

Larger and more tender leaves at the same growth phase. The above reported values of magnetic field, and of times of application thereof are

only those which yielded the best results; but, as already said, they can be varied, with positive effects on growth being equally obtained.

In case of cabbage lettuce (*Lactuca sativa capitata*) called "meraviglia delle quattro stagioni" [wonder of the four seasons], the instant Applicant submitted to the action of the magnetic field the small plants too, during their growth stage, until they reached their complete development.

Seeds were priority submitted to a magnetic field of 300 Gauss, 50 Hz for a 96-hours time.

Irrigation water was previously submitted to a magnetic field of 200 Gauss, 50 Hz for at least 6 hours. A first group of plants were submitted to the action of a magnetic field having a peak intensity of 100 Gauss at a frequency of 50 Hz; a second group of plants were submitted to the action of a magnetic field having a peak intensity of 160 Gauss at a frequency of 50 Hz; and a third group of plants were submitted to the action of a magnetic field having a peak intensity of 140 Gauss at a frequency of 100 Hz.

The results were satisfactory in all of said three cases.

Also wheat was submitted to the treatment by means of a magnetic field, according to the following modalities.

Five groups of seeds were prepared.

\* A first group of seeds were exposed to a magnetic field with a peak intensity of 300 Gauss at 50 Hz for about 20 days; during the whole stage of their growth and maturation, the small plants were submitted to the action of a magnetic field of 140 Gauss of peak intensity and with a frequency of 50 Hz. Irrigation water was magnetized with a magnetic field of 200 Gauss of peak intensity at 50 Hz, for a time of not less than 6 hours.

\* A second group of seeds were exposed to a magnetic field with a peak intensity of 300 Gauss at 50 Hz for about 20 days; during the whole stage of their growth and maturation, the small plants were submitted to the action of a magnetic field of 140 Gauss of peak intensity and with a frequency of 100 Hz.

Irrigation water was magnetized with a magnetic field of 200 Gauss of peak intensity at 50 Hz, for a time of not less than 6 hours.

\* A third group of seeds were exposed to a magnetic field with a peak intensity of 400 Gauss at 50 Hz for about 20 days. Irrigation water was magnetized with a magnetic field of 200 Gauss of peak intensity at 50 Hz, for a time of not less than 6 hours.

During their growth and maturation stage, the plants were not submitted to any actions of any magnetic fields. Irrigation water was submitted to the action of a magnetic field of 200

Gauss of peak intensity at 50 Hz, for a time of not less than 6 hours.

- \* A fourth group of seeds were exposed to the action of a magnetic field with a peak intensity of 200 Gauss at 100 Hz for about 20 days.

During their growth and maturation stage, the plants were not submitted to any actions of any magnetic fields.

Irrigation water was submitted to the action of a magnetic field of 200 Gauss of peak intensity at 50 Hz, for a time of not less than 6 hours.

- \* A fifth group of seeds were not submitted to any treatments, for comparative purposes.

During the growth and the whole development of the plants a difference in development was constantly observed between the groups submitted to the treatment with the magnetic field, and the group which was not given such a treatment; a difference which is more and more marked while time goes on -- to the favour of the treated groups, both as regards the development rate, and the evident state of welth of the plants (colour, dimensions and strength). This difference in luxuriance is larger in case of the groups which underwent a complete treatment.

Referring in particular to Figures from 1 to 4, the equipment according to the invention, generally indicated by the reference numeral 1, comprises a unit for the treatment of the earth and of the plants during their growth stage 2, a unit for the simultaneous, differentiated treatment of bulbs or seeds 3 or a unit for the treatment of seeds in bulk 4, and a unit for water treatment 20. All of the above cited units are connected with a central control unit 5, which governs in synchronism the operation of the individual units, such that they can practically carry out the method according to the present invention, on the basis of the preset values of magnetic field.

The unit for treating earth, as well as the plants during the growing stage of these latter 2 comprises a bedstead 6 in which one or more solenoid(s) 8 is(are) installed. In case more than one solenoids 8 are installed, they constitute a group, preferably arranged according to a common vertical axis 9. In the herein exemplified case, this group of solenoids comprises three solenoids 8; a first solenoid is arranged at the bottom 10 of the bedstead 6, a second solenoid is arranged inside the body of the cultivation earth 11 at sowing depth, and a third solenoid is directly positioned on the surface of the cultivation earth. Therefore, the vegetable species develops inside said groups of solenoids. Obviously, each solenoid is enclosed inside a case, which electrically insulates it from the surrounding cultivation earth.

The distance of the solenoids from one another

is established as a function of their power, and of their operating frequency. The solenoids 8 of each group can generate magnetic fields, which are different as to intensity and orientation of the magnetic flux, so as to endow the resulting magnetic field with particular characteristics selected as a function of the position thereof relatively to the elements to be submitted to the action of the magnetic field.

The unit for the differentiated treatment of bulbs or seeds 3 substantially comprises a top 12 inside which one or more solenoid(s) 8 is(are) housed. In the case shown in Figure 3, the solenoids 8 are more than one, and are suitably spaced apart from each other.

The top 12 is provided with through-holes 13 in correspondence of the circular portion contained inside the winding of each solenoid 8, as well as with guides 14, both under and above the top 12. Inside the through-holes 13 cylindrical glasses 15 can be inserted, and the guides 14 make it possible drawers 16 to be installed.

The cylindrical glasses 15 are equipped with a sleeve 17 placed at middle height around them, acting as a stop element when the glasses are slid into the through-holes 13. The drawers 16 can be installed both above and under the top 12, and furthermore, they can be provided with compartments in order to separate the seed varieties contained inside them.

The cylindrical glasses 15 are also used in order to submit the seeds to the treatment, like the drawers 16, anyway alternatively to these latter.

The unit for the treatment of the seeds in bulk 4 substantially comprises a container 18 on whose side surface the turns of a solenoid 19 are wound. The upper portion of the container 18 is provided with a charge hopper 21, and the bottom portion thereof is equipped with a discharge chute 22, from which the seeds treated in bulk can be easily discharged by gravity. The unit 4 can be possibly completed by a mixer device installed inside the interior thereof and not illustrated for the sake of simplicity. The action performed by the mixer device is of mixing the seeds contained inside the container 18, so as to prevent that a portion of said seeds may be exposed to the action of the magnetic field to a different extent from other portions, owing to a possible unevenness of the magnetic field inside the same container 18.

The unit for the treatment of water 20 comprises a tightly sealed container 23 on whose side surface the turns of a solenoid 24 are wound.

The upper portion of the tightly sealed container 23 is connected with a pipe for water feed 25, and from the bottom portion a watering pipe 26 leaves. The watering pipe 26 is closed by an electrovalve 27.

The tightly sealed container 23 is furthermore equipped at its upper portion with a vent valve 28 which enables the air shifted by water during the filling/emptying of the container 20 to enter/leave said container.

The central control unit 5 governs the units 2, 3, 4 and 20, such as to cause them to operate in synchronism according to programs preset by the operator and stored by said unit.

The herein illustrated equipment 1 is particularly addressed to the cultivations inside greenhouses; however, an application thereof to outdoor cultivations is not excluded. However, in this latter case the unit 2 would be get rid of; and, due to economic reasons, submitting seeds and plants, when bedded out in the land, to the treatment with the magnetic field is avoided, although such a treatment is at all possible in this case too.

**LEGEND**

- 1. Equipment
- 2. Unit for treating earth and plants during the growth stage of these latter
- 3. Unit for the differentiated treatment of bulbs or seeds
- 4. Unit for treating seeds in bulk
- 5. Central control unit
- 6. Bedstead
- 8. Solenoid
- 9. Vertical axis
- 10. Bedstead bottom
- 11. Cultivation earth
- 12. Top of unit "3"
- 13. Through-holes of top "12"
- 14. Guides
- 15. Cylindrical glasses
- 16. Drawers
- 17. Stop collar
- 18. Container of unit "4"
- 19. Solenoid of unit "4"
- 20. Unit for water treatment
- 21. Hopper of unit "4"
- 22. Chute of unit "4"
- 23. Tightly sealed container of unit "20"
- 24. Solenoid
- 25. Feed pipe
- 26. Watering pipe
- 27. Electrovalve
- 28. Vent valve

**Claims**

- 1. Method for accelerating the growth of, and developing better vital qualities in, vegetable organisms, characterized in that it comprises at least one step during which said vegetables organisms are at least temporarily immersed in

a polarized pulsating magnetic field generated by a pulsating-unidirectional current, and having its force lines orientated in north-south direction, with polarity perpendicular to the plane of the induced solenoid.

- 2. Method according to claim 1, characterized in that said magnetic field preferably is of the low-frequency polarized type, with the half-sinusoidal wave shape known as "elf signal".
- 3. Method according to claim 2, characterized in that for the horticultural, floricultural and cereal species, the magnetic field generally shows values comprised within the following ranges: intensity: peak values of from 20 to 1,000 Gauss, corresponding to average values of from 4 to 400 Gauss, as detected by means of a gauss-meter equipped with a Hall sensor and for a polarized, low-frequency pulsating magnetic field, pulsating with frequencies comprised within the range of from 50 to 100 Hz.
- 4. Method according to claim 3, characterized in that the time of exposure of water to the magnetic field before said water is fed to the cultivation earth in order to water it is preferably comprised within the range of from 4 to 24 hours.
- 5. Method according to claim 3, characterized in that the time of exposure of the bulbs or of the seeds to the magnetic field before sowing is preferably comprised within the range of from 6 to 20 days.
- 6. Method according to claim 3, characterized in that the time of exposure of the cultivation earth is substantially equivalent to the necessary time for the plants to completely develop.
- 7. Method according to claim 6, characterized in that the feed of the magnetic flux to earth is carried out throughout the growth time of the vegetable species, possibly with time intervals during which said feed is not carried out.
- 8. Method according to claim 2, characterized in that the bulbs of narcissus are exposed to a magnetic field of 280 Gauss and 50 Hz (40+50 Gauss at the Hall sensor) for 7 days, and that irrigation water is submitted to a treatment with a magnetic field with a peak intensity of about 200 Gauss, for 24 hours.
- 9. Method according to claim 2, characterized in that the bulbs of tulip are exposed to a magnetic field of 280 Gauss and 50 Hz (40+50

Gauss at the Hall sensor) for 15 days, and that irrigation water is submitted to a treatment with a magnetic field with a peak intensity of about 200 Gauss, for 24 hours, and that the cultivation earth is submitted to a treatment with a magnetic field with a peak intensity of about 300 Gauss throughout the growth time, including blooming stage.

10. Method according to claim 2, characterized in that the bulbs of hyacinth are exposed to a magnetic field of 280 Gauss and 50 Hz (40÷50 Gauss at the Hall sensor) for 2 days, and that irrigation water is submitted to a treatment with a magnetic field with a peak intensity of about 200 Gauss, for 24 hours.

11. Method according to claim 3, characterized in that the seeds of winter spinach are exposed to a magnetic field of peak intensity of 280 Gauss and 50 Hz (40÷50 Gauss at the Hall sensor) for 20 days, and that irrigation water is submitted to a treatment with a magnetic field with a peak intensity of about 200 Gauss, for at least 24 hours.

12. Method according to claim 3, characterized in that the seeds of spinach are exposed to a magnetic field of peak intensity of 200 Gauss and 50 Hz (40÷50 Gauss at the Hall sensor) for 96 hours, irrigation water is submitted to a treatment with a magnetic field with a peak intensity of about 200 Gauss at 50 Hz, for at least 12 hours, and the small plants are exposed to a magnetic field of intensity selected from among the following values: 100 Gauss and 50 Hz, 160 Gauss and 50 Hz, 140 Gauss and 100 Hz, throughout the growth time.

13. Method according to claim 3, characterized in that the seeds of the following varieties: green-leaf chicory; mixed salad ("misticanza"), cutting lettuce ("da taglio"), garden cress, garden rocket, "erba stella" (lion's foot, *Alchemilla vulgaris* var. Linn.), endive "riccia" (*Chicorium endivia* var. *crispum*), chicory "spadona verde da taglio" (*Chicorium intybus* var. *Spadona*), "giant" parsley ("gigante d'Italia"), green core chicory ("a grumo verde") are exposed to a magnetic field which, for indicative purposes, has a value of peak intensity of 300 Gauss and 50 Hz (50÷60 Gauss at the Hall sensor) for 15 days, and that the irrigation water is submitted to the action of a magnetic field with a peak intensity of about 200 Gauss, for 48 hours.

14. Method according to claim 3, characterized in that the seed of cabbage lettuce are exposed

to a magnetic field of 300 Gauss and 50 Hz for 96 hours, that the irrigation water is exposed to a magnetic field of 200 Gauss and 50 Hz for at least 6 hours, and the small plants are exposed to a magnetic field of intensity selected from among the following values: peak intensity of 100 Gauss and 50 Hz, peak intensity of 160 Gauss and 50 Hz, peak intensity of 140 Gauss and 100 Hz, throughout the growth time.

15. Method according to claim 3, characterized in that the wheat seeds are exposed to a magnetic field of intensity selected from among the following range: peak intensity of 300 Gauss at 50 Hz, peak intensity of 400 Gauss at 50 Hz, peak intensity of 200 Gauss at 100 Hz for approximately 20 days, the irrigation water is exposed to a magnetic field of 200 Gauss of peak intensity at 50 Hz, for a minimum time of 6 hours, and the small plants are exposed to a magnetic field of intensity selected from among the following range: 140 Gauss of peak intensity at 50 Hz and 140 Gauss of peak intensity at 100 Hz.

16. Equipment (1) for practicing the method according to one or more of the preceding claims, characterized in that it comprises at least one solenoid (8, 19, 24) for generating the magnetic field, with said at least one solenoid (8, 19, 24) being connected with a central control unit (5) capable of programming the operating cycles of said at least one solenoid (8, 19, 24), with said at least one solenoid (8, 19, 24) being so positioned that at least the vegetable organisms, that at least the irrigation water, that at least the cultivation earth are immersed in the magnetic field generated by said solenoid.

17. Equipment (1) according to claim 16, characterized in that said at least one solenoid is applied: to a unit for the treatment of the earth and of the small plants during the growth stage and in the complete development stage of said plants (2); to a unit for the differentiated treatment of bulbs or seeds (3); to a unit for the treatment of the irrigation water (20); to a unit for the differentiated treatment of seeds in bulk (4).

18. Equipment according to claim 17, characterized in that the unit for the treatment of the earth and of the plants during the growth stage and in the complete development stage of these latter (2) comprises a bedstead (6), inside which at least one solenoid (8) is housed, in the nearby of which a vegetable organism is



- sown.
19. Equipment according to claim 18, characterized in that it comprises at least one group of solenoids arranged according to a common vertical axis (9), with said group comprising at least one first solenoid (8) positioned at the bottom (10) of the bedstead (6); a second solenoid (8) positioned inside the cultivation earth (11) at the sowing depth, at least one third solenoid (8) positioned at the surface of the bedstead, or alternatively according to at least one of the above specified arrangements.
20. Equipment according to claim 19, characterized in that the unit for the differentiated treatment of bulbs or seeds (3) comprises a top (12) inside which at least one solenoid (8) is installed, with said top being provided with a through-hole (13) facing the inner circular portion of the solenoid (8) surrounded by the solenoid winding and with at least one pair of guides (14) arranged above and/or under said top (12), with said through-hole (13) housing cylindrical glasses (15), with said at least one pair of guides (14) housing a drawer (16).
21. Equipment according to claim 20, characterized in that the unit for water treatment essentially comprises a tightly sealed container (23) around whose side surface the turns of a solenoid (24) are wound, with said tightly sealed container (23) being provided with means for intercepting entering water and leaving water, and with free water surface level control means.
22. Equipment according to claim 21, characterized in that the unit for the treatment of seeds in bulk (4) essentially comprises a container (18) on whose side surface the turns of a solenoid (19) are wound, with the upper portion of said container (18) being provided with a charging hopper (21), and the bottom portion of said container being equipped with a discharge chute (22).
23. Equipment according to claim 22, characterized in that the unit for the treatment of the seeds in bulk (4) comprises a mixer device inside its interior.
24. Use of a polarized, low-frequency pulsating magnetic field in order to increase the growth of, and improve the vital qualities of, vegetable organisms.
25. Method according to one or more of claims
- from 1 to 15, comprising submitting vegetable organisms, cultivation earth, irrigation water to a polarized, low-frequency pulsating magnetic field, the north pole of which is orientated upwards.
26. Method according to one or more of claims from 1 to 15, comprising submitting a cultivation earth to a polarized, low-frequency pulsating magnetic field, the polarities (north-south) of which are perpendicular to the same earth.
27. Method according to one or more of claims from 1 to 15, comprising submitting plants to a polarized, low-frequency pulsating magnetic field, the polarities of which are longitudinal to the axis of the same plant.
28. Method according to one or more of claims from 1 to 15, comprising submitting irrigation water contained inside a tightly sealed container (preferably of cylindrical shape) to a polarized, low-frequency pulsating magnetic field, the polarities of which are perpendicular to the support plane on which said container is supported.
29. Method according to one or more of claims from 1 to 15, comprising submitting seeds, bulbs, grains to a polarized, low-frequency pulsating magnetic field, the polarities of which are perpendicular to the support plane on which the solenoids are supported.
30. Method according to one or more of claims from 1 to 15, comprising submitting vegetable organisms, cultivation earth, irrigation water to a polarized, low-frequency pulsating magnetic field induced by means of two or more solenoids the axes of which are aligned along one single vertical straight line, and with their north-south polarities being longitudinal to their axes.
31. Method according to one or more of claims from 1 to 15, comprising submitting to a polarized, low-frequency pulsating magnetic field vegetable organisms, cultivation earth, irrigation water in whose polarization plane permanent magnets or fragments thereof, such as: ferrite, samarium-cobalt, neodymium-iron-boron, plasto-ferrite are inserted.
32. Method according to one or more of claims from 1 to 15, comprising submitting to a polarized, low-frequency pulsating magnetic field generated by permanent magnets, such as: ferrite, samarium-cobalt, neodymium-iron-bo-

ron, plasto-ferrite, inserted in the cultivation earth, irrigation water, in the nearby of vegetable organisms, with the north poles of said permanent magnets being all orientated towards the same direction, preferably upwards and with their polarities being perpendicular to the support plane on which they lay (horizontal line).

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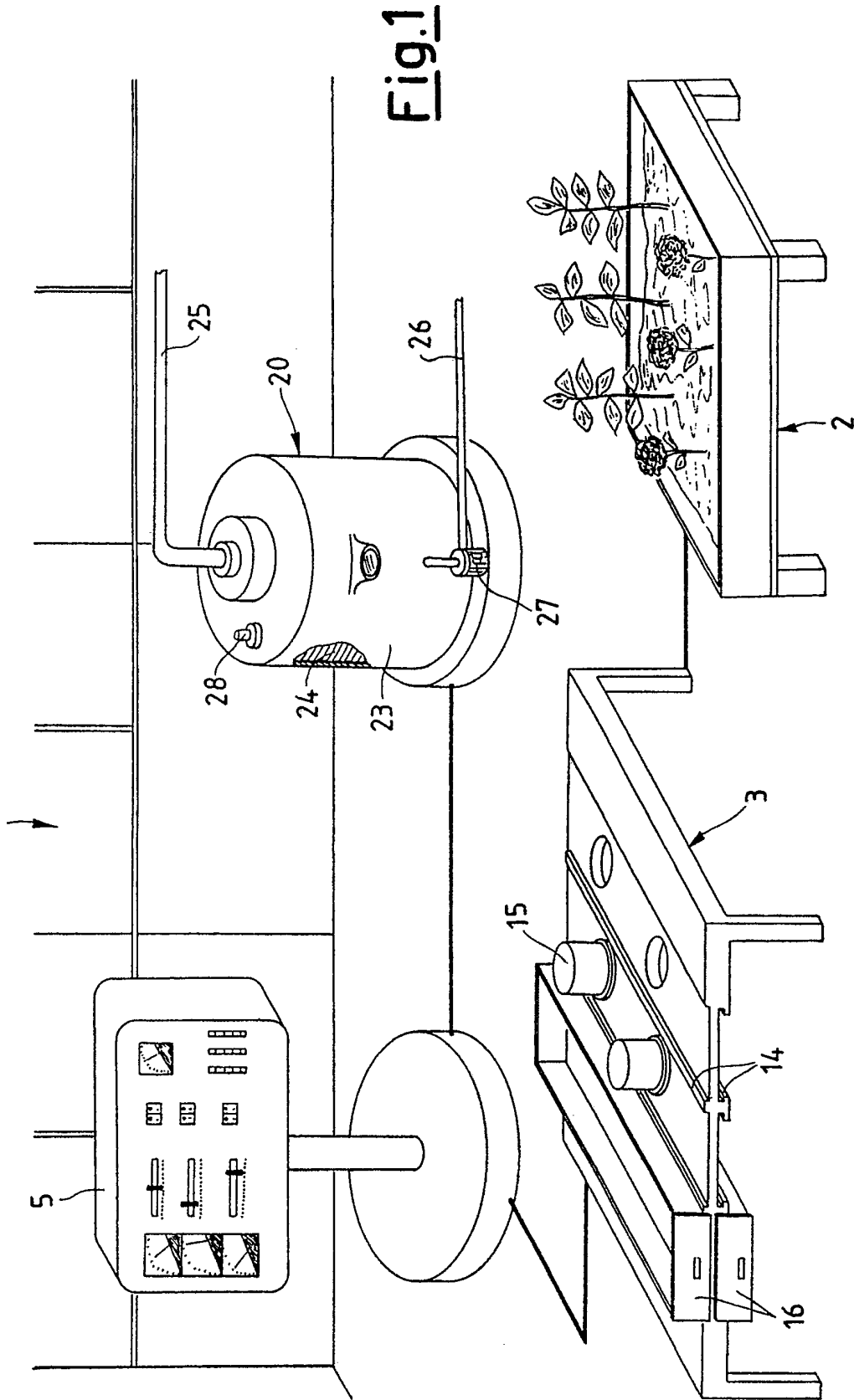
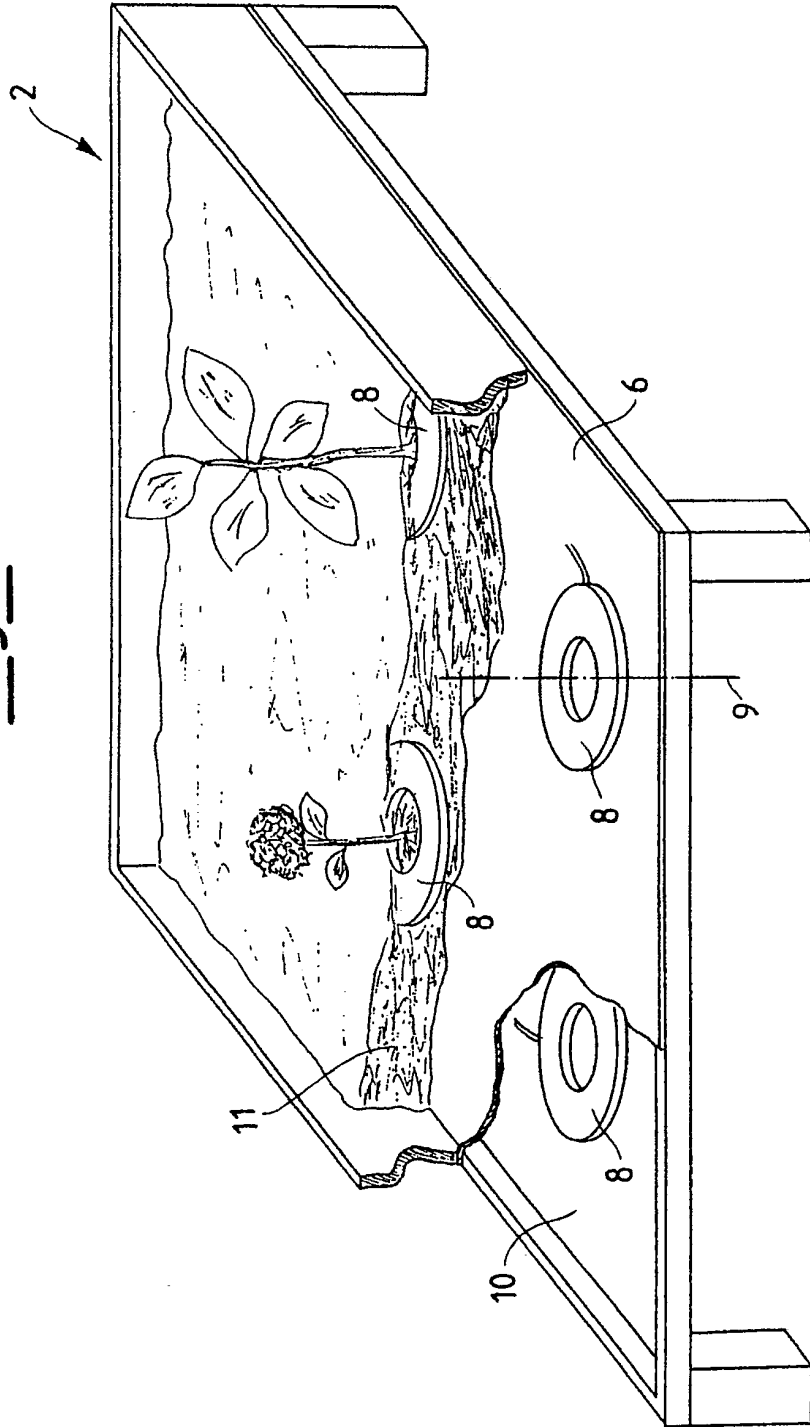
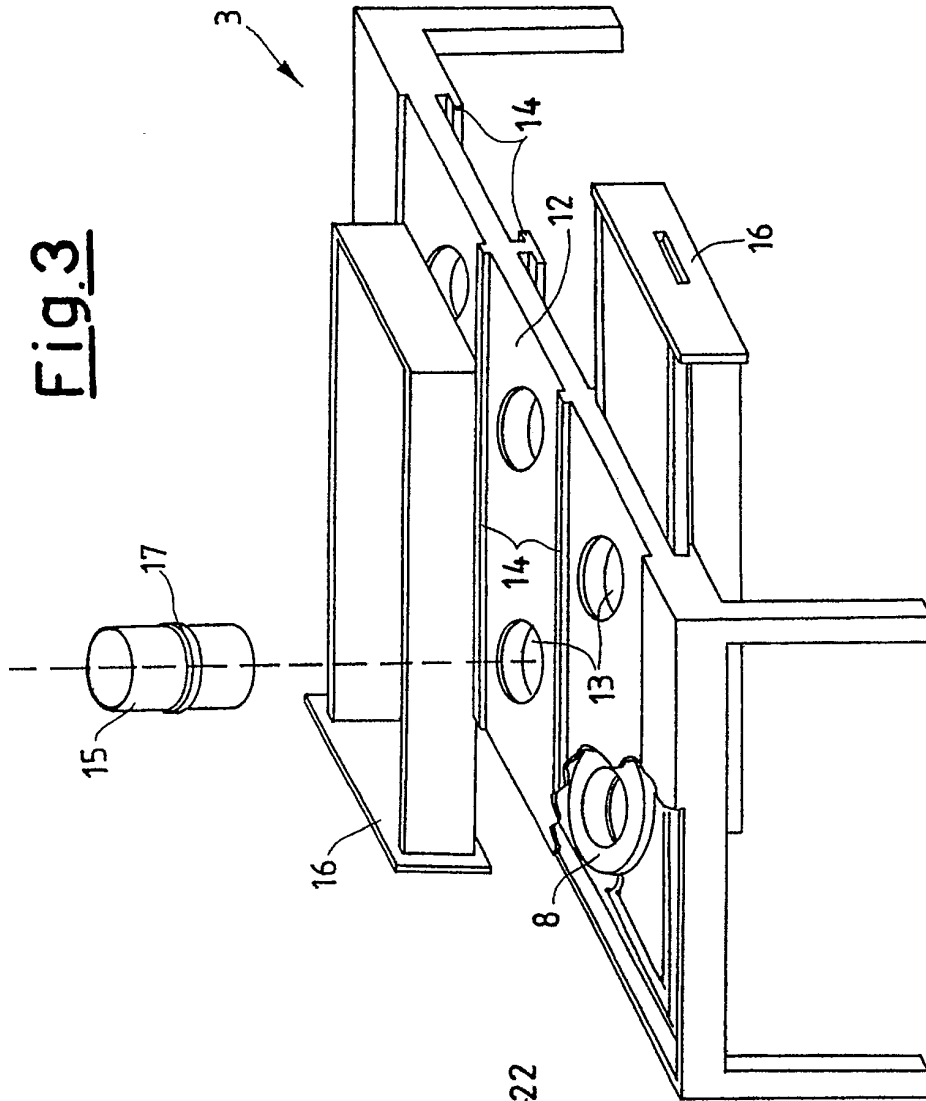


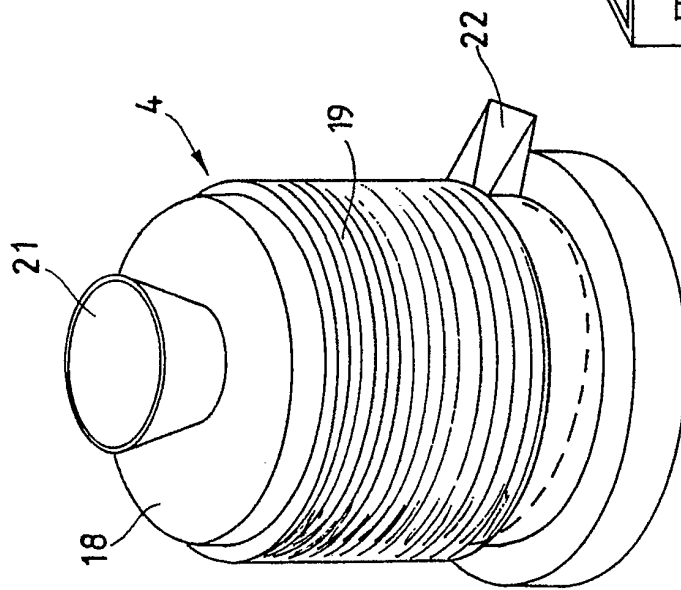
Fig.2



**Fig.3**



**Fig.4**





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 236 088 (SHIMAZAKI) * page 1 - page 5; claims 1-8 * - - - -	1,3,5,10	A 01 G 7/04 A 01 C 1/00
X	DE-A-3 426 153 (MASAAKI) * page 4, line 9 - page 10 * - - - -	1-3,5-7	
A	EP-A-0 197 748 (BROWN) * page 2, line 11 - page 13 * - - - -	1,3,4	
A	CH-A-1 512 02 (BLUMFELDT) * page 1 - page 4, line 12 * - - - -	1,2	
A	EP-A-0 039 163 (ELECTRO-BIOLOGY) * page 3, line 13 - page 19 * - - - -	1,16-18, 24	
A	DE-A-2 234 005 (AMBURN) * page 8 - page 30 * - - - -	1,16,19, 24	
A	DE-A-2 814 286 (BUSCHKY) * page 3 * - - - -	1	
A	FR-A-1 231 676 (SOC. VITALISATION ELECTRONIQUE) - - - - -		TECHNICAL FIELDS SEARCHED (Int. Cl.5)  A 01 G A 01 C
The present search report has been drawn up for all claims			
Place of search  The Hague		Date of completion of search  05 August 91	Examiner  VERMANDER R.H.
<b>CATEGORY OF CITED DOCUMENTS</b> X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention		E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document	