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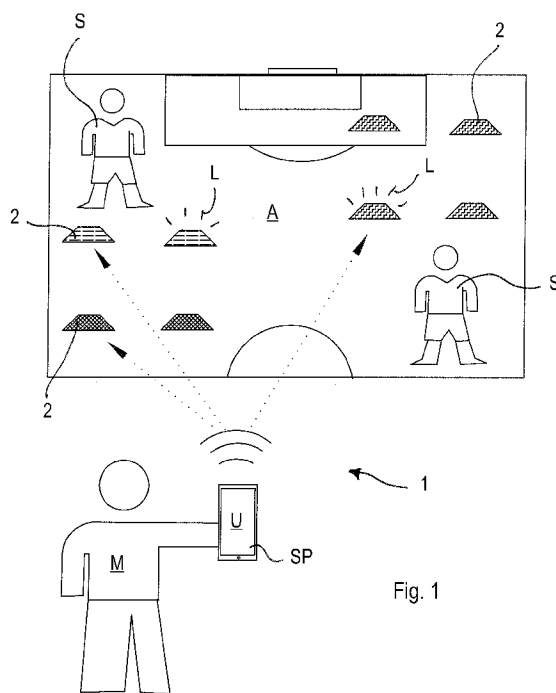


Fig. 1

(57) Abstract: A system for training and sports competitions comprises: one or more delimiting elements (2) suitable for being positioned, according to a desired settable spatial distribution, in a training or sports competition area (A) in which one or more sports users (S) have to move during a training session or sports competition, the delimiting elements (2) are each provided with a signalling unit (3) configured for emitting a signal (L), indicating a command or information, which is perceivable by a sports user (S) during a training session/sports competition, a remote management and control unit (U) configured for activating/deactivating and varying, during the training session/sports competition, the signal of each signalling unit (3) selectively and independently of the other signalling units, on the basis of certain training sessions/sports competitions that are preset and selectable by a coach (M).



SYSTEM FOR TRAINING AND SPORTS COMPETITIONS

BACKGROUND OF THE INVENTION

The invention relates to a system for training and sports competitions, which is usable in multiple disciplines such as soccer, rugby, American football, skating, swimming, and other sports.

PRIOR ART

Systems are known for training professional sportspeople, or also mere amateur sportspeople that involve the use of sports material, in particular delimiting elements such as flat cone markers, discs, bollards, cones, poles, ladders, balance cushions and other obstacles, which are positioned on a training ground, such as for example a soccer field. The aforesaid delimiting elements are used to identify and delimit multifunctional zones within which the sportsperson has to move, for example during a training session. These elements are positioned according to specific spatial distributions that a coach decides each time, taking into account various aspects, such as the progress of the athletes, intensity of training, features of a sporting competition in which to take part or of the adversaries to challenge in an upcoming competition or many other factors.

It is important that during a training session certain aspects of the athlete are maximised, in particular physical and motor features, playing technique, tactics and decision-making strategy and psychology.

With regard to the physical-motor aspect, the delimiting elements, for example the boundary or flat cone markers, of set colours, have to be arranged so as to respect certain spatial arrangements. With regard to the technical aspect, each cone marker of a given colour is associated with a specific action. For example, in soccer, the colour blue corresponds to an action of touching with the outside of the foot, the colour yellow corresponds to an action of touching with the sole and the colour white corresponds to an action of touching with the inside of the foot, etc.

The colour of the delimiting element is of primary importance with regard to the aspect of the tactics and psychology of the athlete. For example, in order to train the rapidity of an attacker, boundary markers of different colours can be placed at the boundary of the area and whilst the attacker dribbles or takes possession of the ball the coach announces a given colour of the boundary markers.

At this point, the attacker leaves the exercise, looks as rapidly as possible at the boundary cone marker having the colour called by the coach and spurts to kick the ball into the goal that is positioned near him.

5 One limit to this training system is that after a few minutes of training the attacker has assimilated and memorized the positions of the boundary markers and the respective colour associated therewith; in other words, to the athlete, models or training sequences are proposed that after a short time are easily predictable by the athlete.

10 Thus with these systems the effect of surprise soon disappears and training loses effectiveness with respect to the action of improving tactics, decision strategy and psychology.

On the other hand, continuous repositioning of the delimiting elements, by varying the spatial distribution thereof so as to re-establish frequently the aforesaid surprise effect and reduce the predictability of the training schemes implies a waste of time for the coach who has the unfortunate task of having to distribute manually, reposition and recover the various delimiting elements scattered in the training area such as a soccer field or a football field.

20 Further, in order to be able to arrange a certain number of delimiting elements of each colour in order to be able to configure appropriately the training schemes, it is necessary to have rather a high total number of delimiting elements, with connected costs and storage difficulties.

In the light of the above it is thus clear that there is ample room for improvement and that it would be desirable to have available a new system of training that is able to overcome the aforesaid limits.

OBJECTS OF THE INVENTION

25 One object of the present invention is to provide a training system that is better than the current prior art systems.

Another object is to provide a solution that enables a sportsperson to be trained more effectively, promoting the sportsperson's speed, agility, strategy and the ability to subject the latter to training sessions that simulate more realistically the effective conditions and actions that occur in a true sporting competition.

30 A further object is to provide a training system that is extremely versatile, easily exploitable and more convenient for a coach.

SHORT DESCRIPTION OF THE INVENTION

The aforesaid objects are achieved by a training system as defined in the claims.

In particular, according to the invention a system for training and sports competitions is provided, as defined in claim 1.

Owing to the system of the invention, made according to a possible embodiment, it is possible to change promptly the colour associated with each delimiting element randomly or in a programmed manner by a setting of a loaded information technology application and executed by a management and control unit located in a portable electronic apparatus such as Tablet or a Smartphone or the like.

Owing to the system, the drawback is eliminated that is associated with the predictability of the playing action that is on the other hand inherent in training systems of static type of the prior art.

The system according to the invention, advantageously, significantly increases the effectiveness of training by significantly stimulating the physical and motor features of the athlete, his technique, the tactics and decision-making strategy, and the game psychology thereof.

In one embodiment, the system according to the invention also comprises moving means, such as an aerial drone, or terrestrial or aquatic or hybrid moving means, controllable by the remote control and management unit and arranged for distributing, repositioning and recovering the delimiting elements.

The training material (defined by the delimiting elements that can have the shape of boundary markers, flat cones, cones, discs, and many other desired shapes) is positioned in the field, managed in real time and removed by using the aforesaid drone, which is also commanded by the aforesaid software application loaded and executed by the aforesaid management and control unit.

Owing to the system according to the invention, it is possible to achieve the preset objects.

In particular, the possibility of changing dynamically the colour of each delimiting element enables the total number of delimiting elements to be reduced, with clear savings in terms of costs and advantages from the logistical point of view (storage, etc). Further, this can save the coach from the unwanted task of having to go up to the delimiting elements to replace the delimiting elements with others of different colours, with clear savings of time and effort.

Further, the system embodiment with drones enables to further reduce the “downtime” that is due to positioning and recovery (and also correcting position) of the delimiting elements:

these operations are assigned to drones that can be conveniently controlled by the coach by the computer application loaded onto the Tablet or Smartphone.

Other features and advantages will be clear from the claims, from the drawings and from the following description.

5 SHORT DESCRIPTION OF THE DRAWINGS

The invention will be better understood and implemented with reference to the enclosed drawings, which illustrate embodiments thereof by way of non-limiting examples.

Figure 1 shows schematically the system according to the invention comprising a plurality of delimiting elements and a management and control unit incorporated into an electronic
10 apparatus such as a Smartphone;

Figure 1A shows, in an exploded view, a first embodiment of a delimiting element according to the invention;

Figure 1B shows more in detail a part of the delimiting element of Figure 1A;

Figure 1C shows the delimiting element of Figure 1A in an assembled configuration;

15 Figure 2 shows schematically one embodiment of the system according to the invention that also includes a movable means, of terrestrial or aerial or hybrid terrestrial/aerial type;

Figures 3A and 3B show respectively a graphic screen generated by the system on a Smartphone and the corresponding arrangement of delimiting elements, of the system, on a training/sports competitions area, such as for example a soccer field;

20 Figure 4 shows as is configured a delimiting element of the system according to the first implementation embodiment;

Figure 5 shows three possible signalling modes of a delimiting element;

Figure 6 shows as is configured a delimiting element of the system in accordance with a second implementation embodiment;

25 Figure 7 shows how another delimiting element of the system is configured in accordance with the second implementation embodiment;

Figure 8 is a diagram of the configuration of robotic movable means that can be included in the system according to the invention;

30 Figure 9 shows one embodiment of terrestrial or aquatic type of the robotic movable means;

Figure 10 shows one embodiment of aerial type of the robotic movable means.

DETAILED DESCRIPTION OF THE INVENTION

With reference to the enclosed Figures, a system is disclosed below for training and sports

competitions that comprises a plurality of delimiting elements 2 that can be positioned, according to a desired settable spatial distribution, in an area A where a training session for one or more sports users S has to be run or where a sporting competition has to take place.

Each delimiting element 2 can be geometrically shaped into a desired shape such as a disc shape, a flat cone shape, a balance cushion shape, a ladder shape, a cone shape or a boundary marker or other shapes. In the enclosed figures, delimiting elements 2 are shown that have a boundary marker shaped only for the simplicity of exposition, in a non-restrictive manner.

Each delimiting element 2, as disclosed in greater detail below, is provided with a signalling unit 3 configured for emitting a signal L, indicating a command or information, which is perceivable by a sports user S during training/sports competition.

The system 1 includes a remote management and control unit U configured for activating/deactivating and varying, during the training session or the competition, the aforesaid signal L of each signalling unit 3 selectively and independently of one another, on the basis of given training sessions/sports competitions preset by the coach M and selectable by the coach each time.

The remote management and control unit U is of programmable type and comprises an internal memory that is suitable for supporting a series of operating instructions to which certain signals or sequences of signals correspond that activate the signalling units 3 incorporated into the delimiting elements 2.

In particular, the remote management and control unit U is configured for managing the communication of the automatic and manual controls of the signalling units (e.g. LEDs), and for managing the position and movement of the delimiting elements 2, and comprises a memory unit and a unit for processing the data (e.g. of the so-called “*arduino*”, “*dusty*”, “*esp32*” or other type).

The aforesaid internal memory is arranged for storing also a series of pieces of information relating to the performance of one or more sports users provided by one or more training sessions/sports competitions that are useful for the coach to set given training/sports competitions schemes. This can be useful for choosing for example a more suitable training scheme on the basis of the progress of the sports users.

The remote management and control unit U consists of a computer apparatus, such as a Tablet, or Smartphone (SP) or personal computer of laptop type, into which the series of operating instructions indicated above is loaded. These instructions are contained in

software code portions (information technology application) loaded into the internal memory of the computer apparatus, which is provided with a graphical user interface (*GUI*) to view graphically and modify the training schemes.

In particular, the computer application (App) generates on the tactile display of the Smartphone SP (or Tablet etc.), graphic screen containing information and graphic icons that are activatable and/or draggable by the coach M, for example in “*drag and drop*” mode.

The computer application (App) enables the entire training session to be set offline or to be reset continuously during training.

10 The signalling units 3 can be configured for emitting an acoustic and/or visual signal.

In particular, at least one signalling unit 3 is configured for emitting an optical signal L. More precisely, at least one signalling unit 3 comprises lighting means 3 configured for emitting a light signal L having a colour that is variable in a desired manner.

Each delimiting element 2 includes a chip 4 provided with a GPS (Global Positioning System) device and with a displacement sensor, in particular an accelerometer for signalling the position and with a transceiver unit for communicating in wireless mode with the aforesaid remote management and control unit (U).

The transceiver unit, included in each delimiting element 2, is able to communicate both with a *Smartphone* and with the remaining delimiting elements 2. In this case, any one of the delimiting elements 2 can act as a main interconnecting element for communicating with the remaining delimiting elements 2 that are thus connected thereby, with the Smartphone or equivalent.

Communication between the Smartphone and the delimiting element 2 – preselected as the connection and communication node – can occur by radio communication technology (wireless for example *WPAN*, *WLAN*, *Wi-Max*, *GSM*, *GPRS*, ...). On the other hand, the remaining delimiting elements 2 will communicate with the aforesaid main delimiting element 2 by low consumption protocols, so-called *Smartmesh* protocols (for example *LoWPAN* like *ZigBee*, *6LoWPAN*, *SimpleLink*, or by *WPAN* or *WLAN* technologies via a suitable defined communication network).

30 The accelerometer acts to activate the signalling (e.g. light) function whenever the delimiting element 2 is moved accidentally; in this manner, a signal is sent to an “*app*” of a remote device, such as a Smartphone or (as will be seen better further on) to movable robotic means (aerial, aquatic or terrestrial drone) to enable the delimiting elements 2 to be

repositioned in the correct position.

In the delimiting element 2 a supply battery 5 for supplying the various electrical/electronic components electrically is further included.

As is shown in Figures 1A, 1B, 1C, each delimiting element 2 is provided with an electrical charging device 25 of wireless type for the supply battery 5. The wireless
5 electrical charging device 25, of inductive type, is in particular placed at the base of each delimiting element 2.

Owing to the computer application loaded into the *Smartphone* (or another electronic apparatus) it is possible to change the colour associated with each delimiting element 2, i.e.
10 the colour of the light emission emitted by the lighting means 3, randomly or in a programmed manner. The colour can be unvaried for the entire training session, or vary over the course of the session, or also, vary cyclically or randomly on the basis of what is deemed to be useful by the coach and decided by him by intervening on the computer application of the Smartphone. The delimiting element 2 can also take on the same colour
15 as the training surface so as to be camouflaged when it is not required.

Suitable algorithms of the computer application can be activated to define rules of mutual exclusivity, i.e. for associating a set colour with a single specific delimiting element. For example, in the case of using the system for training in a soccer environment a ball-possession step can be set in which all the delimiting elements 2 (e.g. boundary markers, or
20 flat cones) of a station or portion of a training area have a set colour, for example dark blue; the athletes then perform a ball-possession action; as soon as the colour of a delimiting element 2 is changed from blue to white (owing to the command given by the Smartphone), each athlete has to spurt to try to be the first to reach and exceed this delimiting element 2, thus scoring the goal.

25 The lighting means, in particular, comprise one or more LED (*Light Emitting Diode*) units of multi-coloured or *RGB* type. Only one LED unit can be provided, or several LED units can be distributed over several zones of the delimiting element 2, or one or more continuous strips of LED units that extend according to a desired direction on the delimiting element 2.

30 The battery 5 supplies the LED unit/s that instantly give the desired colour to the entire material of which the delimiting element 2 is made.

It is possible to modify this colour in real time by intervening on the graphical user interface generated by the application being run on the *Smartphone* or *Tablet*.

With reference to Figure 2, there is disclosed a first embodiment of the structural configuration of the delimiting element 2.

The delimiting element 2 comprises a first part 20 that incorporates and protects the internal electronic components 21, a second part 23 that supports the respective signalling units 3 and is superimposed on the aforesaid first part 20, and a third part 24 superimposed
5 on the first part 20 and on the aforesaid second part 23.

The first part 20 is made of resin 22, or another suitable equivalent material, and is shaped for protecting the electronic components from atmospheric agents (water, humidity), dust and blows. This first part 20 has in particular, but in a non-limiting manner, a disc shape.

10 The second part 23 is made of polymer material that is white in colour and is intended to support the signalling units 3 (such as LED units).

The second part 23 can be configured as a single piece, or be completely integral, with the first part 20.

The second part 23, in particular, but not restrictively, is frustoconically-shaped.

15 The third part 24 is made of polymeric and diffusing material that internally includes polycrystalline minerals that are able to not absorb but reflect the light.

The aforesaid polycrystalline minerals, in one embodiment, comprise titanium oxide. Instead of titanium oxide, or in combination with the latter, other equivalent materials can be provided.

20 The third part 24, in particular, but not restrictively, is frustoconically-shaped.

With reference to Figures 4 to 7 three other possible embodiments of the delimiting element 2 are disclosed that are shown in the non-restricting form of cones or flat cone or boundary markers and disk shapes, i.e. it is not excluded that also other desired forms of implementation can be adopted.

25 All three embodiments of Figures 4 to 7 have the features in common according to which the delimiting element 2 consists of a first part (6A; 6B; 6C) and of a second part (7A; 7B; 7C) that are coupled together, which are both made of polymeric material that is flexible and resistant to blows and to atmospheric agents.

30 Between the first part (6A; 6B; 6C) and the second part (7A; 7B; 7C) the respective signalling units 3 are placed, thus the LED units 3, the supply battery 5 and the chip 4 provided with a GPS device.

The first part (6A; 6B; 6C), placed below, is opaque, and the second part (7A; 7B; 7C), superimposed on the first part (6A; 6B; 6C), is transparent or semitransparent.

Owing to this structural configuration, the light emitted by even one LED unit is distributed on the visible inner surface outside the delimiting element 2. In other words, the first part (6A; 6B; 6C) acts as a diffuser for the light rays, permitting even distribution of the light emission over the entire the delimiting element 2, which in this manner acquires specific colouring.

In one embodiment, in the first part (6A; 6B; 6C) portions of polymeric plastic material such as polymethylacrylate (*PMMA*) can also be included to guide the light waves inside the first part (6A; 6B; 6C) and thus obtain a desired light distribution.

In the embodiment of Figure 4, the delimiting element 2A also comprises a photovoltaic strip 8 configured for transforming solar energy into electric energy to be stored to supply the signalling unit 3 and/or to recharge an electric accumulator built into the delimiting element 2.

The photovoltaic strip 8 can be applied with spray technology and is combined with the optic fibres; this configuration is particular effective and advantageous for open-air training and with daylight lighting because it makes the colour of the delimiting elements 2 even clearer (the greater the light in the environment, the greater the lighting energy of the delimiting elements 2).

The delimiting element 2B of Figure 6 is devoid of a photovoltaic strip and of optical fibres.

Figure 5 shows schematically three different lighting modes (three different colours) that can be chosen in a desired manner and be activated by the management and control unit U. This delimiting element 2 also includes optic fibres to increase the lighting efficacy of the signalling unit 3, in particular of the LED units.

Figure 7 shows one embodiment of a delimiting element 2C in which the two parts 6C and 7C are disc-shaped. Also in this case, the disc has a central through opening to facilitate grasping thereof, for example by movable means 9 disclosed below.

One embodiment is now disclosed in which the system 1 also includes movable means 9 (shown in Figures 2, 8, 10) that is controllable by the remote management and control unit U and is arrange for distributing, repositioning and recovering the delimiting elements 2.

The movable means 9 is provided with grasping means 13 configured for arranging a certain number of delimiting elements 2 according to a desired settable spatial distribution by the coach M, correcting/modifying the position of the delimiting elements 2 during the training/sports competition and recovering the delimiting elements 2 at the end of the

training session. The movable means 9 is provided with a space 14 for storing the delimiting elements 2.

The movable means 9, more precisely the drone, is managed by the computer application loaded in the Smartphone (or equivalent device). The drone 9 can be activated/deactivated
5 at any moment by the aforesaid computer application (*App*).

By this application it is possible to choose, in addition to the colour associated with one or more delimiters 2, also the type of delimiting element (disc, boundary marker, cone, etc.), and to position the delimiting element where desired inside the training area through the intervention of the aforesaid drone 9.

10 Owing to the position identification chip 4 (shock and weather-resistant), the drone 9 recognizes possible involuntary displacements of the corresponding delimiting element 2 during the training sessions and automatically corrects the position thereof (with no invasiveness and without disturbing the athletes) and if necessary also the colour.

The movable means 9 is a movable robotic means of aerial drone type 9B (figure 10), or of
15 terrestrial drone type 9A or of aquatic drone type 9A (figure 9), or of hybrid terrestrial-aerial-aquatic drone type.

As shown in Figure 8, the movable means 9 is provided with a protection system 15
against shocks and atmospheric agents, and with accumulating and electrical supply means 16 with which an electrical supply station is couplable that is automatically reachable by
20 the movable means 9 during the inactivity pauses.

The movable robotic means 9, for the sake of simplicity drone 9, is provided with an inner control module 10 that is operationally remote controlled and subject to the remote management and control unit U (e.g. *Smartphone*).

Further, the drone 9 is provided with movement and obstacle detection sensors 11 that
25 enable the drone to move safely in indoor or outdoor sports facilities.

In particular, alternatively to or in combination with the aforesaid movement and obstacle detection sensors 11, the drone 9 can be provided with camera means for monitoring the position of several sport users during a training session. The camera means acts to view the training area and permit the intervention of the drone 9 on a delimiting element 2 when
30 near the latter there are no sports users S in a zone so as to be able to correct or modify the position of this delimiting element 2. The delimiting elements 2 are provided with RFID (*Radio-Frequency IDentification*) modules for exchanging information (e.g. identification, position) with an interface module 12 provided on the edge of the drone 9.

During operation, the drone 9 is managed by the application (*App*) loaded in the Smartphone. The drone 9 receives the order for the training session, organizes all the training material (e.g. delimiting elements 2), activates the colour thereof, static or dynamic according to need and remains quiescent in a zone that is not used by the sportspersons (according to what is defined in the application on the *Smartphone*). If useful, it is possible to activate the real-time option so that the drone 9, as soon as it detects an unexpected movement of a delimiting element 2 (e.g. blow with the ball, with the athlete) outside an appropriate spatial tolerance, moves in complete safety and repositions the instruments as soon as possible. At the end of the session, the drone 9 automatically reorders the instruments by deactivating the respective signalling units 3 (LED units, chips, etc.) thereof.

As is clear from the description, all the aimed objects are achieved.

Owing to the dynamic appearance of the colour of the delimiting elements 2, it is possible to reduce the number thereof to only a few units; for example, if in a traditional type of system it is necessary to acquire 30 white, 30 red, 30 blue boundary markers etc, with the system 1 according to the invention a significantly reduced number of units is sufficient.

The dynamism of the colours activatable on the delimiting elements 2 favours the improvement of the performance of the sportsperson in terms of tactics, decision-making strategy, psychokinetics and psychology, owing to the insertion of a training session that has a dynamic character.

The presence of the drone 9 significantly reduces downtime from distributing, repositioning and recovering training material, and further ensures the accuracy of the distances, until today rarely certified by the trainer during the training sessions. Further, the possibility of varying both the colour and position of the delimiting elements 2 by the drone 9 adds a further dynamic character to the training session, with excellent results at the level of reaching the objectives and rapid progress obtained by the sportspersons in training.

What has been said and shown in the attached drawings has been provided by way of example illustrating the innovative features of the system 1 and other modifications may be made to the system 1 or to parts thereof without thereby falling outside the scope of the inventions.

In practice, the materials, inasmuch as they are compatible with the specific use and with the respective single elements for which they are intended, can be used appropriately according to the requested requirements and according to the available prior art.

CLAIMS**1.** System for training and sports competitions comprising:

— one or more delimiting elements (2) suitable for being positioned, according to a desired settable spatial distribution, in a training or sports competition area (A) in which one or more sports users (S) have to move during a training session or sports competition,

— said one or more delimiting elements (2) being each provided with a signalling unit (3) configured for emitting a signal (L), indicating a command or information, which is perceivable by a sports user (S) during training/sports competition,

— a remote management and control unit (U) configured for activating/deactivating and varying, during the training/sports competition, the signal of each signalling unit (3) selectively and independently of the other signalling units, on the basis of certain training/sports competitions preset and selectable by a coach (M),

— in which each of said one or more delimiting elements (2) comprises;

- i. a first part (20) that incorporates and protects electronic components (21),
- ii. a second part (23) that supports the respective signalling units (3) and is superimposed on said first part (20), and
- iii. a third part (24) superimposed on said first part (20) and on said second part (23).

2. System according to claim 1, wherein said first part (20) comprises a resin material (22) and is shaped to protect the electronic components from atmospheric agents, dust and shocks, said second part (23) is made of white polymeric material and said third part (24) is made of polymeric and diffusing material that internally includes polycrystalline minerals that are able to not absorb but reflect the light, said polycrystalline minerals comprising titanium oxide or other equivalents.

3. System for training and sports competitions according to claim 1 or 2, wherein one or more of said signalling units (3) are configured for emitting an acoustic and/or visual signal.

4. System for training and sports competitions according to any one of the preceding claims, wherein at least one signalling unit (3) is configured for emitting an optical

signal (L).

5. System for training and sports competitions according to claim 4, wherein at least one signalling unit (3) comprises lighting means (3) configured for emitting a light signal (L) having a variable colour in a desired manner.
- 5 6. System for training and sports competitions according to claim 4 or 5, wherein said lighting means (3) comprises one or more LED (*Light Emitting Diode*) units of or multicolour or *RGB*, type, with which at least one chip (4) is operationally coupled that is provided with a GPS (*Global Positioning System*) device and with a displacement sensor, comprising an accelerometer, to signal the position of the
10 respective delimiting element (2) and with a transceiver unit for communicating in a wireless manner with said remote management and control unit (U), a supply battery (5) being further included to supply the various electrical/electronic components, and a wireless electric charging device (25).
7. System for training and sports competitions according to any preceding claim,
15 wherein each delimiting element (2) is cone-shaped.
8. System for training and sports competitions according to any one of claims 1 to 6, wherein each delimiting element (2) is configured according to a shape chosen from a group comprising: a plate shape, a pole shape, a balance cushion shape, an obstacle shape, a ladder shape.
- 20 9. System for training and sports competitions according to any preceding claim, wherein each delimiting element (2) includes a photovoltaic strip (8) configured for transforming solar energy into electric energy to be stored to supply said signalling unit (3) and to recharge an electric accumulator.
10. System for training and sports competitions according to one of the preceding
25 claims, wherein each delimiting element (2) also includes optic fibres for transmitting the light signal generated by said signalling unit (3).
11. System for training and sports competitions according to any one of the preceding
30 claims, wherein said remote management and control unit (U) is of programmable type and comprises an internal memory that is suitable for supporting a series of operating instructions to which certain activation signals or sequences of activation signals correspond for said signalling units (3), said internal memory being arranged for storing also a series of information data relating to the performances of one or more sports users that are provided by one or more training sessions/sports

competitions that are useful for the coach to set certain training/sports competition schemes.

- 5 **12.** System for training and sports competitions according to claim 11, wherein said remote management and control unit (U) comprises a calculating apparatus, such as a *Tablet*, or *Smartphone* (SP) or personal computer of the laptop type, wherein said series of operating instructions is contained in portions of software code loaded onto said internal memory, said calculating apparatus being provided with a graphical user interface for displaying graphically and modifying the training schemes.
- 10 **13.** System for training and sports competitions according to any preceding claim, further comprising movable means (9), controllable by said remote management and control unit (U), and provided with grasping means (13) configured for arranging said delimiting elements (2) according to a desired settable spatial distribution by said coach (M), and configured for correcting/modifying the position of said delimiting elements (2) during the training/sporting event and retrieving said delimiting elements (2) at the end of the training session, said movable means (9) being provided with a space (14) for storing said delimiting elements (2).
- 15 **14.** System for training and sports competitions according to any preceding claim, wherein said movable means (9) is a movable robotic means of aerial drone type, or of terrestrial drone type or of aquatic drone type or of hybrid terrestrial-aerial-aquatic type.
- 20 **15.** System for training and sports competitions according to claims 13 or 14, wherein said movable means (9) is provided with a protection system (15) against shocks and atmospheric agents, and with accumulator and electrical supply means (16) with which an electrical procurement station is couplable that is reachable automatically by said movable means (9) during the periods of inactivity.
- 25 **16.** System for training and sports competitions according to any one of claims 13 to 15, wherein said movable robotic means (9) is provided with an inner control module (10) connected remotely operationally and slaved to said remote management and control unit (U), said movable means (9) being further provided with movement and obstacle detection sensors (11).
- 30 **17.** System for training e sports competitions according to any one of claims 13 to 16,

wherein said movable robotic means (9) comprises camera means for monitoring the position of several sport-users during a training session, said camera means being able to view the training area and to enable the intervention of said movable means (9) on a delimiting element (2) when there are no sports users (S) near the latter in a zone so as to be able to correct or modify the position of the delimiting element (2).

5
18. System for training and sports competitions according to any one of claims 13 to 17, wherein said delimiting elements (2) are provided with RFID (*Radio-Frequency IDentification*) modules for exchanging information with an interface module (12) provided on said movable means (9).

10
19. Delimiting element suitable for being positioned in a training or sports competition area in which one or more sports users (S) have to move, comprising

— lighting means (3) configured for emitting a light signal (L) having a desired selectable colour and communicating a command or information intended for a sports user (S) during training/the sporting event, wherein said lighting means (3) comprises one or more LEDs (*Light Emitting Diode*) units of multicolour type or *RGB*,

15
— a chip (4) provided with and RFID module, with a GPS (*Global Positioning System*) device and with an accelerometer for indicating the position of the delimiting element (2) and with a transceiver unit that is suitable for communicating in wireless mode with a remote management and control unit (U) by means of which it is possible to control said one or more LED units,

20
— a supply battery (5) for the electrical supply to the various electrical/electronic components .

25
20. Computer product incorporated on a data support included in said system for sports training according to any preceding claim, and loadable on the internal memory of a calculating apparatus (SP), said computer product comprising software code portions that when they are run on said remote management and control unit (U) enable each signalling unit (3) to be activated/deactivated and controlled selectively and independently of one another on the basis of certain training patterns set by the coach.

30
21. Computer product according to claim 20, wherein said software code portions

define a dedicated software application (App) that is loadable onto a Tablet or a Smartphone (SP), said information technology application (App) being configured for generating, when run on said Tablet or Smartphone (SP), graphic screens containing information and graphic icons that are activatable and/or draggable by the coach (M).

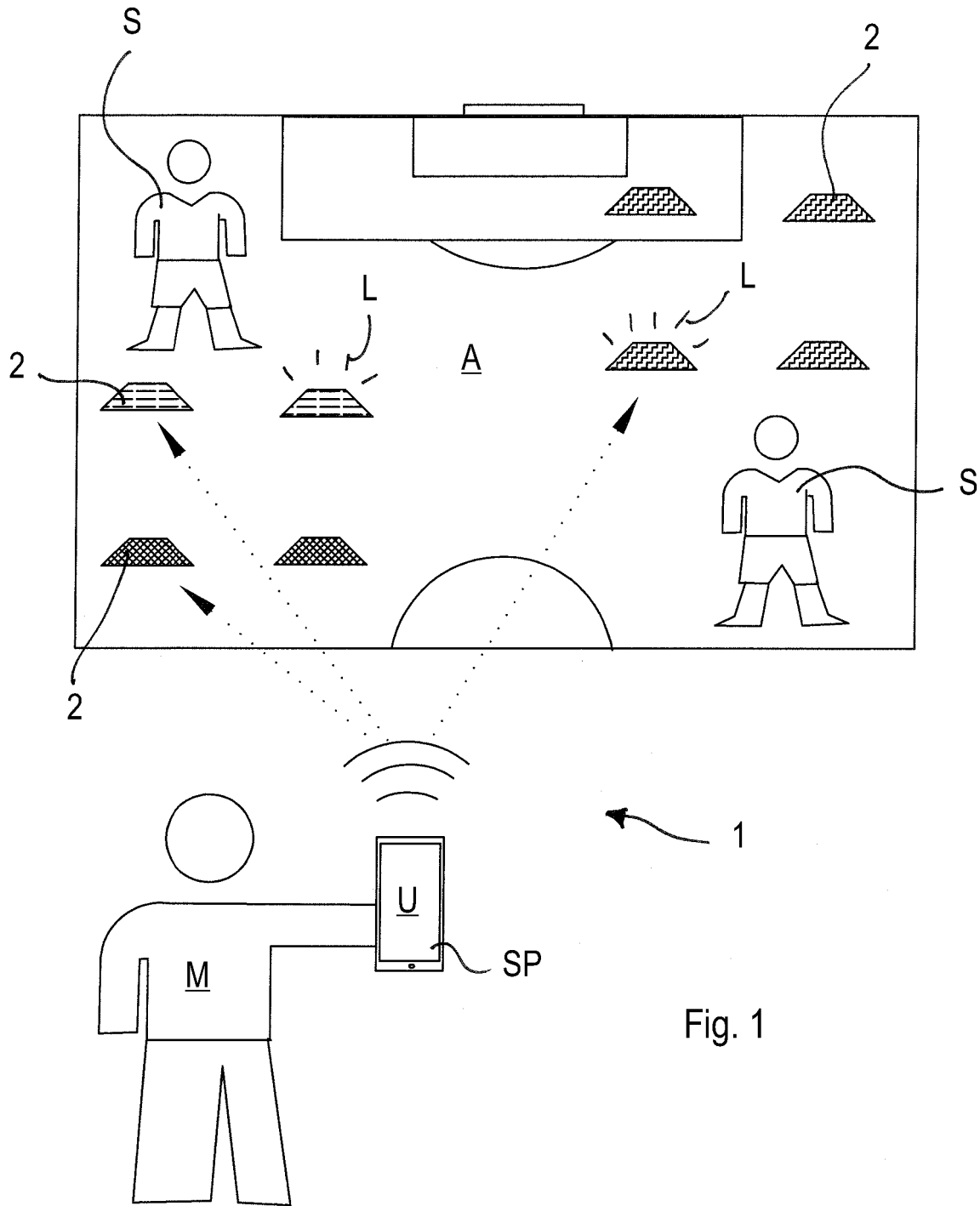
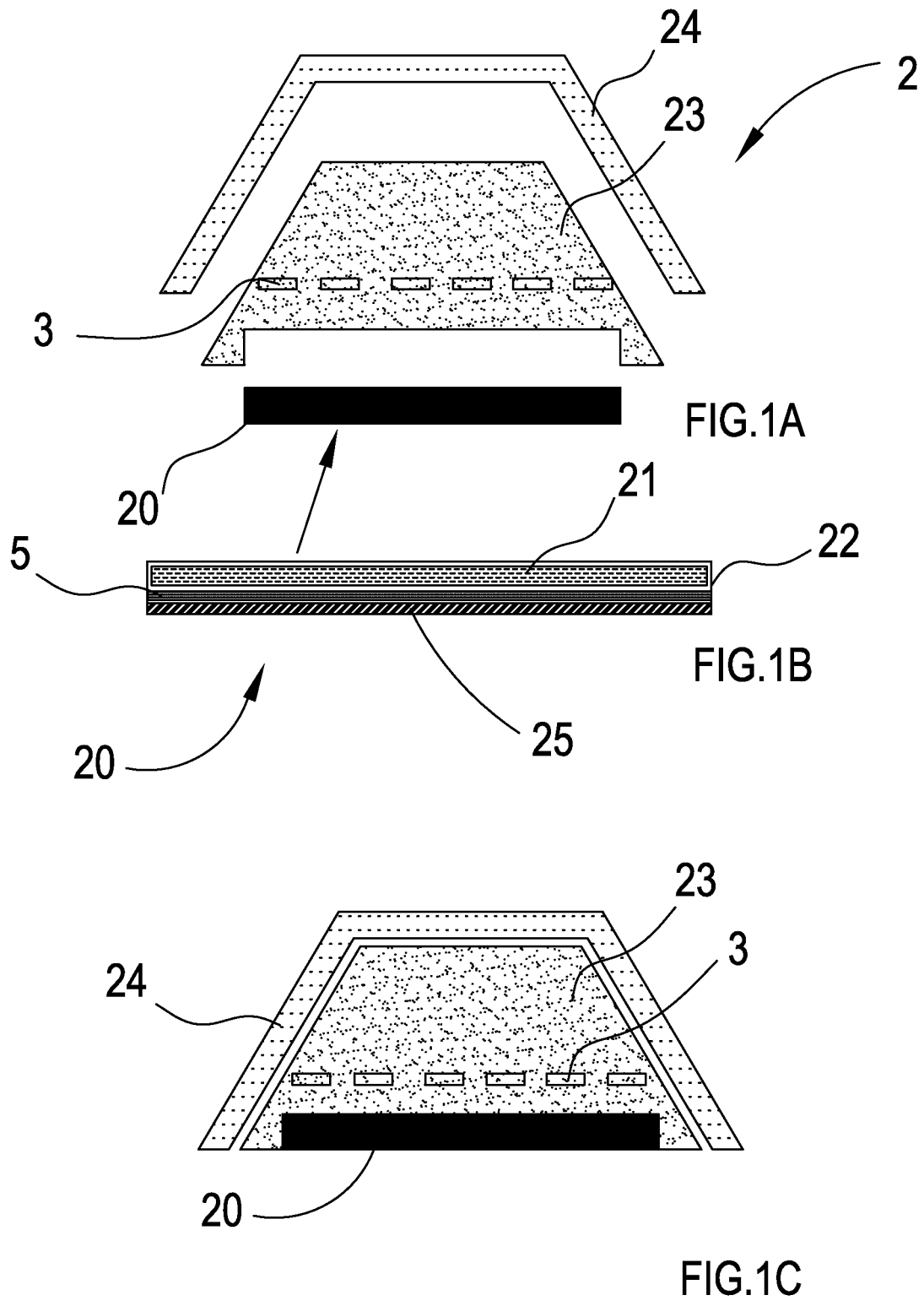


Fig. 1



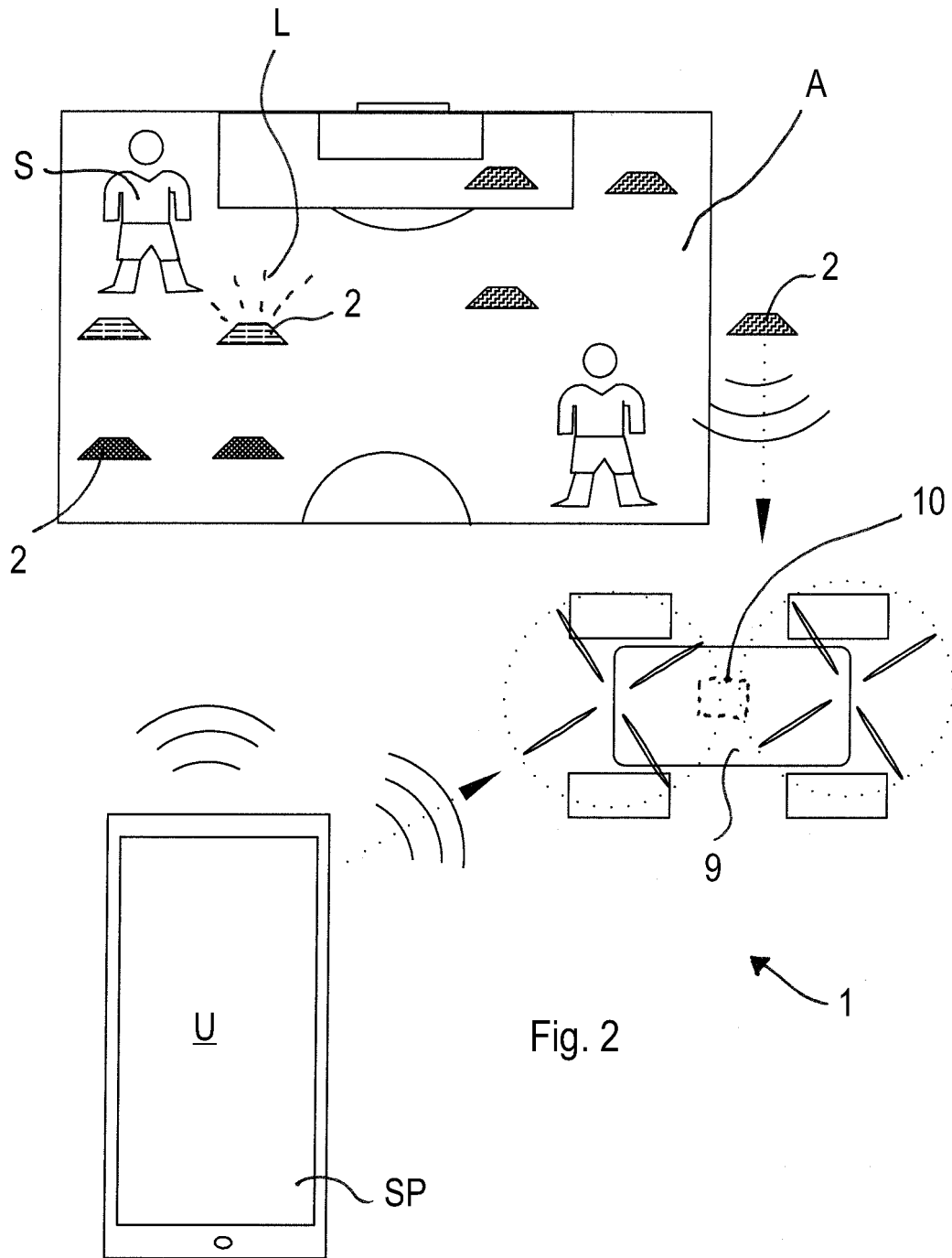


Fig. 2

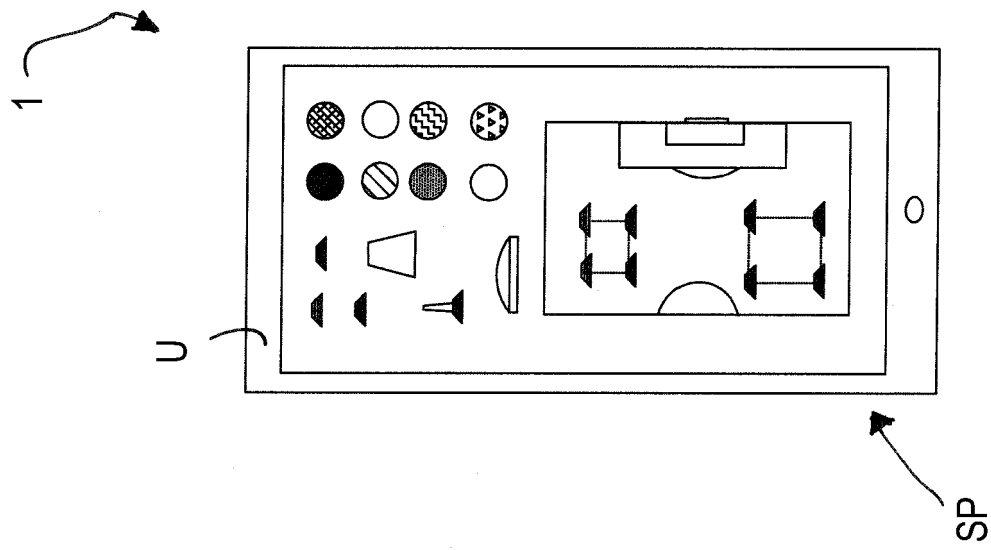


Fig. 3A

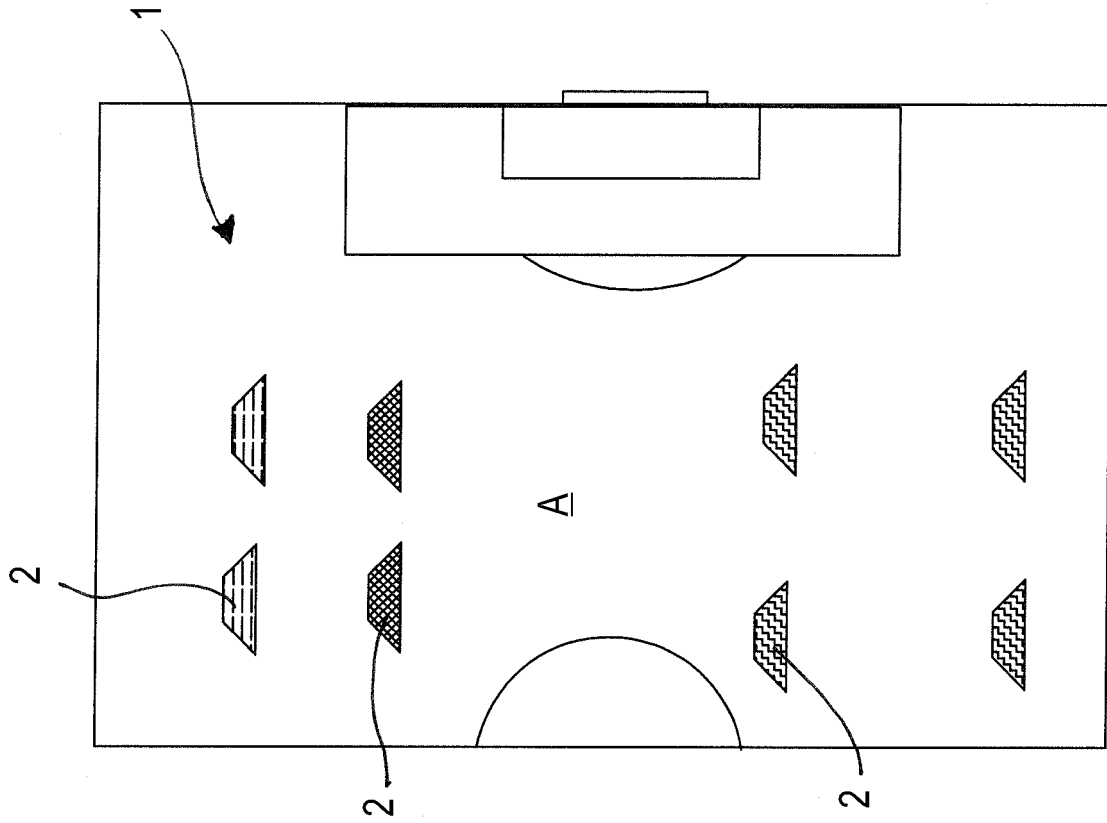


Fig. 3B

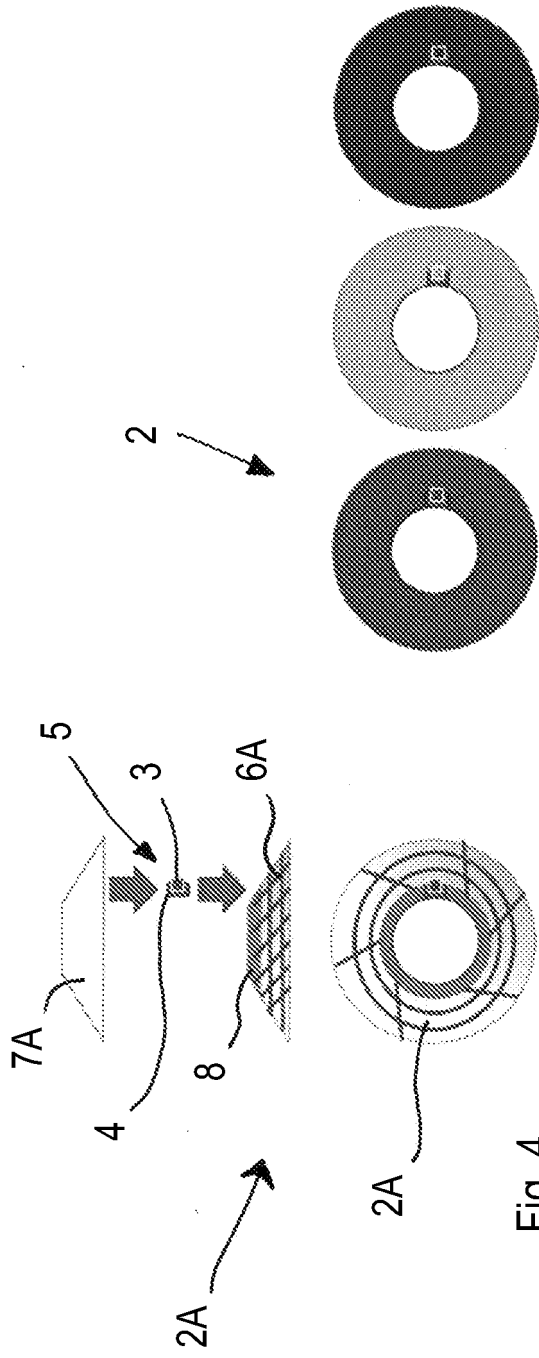


Fig. 4

Fig. 5

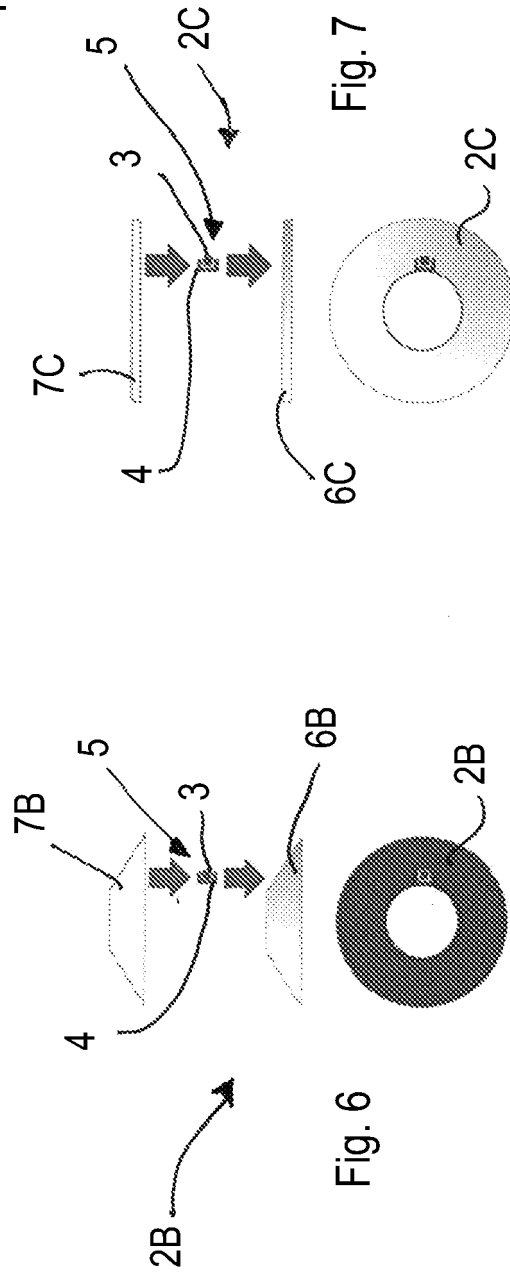


Fig. 6

Fig. 7

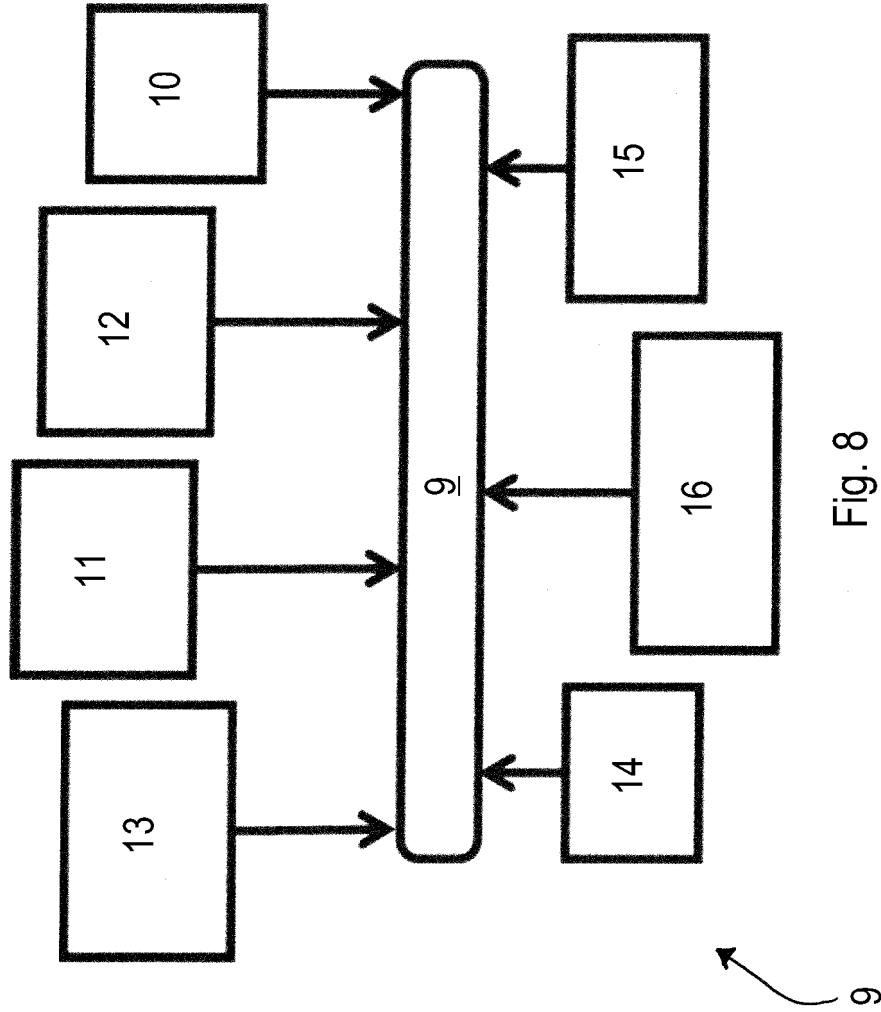


Fig. 8

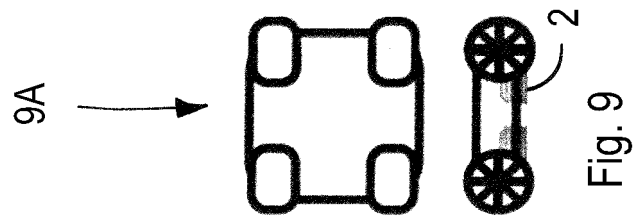


Fig. 9

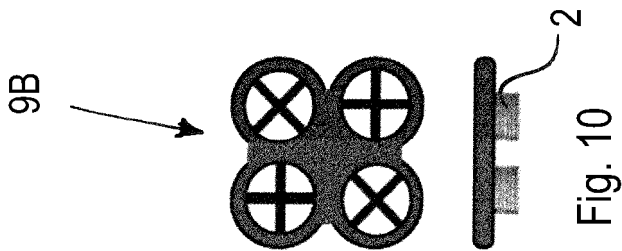


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2018/057097

A. CLASSIFICATION OF SUBJECT MATTER					
INV.	A63B71/06	A63B69/00	A63B71/02	A63B71/00	G05D1/00
	B25J9/00	B65G61/00	H05B33/08	H05B37/02	F21V8/00
ADD.					
According to International Patent Classification (IPC) or to both national classification and IPC					

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols) A63B A63C G05D A47L B25J B65G G05B H05B H04M G02B H04R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2017/041141 A1 (VELOCITY SPORTS RES PTY LTD [AU]) 16 March 2017 (2017-03-16)	1,3-5,7,8,11,12,20,21
Y	the whole document	2
X	CN 206 045 349 U (GUANGDONG NEW SPORTS CO LTD) 29 March 2017 (2017-03-29) paragraph [0034]	1,3-5,8,11,12,20,21
Y	EP 2 556 395 A1 (EVONIK ROEHM GMBH [DE]) 13 February 2013 (2013-02-13) claims 1,2	2
A	JP 2009 212076 A (SONY CORP) 17 September 2009 (2009-09-17) paragraphs [0036], [0047], [0061], [0062]; claim 7	2
	-/--	

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 19 October 2018	Date of mailing of the international search report 21/12/2018
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Tejada Biarge, Diego
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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2018/057097

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 488 029 A (ELEMENT SIX LTD [GB]) 15 August 2012 (2012-08-15) page 3, last paragraph - page 4, paragraph 1 claims 1,5,19 -----	2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2018/057097

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-5, 7, 8, 11, 12, 20, 21

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5, 7, 8, 11, 12, 20, 21

A delimiting element which discloses a third part made of polymeric and diffusing material that internally includes polycrystalline minerals, said polycrystalline minerals comprising titanium oxide or other equivalents.

2. claim: 6

A system with an accelerometer and a wireless electric charging device.

3. claim: 9

A delimiting element with a photovoltaic strip.

4. claim: 10

A delimiting element with optic fibres

5. claims: 13-18

Controllable movable means with grasping means.

6. claim: 19

A delimiting element with an RFID module.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IB2018/057097

Patent document cited in search report	Publication date	Publication date	Patent family member(s)	Publication date
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			GB 2488029 A	15-08-2012
			US 2014158456 A1	12-06-2014
			WO 2012110357 A1	23-08-2012
