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(54) **GRANDSTAND HAVING HIGH SEATS AND DISPLAY OF PERSONAL DATA**

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(57) **ABSTRACT**

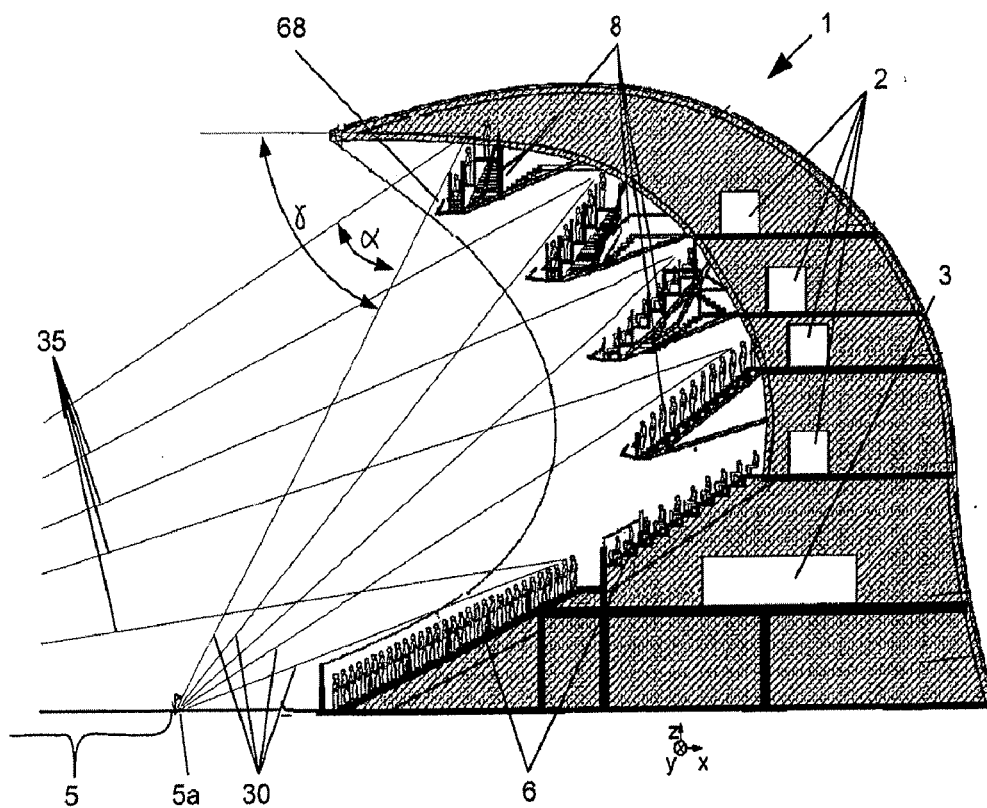
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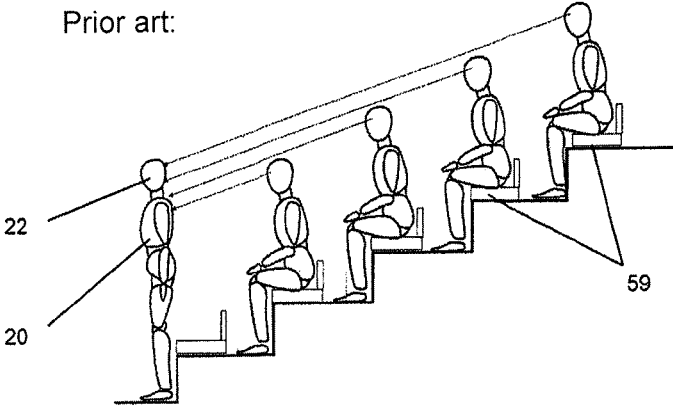
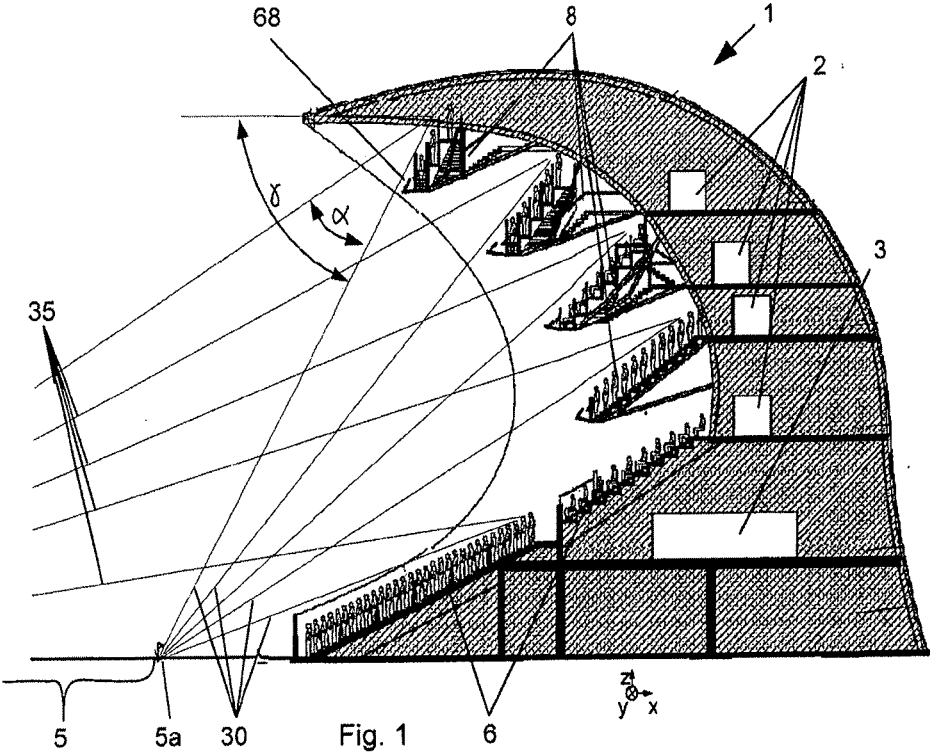
A grandstand with space rows rising in a stepped manner is disclosed, wherein at least two space rows, lying one behind another, have a plurality of spaces for spectators and/or the audience. The spaces each have a seat containing a seat surface or lean-on surface and the seat surface or lean-on surface of the seat is at a distance of at least 65 cm from the floor surface of the respective space.

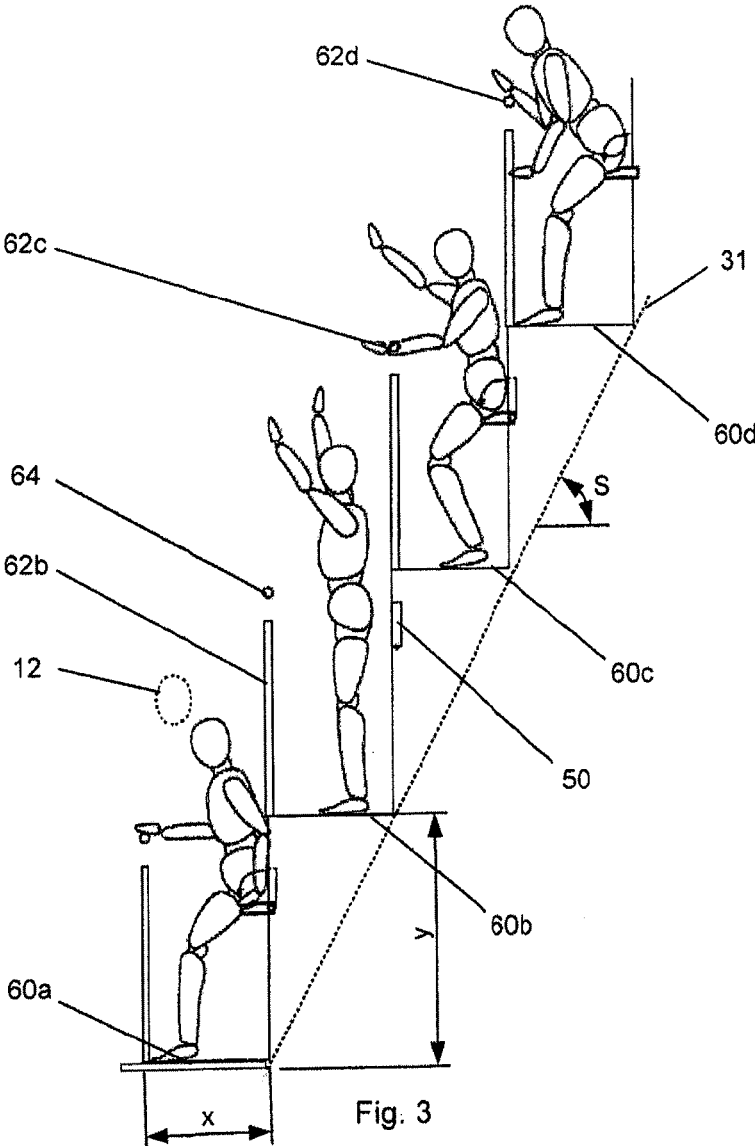
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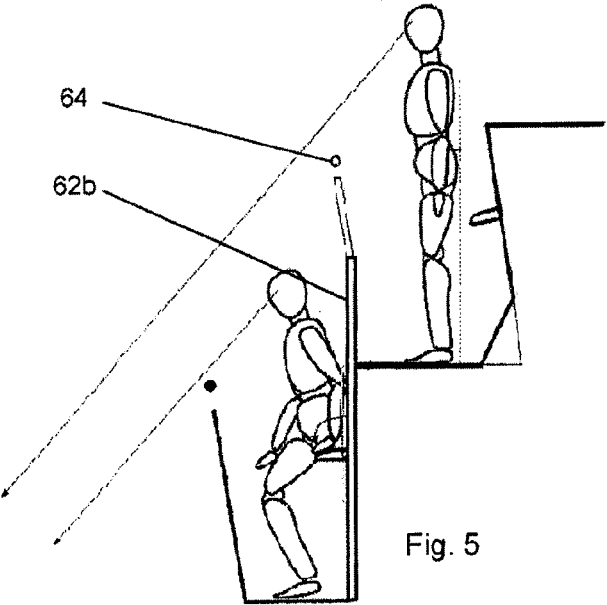
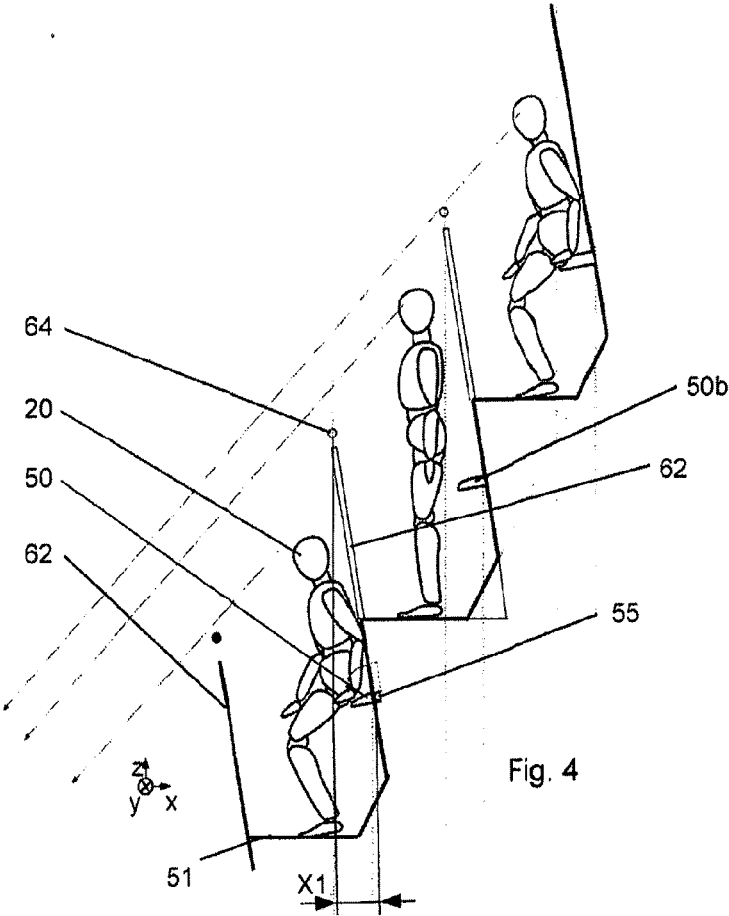
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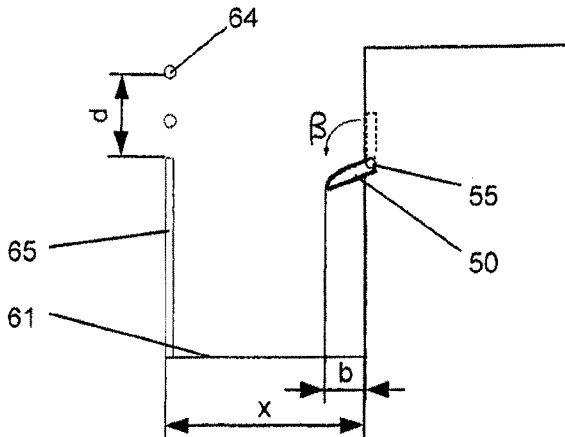


Fig. 6

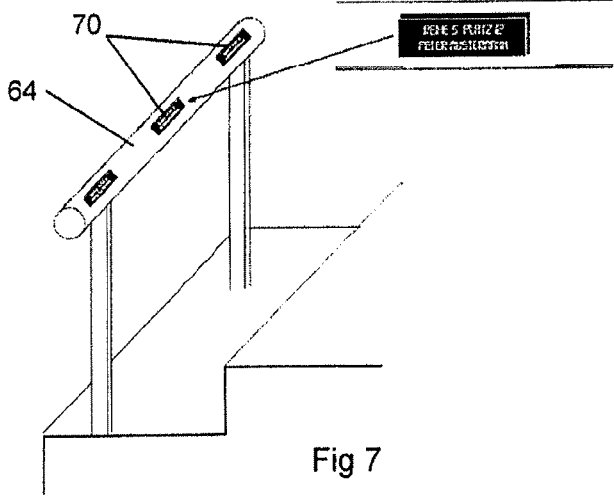


Fig 7

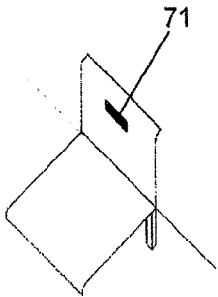


Fig. 8

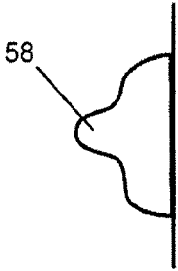


Fig. 9

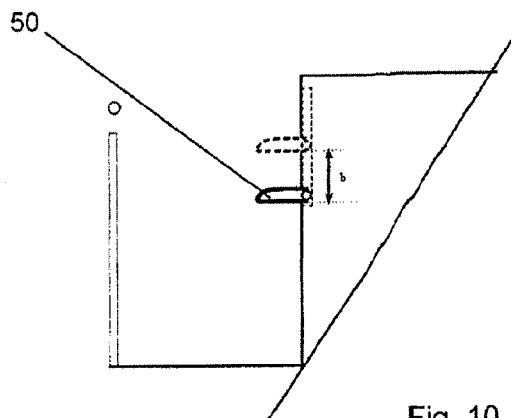


Fig. 10

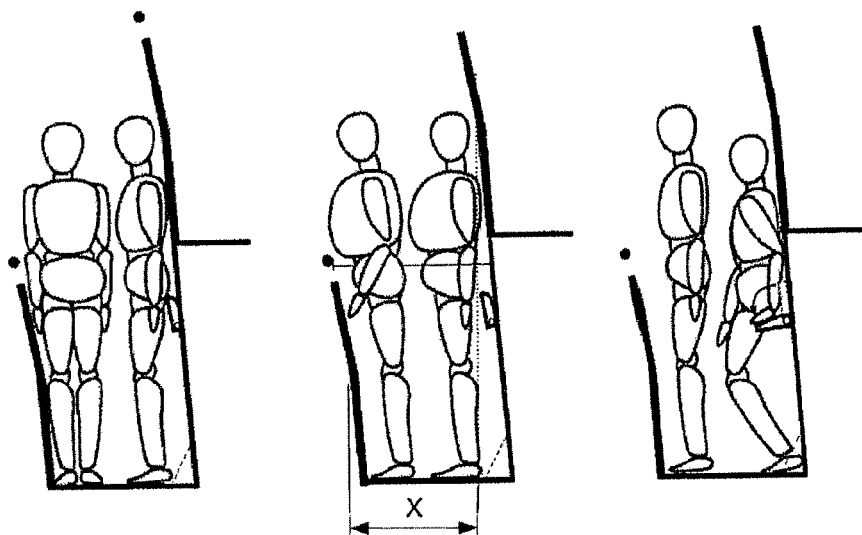


Fig. 11a

Fig. 11b

Fig. 11c

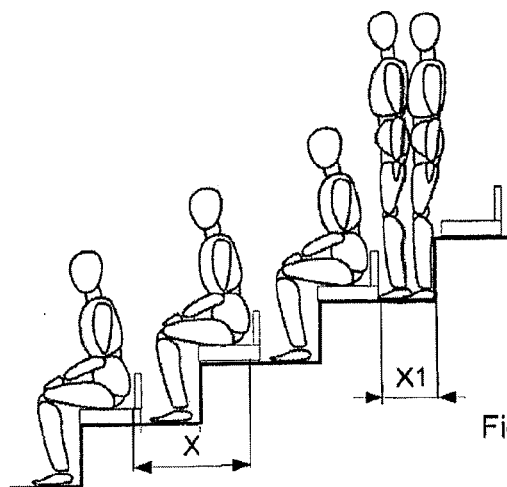


Fig. 12

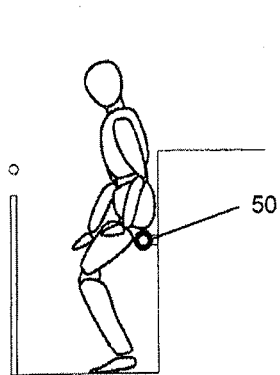


Fig. 13

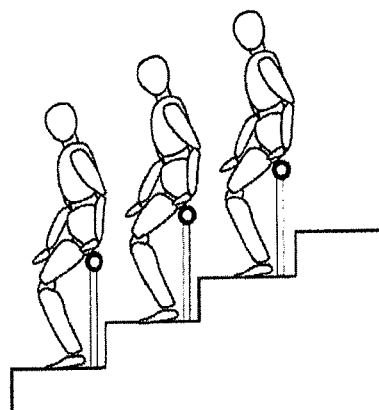


Fig. 14

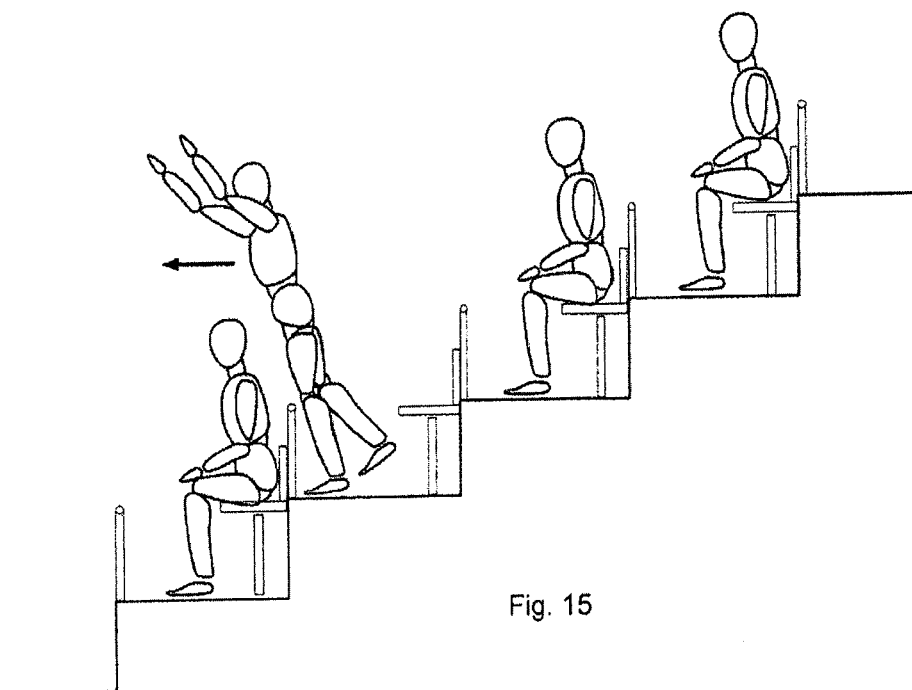


Fig. 15

### GRANDSTAND HAVING HIGH SEATS AND DISPLAY OF PERSONAL DATA

**[0001]** A grandstand with space rows rising in a stepped manner, wherein at least two space rows lying one behind another have a plurality of spaces for spectators and/or the audience, and said spaces each have a seat comprising a seat surface or lean-on surface.

**[0002]** Grandstands of the type mentioned at the beginning are customarily used in order to make it possible for a plurality of users to observe a sporting fixture or cultural performance, wherein the stepped arrangement of the spectators permits a better view of the events, and/or a greater number of spectators can be accommodated in a restricted space. Different problems are used as criteria for the conceptual design of grandstands, such as, first of all, safety, in the sense that the structural design of the grandstand does not assist rioting between the spectators and that the grandstand can be rapidly evacuated. Furthermore, the intention is for a high number of visitors to be involved at as small a distance as possible from the events of the game/play, to have good sight of the pitch and, because of the concept of the grandstand, to feel as involved as possible in the events of the game/play. In particular, football stadia or baseball stadia are under consideration. Closed halls or open arenas are under consideration in particular.

**[0003]** It is the object of the present invention, by weighing up all of the relevant criteria, to develop a novel concept for a grandstand.

**[0004]** This object is achieved by the grandstand according to claim 1. Developing refinements emerge from the dependent claims.

**[0005]** A grandstand has space rows rising in a stepped manner, wherein at least two space rows lying one behind another have a plurality of spaces for spectators and/or the audience, and the spaces each have a seat comprising a seat surface or lean-on surface. The distance of the seat surface or lean-on surface of the seat from the floor surface of the respective space is at least approximately 50 cm, preferably at least 65 cm. According to one embodiment, the seat height can lie within the range of approximately at least 80 cm, for example approximately 80 cm to 90 cm. According to one embodiment, the seat height is more than 80 cm, in particular more than 82 cm, preferably more than 85 cm, further preferably more than 90 cm. In particular (but not exclusively) in the event of adjustability of the seat height, seat heights of up to 100 cm may be advantageous. If the seat surface is inclined vertically, in particular the centre of the seat surface is under consideration here, since this is regarded as being the preferred contact region during sitting. According to one embodiment, the centre of the seat surface on the central axis along the seat depth is considered. The grandstand here can preferably have tiers in which the space rows are in each case arranged. While the customary seat height normally is up to approx. 50 cm, the present seat, which is also referred to as an elevated seat, has a significantly greater height. As a result, as also explained in detail below, the spectator, when sitting, is in a significantly higher position than in the case of conventional sitting, and therefore the increase in size when said spectator jumps up, such as when celebrating, is correspondingly smaller and therefore the obstruction to the sight of subsequent individuals is correspondingly smaller than in the case of conventional seats. In addition to the seats of the indicated

height, spaces can be provided on or in the grandstand that are configured as conventional seats of a low seat height or as standing spaces.

**[0006]** The depth of the seat surface projected onto the horizontal is preferably at maximum 30 cm, preferably at maximum 20 cm. Owing to sitting in the elevated position, a seat surface is no longer required for the entire posterior, including the thighs. In the concept of the elevated seat, the region in front of the seat, i.e. the space depth described in more detail in the exemplary embodiment, can therefore be used as space for standing and celebrating. Corresponding advantages are also afforded for evacuation and assembly.

**[0007]** In preferred embodiments, in each case one space row has a vertical offset of at least 50 cm, preferably at least 70 cm and in particular at least 100 cm with respect to the space row located in front thereof. The offset here is defined in particular as an offset of the floor surfaces of the space rows, and the offset rises rearwards, i.e. away from the pitch. In the case of an offset of at least 10 to 20 cm, at shallow angles of the spectator with respect to the pitch, as is provided, for example, in the case of a space in the stalls, a spectator can readily see over the pitch even if another spectator in the row lying in front thereof has stood up. Higher offset amounts, such as, for example, at least 40 cm, are suitable in space rows in tiers located higher in the grandstand. In principle, when the elevated seat is used in the stalls, vertical offset heights of 10-20 cm can also be advantageous.

**[0008]** The ratio of the vertical offset of two adjacent space rows to the depth of a space row is preferably greater than 1 and in particular greater than 1.5. This ratio is considered to be a measure of the gradient of the space row arrangement, for example of the tier or of the stalls, and, at higher ratios of the offset, a field of vision from the rear rows of a tier located higher onto the pitch is made possible. While it appears possible in principle to define a comparable ratio also in the case of rows with conventional seats, in the present case an advantage is afforded from the fact that the space depth, i.e. the horizontal offset from space row to space row, can be smaller, and therefore the absolute amount of the vertical offset is also smaller, which, in turn, reduces the risk of injuries, such as on falling. The stairs within the tier can thus also be designed more simply and the risk of falling when using the stairs is reduced.

**[0009]** In a development, the space depth, i.e. the space row offset, as viewed in the horizontal, is less than 80 cm. The row offset can also be smaller than 75 or 70 cm. In particular, it can be around 60 to 70 cm. As described in detail in the exemplary embodiment below, the drop below the given standard value of 75 to 80 cm for conventional rows of seat benches is made possible by the changed angular position of the thigh of the seated individual.

**[0010]** In an advantageous manner, a balustrade is provided in each case between one space row and a space row located in front thereof. Specifically at higher vertical offset distances, the balustrade has to prevent the spectators or individuals from falling down. In alternative embodiments, gratings, bars or the like can be used for the balustrade.

**[0011]** In the grandstand, one or more space rows preferably comprises a balustrade which, as measured from the floor surface of the space row, has a height of at least 70 cm. The balustrade can also be at least 80 cm high. The higher sitting position means that the balustrades (safety guards) can also be raised without sight restriction. For conventional seats, the balustrades are often reduced to a height of 65 cm in



order to permit free sight of the pitch even for seated grandstands. (This applies in particular for upper tiers with gradients of between 30 and 37 degrees.) However, the low heights of the balustrades between the seat rows constitutes a great risk for safety. In particular for the assembly of the seats or in the event of jumping up, for example while celebrating a goal, the risk of falling forwards over the "low" balustrade is particularly great. The higher balustrade in elevated seats therefore ensures considerably improved safety in the stadium. According to preferred embodiments, most of the rows, particularly preferably substantially all or all of the rows of the grandstand, are separated by balustrades as described herein. The balustrade preferably extends over the entire width of the corresponding rows, in particular without interruption. It is thereby preferably intended to prevent the balustrade being bypassed or climbed through and the safety to be increased.

**[0012]** The space rows are preferably arranged in a tier, and the angle of view of at least one space row which is mounted behind another space row (upwards) has an angle of view onto a grandstand-adjacent beginning of a pitch or event stage, said angle of view, sloping from the horizontal, describing an angle of 45° or greater. Specifically if, in the higher tiers, a steep angle of view onto the pitch is provided, a relatively large vertical offset from space row to space row arises from the tangent of the vertical offset to the space depth.

**[0013]** The advantage of the standing seat comes to fruition here by the fact that smaller space depths can be realized, which leads correspondingly to a smaller vertical offset.

**[0014]** One aspect of the invention thus also relates to an arrangement of a grandstand as described herein and a pitch or event area adjacent thereto.

**[0015]** According to one embodiment, the above-described sloping view of 45 degrees or greater requires a gradient of the grandstand of more than 45 degrees, thus a ratio of the vertical offset (y) of two adjacent space rows to the depth (X) of a space row greater than 1.

**[0016]** According to a preferred embodiment of the invention, the gradient of the grandstand is at least 45 degrees, in particular more than 45 degrees, in particular at least 47 degrees, further in particular at least 50 degrees.

**[0017]** According to the invention, this greater gradient of the grandstand offers particular advantages for a higher sitting position because the balustrade in front does not obstruct the clear view onto the nearby part of the pitch or on what is happening. According to an embodiment of the invention, the seat height may increase with a greater gradient of the grandstand.

**[0018]** Another aspect of the present invention thus relates to a grandstand with at least two space rows and a gradient of more than 45 degrees, wherein at least one space row has seats with a sitting height as described above, in particular of approximately 50 to approximately 100 cm.

**[0019]** In a development, the balustrade preferably has a handrail in order thereby to provide a spectator with a secure support.

**[0020]** In an advantageous manner, a balustrade and/or a handrail are/is provided for a space, and the balustrade and/or handrail, in a projection under the horizontal, lie/lies at least partially above the seat surface of a space row located in front thereof. A type of overlap of the space rows is thus achieved, which makes it easier for spectators in a rear row to bend forwards and thereby to obtain a better view of the pitch. This advantage comes to fruition in particular in the case of the space rows in the tiers and, in particular, in the higher and

steeper tiers. The overlap can be desired to be greater, the higher the step height, or the vertical offset.

**[0021]** According to one embodiment, a balustrade having a handrail is arranged in front of a space and a distance of at least 8 cm is provided here between the handrail and a main body of the balustrade, and said distance is in particular at least 20 cm. An at least small distance between the handrail and the balustrade enables the spectator to grasp the handrail, and a greater distance makes it possible for the spectator in an improved manner to see through said distance onto the pitch. Said distance, if it is greater than approx. 15 cm, can be protected with a grating or a second rail.

**[0022]** In particular, the seat is a folding seat which is foldable into a vertical position of non-use and into a use position, in which the seat surface or lean-on surface is oriented within an angular range of 90° to 140° with respect to the rising vertical.

**[0023]** According to an embodiment of the invention, the seat (not only as a folding seat) may generally be oriented within an angular range of approximately 90° to 140°, in particular at least approximately 95°, preferably at least approximately 100°, with respect to the rising vertical. According to one embodiment, the maximum angle is approximately 150°, in particular approximately 140° with respect to the rising vertical. At angles of greater than 90°, leaning sitting, in particular, is assisted. An angle of this type may therefore be advantageous, since the seat thus does not project too far into the standing region of the space or into the evacuation path.

**[0024]** The term "seat or lean-on surface" as used herein should express that the seat surface having a pronounced inclination with respect to the horizontal (angular range of greater than 90° with respect to the rising vertical) is rather a lean-on surface. Thus, according to an aspect of the invention, the term "seat or lean-on surface" relates to the same (seat) surface.

**[0025]** The seat can also be adapted ergonomically to the body contour of the spectator in such a manner that said seat has a projection lying in the seat plane for the region between the legs, as a result of which the vertical component of the weight of the individual can be better absorbed that would be possible in the case of a seat surface not shaped ergonomically. According to a preferred embodiment, the seat can be of saddle-like design, wherein the seat depth projects further forwards in a central region than at the edge regions located next thereto.

**[0026]** In particular, the spaces of space rows lying one behind another can have a lateral offset such that the sight of a spectator in the space row lying at the rear through the gap between heads of individuals and the space row lying in front thereof permits a view of central regions of the pitch or performance area.

**[0027]** The balustrade can also not have any interruptions, through which an individual can bypass or climb through the balustrade, over in each case a complete space row.

**[0028]** The seats are preferably assigned a back cushion which is arranged above the seat and is oriented substantially vertically.

**[0029]** A grandstand with space rows rising in a stepped manner can also be provided, wherein at least two space rows lying one behind the other have a plurality of spaces for spectators and/or the audience, and the spaces each have a seat comprising a seat surface or a lean-on surface, and each seat here is assigned an electronic display for displaying

personal data of the spectator and/or audience number. For example, this can be in the name of the individual, but also the name of the individual who made the reservation. Also, for example, the name of the company or the name of the group with which the individual is associated can be displayed. The individual spaces thus provided can increase the safety aspect.

[0030] The invention is explained in more detail below with reference to drawings without restricting the general inventive concept. In the drawings:

[0031] FIG. 1 shows the cross section of a grandstand,

[0032] FIG. 2 shows an arrangement known from the prior art with seats in rows arranged one behind another,

[0033] FIG. 3 shows elevated seat elevated seats arranged one behind another with individuals in different positions,

[0034] FIGS. 4 and 5 each show alternative refinements of the elevated seat elevated seats,

[0035] FIG. 6 shows a foldable elevated seat in section,

[0036] FIG. 7 shows a perspective view of a handrail,

[0037] FIG. 8 shows a perspective sight of a elevated seat with a display element, and

[0038] FIG. 9 shows a top view of an alternative embodiment of a seat,

[0039] FIG. 10 shows an alternative embodiment with a displaceably mounted elevated seat,

[0040] FIGS. 11a to 11c show three alternatives of the meeting of two individuals in a space row with a elevated seat,

[0041] FIG. 12 shows an illustration of the meeting of two individuals in the case of a conventional seat arrangement,

[0042] FIG. 13 shows an alternative refinement of the elevated seat,

[0043] FIG. 14 shows an embodiment of the elevated seat with space rows with a small vertical height offset with respect to each other, and

[0044] FIG. 15 shows a further illustration of a grandstand known from the prior art with the problem of falling over the railing.

[0045] FIG. 1 shows a lateral section through a stadium 1. The latter comprises a lower spectator region which, pointing away from the pitch 5, has a gradient of approx. 30° in order to permit all of the spectators who are in this region, which is referred to below as the stalls 6, a good view of the pitch 5. The gradient can also describe a concave shape. In addition to halls and arenas, the invention refers to a stadium for types of field games, for example football or baseball. Such types of field games are distinguished in that there is a pitch of a predetermined size, wherein events which are of interest for the spectator can take place on all regions of said pitch, and therefore the intention is primarily to make it possible for all spectators to be able to see the entire pitch.

[0046] In the section of FIG. 1, this pitch 5 begins with the corner flag 5a, wherein, for reasons of scale in FIG. 1, the other end of the pitch 5 does not lie in the region of the drawing, but rather is revealed at the intersecting point of the lines of the second viewing direction 35.

[0047] FIG. 1, in the section plane, shows by way of example the viewing directions of a number of spectators and, in the vertical direction, shows the angle of view  $\alpha$  of said individuals. Since, in the case of grandstands, the individuals in the rear rows inherently have the worst view, the angle of view for said individuals is shown by way of example.

[0048] If the grandstand is then arranged by longitudinal side of the pitch, the individuals having this angle of view can have a view of the width of the pitch. For the spectators, it is

likewise of interest to have a view of the pitch 5 in the longitudinal direction thereof. Since this takes place by simple swivelling of the head, no particular requirements for constructing the grandstand arise in this direction, because of the row-shaped arrangement of the spaces, apart from the absolute distance of the rows from the pitch, and therefore this angle of view is not considered in detail below.

[0049] It is apparent from FIG. 1 that, in the case of individuals located in the stalls 6, the vertical position of individuals standing one behind another increases only by a small amount from individual to individual, i.e. the offset thereof in the z direction. This increase is approximately half to one head length and therefore permits a good view for all of the individuals in the stalls, even if the somewhat shorter individual is standing between taller individuals. This relationship changes in the tiers 8. Since the first viewing direction 30, which points to the adjacently located beginning 5a of the pitch 5, is steeper, the individuals of space row to space row in the tiers have to sit higher by a greater amount than the stalls 6. In simplified form, it can be said that, the higher the tier 8, the greater the vertical offset from row to row has to be in order to permit the individuals in the rear row and in the rear rows to have a good view of the pitch and especially of the beginning 5a thereof. By means of the curved construction of the stadium 1 with projecting upper tiers, the uppermost tier in the x direction is closer to the pitch, as a result of which the view of the beginning 5a of the pitch additionally becomes steeper.

[0050] FIG. 1 furthermore shows the necessary infrastructure of the grandstand, such as the entrances 8 and the toilets 3. The basic shape of the stadium 1 corresponds to a breaking wave, wherein the tiers 8 of the grandstand are arranged in the inner concave shape. The tiers are freely suspended, and therefore supports or pillars are not provided downwards, but rather the tiers are held exclusively by being secured on a corresponding contour of the stadium 1.

[0051] FIG. 2 shows a viewing phenomenon known from the prior art. If a spectator 20 in the first row stands up, the view of the individuals in the rows lying therebehind is greatly obstructed. This obstruction arises by the fact that, by standing up, the back and the head have come to a higher position. The elevated seat described below considerably reduces this problem.

[0052] It correspondingly emerges from FIG. 4 that the spectator 20 sits with his/her posterior partially on the elevated seat 50. The latter is distinguished from a conventional seat first of all by means of the vertical distance thereof from the floor surface 51 of the space row. In a conventional seat 59, a vertical seat height of between 40 and 50 cm arises for a pleasant sitting sensation, in which the knees are bent by 90° and the soles of the feet rest entirely on the floor surface 61. A different sitting state arises in the elevated seat 50 according to FIG. 4. This is because, here, the knees are bent by less than 90° and the soles of the feet, for an individual of normal height, rather than being in flat contact with the floor surface, are only in contact with the point of the foot. In the case of an individual sitting in such a manner, the upper body is located higher than in the case of an individual sitting conventionally. If a corresponding individual then stands up, the increase in height is smaller than in the case of an individual sitting conventionally. In other words: the difference of the manner of sitting compared to the conventional manner of sitting according to FIG. 2 and FIG. 4 can be seen in the fact that the individuals sitting in rear rows have a higher body

position while sitting and therefore have a smaller reduction in the field of vision when an individual located in front stands up. The seat height can be within the range of 80 to 90 cm. In particular in the event of adjustability of the seat height, seat heights of up to 100 cm are advantageous.

**[0053]** Since the seat in the embodiment according to FIG. 2 is placed onto the step lying thereabove in each case, the difference in step height has to be approx. 40 cm, since the seat height can be compensated for only by the height of the seat surface. In the event of other differences, but especially in the event of greater differences of more than 40 cm, the seat has to be mounted onto the same step. From a greater step offset, such as, for example, at 50 cm, a balustrade is needed for safety reasons. This case is shown in FIG. 15. A balustrade of 1.10 m would actually have to be provided here. Since, however, this would obstruct the view, there are inevitably special solutions here which greatly endanger the safety in the stadium. For example, German Regulations on Places of Assembly state, in §11(3), sentence 2 "If the step row is not located more than 1 m above the floor of the step row lying in front thereof or of the assembly space, 0.65 m is sufficient in front of seat rows." It is therefore permissible to design the balustrade height to be smaller than would actually be desired for safety reasons. At 0.65 m, however, the problem (shown in FIG. 13) of falling over the balustrade can occur. In the described concept of the elevated seat, the individuals sit at a higher level, and therefore even a correspondingly higher balustrade does not obstruct the view.

**[0054]** FIG. 3 shows, for a tier 8 located at a high level, four spectators in different positions. The position of the head 12 of the individual located in the first row, when said individual stands up or jumps up to celebrate, is shown here by dashed lines. Owing to this position and in conjunction with the relatively large offset  $y$  from seat row to seat row, the view for the further individuals is only minimally reduced, if at all, by said individual standing up.

**[0055]** According to FIG. 3, a further advantage of the elevated seat according to the invention that comes to fruition in particular in the case of tiers located higher up is apparent. FIG. 3 shows the gradient line with a gradient angle  $S$  which arises from the tangent  $S = \tan(y/x)$  and substantially corresponds to the first viewing direction 30 of the corresponding tier. The required offset  $y$  thus immediately results from a space depth  $x$  given a required gradient angle. However, a high offset  $y$  can possibly be considered disadvantageous, since, if an individual climbs over the balustrade, the risk of injury when falling from the balustrade increases. Also, as a result, the group feeling of the spectators is reduced, since, with an increasing offset, a spectator can communicate less with individuals in rows located in front and behind. In order to increase the safety, the balustrade is formed over the entire length of the space row. The balustrade can be designed as a bar arrangement or as a closed or interrupted surface.

**[0056]** According to ergonomic considerations, in the case of a conventional seat, there is a recommended space depth  $x$  of 70 to 80 cm which is cited in DIN EN 13200-1 (Spectator facilities) and in Fifa (Federation Internationale de Football Association) guidelines. This value is based, inter alia, on the fact that, in the case of normal sitting, the thigh is oriented horizontally, and it can therefore be unpleasant for an individual sitting in this manner if a further spectator has to pass in the gap between the knees and the balustrade. The value consists of a passage width of 35 to 40 cm and a seat depth of 35 to 40 cm. Owing to the described construction of the

elevated seat, the angular position of the thigh is no longer in the horizontal, but rather is more vertical, and therefore the gap mentioned becomes wider. In other words, the elevated seat makes it possible to reduce the space depth  $x$  without impairing the convenience of individuals coming past, and this also reduces the offset  $y$  and increases the safety and the community feel of the spectators. The elevated seat affords a further advantage for the situation in which another spectator wishes to go past an occupied space. In the case of the elevated seat, the seated individual is namely in a type of intermediate standing position which makes it easier for the individual to change to full standing, and therefore the other spectator can move past the individual who has stood up. Furthermore, FIG. 3 shows a back cushion 56 which is arranged above the foldable elevated seat 50. A catching cage 68 (see FIG. 1) is arranged in front of the first space row 60a of each of the tiers 8. Should objects fall over the frontmost balustrade or a person climb or fall thereover, said objects or individual are or is retained by the catching cage.

**[0057]** The space depth  $x$  can preferably be 70 to 80 cm. In tiers located high up, it is disadvantageous to have too great an offset. For this reason, in particular in the tiers, the space depth  $x$  can be 60-70 cm. Especially in the stalls 6, the space depth can be greater, such as, for example, 80-100 cm, with too great a space depth  $x$  reducing the overall number of spaces in the grandstand.

**[0058]** In FIG. 4, the balustrades are inclined by approx. 5° from the floor surface 51 in the direction of the pitch. This causes an overlap of the space rows to arise. Within this context, the handrail which is denoted by No. 64 is located further to the left than the axis of rotation 55 of the space row lying therebelow or thereabove. In this manner, the space above the lower individual is partially used for other spectators, and the upper spectators can correspondingly bend forward and thereby obtain a better view of the events of the game.

**[0059]** FIG. 4 furthermore shows an alternative 50b of the elevated seat preferably configured not to be foldable (vertically). The elevated seat here is integrated into a rear wall which is inclined forwards between 2° and 15°, preferably 5°. The sitting sensation is thereby somewhat adversely affected, since the weight of the upper body is no longer located perpendicularly above the seat contact region. By contrast, the effect is achieved that the elevated seat is no longer located in the region in which the spectators stand, and therefore the disadvantage which may arise due to the seat being perceived to be annoying when celebrating standing up, is eliminated.

**[0060]** FIG. 5 shows a further alternative in which the handrail 64, as according to FIG. 4, has an offset in a negative X direction in relation to the axis of rotation of the seat located therebelow. The rear wall, i.e. the backrest, is vertical here, which brings about a pleasant sitting sensation. In the row arranged therebehind or thereabove, more space is created at posterior or belly height and up to chest height. This is pleasant, since the people project further at the height mentioned than in the foot and leg region. The effect which can also be achieved by this refinement is that the space depth  $x$  is reduced.

**[0061]** FIG. 6 shows the optional folding function of the elevated seat. An axis of rotation 55 is integrated in this case in to the rear wall of a space, and the visitor can fold said elevated seat downwards. A stop is provided owing to the design at an angle  $\beta$  of 90°, the stop ensuring that the spectator can correspondingly sit down on the seat. Alternatively, the

angular position can also be between  $90^\circ$  and  $130^\circ$ . At these angular positions, there is leaning sitting. If the visitor leans against the seat, a vertical force component is exerted on the visitor's body via the seat and therefore the weight of the body onto the legs is reduced. The seat depth  $b$  of the seat is preferably between 13 and 20 cm. The seat depth  $b$  can also be up to 30 cm, wherein, at this seat depth  $b$ , the space depth  $x$  increases in a disadvantageous form and, at seat depths  $b$  below 13 cm, the pleasant sitting sensation can no longer be completely realized.

**[0062]** FIG. 6 shows a vertical distance  $d$  from the handrail 64 to the main body of the balustrade. Said distance is at least 5 cm, and therefore a visitor can comfortably grasp the handrail. The main body of the balustrade is manufactured from a plastics plate or metal plate, or also from a grating or glass, and provides the individuals in the respective space row with the security not to fall through forwards.

**[0063]** In addition, as shown in FIGS. 7 and 8, a display 70 can be integrated in either the handrail 64 or a display 71 can be integrated into the region of the elevated seat. In the case of personalized space cards, the visitor's name can be shown by said display.

**[0064]** FIG. 9 shows an alternative of the elevated seat in a top view. While, in the previously mentioned embodiments, the front edges of the seats 50 were rectilinear, the seat according to FIG. 9 has a saddle-shaped projection 58. As explained above, the width of the elevated seat is relatively small, and therefore there is not space for the entire posterior on the seat. In the event of sitting, it is of essential importance to absorb the weight, i.e. forces in the vertical direction. The projection 58 is of saddle-shaped configuration in such a manner that it can be partially accommodated in the region between the legs. The body contour there has a basically horizontal contact surface with the projection, via which contact surface the weight can be better absorbed than via the cheeks of the posterior.

**[0065]** FIG. 10 shows an elevated seat 50 which is accommodated in a vertical guide and is movable by a distance. By this means, the height of the seat can be adjusted to the individual dimensions and preferences. The movement path  $h$  is preferably up to 10 cm. It may also be up to 20 cm or up to 40 cm. The elevated seat can be latched at any point. Alternatively, it can be configured in such a manner that, owing to the weight of an individual sitting or leaning on the seat, said elevated seat jams in its guide and is thus secured against unintentional slipping down. The seat surface of the seat according to FIG. 10 is oriented horizontally, wherein a combination with a seat angle adjustment means can also be provided.

**[0066]** In the conceptual design of the grandstand, different criteria are of essential importance. Firstly, it is important for sufficient safety to be provided. In the case of standing spaces being allocated in blocks, the people typically collect in the front region where high densities may occur. Similarly, in the case of standing spaces, the greater mobility of the spectators can more easily result in throngs, with the risk of rioting. For this reason, there are calls which increasingly demand only seats in the stadia. In the case of seats, the spectators, by contrast, frequently do not feel sufficiently involved in the events of the game and experience the game passively, virtually as "on a television chair" and the group-dynamic-related feeling towards one another and to the events of the game suffers because of it. With regard to safety, the concept of the elevated seats affords an advantage, since the spectators are

thereby "bound" to a space allocated to them and therefore crowds of people are avoided. With regard to the involvement of the spectators in the events of the game, the elevated seat is advantageous, since it describes a position in transition to standing, which makes it possible for the spectators to jump up without much effort during an exciting situation of the game. In contrast to standing spaces, there are therefore individual rows (as also in the case of seats) and, in contrast to conventional standing spaces, there are space allocations (therefore as in the case of seats). Owing to the higher position of the spectator in the case of the elevated seat, balustrades of a greater height can be used, which improves the safety with the view remaining the same.

**[0067]** In the case of elevated seats, there is even a greater possibility of interaction for the spectator than in the case of pure standing spaces, since, in the case of the latter, the spectator is always standing, i.e. even during the less exciting scenes of the game. However, in the case of the elevated seat, the spectator always has the choice of enjoying the game sitting or standing, depending on the situation of the game, and, as a result, the spectator subjectively experiences a feeling of involvement in the events of the game, which is expressed by his/her posture.

**[0068]** A further important aspect of the concept of the grandstands is that the view of as far as possible all of the regions of the pitch is intended to be made possible for as far as possible all of the spectators. Since, in the case of the elevated seat according to the invention, as mentioned, the "increase in height" on standing up is smaller than in the case of conventional seated grandstands, a good view for all is thus ensured.

**[0069]** A further important aspect in the concept of the grandstands consists in providing as large a number as possible of spectator spaces and of having the latter as close as possible to the events of the game in order thereby to improve the view and interaction. This takes place via the described tiers which are located above the stalls of the grandstand. As described, the space depth  $X$  can be reduced by the concept of the elevated seats, which reduces the height offset from row to row.

**[0070]** Furthermore, the matter of evacuation also plays an essential role. In the event of a catastrophe, the visitors should be able to rapidly leave the grandstand. Since the depth of each individual seat is configured to be smaller than in the case of conventional seats, the space depth  $x$  which is used in this case as an evacuation aisle is only insignificantly reduced.

**[0071]** The relationship explained above is also evident from FIGS. 11a to 11c. A space depth of 60 cm is shown here. If an individual of normal build wishes to go straight past a seated individual of normal build, said individual at the best stands up, as shown in FIG. 11a. Alternatively, said individual can go past the seated individual stepping sideways, i.e. turned through  $90^\circ$  and therefore oriented towards the pitch 5, as shown according to FIG. 11c. If an individual of heavy build is sitting in the space and a corpulent individual wishes to go past the latter, the corpulent individual turns and the seated individual stands up, as shown according to FIG. 11b. In the cases of FIGS. 11a and 11b, the elevated seat folds upwards during the passing procedure and therefore no longer obstructs the passage.

**[0072]** In these three cases, a passage is therefore possible without annoying the seated individual. This arises because of the small seat depth of the elevated seat, the standing up facilitated by the higher sitting position and the folding of the

elevated seat upwards. In the case of conventional seat rows, as shown in FIG. 12, the space of the seated individual is determined by the seat surface and the foot region X1. In the example shown, the space depth X is 80 cm and the depth of the foot region X1 is 40 cm. In these conditions, it is scarcely possible for an individual to be able to go past a seated individual. On the contrary, said individual has to stand up. Nevertheless, as FIG. 12 shows, passage is more difficult than in the case of a elevated seat with a space depth of 60 cm.

[0073] Of course, the invention is not restricted to the embodiments illustrated in the drawings. Features of different embodiments, in particular also the features which are shown exclusively in the drawings, are freely combinable with one another unless there are any technical arguments there-against. Therefore, the above description should be regarded as explanatory, rather than limiting. The subsequent claims should be understood as meaning that a feature referred to is present in at least one embodiment of the invention. This does not exclude the presence of further features.

[0074] FIG. 13 shows a further embodiment of the elevated seat, in which the seat is bar-shaped and the bar is oriented along the direction of the space row. The bar can have a core in the form of a metal tube and can be clad by a foam or a soft plastic or a rubber material. In the case of arrangements of the elevated seat with a small vertical offset of the space rows, as can be provided in particular in the stalls 6, elevated seat rows can be used without balustrades, wherein the seats, as explained in FIG. 13, can be of bar-shaped design.

1. A grandstand comprising space rows rising in a stepped manner, wherein at least two space rows, lying one behind another, have a plurality of spaces for spectators and/or an audience, wherein the spaces each have a seat comprising a seat surface or lean-on surface, and wherein the seat surface or lean-on surface of the seat is at a distance of at least 65 cm from a floor surface of the respective space.

2. The grandstand according to claim 1, wherein a depth of the seat surface (b) projected onto a horizontal is at maximum 30 cm (11.8 in.).

3. The grandstand according to claim 1, wherein a gradient of the grandstand is more than 45 degrees.

4. The grandstand according to claim 1, wherein in each case one space row has a vertical offset (y) of at least 70 cm (27.5 in) with respect to the space row located in front thereof.

5. The grandstand according to claim 1, wherein a ratio of a vertical offset (y) of two adjacent space rows to a space depth (X) of the space row is greater than 1.

6. The grandstand according to claim 5, wherein the space depth (X), i.e. a space row offset as viewed in the horizontal, is less than 80 cm (31.5 in.).

7. The grandstand according to claim 1, wherein a balustrade is provided between at least one space row and a space

row located in front thereof, and wherein the balustrade, as measured from the floor surface of the space row, has a height of at least 70 cm (27.6 in.).

8. The grandstand according to claim 1, wherein the space rows are arranged in a tier and wherein at least one space row, which is mounted downstream of another space row, has an angle of view ( $\gamma$ ) onto a grandstand-adjacent beginning of the pitch, and wherein said angle of view, sloping from a horizontal describes an angle of 45° or greater.

9. The grandstand according to claim 7, wherein the balustrade further comprises a handrail.

10. The grandstand according to claim 9, wherein the balustrade and/or the handrail are/is provided for at least one space, and wherein the balustrade and/or handrail, in a projection under a horizontal, lie/lies at least partially above the seat surface of the space row located in front thereof.

11. The grandstand according to claim 9, wherein the balustrade having handrail is arranged in front of at least one space and a distance (d) of at least 8 cm (3.1 in.) is provided between the handrail and a main body of the balustrade.

12. The grandstand according to claim 1, wherein the seat is a folding seat which is foldable into a vertical position of non-use and into a use position, wherein the seat surface of the seat or lean-on surface has an angle ( $\beta$ ) of 90° to the vertical or is oriented within an angular range ( $\beta$ ) to the vertical of greater than 90° to 140°.

13. The grandstand according to claim 1, wherein the seat is ergonomically adapted to the body contour of the spectator in such a manner that the seat has a projection lying in a seat plane for a region between legs of the spectator.

14. The grandstand according to claim 1, wherein the spaces of space rows lying one behind another have a lateral offset such that sight of the spectator in the space row lying at a rear through a gap between heads of spectators on the space row lying in front thereof permits a view of central regions of the pitch or performance area.

15. The grandstand according to claim 7, wherein the balustrade does not have any interruptions over at least one complete space row.

16. A grandstand comprising space rows rising in a stepped manner, wherein at least two space rows lying one behind the other have a plurality of spaces for spectators and/or an audience, and the spaces each have a seat comprising a seat surface or lean-on surface, and wherein each seat is assigned an electronic display for displaying personal data of the spectator and/or of the audience.

17. The grandstand according to claim 1, wherein in each case one space row has a vertical offset (y) of at least 100 cm (39.4 in) with respect to the space row located in front thereof.

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