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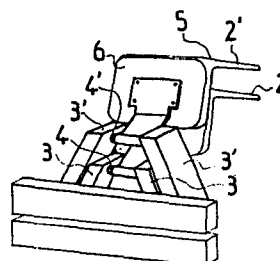
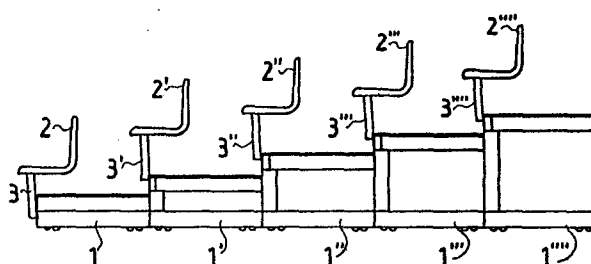
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54 Collapsible grandstand.

57 The present invention concerns a collapsible grandstand, comprising a plurality of movable carriage elements pushable into and under each other and provided with seats mounted on the front margin of the carriage elements by the aid of mounting frames. The mounting frames (3-3''') of the carriage elements (1-1''') have been arranged and disposed to be intercalated in the manner that the mounting frames of the seats (2-2''') of a given carriage element are pushed between the mounting frames of the next carriage element when the first carriage element is pushed under and into the latter. Furthermore, the seats are pivotally mounted on the mounting frames to be inclinable in forward direction so that the mounting frames become intercalated, mainly one on top of the other and that the seats when inclined in forward position are likewise intercalated and mainly one on top of the other when the carriage elements are pushed one under the other and into each other. The back rest (5) and seat part of the seats are preferably rigidly interconnected. The height difference of seats between the first and next seat disposed to go under each other is preferably less than the seat height of the seats. Two or more mutually adjacent seats of one carriage element may be advantageously joined together to be substantially unturnable with reference to the pivots so that the seats are simultaneously inclinable.



Collapsible grandstand

The present invention concerns a collapsible grandstand, comprising a plurality of movable carriage elements, pushable one within and under the other and provided with seats, the carriage elements comprising mounting
5 frames for seats, disposed on the front edge of the carriage element.

Collapsible grandstands of the above mentioned type are known in the art among others through U.S. Patents No. 2,817,122 3,228,123 3,352,069 4,000,586 4,063,392 and
10 4,155,202, through German Patents No. 8,23,033 and 1,923,714, through British Patent No. 1,414,751 and through U.S. Patent No. 2,987,114. However, these grandstands known in the art present some drawbacks. Particularly, the folding down of the seats permitting
15 the carriage elements to be pushed into and under each other engenders problems. The folding mechanisms of the seats are complicated and cumbersome. The structure of the seats is costly. Moreover, the folding mechanisms of the seats increase maintenance and operating costs
20 considerably. Furthermore, these collapsible grandstands of prior art display the drawback that the height difference between each two seat rows has to be almost as great as the height of one seat, that is, each row is located one seat height higher up than the preceding
25 row.

The object of the present invention is to eliminate the drawbacks described above. It is a special object of the invention to provide a collapsible grandstand which is free of the drawbacks mentioned above. It is a further
30 object of the present invention to provide a collapsible

grandstand wherein the seats do not have a cumbersome and complicated machinery for collapsing. It is still a further object of the invention to provide a collapsible grandstand in which the height difference between seat
5 rows may also be less than each seat height.

Regarding the characteristic features of the invention reference is made to the claims.

The invention is based on the feature that each carriage element comprises a particular seat mounting frame
10 disposed in the front part of the carriage element so that the mounting frames are intercalated in vertical direction when the grandstand has been collapsed, that is, when the carriage elements are pushed one under the other. Furthermore, to each seat frame has been pivoted
15 a forwardly inclinable seat, and the seats have been arranged to be inclinable in forward direction one on top of the other, and intercalated when the grandstand is pushed together. The seats are preferably rigid, that is, the seats comprise a back rest and a seat rigidly
20 attached to each other. Furthermore, the height difference between a first and a second seat to be fitted one under the other may be less than the seat height of these seats; the height difference is restricted by nothing else but the strength requirements of the seat frame.

25 The collapsible grandstand of the invention is substantially simpler of its structure than those of prior art. The back rest and the seat portion of the seats may be rigidly affixed to one another. In addition, the height difference between the seat rows, that is,
30 between the seats may be substantially less than in grandstands known of prior art.

The invention is described in the following in detail with the aid of embodiment examples, referring to the

drawings attached, wherein:-

Fig. 1 presents in elevational view part of a collapsible hall grandstand according to the invention when the grandstand is open, that is, it is spread out to form
5 a hall stand,

Fig. 2 shows part of the grandstand of Fig. 1 when the stand is pushed together,

Fig. 3 shows seats of the grandstand of Fig. 2 in oblique rear view,

10 Fig. 4 shows a seat of the grandstand of Figs 2 and 3 when inclined for collapsing,

Fig. 5 presents part of the carriage element of the hall grandstand according to another embodiment of the invention, viewed from the side and obliquely from above,

15 Fig. 6 presents the seat mounting frame of the hall grandstand according to a third embodiment of the invention, in rear view, and

Fig. 7 presents one seat of the hall grandstand according to a fourth embodiment of the invention in elevational
20 view, with the seat inclined in forward direction.

A collapsible grandstand according to the invention is presented in Fig. 1. The grandstand comprises a plurality of mov-able carriage elements 1-1''', pushable one into and under the other. The carriage elements are
25 fitted with folding seats 2-2'''. .

As taught by the invention, each carriage element 1-1''' comprises a mounting frame 3-3''' for the seat 2-2''',

each mounting frame being placed on the front margin of the respective carriage element, suitably close to the next element to be pushed under said element. The mounting frames 3-3'''' are downwards widening in shape and so arranged and fitted that the seat mounting frame of a given carriage element is pushed underneath the seat mounting frame of the next carriage element when the first carriage element is pushed under and into the second. The seats 2-2'''' have been pivotally 4,4' mounted on the mounting frames and so fitted and arranged that the seats are inclinable in forward direction, supported by said pivots, whereby when the carriage elements are pushed under each other and into each other the seat mounting frames come to lie upon each other and in each other, in register and intercalated, and the seats will likewise lie upon each other, in register and intercalated.

In the embodiment described, the mounting frames 3-3'''' consist of beams mounted to the front of the carriage elements, so fitted in V-letters shape that each first mounting frame enters under the second when the carriage element supporting the first mounting frame is pushed under that one supporting the second. The seats 2-2'''' are pivotally mounted by means of conventional horizontal axle pins in the respective mounting frames, to be inclinable in forward direction.

The seats 2-2'''' are rigid, that is, the back rest 5 and seat part 6 of each seat are rigidly connected with each other. Therefore, the seats are cup-shaped and they can advantageously be manufactured at low expence, e.g. by casting them from plastic. The seats are mounted on the mounting frames with the aid of said pin pivot 4 as shown in Fig. 4. A plate-like mounting member 7 has been affixed e.g. with screws under the seat. Said mounting member constitutes an obliquely forward and

downward projecting flange part 8 pivotally connected to the mounting frame 3 with the aid of said axle pin 4. The mounting is highly stable, easy to construct and inexpensive. The mounting frame may comprise e.g.
5 a member protruding backwards and resting on the seat part 6 of the seat, to hold the seat in its seating position when it has been raised up for sitting as shown in Fig. 1.

In Fig. 5 is shown part of the carriage element 1 to
10 which a plurality of mounting frames 3-3'' for seats have been attached side by side, in which frames the seats 2-2'' are in turn mounted. The mounting frames are made of furniture tubing with rectangular cross section, and have the shape of an inverted, truncated
15 letter V. The mounting frames have been fixed by welding by their widening ends to the front edge frame beam of the carriage element 1. The mounting frames 3-3'' are placed upright, side by side and parallel with each other, and on the same elevation. One cup-
20 shaped seat 2-2'' has been pivotally mounted on each mounting frame 3-3'' by the aid of pivots 4; the design of the pivots is equivalent to the design of the mounting frame pivot shown in Fig. 6. Furthermore, the mutually adjacent seats 2-2'' in Fig. 5 have been inter-
25 connected unturnable with reference to the pivots 4 so that the adjacent seats are inclinable and raisable all at once. In Fig. 5, the mutually adjacent seats have been interconnected by the aid of a joining rod 10, passed through horizontal, transversal guiding
30 apertures 12 provided in the seats. The guiding apertures 12 consist of the lamina of rectangular furniture tubing sections¹³ welded to each seat in succession and in parallel. The joining rod 10 thus joins the seats together in such manner that the functioning of the
35 seats is synchronized.

In the embodiment depicted in Fig. 6, a seat mounting frame 3 of a seat is seen, consisting of a tine-resembling and upwardly projecting supporting member affixed to the frame beam on the front margin of the carriage element 1. The mounting frame projects on one side, obliquely upward and forms a horizontal, sidewise protruding extension, to which the seat mounting member 7 is, attached. On the mounting frame two parallel mounting lugs 14 have been affixed, matched by two mounting lugs 15 on the mounting member 7, in parallel and equally side by side; the mounting lugs have been pivotally joined by the aid of a pivot rod 16. In addition, the mounting member 7 comprises a horizontal and transversal tube 13, through which a rod joining together several seats may be pushed if desired.

The structural design of the seat mounting frame 3 and of the mounting member 7 presented in Fig. 7 are substantially like the equivalent structures presented in Figs 5 and 6. However, in Fig. 7, the mounting frame 3 is formed by a supporting tube projecting obliquely in upward direction from the front margin of the carriage element 1, and to which tube mounting member 7 has been pivotally attached by the aid of the pivot 4. Owing to the simple construction of the mounting frame 3, made of one single tube, the seats of Fig. 7 may be placed so that the seats of two successive carriage elements are either in register laterally (as shown in Figs 1-4) or, if desired, laterally intercalated. The intercalated placement of seats may also be accomplished by using the asymmetric design, Fig. 6, of the mounting frame. Laterally intercalated arrangement of the seats located behind each other is particularly advantageous in view of improved visibility from the grandstand.

The design of the movable carriage elements which are part of the grandstand may of course vary. The invention

may be applied in connection with any collapsible
grandstands, and carriage elements thereof, known in
themselves in the art, for instance in connection with
the grandstands and/or carriage elements disclosed in
5 the Patents cited in the introduction part of this
disclosure.

The embodiment examples are intended for illustration
of the invention, without confining it in any way.

CLAIMS

1. Collapsible grandstand, comprising a plurality of movable carriage elements (1,1',1'',1''',1''''') pushable into and under each other, said elements being provided with seats (2,2',2'',2''',2'''''), the carriage elements (1-1''''') comprising mounting frames (3,3',3'',3''',3''''') for the seats (2-2'''''), disposed on the front edge of the carriage element, characterized in that the mounting frames (3-3''''') are arranged and disposed to be intercalated so that the mounting frames of the seats (2-2''''') of a given carriage element (1-1''''') enter between the mounting frames of the seats of the next carriage element when the first carriage element is pushed under and into the second, and that the seats are pivotally mounted (4,4') on the mounting frames and so disposed that the seats are inclinable forwardly in support by said pivots, whereby, when the carriage elements are pushed under and into each other, the mounting frames of the seats assume intercalated positions, mainly on top of each other, and likewise the seats assume intercalated positions, mainly on top of each other.
2. Grandstand according to claim 1, characterized in that the mounting frames (3-3''''') have downwardly widening shape and are disposed mainly on top of each other and partly within each other.
3. Grandstand according to claim 2, characterized in that the mounting frames (3-3''''') have the shape of an inverted, and possibly truncated, letter V.
4. Grandstand according to claim 1, characterized in that the mounting frames (3-3''''') are disposed to be laterally intercalated, each mounting frame being laterally

displaced a given distance from the preceding frame, and that the seats (2-2''') are likewise disposed to be laterally intercalated.

5 5. Grandstand according to any one of claims 1 to 4, characterized in that the mounting frames (3-3''') constitute projections protruding in oblique forward and upward direction from the front edges of the carriage elements (1-1'''), to said projections the seats (2-2''') being affixed.

10 6. Grandstand, according to claims 1,2,3 or 5, characterized in that the seats (2-2''') have been disposed to be placed in register and under each other when the grandstand is pushed together.

15 7. Grandstand according to any one of claims 1 to 6, characterized in that the seats (2-2''') comprise a back rest (5) and a seat part (6) rigidly connected together.

20 8. Grandstand according to any one of claims 1 to 7, characterized in that at least two mutually adjacent^{seats} belonging to one carriage element (1-1''') have been joined together to be substantially unturnable with reference to the pivots (4) so that said mutually adjacent seats can be simultaneously inclined.

25 9. Grandstand according to claim 8, characterized in that at least two mutually adjacent seats (2-2''') belonging to one carriage element (1-1''') are joined together by the aid of a joining rod (10) disposed to pass through horizontal and transversal apertures (12) provided in the seats.

30 10. Grandstand according to any one of claims 1 to 9, characterized in that at least two

mutually adjacent seats (2-2''') belonging to one carriage element (1-1''') are provided with a common, substantially rigid pivot rod by the aid of which the seats are pivotally mounted on said mounting frame.

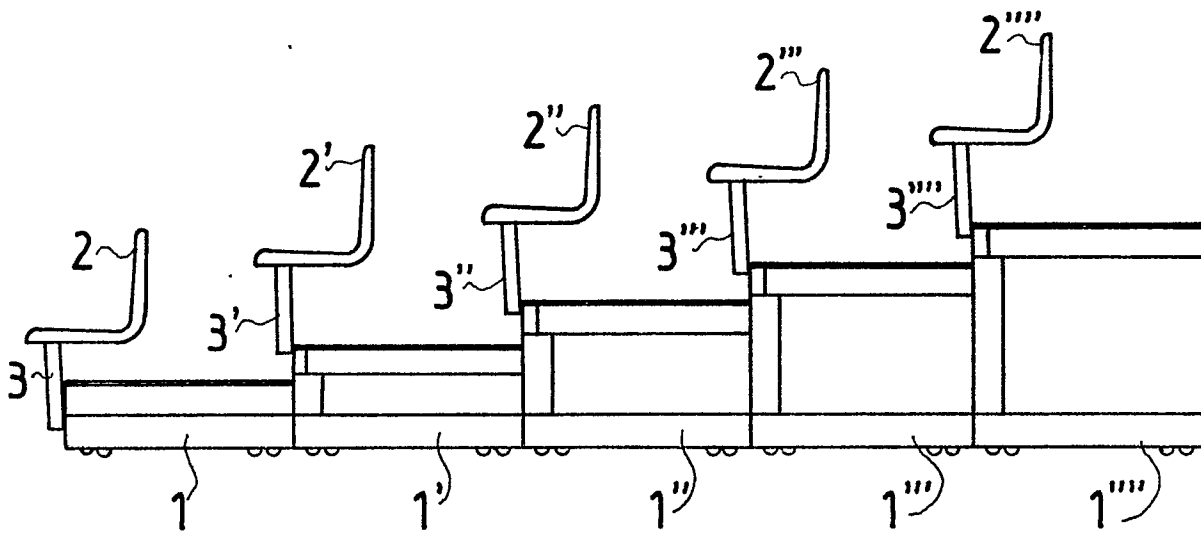


Fig. 1

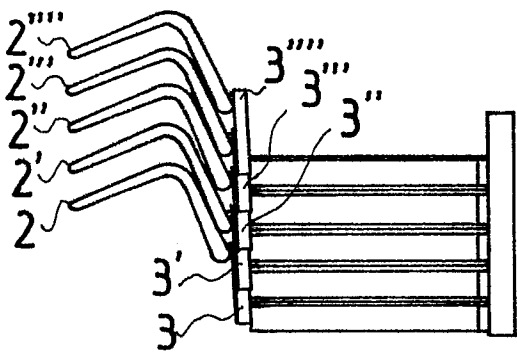


Fig. 2

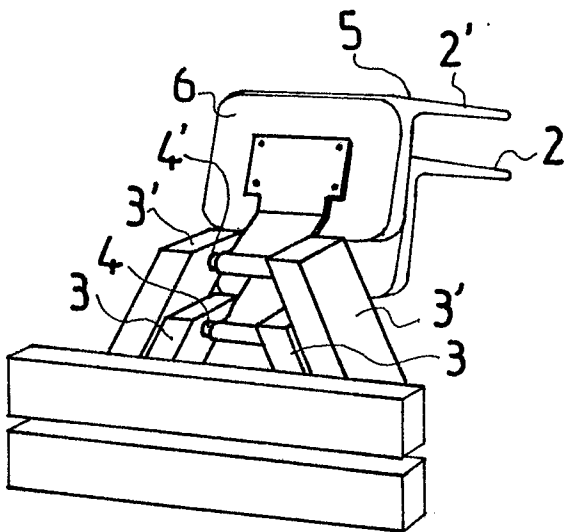


Fig. 3

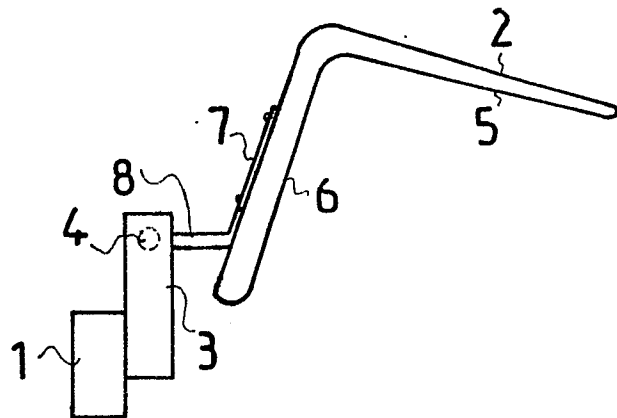
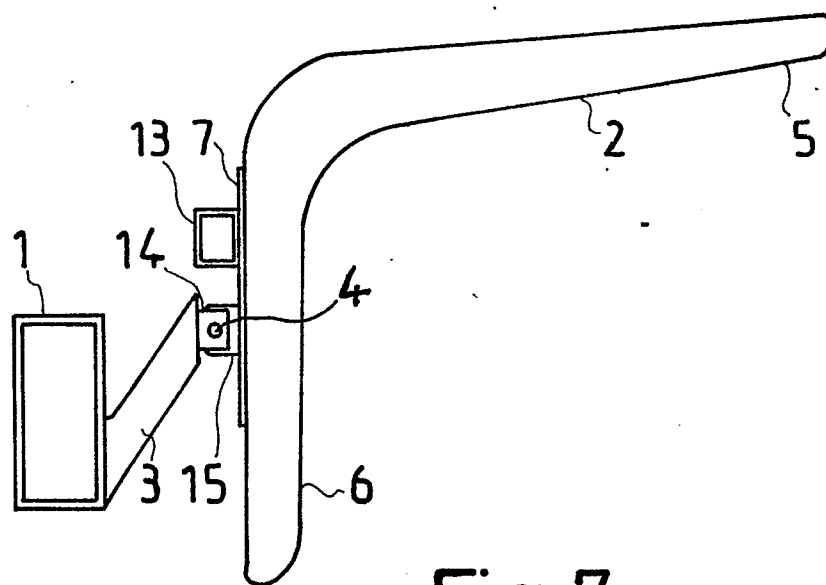
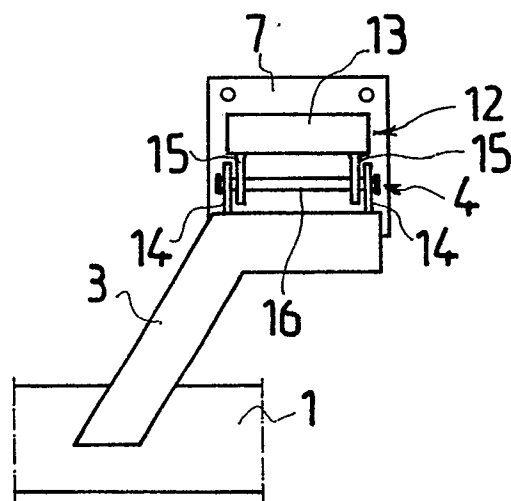
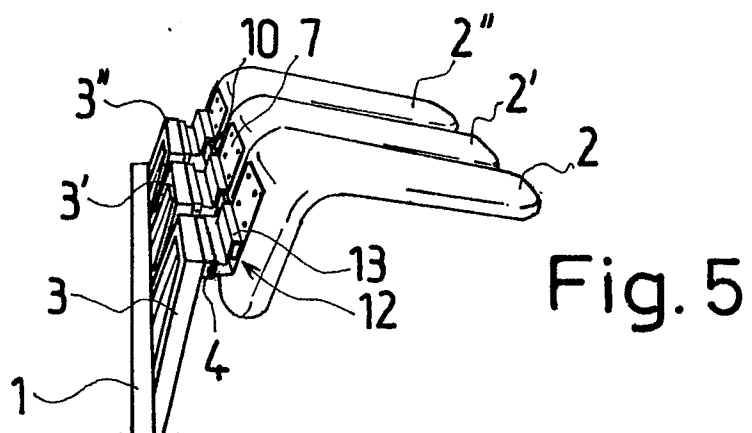


Fig. 4





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	--- CH-A- 433 688 (A. DEGE) * figures 1, 2 *	1	E 04 H 3/12 A 47 C 1/16
A	--- US-A-3 025 106 (G.A. EVANS et al.) * figures 1, 2 *	1	
A,D	--- DE-B-1 923 714 (M. MAIER GMBH & CO KG) * Figures 1 to 3; claims 1, 2 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			E 04 H 3/00 A 47 C 1/00
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 10-01-1983	Examiner VON WITTKEN-JUNGNIK
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	