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(71) Applicant (for all designated States except US): STM SAVUNMA TEKNOLOJILERI MUH. TIC. A.S. [TR/TR]; Mecnun Sokak No:58, Bestepe Merkez, Ankara (TR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): CEVIK, Fatih [TR/TR]; Mecnun Sokak No:58, Bestepe Merkez, Ankara (TR). OGUZ, Mustafa [TR/TR]; Mecnun Sokak No:58, Bestepe Merkez, Ankara (TR). ISCI, Hakan [TR/TR]; Mecnun Sokak No:58, Bestepe Merkez, Ankara (TR).

(74) Agent: DESTEK PATENT, INC.; Osmangazi Mah. Toplane Ortapazar Cad., Zindankapi Sk., No.10 Osmangazi, 16040 Bursa (TR).

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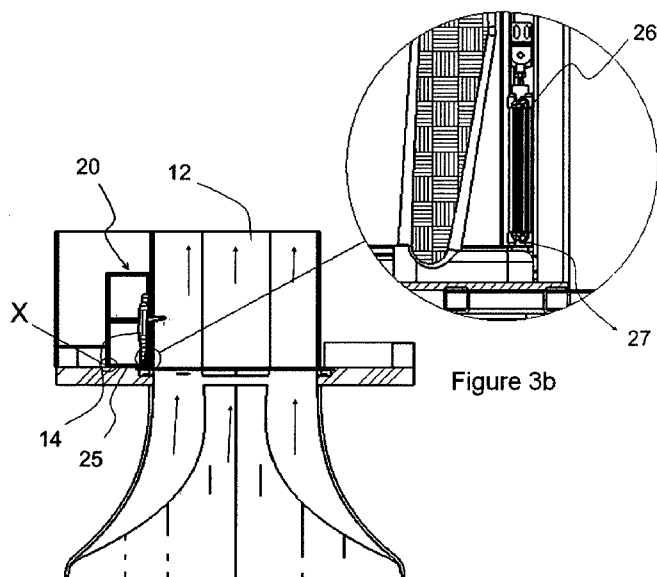


Figure 3a

Figure 3b

(57) Abstract: The invention is the vertical wind tunnel comprising air flow channels (10) having rectangular shaped structure, high power fan mechanisms for providing air flow inside the said air channels (10), flying field (12) having the capacity to hold at least one person (14) on air, who is to be trained inside at least one air flow channel (10), waiting area (11) for the people (14) kept waiting with the purpose of training, and waiting room (13) at the passage from the waiting area (11) to the flying field (12), and it comprises a vibration cabin (20), which is placed as a resonance absorber at the region where the flying field (12) and the waiting area (11) are found and in a way that it would correspond to the opening used for passage from the waiting room (13) to the flying field (12), which has a closed volume, and which comprises insulators (25) and at least one absorber (26) placed at the bottom and side parts, at the surfaces contacting with the ground and the flying field (12) walls in order to provide absorbing of the energy formed via enclosing of the cavitation resonance formed due to the air flow separations caused at the internal volume by the opening found in the flying field (12).

FLOW BASED RESONANCE ABSORBER CABIN AT SURFACE OPENINGS

The Related Art

The invention relates to absorbing of cavity resonances caused by the openings left parallel to the flow in the mediums wherein high velocity air flow is present.

- 5 The invention particularly relates to the vibration cabin placed at the inlet door for absorbing the cavity resonance (space oscillation, swinging, vibration) formed as a result of the flow separation formed at the door, which is found for entering into the flying field in the vertical wind tunnels used for parachutist training.

The Prior Art

- 10 It is known that vertical wind tunnels are present in the prior art, which are used as parachutist training simulators for training of parachutists. Vertical wind tunnels are formed of air channels having air flow in vertical direction. Vertical wind tunnel comprises a flying area for the person to be trained in free flight and the person flying in this flying field acquires the experience of free falling simulation. The air flow carrying
15 the flying person is provided through a channel via the fans placed in the wind tunnel. The trainee waiting in the waiting room, which has a door opening to the flying field, is taken into the flying field after all the controls are complete. There are patent applications in the prior art related with vertical wind tunnels. The Japanese patent with no JP9327540 and the international patent with publication no WO2007008184 can be
20 given as examples to vertical wind channels. While vertical wind tunnels can be used in special practices such as parachute or free skydiving, it can also be designed for public use with the purpose of amusement.

- In vertical wind tunnels, prevention of the flow separation formed at the door found for
25 entrance into the flying field and prevention of the cavity resonance formed as a result of this are quite important. As an example to the solutions in this subject, the international patent application with publication no WO2006012647 and title "Vertical wind tunnel with recirculation/free skydiving simulator and cable reducing dragging for use in wind tunnels and other places". The figures of the patent application related to the solution are given in Figure 4 and Figure 5. In the application disclosed in the said
30 patent, cavity resonance is tried to be prevented via at least one rectifier/front end

placed at the door entrance opening to the flying area. However, this solution does not have adequate effect in low air velocities and also the volume of the waiting area has to be smaller in this solution. In addition to this, it can not prevent the effect of the pressure formed by the vertical movements made by the people being trained inside the tunnel at the inlet door region during the parachute training on the waiting area walls. The applications of the prior art related to absorbing the cavity resonance can not provide the desired efficiency.

The number of examples about the applications related with absorbing of the cavity resonance formed as a result of flow separation caused at the door which is found for entering into the flying field in vertical wind tunnels can be increased, but all of the descriptions made in the prior art documents are inefficient and inadequate.

When the improvements in the prior art and the patent applications made are analyzed together, the presence of the need for a vibration cabin for absorbing the cavity resonance formed as a result of the flow separation formed at the door which is found for entering into the flying field in the vertical wind tunnels and the inadequacy of the prior solutions have necessitated an improvement in the related technical field.

Brief Description of the Invention

The present invention relates to flow based resonance absorber cabin at surface openings, which meets the above said requirements, eliminates all of the drawbacks and brings about some additional advantages.

From the known status of the art, the purpose of the invention is to eliminate the vibration problem formed by the cavity resonance in the complete interval from the initial velocity up to the flying velocity of the system.

Another purpose of the invention is to obtain a wider waiting area. Especially, adequate area is formed for the military equipments that have larger area requirement and the number of personnel, which directly affects the education time, can be increased because of having larger area. In this way, the number of personnel can be increased in the groups to be trained.

More particularly, the purpose of the invention is to provide that the air pressure formed by the vertical movements made by the people being trained would not have any impact on the waiting room.

5 In order to achieve the above said purposes, the invention is the vertical wind tunnel comprising air flow channels having rectangular shaped structure, high power fan mechanisms for providing air flow inside the said air channels, flying field having the capacity to hold at least one person on air, who is to be trained inside at least one air flow channel, waiting area for the people kept waiting with the purpose of training, and waiting room at the passage from the waiting area to the flying field, and it comprises a
10 vibration cabin, which is placed as a resonance absorber at the region where the flying field and the waiting area are found and in a way that it would correspond to the opening used for passage from the waiting room to the flying field, which has a closed volume, and which comprises insulators and at least one absorber placed at the bottom and side parts, at the surfaces contacting with the ground and the flying field walls in
15 order to provide absorbing of the energy formed via enclosing of the cavitation resonance formed due to the air flow separations caused at the internal volume by the opening found in the flying field.

In order to achieve the above said purposes, the invention is the vibration cabin placed behind the relatively large opening found on a surface in order to provide absorption of
20 the cavitation resonance formed due to fluids flowing parallel to this surface, the opening found on this surface, and the wide volume found behind this opening, and it is characterized in that; it comprises at least one absorber, which absorbs energy via the resistance formed by the insulators placed at its bottom and side surfaces and by the adjustable non-return valves placed at the air inlet and outlet ports.

25 In order to achieve the above said advantages which will be better understood from the below detailed description, the present invention; brings about many advantages through its said characteristics.

The structural and characteristic features of the invention and all advantages will be understood better in detailed descriptions with the figures given below and with
30 reference to the figures, and therefore, the assessment should be made taking into account the said figures and detailed explanations.

Brief Description of the Figures

For better understanding of the embodiment of present invention and its advantages with its additional components, it should be evaluated together with below described figures.

5 Figure 1, is the perspective view of the vertical wind tunnel used with the purpose of parachutist training.

Figure 2, is the top view of the vibration cabin of the invention placed at the opening, which is opened at the flying field from the waiting room.

10 Figure 3a, is the section view of the air channel (together with the flying field and vibration cabin).

Figure 3b, is the detail view of the vibration cabin.

Figure 4, is the view of the prior art.

Figure 5, is the view of the prior art.

Reference Numbers and Abbreviations

15	10. Air channel
	11. Waiting area
	12. Flying field
	13. Waiting room
	14. Trainee
20	20. Vibration cabin
	21. Waiting room door
	22. Flying field door
	23. Frame/carrier structure
	24. Glass
25	25. Insulator

26. Absorber

27. Valve set

Detailed Description of the Invention

5 In this detailed description, the preferred embodiments of the flow based resonance absorber cabin (20) at surface openings, which is the subject of the invention, will only be disclosed for better understanding of the subject, and will not form any limiting effect.

10 In general, cavitation resonance is a physical reality formed by fluids flowing parallel to a surface, relatively large openings formed on this surface, and wide openings found behind these openings. In the preferred applications of the invention, this vibration formed is absorbed via a vibration cabin (20) placed behind the opening and thus the destructive effects of this physical reality are eliminated. Below, the use related to the vertical wind tunnels used with the purpose of parachutist training is described as a preferred application of the invention. These descriptions are given for better understanding of the invention and they do not restrict the protection area of the
15 invention.

20 In Figure 1, the perspective view of the vertical wind tunnels used with the purpose of parachutist training is given. Vertical wind tunnel comprises air flow channels (10) having rectangle shaped structure, flying field (12) having the capacity to hold at least one person (14) on air, who is to be trained inside at least one air flow channel (10), waiting area for the people (14) kept waiting with the purpose of training, waiting room (13) at the passage from the waiting area to the flying field, and high power fan mechanisms in order to provide air flow.

25 The vibration cabin (20) used as resonance absorber in the application of the invention is placed at the region where the flying field (12) and the waiting area (11) are found at the parachutist training simulator (wind tunnel) formed by the said air channels (10). The said vibration cabin (20) is proposed in rectangular structure - while it can also be in different geometric shapes. The cabin (20) is formed of outer frames (23) forming the carrier structure and glass surfaces (24) are formed between the said frames (23) in order to provide the personnel (14) to be trained with the facility to see the external
30 medium. The cabin (20) comprises at least one waiting room door (21) opening to the waiting room (13) and at least one flying field door (22) opening to the said flying field

(12). The flying field door (22), which opens to the flying field (12) wherein flying training would be conducted, is placed in a way that it would close the opening at the flying field (12) wherein air flow is present. The cavitation resonance formed via the air flow separations formed by this opening is enclosed within the volume formed by the glasses and frames (3,4) of the said vibration cabin (20). The energy created by this dynamic event is absorbed via the insulators (25) and the absorber (26) placed at the bottom and the side, in other words, at the surfaces of the said vibration cabin (20) contacting with the ground and the flying field (12) walls. The said absorber (26) prevents movement of the said vibration cabin (20), which tries to rollover around the point (X) via the impact of the flow separation formed during passage of the air flow through the flying door (22) by having the flow direction shown in Figure 3. The absorber (26) absorbs the energy formed in the vibration cabin (20) via the resistance formed by the adjustable non-return valves placed at the air inlet and outlet ports.

The said absorber (26) used in the preferred embodiments of the invention is pneumatic piston.

Alternatively, the invention can be used in the doors of all types of air freight systems opened for maintenance at the intrusions wherein measurement devices are placed. Moreover, it can be used in weapon or landing gear housings of aircrafts and behind the parachutist doors of cargo planes.

The protection area of this application has been specified under claims and cannot be limited to the descriptions only given as sampling above. It is obvious that a person skilled in the related art can apply the innovation disclosed by this invention into similar purposed other areas by means of changing the parts in form and using similar structures. Therefore, it is also clear that such embodiments lack of innovation criteria and especially the criteria of exceeding the known status of the art.

CLAIMS

1. Vertical wind tunnel comprising air flow channels (10) having rectangular shaped structure, high power fan mechanisms for providing air flow inside the said air channels (10), flying field (12) having the capacity to hold at least one person (14)
5 on air, who is to be trained inside at least one air flow channel (10), waiting area (11) for the people (14) kept waiting with the purpose of training, and waiting room (13) at the passage from the waiting area (11) to the flying field (12), and it is characterized in that; it comprises a vibration cabin (20), which is placed as a resonance absorber at the region where the flying field (12) and the waiting area
10 (11) are found and in a way that it would correspond to the opening used for passage from the waiting room (13) to the flying field (12), which has a closed internal volume, and which comprises insulators (25) and at least one absorber (26) placed at the bottom and side parts, at the surfaces contacting with the ground and the flying field (12) walls in order to provide absorbing of the energy formed via
15 enclosing of the cavitation resonance formed due to the air flow separations caused at the internal volume by the opening found in the flying field (12).
2. A wind tunnel according to Claim 1, and it is characterized in that; the said absorber (26) placed in the vibration cabin (20) prevents movement of the said vibration cabin (20), which tries to rollover around the point (X) via the impact of the flow
20 separation formed during passage of the vertical direction air flow through the flying door (22).
3. A wind tunnel according to Claim 1, and it is characterized in that; it absorbs the energy formed in the vibration cabin (20) via the resistance formed by the adjustable non-return valves (27) placed at the air inlet and outlet ports of the said
25 absorber (26) that is placed in the vibration cabin (20).
4. A wind tunnel according to Claim 1, and it is characterized in that; the said absorber (26) placed in the vibration cabin (20) is pneumatic piston.
5. A wind tunnel according to Claim 1, and it is characterized in that; the said vibration
30 cabin (20) is formed of outer frames (23) forming the carrier structure and the said frames (23) comprise glass surfaces (24) between them in order to provide the personnel (14) to be trained with the facility to see the external medium.

6. A wind tunnel according to Claim 1, and it is characterized in that; the said vibration cabin (20) comprises at least one waiting room door (21) opening to the waiting room (13).
- 5 7. A wind tunnel according to Claim 1, and it is characterized in that; it comprises at least one flying field door (22), which opens to the said flying field (12), and which is placed in a way that it would close the opening at the flying field (12) wherein air flow is present.
- 10 8. The invention is the vibration cabin (20) placed behind the relatively large opening found on a surface in order to provide absorption of the cavitation resonance formed due to fluids flowing parallel to this surface, the opening found on this surface, and the wide volume found behind this opening, and it is characterized in that; it comprises at least one absorber (26), which absorbs energy via the resistance formed by the insulators (25) placed at its bottom and side surfaces and by the adjustable non-return valves (27) placed at the air inlet and outlet ports.

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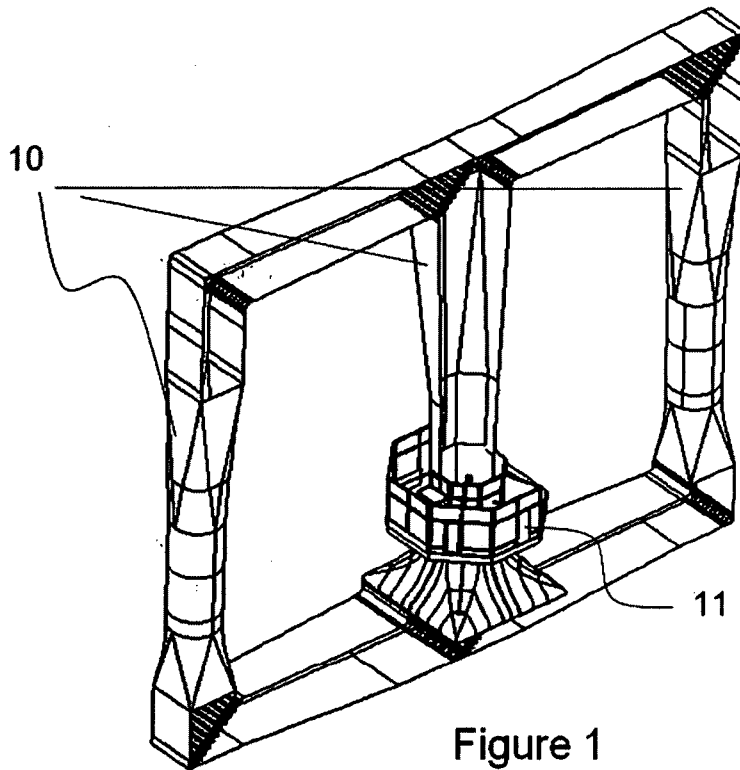


Figure 1

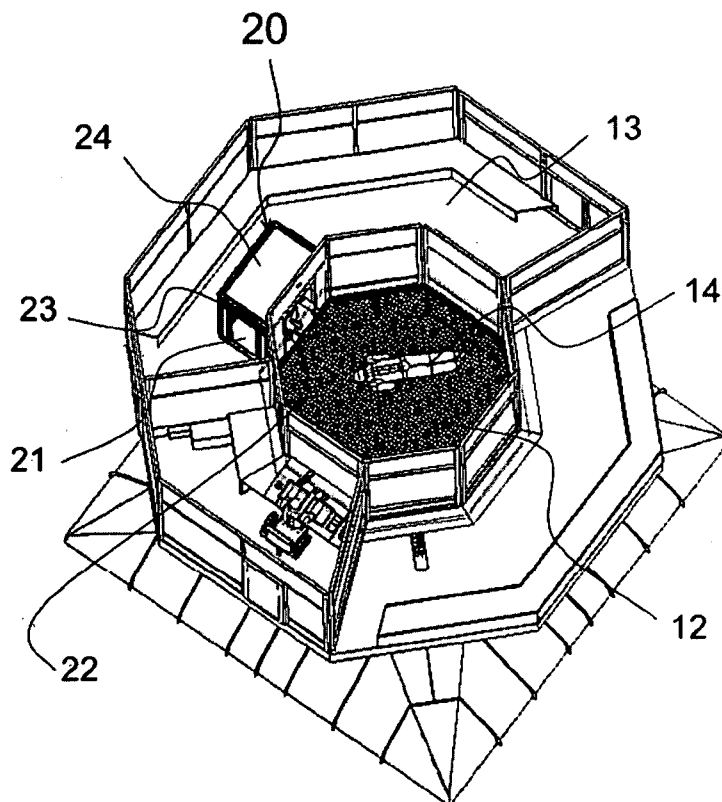


Figure 2

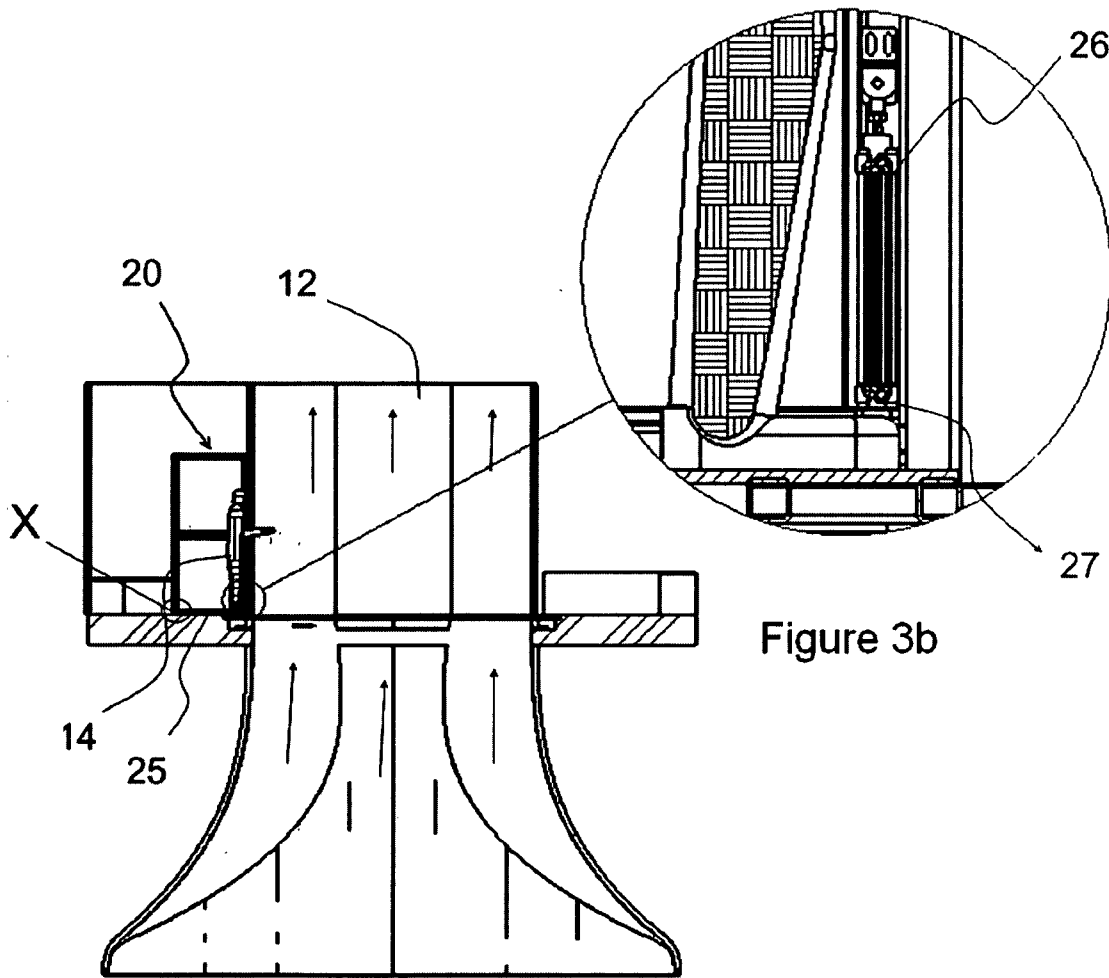


Figure 3a

Figure 3b

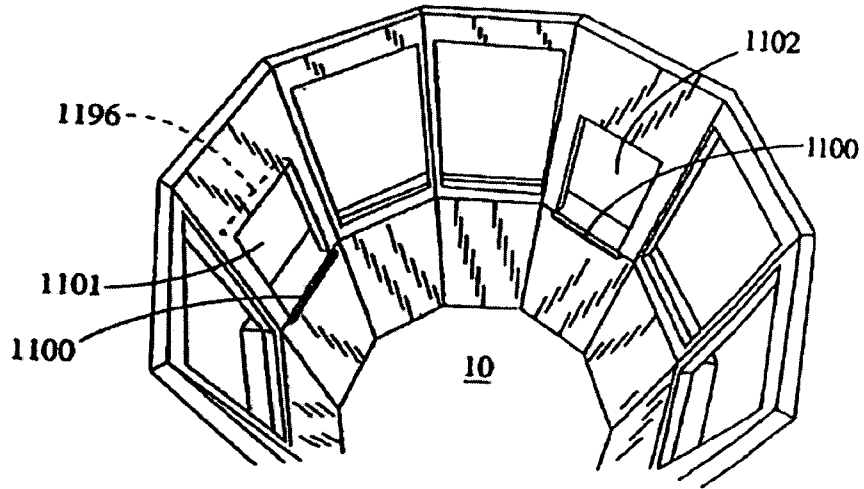
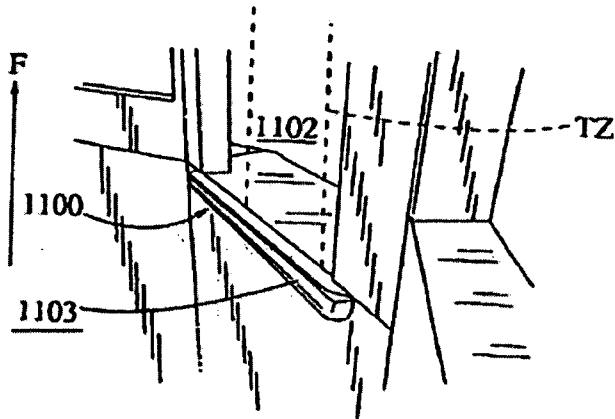


Figure 4



The Prior Art

Figure 5