June 3, 1941. A. HUET 2,243,906

APPARATUS FOR SHIELDING A BODY FROM FLUID CURRENTS

Filed April 23, 1938

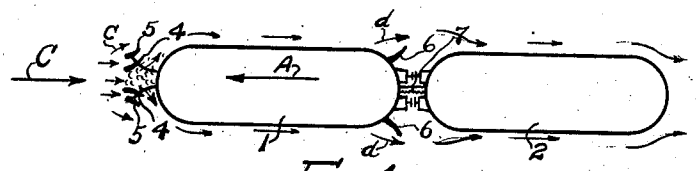


Fig. 1

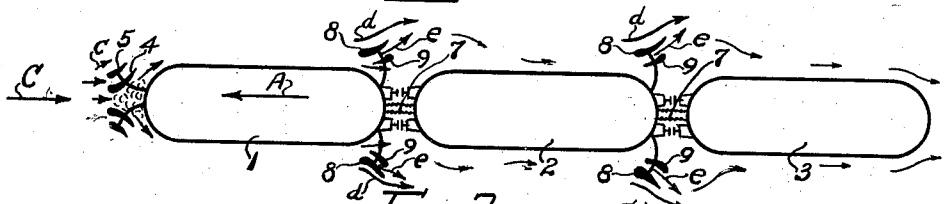


Fig. 2

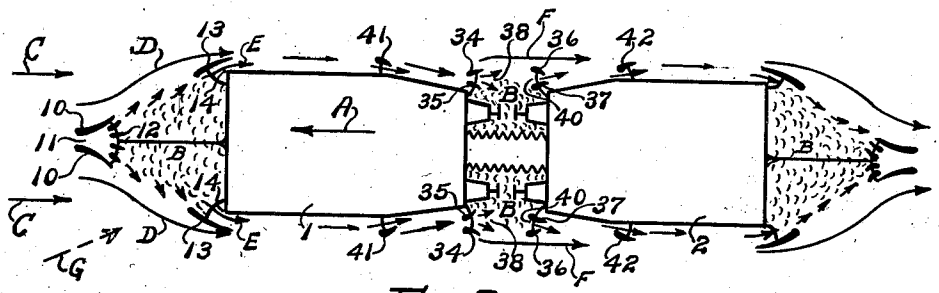


Fig. 3

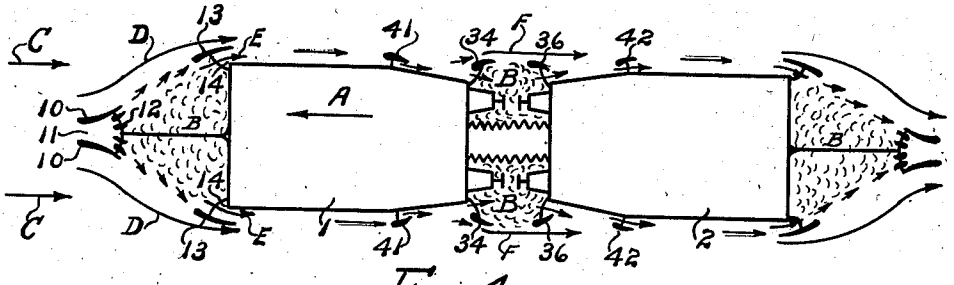


Fig. 4

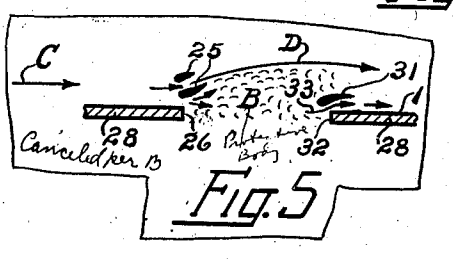


Fig. 5

INVENTOR
ANDRE HUET
BY O. V. Thiele
ATTORNEY

Patented June 3, 1941 2,243,906

UNITED STATES PATENT OFFICE

2,243,906

APPARATUS FOR SHIELDING A BODY FROM FLUID CURRENTS

André Huet, Paris, France

Application April 23, 1938, Serial No. 203,895
In France December 19, 1933

3 Claims. (Cl. 105—2)

The present invention relates to apparatus for reducing resistance to the movement of a body occasioned by air currents.

In my copending applications, Serial No. 757,026, filed December 11, 1934, now Patent No. 2,122,422, dated July 5, 1938, and Serial No. 86,714, filed June 23, 1936, I have disclosed apparatus mounted at the front end of a vehicle for decreasing the resistance to its forward travel by enveloping a part or all of the body with an envelope or body of air which shields and protects the vehicle, particularly at its front end. This protective air body is made up of the air through which the vehicle travels and accompanies it to provide a surface on which wind currents glide in their course along the vehicle. Thus, the surface of the protective air body provides a "streamlined" effect for the vehicle without actually streamlining the physical parts of the latter.

The present invention relates particularly to deflecting devices for eliminating eddy currents at gaps in the peripheral surface of the moving body, such for example as in the space between two cars of a train.

The invention will best be understood upon consideration of the following detailed description when read in conjunction with the accompanying drawing in which

Figs. 1 to 4 illustrate various arrangements of deflecting devices for preventing eddy currents in the space between cars of a train.

This application is a continuation in part of my aforesaid application Serial No. 757,026.

Referring to Fig. 1 the numerals 1 and 2 designate two cars of a train which are connected in series. At the front end of the car 1 deflecting plates 4 are mounted forwardly of the front end in transversely spaced relation and inclined outwardly and rearwardly with respect to the axis of the train so as to turn wind currents striking their surfaces away from the front end of the car 1. When the train is driven in the direction of the arrow A, part of the wind currents C pass through a rearwardly divergent passage between the deflectors 4 and the consequent reduction of velocity and expansion of the air produce a body of air of higher static pressure between the rear of the deflectors and the front of the car 1 which prevents the deflected streams of air striking the front of the car. Other deflecting members 5 cooperate with the deflectors 4 to also produce jets of air directed against the deflected air currents c to maintain them in the path to which they have been diverted. The functioning of the deflectors 4 and 5 is more fully described in my copending application 757,026.

Mounted adjacent the rear side edges of the car 1 and extending vertically in outwardly and rearwardly inclined relation are a pair of deflecting plates 6 positioned so that air streams flowing along the side of the car 1 are turned outwardly as indicated by the arrows *d* in their course past the space 7 between the cars 1 and 2 to avoid the formation of eddy currents in this space.

In the arrangement shown in Fig. 2 the deflectors 8 at the rear end of the car 1 are spaced from the body of the car and another deflector 9 is mounted with respect to each deflector 8 to form a rearwardly converging passage so that the part of the air stream flowing along the car is directed in the form of a jet *e* against the streams of air *d* turned outwardly by the deflectors 8 in order to assure that they are maintained in their deflected course until they pass the gap 7 between the cars.

In Fig. 3 two cars of a train are again represented by the rectangles numbered 1 and 2. In a central position forwardly of the front end of the car 1 a pair of deflecting devices 10 are arranged in transversely spaced relation and symmetrically with respect to the longitudinal axis of the car. These deflecting devices like the deflectors 4 in Figs. 1 and 2 are inclined outwardly and rearwardly with respect to the axis of the car 1 so that air currents C moving with respect thereto are deflected outwardly away from the front end thereof as indicated by the arrows D. The spacing of the deflectors 10 forms a rearwardly diverging passage 11 through which undeflected air passes to create a body of air B rearwardly of the deflectors 10 and acting to shield the car A against the fluid currents C. When the deflectors are arranged as illustrated in Fig. 3, a rearwardly diverging passage is formed so that the undeflected air in passing therethrough expands and as its velocity is decreased its static pressure becomes greater so that it acts dynamically to maintain the fluid currents C away from the car 1. A series of supplementary deflectors 12 are mounted between the deflectors 10 near their rear ends and act to subdivide passage 11 so fluid currents passing therethrough do not create eddies or produce turbulence in the protective air body B.

In order that the air currents C may not deform the protective body of air B by pushing it partly to one side, and thus lessen its efficiency, if they come from a direction at an angle to the path of travel as indicated by the arrow G, a second pair of deflecting devices 13 is mounted near the side edges of the car 1 at the front thereof. These deflectors act to maintain the deflected streams of air D in the courses to which they have been diverted by the deflectors 10. As illustrated, the deflectors 13 are positioned further outwardly than the deflectors 10 and the rear edges are also spaced from the

surface of the car 1 to form passages 14 through which currents E of fluid pass to flow along the sides of the car 1 between its surface and the deflected currents of air D.

The deflectors 13 may be disposed with respect to the car 1 so that air E passing between them and the car is directed as a jet toward the deflected streams D to maintain these streams away from the body.

Deflecting members 34 positioned adjacent the side edges of the forward car 1 at its rear end deflect the air currents D outwardly away from the gap between the cars 1 and 2. Deflecting devices 36 adjacent the side edges of the front end of the rear car 2 maintain the outwardly diverted air currents in their deflected course until they have passed the gap between the cars. Each deflector 34, together with a deflector 35 spaced transversely therefrom, provides a rearwardly diverging passage 38 for admitting air to the space between the cars for creating a protective body or shield of air at a desired pressure in this space. This air body acts to maintain the outwardly deflected currents F away from the gap between the cars.

Each deflector 36 and another deflector 37 are disposed to form a rearwardly converging passage 40 acting to direct air currents, withdrawn from the protective shield B by friction against the deflected currents F. Auxiliary deflectors 41, 42 may be provided forwardly of the deflectors of the car 1 and rearwardly of the deflector on car 2 to direct the air currents toward and away from passages 38, 40, respectively. In Fig. 4 a single deflector 34 is shown mounted at the rear of the forward car 1 and a single deflector 36 is similarly mounted at the front end of the rear car 2. The deflector 34 is inclined outwardly and rearwardly to deflect air away from the gap between the cars and undeflected air passes between the deflector 34 and the rear side edge of car 1 to provide the protective air body from which currents of fluid pass between deflector 36 which is spaced from the side of the rear car 2.

In order that a train provided with deflectors for reducing air resistance in accordance with the invention may be operated in either direction without being turned around the rear end of the car 2 would also be provided with deflectors as shown for the front end of car 1 in any of Figs. 1 to 4. Likewise both ends of each car between end cars of a train would be provided with deflecting devices such as 34, 35 so that deflecting devices on adjacent ends of contiguous cars cooperate to prevent eddy currents and turbulence in the gaps between cars.

Although illustrative embodiments of the invention have been shown in the drawing and described in detail herein, deflecting devices embodying the invention may be applied to protect all or parts of other types of moving or stationary bodies and it is to be understood that there are many variations and changes which may be made without departing from the invention. Therefore, it is intended that all such variations and changes be included within the scope of the appended claims.

What I claim is:

1. In combination with a moving body including a pair of contiguous vehicles connected in series with a gap in the surface of said body between the rear and front ends, respectively, of the forward and rear vehicles of said pair; deflecting means positioned adjacent each side edge of the forward vehicle at the rear end thereof and disposed for deflecting fluid currents of fluid flowing along said body outwardly away from said gap, said deflecting means being spaced from said edge to form a passage for admitting undeflected fluid to said gap for creating therein a body of fluid that is substantially stationary with respect to said vehicles; and deflecting means positioned adjacent each side edge of the rearward vehicle at the front end thereof and disposed to maintain the streams of fluid deflected by said first deflecting means in the path to which they are diverted thereby, said second deflecting means being spaced from said edge of the rear vehicle to form an outwardly directed and rearwardly converging passage extending from said gap for regulating the flow of fluid withdrawn from said fluid body by the movement of the deflected fluid currents with respect thereto.

2. In combination with a moving body including a pair of contiguous vehicles connected in series with a gap in the surface of said body between the rear and front ends, respectively, of the forward and rear vehicles of said pair; pairs of deflecting members positioned adjacent each side of the rear end of the forward vehicle, the deflecting members of each pair being spaced from each other in a direction transversely of the longitudinal axis of said vehicle with the outer one of each pair disposed to deflect fluid currents flowing along said vehicle outwardly away from said gap and the inner one of each pair disposed with relation to said first member to form a passage diverging rearwardly and directed inwardly with respect to the axis of said vehicle for admitting undeflected fluid to said gap to expand therein and create a body of air occupying said gap.

3. In combination with a moving body including a pair of contiguous vehicles connected in series with a gap in the surface of said body between the rear and front ends, respectively, of the forward and rear vehicles of said pair; pairs of deflecting members positioned adjacent each side of the rear end of the forward vehicle, the deflecting members of each pair being spaced from each other in a direction transversely of the longitudinal axis of said vehicle with the outer one of each pair disposed to deflect fluid currents flowing along said vehicle outwardly away from said gap and the inner one of each pair disposed with relation to said first member to form a passage diverging rearwardly and directed inwardly with respect to the axis of said vehicle for admitting undeflected fluid to said gap to expand therein and create a body of air occupying said gap; and a pair of deflecting members positioned adjacent each side of the front end of the rear vehicle, the deflecting members of each pair being spaced transversely of the longitudinal axis of said vehicle and disposed with relation to each other so as to form an outwardly directed and rearwardly converging passage extending from said gap for regulating the flow of fluid from the fluid body in said gap.

ANDRÉ HUET.