May 13, 1947. J. M. BAER ET AL 2,420,292

AIRPLANE BODY

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Fig. 1.

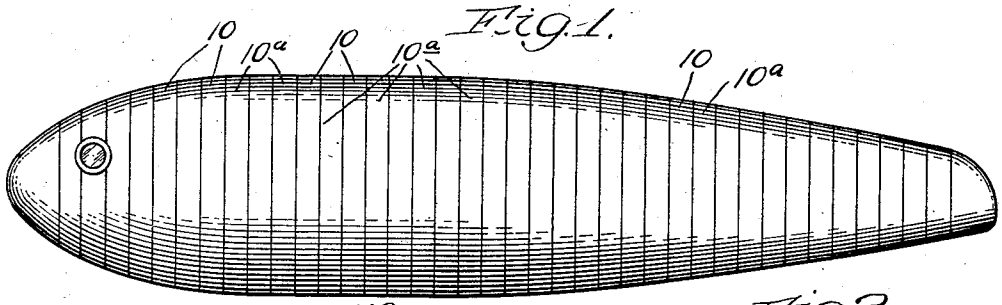
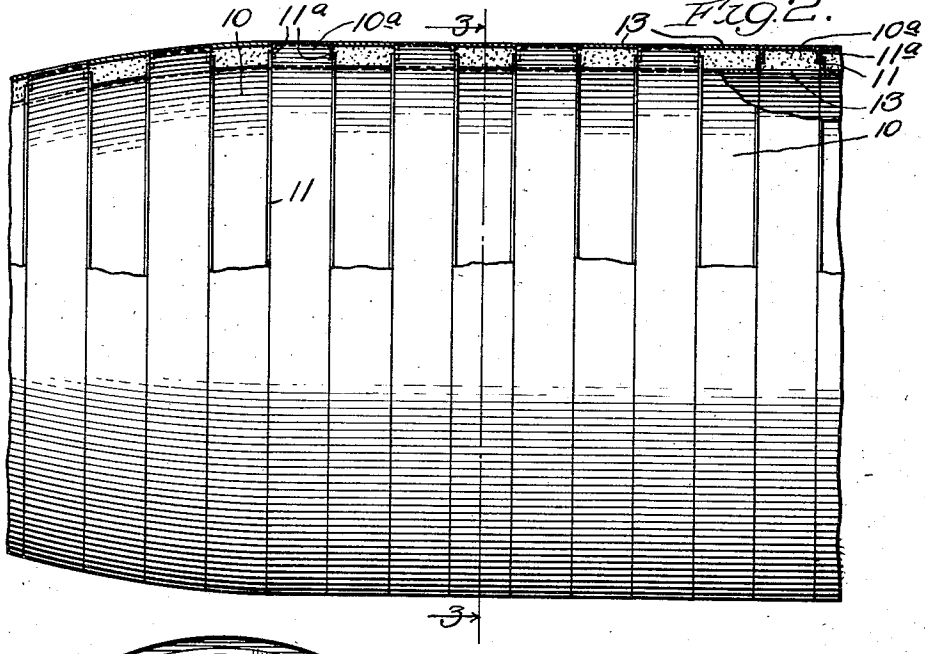


Fig. 2.



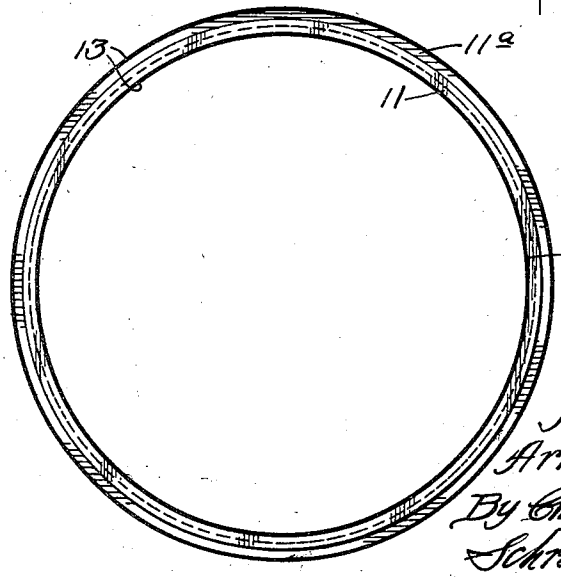


Fig. 3.

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Fig. 4.

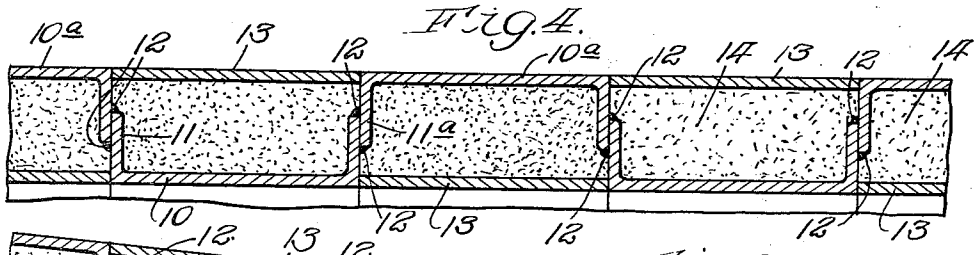


Fig. 5.

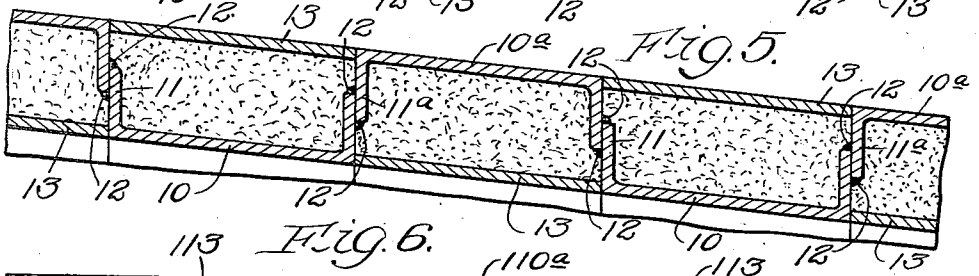


Fig. 6.

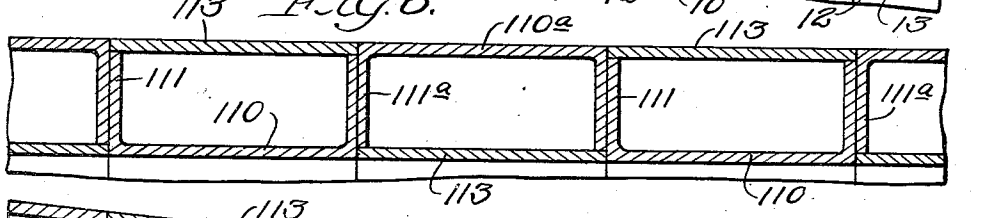


Fig. 7.

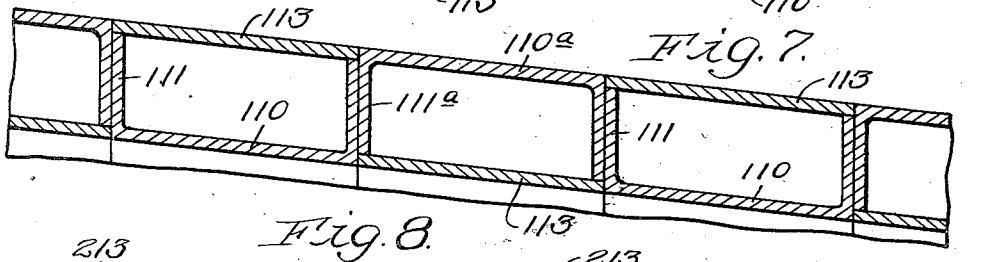


Fig. 8.

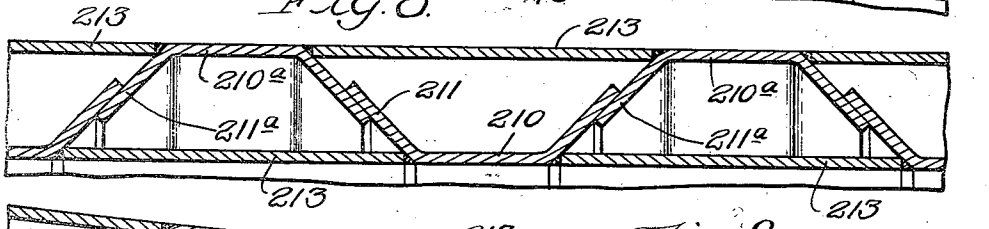
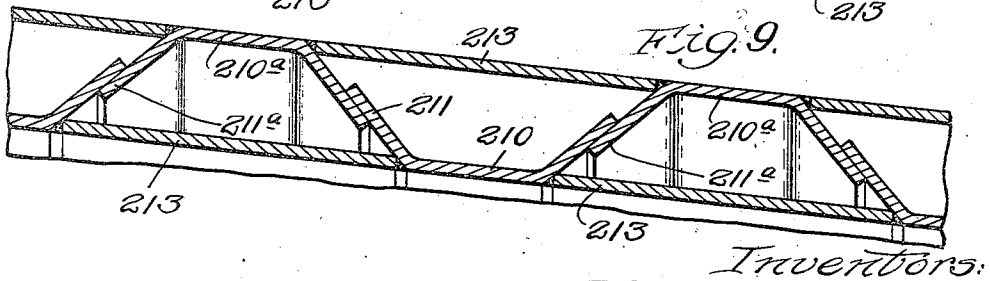


Fig. 9.



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AIRPLANE BODY

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Fig. 10.

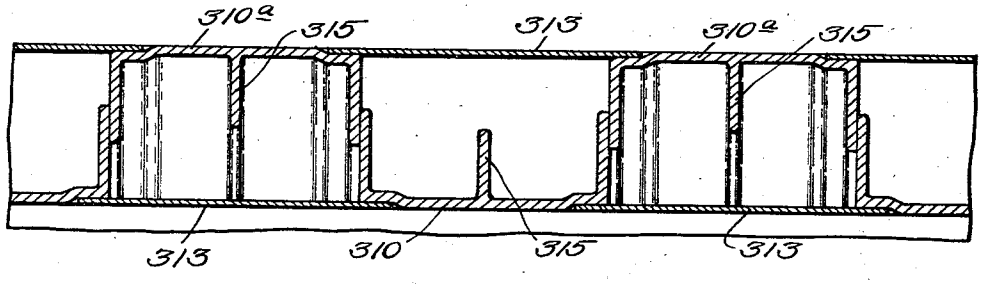


Fig. 11.

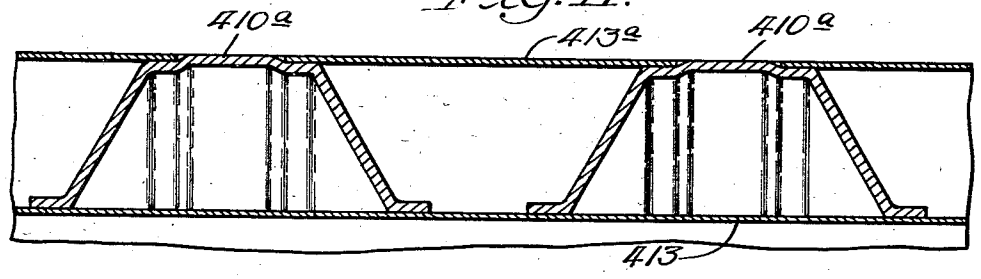


Fig. 12.

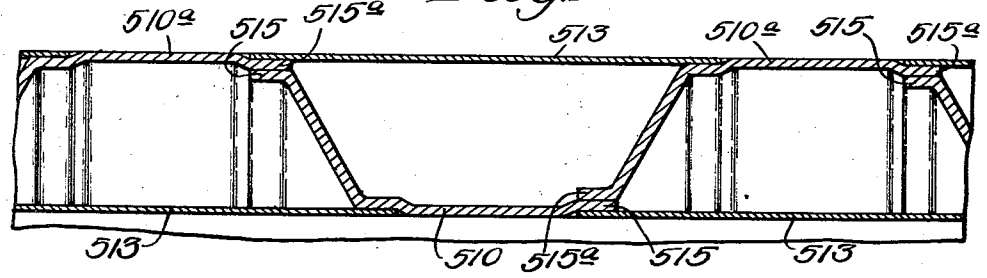
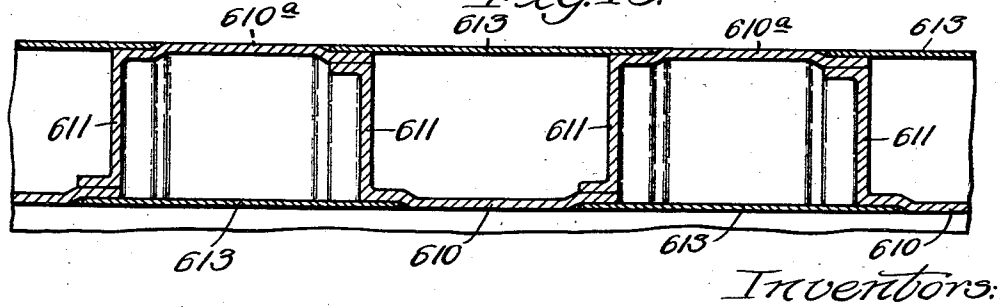


Fig. 13.



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2,420,292

UNITED STATES PATENT OFFICE

2,420,292

AIRPLANE BODY

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Application October 23, 1942, Serial No. 463,032

2 Claims. (Cl. 244—119)

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This invention relates to improvements in airplane body or fuselage.

Among the features of our invention is the provision of a strong rigid body adapted to withstand excessive internal pressure. Consequently, the invention is well adapted for use in airplanes designed for high altitude flying where the pressure inside of the body or cabin is considerably higher than the atmospheric pressure at such altitudes.

Another feature of our invention is the provision of a body that can be easily and cheaply made.

Other features and advantages of our invention will appear more fully as we proceed with our specification.

In those forms of devices embodying the features of our invention, shown in the accompanying drawings, Fig. 1 is a view in side elevation; Fig. 2 is a fragmentary vertical sectional view; Fig. 3 is a view taken as indicated by the line 3 of Fig. 2; Figs. 4 and 5 are enlarged vertical sectional views showing a modified form of construction; Figs. 6 and 7 are similar views showing another modification; Figs. 8 and 9 are similar views showing another modification; and Figs. 10, 11, 12 and 13 are similar views each showing another modification.

For the purpose of illustrating the invention it is assumed that the body is circular in transverse cross section and that it has a short forward tapering portion, a main cylindrical portion, and a longer rear tapering portion. It is obvious, of course, that the transverse sections, instead of being circular, could be oval, ovaloid, elliptical, or any other desired shape. For example, the transverse vertical sections could even be square or polygonal. It will serve to illustrate the invention, however, to assume here that they are circular.

In general, the body comprises a plurality of ring shaped channel members placed side by side, alternating members having their flanges turned inwardly, and the intermediate members having their flanges turned outwardly, the adjacent flanges of adjacent members being fastened together, as by welding. In Figure 1, the rings are indicated by 10 and 10*a*, alternating with each other. Each ring is formed of a channel. The rings 10 have the flanges 11, 11 turned outwardly, whereas the rings 10*a* have the flanges 11*a*, 11*a* turned inwardly. In order to form the tapers, each ring is somewhat tapered. This is shown more clearly in the enlarged views, Figures 4 and 5. Figure 4 is a section of the cylindrical portion, whereas Figure 5 is a section of the tapered tail portion. We have not shown the welding in all the views as this is unnecessary, but we have indicated it in a few places in Figure 4 by the reference numeral 12. Riveting or other fastening means may be used.

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13, 13 indicate cover plates enclosing the spaces formed between the flanges of the channels and these spaces thus enclosed by the cover plates are preferably filled with compressed sealing material 14 which, for example, may be sponge rubber, or some material adapted automatically to seal holes that might be formed in the shell by bullets. For example, rubber partially dissolved in some solvent that will quickly evaporate upon exposure to air could be used. As long as the material is sealed against the air it will remain soft, but, if a hole is formed, as the material oozes through the hole, the solvent will dry, causing the hole to become clogged.

The construction shown in Figures 6 and 7 is substantially the same as above described, except that the channels 110 and 110*a* are more nearly in registry so that when the cover plates 113 are placed against the edges of the flanges 111 or 111*a*, they will be flush with the webs of the adjacent ring members.

The construction shown in Figures 8 and 9 is similar to that shown in Figures 1 to 5, except that the flanges 211 on the channels 210, and the flanges 211*a* on the channels 210*a*, instead of being parallel and lying at right angles to the web, flare outwardly from the web.

In the device of Fig. 10 we have employed E sections; that is, each of the channels 310 and 310*a* has a center stiffening rib 315.

In the device of Fig. 11 the channels 410*a*, 410*a* all face the same way and are preferably spaced a short distance from each other as shown. The open sides of all these channels may be covered by a single plate 413 and the spaces between the channels may be closed by the smaller plates 413*a*.

In the device of Fig. 12 we employed Z sections 510 and 510*a*, as shown, which have their adacent flanges 515 and 515*a* overlapped and welded, as shown. The spaces between these Z sections are closed by the closure plates 513.

The device of Fig. 13 is similar to that shown in Fig. 12 except that the webs 611 of the Z sections are parallel instead of flared.

In all of the forms it will be seen that there is formed virtually a double wall with partitions or bulkheads, leaving spaces between. As mentioned above, these spaces may be filled with com-

pressed sealing material 14. This material may be sponge rubber or similar cellular material. If such material is put in these spaces at atmospheric pressure substantially at sea level, it will follow that if the plane ascends to a higher altitude where the atmospheric pressure is much lower, that the sponge rubber or similar material in the spaces between the walls will be under considerable pressure. That is, the pressure in the cells will be considerably higher than the atmospheric pressure outside at that altitude. Consequently, if the wall be punctured at that altitude, as by a bullet, the sponge rubber inside will immediately expand and fill the hole. In the same way, other sealing materials may be employed in the spaces in the walls. It would also be possible merely to put in the spaces some material such as partially cured rubber or rubber partially dissolved in some solvent that will quickly evaporate upon exposure to air. If some of this material be put into the spaces when the plane is on the ground, for example substantially at sea level, and the spaces then closed, it will follow that at a higher altitude the air confined in the spaces will be under considerable pressure. Therefore, if a hole be made in the wall at such higher altitude as by the bullet, the air under pressure at such an altitude will tend to escape through the hole into the atmosphere and force the sealing material into the hole. Such sealing material being thereby exposed to additional drying air, will become hardened and seal the hole; or the mere air pressure inside will probably force any more or less soft, plastic, or granular sealing material into the hole to seal the same.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom.

What we claim as new, and desired to secure by Letters Patent, is:

1. A sealed airplane fuselage comprising: a

plurality of annular channel members, each of said members being constructed of a single piece of metal and comprising flanges and a connecting web, said members being secured together at their flanges in abutting relationship, alternate members having their flanges turned inwardly and the intermediate members having their flanges turned outwardly; and a separate cover plate secured to each of the members at the base of the flanges, said cover plates covering each of the openings between said flanges to form a smooth inner and a smooth outer wall whereby said fuselage is capable of withstanding large internal pressures.

2. The fuselage of claim 1 in which the base of said flanges is in contact with said cover plate.

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ARNOLD H. HEINEMAN.

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