Jan. 16, 1940. R. E. C. SCHULZ ET AL 2,187,331

DOOR

Filed March 17, 1937

Fig. 1.

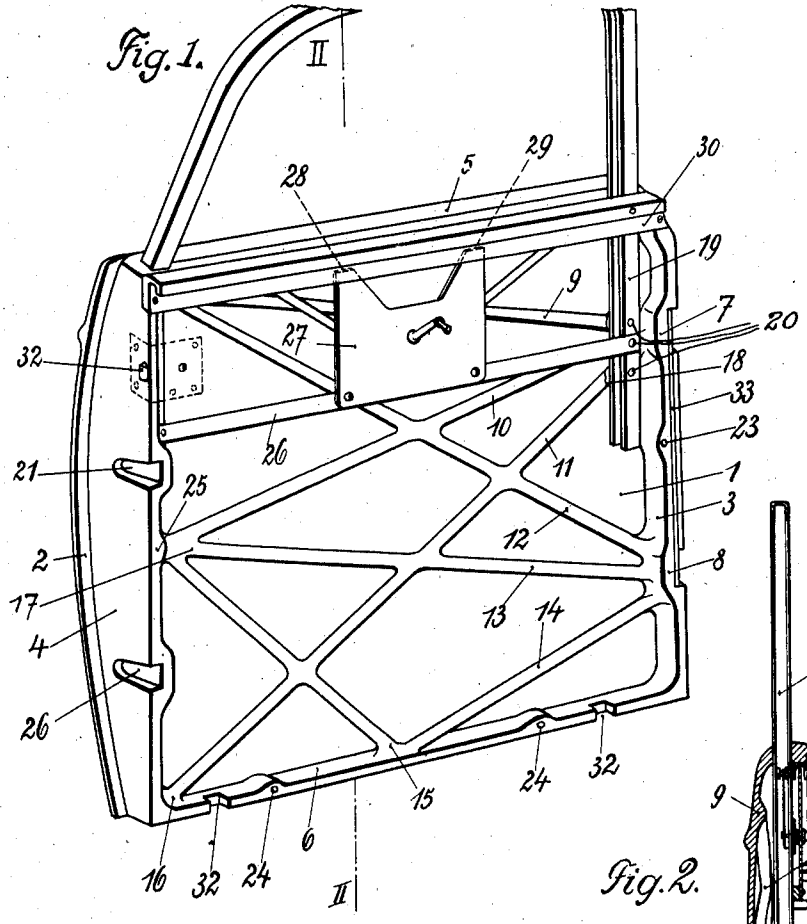
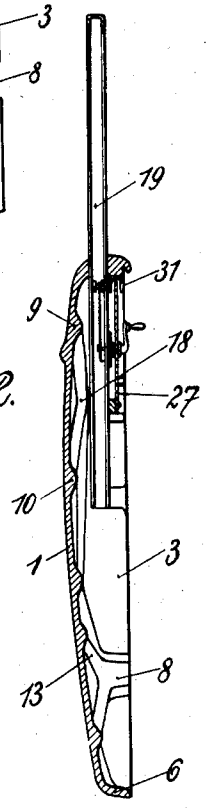


Fig. 2.



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DOOR

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9 Claims. (Cl. 296—44)

Doors for automobiles made of artificial resin materials have not been successful because they were made of artificial resins which are easily pressed but have not sufficiently high strength, and because the necessary reinforcements were only arranged in such a manner that they increased the local strength of the wall but did not take into consideration the high stresses in the material caused, for example, by the hinges.

The invention provides a door, more particularly for automobiles, made of artificial resin or similar materials, with thin walls and with marginal parts, and the novelty consists in this, that the door, which is pressed in one pice from artificial resin pressed material containing laminated paper or fabric, has, at highly stressed places, reinforcing layers or ribs of the same material which are welded to the other material by the pressing operation, if necessary with addition of artificial resin binding agents. In this way the yielding of the material at the highly stressed parts is completely prevented and any metal fittings otherwise required are avoided. The reinforcing layers relieve from strain the door frames, which are extremely highly stressed, for example at the points of suspension, and distribute the forces over the adjacent zones.

As a further valuable development, the door according to the invention has an arched external surface and the reinforcing layers are on the inside. This gives a door which is in itself very rigid, while at the same time retaining the smooth outer surface, which is important for guiding air without forming eddies.

Preferably the reinforcing layers radiate from the highly stressed parts, whereby the forces to be taken up are sub-divided, so that thinner narrow reinforcing layers or ribs are sufficient, which facilitate the manufacture of the pressing and make it more economical.

According to the invention the reinforcing layers are also so constructed that they intersect and, if necessary, join on to the edge parts lying in their course. In this way at the same time these edges are sub-divided in their length and are therefore reinforced and the wall is supported over the whole area by the supporting ribs which are formed.

A further valuable detail consists in this, that the reinforcing layers start from the points of attachment of the hinges, these parts of the edge being preferably reinforced. In this way this part of the door becomes the foundation of the door corresponding to the very high tension and pressure forces occurring there, so that even very broad doors can be made completely unyielding at these points.

The provision of the reinforcing layers is carried out according to the invention in such a manner that the pressing operation unites the reinforcing layers (preferably in the form of strips) with the remaining material with application of heat, in the manner of welding. Preferably a pulverised artificial binding agent is added at the welding points, more especially for rounding the points of transition. In this way the layers form reinforcements similar to welded-on sections, which are not obtained in the usual way by pressing an amorphous mass but have throughout the same structure and lamination as the rest of the material. The added artificial resin binding agents fill out any sharp transitions and give a better hold for the layers at these points.

A further valuable detail consists in this, that the ribs are formed with bearing surfaces for attaching the accessories belonging to the door, such as window guiding frames and the like. It thus becomes possible to cut threads directly at these points of greater thickness of material without having to use separately inserted metal bushes. The strength of the artificial resin material used is preferably such that, when the screws are made too tight, the thread on the screw is damaged.

The invention includes also a number of further valuable details which will be more fully described below.

A constructional example of the invention is illustrated in the accompanying drawing.

Figure 1 is a perspective view of the inner side of the door without the inner lining.

Figure 2 shows the door in section on the line II—II in Figure 1.

According to Figures 1 and 2, the door, made in one piece, for example by pressing from artificial resin with laminated paper or fabric as filling material, consists essentially of a comparatively thin outwardly arched wall 1 with door stop 2, side edges 3, 4 and upper and lower edge parts 5, 6. The edge parts are preferably integral with the base material before the pressing or according to the properties of the material, are applied separately and unite with the wall only during the pressing. The edge 3 is made with reinforcements at 7 and 8 for securing the hinges, for example by applying several layers of the same material before pressing and uniting them with the rest of the material during the pressing operation. From the reinforced edge part 7 extend

strengthening strips 9, 10, 11 and from the edge part 8 extend strengthening strips 12, 13, 14 which are all formed by strips of the same material, of which a number may be superposed, being united by heat with the remaining material, in the manner of welding during the pressing operation, preferably with addition of pulverised artificial resin, especially at the rounded parts. In the constructional example illustrated, these reinforcing strips are made so long that they intersect and join on to the edges lying in their course, for example at 15, 16, 17, and thereby give the edges a more secure hold. The strips 9, 10, 11 are provided with an extension, on which a window guiding frame 19 is secured by means of screws 20. For the other limb of the window guiding frame 19, a suitable reinforced support is provided, which is not illustrated. In the edge 4 grooves 21, 22 are pressed for taking buffers of rubber or similar material. Edge reinforcements 23, 24, 25 of the edges 3, 4 and 6 provide opportunities for securing screws for holding the door lining, which is not illustrated, and are preferably provided with directly cut threads. A strip 26 screwed on to the window guiding frame carries the usual window raising device 27, the supporting plate of which runs out into two projections 28, 29 which are clamped, with interposed rubber buffers 31, in grooves of a strip 30 also made of artificial resin and screwed tightly on to the upper edge. Cut-away parts 32 in the lower edge 6 and in the side edge 4 make possible the flowing away of rain water or the passage of the lock catch.

If particularly strong construction of the side edge 3 is desired, a metal rod 33 is preferably pressed into the edge, into which the hinge screws can be screwed.

The materials may be any artificial resins which have a notch shock strength of 20–25 cmkg./cm.^{2} and which are reinforced by means of laminated fabrics, paper strips or other fibrous materials of large area.

What we claim is:

1. A door, more particularly for an automobile, with thin walls and with edge parts, said door consisting of a pressing of artificial resin material containing fibrous material in the form of superimposed sheets with reinforcements consisting of strips of the same material at points subjected to greater stresses and further like reinforcements distributing said stresses over the area of the door, which reinforcements are homogeneously joined to the material of the door during the pressing and curing operation.

2. A door as claimed in claim 1, having reinforcing layers rounded off at the junctions with the main part of the door.

3. A door as claimed in claim 1, having reinforcing layers and reinforcements of the edge parts at the points of attachment of the hinges.

4. A door as claimed in claim 1, in which the reinforcements are formed with bearing surfaces for securing the door furniture, window equipment and the like.

5. A door as claimed in claim 1, which is made arched with the reinforcements on the inside.

6. A door as claimed in claim 1, having edge thickenings with holes, for the passage of lock elements, and depressions or slots, for accommodating rubber buffers.

7. A door as claimed in claim 1, having metal insertions for increasing the strength at highly stressed edge parts, especially where the hinges are attached.

8. A door as claimed in claim 1, having in the edge part, where the hinges are attached, a metal rod connecting the two points of attachment, for increasing the strength.

9. A door, more particularly for an automobile, with thin walls and with edge parts, said door consisting of a pressing of artificial resin material containing fibrous material in the form of superimposed sheets with reinforcements consisting of strips of the same material at points subjected to greater stresses, which reinforcements are homogeneously joined to the material of the door during the pressing and curing operation.

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