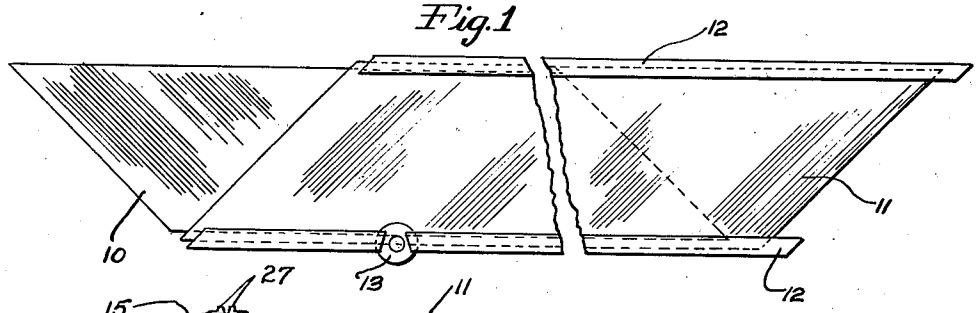
Aug. 17, 1937. W. J. LEE 2,090,210

METHOD OF BUILDING SAFETY INNER TUBES FOR PNEUMATIC TIRES

Filed Feb. 2, 1935 4 Sheets-Sheet 1

Fig. 1



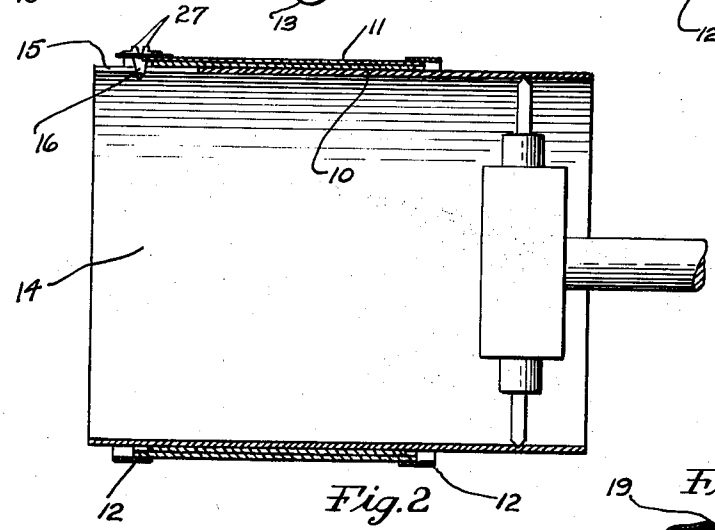




Fig. 2

Fig. 3

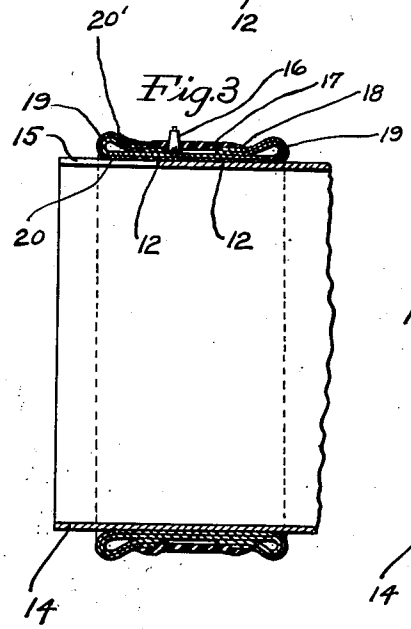



Fig. 4

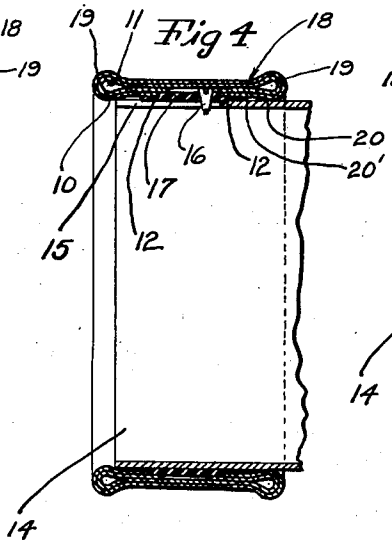



Fig. 5

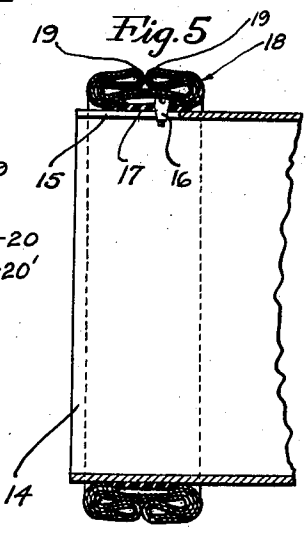



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Fig. 6

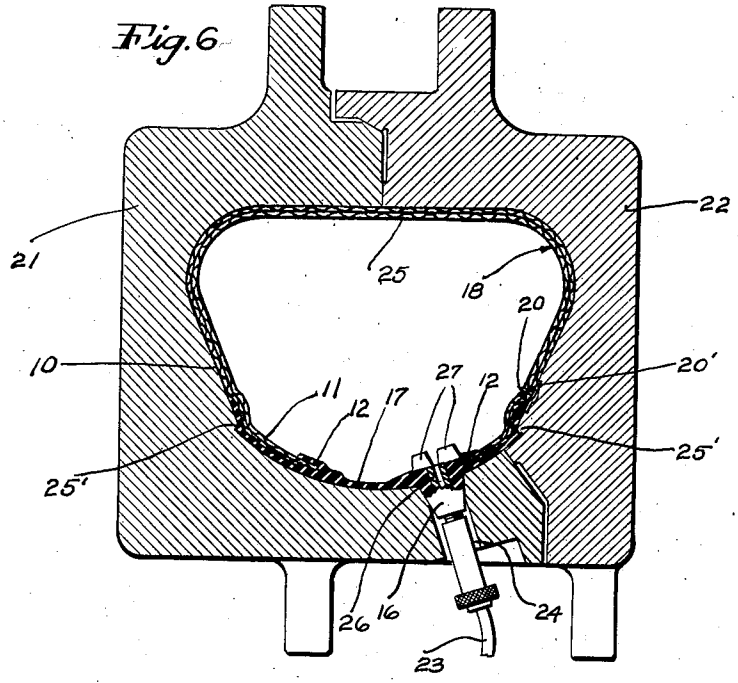



Fig. 7

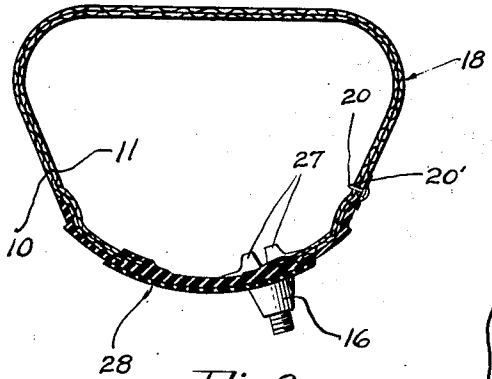


Fig. 8

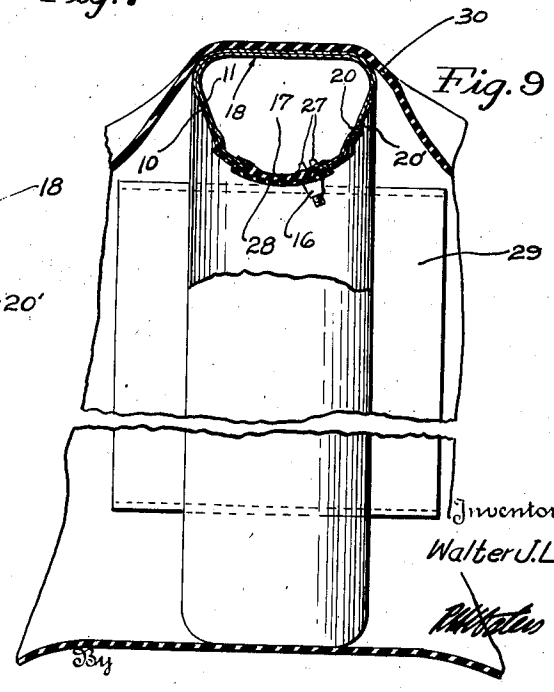


Fig. 9

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METHOD OF BUILDING SAFETY INNER TUBES FOR PNEUMATIC TIRES

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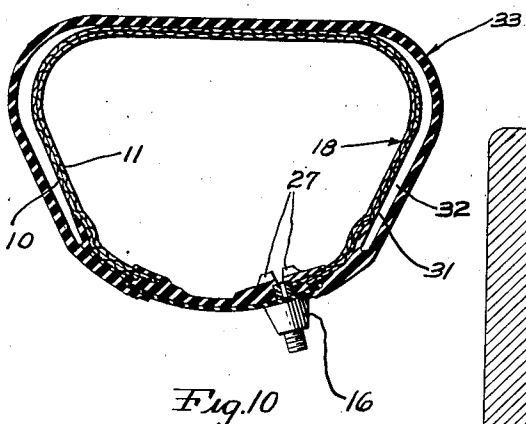


Fig.10

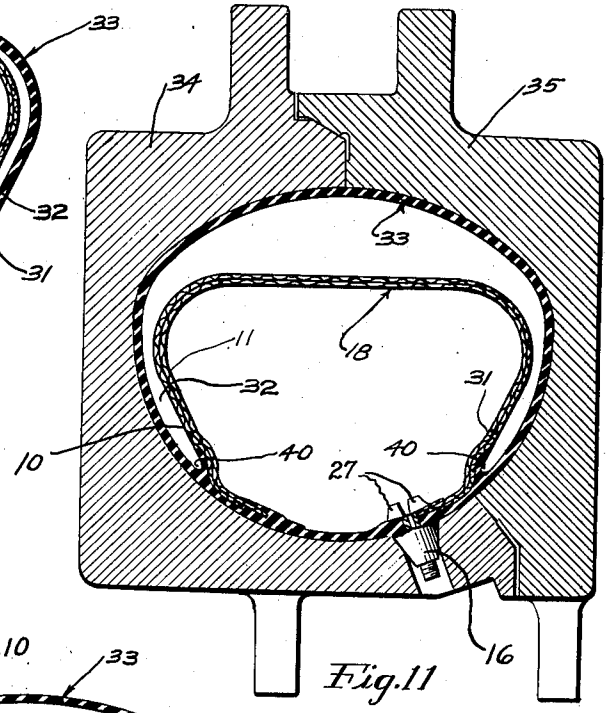


Fig.11

Fig.12

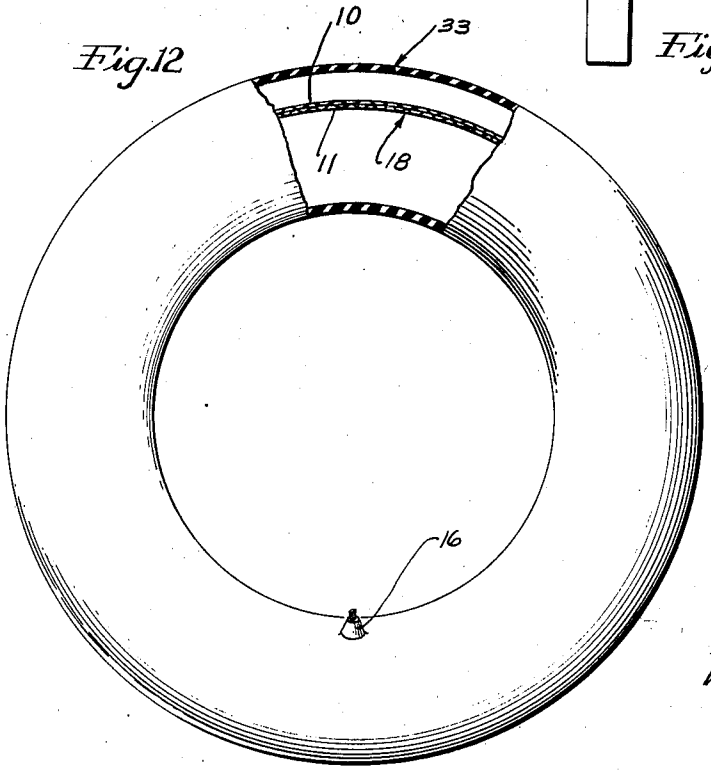


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Fig. 13

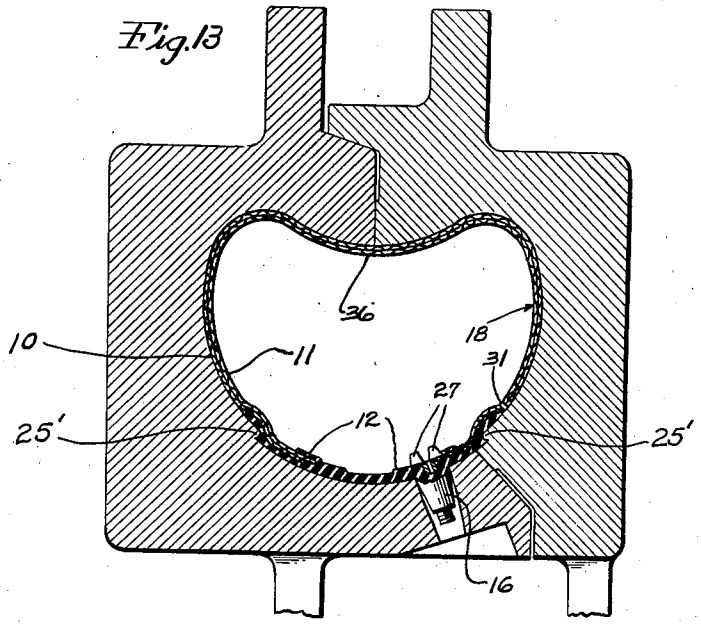
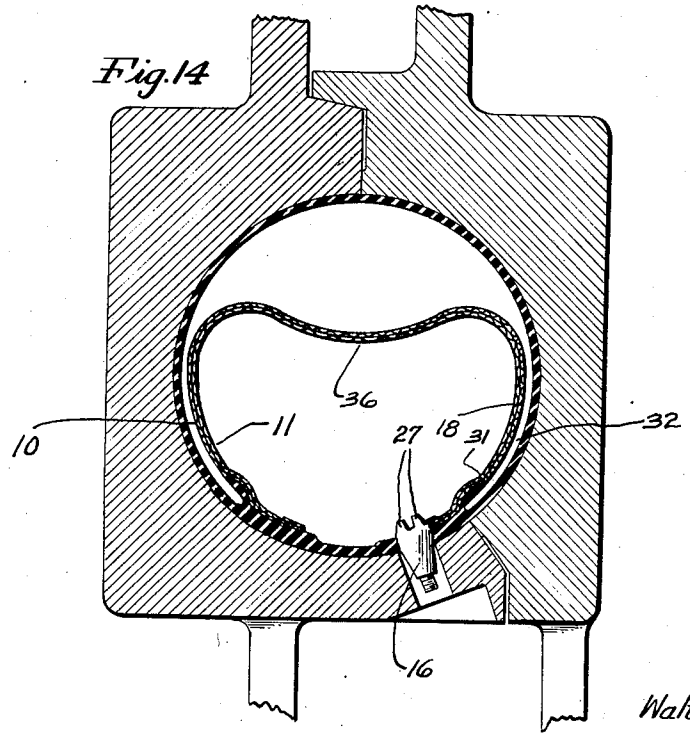



Fig. 14

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Patented Aug. 17, 1937 2,090,210

# UNITED STATES PATENT OFFICE

2,090,210

## METHOD OF BUILDING SAFETY INNER TUBES FOR PNEUMATIC TIRES

Walter J. Lee, Cuyahoga Falls, Ohio, assignor to Wingfoot Corporation, Wilmington, Del., a corporation of Delaware

Application February 2, 1935, Serial No. 4,691

33 Claims. (Cl. 154—14)

This invention relates to a method of building inner tubes for pneumatic tires, and while capable of more general application, it relates particularly to a method for building the safety tube disclosed and claimed in my co-pending application, Serial No. 2,517, filed January 19, 1935.

With the type of inner tube now in general use for penumatic tires, formed with a single air receiving compartment, when a blowout occurs on a vehicle, the tube almost instantly loses its air and before the vehicle can be stopped, subjects the driver to hazards such as skidding and inability to steer properly which are particularly dangerous if the vehicle is traveling at a high speed. Also, the casing as well as the tube is frequently ruined by running flat in the time required to stop the vehicle after a blowout.

I have discovered that by providing a tube with a plurality of chambers or compartments, two in this instance, having one or more openings communicating between the chambers or compartments that when a blowout occurs the air will leave rapidly from only one compartment and the other compartment will lose its air slowly enough to permit the vehicle to be brought to a stop in ample time before the tube becomes flat. Thus, with a structure of this type the dangers of blowouts at high speed are minimized if not completely eliminated.

In my co-pending application referred to above I have described and claimed several embodiments of a safety tube which may be built by various methods. The general object of this invention is to provide a novel method for building the tube illustrated in Figs. 1 and 6 of said co-pending application.

Another object is to provide a method which is practical, comparatively inexpensive and does not require the use of elaborate equipment.

A further object is to provide a method by means of which the two tubes forming the compartments may easily be built and vulcanized together in a unitary structure that will have long life.

Other objects and advantages will become apparent from the following description taken in conjunction with the accompanying drawings.

In the drawings:

Fig. 1 is a plan view of the fabric plies used in the inner of the two tubes,

Fig. 2 is a section through a drum showing said plies in their initial position thereon,

Fig. 3 is a similar section partly broken away showing the plies folded over with their edges connected by a rubber strip to form a tube,

Fig. 4 is a similar section showing the tube reversed from its position in Fig. 3,

Fig. 5 is a similar section showing the tube folded for insertion in a mold,

Fig. 6 is an enlarged section through a mold having the tube therein,

Fig. 7 is a longitudinal section through the band forming the outer of the two tubes,

Fig. 8 is an enlarged section through the inner of the tubes showing a base band thereon for the outer of the tubes,

Fig. 9 is a section through an annular support showing the inner of the tubes inflated thereon and the band of the outer tube in position thereover,

Fig. 10 is an enlarged section showing the outer tube completely formed around the inner tube,

Fig. 11 is a section through a mold showing the two tubes therein,

Fig. 12 is a side elevation of the finished tube structure with parts broken away and shown in section,

Fig. 13 is a section through a mold showing a slightly modified form of inner tube,

Fig. 14 is a similar section showing the composite structure with the modified inner tube therein.

In practicing the method a pair of bias cut plies 10 and 11 preferably formed of rubberized cord fabric or the like are arranged in superimposed relation, with the cords of one ply at an angle with respect to those of the other. The plies are cut to a suitable size and arranged so one end of ply 10 will extend beyond the same end of ply 11 and the other end of ply 11 will extend beyond the end of ply 10. Also, ply 11 is preferably slightly wider than ply 10 and the side edges of the former extend beyond the latter substantially as shown in Fig. 1. The angle of the cords (measured between the cut and the warp) preferably should be as small as practical since a small angle provides a stiffer tube which will better resist the action of centrifugal force (later referred to). For example, in tubes of 7.00 and 7.50 size a cord angle of 52½ degrees has been found satisfactory, and in 6.00, 6.25 and 6.50 sizes a cord angle of 50 degrees has been found satisfactory. Naturally, the cord angle may vary in different sizes and with different kinds of fabric and the figures given are to be considered as illustrative only. Also while

I have shown two plies of fabric as being suitable to carry out the method it is to be understood that the invention is not limited to the use of any particular number of plies. As shown in Fig. 1, gum strips 12 are arranged on each side of ply 11 and extend beyond the sides of said ply. One of said gum strips is broken away to permit an annular gum patch 13 or the like to be secured to ply 11 in a position extending beyond the edge thereof, said patch having an opening therein in alignment with a similar opening in the ply, to receive a valve stem.

The superimposed plies are placed around a suitable rotatable, annular shell or drum 14 (Fig. 2) and the ends of the plies are then brought together and spliced to form an endless band, said ends overlapping because of their extended arrangement to provide an excellent joint. However, any type of splice providing a suitable joint may be used. Drum 14 is provided with a slot 15 extending from one edge thereof a distance inwardly to permit insertion of a valve stem 16 which is placed through the openings in ply 11 and patch 13. Said slot also serves to permit removal of the valve stem when the plies are removed from the drum. Further reference will be made later to this valve stem.

As shown in Fig. 3, the edges of the fabric band are next folded over toward each other and an appreciable gap is left between these edges. This gap is then closed by means of an annular rubber band 17 joined to the edges and having an opening therein through which valve stem 16 projects. Thus, a flattened tube is formed, which will be referred to as a whole by the numeral 18, which subsequently becomes the inner of the two tubes making the composite structure. Due to the stiffness of the fabric, when the edges are folded over, loops 19 are provided in the fabric and one or more vent plugs 20, preferably of metal having a pointed shank and flat head, is forced through the fabric of one of the loops 19 a slight distance from the edge of band 17, said vent plug or plugs remaining in position during vulcanization of the tube, whereby upon its or their removal after vulcanization one or more openings will be permanently formed through the fabric. The flat head of the plug or plugs may, but not necessarily so, be covered with a small patch 20' for protection.

The flattened tube 18 is next removed from the drum, reversed, and replaced on the drum substantially as shown in Fig. 4. Then the sides of the tube are again folded over as shown in Fig. 5 to more or less compact the tube whereby it easily fits into a vulcanizing mold for cure. Of course, the tube need not be folded in order to be placed in the mold but it has been found that after the folded tube has been inserted in the mold and inflated therein, the fabric more readily assumes the contour of the mold.

In Fig. 6, I have shown the tube 18 after vulcanization thereof has been effected in a mold formed of complementary sections 21 and 22 having a cavity therein determining the final shape and size of the tube. Any suitable means such as bolts or the like (not shown) may be used to secure the mold sections together in the customary manner, and air for inflating the tube is admitted through connection 23 extending into an opening 24 formed in the mold, said connection being threaded or otherwise suitably secured to valve stem 16. Tube 18 is not completely vulcanized at this time since it is necessary to again subject it to vulcanization with the outer tube, and if vulcanization were to be completed during this step of the method, there would be danger of over curing tube 18 during subsequent vulcanization. Hence, tube 18 is at this time vulcanized sufficiently to give it a permanent set but not enough to permit it to become over-vulcanized during the subsequent cure. It will be noted that the cavity in the mold sections is formed to provide a substantially flat outer surface 25 on the tube, such surface being formed substantially permanently flat during the cure, so that when the tube is inflated in the composite structure, this flat outer surface will serve to assist in overcoming the effect of centrifugal force (later referred to) in the finished structure. It will also be observed that in the curing operation the gum strips 12 have now become substantially integral with the rubber band 17 and the ends of ply 11 are embedded in this rubber. The mold sections are also provided with projections 25' on the sidewalls defining the cavity therein, which projections cause the rubber in band 17 to assume a shape complementary to these projections so that desirable fillets can be formed in the finished structure.

It will be apparent that the inner tube also may be formed completely of rubber or completely of fabric. If formed wholly of rubber, it may or may not be necessary to subject it to preliminary vulcanization as described herein, depending principally on the compounds used in the rubber. In the case of an all fabric tube however, I prefer to give it a preliminary vulcanization as is done with the combination rubber and fabric tube, whereby it will receive a permanent set and later become fully vulcanized during the final cure.

Referring now to the valve stem used with this structure, it is preferably formed with a metal core 26 having a tapered rubber body, both core and body being relatively short and stocky. Also the body may be made slightly smaller than the hole in the rim with which the structure is to be used, thereby insuring the valve pulling through the rim hole and not tearing off when a blowout occurs, as frequently happens with standard types of valve stems. Inwardly of tube 18 the valve stem is provided with a plurality of projections 27 for a purpose to be described, and the opening in the core through which air passes is restricted in any suitable manner to about .025 of an inch.

The tube 18 is deflated after vulcanization and removed from the mold, then inflated to receive an additional band of rubber 28 around its base portion substantially as shown in Fig. 8. This band 28 serves to increase the thickness of the base and at the same time provides a tacky surface to which the envelope making up the outer tube can be secured.

In Fig. 9, tube 18 is still inflated and mounted on a suitable drum 29. The inflation of tube 18 at this time need only be sufficient to permit it to fill out without causing the outer surface to lose its flat form. An outer band 30, preferably formed of elastic material, such as would be provided with suitable rubber compounds, having been spliced substantially as shown in Fig. 7, is now mounted over the inflated tube and centered thereon. Powdered soapstone or the like is preferably spread over the outer surface of the tube to prevent band 30 from sticking thereto. This band 30 is of a size permitting it to readily fit over tube 18 and to be centered thereon substantially in accordance with the showing in Fig. 9, but, of course band 30 being

elastic will subsequently be stretched to provide a space between the outer surface of tube 18 and the band. The edges of band 30 are now tucked down and stitched to the tacky rubber of band 28 until a structure is formed which, when viewed in cross section, will appear substantially as in Fig. 10. The vent plug or plugs 20 are removed from tube 18 before band 30 is stitched to its base adjacent such plug or plugs and thus a minute permanent opening or openings 31 are formed in tube 18 communicating between the interior of said tube and the chamber 32 formed between tube 18 and band 30 which has now assumed a tubular form and will be referred to as the outer tube and by the numeral 33.

The composite structure is now inserted in another mold formed of sections 34 and 35 having a cavity therein which defines the ultimate size of tube 33. When air is admitted into the structure through any suitable means connected to the valve 16 it will be restricted in its admission by virtue of the narrow opening in the valve stem and thus will pass slowly through the opening or openings 31 into compartment 32 to stretch and force tube 33 against the walls of the mold cavity while tube 18 will remain substantially in its set position, thereby forming a structure after vulcanization as shown in Fig. 11. The rubber of tube 33 has been thoroughly united with the rubber of tube 18 and fillets 40 have been formed adjacent the sealed portion of the tube to keep the walls of the two tubes as far apart as practical to prevent separating or tearing of one tube from the other.

In Fig. 12 I have shown the structure as it will appear when inflated for use in a tire casing and, of course, a cross-section through the structure would appear similar to the showing in Fig. 11.

When the structure is in use on a vehicle, the action of centrifugal force tends to move the outer surface of tube 18 into contact with the inner surface of tube 33 and, to overcome, to a considerable degree, the effect of centrifugal force, I make the outer surface of tube 18 flat as previously indicated. Also, when deflating the structure, the fabric in tube 18 has a tendency to be sucked toward the valve stem and may close the opening in same, but by providing projections 27, I effectively prevent the closing of this opening. Similar projections could be formed around the opening or openings 31 to prevent closing of same during deflation, but as these openings are preferably located in a stiff portion of the tube, the tendency of the fabric to close same is not so great.

The foregoing method is more particularly adapted for building the tube shown in Fig. 1 of my said copending application and the method is varied slightly to permit the building of a tube similar to that shown in Fig. 6 of said copending application. In order to construct this modified form of tube, the inner tube 18 is cured in a mold having a cavity therein shaped to form a reverse curvature in the outer surface of the fabric as indicated at 36 (Fig. 13). This reverse curvature becomes substantially permanent during the vulcanization of the inner tube and when united with the outer tube provides a structure similar to that shown in Fig. 14. This reverse curvature in the inner tube also is useful to overcome the effect of centrifugal force.

Manifestly, numerous benefits will be derived from the use of a structure of the type herein described. For example, when a blowout occurs in a casing sustained by the structure herein described, the air will quickly leave compartment 32 and render useless the outer tube 33. However, tube 18 will not be affected by the blowout and it will support the tire until the air leaks out through the opening or openings 31. The leakage of air from tube 18 is necessarily slow due to the small size of the opening or openings therein and the vehicle readily may be brought to a stop before the tube is completely flat. Thus a safety feature is made possible by my tube which is of decided advantage to the drivers of automobiles and other vehicles using pneumatic tires.

It is to be observed that in the event a blowout should occur in the portion of the structure around the base so that air would first escape from tube 18 the safety feature would still be present because the air in tube 33 would support the tire at least long enough to bring the vehicle to a stop before all air escapes.

It is believed to be apparent that I have provided a novel method of building a novel tube structure which is well adapted for the purposes intended and which will result in the prevention of many accidents formerly caused by blowouts.

Although I have illustrated the preferred manner of carrying out the method and have described same in detail, it will be apparent to those skilled in the art that the invention is not so limited, but that various modifications may be made therein without departing from the spirit of the invention or from the scope of the subjoined claims.

I claim:

1. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube, circumferentially sealing to the base of said tube the edges of an envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing said tubes while so joined, both of said tubes being adapted to receive inflating fluid.

2. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tubular compartment, forming one or more permanent minute openings in the wall of said compartment, circumferentially sealing to the base of said compartment the edges of an envelope arranged outwardly of said compartment in a manner to provide two compartments joined in a common base with said opening or openings communicating between the compartments, and vulcanizing said tubes while so joined, both of said compartments being adapted to receive inflating fluid.

3. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube of vulcanizable material adapted to receive inflating fluid, vulcanizing said tube at least until it attains a substantially permanent form when inflated, surrounding said tube with a second and larger tube and joining both tubes in a common base, and finally vulcanizing the joined tubes.

4. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tubular compartment of vulcanizable material adapted to receive inflating fluid, vulcanizing said compartment until it attains a substantially permanent form when inflated, forming one or more permanent minute openings in the wall of said compartment, circumferentially sealing to the base of said com-

partment the edges of a vulcanizable envelope arranged outwardly of said compartment in a manner to provide two compartments joined in a common base with said opening or openings communicating between the compartments, and finally vulcanizing the compartments into a unitary structure.

5. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of vulcanizable material, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, surrounding said tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes.

6. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of vulcanizable material, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, circumferentially sealing to the base of said tube the edges of a vulcanizable envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing the joined tubes.

7. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of vulcanizable material, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, forming one or more permanent minute openings in said tube above the base thereof, surrounding said tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes so as to form two tubular compartments having one or more permanent minute openings communicating between the compartments.

8. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of vulcanizable material, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, vulcanizing said tube at least until it attains a substantially permanent form when inflated, surrounding said tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes.

9. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of vulcanizable material, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, vulcanizing said tube at least until it attains a substantially permanent form when inflated, circumferentially sealing to the base of said tube the edges of a vulcanizable envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing the joined tubes.

10. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of vulcanizable material, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, vulcanizing said tube at least until it attains a substantially permanent form when inflated, forming one or more permanent minute openings in said tube above the base thereof, circumferentially sealing to the base of said tube the edges of a vulcanizable envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing the joined tubes so as to form two tubular compartments having one or more permanent minute openings communicating between the compartments.

11. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube of vulcanizable material adapted to receive inflating fluid, inserting one or more vent plugs in said tube above the base thereof, vulcanizing said tube at least until it attains a substantially permanent form when inflated, removing the vent plugs after vulcanization to provide one or more permanent minute openings in said tube, surrounding said tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes.

12. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube of vulcanizable material adapted to receive inflating fluid, inserting one or more vent plugs in said tube above the base thereof, vulcanizing said tube at least until it attains a substantially permanent form when inflated, removing the vent plugs after vulcanization to provide one or more permanent minute openings in said tube, circumferentially sealing to the base of said tube the edges of a vulcanizable envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing the joined tubes.

13. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube of vulcanizable material adapted to receive inflating fluid, placing the tube in a vulcanizing mold and vulcanizing it at least enough to give it permanent shape, surrounding the tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes.

14. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube of vulcanizable material adapted to receive inflating fluid, placing the tube in a vulcanizing mold and vulcanizing it at least enough to give it permanent shape with the portion opposite the base of the tube formed substantially flat, surrounding the tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes.

15. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube of vulcanizable material adapted to receive inflating fluid, placing the tube in a vulcanizing mold and vulcanizing it at least enough to give it perma-

nent shape with the portion opposite the base of the tube formed with a reverse curvature, circumferentially sealing to the base of said tube the edges of a vulcanizable envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing the joined tubes.

16. A method as practiced in claim 3 wherein the first named or inner of the two tubes is formed substantially of rubberized fabric.

17. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of two or more superimposed plies of rubberized fabric, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a rubber band secured to the edges of the fabric to thereby form a tube adapted to receive inflating fluid, vulcanizing said tube at least enough to give it substantially permanent shape, forming one or more permanent minute openings in the fabric portion of the tube, surrounding said tube with a second and larger rubber tube, joining both tubes in a common base, and vulcanizing the joined tubes.

18. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of two or more superimposed plies of rubberized fabric, associating a valve stem with the band, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a rubber band secured to the edges of the fabric to thereby form a tube, vulcanizing said tube at least enough to give it substantially permanent shape, forming one or more permanent minute openings in the fabric portion of the tube, securing a band of tacky rubber to the base of said tube, circumferentially sealing to said band of tacky rubber the edges of a rubber envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing the joined tubes.

19. A method as practised in claim 13 wherein the final vulcanization is carried out in a mold which gives permanent form to the outer of the two tubes but which does not change the permanent shape previously given to the inner of the two tubes.

20. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of rubberized fabric, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, surrounding said tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes.

21. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of rubberized fabric, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, circumferentially sealing to the base of said tube the edges of a vulcanizable envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing the joined tubes.

22. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of rubberized fabric, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, forming one or more permanent minute openings in said tube above the base thereof, surrounding said tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes so as to form two tubular compartments having one or more permanent minute openings communicating between the compartments.

23. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of rubberized fabric, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, vulcanizing said tube at least until it attains a substantially permanent form when inflated, surrounding said tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes.

24. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of rubberized fabric, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a vulcanizable band secured to said edges to thereby form a tube adapted to receive inflating fluid, vulcanizing said tube at least until it attains a substantially permanent form when inflated, circumferentially sealing to the base of said tube the edges of a vulcanizable envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing the joined tubes.

25. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube of rubberized fabric adapted to receive inflating fluid, placing the tube in a vulcanizing mold and vulcanizing it at least enough to give it permanent shape, surrounding the tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes.

26. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube of rubberized fabric adapted to receive inflating fluid, placing the tube in a vulcanizing mold and vulcanizing it at least enough to give it permanent shape with the portion opposite the base of the tube formed substantially flat, surrounding the tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes.

27. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an annular tube of vulcanizable material adapted to receive inflating fluid, placing the tube in a vulcanizing mold and vulcanizing it at least enough to give it permanent shape with the portion opposite the base of the tube formed substantially flat, surrounding the tube with a second and larger tube of vulcanizable material, joining both tubes in a common base, and vulcanizing the joined tubes, in a mold which gives permanent form to the outer

of the two tubes but which does not change the permanent shape previously given to the inner of the two tubes.

28. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of two or more superimposed plies of rubberized fabric, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a rubber band secured to the edges of the fabric to thereby form a tube adapted to receive inflating fluid, vulcanizing said tube at least enough to give it substantially permanent shape, forming one or more permanent minute openings in the fabric portion of the tube, surrounding said tube with a second and larger rubber tube, joining both tubes in a common base, and vulcanizing the joined tubes in a mold which gives permanent form to the outer of the two tubes but which does not change the permanent shape previously given to the inner of the two tubes.

29. A method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of two or more superimposed plies of rubberized fabric, associating a valve stem with the band, folding the edges of the band toward each other but leaving a space between said edges, closing said space with a rubber band secured to the edges of the fabric to thereby form a tube, vulcanizing said tube at least enough to give it substantially permanent shape, forming one or more permanent minute openings in the fabric portion of the tube, securing a band of tacky rubber to the base of said tube, circumferentially sealing to said band of tacky rubber the edges of a rubber envelope arranged outwardly of said tube in a manner to provide substantially two tubes joined in a common base, and vulcanizing the joined tubes in a mold which gives permanent form to the outer of the two tubes but which does not change the permanent shape previously given to the inner of the two tubes.

30. The method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of vulcanizable material, applying strips of vulcanizable material to the edges of the band, folding the edges of the band toward each other, but leaving a space between said edges, and closing said space with a vulcanizable band overlapping said edges and said second strips of vulcanizable material.

31. The method of building an inflatable container for sustaining a pneumatic tire casing which comprises forming an endless band of vulcanizable material, applying strips of vulcanizable material to the opposite edges of said band on one surface of said band with portions of said strips projecting beyond the said edges of said band, folding the edges of said band in a direction toward each other but in spaced relation, and applying a strip of vulcanizable material to close the opening between said edges, the last-mentioned piece of vulcanizable material overlapping the edges of said band on the opposite surface of said band to that on which the first-mentioned strips are applied, and vulcanizing the inflatable container.

32. The method of making an inflatable container of tubular form comprising the steps of forming an endless flat band, folding the edges of said band in a direction toward each other and sealing the edges to each other to form a continuous tube, thereafter folding the edges of the tube toward each other over the same surface of the tube until the same are in close proximity to each other, placing said tube while thus folded within a mold and introducing an inflating fluid into said tube after the mold is closed to expand the tube into contact with the walls thereof.

33. The method of forming an inflatable container for sustaining a pneumatic tire casing which comprises the steps of forming an inner tube, thereafter placing a band of vulcanizable material about the periphery of said tube, thereafter bringing the opposite edges of said band downwardly on opposite sides of said tube, adhering the same to said tube at the inner periphery thereof and subsequently vulcanizing said edges of said band only to said tube.

WALTER J. LEE.