UNITED STATES PATENT OFFICE.

CLARK FRANCIS FISK, OF TRENTON, NEW JERSEY.

TIRE-TUBE AND METHOD OF CONSTRUCTING SAME.


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To all whom it may concern:

Be it known that I, CLARK FRANCIS FISK, a citizen of the United States, residing at Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Tire-Tubes and Methods of Constructing the Same; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in the inner tubes of automobile and other tires, and has for its object to provide a heavily reinforced tube and a novel method of constructing the same.

With the foregoing object in view, the invention resides in the improved method and the article constructed thereby, as hereinafter fully described and claimed, the descriptive matter being supplemented by the accompanying drawings which form a part of this specification and in which:

25 Figures 1, 2, 3, 4, 5 and 6 are sectional perspective views showing several of the steps employed in constructing the improved tube, the latter figure showing the tube in its complete state, but deflated.

30 Fig. 7 is a sectional perspective showing the condition of the tube when inflated; Figs. 8 and 9 are sectional perspective views showing two modified forms of construction; Fig. 10 is a similar view illustrating the manner in which the fabric reinforcements may be located on the exterior of the tube rather than on the interior thereof; and Figs. 11, 12 and 13 are sectional perspectives showing still other modifications.

In the manufacture of the improved tube, an uncured tube 1 is placed upon a mandrel of the well known type and non-vulcanizable material 2 is applied to the sides of said tube, between the tread and rim portions thereof. This material may be in strip form as shown in the drawings or it might well be in the form of a powder or fluid. A band 3 of processed fabric or more than one band if desired, is now applied to the rim portion 4 of the tube 1, with its edges 5 overlapping the non-vulcanizable material 2 as shown in Fig. 2. This having been done, additional non-vulcanizable material 6 is applied to the fabric band 3 as illustrated in Fig. 3, and a second processed fabric band 7 or more than one band if required, is then applied to the tread portion 8 of the tube, with its edges 9 overlapping the material 6 and substantially meeting each other as indicated in Fig. 4.

The structure so far described, is placed in a mold and suitably cured, after which the non-vulcanizable material 2 and 6 is removed, the result being that the bands 3 and 7 are secured to the tube 1 substantially throughout their widths, whereas their edges remain unsecured and overlap each other in the forms of flaps. The structure is now removed from the mandrel and if the reinforcing bands are to remain on the exterior 70 of the tube 1 as shown in Fig. 10, the ends of said tube are spliced together to complete the article. If, however, the bands in question are to be located on the interior of the tube, as is preferable, the structure will be 75 stripped or turned so that the inner side becomes the outer side, before the ends of the tube are joined.

After completion, the tube assumes the condition illustrated in Fig. 6, and when inflated, it will be observed that the two sets of flaps overlap only to a sufficient extent to protect the highly elastic sides 10 of the tube, to which sides said flaps are entirely unsecured (see Fig. 7).

As illustrated in Fig. 8, the flaps or edges of the tread band 7 may be joined by a web 11 of rubber or any other preferred yielding material. In the figure in question, the web is shown of solid construction, whereas Fig. 9 illustrates a somewhat similar web 12 having openings 13 so that narrow straps 14 are formed between said openings to connect the flaps.

All fabric is cut obliquely of the weave so that both bands 3 and 7 may yield a suitable amount with the tube 1, when the device is inflated. The larger proportion of the elasticity of the device, however, lies in the sides 10 which are free of connection with the fabric bands. Nevertheless, these sides are effectively protected and reinforced by the overlapping flaps. As will be clear from my former Patent 1,136,278 of April 13, 1915, proper cutting and application of the fabric 105 will cause the necessary rim side contraction and tread side expansion when inflating. This expansion and contraction is necessary since the tube is made straight and then formed into a ring which must adapt itself 110
to the casing without wrinkling or creasing, thus requiring the smaller rim side diameter caused by said rim side expansion, and the large tread side diameter allowed by the tread side expansion.

The expansion and contraction above referred to may be obtained in several ways.

First, by applying the tread fabric cut at 45 degrees bias, it will expand under influence. When applying the rim side fabric if it is cut at 45 degrees and stretched to 90 degrees or 90 degrees, it will contract under inflation.

Second, if I cut the tread side fabric 45 degrees bias and the rim side 80 degrees or 90 degrees bias, the tread side will expand and the rim side contract under inflation, without the necessity of stretching the rim side fabric when applying.

Third, to economize in time and labor, if I calender the fabric with friction under tension, I stretch the fabric the desired amount and without extra work.

Also, if after building the tube up on a straight mandrel, I cure it on a circular mandrel it will be shaped to fit the shoe or casing.

In Figs. 11, 12 and 13, I have illustrated slightly different forms of the invention. Fig. 11 shows the fabric 7 on the tread side only of tube 1; Fig. 12 illustrates fabric 8 on the rim side only, and Fig. 13 shows fabric 7 and 8 respectively, on the tread and rim sides. The edges of the fabric in each case are left free from the tube and in Fig. 13 these edges do not overlap as in Figs. 6, 7, 8, 9 and 10. It is understood that the fabric in all cases will be properly cut and applied to meet the occasion.

From the foregoing, taken in connection with the accompanying drawings, it will be obvious that although the method of constructing the article is simple, it will produce highly effective results. Similarly, the tube may be constructed with ease and at little expense, yet its life and efficiency will be greatly prolonged by its novel construction. The drawings illustrate the preferred forms of my invention, but I wish it understood that within the scope of the latter, as claimed, numerous minor changes might well be made.

I claim:

1. The method of constructing an inner tube for vehicles comprising the steps of 55 applying non-vulcanizable material to the sides of an unsecured tube, between the rim and tread portions thereof, applying a band of fabric to one of said portions with its edges overlapping said non-vulcanizable material, applying additional non-vulcanizable material to the outer side of said fabric band, applying a second fabric band to the portion of the tube opposite the first named band with its edges overlapping said additional non-vulcanizable material, and curing the entire structure.

2. The method of constructing an inner tube for vehicles comprising the steps of applying non-vulcanizable material to the sides of an unsecured tube, between the rim and tread portions thereof, applying a band of fabric to one of said portions with its edges overlapping said non-vulcanizable material, and curing the entire structure.

3. A rubber inner tube having a fabric band cured on its wall and extending over approximately half the cross sectional circumference of the tube with its edges left free to form flaps.

4. The combination with an inner tube for tires, of two bands of fabric secured on the tread and rim portions of said tube respectively, the edges of said bands being free of connection to the sides of the tube to render said sides highly elastic, said edges overlapping to protect said elastic sides, the edges of one band being secured to those of the other.

5. A structure as specific in claim 4 together with yielding means connecting the edges of one of said bands.

6. A rubber inner tube having a fabric band cured on its inner side and extending over approximately half the cross sectional circumference of the tube with its edges left free to form flaps.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CLARK FRANCIS FISK.

Witnesses:

JAMES W. MILLIGAN,
 Edgar E. STEILES.