

J. W. BLODGETT.
PROCESS OF MAKING SELF MENDING TIRES.

APPLICATION FILED JULY 1, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1

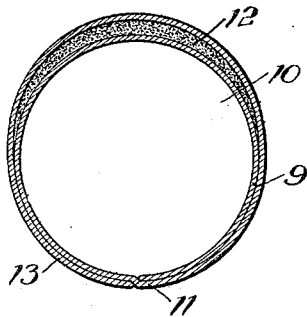


Fig. 3

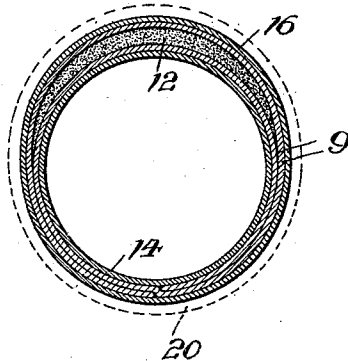


Fig. 2

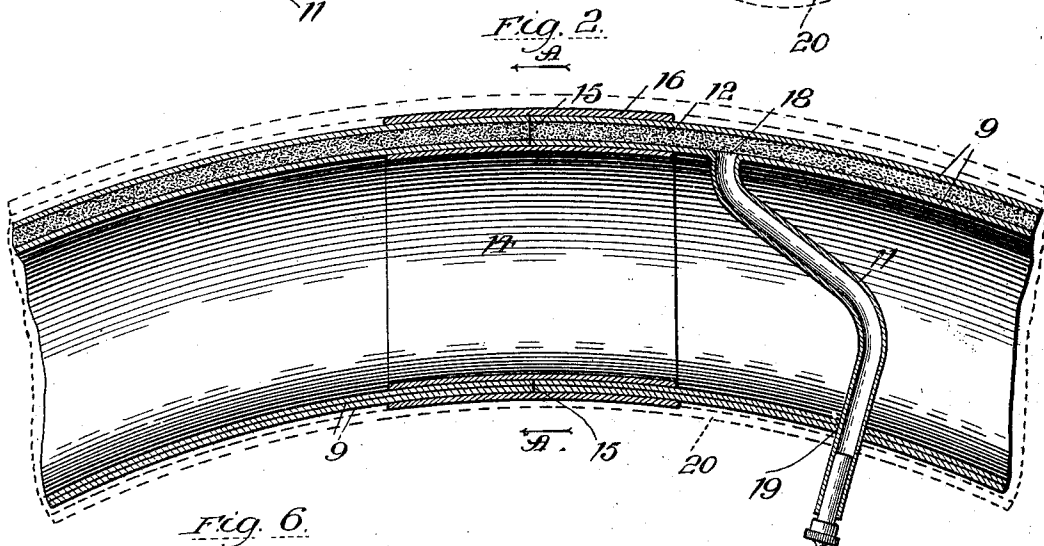


Fig. 6

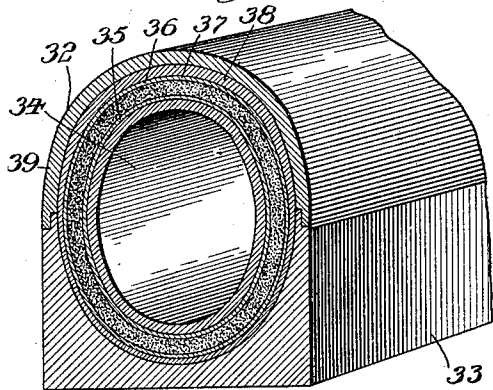
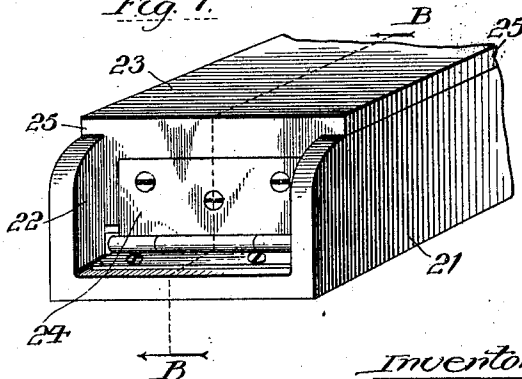


Fig. 7



Witnesses:

Lute S. M. W.

R. M. Guateferron

Inventor:

John W. Blodgett.

By Coburn, McRoberts & McElroy
Attorneys

No. 719,425.

PATENTED FEB. 3, 1903.

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PROCESS OF MAKING SELF MENDING TIRES.

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2 SHEETS—SHEET 2.

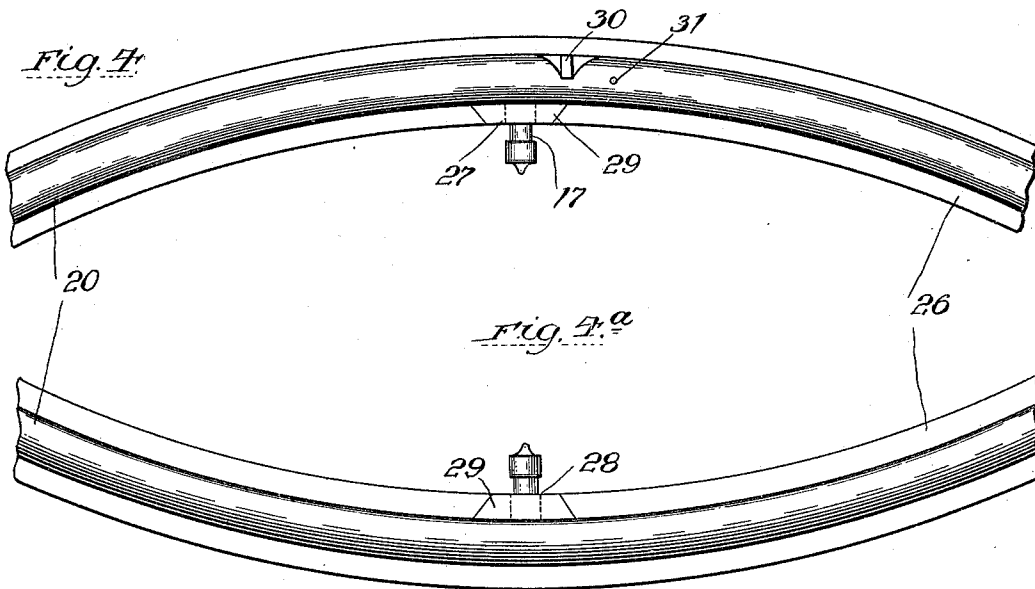


Fig. 5.

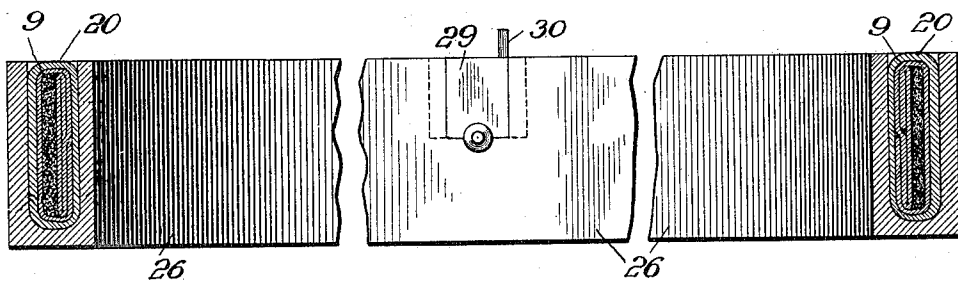
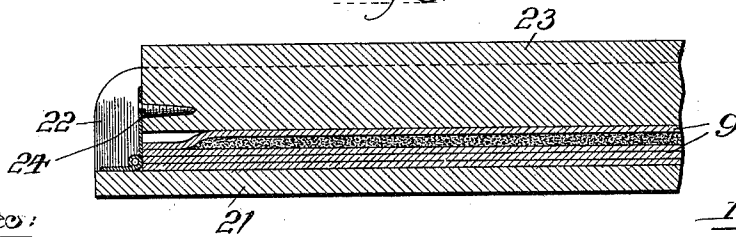


Fig. 8.



Witnesses:

Lute J. Alter.

R. H. Gustafson.

Inventor:

John W. Blodgett.

By Cohen, McRobert & McElroy.
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN W. BLODGETT, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE N TIRE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PROCESS OF MAKING SELF-MENDING TIRES.

SPECIFICATION forming part of Letters Patent No. 719,425, dated February 3, 1903.

Application filed July 1, 1902. Serial No. 113,977. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN W. BLODGETT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Making Self-Mending Tires, of which the following is a specification.

My invention relates to certain improvements in the process of making self-mending tires, and is designed to produce a more perfect tire of the class described and with as little labor and manipulation as possible.

Referring to the accompanying two sheets of drawings, in which the same reference characters designate identical parts in all the figures, Figure 1 is a sectional view illustrating the process of forming in the air-tube a pocket which contains the self-mending material. Fig. 2 is a longitudinal section of the air-tube, showing how its ends are spliced to make it continuous. Fig. 3 is a sectional view of the same on the line A A of Fig. 2. Figs. 4 and 4^a are plan views of portions of a circular mold employed in placing the self-mending material in the pocket of a single-tube tire. Fig. 5 is a sectional elevation of the mold shown in Figs. 4 and 4^a with portions thereof broken away. Fig. 6 is a perspective view of a portion of a modified form of mold employed in the process of placing the self-mending material in a pocket extending all the way around the air-tube next to the tread-surface of the tire. Fig. 7 is a perspective view of one end of still another form of the mold for pressing the self-mending material in a pocket to a uniform thickness and width for either a self-mending pad or self-mending air-tube, and Fig. 8 is a longitudinal section on the line B B of Fig. 7.

In carrying out my invention I preferably start with a sheet 9 of thin unvulcanized rubber, slightly longer than the tire, such as is used in manufacturing the air-tubes of pneumatic tires, and wrap it once around the mandrel or arbor 10, so that the inner edge is overlapped by the central portion of the sheet, as at 11. The outer surface of the portion of the sheet beyond the overlapping portion (the portion directly adjacent the tread-surface of the tire) is now covered with a thin

layer 12 of pulverized soapstone, which layer will extend over, say, one-half to three-quarters of the circumference of the mandrel. The outer portion of the rubber sheet is then brought over the layer of soapstone and its edge united to the inner layer of the sheet, as at 13, by pressing the parts of the rubber together, which being unvulcanized will readily adhere. Of course it will be understood that instead of terminating the overlapped portion of the rubber sheet at a point where it just makes two thicknesses all the way around it might be extended more or less, the requirement being that the pocket shall be formed and sufficient additional material overlapped to seal the pocket thoroughly.

The method of construction thus far described may be used in forming the air-tube of either a double or single tube tire. If the inner tube for a double-tube tire is being manufactured, the tube is now vulcanized in the customary manner, and the soapstone prevents the layers between which it is placed adhering to each other, so that when the vulcanization is completed a pocket is formed in the air-tube in which a uniform layer of self-mending material is placed, after which the ends are sealed and the air-tube is completed.

Of course it will be understood that I might form the tube from sheets of vulcanized rubber by connecting them where they overlap by using rubber-cement; but I prefer to form them of sheets of unvulcanized rubber.

When a continuous air-tube is to be manufactured, instead of vulcanizing the tire after the tube is manufactured, as above described, it becomes necessary to fasten the ends of the tube thus far formed together, and in order to preserve the continuity of the air-space and of the pocket for the self-mending material a novel method of splicing the ends is employed. A short section of unvulcanized-rubber tube 14 of a size to just fit inside of the inner or air tube is secured in position, as shown in Fig. 2, at one end of the tire, and the other end of the tire is brought over it until the ends meet, as at 15, and the tire is inflated. Before the ends of the pockets for the self-mending material are brought together soapstone is applied freely on the inside of the pocket and air-tube up to

the meeting edges thereof, which are brought together accurately, the soapstone being employed to prevent the inner surfaces of the pocket from adhering to each other when the tube is vulcanized. A strip 16 of unvulcanized rubber is now wrapped around the outer surface of the air-tube and the pocket, so as to form a lapped joint, and the entire tube is now placed in a mold and vulcanized in the customary manner. Before the tire is vulcanized, however, a small tube 17 is opened into the pocket, as at 18, and from thence leads out through the air-space and out through an opening 19 in the inner circumference of the tire, to which the tube is attached and through which it projects for a considerable distance, so that a pump may be eventually attached thereto. Before the tube 17 is put in position its interior is coated with soapstone, so as to prevent adhesion of its inner walls when the tire is vulcanized.

Of course, if a single-tube tire is being manufactured, before the air-tube is vulcanized as above stated the outer sheathing or coating, as indicated by dotted lines at 20 in Fig. 2, must be applied in the customary manner. After the tire is thus completed the self-mending material, which is of any desired practical composition, must be forced by means of a pump into the pocket thus formed in the tread-surface. To insert and distribute this material uniformly throughout the pocket, I employ the following method: A mold varying somewhat in shape and construction, in accordance with the kind of a tire that is to be manufactured, must be employed. If a removable inner tube having its ends closed is being manufactured, I employ a mold 21, such as is shown in Figs. 7 and 8. This mold consists of a trough 22, with a lid 23 hinged thereto at one end, as by the hinge 24. The lid is quite thick and projects down into the body of the trough, as shown at 24, so far that when the lid is down the space between the bottom of the lid and the bottom of the trough will just be equal to the thickness of the tube when flattened out plus the desired thickness of the layer of self-mending material that is to be forced into the pocket. The flanges 25 or lugs are employed to prevent the lid from closing down more than to the desired depth. When the pocket of the tube is ready to be filled, one end is closed and a puncture is made leading into the pocket, through which puncture a sufficient quantity of the self-mending material in a heated state is forced by a pump. Of course the material does not distribute itself evenly throughout the length of the tube, and the tube is now placed in the trough, which is heated up to the temperature of the material—say 220° Fahrenheit—with the material in the end next to the hinge. The lid is now lowered upon the tube, and the pressure forces the material from the end in which it is placed uniformly through to the other end, where the expelled air will be col-

lected in a bulb that is formed. After it has cooled off the bulb is opened and the air is permitted to escape and the apertures in the pocket are sealed up and the inner tube is completed.

If a single-tube tire is being manufactured, a circular mold 26 is employed, which is of a trough-like shape, as shown in cross-section in Fig. 5, and its outline is unbroken, except for the preferably oppositely-disposed apertures 27 and 28, through which the air-valve and the tube 17 project when the tire is placed in the mold. A removable block 29 is formed in the mold over each aperture, so that the tire can be readily put in place with the two valves projecting inwardly in the position that they occupy when on the wheel. The tire when placed in the mold occupies the position shown in Fig. 5, and the width of the trough in the mold is as much greater than the combined thicknesses of the various layers of which the tire is made up as the thickness of the layer of self-mending material which is desired to be placed in the pocket. A small wedge or block 30 is placed between the outer wall of the tube and the tire just at one side of the tube 17, so as to prevent the self-mending material passing that point, and the puncture 31 is made through the tube into the pocket immediately adjacent the wedge 30 on the other side from the tube 17. Before the tire is put in place the mold is heated up to about 220° Fahrenheit, and the self-mending material is also brought up to about the same heat, at which it makes a paste which can be transferred to the tire by a force-pump through the tube 17, and the material when pumped in forces its way around the tube until it is completely filled, as will be ascertained by the material oozing through the puncture 31, which permits the escape of any confined air. The wedge 30 is now removed and the material is allowed to fill up the space occupied by it, after which the puncture 31 is allowed to seal up by the material, and the end of the tube 17 which projects outside of the tire is cut off, the self-mending material now serving to close it, and the tire when cooled is ready to be placed upon the rim of the wheel in the customary manner.

In case it is desired to form a pocket that extends entirely around the air-tube I form the same and fill it in the manner illustrated in Fig. 6, which shows a cross-section of a mold 32, adapted for making this form of an air-tube. The mold consists of the base 33, having the semicircular trough in its upper side of a size just equal to the outer diameter of the completed tire. An inner metallic tube 34 is adapted to be supported in the mold concentrically therewith by any ordinary means. Before the metallic tube 34 is put in place the thin rubber inner tube 35, which fits snugly over it, is drawn over the tube, and then the thin outer tube 36 is drawn over the tube 35, the diameter of the tube 36 be-

ing as much greater than the diameter of the tube 35 as is necessary to produce the layer 37 of the self-mending material extending uniformly around and between the tubes. 5 The outer coating 38, if one is to be employed, is then or previously secured to the outer surface of the tube 36, and the whole is placed concentrically in the trough 32, which it completely fills, and the lid 39 is put in place. 10 The trough and the material being heated, the material is pumped into the pocket until as much is pumped in as it will hold, when it will be seen that a uniform layer is distributed entirely about the tire. With this 15 form of tire a puncture entirely through the tire cannot do any damage.

While I have herein disclosed the complete methods of making a self-mending tire, I do not herein claim any portions of the process 20 except that of placing the self-mending material in the pocket, but reserve the other features of the invention for a divisional application.

While I have shown my invention as embodied in the forms and processes which I at 25 present consider best adapted to carry out its purposes, it will be understood that it is capable of modifications and that I do not de-

sire to be limited in the interpretation of the following claim except as may be necessi- 30 tated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

The method of inserting a self-mending material in a pocket in a tire which consists in 35 placing the deflated and flattened endless tube having the pocket therein in a trough-like mold whose available inner width is equal to the thickness of the entire tube at that time plus the desired thickness of the layer 40 of self-mending material, said mold being heated to a temperature at which the self-mending material can be pumped; and in forcing the self-mending material heated sub- 45 stantially to the same temperature into such pocket while the tube is in the mold and until the pocket is filled as completely as the width of the mold will permit, substantially as described.

In testimony whereof I affix my signature 50 in presence of two witnesses.

JOHN W. BLODGETT.

Witnesses:

JOHN H. MCELROY,
R. K. GUSTAFSON.