Jan. 3, 1928.

1,655,095

E. FETTER

VULCANIZER

Filed Jan. 13, 1920

2 Sheets-Sheet 1

Fig. 1

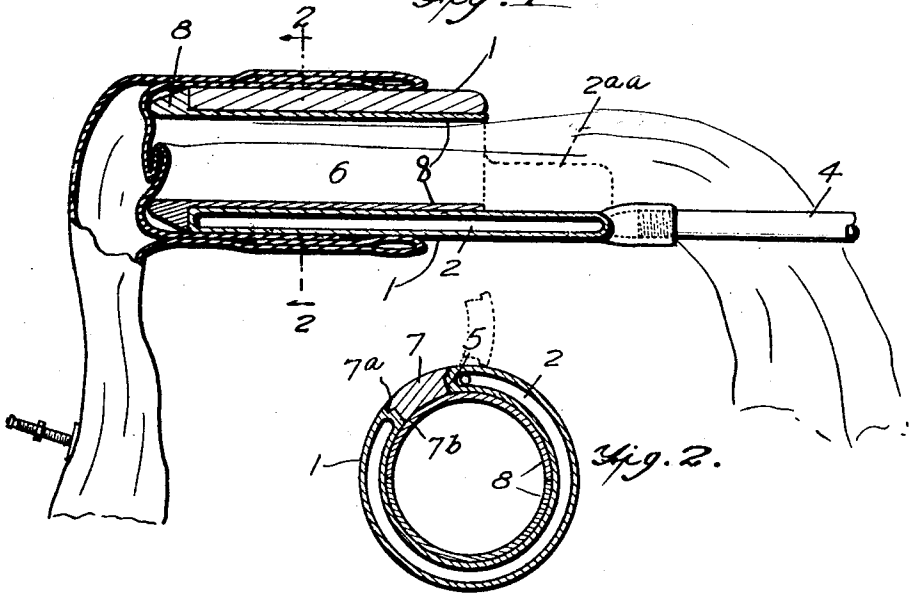


Fig. 2.

Fig. 3.

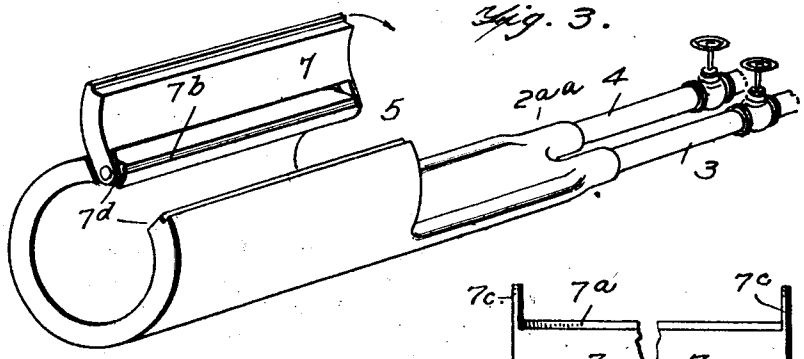


Fig. 4.

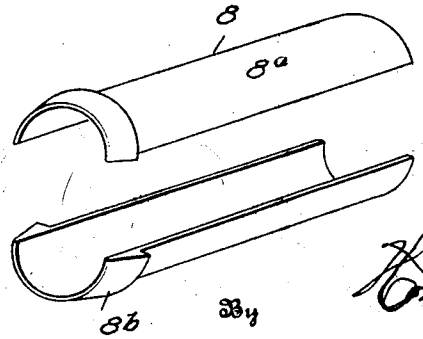


Fig. 5.

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Fig. 6

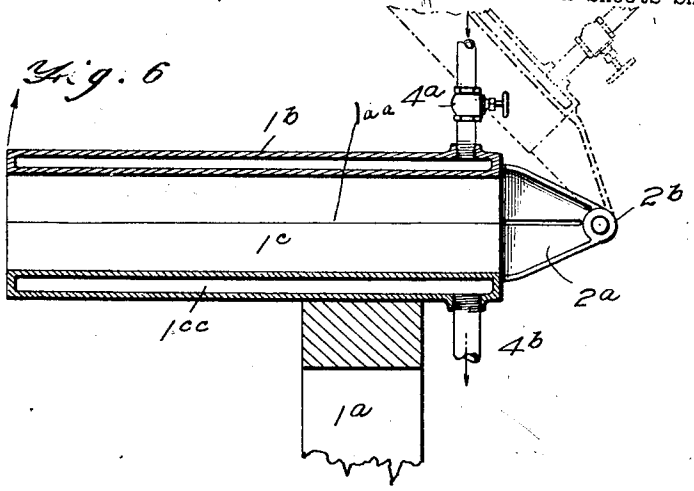


Fig. 7.

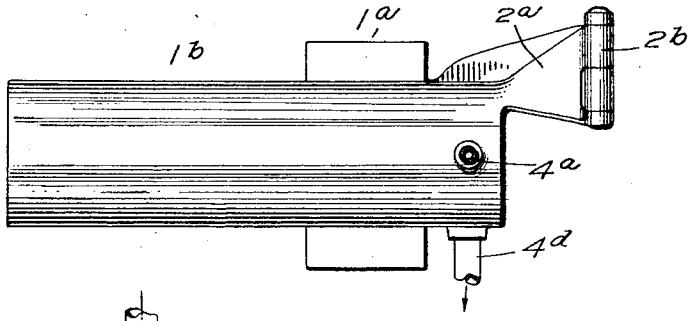


Fig. 8.

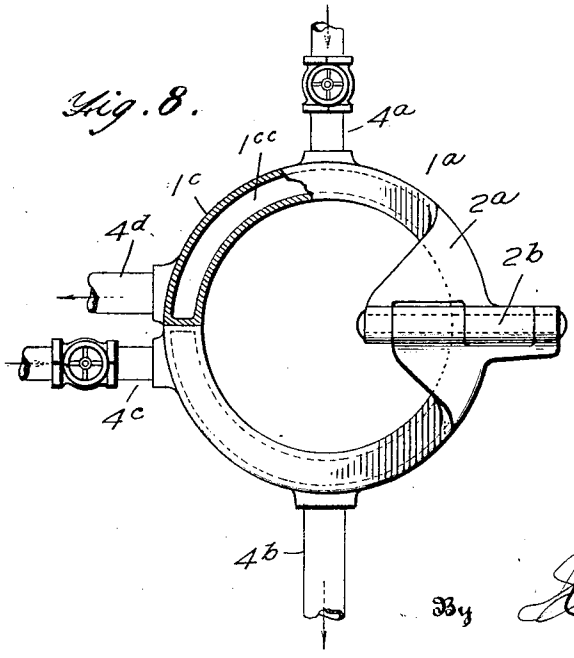
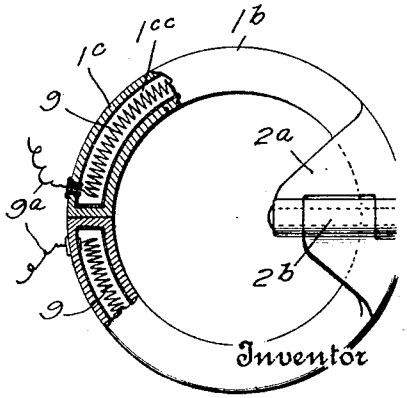


Fig. 9.



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Patented Jan. 3, 1928. 1,655,095

UNITED STATES PATENT OFFICE.

EDWARD FETTER, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE PNEUMATIC TUBE STEAM SPLICER COMPANY, OF BALTIMORE, MARYLAND, A CORPORATION OF MARYLAND.

VULCANIZER.

Application filed January 13, 1920. Serial No. 351,172.

This invention relates to certain improvements in vulcanizing devices, particularly of the type wherein the inner tubes of pneumatic tires are spliced or joined together in vulcanizing the ends instead of cementing said ends by the use of acids or other cementing agencies, and which improvements are particularly applicable to my apparatus or device as covered by Letters Patent dated August 5, 1919, No. 1,312,029.

A further object is to provide for utilizing or applying an electrical heating action for aiding the vulcanizing operation, as well as other heating means for that purpose.

Other objects of the invention, together with the foregoing recited objects will be apparent from the following description and accompanying illustrations.

The invention consists therefore of certain instrumentalities and features of construction substantially as hereinafter more fully disclosed and defined by the appended claims.

The accompanying drawings illustrate the preferred embodiment of one form of my invention wherein it will be understood that various changes and modifications as relate to the detailed construction and arrangement of parts are provided for without departing from the spirit or scope of said invention as covered by the claims, and in which drawings:

Figure 1 is a view partly in longitudinal section, and partly in elevation representing my invention or vulcanizer as applied for use in effecting the vulcanizing operation, the inner tube of a pneumatic tire being shown as having its ends for splicing or joining in position on the heater or cylinder for vulcanizing;

Figure 2 is a transverse section taken on the line 2—2 of Figure 1;

Figure 3 is a perspective view of the vulcanizer with the closure for the entrance opening thereto removed or displaced;

Figure 4 is an inverted view of said closure;

Figure 5 is a perspective view of the insulator withdrawn from the vulcanizer, the sections or members thereof being shown separated.

Figure 6 is a vertical longitudinal section of a modification of my invention, a fragmentary portion thereof being shown thrown up or elevated in dotted lines;

Figure 7 is a plan view thereof;

Figure 8 is an end view, partly broken away and partly in section of the same;

Figure 9 is a corresponding view disclosing a second modification of my invention as adapted more particularly for effecting the vulcanizing operation electrically.

As characteristic features of these improvements, I employ a heating or vulcanizing instrumentality, as for example, a cylinder designated generally as 1, and of the general outline of the greatest portion of its longitudinal area as that disclosed in my patent above noted, being suitably supported in position as at 1^a, said cylinder having an annular or circumferential heat-receiving space or chamber 2.

The annular heat-receiving chamber 2 has its walls preferably suitably extended as at 2^{aa} the resultant extension being arcuate in transverse section or contoured in conformity with the walls of the primary or main portions of said chamber of which it forms a continuation, as clearly seen, particularly in Figures 1 and 3. The purpose of this arrangement is to provide for the requisite clearance in sleeving the rubber or elastic tube over the primary heating surface of the cylinder, as in bringing the portions of the tube doubled or folded upon itself necessary to suitably effect contact at whatever point the tube or fabric may require joining or splicing, as will be more fully appreciated from the description of the operation of carrying out my invention as subsequently herein disclosed.

Also, as in said patent, said cylinder is provided with a valve-equipped supply pipe 3 and a correspondingly equipped outlet 4, said pipes 3 and 4 being in communication with the annular steam or heat-receiving chamber 2.

The cylinder or instrumentality 1 is provided in its upper surface with a longitudinal opening 5, extending the entire length of the primary portion thereof, to provide for the insertion of the required portion of the tire inner tube 6, collapsed of course, therethrough, into the cylinder, said tube after the vulcanizing operation being removed, as presently described. A suitable closure 7 for said opening is provided along its longitudinal edges upon the underside, with slightly tapered lateral extensions 7^a let into corresponding recesses 7^b, in the

outer edges of the cylinder to prevent lateral displacement of the closure, said closure being hinged or pivoted at its ends to provide for raising the same without having to bodily lift it out of the opening 5, said closure being provided at opposite corner edges with ears or apertured projections 7^c receiving pin-like projections 7^d extending from the ends of the cylinder.

I provide, however, means, as for instance, a tubular device 8 for insertion or interposition intermediate the heating or vulcanizing cylinder and the inner tube to exclude the heat radiated inwardly from the heating agency within the annular chamber 2 of the cylinder 1, and prevent its affecting the rubber tube, as would result during the vulcanizing operation. The device or tubular member 8 is preferably of wood or fibrous material, or other good non-conductor of heat, and is preferably in two longitudinal members or sections 8^a, as shown to provide for its ready application for use or insertion within the cylinder, around the rubber tube as clearly shown on Figure 1. One end of each section or member 8^a of the non-conductor or fibrous device 8, is adapted to suitably project beyond one end of the cylinder, as also shown in Figure 1, said projecting ends being formed with shoulders 8^b adapted to abut the end of the cylinder 1 and thus serve as stops to limit the extent of their insertion and provide for facilitating their withdrawal by the grasping thereof by the fingers.

The method herein employed for effecting the vulcanizing operation is practically the same as that described in my patent above noted which is substantially as follows:

The rubber tube the ends of which have been overlapped and secured together in a preliminary way by means of a vulcanizable cement is suitably applied in a deflated condition into the cylinder or vulcanizing device 1 through the longitudinal opening or slot 5 after raising the hinged or pivoted closure 7 from over said slot or opening. The cylinder being only slightly larger in diameter than the diameter of the tube whose ends are to be "spliced," it is therefore necessary to admit compressed air into said tube after placing it in position within the vulcanizer. Before doing this however, the closure 7 is removed, as previously stated, from its place by swinging it on its hinges, and the deflated tube, whose ends it is desired to join or "splice," is passed through the slot of the cylinder after which the closure is replaced.

The tube is now "pumped" up, or inflated to allow of the portion of the tube where the joint is located to be forced over one end of the vulcanizing cylinder, so as to bring the outer surface of the tube and joint next to the outer surface of the cylinder. The tube is now deflated during which the tube will automatically adhere tightly to the outer surface of the cylinder, but its grip thereon may be increased or insured by wrapping around the same strips of suitable material.

Another method of arranging the tube within the cylinder, in order to accomplish the effect of forcing the tube over the cylinder, as described above, is to fold the tube upon itself before laying it in the cylinder, and after replacing the closure 7, pull or force the fold back over the end of the cylinder or vulcanizer, in which case the tube is placed on the cylinder for vulcanizing or "splicing" without the use of compressed air.

The heating agent, as steam or electricity, is now admitted to the annular heating chamber of the cylinder for effecting the vulcanizing process or operation, the manner of providing for heating the cylinder electrically being later described. The amount of time for carrying out the vulcanizing operation depends, of course, upon the composition of the material used. When the joint has been vulcanized it is only necessary to admit compressed air pressure to the tube when the latter will force itself off the end of the cylinder, the resultant effect of the aforesaid operation being the forming of a perfect or effective joint.

As disclosed by Figure 6, I provide a cylinder or instrumentality 1^b which, unlike the above described cylinder 1, is bisected longitudinally in a horizontal line or plane as at 1^{aa}, the resultant sections thereof 1^c being preferably each extended or formed at one end into what may be termed as brackets 2^a, the outer end-portions of which are preferably flared laterally or vertically and hingedly or pivotedly connected together as at 2^b, thus providing for swinging or moving the upper cylinder-section away from the lower section as indicated by arrow and diagrammatically in dotted lines in Figure 6, whereby the insertion or disposition of the rubber tube within the cylinder may be effected with greater facility than would otherwise be the case. The sections 1^c of the cylinder 1^b are tubular or formed with heating chamber 1^{aa}, suitably provided with steam or other heating agency admitting an outlet means as the valve equipped pipes 4^a, 4^b, 4^c, 4^d, respectively, as seen particularly in Figure 8.

As disclosed by Figure 6, as a second modification of my invention, I provide for heating the chambers 1^{cc} (see Figure 8), of the tubular portions or sections 1^c of the cylinder 1^b with means for performing the vulcanizing operation electrically by equipping the same preferably with rheostatic wires 9, as shown, said chambers being adapted to provide for suitably insulating

the wires as shown, the terminals 9ª of the wires in practice, being connected to a suitable source of electrical energy utilized by the rheostat or wires for generating the requisite heating action in effecting the vulcanizing operation.

I claim:

1. A tube splicing appliance comprising a cylindrical mandrel having hollow walls and means for introducing heating medium into said hollow portion providing an external vulcanizing surface, the mandrel having a longitudinal opening to admit the tube and a gate for closing said opening and a hinge on which said gate swings, the hinge being parallel to the axis of the cylinder.

2. A tube splicing apparatus comprising a mandrel having hollow walls, means for introducing heating medium into said walls, the mandrel having an external vulcanizing surface which is substantially cylindrical and having an opening extending longitudinally the full length of the mandrel to admit the tube, and a gate for said opening having a hinge connecting the gate to the mandrel and permitting it to swing from open to closed position.

3. A tube splicing appliance comprising a mandrel having hollow walls and means for introducing heating medium into said hollow portion providing an external vulcanizing surface, the mandrel having a longitudinal opening to admit the tube, and a gate for said opening, said gate being provided at opposite edges with ears and pivoting means extending through said ears and through a portion of the mandrel in the direction of the length of the mandrel.

In testimony whereof I have affixed my signature.

EDWARD FETTER.