(No Model.) 3 Sheets—Sheet 1.

E. W. YOUNG.

PROCESS OF AND APPARATUS FOR VULCANIZING AIR TUBES FOR PNEUMATIC TIRES.

No. 545,118. Patented Aug. 27, 1895.

Fig. 1.

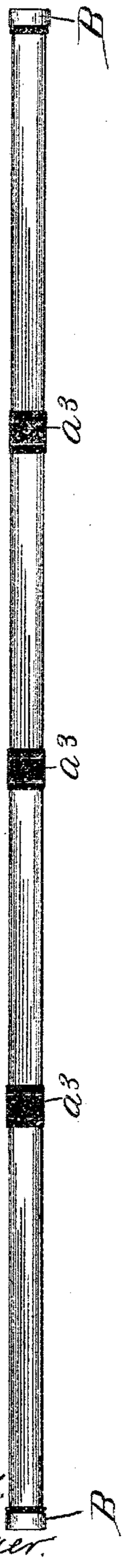
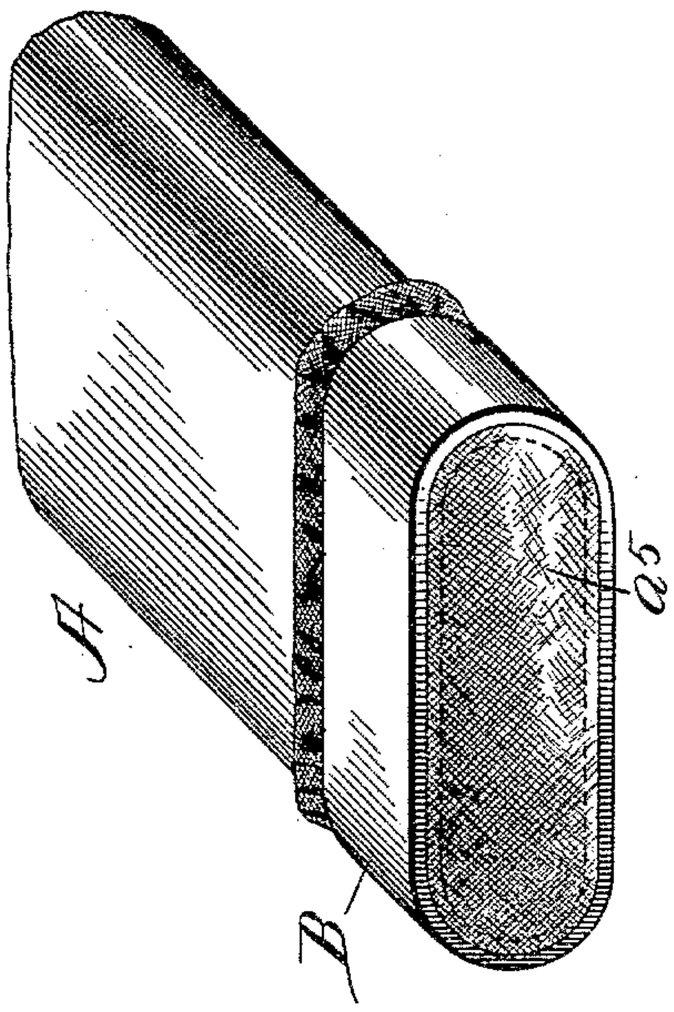


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

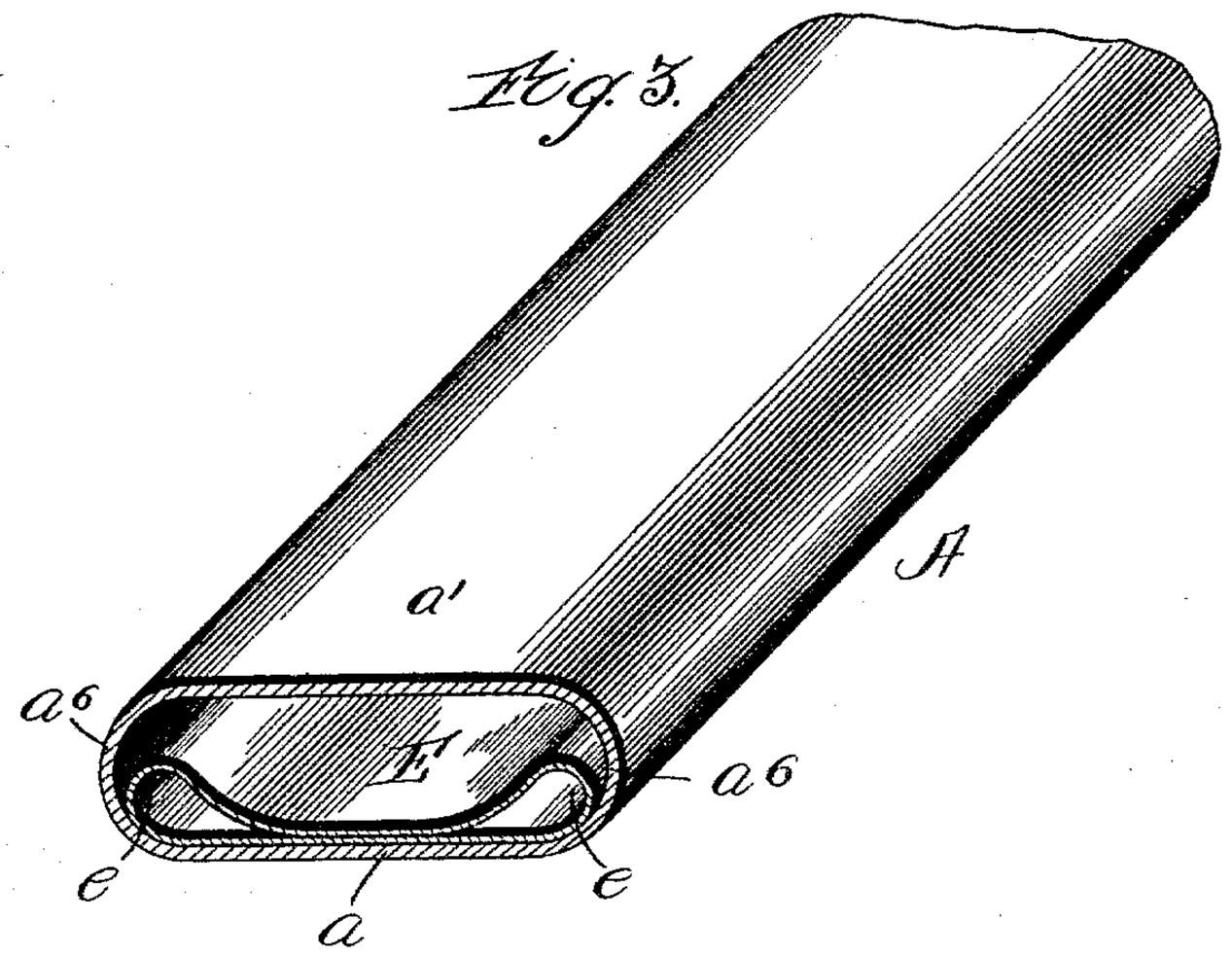


Fig. 4.

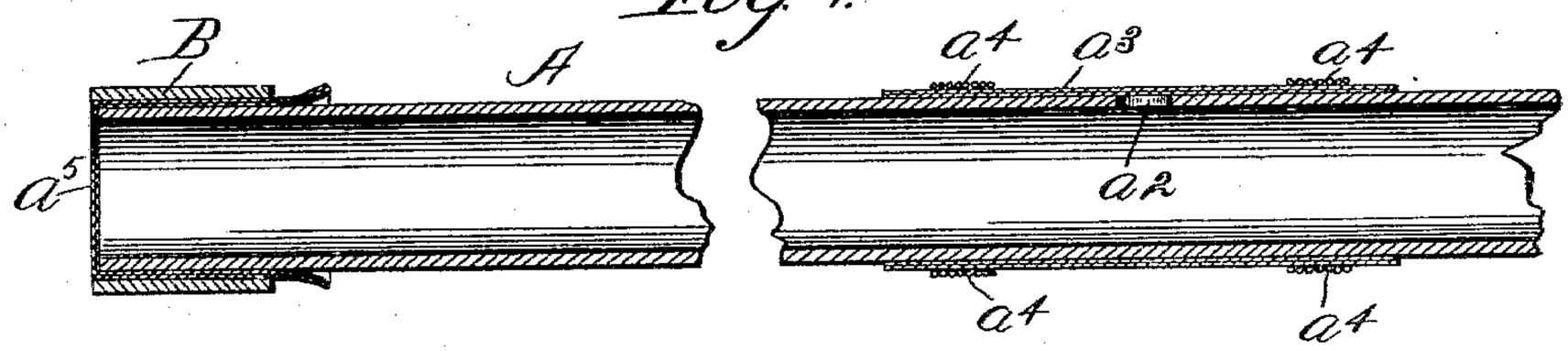
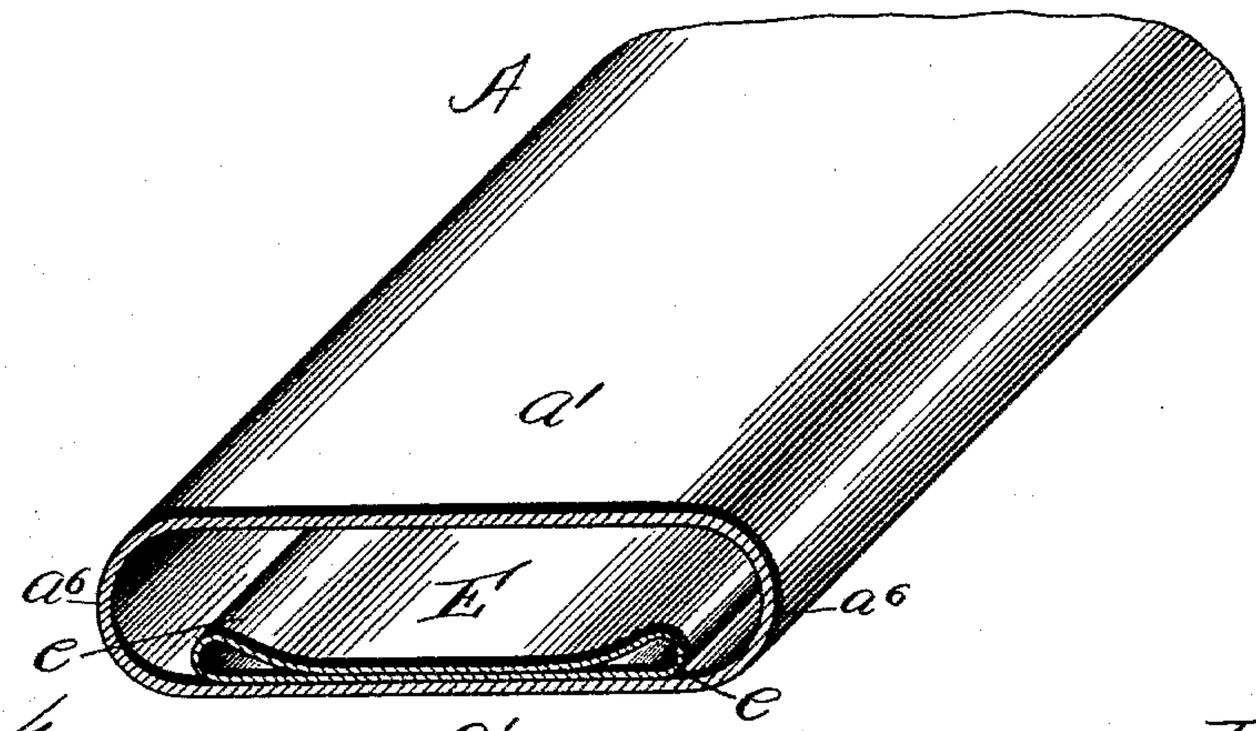


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

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PROCESS OF AND APPARATUS FOR VULCANIZING AIR TUBES FOR PNEUMATIC TIRES.

No. 545,118. Patented Aug. 27, 1895.

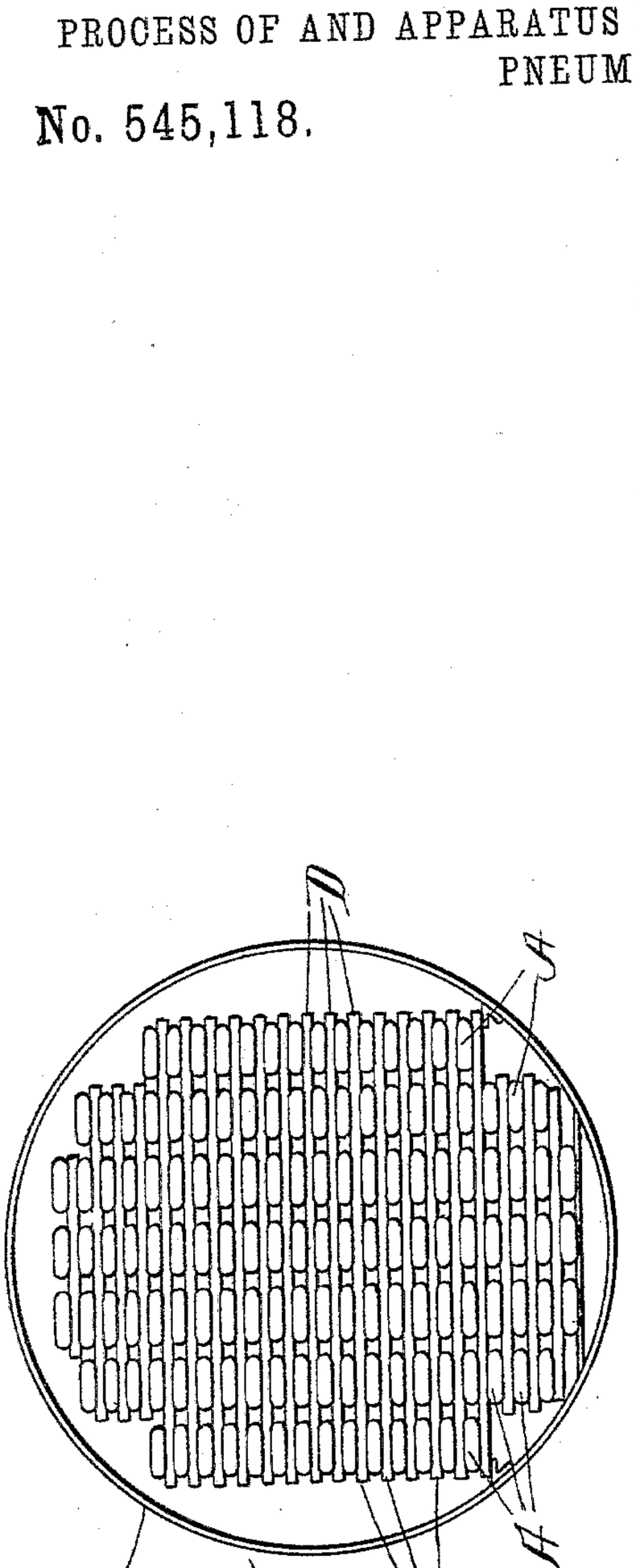

Fig. 7.

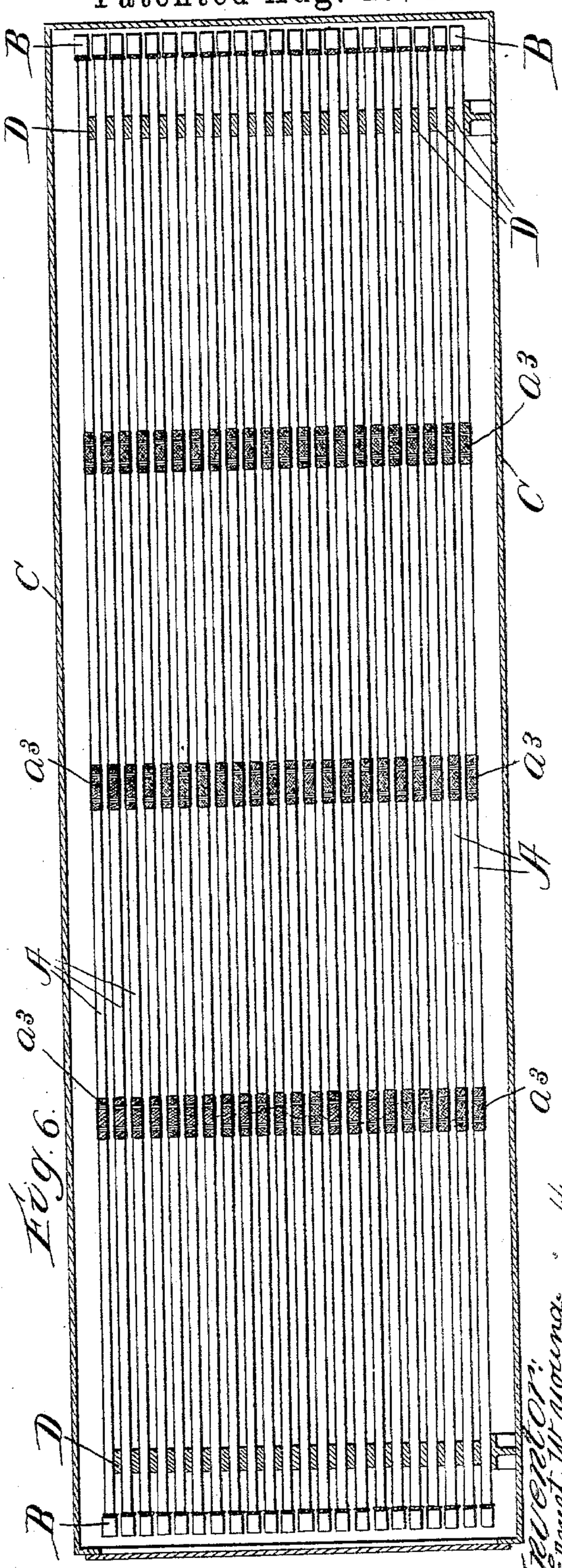

Fig. 6.

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UNITED STATES PATENT OFFICE.

ERNEST W. YOUNG, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE MORGAN & WRIGHT, OF SAME PLACE.

PROCESS OF AND APPARATUS FOR VULCANIZING AIR-TUBES FOR PNEUMATIC TIRES.

SPECIFICATION forming part of Letters Patent No. 545,118, dated August 27, 1895.

Application filed January 22, 1895. Serial No. 535,759. (No model.)

To all whom it may concern:

Be it known that I, ERNEST W. YOUNG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in the Process of and Apparatus for Vulcanizing Inner Elastic Air-Tubes for Pneumatic Tires, of which the following is a specification.

My invention relates more particularly to the vulcanization of inner elastic air-tubes for pneumatic tires in a flattened condition. These air-tubes, being light and thin, will flatten of their own accord; but in arranging a large number of them within a vulcanizer, so as to economize in time and labor on the part of the workmen and further reduce expense by making one process or operation serve to vulcanize a comparatively large number of tubes, it has been customary to so dispose them that as an incident to such disposition and arrangement they are subjected to pressure, serving to objectionably flatten their longitudinal side edges. As a result of such objectionable flattening the vulcanized tubes will have crease-lines along their longitudinal edge portions, and in use they are found to be weak along such lines and to frequently rupture at points along the same. With reference to the vulcanization of these tubes the objects of my invention are mainly to relieve the flattened tubes from pressure tending to objectionably flatten their longitudinal edge portions during the process of vulcanization, to permit a large number of said tubes to be contained within a vulcanizing-chamber at one and the same time and free from the aforesaid objectionable pressure, and, further, to provide a rapid, economical, convenient and improved method of and means for producing normally-flattened vulcanized air-tubes for pneumatic tires involving greater perfection than heretofore.

To the attainment of the foregoing and other desirable ends my invention consists in matters hereinafter set forth.

In the accompanying drawings, Figure 1 is a side view of a shell or casing in which the air-tube can be vulcanized. Fig. 2 shows, in perspective and on a larger scale, an end portion of the casing illustrated in Fig. 1. Fig. 3 shows, in perspective, a portion of said casing and illustrates a portion of an inner elastic air-tube for a pneumatic tire arranged therein. Fig. 4 is a longitudinal section through portions of the casing. Fig. 5 is a view similar to Fig. 3, the casing being, however, transversely widened, whereby the longitudinal edge portions of the air-tube are not in contact with the curved sides of the casing. Fig. 6 illustrates the vulcanizing-chamber with one side removed, so as to show the casings arranged therein. Fig. 7 is a like view showing one end of the vulcanizing-chamber removed, so as to show, in elevation, the ends of the casings.

The casing A consists of a straight, tubular sheet-metal shell which is transversely flattened, so as to provide it with a bottom a and preferably with a flat top a'. This casing is provided at points between its ends with ports a^2, which are formed through the top a' and covered with cloth or other analogous steam-filtering material, a simple and convenient arrangement being to wrap one or more layers of cloth about the casing, as at a^3, and to secure such wrapping in place by cords or wires a^4. The casing is provided at its ends with ports, which are also covered with cloth or other analogous steam-filtering material, and as a convenient arrangement whereby the casing can be opened at either end for the purpose of introducing and removing the air-tube, one or more layers of cloth a^5 are stretched over the ends of the casing and temporarily held in place by removable bands B.

The air-tubes hereinbefore referred to are made upon mandrels, as usual, and being light and thin they will flatten out of their own accord upon the bottoms a of the casings, after having been properly introduced within the same. These air-tubes can be readily introduced into said casings, it being only necessary to remove the band and cloth from one end of the tube, and while holding the latter in an inclined position introduce the air-tube by way of said open end of the casing. After such introduction of the air-tube the cloth can be replaced upon the end of the casing, and thereupon the whole will be ready for the vulcanizer. The casings thus containing the air-tubes can be piled up in layers within the

vulcanizing-chamber C of a vulcanizer, as in Figs. 6 and 7, wherein the casings are arranged in layers, with metal strips or bars D between such layers, so as to permit a free circulation of live steam about the casings. It will be seen by said figures that within a given area of the vulcanization-chamber I can arrange a large number of these flattened tubular casings, and hence that the process of vulcanization can be economically performed. By transversely flattening these casings I can obviously introduce within the vulcanizing-chamber a greater number than I could so introduce should I make them with transversely arched tops, although aside from such considerations the tops a' can be made either arched in cross-section or of other desired shape.

The air-tube, after being introduced within the casing, as hereinbefore described, will flatten out upon the bottom a of the casing when the latter is placed horizontally, as in Figs. 6 and 7. The space or chamber within the casing, while being shallow, for certain economical reasons, hereinbefore set forth, is of sufficient depth to permit the air-tube to lie without pressure upon it. In Fig. 5 the greatest transverse width of the space or chamber within the casing is greater than the width of the flattened tube E, which latter will flatten out substantially as in Fig. 5. With this arrangement the bent longitudinal edge portions e will be free from pressure and will be self-sustaining to an extent to preserve in cross-section the curved form indicated in Fig. 5, or at least an approximation to such curve. In Fig. 3 the greatest transverse width of the space or chamber within the casing is less than in Fig. 5 and is contracted to an extent to permit the longitudinal edge portions of the flattened air-tube to bear and rest against the curved sides a^6 of the casing. By this arrangement the longitudinal edge portions of the air-tube will be somewhat raised, as indicated, and will be supported so as to cause them to assume in cross-section the curved form shown. This mode of raising the edge portions of the flattened tube by causing them to rest to some extent against curved side walls or abutments, which are also in effect inclined side walls, is reliable and effective and constitutes a matter of further and positive improvement over the arrangement of air-tube shown in Fig. 5.

When the casings containing air-tubes, as hereinbefore described, are arranged within the vulcanizing-chamber and steam is let on, condensation of moisture within the casings will be avoided by reason of the layers of cloth over the openings on the casings, since such layers will so retard the entrance of live steam within the casings and so take up moisture that by the time the steam fairly enters the casings the latter will be heated to the temperature of the surrounding body of steam, and thereby the condensation of moisture (which if allowed within the casing would wet and spoil the air-tubes) does not take place within the casings. The ports thus covered with cloth also form vents, which permit an equable distribution of steam throughout the space within each casing, and by employing closed casings, as illustrated, any moisture which at the start might collect on the under side of one casing cannot by any possibility find its way into the casing next below.

What I claim as my invention is—

1. The within described improvement in the process of producing inner elastic air-tubes for pneumatic tires, consisting in forming the tube of unvulcanized rubber; confining it within a chamber formed by the interior of a shell or casing; causing the confined tube to flatten of its own accord and without weight or pressure upon it; and vulcanizing the flattened tube thus arranged and free from superposed weight, by superficially exposing the shell or casing within a vulcanizer and permitting the steam to have access to the chamber within such shell or casing only by passing through steam filtering material.

2. The within described improvement in the process of producing inner elastic air-tubes for pneumatic tires, consisting in forming the tube of unvulcanized rubber; confining it within a chamber formed by the interior of a shell or casing; causing the confined tube to flatten of its own accord except along the resulting longitudinal edge portions thereof, and upholding the latter so as to allow them to assume and maintain a curved form in cross-section; and vulcanizing the tube thus arranged, so as to produce a normally flattened inner elastic air-tube adapted for service in a pneumatic tire.

3. The within described improvement in the process of producing inner elastic air-tubes for pneumatic tires, consisting in confining the tubes in an unvulcanized condition in chambers formed within shells or cases, flattening the confined tubes without the application of weight or pressure; piling the cases in separated layers within a vulcanizer; and vulcanizing the tubes by superficially exposing the cases to steam and permitting the latter to enter the cases only through filtering material.

4. As an improvement in apparatus for vulcanizing inner elastic air-tubes for pneumatic tires in a flattened condition, a shell or case providing a chamber wherein the unvulcanized tube can flatten of its own accord, and having ports covered with filtering material, substantially as described.

5. As an improvement in apparatus for vulcanizing inner elastic air-tubes for pneumatic tires in a flattened condition a shell or case A provided with ports covered with steam filtering material and having a flat bottom a and curved or inclined sides a^6, the width of the flat bottom being less than the width of the proposed flattened air-tube whereby the

edge portions of the flattened tube shall be supported by the inclined or curved sides, substantially as described.

6. As an improvement in apparatus for vulcanizing inner elastic air-tubes for pneumatic tires in a flattened condition the flattened tubular case A provided with ports a^2 covered with steam filtering material, and also having its ends temporarily capped by such material, substantially as described.

7. The within described improvement in vulcanizing inner air-tubes for pneumatic tires, consisting in arranging the tubes in an unvulcanized condition, in separated layers within a vulcanizer; allowing the tubes to flatten of their own accord and during the process of vulcanization maintaining them free from weight; and vulcanizing them in such flattened condition, for the purpose de-described.

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