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PATCH VULCANIZING APPARATUS

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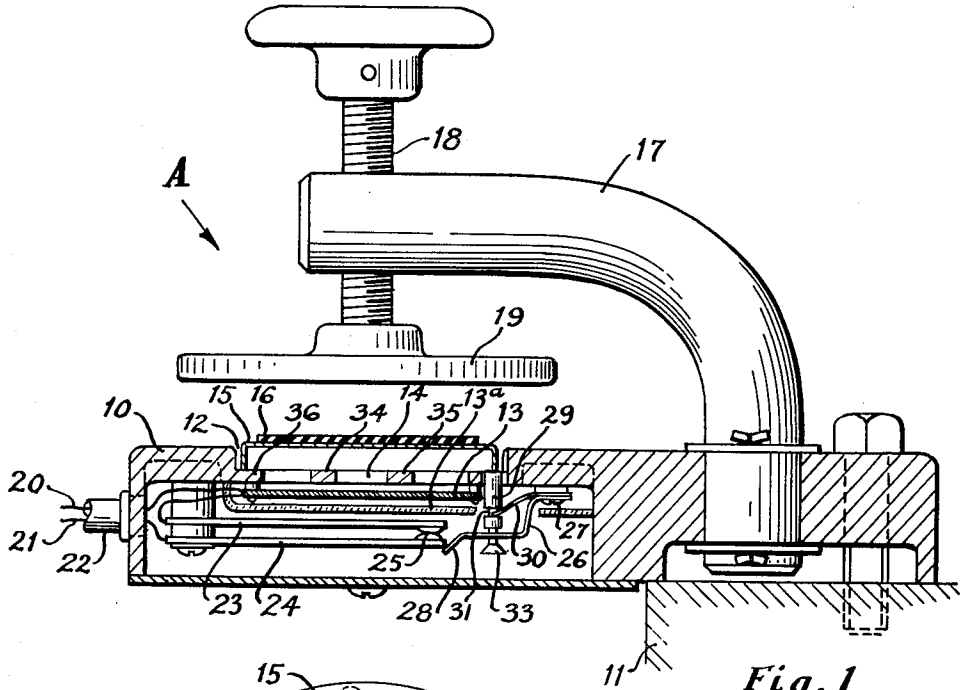


Fig. 1

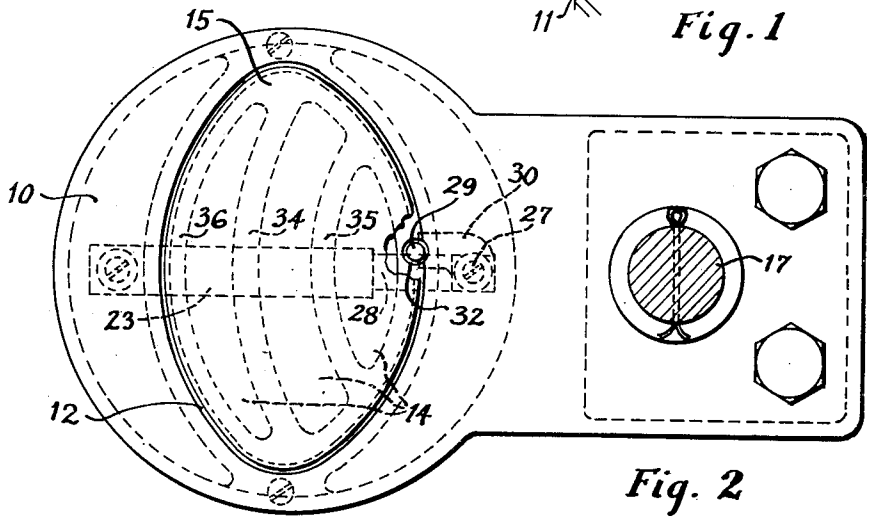


Fig. 2

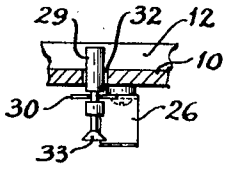


Fig. 3

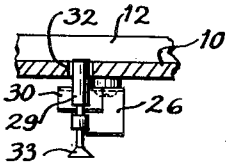


Fig. 4

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PATCH VULCANIZING APPARATUS

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7 Claims. (Cl. 219—19)

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This invention relates to patch vulcanizing apparatus.

In the vulcanizing of patches on inner tubes and other rubber articles, it has previously been proposed to apply the patch and to place over it a small metal pan carrying ignitable material which upon being ignited burns for a short time and produces the necessary heat to effect the vulcanization. This is a substantially quick way of vulcanizing a patch on rubber goods. However, it has a substantial disadvantage, which resides in the fact that the heat generated is substantially intense and greater than that required to effect the vulcanizing in question, so that in such a vulcanizing operation rubber is often deteriorated due to the heat.

Moreover, it has a further disadvantage through the fact that sparks tend to fly which makes the apparatus hazardous particularly as the apparatus is mainly used where inflammable materials may be present.

It has also been proposed to effect patch vulcanizing and the like by heat produced electrically and whereby the electric means is controlled by means of a fuse which will burn out at a given temperature. Usually, the fuse is part of a light metal plate carried by each patch and which is adapted to form the continuity of circuit or the patch is accompanied by a separate fuse which is inserted in the vulcanizing machine for each patch applying operation. In the first case, a rather expensive patch results apart from the added difficulty of removing the metal from the patch at the completion of the operation. In the second place, needless operation is necessary while the mechanism is intricate and relatively expensive.

These disadvantages of prior practice are avoided by the present invention which presents a simplified structure heated electrically.

It is an object of the present invention to provide a patch vulcanizing apparatus which will vulcanize patches quickly and efficiently and wherein the heat is controlled so as to effect the vulcanizing operation without overheating, tending to injure or deteriorate the rubber material.

A further object of the invention is to provide an apparatus of this kind which will operate automatically to control the degree of heat each time that the apparatus is used.

A further object of the present invention is to provide a particularly simple apparatus of this kind and employing a novel thermostatic control means which immediately cuts out the electric element when the required heat has been obtained

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and which is set for operation immediately that the patch applying accessory thereof is mounted in the machine for a patch applying operation.

With these and other objects in view the invention generally comprises a casing embodying an electric heating element designed to concentrate heat on a given area of the apparatus, a patch applying plate designed to be mounted over the heat concentrated area, a thermostatic switch connected in the circuit of the heating element designed to open at a given temperature to break the circuit, a means of automatically locking the thermostatic switch in open position and means operable by the patch applying plate for unlocking said switch and closing the circuit when said plate is positioned in the apparatus and operative for patch applying.

The invention will be clearly understood by reference to the following detailed specification taken in conjunction with the accompanying drawings.

In the drawings,

Fig. 1 is a longitudinal section taken through one form of patch applying apparatus according to the present invention.

Fig. 2 is a transverse section taken through Fig. 1 just above the top of the casing to show the general manner in which the patch applying plate is related to other parts of the apparatus.

Fig. 3 is a fragmentary sectional detail of the actuating plunger operable to unlock the thermostatic switch, the plunger being shown in normal position when the apparatus is not in use, and

Fig. 4 is a similar view to Fig. 3 showing the plunger in operative position when the apparatus is in use.

Referring to the drawings, A indicates the vulcanizing apparatus as a whole according to the present invention which includes a casing 10 or other suitable support which may conveniently be rigidly carried and projected from a suitable mounting base 11. The upper face of the casing 10 is formed with a suitable recess 12 of predetermined area positioned to encompass the area of the largest patch which is desired to be applied. The recessed area 12 is disposed directly over an electric heating element 13, the casing 10 preferably being open, in the area of the recess 12 and heating element 13, such as indicated at 14, to permit concentrating of the heat upon a patch applying plate 15 designed to fit within the recess 12 when placed therein and being readily removable therefrom.

The patch applying plate 15 is designed to receive a suitable patch 16 over which an inner

tube or other rubber article is placed so that the patch covers any opening therein designed to be permanently closed by the patch. Suitable clamping apparatus is provided such as the arm 17 and the screw threaded shank 18 designed to traverse the arm and carrying at its lower end a clamping plate 19. Thus, the rubber article to be vulcanized is pressed against the patch 16 carried by the patch applying plate 15.

According to the present invention, the heating element is connected by means of the leads 20 and 21 of and suitable conductor cable 22 and one of these leads, here shown as lead 21, is connected in series with the opposed arms 23 and 24 of the thermostatic switch which employs the contacts 25. These contacts are normally designed to be closed as the patch is disposed in practical contact with the rubber article to be vulcanized at the start of the operation, and when the electric element 13 has been heated to the proper degree to effect a practical vulcanizing, the arm 24 of the switch which is chosen of suitable bimetal characteristics is designed to move away from the arm 23, thus to separate the contacts 25. Accordingly, the circuit to the heating element 13 is broken. However, with any drop in heat due to the breaking of the circuit the arm 24, if unrestrained, would return to normal position and again set the heating element in operation. This is automatically prevented under the present invention. In this connection, a spring locking element 26 is suitably mounted within the casing, as shown in Fig. 1, and may be secured by a suitable anchoring screw 27. The latching element is formed with a locking tongue 28 downwardly and forwardly sloped so that its extreme free edge slightly underlies the extreme free end of the switch arm 24. Consequently, as the switch arm 24, under the concentration of heat from heating element 13, moves away from the switch arm 23 to break contacts 25, the end of switch arm 24 will slightly depress the tongue 28 of the latch member 26 so that the end of the switch arm will pass the tongue and then will be retained by the end of the tongue from returning to normal position closing contacts 25. Accordingly, the heating element is shut off at the proper temperature and the vulcanizing operation is carried out under proper heat conditions without possibility of deteriorating the rubber due to excess heat. A suitable adhesion shield 13a may be employed between element 13 and the switch arms 23 and 24.

When the vulcanizing operation has been completed, the clamping plate 19 is raised and the vulcanized article is taken out with the patch 16 properly vulcanized thereon. Then, in order to proceed with a further vulcanizing operation, it is necessary to remove the patch applying plate 15, apply to it a new patch and reinsert the plate 15 in the recess 12 of the apparatus. In this case, it will be apparent that the switch arm 24 is held separated from the switch arm 23 so that the contacts 25 do not meet. In order to cause closing of the contact 25, I provide a means which will function automatically to achieve this result when the clamping plate 19 has been pressed onto the rubber article so as to engage it practicably with the patch 16.

Adjacent to the periphery of the recess 12, I mount a plunger or actuator 29 designed to have a main vertical or axial movement, but also so mounted that it can swing slightly from vertical position. The plunger is spring mounted preferably by means of a leaf spring 30 which may also

be anchored by the mounting screw 27. This spring is slotted or otherwise recessed to engage a preferably reduced portion 31 of the plunger, the upper end of which is always disposed within the confines of the guide orifice 32 disposed in the upper portion of the casing 10 within the recess 12. Normally, when the apparatus is not in use, the plunger is in the position shown in Fig. 3 with the upper end of the plunger projecting substantially past the top surface of the casing 10 within the recess 12.

The lower end of the plunger 29 is formed with a preferably conical foot 33 being formed with the sloped surface disposed upwardly and a flat face disposed downwardly. The latter is designed partially to overlie the latch 26 when the plunger 29 is in the raised position. Consequently, as the article to be vulcanized is disposed in firm engagement with the patch 16 carried on the patch applying plate 15, the latter is caused to depress the plunger 29 because it is so positioned that an edge of the patch applying plate must be disposed to engage the plunger when the plate is properly disposed within the recess 12. As a result, therefore, when the plunger 29 is depressed the foot thereof will depress the latch member 26, thereby releasing its tongue 28 from engagement with the switch arm 24 so that the latter will spring back to normal position closing the contacts 25.

As has been stated above, the orifice 32 is so formed that a small amount of swingable movement is permitted plunger 29, and the conical portion 33 of plunger 29 is so disposed that a sector of its base overlies a portion of one side of latch member 26. The amount of swingable movement permitted is so small that it is impossible for conical portion 33 to depress latch arm 26 sufficiently to enable the conical portion to slip off the arm as long as the transverse axis of the latter is substantially horizontal. During the first part of the downward movement of plunger 29, latch member 26 bears against the bi-metallic strip 24, and is held with its transverse axis substantially horizontal by means of said strip. However, when latch member 26 has been sufficiently depressed to free the bi-metallic strip, the further depression of latch member 26 not only causes its tongue 28 to move further downward, but also causes the transverse axis of the said latch member to rotate, whereby the plunger is permitted to slip off the latter and assume the position shown in Figure 4. With the closing of contacts 25 as described, the vulcanizing operation automatically proceeds, since the heating of the element 13 is brought into operation, and when the predetermined heat has been reached the switch arm 24 is again caused to swing outwardly from the switch arm 23, thereby to break the circuit, and it will be locked in this position by means of the tongue 28 of the latch member 26.

When the vulcanized article is removed, the spring 30 returns the plunger 29 to the position shown in Fig. 3, since upon removal of the plate 15, or alternatively, the release of the pressure on the plate the spring 30 will naturally move the plunger 29 upwardly. Moreover, due to the conical or sloped upper surface of the foot 33 and the fact that the plunger 29 is mounted in the spring 30 so as to permit swinging movement as well as axial movement, the foot will be deflected by the conical surface thereof as it engages the edge of the latch member 26, thereby to return to normal

position disposed above the latch member 26, as shown in Fig. 3.

In Fig. 1, a large sized patch applying plate 15 is shown disposed within the recess 12 and carrying a large sized patch 16. The apparatus, however, is adaptable to smaller sized patch applying plates and patches. In this connection, the opening 14 at the bottom of the recess 12 is bridged by the intermediate ribs 34 and 35 respectively. They are designed to perform the same function as the peripheral ledge 36 at the edge of the recess 12, namely, to support the edge of the patch applying plate. Therefore, in the case of a smaller patch applying plate, the rib 34 is positioned to support the edge of the next size of plate while the rib 35 is disposed so as to support a smaller sized plate. Thus, one edge of the patch applying plate 15 is supported either by the ledge 36 or ribs 34 or 35, while the other edge of the plate is positioned so as to depress the plunger 29 as shown in Fig. 1.

The recess 12 is given a predetermined shape preferably and the patch plate 15 a corresponding shape to make it necessary that a proper patch applying plate is used and to avoid any tendency to employ makeshift plates which might not operate satisfactorily. In the present illustration, the patch applying plate is substantially elliptical.

It will be apparent from the foregoing, that I have produced a simple apparatus which will act automatically to vulcanize at a controlled temperature and wherein the heating element is cut off at a predetermined temperature, automatically and successively as the apparatus is used and in contradistinction to fuse control, thereby to avoid overheating and deterioration of the rubber, as is caused by apparatus previously referred to in this application while avoiding complication in both operation and structure as in the case of fuse controlled apparatus. The apparatus is quick acting since composite switch arm 24 can be made as quick acting as desired, so that very practical control is established while the switch is retained out of operation so that it cannot function again until a further vulcanizing operation is to be performed and the parts required are positioned properly for the operation.

What I claim as my invention is:

1. Patch vulcanizing apparatus comprising a support, an electric heating element mounted on said support, a patch applying plate mountable on said support adjacent to the heating element and designed to be heated thereby, said plate being adapted to carry a patch to be vulcanized to a rubber article, electric conduit means connected with said heating element and forming part of an electrical circuit for heating said element, a thermostatic switch in connection with said conduit means designed to open when said heating element is heated to a predetermined degree, thereby to break the circuit, means for locking said switch in open position as it opens, and means for actuating said locking means to release said switch whereby to cause it to close, said actuating means being located on said support in the area designed to receive said patch plate and being engageable by the latter when placed on the support and caused to press the patch against the article to be vulcanized.

2. Patch vulcanizing apparatus comprising a support, a heating element carried thereby, said support being recessed over an area in its upper surface above said heating element, a patch applying plate mountable in said recess to overlie

the heating element designed to be heated thereby, said plate being adapted to carry a patch to be vulcanized to a rubber article, electric conduit means in connection with said heating element designed to form part of an electrical circuit for heating the element, a thermostatic switch in connection with said conduit means designed to open when said heating element is heated to a predetermined degree thereby to break the circuit, means for locking said switch in open position as it opens, actuating means for causing said locking means to release said switch whereby to cause it to close, said actuating means being operable from said recessed portion of the support and being engageable by said patch plate when disposed in operable patch applying position.

3. Patch vulcanizing apparatus comprising a support, a heating element carried thereby, said support being recessed over an area in its upper surface above said heating element, a patch applying plate mountable in said recess to overlie the heating element designed to be heated thereby, said plate being adapted to carry a patch to be vulcanized to a rubber article, electric conduit means in connection with said heating element designed to form part of an electrical circuit for heating the element, a switch connected to said conduit means and including a pair of arms, one of which is a bi-metal arm, said arms having contacts normally held in engagement to complete the circuit, a latch member carried by said support adjacent to said bi-metal arm and partially in the path of movement of one end thereof, said bi-metal arm being caused to move away from said other arm to break said circuit when said heating element is heated to a predetermined degree, said bi-metal arm as it moves engaging and partially lodging behind said latch member to lock said switch in open position, and actuating means movable to engage and actuate said latch member to release said arm when said circuit is to be closed, said actuating means being operable from the recessed portion of said support and engageable by said patch plate when disposed in operable patch applying position.

4. Patch vulcanizing apparatus comprising a support, a heating element carried thereby, said support being recessed over an area in its upper surface above said heating element, a patch applying plate mountable in said recess to overlie the heating element designed to be heated thereby, said plate being adapted to carry a patch to be vulcanized to a rubber article, electric conduit means in connection with said heating element designed to form part of an electrical circuit for heating the element, a switch connected to said conduit means and including a pair of arms, one of which is a bi-metal arm, said arms having contacts normally held in engagement to complete the circuit, a latch member carried by said support adjacent to said bi-metal arm and partially in the path of movement of one end thereof, said bi-metal arm being caused to move away from said other arm to break said circuit when said heating element is heated to a predetermined degree, said bi-metal arm as it moves engaging and partially lodging behind said latch member to lock said switch in open position, and actuating means movable to engage and actuate said latch member to release said arm when said circuit is to be closed, said actuating means being operable from the recessed portion of said support and engageable by said patch plate when disposed in operable patch applying position, said actuating member comprising an axially movable plunger,

a part of which is designed to project within the recess in a position to be engaged by said patch applying plate, the other part of which is disposed partially to overlie said latch member and to engage and displace said latch member when depressed by said patch plate, and means for returning the actuator to normal position.

5. Patch vulcanizing apparatus comprising a support, a heating element carried thereby, said support being recessed over an area in its upper surface above said heating element, a patch applying plate mountable in said recess to overlie the heating element designed to be heated thereby, said plate being adapted to carry a patch to be vulcanized to a rubber article, electric conduit means in connection with said heating element designed to form part of an electrical circuit for heating the element, a switch connected to said conduit means and including a pair of arms, one of which is a bi-metal arm, said arms having contacts normally held in engagement to complete the circuit, a latch member carried by said support adjacent to said bi-metal arm and partially in the path of movement of one end thereof, said bi-metal arm being caused to move away from said other arm to break said circuit when said heating element is heated to a predetermined degree, said bi-metal arm as it moves engaging and partially lodging behind said latch member to lock said switch in open position, and actuating means movable to engage and actuate said latch member to release said arm when said circuit is to be closed, said actuating means being operable from the recessed portion of said support and engageable by said patch plate when disposed in operable patch applying position, said actuating member comprising an axially movable plunger, a part of which is designed to project within the recess in a position to be engaged by said patch applying plate, the other part of which is disposed partially to overlie the latch member and to engage and displace said latch member when depressed by said patch plate, said actuator having a foot to engage said latch member and push swingably to pass said actuator when the latter is displaced, said foot being formed with a sloping upper surface, and means for returning the actuator to normal position, said sloping surface of the foot causing said actuator to deflect past the latch member as it returns to normal position.

6. In patch vulcanizing apparatus, an electrical heating element designed to heat a patch applying plate for vulcanizing purposes, a thermostatic switch controlling the circuit for said element and designed to open when said element has reached a predetermined heat, locking means for locking said switch open as it moves to open position, and means operable by the patch applying plate when disposed in said apparatus in operable patch applying position for actuating said latch to release and close said switch.

7. Patch vulcanizing apparatus comprising a support, a heating element carried thereby, a patch applying plate mountable on said support adjacent to the heating element and designed to be heated thereby, said plate being adapted to carry a patch to be vulcanized to a rubber article, electric conduit means in connection with said heating element and designed to form part of an electrical circuit for heating the element, a switch connected to said conduit means and including a pair of arms, one of which is a bi-metal arm, said arms having contacts normally held in engagement to complete the circuit, a latch member carried by said support adjacent to said bi-metal arm and partially in the path of movement of one end thereof, said bi-metal arm being caused to move away from said other arm to break said circuit when said element is heated to a predetermined degree, said bi-metal arm as it moves engaging and partially lodging behind said latch member to lock said switch in open position, and actuating means movable to engage and actuate said latch member to release said arm when said circuit is to be closed, said actuating means being operable by said patch plate when disposed in operable patch applying position.

ALFRED DANIEL SLATKIN.

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