United States Patent [19]

Barnes

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[54] **TIRE BUFFING TOOL AND METHOD**

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[52] **U.S. Cl.** ..... **51/168,** 51/170 T, 51/407, 81/15.2

[51] **Field of Search** **B60c 25/16,** B24d 7/18

[58] **Field of Search** ..... 51/394, 401, 51/407, 209, 170 T, 168, 376–379, 328; 29/78; 81/15.2, 15.5, 15.6, 15.7

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[57] **ABSTRACT**

Because of the lack of access to the interior of tube-tires, internal patches must be applied through the rupture or puncture in such a tube-tire. For proper preparation of the internal patch area, a buffer having a shaft connected to a pivoted buffing head with an elastomer coated spring plate that also includes an abrasive surface on the outer elastomer surface can be folded about its pivot so it can be inserted through the rupture and then opened so that the plate is normal to the shaft, whereby the rotation of the shaft, while the shaft is simultaneously pulled outwardly, brings the abrasive surface into contact with the interior patch area about the rupture to abrade and clean the patch area preparatory to applying the patch.

7 Claims, 5 Drawing Figures

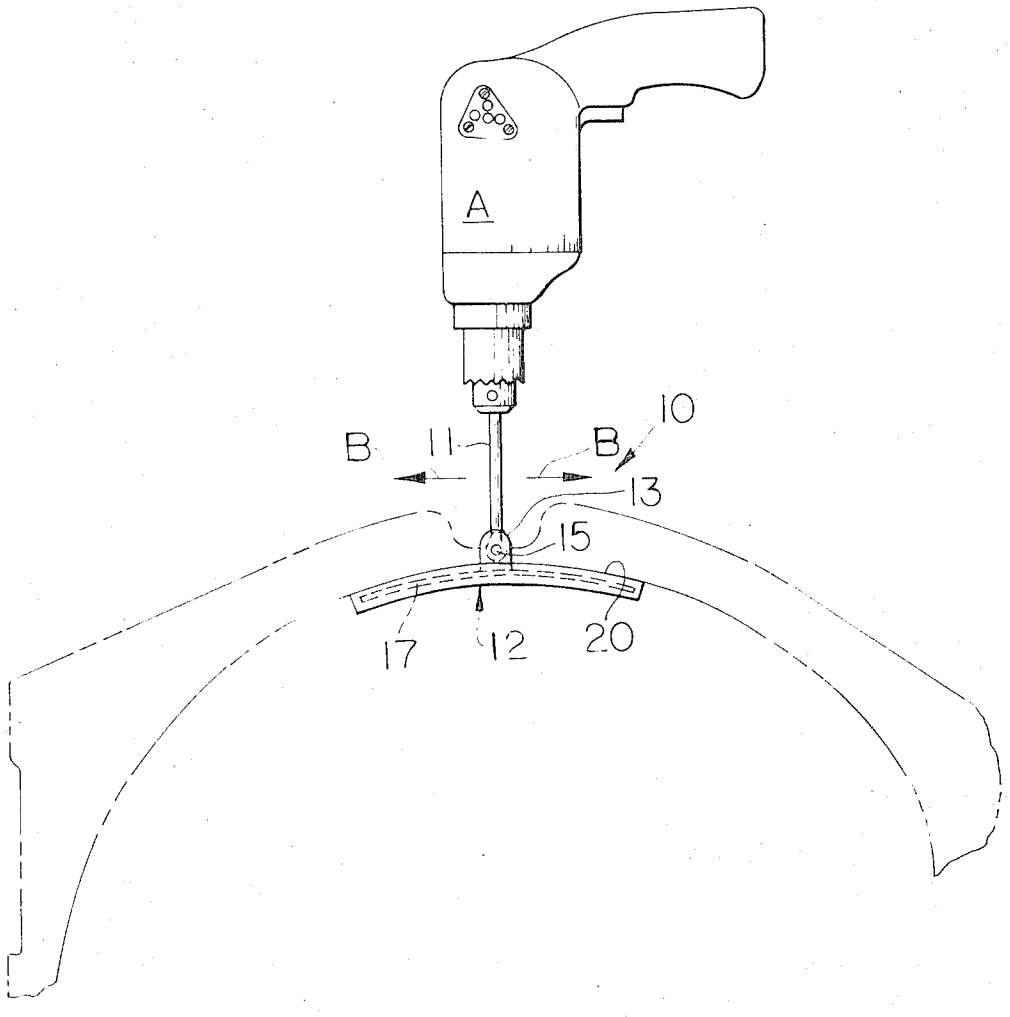


Fig. 1

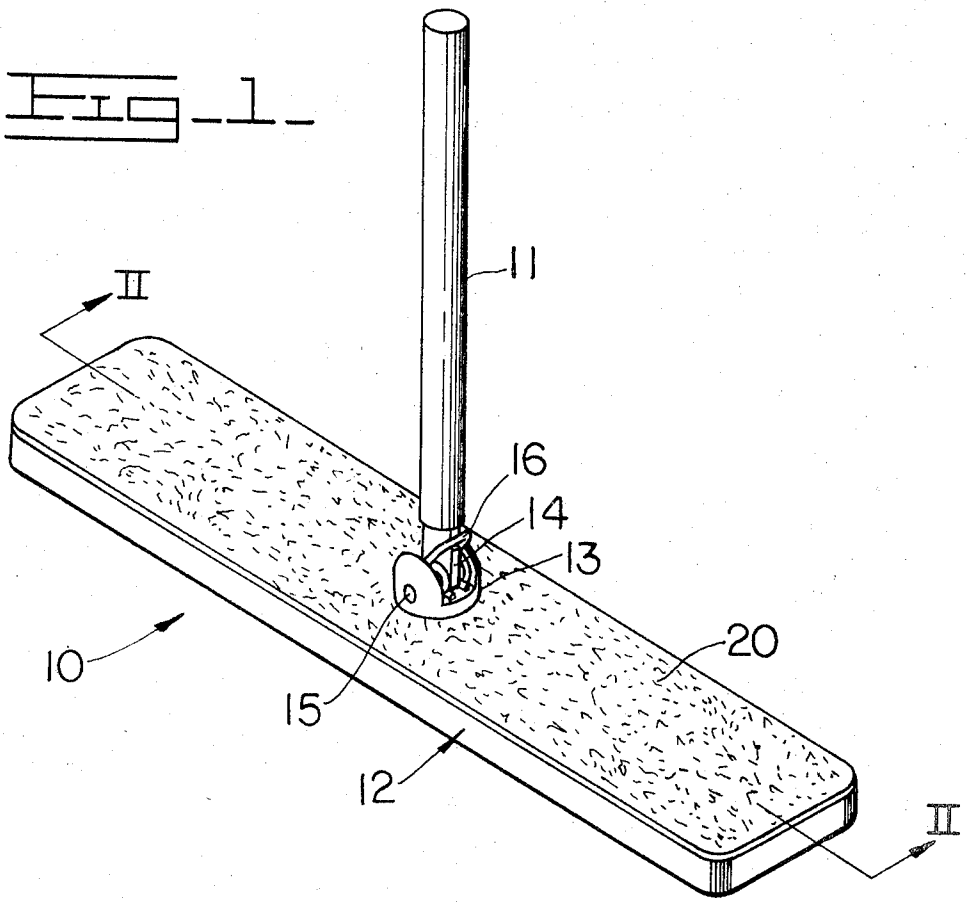


Fig. 2

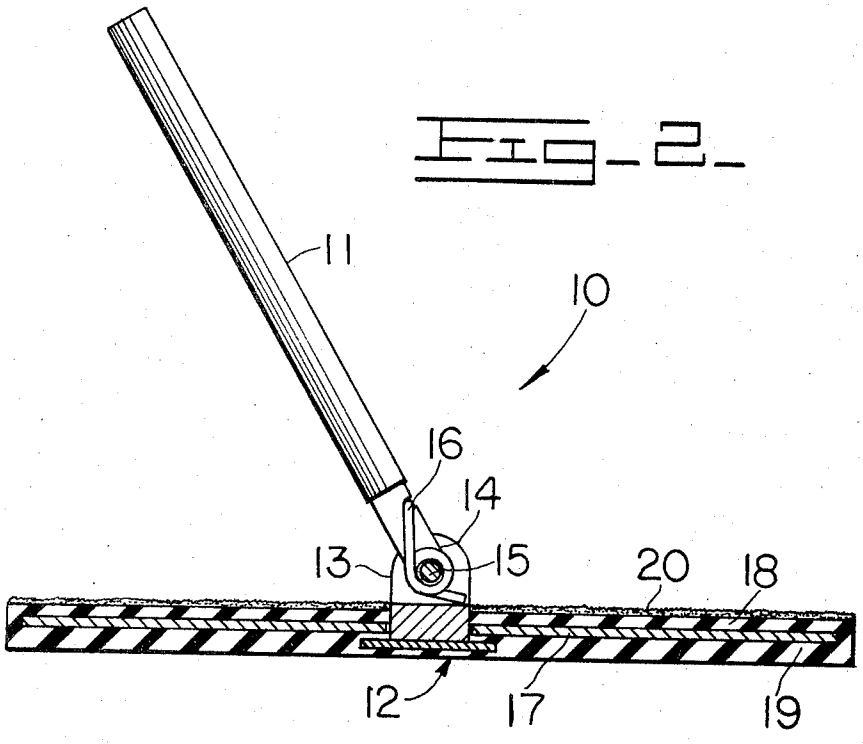


Fig. 3

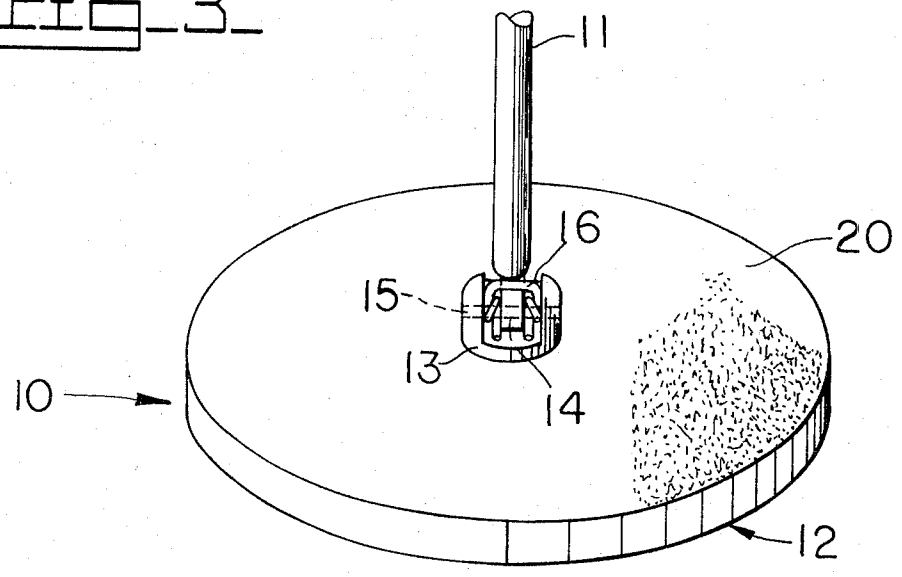


Fig. 4

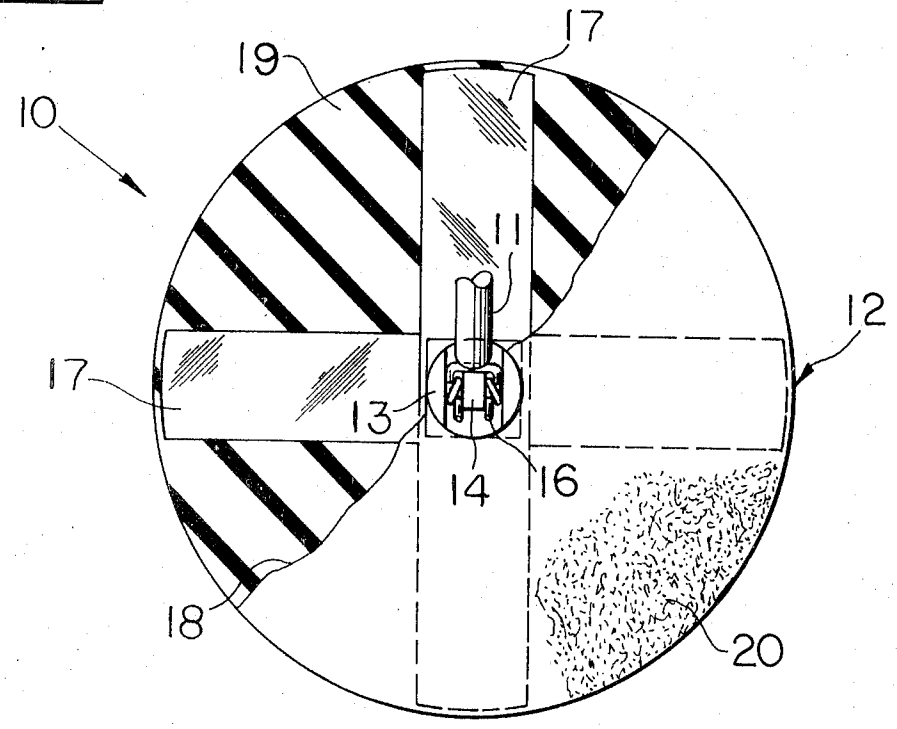
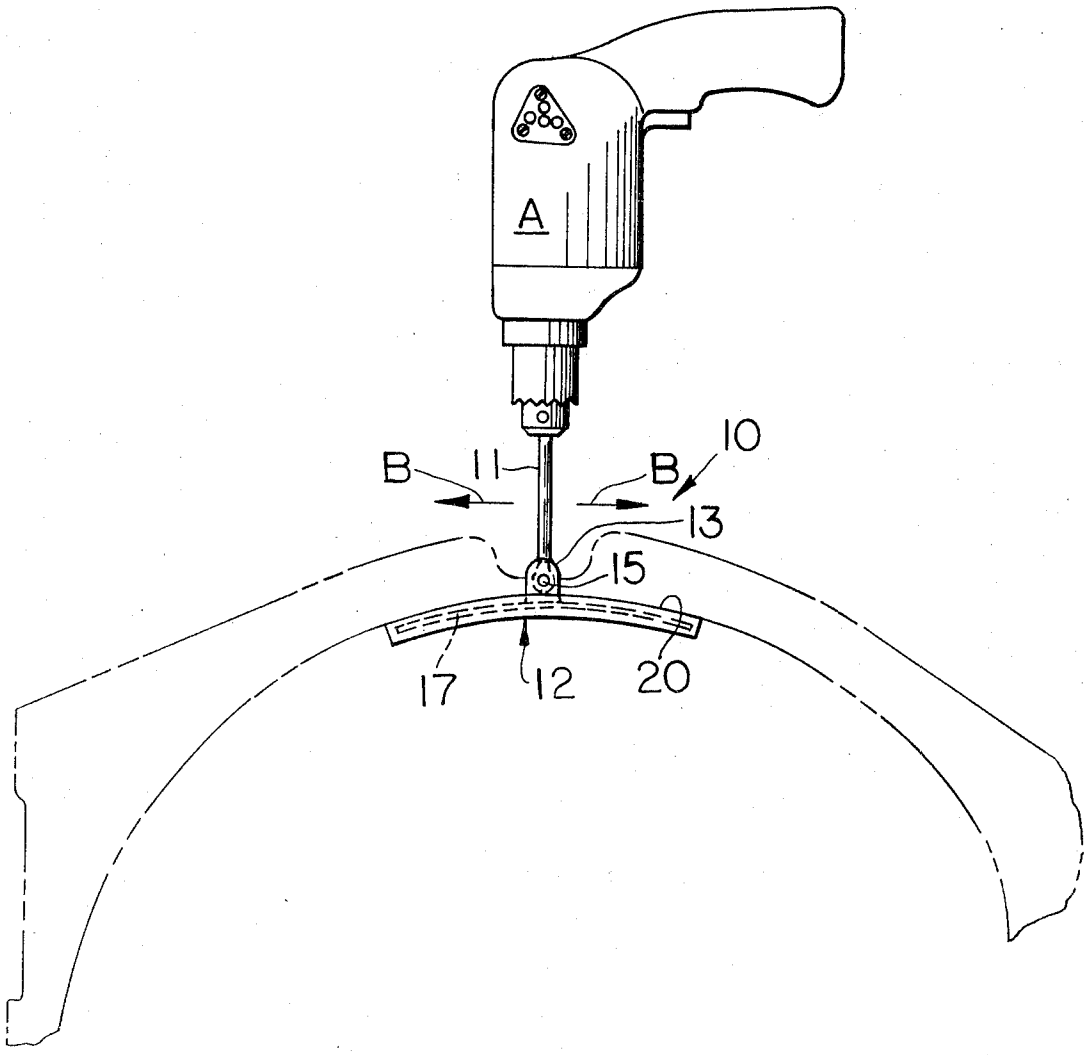


Fig. 5



TIRE BUFFING TOOL AND METHOD

BACKGROUND OF THE INVENTION

Tube-tires have been successfully utilized in the earth mover field, and while far less susceptible to puncture when formed with a steel belt, are occasionally punctured or ruptured in severe environments. Such environments include broken rock operations and similar environments. As can be seen in U.S. Pat. No. 3,606,921 issued to Grawey, which disclosure is incorporated herein by reference, these tube-tires have a completely enclosed air chamber which is completely formed with components of the carcass, and which is inaccessible from outside the tire. As a result, once a puncture or rupture of the tube-tire carcass has occurred, conventional techniques, utilizing internal boots or large reinforcing liners, cannot be employed to repair the tire because of the inaccessible interior of the tube-tire. Obviously, the tube-tire cannot be opened without further damaging the tire, and thus all repairs must be accomplished through the rupture or puncture if the tire is to be repaired In addition, since these tube-tires are usually produced on a destructible sand mandrel, the internal surface of the carcass about the rupture is rough and not compatible with practical patching techniques.

As a result of these problems, this invention has as its object the provision of a tire buffing tool which can be utilized to prepare the surface area immediately adjacent and surrounding the puncture or rupture to receive a patch which is subsequently applied through the puncture or rupture opening.

SUMMARY OF THE INVENTION

An internal tire buffing tool suitable to accomplish the above object and other advantages includes an elongated shaft with an elastomer coated plate being centrally pivoted on one end thereof and an abrasive surface disposed on the elastomer coated plate whereby the plate can be folded parallel to the shaft about its pivot for insertion through the opening of the puncture and then opened to orient it normal to the shaft allowing its abrasive surface to abrade the inner carcass area surrounding the puncture as the shaft is rotated and simultaneously partially withdrawn so the abrasive surface contacts the inside surface area of the carcass while the flexible plate allows its abrasive surface to follow the contours thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective of an embodiment of the buffing tool;

FIG. 2 is a section along line II—II of FIG. 1;

FIG. 3 is a perspective of an alternate embodiment of the buffing tool;

FIG. 4 is a plan view of the plate of the alternate embodiment of the buffing tool shown in FIG. 3 with parts broken away to show its internal construction and also showing the plate in a folded position used for insertion through a puncture or enlarged puncture opening; and

FIG. 5 illustrates in elevation the buffing tool as utilized within a tube-tire illustrated in phantom for abrading its inner surfaces contiguous to the puncture.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2, one embodiment of the buffing tool 10 is illustrated. As can be seen in these Figures, it includes an elongated shaft 11 and an elastomer coated flexible plate 12 that has its pivot housing 13 centrally disposed on the plate so that it can be connected to the flattened hub 14 on one end of the shaft with pin 15. A coil spring 16 also may be included in the pivot to urge the plate into generally parallel alignment with the shaft (see the respective positions of the plate and shaft in FIG. 4) so the tool can be easily removed from the tube-tire once the buffing operation is complete.

More particularly, the elastomer coated plate 12 includes an internal flexible spring steel plate 17 which is welded or otherwise fixed to the pivot housing 13 that projects from one side thereof. The plate is formed as indicated of spring steel so that it can flex and follow the contours of the surface being buffed. This surface will have variable contours, depending upon the location of the puncture or rupture.

Usually the spring steel plate has a thickness of approximately 0.020 to 0.125 inches and can vary in lenth and width, even being circular. Also, it can be brass plated to enhance the bond between the upper elastomer layer 18 through which the pivot housing projects and the lower elastomer layer 19, which are normally bonded to this spring steel plate to form the elastomer coated plate. On the exterior surface of the upper elastomer layer of the coated plate is an abrasive surface 20, which is bonded thereto. This abrasive surface can be formed from broken quartz or other similar abrasive materials which are bonded to the upper elastomer surface with suitable bonding agents which are well known in the abrasive arts. It is preferred that the abrasive surface be quite coarse to prevent it from loading up with abraded elastomer particles as the tool is used to buff the internal areas surrounding punctures in tube-type tires.

In FIGS. 3 and 4, an alternate embodiment of the tool is illustrated wherein a circular disc configuration is shown in place of the rectangular elastomer coated plate 12. This disc includes two separate spring steel plates 17 which are employed at right angles and also are fixedly joined to the pivot hub 13 which projects from one side of the coated plate. The upper and lower elastomer layers 18 and 19 are then formed as a circular disc with the Xed spring steel plate sandwiched therebetween. Otherwise, the two embodiments are essentially identical. However, this embodiment requires a larger opening to insert it into the tube-tire in the area of the rupture but has an advantage in that it is less susceptible to catching on the edges of the puncture. Such an enlarged opening can be formed by cutting the tire parallel and between the radial reinforcing filaments at sufficient distance to accommodate the diameter of the disc configuration of the coated plate.

After the buffing tool has been inserted through a rupture or puncture of a tube-tire, the elastomer coated plate 12 is manipulated so that it is normal to the elongated shaft 11 to the position shown in FIG. 5. With the elongated shaft secured in the chuck of an electric drill A, the buffing tool can be rotated at a speed between 50 and 2,500 rpms as the elongated shaft is simultaneously pulled outwardly to flex the elastomer coated

plate to the inner contour of the area of the tube-tire surrounding the puncture or rupture. It should be appreciated that flexure occurs both in the plate and in the elastomer coated layers which provide some additional resilience and allow the abrasive surface **20** to closely follow the contours of the internal surfaces of the carcass. Since the tool is rotated by the drill, the abrasive surface will abrade the area immediately surrounding the rupture or puncture on the inside of the carcass, and the shaft can be moved in the direction of arrow B (parallel to the radial reinforcing) to the extent of the opening in the carcass to insure that the areas at each end of the opening are properly prepared and buffed to receive the internal patch when it is applied.

When the buffing operation has been completed, the shaft is pushed into the carcass so that the elastomer coated plate can be brought into general parallel alignment with the shaft. When this is accomplished, the tool can then be removed through the opening through which it was inserted.

As can be seen in the drawings, the pivot connection is arranged so that the rotation of the shaft will cause the rotation of the elastomer plate, but the connection allows the plate to be aligned parallel to the shaft so that it can be easily inserted and removed through a puncture or rupture in the tube-tire carcass. It should be appreciated that if spring **16** is utilized in the pivot connection, the plate will automatically, when it is free to do so, generally align with the shaft. Obviously, a small amount of manipulation is needed to orient the elastomer coated plate normal to the shaft when it is inserted, but this can easily be done by simply wiggling the shaft as it is being pulled outwardly.

I claim:

1. An internal buffing tool for tube-type tires comprising:

an elongated shaft having a hub at one end thereof;

an elastomer coated plate having a pivot housing centrally disposed thereon and projecting from one side thereof, said coated plate having an internal flat spring steel member fixedly connected to said pivot housing with elastomer layers bonded to its opposite sides;

a pivot connection between said pivot housing and said hub operable to allow said coated plate to be aligned parallel with said elongated shaft and rotated therewith when said coated plate is positioned normal to said shaft; and

an abrasive surface bonded to said elastomer coated plate on the side with the projecting pivot housing whereby the tool can be inserted into a tube-tire through a puncture and said coated plate oriented normal to said shaft as it is rotated and pulled outwardly to abrade the internal surface areas of the tube-tire surrounding the puncture as the coated plate flexes to the internal contour of said area.

2. The internal buffing tool defined in claim **1** wherein the elastomer coated plate is rectangular.

3. The internal buffing tool defined in claim **1** wherein the elastomer coated plate is circular.

4. The internal buffing tool defined in claim **1** wherein the pivot connection includes a spring means therein operable to urge the elastomer coated plate into general parallel alignment with the elongated shaft to facilitate insertion and removal of the tool through a puncture in a tube tire.

5. A method of preparing the internal surface of a tube-tire surrounding a puncture for acceptance of a patch to be applied through the puncture comprising the steps of:

inserting a buffing tool with an elongated shaft having a flexible plate element foldably attached to its inserted end, said plate element having an abrasive surface;

rotating said plate element with it normal to said shaft by rotating said shaft while simultaneously pulling said shaft outwardly to bring said abrasive surface into contact with the internal surface surrounding the puncture; and

subsequently removing said buffing tool through said puncture.

6. The method defined in claim **5** wherein the shaft is pulled outwardly with sufficient force to cause the flexible plate to conform with the contours of the internal surface area surrounding the puncture.

7. The method defined in claim **6** including the step of moving the rotating shaft in the opening of the puncture to insure all the internal surface immediate thereto is buffed.

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