

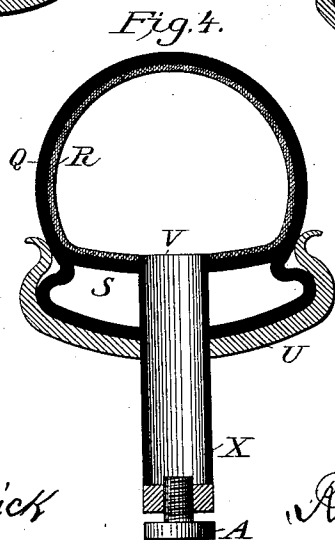
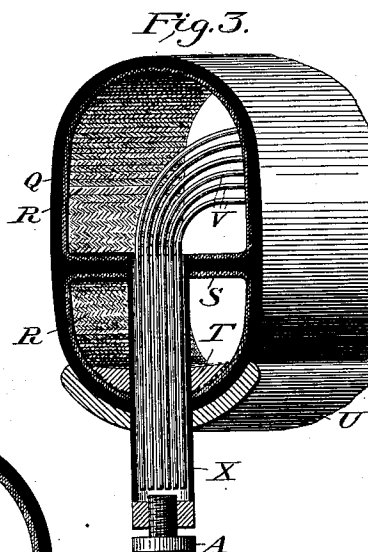
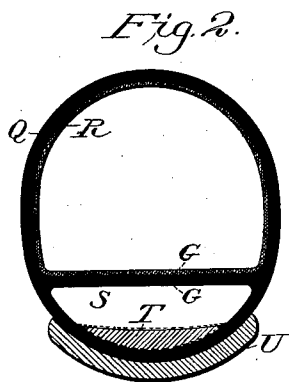
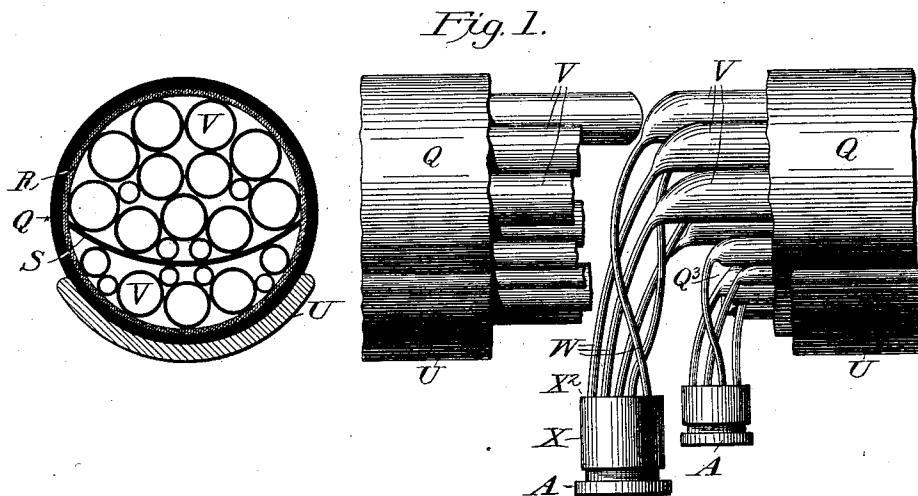
(No Model.)

2 Sheets—Sheet 1.

R. E. HUMPHREYS.
PNEUMATIC TIRE.

No. 532,879.

Patented Jan. 22, 1895.



Witnesses.
Thomas, G. Patrick
Ross, S. Withrow

Inventor.
Robert Evans Humphrey

(No Model.)

2 Sheets—Sheet 2.

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Fig. 5.

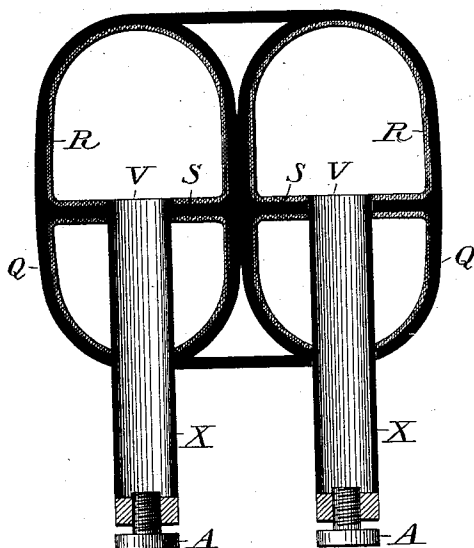


Fig. 6.

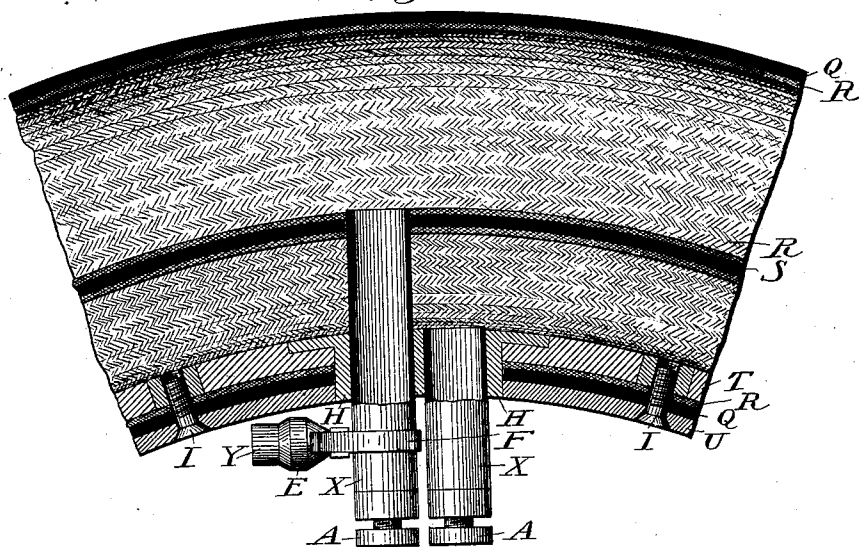
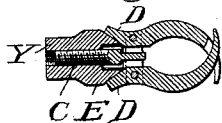


Fig. 7.



Witnesses.
Thomas C. Patrick
Ross S. Hitchman

Inventor.

Robert Evans Humphreys

UNITED STATES PATENT OFFICE.

ROBERT EVANS HUMPHREYS, OF IRWIN, PENNSYLVANIA.

PNEUMATIC TIRE.

SPECIFICATION forming part of Letters Patent No. 532,879, dated January 22, 1895.

Application filed February 7, 1894. Serial No. 499,421. (No model.)

To all whom it may concern:

Be it known that I, ROBERT EVANS HUMPHREYS, a citizen of the United States, residing at Irwin, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in the Detail Construction of Bicycles and in Pneumatically-Inflated Tires for Bicycles, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings and explanations and the claims hereinafter designated.

The object of my invention is to improve in detail the various parts of the bicycle, and the pneumatic tires, increasing the comfort, utility, pleasure and satisfaction in their use.

To accomplish this I reduce the liability to delay and annoyance caused by punctured air chambers in pneumatic tires, and increase their cushioning power to an extent heretofore unknown in their use; second, provide a wearing surface or outer case for the protection of such air chambers, thus completing the pneumatic tire, that will be firmly held to its place in the rim, and easily removed therefrom, on the whole, simple in construction, and effective in use. For the various styles of rims now in use, more than one shape of bottom of cover is necessary; therefore I show an ordinary rounded base, crescent shape rim, a special shape for sigmoidal or irregular overlapping rims with an extended or enlarged inflatable lower berth, which can be used with or without the hoop lying on the bottom of lower berth, extending around the case, and where a duplicate of air chamber V., is used, sharing part of the space within said lower berth. I attain these objects by the mechanism illustrated in the accompanying drawings.

Figure 1, is a section of pneumatic tire, branching air chamber and rim; Fig. 2, the cover with small lower berth; Fig. 3, the cover divided into upper and lower berths equal size; Fig. 4, the cover with lower berth of enlarged or extended; Fig. 5, union of tires; Fig. 6, cross section showing hoop and valvate in place; Fig. 7, compression valvate.

Similar letters refer to similar parts throughout the several views.

In Fig. 1, A is a section of pneumatic tire and branching air chamber in perspective of which Q. is the covering or wearing surface

of water-proof material; R., fleecy knit fabric of sufficient strength to withstand the required air pressure from within, and the severe contusion from without. This fleecy knit fabric lends a greater resilient property to the natural resilient qualities of elastic, than is possible in a plain fabric.

S. is a horizontal division wall as rigid and restraining as any other part of the cover. It extends around and separates the cover into upper and lower berths, either of which may be larger than the other, or of equal size as described. An incision is made through the bottom of the cover to the lower berth, and through the horizontal wall S. to the upper berth for the purpose of seating the removable branching air chamber and parent port stem properly in the upper berth, with parent stem protruding through the wall, lower berth, and rim. When cover Q. is made with equal or thereabout berths it is practically a union of two tires or if doubled for a special purpose as in Fig. 5 a union of four tires. A duplicate branching air chamber is introduced into the lower berth in a like manner, the stem protruding through the bottom of cover Q., and rim side by side as A A, Figs. 1 and 6.

Fig. 2 illustrates cover Q, with small lower berth of wood or metal hoop within showing as dotted lines and incision flap lifted as dotted lines G G, Fig. 3 showing the cover divided into upper and lower berths, with stem protruding, and extending to upper berth; Fig. 4, the cover with lower berth enlarged or extended horizontally as though inflated to fill an overlapping rim, with or without the hoop Fig. 6.

Fig. 5 shows a union of tires for special purposes, as heavy traffic or other uses to which such a construction would be applicable, and wherein such duplication would not be objectionable.

It is also considered within the spirit of this invention that if found desirable, the several berths could be made air tight, as well as the air tight branching chamber herein claimed, and that the air chambers, or covers, are considered, as applicable to other styles or kinds of tires, found in commerce, and to be sold together or separate as desired.

Fig. 6 shows the retaining hoop of wood, fiber or metal preferably wood. It is placed

in the lower berth through the incision in bottom of cover Q, cincturing the bottom of a cover, on the inside, and is secured to the rim, by hooks H H, fastened to the ends of
 5 hoop T, to be pressed into the stem hole of rim with slight friction, the hoop being a little short for this purpose. As an additional security to keep the hoop tight to the tire and rim, a screw bolt I, at one or more points
 10 through the rim and tire and into hoop within, serves to prevent any loosening of the hoop or tire, from the rim. Removing the screw bolt or bolts allows of pressing the hoop upward thus unhooking the ends from the stem hole
 15 and allowing the case to be removed from the rim for repair or other purpose.

Fig. 7 shows the cheliform compressing valvate Y, which is closed by turning the bevel nut E, on the short rod C, spreading the
 20 hinged sides D D, and closing the claws F F, thus inclosing and exerting a valvate compression against the base X in this manner closing all the branch ends with but one manipulation. The valvate is small, neat, and
 25 of little weight, and so made as to not tear the part or parts in contact therewith, and to hold the air securely in the branching chamber V. The elastic branching vesicular inner air chamber V., for containing an abnormal
 30 pressure, within the pneumatic tire, in efficiency transcends any now in use. It is a multipartite branching air chamber of vesicle cells radiating or branching from but a single parent port stem, placed at a convenient
 35 point in the circumference of the branches or at an end of the chamber, where the ends of the branches are attenuated to be compacted into as small a space as desired, and to conveniently connect in a suitable manner to the
 40 parent stem and port, without making an overly large or cumbersome stem and port.

In the base or bottom of the port are as many openings connecting to the branches as there are branches in the air chamber. The
 45 branches have no separate or independent valves, but are controlled by a single compression or cheliform valvate Y, attachable below the port. It will thus be seen that all the branches are closed into segregate cells,
 50 by one manipulation of the valvate, though all the branches are of one air chamber and port as part and parcel thereof. There are no idle or dormant branches for purpose or necessity, but accident or puncture may temporarily
 55 disable one more of the branches.

Air is forcepumped into all the many branches by one and the same inflation through the medium of an inflater attachable at the top of port X. After closing the valvate
 60 and removing the inflater, the top of port is capped or closed by a washer and screw or equivalent device. The internal conflict of confined air of the many branches in combat each with other when carrying the required
 65 burden, such as a rider or traffic, is a mitigated divided pneumatic force of less swash of air than that of the air chamber used heretofore

and is not so severe a stress upon the ends. Such stress often causes exploding or collapsing of such chamber. In the improved
 70 branching chamber such conflict tends to a greater rebounding of one branch from another, giving a greater cushioning power, and thus a more resilient speedy tire is attained. When the branches connect at any other
 75 point of the chamber than an end, the ends may be telescoped or attached in a like manner. The ordinary or little punctures often most troublesome and most likely to cause
 80 annoyance or delay, are of little moment in the use of this branching chamber within a tire. The puncturing of a few branches of the air chamber effects the percentage of air within less than the contraction from climatic causes. A temporarily disabled branch,
 85 where perhaps a dozen make up the chamber would cause a loss of but about eight per cent. of force. Where a score of branches are used, a relatively less per cent. would be lost. A properly filled air chamber could from any
 90 cause lose more than a fifth of its pressure without damage to the vehicle, or inconvenience in use.

It is to be understood that none of the branches are thought capable of separate expansion to the full size of the space within
 95 a case suitable for the reception of the chamber. Neither do the branches have partitions, walls or webs. Such would be nearly impossible to repair after being punctured a time
 100 or two and would likely be discarded as impracticable. The chamber herein described is distinctly a branching air chamber and thus any or every branch can be easily repaired in the usual manner of treatment in such rupturing or puncturing of the air chamber.

A sufficiency of air can be forced into the branches to replace any lost from disabled branches, and the well known tendency of good elastic to heal itself may at the next inflation bring temporarily disabled branches
 110 into activity again. Decreased liability to puncture from chances that many penetrating thrusts may be between some of the many branches and consequently would not puncture any branches is a pleasant contemplation in comparison with the trials and vicissitudes of former air chambers. The branches are preferably small and the chamber as a whole
 115 may be sleeved with fleece knit fabric similar to fabric R. of cover Q. It will be seen by reference to Fig. 3, that when a duplicate branching air chamber is used in the lower berth the hoop which is placed in position through the incision, occupies a portion of the
 120 space in the bottom of cover Q., which cover or case is a closed base tire, not to be confounded with open base tires, such as are usually designated mechanically fastened. The lower berth as shown in Fig. 4 with duplicate branching air chamber V², having
 125 nearly the whole of the tire and overlapping rim, together with upper berth of cover, containing the branching air chamber, as its pro-

tection, will not be likely to require much attention save occasional inflation.

There is nothing in the construction of the within described tire, to prevent its being secured to the rim with cement though generally cementing is considered more objectionable than a quickly securing device for such purpose. The upper and lower berth principle in a pneumatic tire or case, giving as it does, a maximum amount of air, with minimum tread, lessens the spread found so objectionable in wide tires in that it prevents to a great extent the clinging of the tires so tenaciously to a smooth asphaltum surface, where the suction of the wide elastic tire is so great. It also lessens the liability to puncture, in that it surely follows, a narrower tread, will not meet with as many obstructions in narrow or wide passage ways, as the wide tires, which latter, unless inflated to hardness have a spread under the weight of its load, of possibly more than a third of its width, which lessens its vertical depth to an extent often endangering the rim, and picking up nails, tacks or sharp points, that would be out of the reach of the narrower tread. This narrowing at no loss of air cushioning power is a positive gain in utility.

The use of several independent chambers with a multiplicity of valves, is considered in practice such an abomination, as to be practically worthless. In the within invention the one valvate is made to do the work of closing any number of branches that I desire to use as an air chamber.

In the foregoing specification is shown a pneumatic tire as near faultless and convenient as is possible in the present state of the art, as disclosed by a rapid advancing manufacture.

The aim of this invention is to supply the exacting and clamorous demands for improvement, convenience, and simplicity, desired by users of this class of inventions. One branching chamber only is used to a berth. A duplicate berth requires a duplicate chamber. The within branching chamber, so conveniently arranged and so simply constructed, will under usual conditions require little or no repair in a season's use.

I am aware that prior to my invention pneumatic tires have been made with a few removable independent tubes each with a separate valve for each and some with parti-

tioned sections and restraining devices. I therefore do not claim such combinations broadly; but

What I do claim, and desire to secure by Letters Patent, is—

1. The improvement in a pneumatic tire for rims of wheels, consisting of a cover of water-proof material and fleecy knit fabric, a horizontal divisional wall separating the cover into upper and lower berths therein, in combination with an abnormal pressure air chamber, branching from a parent port and stem, in multipartite vesicle cells, adapted to be closed at or near the port, by a single valvate mechanism, arranged therein or on, and a hoop within the lower berth, hooking through the stem hole with tension, additionally screw bolted at one or more points to the hoop, through the tire and rim, and holding the tire between the hoop and rim securely, all substantially as and for the purpose specified.

2. In a pneumatic tire the combination of fleecy knit fabric and water-proof cover Q., the removable branching air chamber of elongated vesicle cells each of a length not less than the inner periphery of a cover the ends compacted attenuatedly into a stem and valveless port equally distributing to each encircling branch or multipart, air under pressure held therein by compression valvate Y., or usual valve device adapted thereto additionally capped or closed by washer and screw, all substantially as, and for the purpose specified.

3. For the pneumatic tires of bicycles, an improved removable air chamber, having multipartite vesicular cells radiating from a stem of its own dependent ends, attenuated compactly, and adapted to have an abnormal pressure distributed to the branches, through the stem of its own ends, from a valveless port, common to each branch alike the branches controlled, by a compression valvate enveloping the ends below or near the port, closing all the ends together by one manipulation of a valvate with no exchange of air from one to the other, the port additionally capped or closed by a washer and screw, substantially as and for the purpose described.

ROBERT EVANS HUMPHREYS.

Witnesses:

JOHN H. OVER,

THOS. C. PATRICK.