(No Model.)

# R. W. CHURCHILL.

## VEHICLE TIRE.

No. 576,809. Patented Feb. 9, 1897.

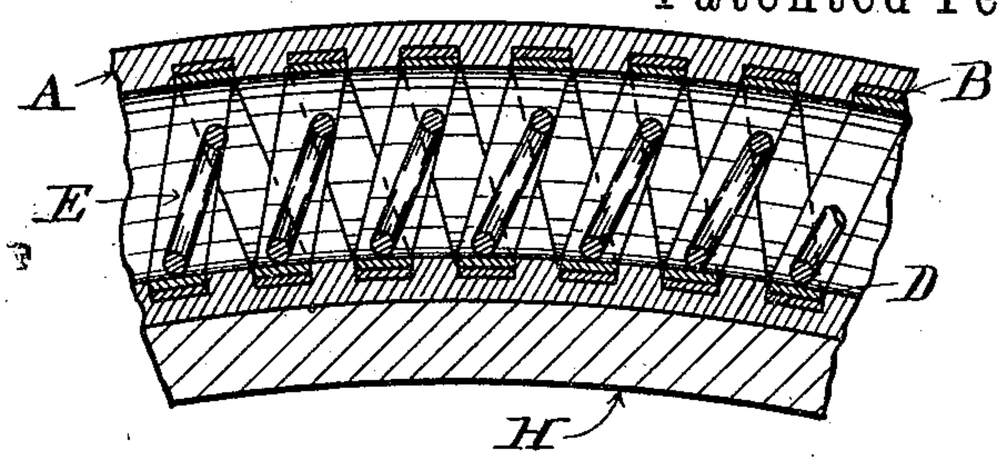


FIG. 1.

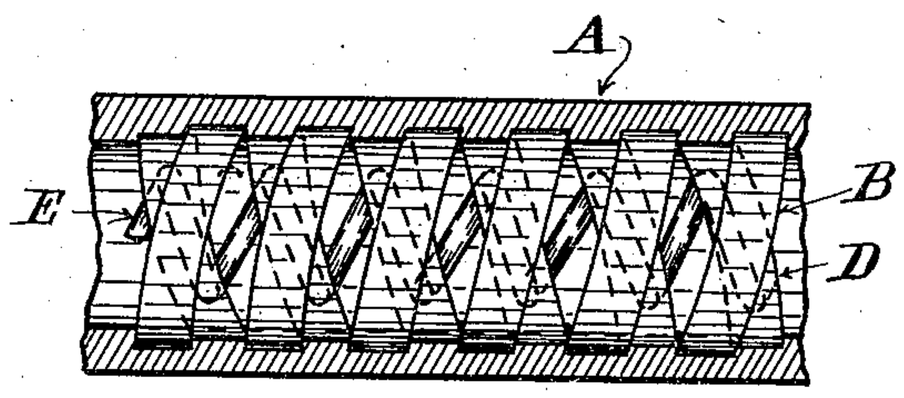


FIG. 2.

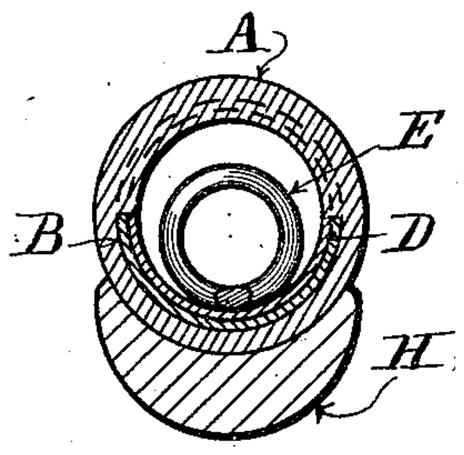


FIG. 3.

WITNESSES.

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# UNITED STATES PATENT OFFICE.

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## VEHICLE-TIRE.

SPECIFICATION forming part of Letters Patent No. 576,809, dated February 9, 1897.

Application filed November 20, 1895. Serial No. 569,486. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT W. CHURCHILL, a citizen of the United States, residing in Peabody, in the county of Essex and Commonwealth of Massachusetts, have invented new and useful Improvements in Vehicle-Tires, of which the following, taken in connection with the accompanying drawings, is a specification.

The present invention relates to improvements in that class of vehicle-tires commonly termed "cushion" or "elastic" tires; and it consists of a tubular casing of suitable flexible material which incloses a coiled spring the coils of which engage its inner wall and act to keep it expanded, and a cushioning device located within the spring and independent thereof, which acts to relieve the spring when compressed beyond a predetermined limit.

I am aware that it has heretofore been proposed to provide a tubular flexible casing with a coiled spring engaging its inner wall to keep it expanded; but such arrangement has heretofore been found to be objectionable in that when compressed beyond a certain limit the coils of the spring became set in their compressed form and position and did not perform their intended function.

The object of the present invention is to remedy the objections above cited and to provide an effective and durable device of this class.

The present invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section through a portion of a vehicle-tire embodying the present invention. Fig. 2 is a top view with a section of the casing removed. Fig. 3 is a transverse vertical section.

Similar letters of reference refer to similar parts in the several views.

In the drawings, A represents the outer casing, which is tubular in form and made of any suitable flexible material. In practice I find it convenient to use for this purpose the common form of "hose-pipe" tire, so called.

H represents a portion of the rim of the wheel to which the tire is applied.

The casing A incloses a coiled spring B, the coils of which engage the inner wall of the casing A and which acts to keep the casing A expanded. Inside of the spring B is preferably placed a second coiled spring D, the respective coils of which interiorly engage the respective coils of the spring B, preferably along the tread of the tire. The springs B and D are wound in opposite directions—that is to say, one is a "right-hand" spring, so called, and the other a "left-hand spring," and the coils engaging each other, as shown, form a system of elastic bracing which not only tends to resist a force normally applied to compress the tire, but also effectually prevents the coils of either spring from being overset or "capsized" by a force applied otherwise than normally to the casing.

The springs B and D are preferably made of flattened wire, similar to that used in the common form of clock-springs, and are held in position in the tire by being embedded in its inner wall, which is suitably grooved for that purpose.

It will be noted that when arranged as above stated the springs B and D may be made of very thin and light material and a great degree of effectiveness and durability secured. I desire to say in this connection that while I prefer to use the spring D for the reason above set forth I do not consider the present invention as limited thereto, and the same may be omitted, or some other system of bracing the outer spring substituted therefor, without any departure from the present invention.

The reference-letter E represents what I have termed a "cushioning" device, which is located within, but which is independent of, the springs D and B. The cushioning device E does not begin to act, but remains entirely unaffected by the compression of the springs B and D, until the springs B and D have been partially compressed, when the cushioning device E assumes a portion of the strain and prevents too great compression of springs D and B.

As shown in the drawings, the cushioning device E consists of a coiled spring, preferably made of ratan or some other light and elastic material, which is placed in the tubular casing A within the springs D and B. The coiled spring forming the cushioning device E is of less diameter than either of the springs D and B and is held in contact therewith (or with the inside of casing A) along the portion adjacent to the rim H.

The above arrangement leaves a space between the tread portion of the casing A and the cushioning device E through which the springs D and B must be compressed before being brought in contact with the cushion E, which acts as a reinforcement to prevent further compression of springs D and B. I may say in this connection that in practice I construct the springs D and B of sufficient strength to take up the usual pressure upon the tire when passing over an even surface, the cushioning device being brought into action only when more than the usual strain is brought upon the tire by unevenness in the surface traveled or other cause.

When the form of cushioning device shown in the drawings is used, it may be conveniently held in position by its own elasticity, being slightly shorter than the casing. I desire to say in this connection that I am aware that it has been proposed to provide in a tubular tire a coiled spring having alternate coils of different diameters for the purpose of allowing the spring to contract instead of flatten under pressure, but such arrangement differs widely both in principle and mode of operation from the cushioning device herein described, which, as before stated, forms no part of either spring and performs no function until the springs have been compressed beyond a predetermined limit.

I wish, further, to say in regard to the cushioning device that I do not consider my invention limited to the specific form shown, as it is evident that a cushion of rubber, cork, or other suitable material might be substituted therefor and similarly arranged to secure substantially the same results.

I claim as novel and desire to secure by Letters Patent—

1. In a vehicle-tire the combination with a flexible tubular casing of a coiled spring inclosed by the casing and engaging the inner wall thereof, an oppositely-wound coiled spring the respective coils of which interiorly engage the respective coils of the first-mentioned spring, and a cushioning device located within and independent of both springs, substantially as described.

2. In a vehicle-tire the combination with a flexible tubular casing of a duplex coiled spring, comprising two springs the coils of which are wound in opposite directions, and in close contact with each other and with the inner wall of the casing, and an independent metallic cushioning device located within said duplex spring, substantially as described.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, this 18th day of November, A. D. 1895.

ROBERT W. CHURCHILL.

Witnesses:
BENJAMIN PHILLIPS,
A. E. WHYTE.