

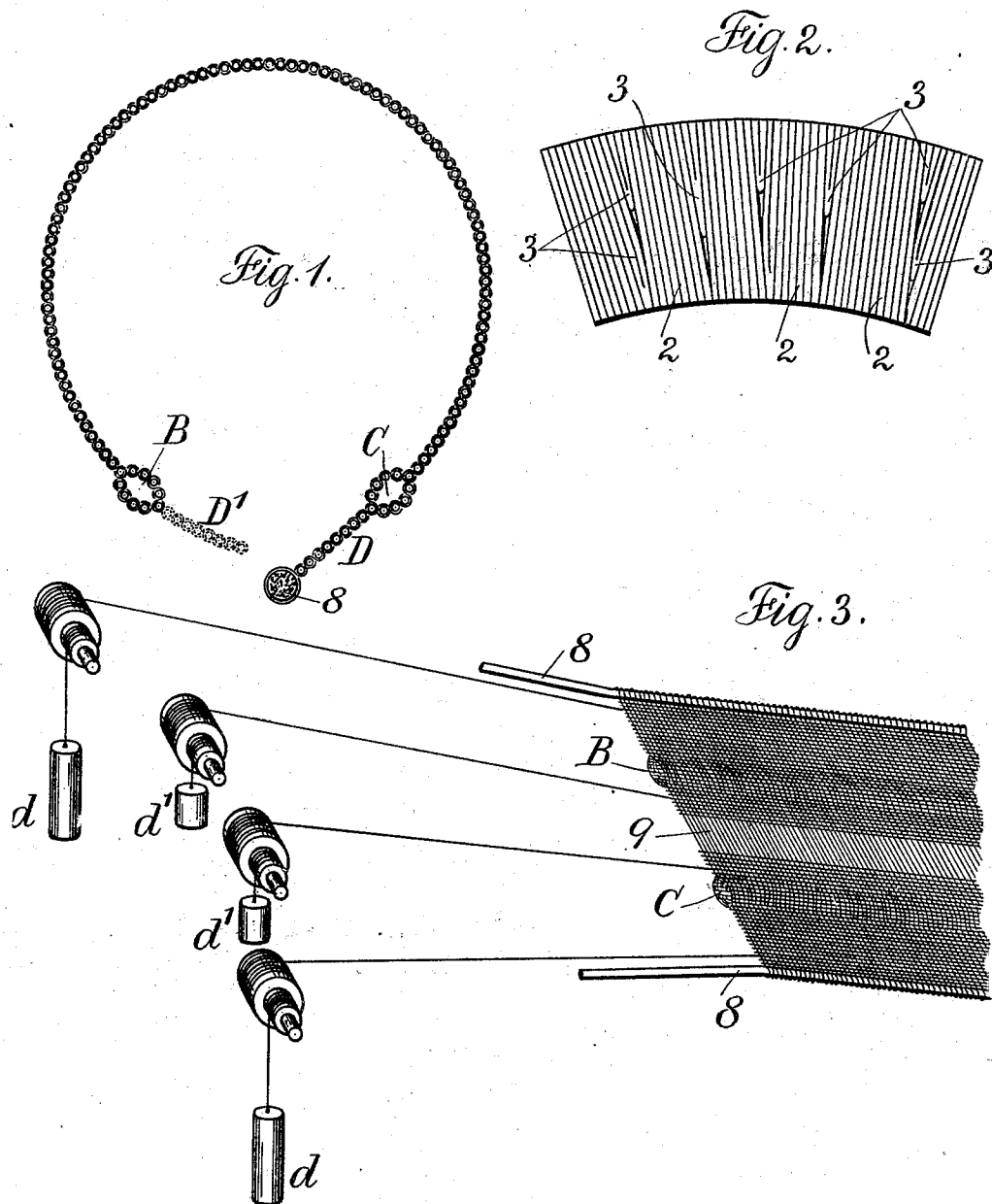
(No Model.)

2 Sheets—Sheet 1.

J. LYALL.  
WOVEN FABRIC FOR WHEEL TIRES.

No. 504,883.

Patented Sept. 12, 1893.



Witnesses:  
J. Stail  
Chas. H. Smith

Inventor:  
James Lyall  
per Lemuel W. Serrell

(No Model.)

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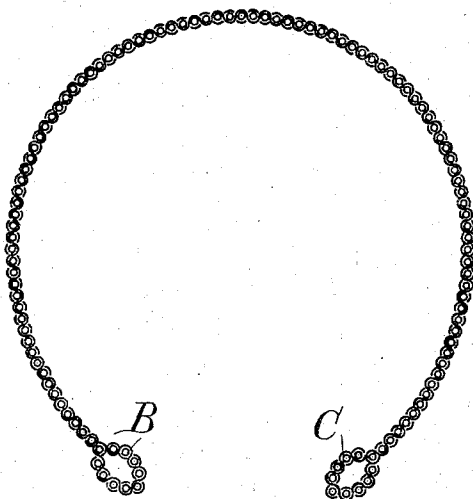
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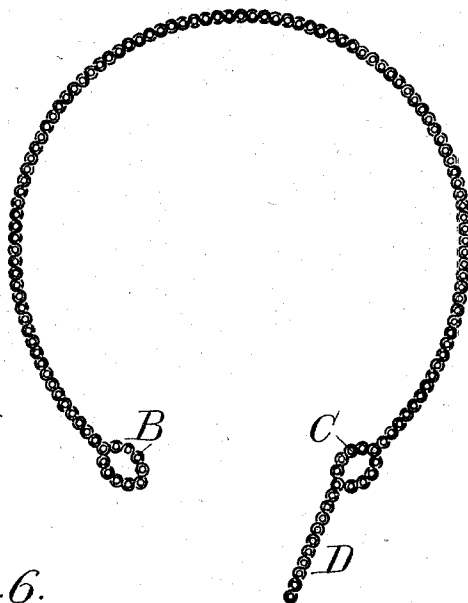
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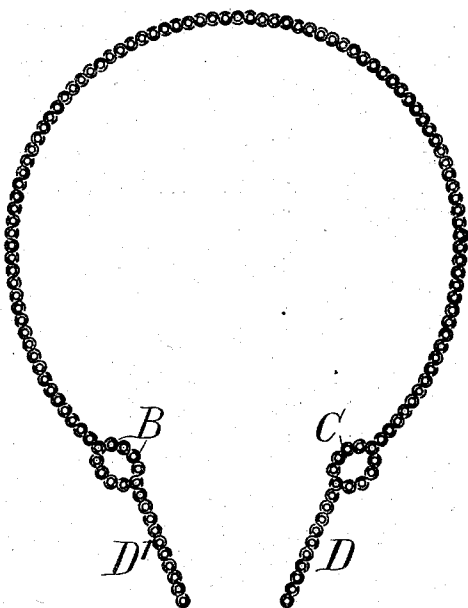
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



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# UNITED STATES PATENT OFFICE.

JAMES LYALL, OF NEW YORK, N. Y.

## WOVEN FABRIC FOR WHEEL-TIRES.

**SPECIFICATION** forming part of Letters Patent No. 504,883, dated September 12, 1893.

Original application filed December 27, 1892, Serial No. 456,327. Divided and this application filed July 11, 1893. Serial No. 480,138. (No model.)

### *To all whom it may concern:*

Be it known that I, JAMES LYALL, a citizen of the United States, residing in the city and State of New York, have invented an Improvement in Woven Fabrics for Wheel-Tires, of which the following is a specification.

This application is a division of my application, Serial No. 456,327, filed December 27, 1892.

10 Wheels for bicycles and other vehicles have been made containing an inflatable tube, and in many instances there has been a rubber tire outside of the inflatable tube, and in constructing the tires or elastic portions of such  
15 wheels, strips of canvas have been employed in connection with the india rubber and either permanently attached thereto or forming coverings for the interior or inflatable tube, and such coverings of canvas or similar material  
20 have in many instances been of woven fabric cut on the bias with the edges folded over and inclosing ribs of india rubber, wires or similar devices by which the covering or fabric has been permanently connected to the felly  
25 of the wheel. Difficulty has been experienced in making and applying these fabrics because the material cut upon the bias was liable to stretch and not to hold the parts reliably in position, and if an ordinary strip of fabric was employed the same could not easily be  
30 caused to assume the form of the circular tube, because one portion of such fabric had to be longer than another portion.

35 In my present invention the fabric for the wheel tire is woven with pockets for the reception of wires, ribs or other similar devices by which the fabric is permanently connected with the felly of the wheel, and a flap is provided at one or both of the edges of the fabric to pass within such felly, and in weaving  
40 this fabric the middle portions of the strip are woven longer than the edge portions, so that the fabric is capable of being easily applied in the form of a hollow tube around the periphery of the wheel.

45 In the drawings, Figure 1 is a cross section illustrating the tubular form that the strip of fabric assumes, showing also the pockets and the flaps of the same. Fig. 2 is a portion of the fabric illustrating the lines of weaving by  
50 which the increased length may be given to

the middle portions of the strip. Fig. 3 is a diagrammatic illustration of the warp thread tension device whereby the woven fabric is adapted to assume the shape of a circular  
55 tube. Fig. 4 is a section of the fabric similar to Fig. 1 but without any flaps. Fig. 5 is a section similar to Fig. 4 and with but one flap extending out from one of the pockets, and Fig. 6 is a section with two flaps one extend-  
60 ing out from each pocket.

In weaving this fabric any suitable heddles, heddle motion or Jacquard is employed to move the warp threads in such a manner that the weft threads are laid in as hereinafter described, and the warp threads are mounted upon separate spools or short beams so that the middle warps can be drawn off faster than the edge warps of the fabric, and more tension is applied to the edge warps  
65 than to the center warps, so that the warps may all be under a similar strain when the strip surrounds the wheel and in a form approximating a tube sectionally. The warp threads are exposed to different tensions or fed into the loom so that the middle warps of the strip are under less tension than the warps near the edges. Hence the middle warps in the strip will be longer than the edge warps, and the intermediate warps have tensions lessening from the edge toward the middle. Any desired or known devices may be used for varying the tension on these warps, so that they will be taken up in weaving in the desired proportions for forming the strip  
80 so that it can be coiled to correspond to the wheel and assume a tubular form or nearly so sectionally. I have illustrated this in Fig. 3 by representing heavier friction weights  $d$  to the tension straps of the edge warps than the weights  $d'$  used with the middle warps.

If desired the weft threads may be laid in as shown in Fig. 3 with the weft threads going from edge to edge of the strip.

85 In Fig. 2 I have shown the fabric in the curved form it would assume if folded in the middle, in consequence of there being a greater number of wefts in the middle portion, there being threads 2 which pass entirely across and other weft threads that only  
90 pass part of the way across and return, as shown at 3, and the weft threads are to be so

disposed that when the fabric has been woven the middle part of the fabric will be of greater length than the edge portions of the fabric, so that such fabric can be bent into the form of a tube or nearly so and also rolled up as a circle of a diameter corresponding or nearly so to the diameter of the bicycle or other wheel to which such fabric is to be applied, and it is to be understood that the manner of laying in the weft threads or the tension upon the warps to give the proper length to the middle portions of the fabric will depend upon the diameter of the pipe or inflatable tube around which the fabric is to pass in making up the wheel.

Pockets B C are made in the fabric and they are woven by causing one shot of the weft thread to pass below the pocket and the other shot of the weft thread to pass above the pocket, the warp threads being manipulated to effect this object, and these pockets are to receive wires, rubber strips or other devices that are to be clamped by the felly and movable portions of the wheel in constructing or applying the tire to such wheel; and I remark that the distances between these pockets will vary according to the character of the inflatable or elastic tire of the wheel, and as wheels of this character are well known it is not necessary herein to describe the wheels with which my fabric may be used.

In cases where a flap is required at one edge of the fabric to pass within the felly of the wheel or to wrap around any of the rubber or other attaching devices, the hereinbefore described fabric is to be woven with the flap D projecting at one edge of such fabric beyond the woven pocket, or there may be a flap at both edges of the strip of fabric, as illustrated by the dotted lines at D', Fig. 1, and full lines in Fig. 6.

The present invention, it will now be apparent, relates to the new fabric which when woven in the manner aforesaid is very strong and it is not liable to become displaced, to stretch or to assume a different form in use, and hence it is not liable to become disconnected from the clamping parts of the wheel, and it is much better than the devices heretofore made, because it has been woven to the shape desired and has selvages or open pockets or flaps or both in the right places for the connecting devices.

If the warps that occupy the central portions of the strip are elastic, the increased length required in such warps will be obtained by the stretching of such warps when the strip is employed in the tire and the increased length will be obtained in an equivalent manner to that before described of applying less tension to the central warps.

The flaps may receive eyelets, hooks or other attaching devices, and when desired heavier warp threads or cords 8 may be introduced and held by the weft threads, such cords 8 running longitudinally and preferably being

at one or both edges, to give additional strength to the fabric and to receive or become part of the fastening devices that secure the fabric to the wheel. The warp threads may be omitted in any portions of the strips, as illustrated at 9, in Fig. 3, when so desired. I have shown the warp threads omitted in the central portions of the strip.

It will be observed that the fabric has nearly the same appearance throughout and is not woven with a different character of weaving at one place from another and hence such fabric is nearly uniform throughout.

My aforesaid application Serial No. 456,327 relates broadly to the woven strip with the middle warp threads the longest so that the same is adapted to conform to the tire when drawn around the same. The present division relates to the additional features such as the securing devices, &c.

I claim as my invention—

1. As a new article of manufacture, a woven fabric in the form of a strip for wheel tires, the same having longitudinal warp threads to pass around the wheel, weft threads passing transversely of the woven strip, and pockets at or near the edges for the reception of wires, strips or similar devices employed in connecting the elastic tire to the wheel felly, the warps in the middle of the strip being longer than those near the edges, substantially as set forth.

2. As a new article of manufacture, a woven fabric in the form of a strip for wheel tires, the same having longitudinal warp threads to pass around the wheel, weft threads passing transversely of the woven strip, pockets at or near the edges for the reception of wires, strips or similar devices employed in connecting the elastic tire to the wheel felly, and flaps at one or both edges of the strip and adjacent to the pockets, substantially as set forth.

3. As a new article of manufacture, a fabric for elastic wheel tires woven in the form of a strip with longitudinal warp threads and transverse weft threads, some of which transverse weft threads cross only a part of the entire fabric and are doubled upon themselves in the middle portions of such fabric to increase the length of the center of the fabric, so that such fabric is adapted to surrounding the tubular or elastic tire and to the circular form required in passing around the wheel, substantially as set forth.

4. As a new article of manufacture, a woven fabric for elastic wheel tires in the form of a strip, with longitudinal warp threads and transverse weft threads, some of which transverse weft threads cross only a part of the entire fabric and are doubled upon themselves in the middle portions of such fabric to increase the length of the center of the fabric, so that such fabric is adapted to surrounding the tubular or elastic tire and to the circular form required in passing around the wheel,

and longitudinal pockets woven in such fabric near the edges of the same, substantially as set forth.

5 5. As a new article of manufacture, a strip of canvas or duck for elastic wheel tires, woven with longitudinal warp threads that are longer near the middle of the strip than those near the edges, and weft threads, so that the fabric is adapted to pass around a wheel and to  
10 surround the tubular or other tire, and heavier warps at or near the edge or edges of the strip held in place by the weft threads, substantially as set forth.

6. As a new article of manufacture, a strip

of canvas or duck for elastic wheel tires, woven 15 with weft threads and longitudinal warp threads that are longest in the middle portion of the strip and proportionately shorter toward and at the edges, and means for securing such strip to the elastic or other wheel 20 tire when drawn around the same, substantially as set forth.

Signed by me this 6th day of July, 1893.

JAMES LYALL.

Witnesses:

GEO. T. PINCKNEY,  
A. M. OLIVER.