

(No Model.)

H. C. GOODRICH.  
WHEEL.

No. 455,426.

Patented July 7, 1891.

Fig. 1.

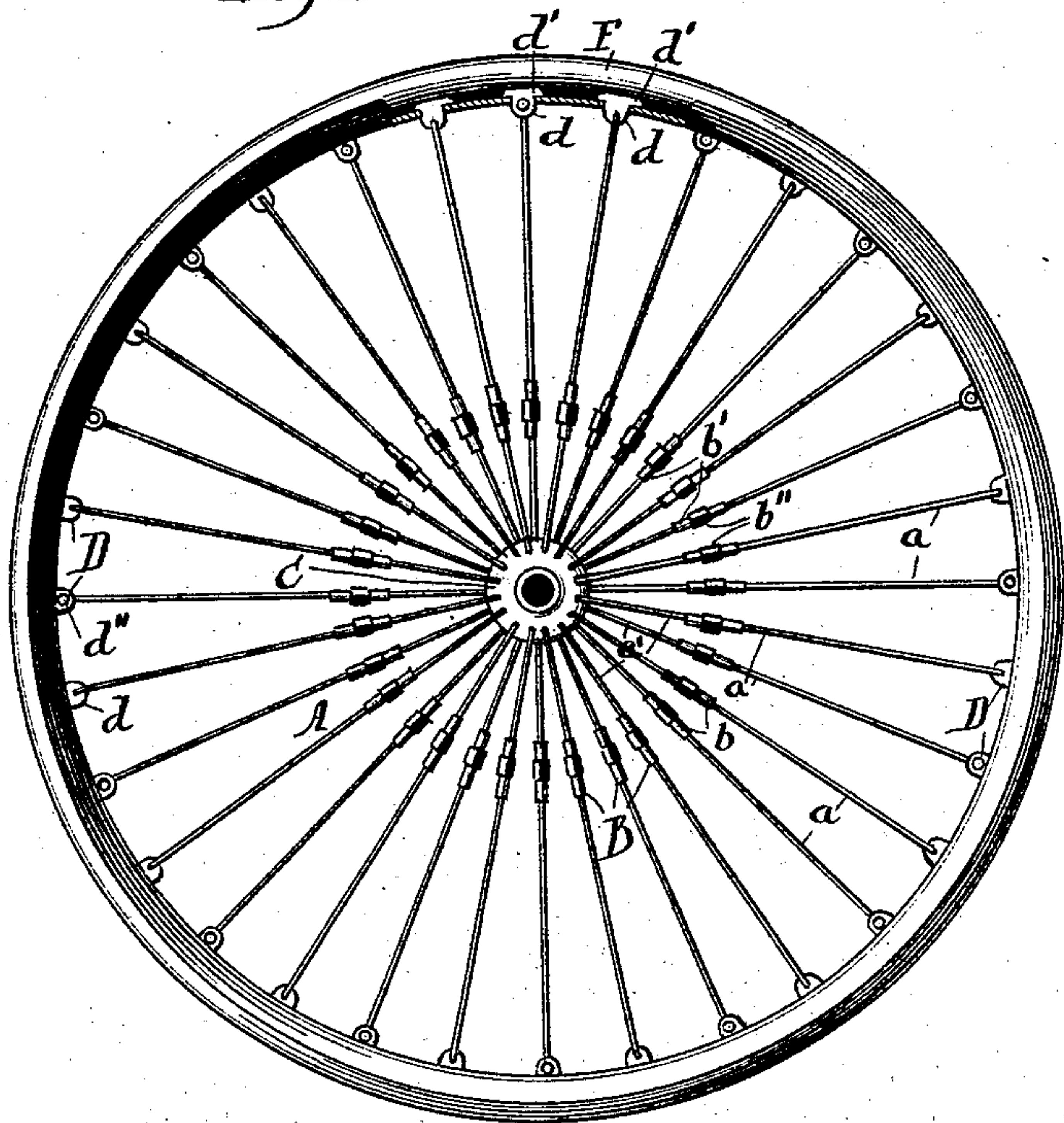


Fig. 2.

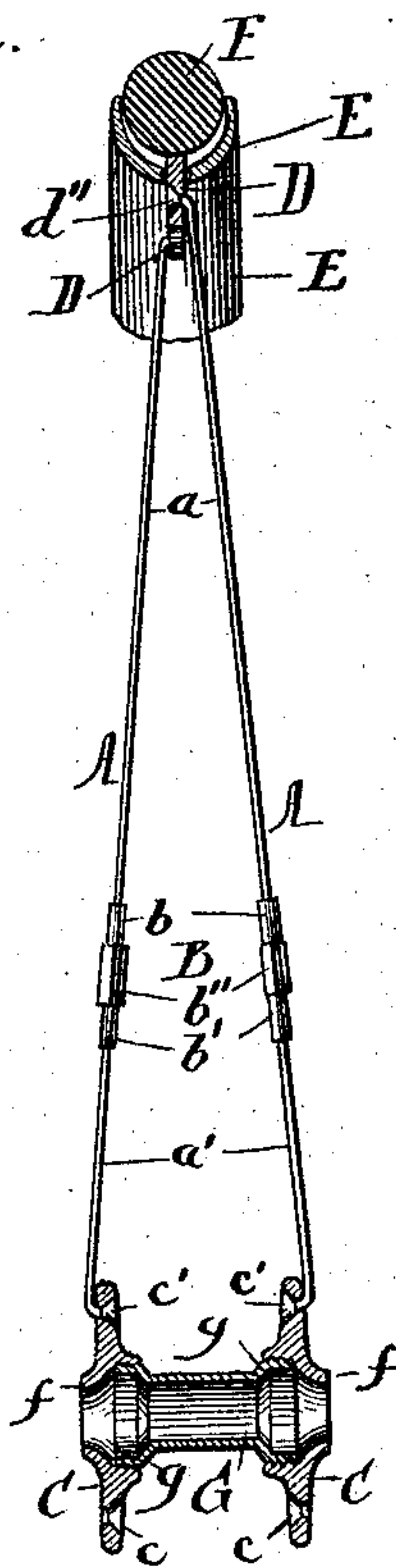


Fig. 3.

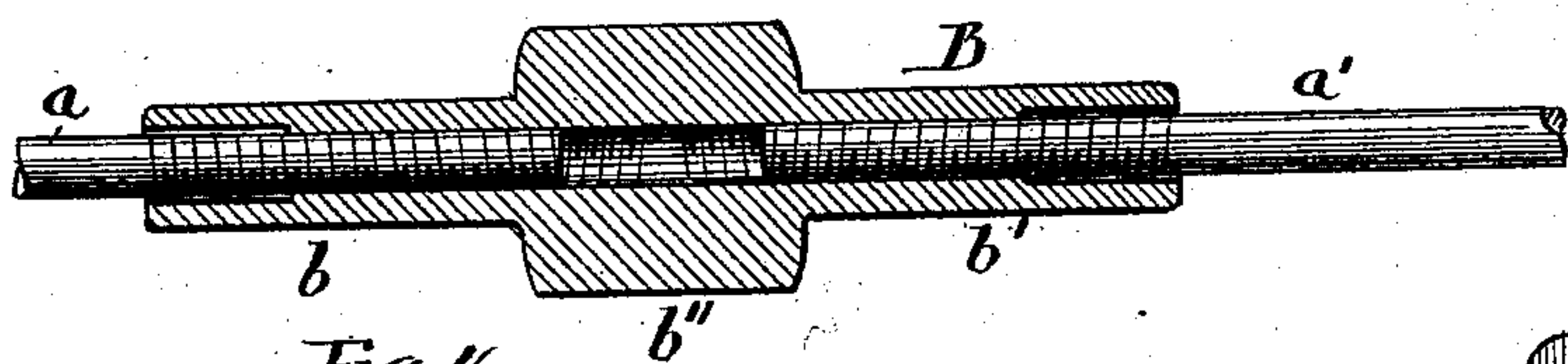


Fig. 4.

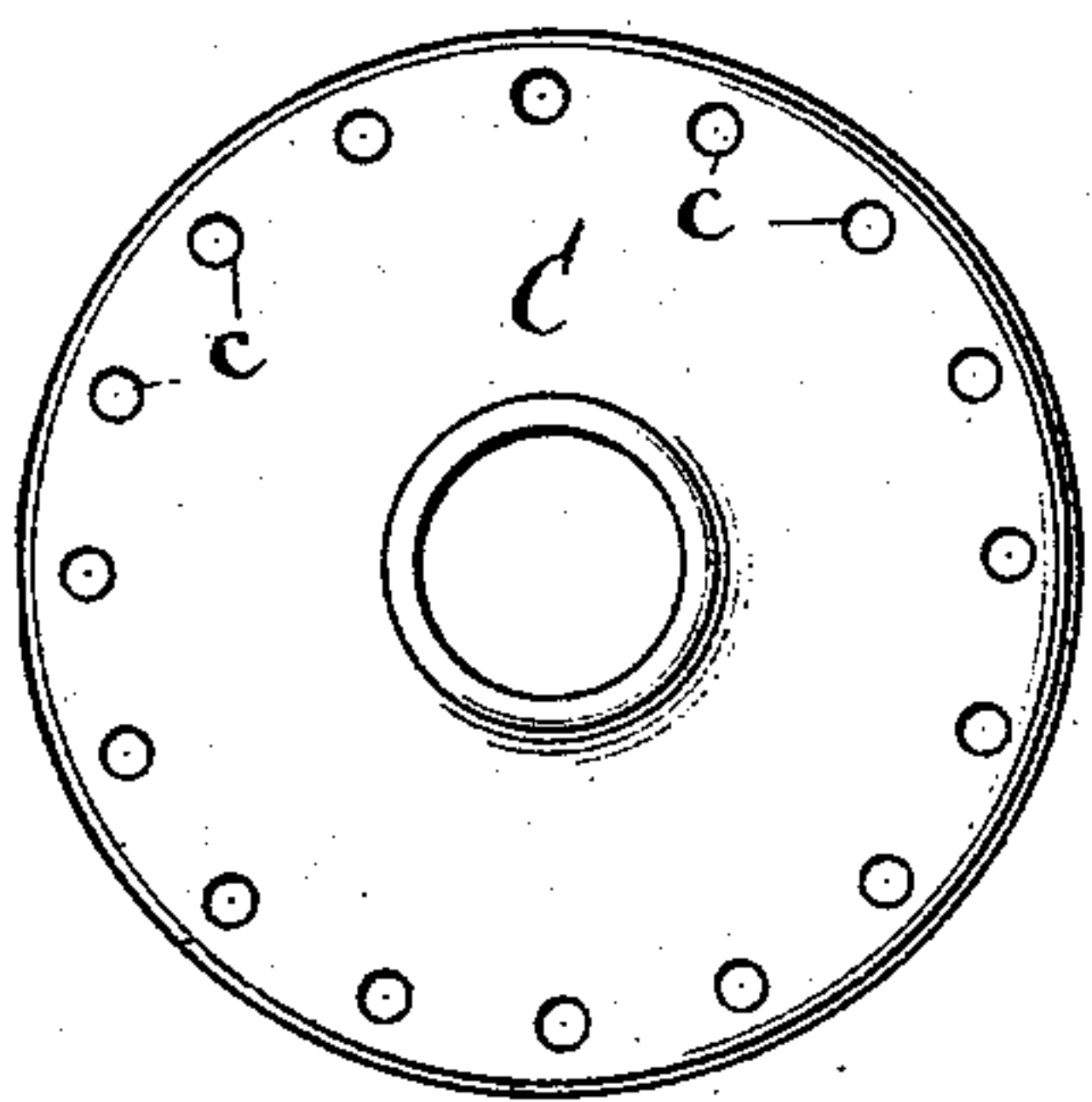


Fig. 5.

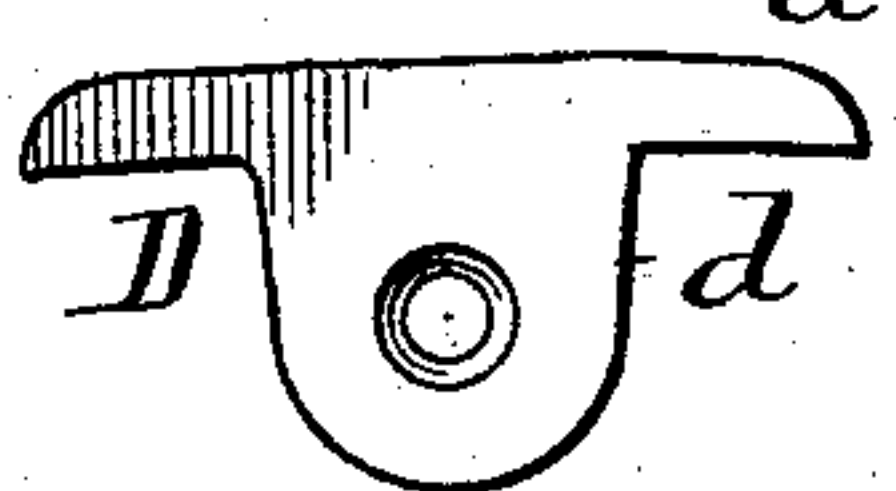
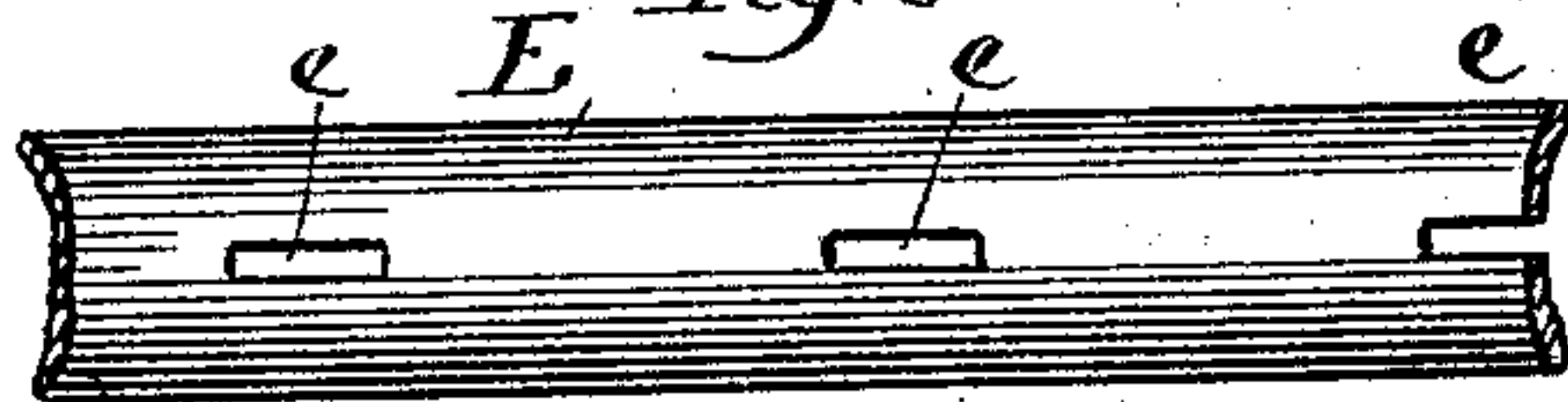


Fig. 6.



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# UNITED STATES PATENT OFFICE.

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## WHEEL.

SPECIFICATION forming part of Letters Patent No. 455,426, dated July 7, 1891.

Application filed February 26, 1891. Serial No. 382,991. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY C. GOODRICH, a citizen of the United States, residing at the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Wheels; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable other skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, forming a part hereof, in which—

Figure 1 is a side elevation of the wheel; Fig. 2, a sectional elevation of the wheel; Fig. 3, a detail in section showing the connection for the divided spokes; Fig. 4, a face view of the disk for the hub; Fig. 5, a detail showing the connection for the rim end of the spoke; Fig. 6, a detail showing the construction of the wheel-rim. Figs. 3, 4, 5, and 6 are enlarged as compared with Figs. 1 and 2.

This invention is primarily designed for use in the construction of bicycle-wheels, but can be used in the construction of other wheels using a light wire spoke.

It has been found in practice that light wire spokes are liable to be broken, and when broken it is exceedingly difficult to replace such spokes when made of a continuous piece, and to obviate this objection divided spokes have been devised, and it is to this special form of spoke that the present invention relates.

The object of the invention is to furnish a ready attachment of the spokes to the hub and a ready attachment of the spokes to the rim, and have such attachment form a strong wheel, and capable of resisting the strain of the spokes when tightened; and the invention consists in the several parts and combination of parts hereinafter described, and pointed out in the claims as new.

In the drawings, A represents the spoke, each spoke consisting of a section *a* and a section *a'*, forming a divided spoke, and these spokes are made of light steel wire or other material.

B is a turn-buckle, having an end *b*, with a screw-threaded socket or hole to receive the end of the section *a* of the spoke and having an end *b'* with a screw-threaded socket or

hole to receive the end of the section *a'* of the spoke, and the holes of the ends *b* and *b'* are right and left hand screw-threaded, with the spoke ends correspondingly screw-threaded. The center of the turn-buckle B has a hexagonal flange *b''* to receive a wrench or other device by means of which the turn-buckle can be turned to draw the sections *a* and *a'* of the spoke together.

C are disks, one for each end of the wheel-hub, and each disk has a series of holes *c*, each hole receiving a hub end *c'* of a spoke, which end is headed or otherwise formed to prevent it from being withdrawn from the hole.

D is a head formed of a plate or base *d'* and an ear *d*, projecting down from the plate, and the under face of the plate or base *d'* has a face conforming to the face of the rim with which the head is used. As shown, the bearing-face of the base or plate *d'* has a circular form to fit the concave face of the rim of the wheel shown. Each ear *d* has a hole to receive the rim end *d''* of a spoke, and this end of the spoke is headed or otherwise formed, so as not to be withdrawn from the ear *d* in use.

E is the rim of a wheel, the rim shown being one designed for a bicycle-wheel, for which purpose it has an outer concave face. This rim is provided with a series of slots *e*, corresponding in number to the number of spokes used in the wheel, and each slot *e* receives an ear *d* of a head D, so that such ears will project beyond the inner face of the rim, as shown in Figs. 1 and 2.

F is a rubber tire secured to the rim E in the usual manner of securing rubber tires, and this tire comes in contact with the base or plate of the heads D, and furnishes the means for holding the heads securely in place on the rim.

G is the hub of the wheel, which hub, as shown, at each end has an enlarged band *g*, onto which the disks C are slipped and firmly secured, and, as shown, each disk C has an outwardly-projecting rim *f* at the center, which rims finish the ends of the hub.

The spokes are secured in place to the hub and rim by inserting the inner sections *a'* of the several spokes in the holes therefor of



the disks C, which can be done by inserting the ends of the spokes and then turning or heading them for the end or head  $c'$  to engage with the rims E. The heads D are inserted in the slots  $e$  of the rim E for the ears  $d$  to lie inside of the rim E, and the ends of the spoke-sections  $a$  are inserted in the holes in the ears  $d$  and then turned or headed for the end or head  $d''$  to engage the ears. The turn-buckle B, attached to the sections of each spoke by entering the ends of the sections into the screw-threaded holes therefor in the turn-buckle, is then turned, drawing each spoke to its proper tension. The rubber tire is then placed on the rim in the usual manner, locking the heads D against end play, when the spokes are drawn to the required tension by means of the turn-buckles, and the wheel is ready for use.

A broken spoke is easily replaced without taking down the wheel, to do which all that is necessary is to detach the turn-buckle, remove the sections of the broken spoke from the rim C and the head D, attach new spoke-sections to the turn-buckle, insert the section  $a$  of the new spoke in the ear  $d$ , and insert the section  $a'$  of the new spoke in the rim C, rotate the turn-buckle, and draw the spoke taut. It will thus be seen that repairs of broken spokes can be readily made by an unskilled person by simply obtaining a new spoke, placing the sections in their proper position, and drawing the spoke taut with the turn-buckle, and this can be done without removing the rim or the hub or any part of the wheel except the broken spoke.

It is also evident that either end of the spoke when broken can have that end alone replaced by simply removing the section or end that is broken and inserting a new section or end in place thereof, and with this mode of repairing the unbroken end or section of the spoke can be used with the new end or section, thus saving in the cost of repairing one end or section, and for the purpose of thus repairing the spoke, sections for a wheel of a given size are to be made, each section a duplicate of the other, so that one section when broken can be replaced by a new section.

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

1. The combination, with a wheel-rim having a series of locking-holes therein, of a series of heads, each formed of a bearing-plate, and a projecting ear having a locking-face and each head interlocked with the wheel-rim by inserting the ear through a locking-

hole of the rim for the locking-faces of the hole and ear to engage, and the bearing-plate of the head to engage the face of the wheel-rim for attachment of a spoke end against turning, substantially as and for the purposes specified.

2. The combination, in a wheel, of disks attached to the hub and each having a series of holes receiving the ends of the spokes and locking the spokes against turning, a wheel-rim having a series of locking-heads therein, a series of heads, each formed of a bearing-plate, and a projecting ear having a locking-face, each head interlocked with the rim by inserting the ear through a locking-hole of the rim for the locking-faces of the hole and ear to engage, and the bearing-plate to engage the face of the wheel-rim and have the ear of each head project through the rim to receive and lock the spoke end and hold the spoke against turning, substantially as and for the purposes specified.

3. The spokes A, formed of two sections  $a$  and  $a'$ , and the turn-buckle B, uniting the spoke-sections, in combination with the disks C, each having a series of holes  $c$ , in which the spoke ends of the sections  $a'$  are locked, the heads D, each formed of an ear  $d$ , with a locking-face, and a bearing-plate  $d'$ , and a rim E, having slots  $e$ , with a locking-face, through which the ears  $d$  project and interlock for the ears to receive the spoke ends of the sections  $a'$  and lock the sections  $a'$  against turning, substantially as and for the purposes specified.

4. The spokes A, formed of two sections  $a$  and  $a'$ , and turn-buckle B, uniting the spoke-sections, in combination with the hub-disks C, each having a series of holes to receive the ends of the spoke-sections  $a'$  and lock the spoke-sections against turning, the heads D, each formed of an ear  $d$ , with a locking-face and a hole to receive a spoke end, and a bearing-plate  $d'$  to engage the wheel-rim, a wheel-rim having the slots  $e$ , each with a locking-face, and through which the ears  $d$  project and interlock by the engagement of the locking-face of the ear with the locking-face of the slot for the ear to receive the end of the spoke-section  $a'$  and lock the spoke-section against turning, and a rubber tire F, engaging the bearing-plate  $d'$  and locking the heads D in position, substantially as and for the purposes specified.

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Witnesses:

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