

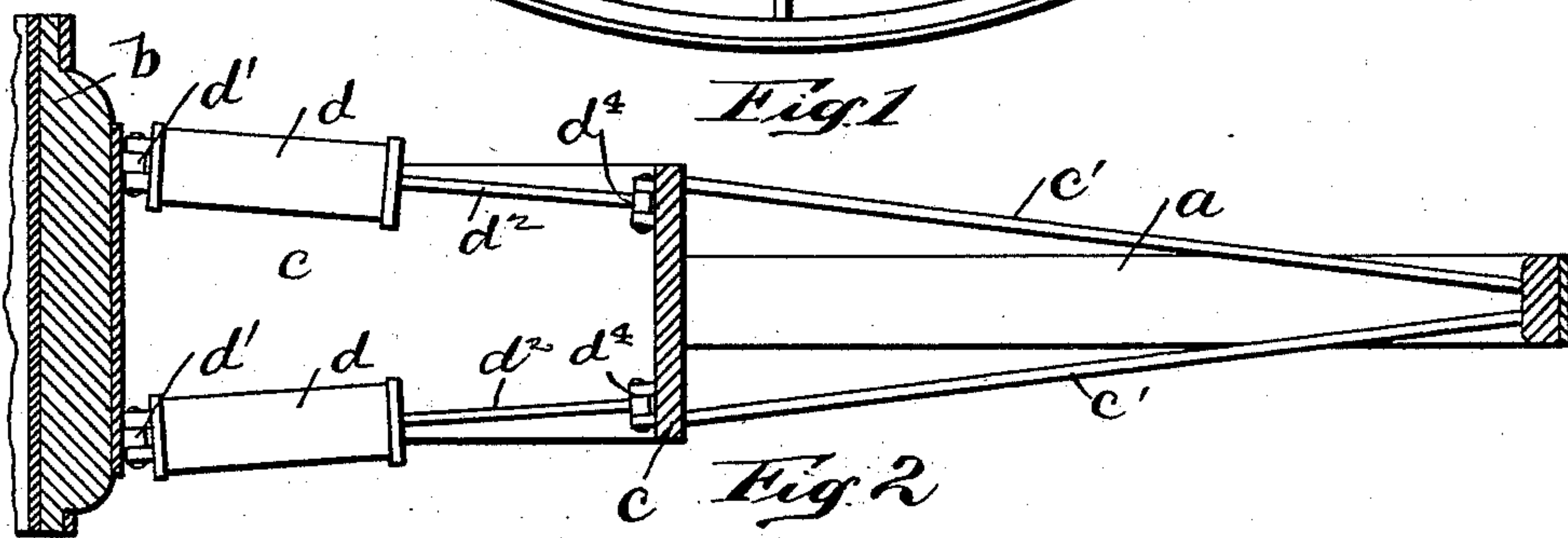
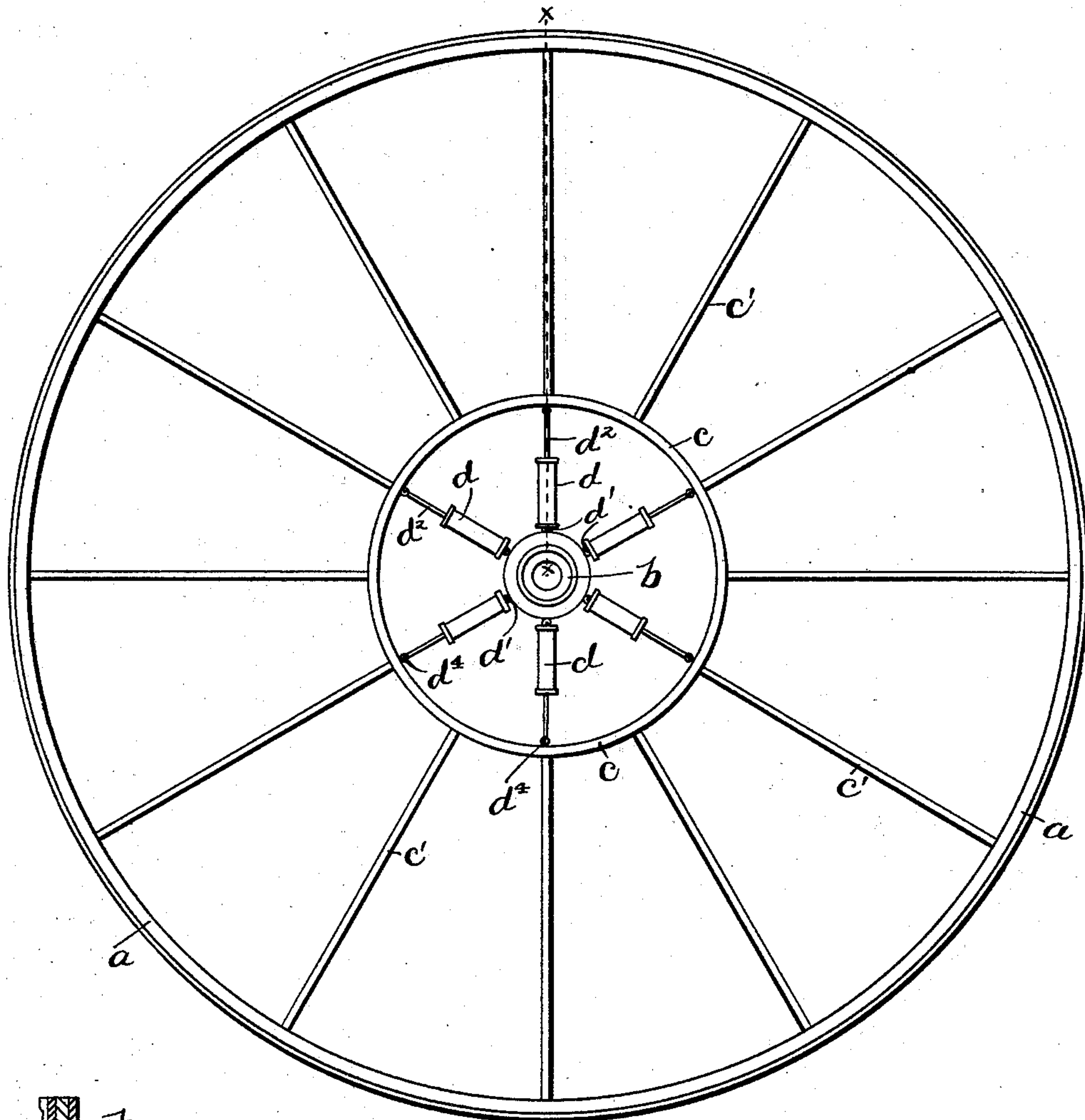
(No Model.)

2 Sheets—Sheet 1.

S. GARWOOD.  
WHEEL.

No. 525,011.

Patented Aug. 28, 1894.



WITNESSES:

*H. B. Bradshaw*  
*A. I. Phelps*

INVENTOR

*Spencer Garwood*

BY

*Staley and Shepherd*  
ATTORNEYS.

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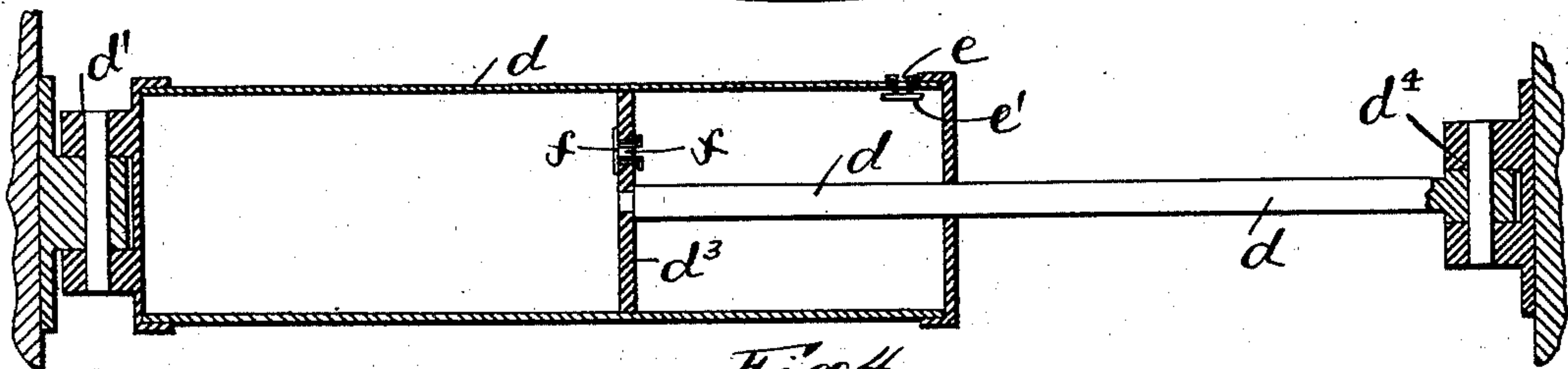
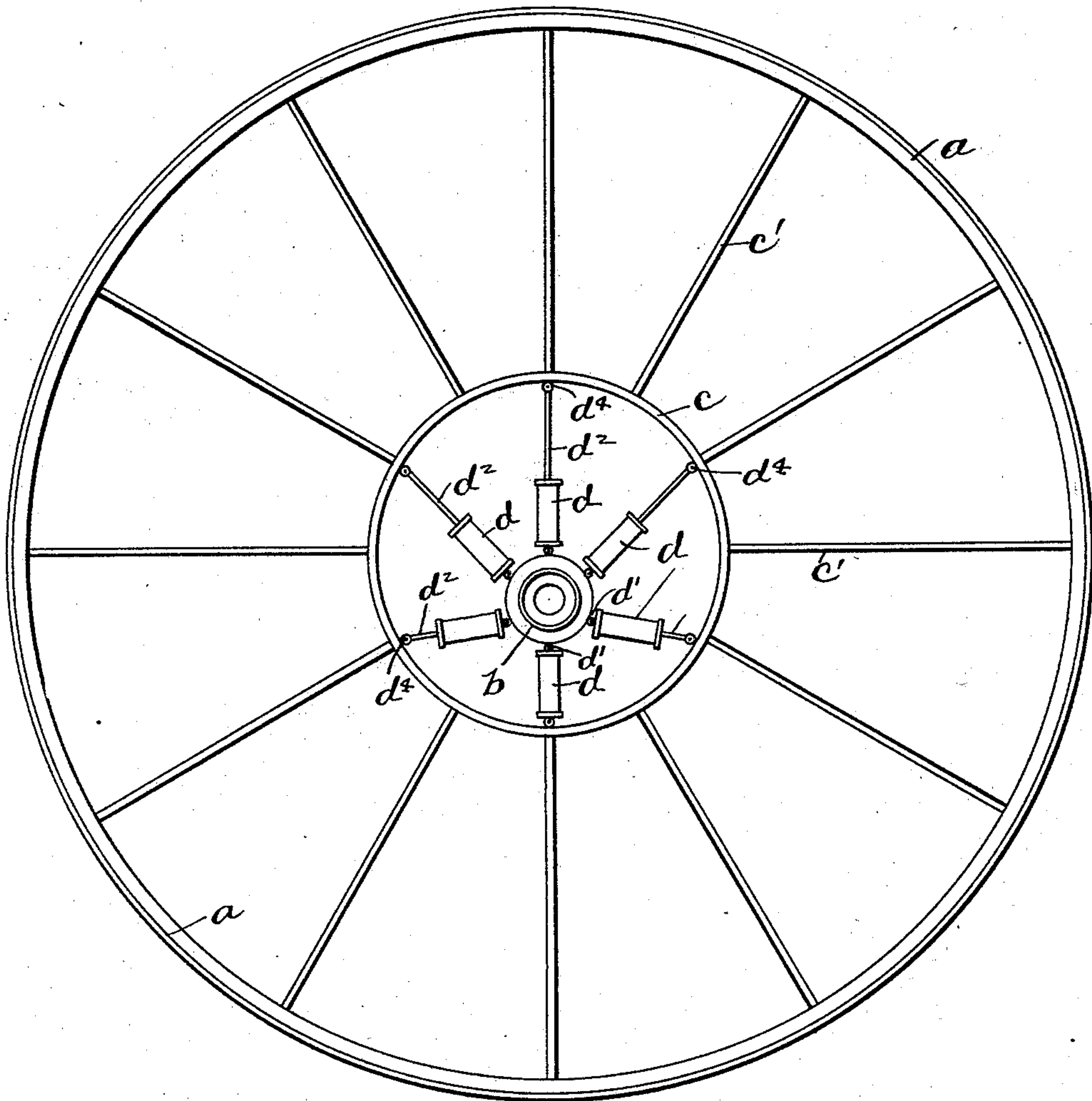
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*Fig. 3*



*Fig. 4*

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# UNITED STATES PATENT OFFICE.

SPENCER GARWOOD, OF MILFORD CENTRE, OHIO.

## WHEEL.

SPECIFICATION forming part of Letters Patent No. 525,011, dated August 28, 1894.

Application filed December 11, 1893. Serial No. 493,303. (No model.)

*To all whom it may concern:*

Be it known that I, SPENCER GARWOOD, a citizen of the United States, residing at Milford Centre, in the county of Union and State of Ohio, have invented a certain new and useful Improvement in Wheels, of which the following is a specification.

My invention relates to the improvement of wheels and the objects of my invention are to provide an improved resilient connection between the hub and felly of the wheel and therefore attain the effect substantially of pneumatic spokes and to produce improvements in the details of construction which will be more specifically pointed out hereinafter. These objects I attain in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation of my improved wheel as the same appears when running. Fig. 2 is an enlarged detail sectional view on line  $x x$  of Fig. 1, from which is omitted for the sake of clearness the intermediate spokes which would appear in rear of the parts shown. Fig. 3 is a side elevation of my improved wheel, showing the same as it appears before rotation and Fig. 4 is an enlarged sectional view in detail of one of the intermediate spokes.

Similar letters refer to similar parts throughout the several views.

$a$  represents a wheel felly within which and surrounding the usual hub  $b$  at a distance therefrom is an intermediate felly or ring  $c$ . The fellies  $a$  and  $c$  are connected by the usual radial spokes  $c'$ , which may be of any desired material.

$d$  represent small air pump cylinders the inner closed ends of which are, as indicated at  $d'$ , hinged or jointedly connected at equidistant points to the periphery of the hub near opposite ends thereof. These cylinders  $d$  have working therein through their outer ends piston rods  $d^2$ , each of the latter carrying a piston head  $d^3$  on its inner end within said cylinder and having its outer end hinged or jointedly connected at  $d^4$  with the intermediate felly or band  $c$ , the latter connections being formed preferably near the edges of said bands and at equidistant points thereon. It will thus be seen that said pump cylinders

together with their pistons form substantially inner spokes which radiate from the hub.

Although other ordinary forms of air pumps might be employed without altering the principle of my invention, I preferably employ a valve opening  $e$  in the outer end portion of each of the cylinders  $d$  which is adapted to be closed by air pressure upon a suitable closing valve  $e'$  on the inner side of said opening. I also employ a similar valve opening  $f$  in the piston  $d^3$ , the inner end of which is adapted to be closed by a valve  $f'$  through pressure of air contained between said piston and the inner end of the cylinder. It is evident, however, that the arrangement of these valves might be varied without affecting the operation of my invention.

Assuming that my improved wheel is adapted for use as a vehicle wheel, although the same may be employed for other purposes, it is evident that before rotation and before an equal amount of air became compressed within the inner portions of the cylinders, the hub would be below the center of the wheel, as indicated in Fig. 3 of the drawings. It is evident that this eccentric arrangement of the hub is due to the fact that there is not sufficient volume of air in the inner portions of the lower cylinders to resist such pressure of the piston heads as may be caused by the downward pressure or weight of the axle upon which the wheel is mounted. However, at each revolution of the wheel, it is evident that the air which enters through the valve opening  $e$  and valve opening  $f$  must gradually become compressed within the inner portions of the pump cylinders and that a continued revolution of the wheel must result in the volumes of compressed air within said cylinders becoming equalized, thus causing the air therein to offer a uniform resistance to the piston heads and resulting in the hub becoming centered, as indicated in Fig. 1 of the drawings. A cushion of air being thus afforded each of the piston heads, it is evident that any jolt or jar to which the outer felly of the wheel may be subjected will be taken up by the cushions thus formed, and any pressure already communicated to the axle or shaft upon which the hub is mounted.

From this construction it will be seen that



the necessity of employing a pneumatic tire for vehicle wheels is entirely obviated and that the results ordinarily attained by pneumatic tires are by my invention accomplished  
5 without the danger of puncture and by means which are positive in their action and which will not readily get out of working order.

It will be observed that the construction of my improved wheel is such as to render the  
10 same inexpensive and neat in appearance.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a wheel the combination with a felly  
15 or band and a hub therein, of radially arranged air pumps, the pistons of said pumps having jointed connections with said felly or

band, and the pump cylinders having direct jointed connections with said hub substantially as and for the purposes specified. 20

2. In a wheel the combination with the outer rim or felly *a*, an inner ring or band *c*, and radial spokes *c'* connecting said outer felly and inner band; of a hub *b* within said band, and radially arranged air pumps between  
25 said hub and band, the cylinders and pistons, said pumps being jointly connected respectively with said hub and band, substantially as and for the purpose specified.

SPENCER GARWOOD.

In presence of—

CHAS. H. ERB,  
JOHN MCCLUY.