

R. & G. H. WELFORD.
 SPRING WHEEL.
 APPLICATION FILED DEC. 29, 1908.

972,136.
 FIG 1

Patented Oct. 4, 1910.
 2 SHEETS-SHEET 1.

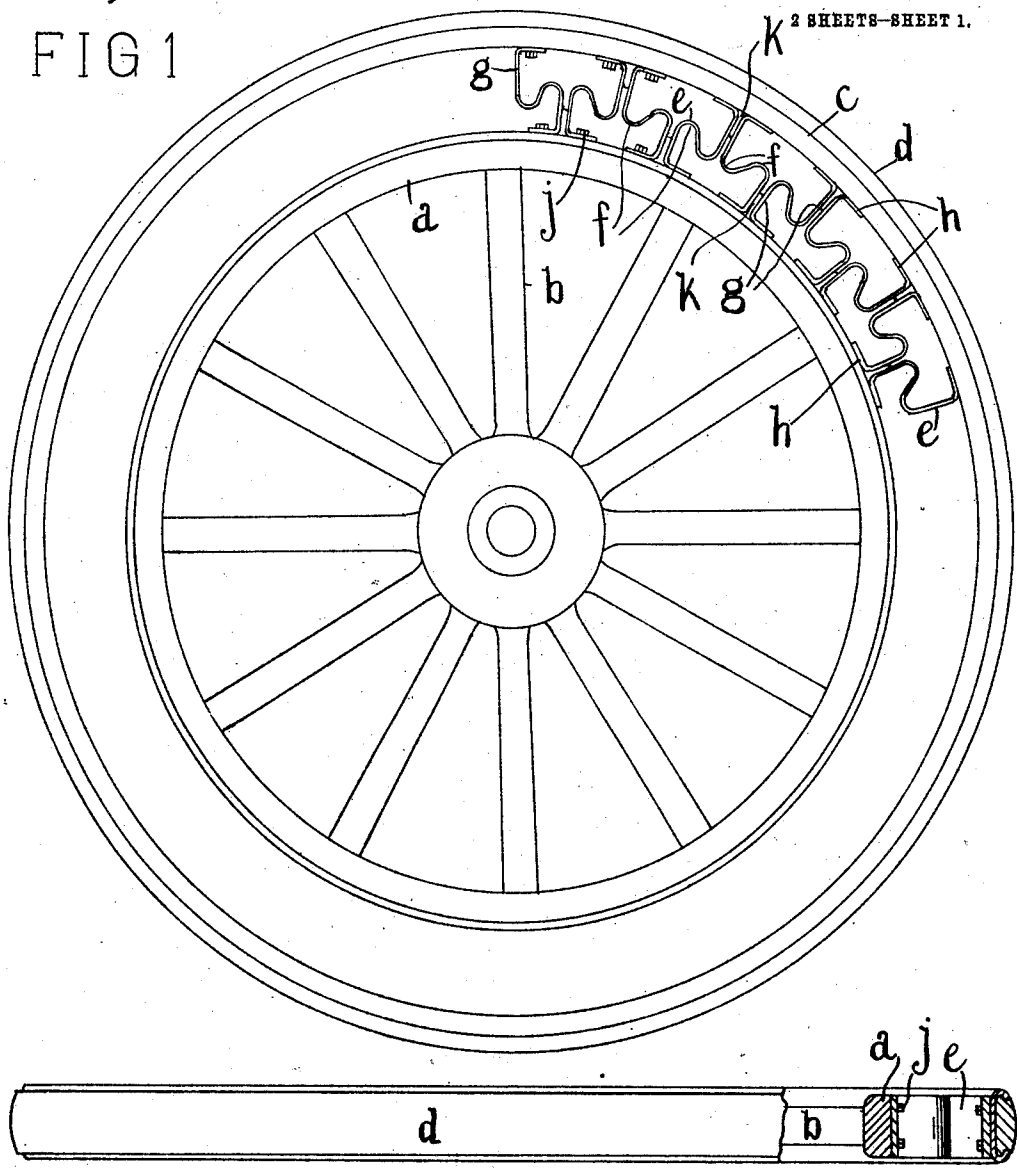


FIG 2

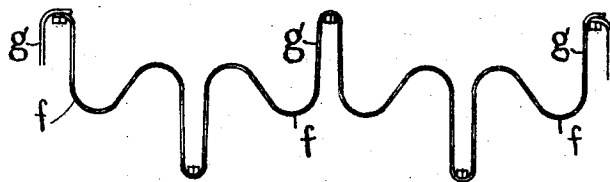
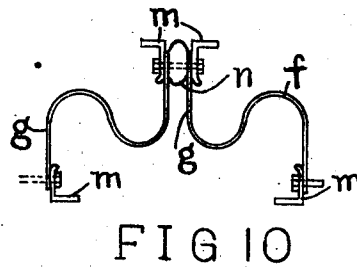
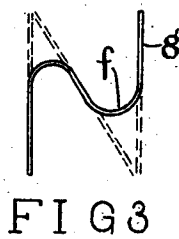
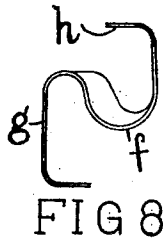
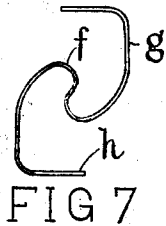
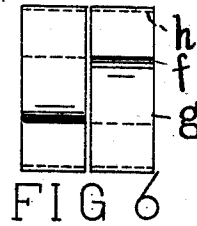
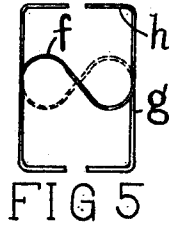
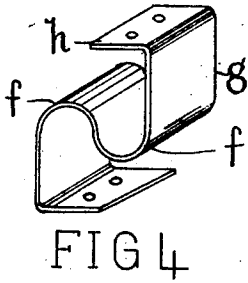
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 2 SHEETS—SHEET 2.

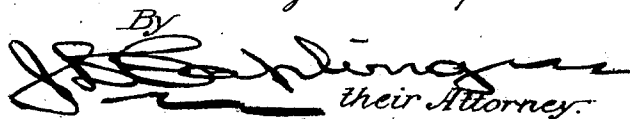


Witnesses

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UNITED STATES PATENT OFFICE.

ROBERT WELFORD AND GEORGE HENRY WELFORD, OF NORTH HYLTON, ENGLAND.

SPRING-WHEEL.

972,136.

Specification of Letters Patent.

Patented Oct. 4, 1910.

Application filed December 29, 1908. Serial No. 469,831.

To all whom it may concern:

Be it known that we, ROBERT WELFORD and GEORGE HENRY WELFORD, both subjects of the King of Great Britain, residing at North Hylton, Durham, England, have invented new and useful Improvements in Spring-Wheels, of which the following is a specification.

This invention relates to spring wheels of the kind wherein springs formed with two opposite bends having prolonged or extended portions or ends are interposed and act between inner and outer concentric rims or the like, said prolonged or extended portions or ends being adapted for attachment at their extremities to the inner and outer rims or the like in such manner that under ordinary tension, compression or flexure of any kind no working part or parts of the springs touch or come into contact with either the inner or outer rims or the like or each other.

The invention has for its object to provide an improved form or arrangement of springs for such wheels.

According to this invention we employ springs more or less approximately in form to the shape of the letter **N** with the corners or junctions between the diagonal member and the side members curved or rounded and forming two oppositely disposed working bends, said side members being disposed radially of the wheel and being adapted for attachment at their extremities to the inner and outer rims or the like respectively in such a manner that, when under ordinary tension, compression or flexure, no working part or parts of the springs touch or come into contact with either the inner or outer rims of the like or each other.

We will fully describe our invention with reference to the accompanying drawings wherein—

Figure 1 is an elevation of one form of spring wheel made in accordance therewith, and Fig. 2 is a plan of Fig. 1 partly in section. Fig. 3 is a diagrammatic view showing our special form of spring, and Fig. 4 is a perspective view of one of said springs. Fig. 5 is an elevation showing a modified arrangement of the springs, and Fig. 6 is an end view of same. Figs. 7, 8 and 9 are elevations of modifications of our special form of spring, and Fig. 10 and Fig. 11 are developed or diagrammatic elevations of modified arrangements of springs.

Referring to Figs. 1 and 2 of the draw-

ings, in a spring wheel made in accordance with this form of our invention we employ an inner rim or felly *a* carried by the spokes *b*, and an outer rim *c* provided with a tire *d*, outer rim *c* being connected to the inner rim *a* by springs *e* in the form hereinafter referred to.

The springs *e*, shown best in Figs. 3 and 4, are made of flat section steel or other suitable material and more or less approximate in form to the shape of the letter **N** with the corners or junctions between the diagonal member and the lateral members rounded or curved, or, in other words, the springs are formed with two opposite bends *f, f* and parallel or approximately parallel side members *g, g*. The springs are arranged between the inner and outer rims *a* and *c* so that the bends *f f* are disposed circumferentially and the side members *g g* are disposed more or less radially of the wheel, and the extremities of the said members *g g*, are attached to the inner and outer rims, the effect being that the tension, compression or flexure is localized about bends *f, f*, the radially disposed side members *g g* suitably resisting distortion and retaining their radial disposition. It will thus be seen that no working part or parts of the spring other than the extremities or points of attachment touch or come into contact with either the inner or outer rims or with each other. Conveniently the radial side members *g g* may be provided with flanged extremities *h h* for attachment to the inner or outer rims *a* and *c* by set screws *j*, Fig. 1.

The springs *e* may be arranged in opposite directions as shown in Fig. 1, or they may be arranged in two or more planes or rows in which case the adjacent springs of each pair of rows are preferably arranged in opposite directions as shown in Figs. 5 and 6.

Rubber or other suitable material *k* (Fig. 1) may be fitted between the pairs of radial side members *g g*. In some cases the radial side members *g g* may be curved near the bends *f, f* as shown in Fig. 7 or the springs may be coiled or twisted between said radial side members *g g* as shown in Fig. 8, or they may be formed in two parts connected or fitted together as shown in Fig. 9, or otherwise.

Instead of the radial side members *g g* being provided with flanged extremities for direct attachment to the inner and outer

rim, they may be attached thereto by brackets *m*, Fig. 10, suitable washers or distance pieces *n* being interposed between the pairs of radial side members *g g*.

5 Two or more springs may be formed out of a single piece or strip of material as shown in Fig. 11, the distinctive configuration of each spring being maintained and they may be secured to the inner and outer
10 rims by set screws as shown in said figure or as shown in Fig. 10, or in any other suitable fashion.

We declare that what we claim is:—

1. In a spring wheel an inner rim or felly,
15 an outer rim, and springs secured to both said felly and said outer rim said springs being approximately in the shape of the letter **N** with the corners rounded on and the side members disposed approximately
20 radially of the wheel.

2. In a spring wheel an inner rim or felly, an outer rim a plurality of springs of flat steel sections approximately the shape of the letter **N** with the angles rounded off all fac-

ing one direction and a plurality of springs 25 similar in shape to said first plurality of springs arranged alternately with the springs of said first plurality between said inner rim and said felly and facing in the opposite direction to the springs of said first plurality 30 of springs.

3. In a spring wheel an inner rim or felly, an outer rim, springs of approximately **N** shape with the angles rounded off said springs being arranged alternately facing in 35 different directions between said felly and said inner rim, means for securing the side members of each said springs one to the felly and the other to the outer rim and buffer devices between adjacent springs. 40

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ROBERT WELFORD.

GEORGE HENRY WELFORD.

Witnesses:

JOHN TAYLOR,

J. STANLEY TAYLOR.