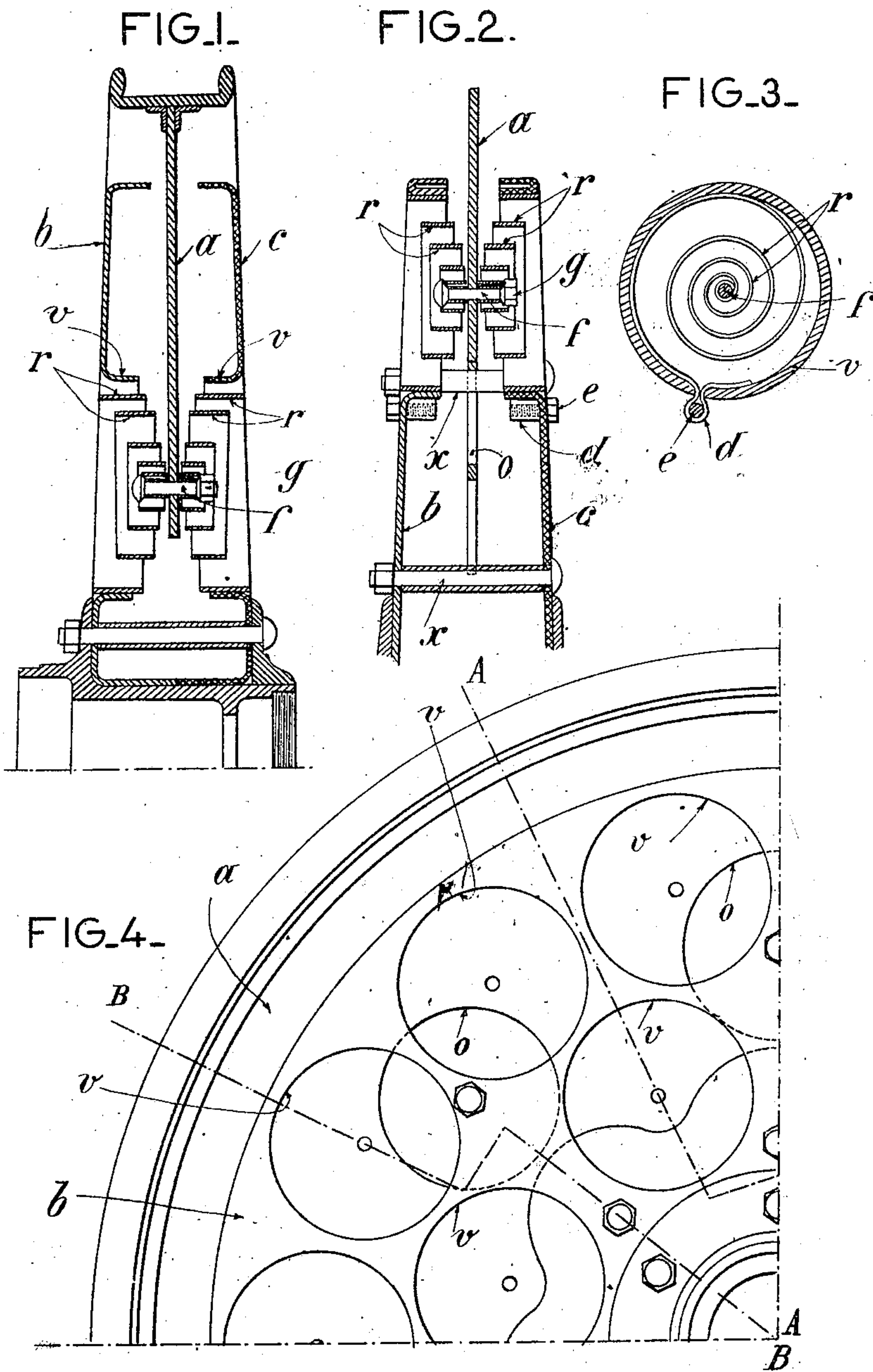


No. 846,938.

PATENTED MAR. 12, 1907.

L. A. NOËL.
SPRING WHEEL.

APPLICATION FILED JULY 30, 1906.



Witnesses:

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LOUIS ANDRÉ NOËL, OF PARIS, FRANCE.

SPRING-WHEEL.

No. 846,938.

Specification of Letters Patent.

Patented March 12, 1907.

Application filed July 30, 1906. Serial No. 328,399.

To all whom it may concern:

Be it known that I, LOUIS ANDRÉ NOËL, civil engineer, a citizen of France, residing at 52 Boulevard Haussmann, Paris, France, have invented new and useful Improvements in Spring-Wheels, of which the following is a specification.

This invention relates to a spring-wheel of uniform resiliency, the characteristic feature of which consists in the application of spiral springs all arranged to work constantly and simultaneously in all directions and on all the coils, whatever be the point of the felly which receives a shock or impact.

The wheels consist of a felly-plate moving between two plates solid with the hub, between which are disposed spiral springs on which the felly works, and the distinguishing feature is that the springs are placed outside of the felly-plate in housings or pockets suitably formed in the plates solid with the hub and that the inner ends of these springs are solid with axles fixed on the felly-plate and which project from each side of this plate.

Another important feature of the invention is that the felly-plate does not touch the side plates and may, on the contrary, be inclined laterally in all directions without affecting its movement parallel to the said plates.

The spring connection between the side plates and the felly-plate is insured by conical spiral springs of such kind that the lateral stresses will force the springs to play in the direction of the thickness of the wheels, some working in compression, those in front in tension, and all exercising more or less torsion.

With such a construction the felly-plate is extremely light, the springs being outside this plate, and its inertia is very slight, which increases its sensitivity, and therefore the elasticity of the wheel. On the other hand, the springs bear constantly at their outer coil in the recesses in the side plates, and as they have their inner coil solid with the axles carried by the central plate or felly-plate it will be understood that these springs are forced to work constantly and simultaneously all at one time in all directions and on all the coils either under tension or compression or rolling strain and following all the radial directions into which they are brought by the movement of the felly-plate.

In the annexed drawing, Figures 1 and 2 are longitudinal sections of the wheel follow-

ing the broken lines A A and B B of Fig. 4. Fig. 3 is a detail showing the mounting of a spiral spring in its pocket; and Fig. 4 is a side elevation of a part of the wheel, the spiral springs being supposed removed.

The wheel comprises a central plate *a*, which carries the rim, and two side plates *b* and *c*, solid with the hub, rigidly connected together by adjustable cross-pins *x* and kept at a suitable distance apart to allow of play for the central plate *a*. The side plates *b* and *c* are formed with cylindrical housings or pockets *v* of variable number and distributed over the whole surface of the said plates. In these pockets are arranged the conical spiral springs *r*. The central plate *a* has fixed thereto, corresponding to the pockets *v*, axles or spindles *f*, which enter from each side the center of these pockets and on which axles are fixed the inner coils of the springs *r*. This attachment is generally made by making the inner coil in the form of a cylindrical tube which is engaged on the corresponding spindle *f*. Perforations *o* are formed in the plate *a* for the free passage of the hub and the cross-bolts *x* during the movement of the plate.

As seen in Figs. 1 and 2, the felly-plate *a* does not touch the side plates *b* and *c* and may, on the contrary, be inclined laterally in all directions without interfering with its movement parallel to the said plates.

The spring connection between the side plates and the felly-plate is insured, as already stated, by conical spiral springs *r*, lodged in the pockets *v*, formed in the side plates. These springs are preferably fixed by their outer coil to the wall of the pocket and by their inner coil to the central plate through the intermediary of a bolt. Each spring may be fixed to the wall of the pocket by means of a loop *d*, formed by the spring passing across an opening in the said wall and secured by a screw *e* or a bolt on the body of the corresponding plate *b* or *c*.

The mounting of the springs on the central plate is effected by means of the bolts *f* and nuts *g*, which will permit the simultaneous attachment of the springs in pairs on the said plate, the inner coil of one of the two springs being locked between the plate and the head of the bolt and the inner coil of the other spring being locked between the plate and the nut.

It will be understood that with this construction the radial and lateral stresses ap-

plied to the felly-plate act simultaneously on all the springs whose coils all work at the same time. In particular lateral stresses will force the springs to play in the direction of the thickness of the wheel, some working in compression, those in front working in tension, and all more or less exercising torsion.

An analogous result will be obtained by using flat spiral springs and by suitably lengthening the attachment-bolts which again connect the springs solidly with the central plate by means of the abutments carried by these bolts and against which the said springs will be locked. The lateral play of the springs would take place again either toward the interior or toward the exterior of their mid-position.

The spiral springs *r*, (shown in the drawing,) besides their conical formation, have another characteristic. They have been so formed that in doing work in radial direction the different coils offer practically the same resistance whatever the leverage of the stress transmitted by the bolts *b* to these coils and so that these coils in their elastic play can only come in contact along one of the radii all at the same time, which causes them to remain always in operation. This double result is obtained by constructing each spiral spring so that the blade which constitutes the same increases progressively in width and in thickness from the center of the spring to the circumference and so that the distance between the successive coils will likewise increase from the center to the circumference. Finally, the pockets in the plates *b* and *c* may be open on the outside or be closed by a diaphragm, preventing the access of dirt and dust.

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

1. A spring-wheel comprising in combination a central plate carrying the felly, two side plates solid with the hub and kept one from the other sufficiently apart not to touch the central plate, cylindrical housings or pockets formed in the side plates, axles or

spindles fixed to the central plate, conical spiral springs located within the housings or pockets and having their inner coil fixed to said axles or spindles, and means for keeping the two side plates at a suitable distance apart, substantially as described and for the purpose set forth.

2. A spring-wheel comprising in combination a central plate carrying the felly, two side plates solid with the hub and kept one from the other sufficiently apart not to touch the central plate, cylindrical housings or pockets formed in the side plates, axles or spindles fixed to the central plate, conical spiral springs located within the housings or pockets and having their inner coil fixed to said axles or spindles, loops formed at the outer coil of the springs adapted to be passed through openings in the wall of the housings or pockets and to be secured thereto by screws or bolts, and means for keeping the two side plates at a suitable distance apart, substantially as described and for the purpose set forth.

3. A spring-wheel comprising in combination a central plate carrying the felly, two side plates solid with the hub and kept one from the other sufficiently apart not to touch the central plate, cylindrical housings or pockets formed in the side plates, conical spiral springs located within the housings or pockets and so constructed that their blade increases progressively in width and in thickness from the center of the spring to the circumference, and that the distance between the successive coils will likewise increase from the center to the circumference, axles or spindles fixed to the central plate and on which are fixed the inner coils of the springs, and means for keeping the two side plates at a suitable distance apart, substantially as described and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS ANDRÉ NOËL.

Witnesses:

ANTOINE LAVOIX,
HANSON C. COXE.