

No. 846,951.

PATENTED MAR. 12, 1907.

A. S. F. ROBINSON.

SPRING WHEEL.

APPLICATION FILED JAN. 3, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

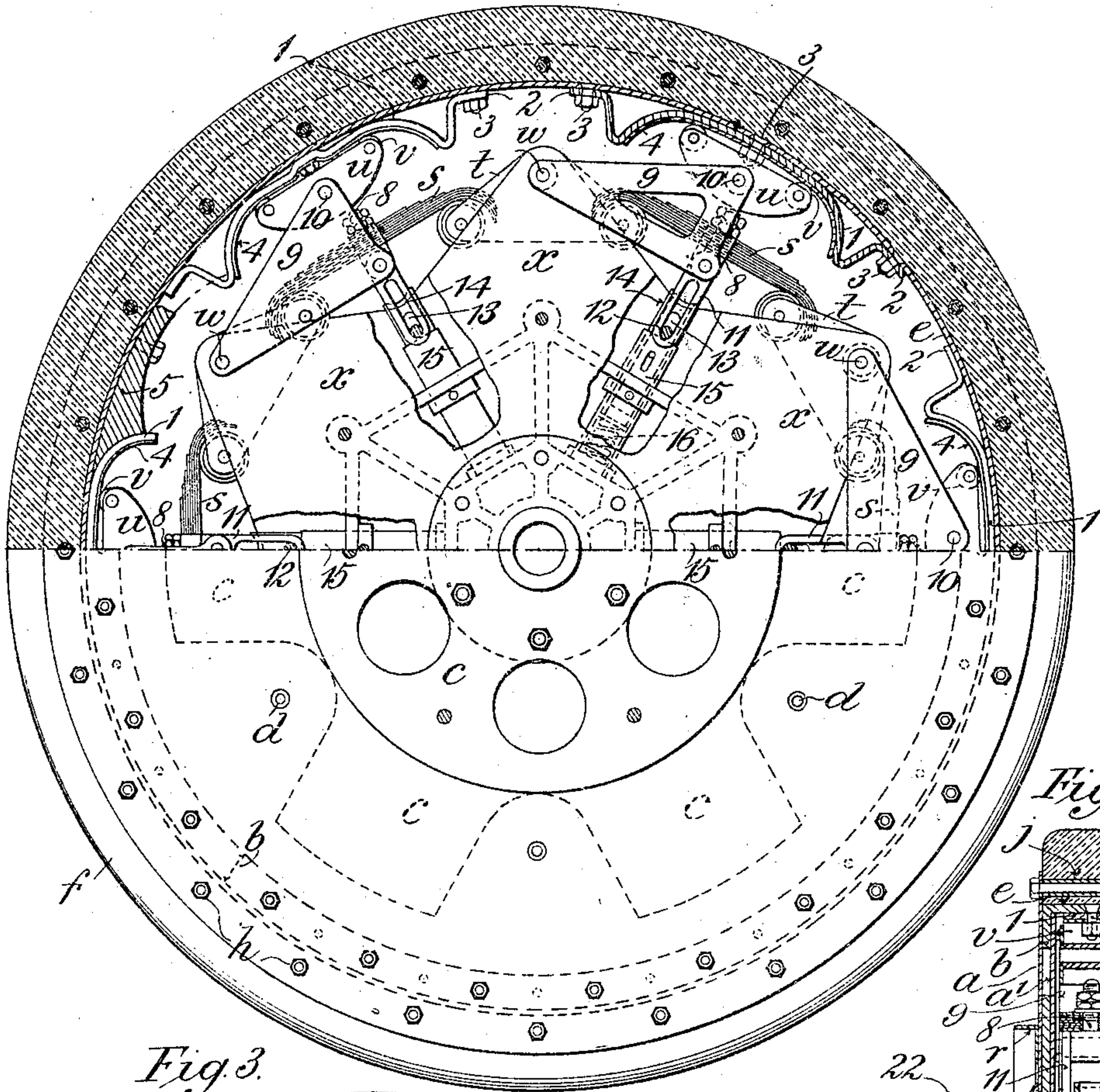


Fig. 3.

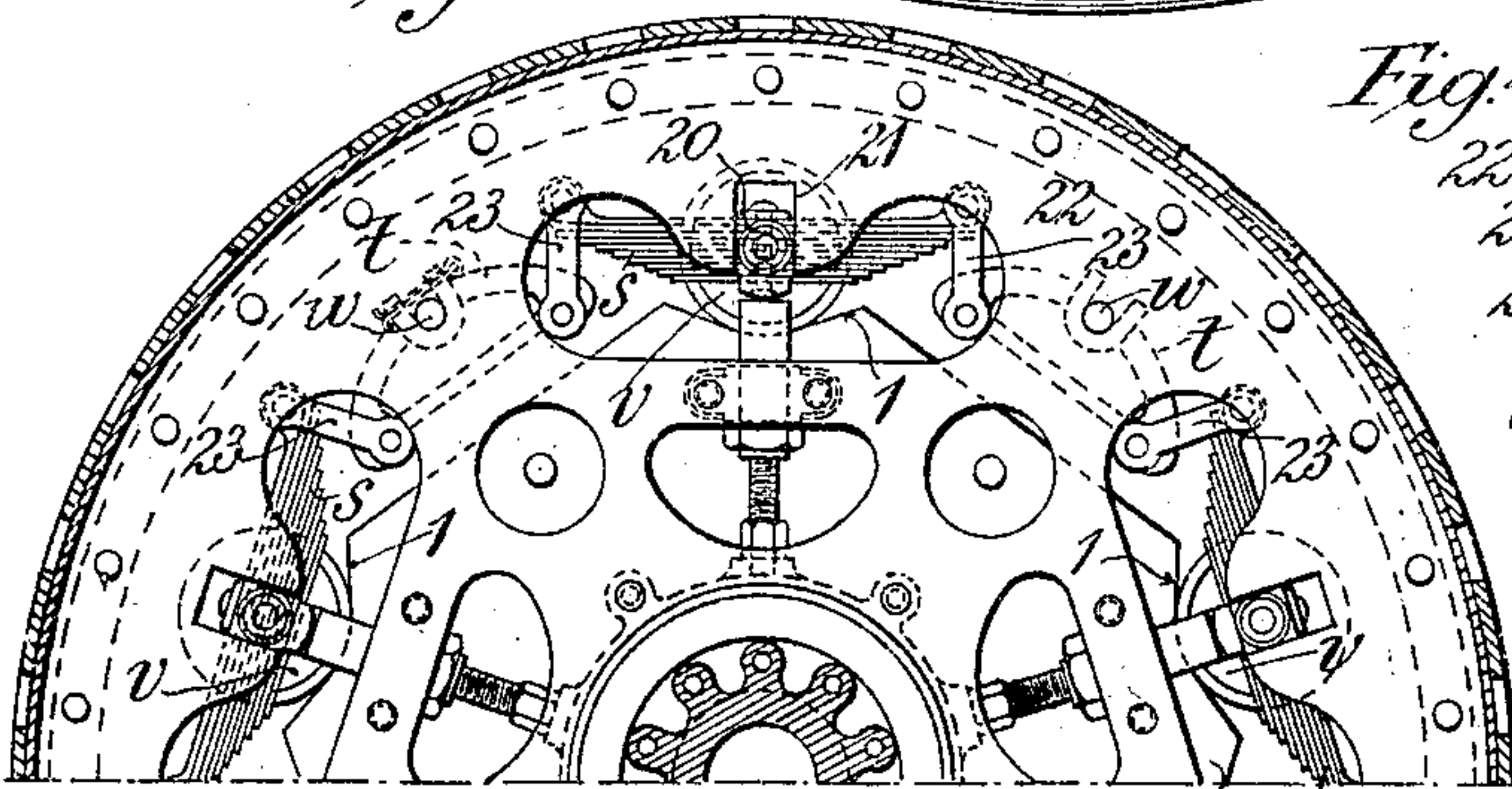


Fig. 4.

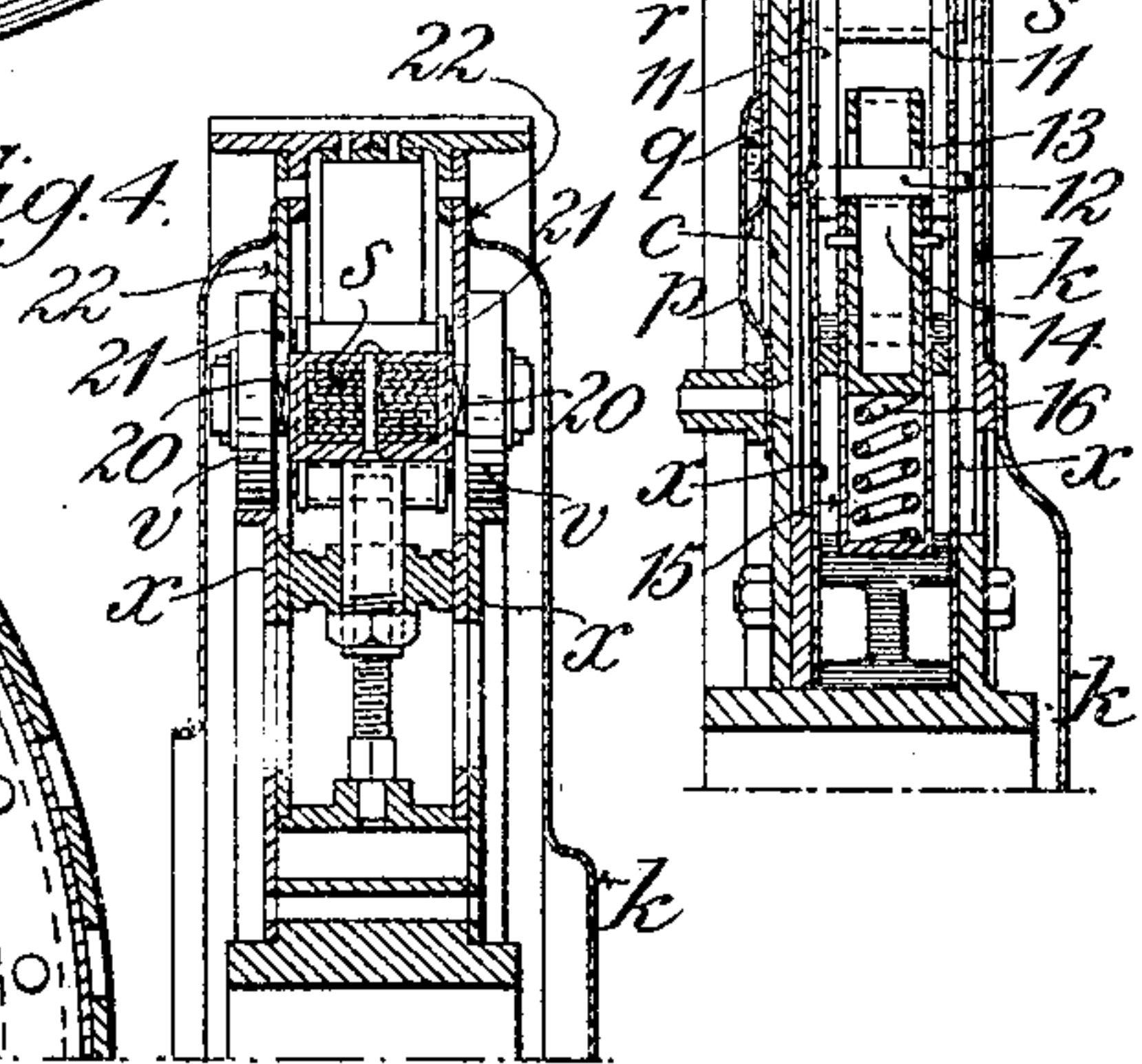
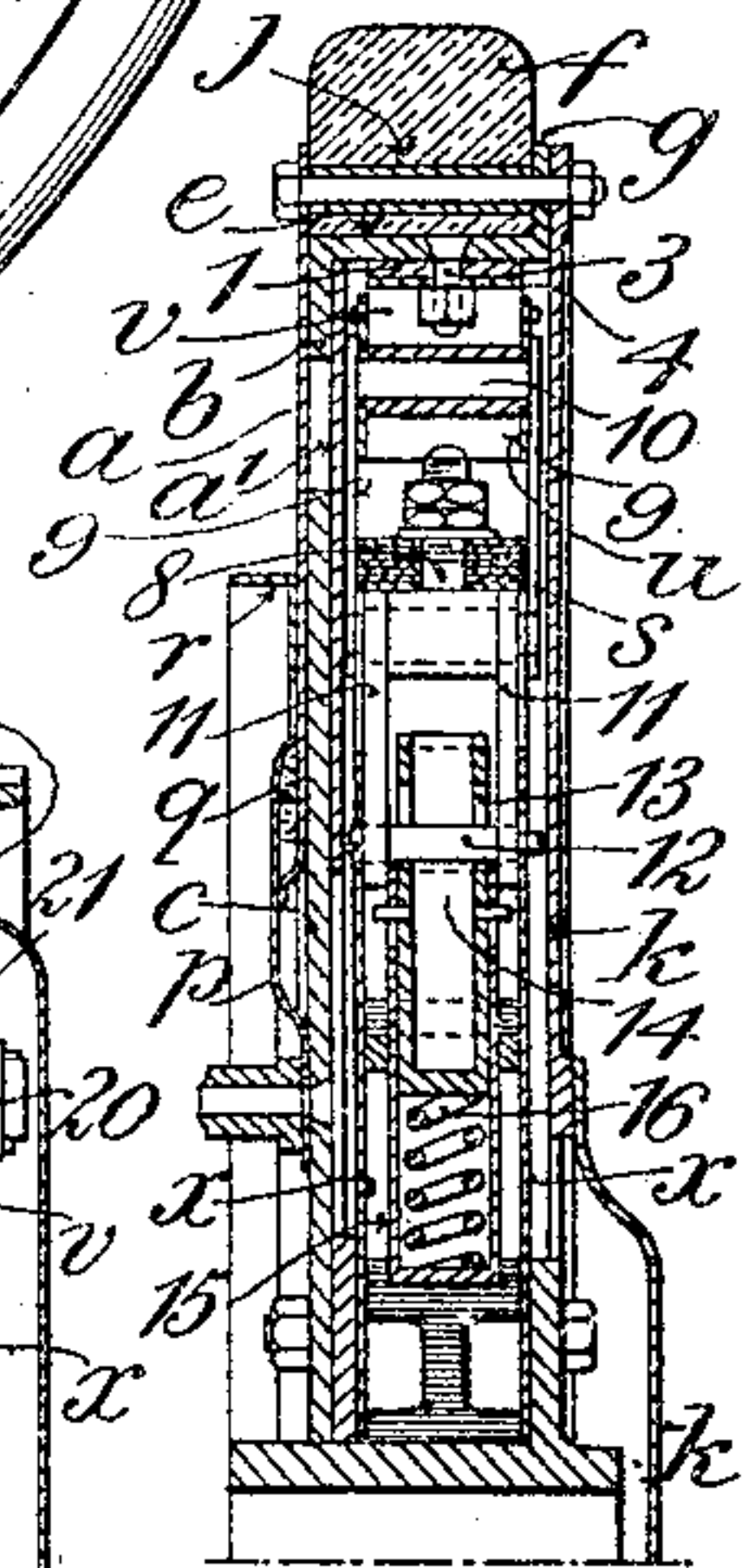


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 5.

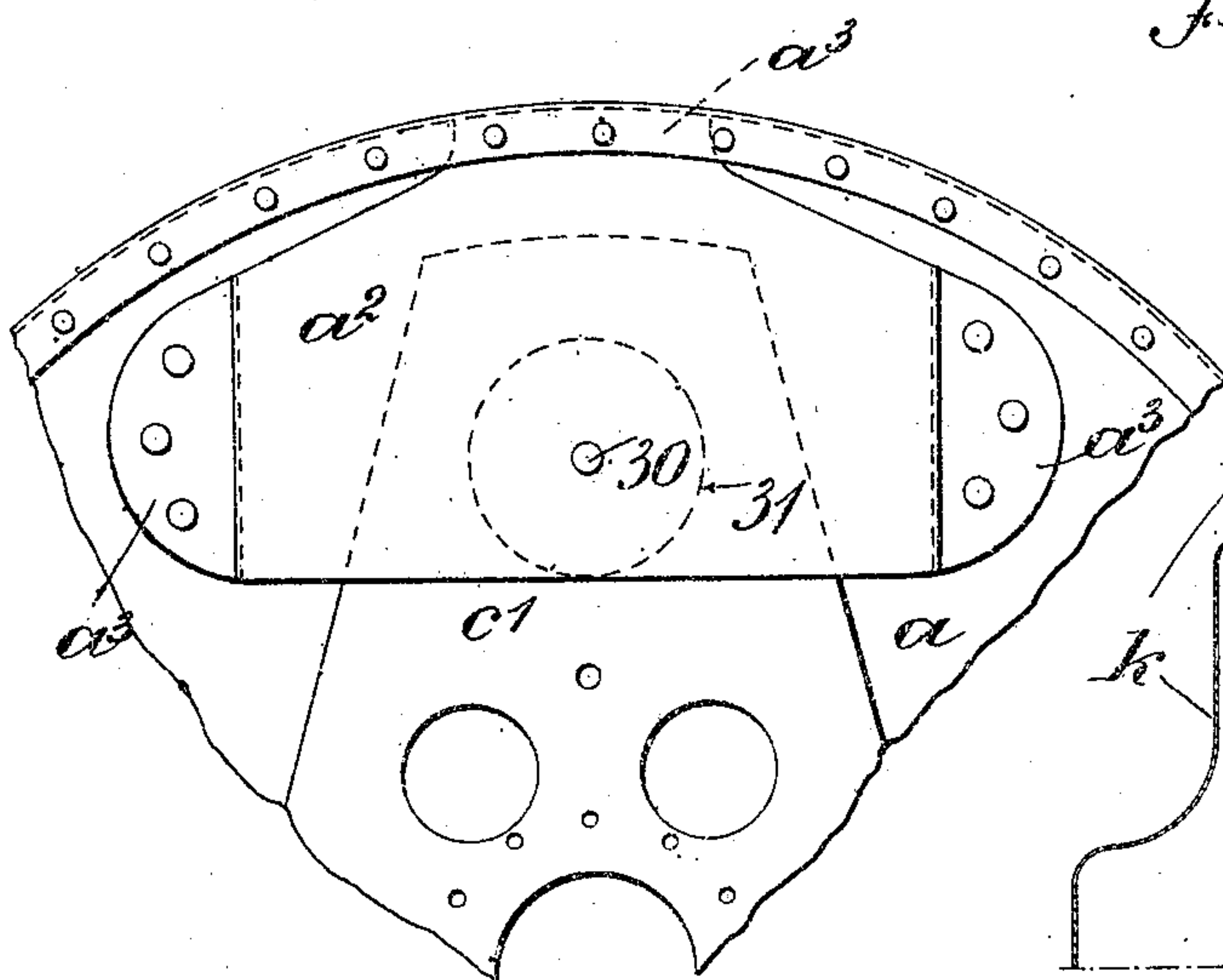
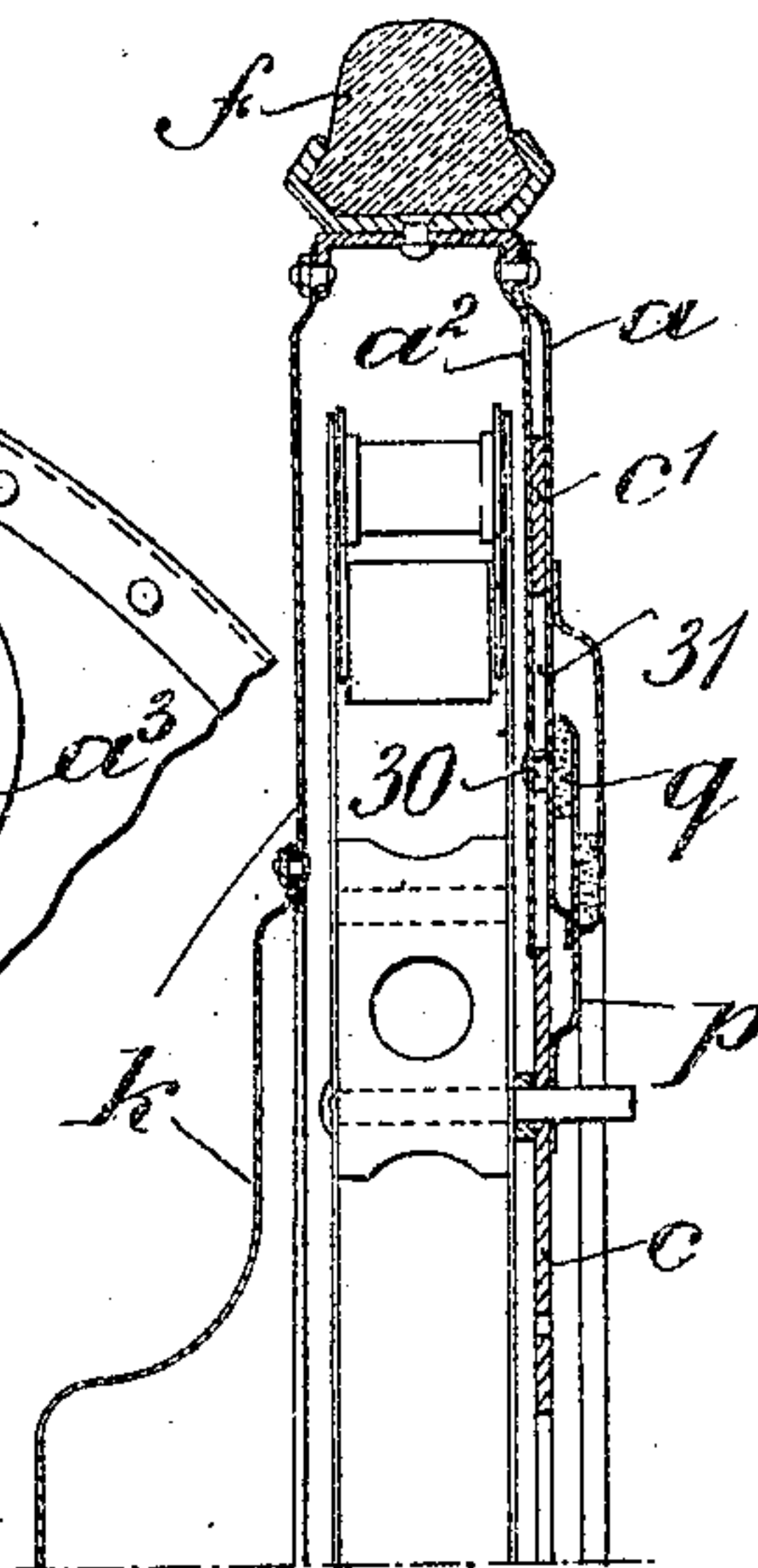


Fig. 6.



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UNITED STATES PATENT OFFICE.

ARTHUR SAMUEL FRANCIS ROBINSON, OF BARSHAM, ENGLAND.

SPRING-WHEEL.

No. 846,951.

Specification of Letters Patent.

Patented March 12, 1907.

Application filed January 3, 1905. Serial No. 239,334.

To all whom it may concern:

Be it known that I, ARTHUR SAMUEL FRANCIS ROBINSON, a subject of the King of Great Britain and Ireland, residing at Barsham, in the county of Suffolk, England, have invented Improvements in Spring-Wheels for Vehicles, of which the following is a specification.

This invention has reference to various improvements in spring-wheels wherein the rim portion of a wheel is normally maintained concentric to its hub portion by means of interposed springs, such improvements being more particularly designed for application to spring-wheels forming the subject of former Letters Patent granted to me, No. 762,196, dated June 7, 1904.

An object of this invention is to prevent the rim portion of such a wheel from being displaced laterally in relation to the hub portion, for which purpose an annular plate or disk rigidly secured to the one portion fits between two annular plates extending in the reverse direction and rigidly secured to the other portion, so that relative movement between the plates connected to the respective portions in a plane at right angles to the wheel-axis is permitted; but side play between the said plates is prevented.

A further object of this invention is to enable special driving means, such as, link or pin-and-slot connections, between the hub and rim portions to be sometimes dispensed with and a spring or resilient drive obtained. For this purpose in a spring-wheel in which the rim is maintained concentric to the hub by interposed springs acting through rollers, shoes, or like thrust-transmitting devices that portion of the wheel to which the springs, which are usually in the form of spring-levers, are not connected is provided with a series of inclined or curved paths or tracks for the rollers or other thrust-transmitting devices to travel upon, the inclination or curvature being such that on relative rotary movement of the two portions of the wheel in either direction the thrust-transmitting devices will ride up inclined paths or tracks, thereby causing flexure of the springs or spring-levers, which offer resistance to further relative rotation of the two portions of the wheel and tend to restore them to their normal relative positions. Such inclined or

curved portions may be carried by the rim portion or the hub portion of the wheel, according to the arrangement of the springs, and may be formed in sections of spring-steel and are usually of channel-like form as viewed from the end of the wheel-axis. Each may be provided with a supplementary spring-path adapted to constantly remain in contact with the corresponding thrust-transmitting device.

Figure 1 of the accompanying illustrative drawings shows, partly in front elevation and partly in section, one construction of wheel embodying my improvements. Fig. 2 is a half vertical transverse section thereof. Fig. 3 is a view partly in elevation and partly in section; and Fig. 4 is a similar view to Fig. 2, showing the upper half of another construction of my improved wheel. Figs. 5 and 6 are detail views, to which reference will hereinafter be made, illustrating a modification.

Referring to Figs. 1 and 2, *a a'* are two annular plates secured one to each side of an inwardly-extending flange *b* of a rim of section. *c* is a metal disk secured to the hub portion which extends between the plates *a a'*. It is cut away at parts to clear studs *d*, that hold the plates *a a'* the desired distance apart. The outer plate *a* extends beyond the horizontal web *e* of the rim, and the wheel-tire *f* is held in position on the rim, between the outwardly-extending flange *g* of the rim and the projecting marginal portion of the outer annular plate *a*, by bolts *h*, that pass through holes in the said marginal portion of the outer plate *a*, through distance-pieces *j*, embedded in the tire *f*, and through the outwardly-extending flange *g* of the rim. A cover-plate *k* is fixed to the outwardly-extending rim-flange *g*, and as it is not subject to strain due to side play this cover-plate may be made comparatively light. A light cover-plate *p* may, as shown in Fig. 2, be secured to the metal disk *c*, so as to overlap the outer rim-plate *a*, an annular pad *q* being interposed. To prevent mud reaching this pad, a light metal ring or guard *r* is secured around it to the outer plate *a*. The inner edge of the outer plate *a* is bent outwardly, so as to bear against the plate *p*, as shown, and thus prevent escape of oil. *s* are spring-levers tending to maintain the hub and rim portions of the wheel concentric; *t*, inter-

posed levers connecting the several springs *s*. The spring-levers *s* are furnished with roller-carriages *u*, whose rollers *v* are adapted to thrust against the rim portion, and the levers *t* are pivoted at *w* to plates *x*, fixed to the hub portion. The path or track for the rollers *v* consists of a series of sections 1, each comprising a plate or strip of spring-steel arched at its middle portion and having portions near the ends bent backwardly (i. e., in the direction of the crown of the arch) and the extremities 2 bent approximately at right angles to the backwardly-bent portions, countersunk bolts 3 passing through the crown of the arch and the extremities 2 securing the track-section to the rim-web *e* of the wheel. As shown, there may be provided supplementary spring-paths 4, that constantly bear upon the rollers *v*, so preventing rattling.

In the construction shown in the left-hand portion of Fig. 1 a plate or strip of steel 1, arched at its middle portion and secured to the wheel-rim by countersunk bolts 3 passing through the crown of the arch, is supported by suitably-curved chocks 5, bolted to the wheel-rim *e*. Such path or track-sections 1 may in some arrangements of springs *s* be applied to the hub portion of a wheel. The fulcrums of the springs *s* may, as shown in Fig. 1, be formed by their clamping-bolts 8 being pivoted to levers 9, hinged to the hub-plates *x*. The pivots 10 of the roller-carriages *u* are mounted in the levers 9 and only come into line radially with the center of the corresponding spring *s* under excessive load. Each clamping-bolt 8 may have pivoted to it one end of a slotted link 11, which by engaging a pin 12, fixed to the side plates *x* of the hub portion, limits outward movement of the spring when in the upper portion of the wheel. The pin 12 also passes through a slot 13 in a sliding piece or plunger 14, working in a radial guide or socket 15, fixed to the hub portion and containing a reserve or reinforcing spring 16. The outer end of the sliding piece or plunger 14 extends to near the head of the clamping-bolt 8, and the arrangement is such that upon the fulcrum of the corresponding spring *s* being moved inwardly, owing to excessive load, the head of the clamping-bolt 8 will come in contact with the end of the sliding piece or plunger 14 and force it within its guide or socket 15 against the action of the spring 16.

In the arrangement shown in Figs. 3 and 4 the curved or inclined portions 1 of a track are formed on the periphery of the hub-disks *x*. The springs *s* are fulcrumed in blocks 20, adapted to slide in radial slots 21, formed in side plates 22, fixed to the rim portion, and the ends of the springs are connected, as by

links 23, to intermediate levers *t*, fulcrumed on pins *w*, secured to the plates 22 of the rim portion, the fulcrum-pins of the spring-levers *s* being provided with thrust-rollers *v*, running on the inclined or curved track portions 1.

The plate *c* of the hub, Fig. 2, may be formed with radial arms *c'*, each extending between the annular plate *a* and a clip *a'*, secured to the plate *a*, as shown in Figs. 5 and 6. The clips *a'* may, as shown, each consist of a plate with set-up portions or lugs *a''*, riveted to the plate *a*, so as to leave sufficient space between the clip-plate *a'* and the plate *a* for the corresponding radial arm *c'* to freely work. If desired, the clips *a'* may be each additionally fixed to the plate *a* by a shouldered rivet 30, which extends through a large hole 31 in the corresponding radial arm *c'*. A plate with three arms *c'* may be conveniently employed; but in some cases a five-armed plate may be used, in which case additional rivets 30 would not be required.

What I claim is—

1. In a spring-wheel, a rim formed with a horizontal web, an inwardly-extending flange and an outwardly-extending flange, a hub portion, interposed springs that tend to keep said rim and hub concentric, two annular plates secured one to each side of the inwardly-extending flange of said rim, the outer of said plates extending beyond the horizontal web of said flange, a metal disk rigidly secured to said hub and fitting and working between said annular plates, a tire mounted on said rim between the marginal portion of said outer annular plate and the outwardly-extending flange of said rim, distance-pieces embedded in said tire and screw-bolts extending through the marginal portion of said outer plate, said distance-pieces and said outwardly-extending flange, as set forth.

2. In a spring-wheel, a hub portion, a rim portion, interposed springs tending to maintain said portions concentric, thrust-transmitting devices in connection with said springs, a track for said thrust-transmitting devices fixed to one of said portions and consisting of a series of channel-like sections, as set forth.

3. In a spring-wheel, a hub portion, a rim portion, interposed spring-levers tending to maintain said portions concentric, thrust-transmitting devices in connection with said springs, a track for said thrust-transmitting devices fixed to one of said portions and consisting of a series of channel-like sections, each approximately parallel to the corresponding spring, as set forth.

4. In a spring-wheel, a hub portion, a rim portion, interposed springs tending to maintain said portions concentric, thrust-transmitting devices in connection with said

springs, a track for said thrust-transmitting devices fixed to one of said portions and consisting of parts on which the thrust-transmitting devices will travel in a rotary sense and adapted to increase the stress of the springs as the said devices travel over said parts until the resistance of the springs prevents further relative rotation of the said two wheel portions, as set forth.

5. In a spring-wheel, a hub portion, a rim portion, interposed springs tending to maintain said portions concentric, thrust-transmitting devices in connection with said springs, a track for said thrust-transmitting devices fixed to one of said portions and consisting of a series of channel-like sections, and supplementary spring-paths for said thrust-transmitting devices, as set forth.

6. In a spring-wheel, a hub portion, a rim portion, interposed springs tending to maintain said portions concentric, thrust-transmitting devices in connection with said springs, a track for said thrust-transmitting devices fixed to one of said portions and consisting of a series of channel-like sections, and chocks arranged to support said sections, as set forth.

7. In a spring-wheel, a hub portion, a rim portion, interposed springs tending to maintain said portions concentric, thrust-transmitting devices in connection with said springs, a track for said thrust-transmitting devices fixed to one of said portions and consisting of a series of channel-like sections secured to said rim portion, as set forth.

8. In a spring-wheel, a hub portion, a rim portion, interposed springs tending to maintain said portions concentric, thrust-transmitting devices in connection with said springs, a track for said thrust-transmitting devices fixed to one of said portions and consisting of a series of channel-like sections of spring-steel, secured to said rim portion, as set forth.

9. In a spring-wheel, a hub portion, a rim portion, interposed springs tending to maintain said portions concentric, thrust-transmitting devices in connection with said springs, and a track for said thrust-transmitting devices fixed to one of said portions consisting of parts fixed to said rim portion on which the thrust-transmitting devices will travel in a rotary sense until the resistance of the springs prevents further relative rotation of the said two wheel portions, as set forth.

10. In a spring-wheel, a hub portion, a rim portion, a series of connected springs and levers tending to maintain said portions concentric, each of said springs consisting of a number of steel blades, a clamping-bolt for each of said springs, links pivoted one to each clamping-bolt, pins fixed to one of said wheel portions and passing through the slots of said

links, slotted sliding pieces through the slots of which said pins also extend, radially-arranged sockets in which said sliding pieces work, and, springs located in said sockets, as set forth.

11. In a spring-wheel, a hub portion, a rim portion, interposed springs that tend to maintain said portions concentric, a metal disk rigidly secured to one said portion, a pair of annular plates rigidly secured to the other said portion between which the said metal disk extends, a cover-plate secured to said metal disk and overlapping the outer plate of said pair, the said outer annular plate having an outwardly-turned inner edge adapted to bear against said cover-plate, and an interposed annular packing-pad, as set forth.

12. In a spring-wheel, a hub portion, a rim portion, interposed springs that tend to maintain said portions concentric, a metal disk rigidly secured to one said portion, a pair of annular plates rigidly secured to the other said portion between which the said metal disk extends, a cover-plate secured to said metal disk and overlapping the outer plate of said pair, an interposed annular packing-pad, and a light plate that entirely covers the outer side of the wheel, as set forth.

13. In a spring-wheel, a hub portion, a rim portion, interposed springs that tend to maintain said portions concentric, a metal disk rigidly secured to one said portion, a pair of annular plates rigidly secured to the other said portion between which the said metal disk extends, a cover-plate secured to said metal disk and overlapping the outer plate of said pair, the said outer annular plate having an outwardly-turned inner edge adapted to bear against said cover-plate, an interposed annular packing-pad, and a light plate that entirely covers the outer side of the wheel, as set forth.

14. In a spring-wheel, a hub portion, a rim portion, interposed springs that tend to maintain said portions concentric, a metal disk rigidly secured to one said portion, a pair of annular plates rigidly secured to the other said portion between which the said metal disk extends, a cover-plate secured to said metal disk and overlapping the outer plate of said pair, an interposed annular packing-pad, and a light metal guard-ring for said pad, as set forth.

15. In a spring-wheel, a hub portion, a rim portion, interposed springs tending to maintain said portions concentric, thrust-transmitting devices in connection with said springs, a track for said thrust-transmitting devices fixed to one of said portions and consisting of a series of path-surfaces that are reversely inclined in relation to the direction of the thrust of the corresponding spring, as set forth.

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16. In a spring-wheel, a hub portion, a rim
portion, interposed springs tending to main-
tain said portions concentric, thrust-trans-
mitting devices in connection with said
5 springs, a track for said thrust-transmitting
devices fixed to one of said portions, and con-
sisting of a series of sections, each having
path-surfaces that are reversely inclined in

relation to the direction of the thrust of the
corresponding spring, as set forth. 10

Signed at London, England, this 20th day
of December, 1904.

ARTHUR SAMUEL FRANCIS ROBINSON.

Witnesses:

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A. NUTTING.