J. W. CULMER.

Railroad Car-Springs.

No. 134,645. Patented Jan. 7, 1873.

Fig. 1.

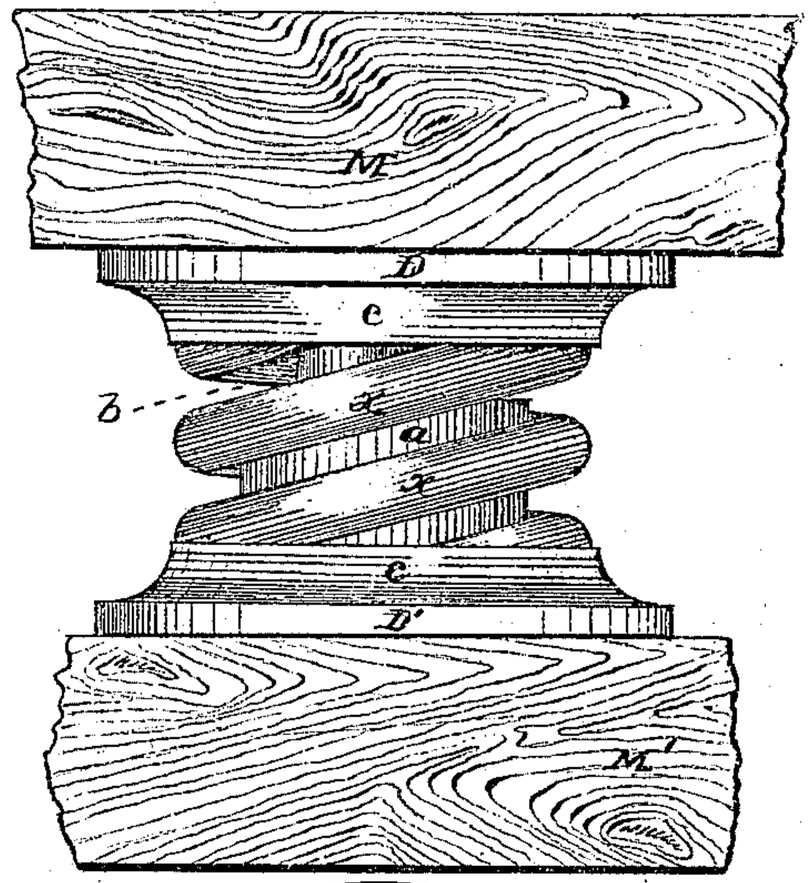


Fig. 2.

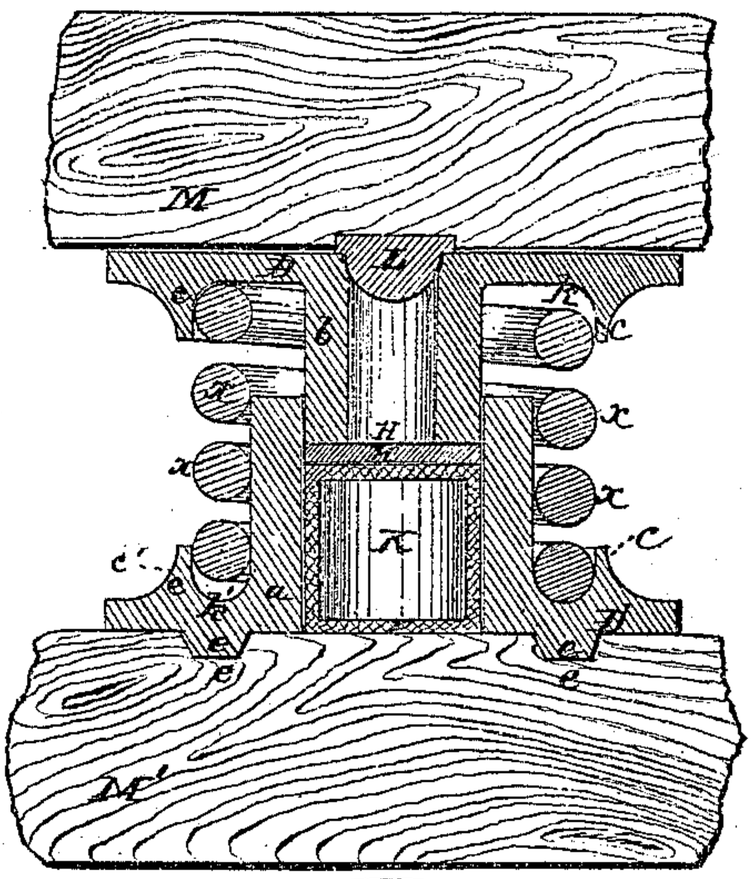


Fig. 3.

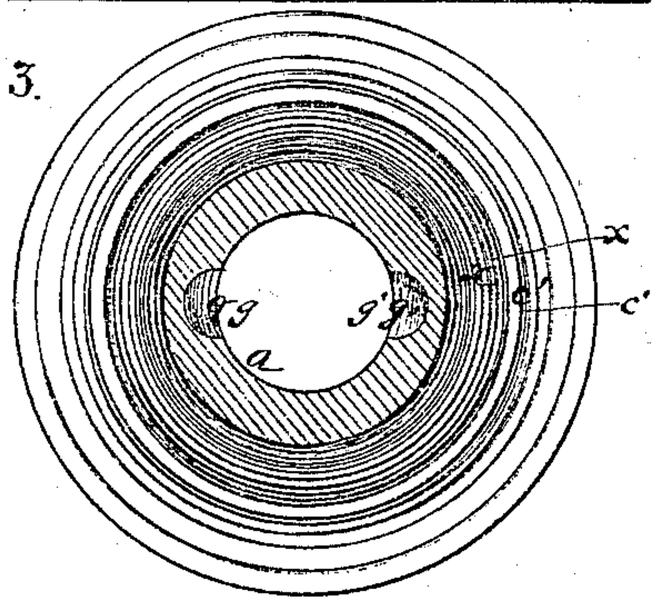


Fig. 4.

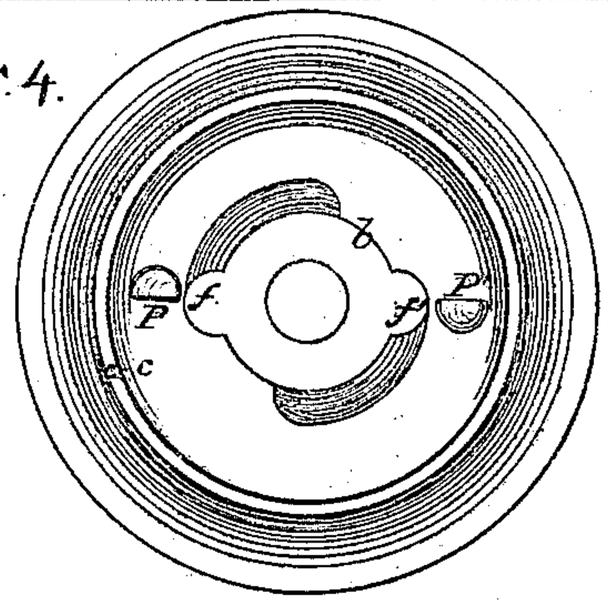


Fig. 5

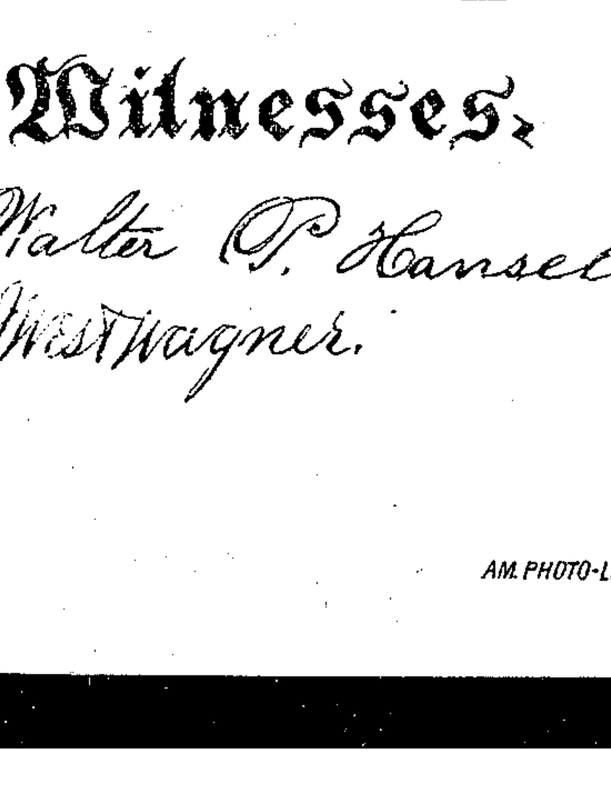
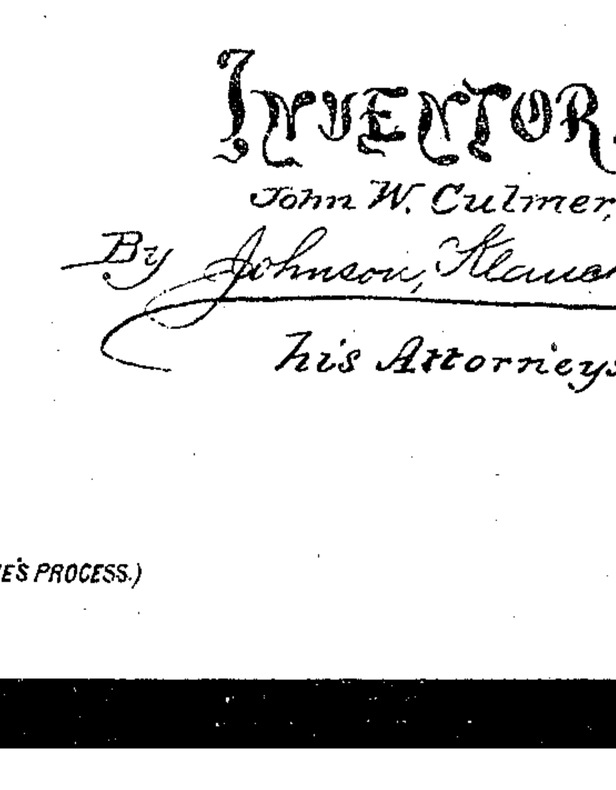


Fig. 6.



Witnesses.

Walter P. Hansell

Fred Wagner.

Inventor.

John W. Culmer,

By Johnson, Klauske & Co.

His Attorneys—

UNITED STATES PATENT OFFICE.

JOHN W. CULMER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF THREE-FOURTHS HIS RIGHT TO C. J. CLARKE, G. B. EDWARDS, AND ANDREW HOWARD, OF SAME PLACE.

IMPROVEMENT IN RAILROAD-CAR SPRINGS.

Specification forming part of Letters Patent No. **134,645**, dated January 7, 1873.

To all whom it may concern:

Be it known that I, JOHN W. CULMER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Railway-Car Springs, of which the following is a specification:

My invention relates to improvements in certain devices mutually co-operating to form a complete railway-car spring; and the invention forming the subject-matter of this patent consists, first, in the combination of a spiral circumscribing-spring with male and female telescoping-cylinders, respectively, having tongues and grooves slanting differentially to the pitch of the spring, to secure both direct and torsional resistance, as hereinafter more fully set forth; second, of an air-tight sack or diaphragm filled with air compressed to two or more atmospheres for application as an air-spring, in combination with telescoping-cylinders having an intervening annular metallic head or plate and an external spiral spring arranged for joint operation, as hereinafter described; third, in the combination of stops or bosses upon spiral-grooved telescopic cylinders with the circumscribing-spring to prevent spreading of the coils of the latter in the direction of the pitch.

In the accompanying drawing, Figure 1 represents a side elevation of my device with the parts in position; Fig. 2 represents a vertical central section of Fig. 1; Fig. 3 represents a top-plan view of the lower or female cylinder; Fig. 4 represents a plan view of the male cylinder from the point of application to the female; Fig. 5 is a vertical central section of the female cylinder, showing one of the grooves; and Fig. 6 is a side elevation of the male cylinder, showing one of the tongues upon its periphery.

My improved spring device is interposed between two bearing-surfaces, M M′, which represent portions of the frame of the truck of the car. The lower cylinder *a* and the upper one *b* are fitted to slide, the latter within the former, to form a carriage or supporting device for the spring *x*. The cylinder *b* has tongues *f f′* fitting and working in corresponding grooves *g g′* in the female cylinder *a*. The tongues and grooves are oblique to the axes of the cylinders, and differentially inclined to the pitch of the circumscribing-spring *x*—that is to say, while having the same general direction, the pitch or slant is less than that of the coil; the object being to secure torsional resistance, without any sudden strain upon the spring, at the same time that direct resistance is being utilized in the ordinary manner. The cylinder *b* has a broad flange, D, at its top or the point of application to the bearing-surface M, and the cylinder *a* has a corresponding flange, D′, where it meets the surface M′. The flange D of the upper cylinder is ridged circumferentially at *c* to form a channel, *k*, for the reception of the top of the coiled spring. The lower cylinder is correspondingly ridged at *c′* and channeled at *k′* to receive the foot or base of the spring. In the channels of both upper and lower cylinders are placed stops or bosses P P′, one or more in number, to abut against the ends of the spring and prevent lateral motion or spreading in the pitch of the coil when acted upon by the twisting force imparted to the male cylinder by the tongues and grooves. The flange D′ of the lower cylinder has projections *e* upon its bottom engaging with the bearing-surface, and is otherwise suitably fastened. A central boss, L, upon the upper bearing-surface M enters the bore of the male cylinder, effectually securing it, while allowing the necessary play thereon as a pivot to take up the twist imparted by the tongues and grooves in the motion of the cylinders upon each other. Within the chamber formed by the lower cylinder, when in position, I place a yielding impervious case or diaphragm, K, filled with air compressed to two or more atmospheres. A plate or piston, H, closely fitting the inside of the female cylinder and communicating with the end of the upper cylinder, rests upon the top of this air-spring, and imparts to it any impulse received from the superposed cylinder, the diaphragm H forming the junction between the two.

The operation of the spring device is as follows: Any shock or jolt acting upon the male cylinder forces it downward into the female cylinder, when it encounters the direct resistance of the outer coiled spring *x* and the in-

closed air-spring K; but as it moves downward a slight rotating motion is imparted to it, by the oblique tongues *f f'* and grooves *g g'*, in the direction of the pitch of the spiral spring, which is prevented from sliding by the stops P P', thereby bringing into play the torsional resistance of this spring. The grooves being differential to the pitch of the spring, the full shock, which might be injurious, cannot be directly opposed to the whole torsional resistance, and the direct resistance of the air-spring and coil is allowed proper field. The shock is therefore subdivided, and taken up either by the direct and torsional resistance of the coiled spring, jointly, or by the direct resistance of the air-spring and coiled spring in connection with the torsional resistance of the latter, and it is highly improbable that any one of these resisting forces can receive such a shock, reenforced as it is by the others, as to injure or destroy it.

The coiled spring used in connection with my device may be any ordinary spring; but in practice I prefer to employ a compound spring, consisting of two or more separate springs of the same pitch intercoiled upon the same plane or diameter.

I am aware that air-bags have been arranged within a cylinder on either side of a moving piston, and inflated and collapsed alternately with the movement of said piston by inlet and outlet openings in said bags, to form air-springs; and that a cylinder without air has been used in connection with telescoping-cylinders for railway-car springs; and I do not claim these things, my invention of the air-sack having no function of filling and collapsing, and also possessing, in the connection in which it is used, advantages over a solid-rubber spring.

Having thus described my invention, I claim—

1. The combination of the flanged telescoping-cylinders *a* and *b* having grooves and tongues oblique to their axes, substantially as described.

2. The combination of a spiral circumscribing spring with male and female telescoping-cylinders, tongued and grooved differentially to the pitch of the spring, substantially as and for the purpose set forth.

3. The combination of stops P P' upon oblique tongued and grooved male and female cylinders with a coiled spring, as and for the purpose set forth.

4. The inclosed fixed air spring or case K fitted with a superposed cylinder, substantially as and for the purpose described.

5. The combination of compressed-air spring with telescoping-cylinders, an intervening metallic plate or head, and external spiral spring, whether the cylinders are grooved and tongued or not, as and for the purpose specified.

6. The central pivot-boss L for the upper telescoping-cylinder, as and for the purpose described.

7. The railway-car spring having all its parts constructed and arranged for joint operation, substantially as described.

In testimony whereof I have hereunto set my hand this 3d day of October, A. D. 1872.

JNO. W. CULMER.

Witnesses:

GEO. R. SHAW,

A. P. RUTHERFORD.