

No. 41,868.

PATENTED MAR. 8, 1864.

T. SILVER.
SPRING TENSION REGULATOR.

Fig. 3

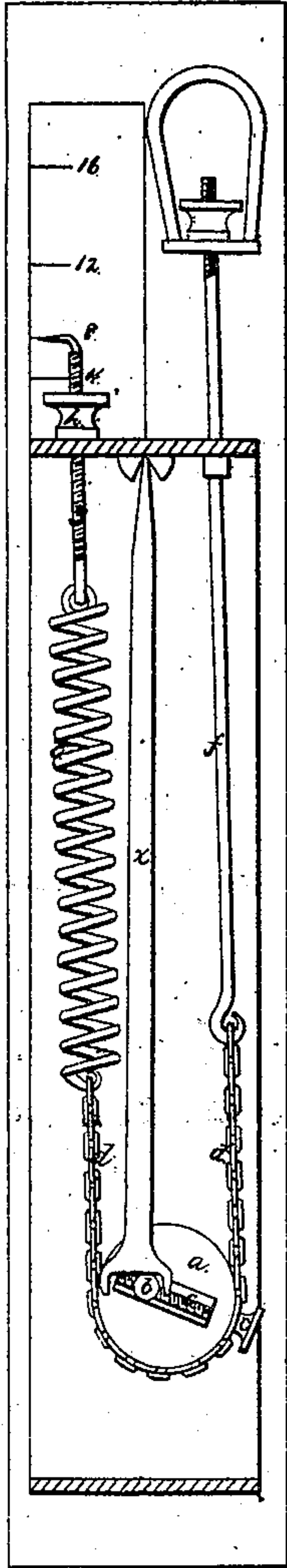


Fig. 2

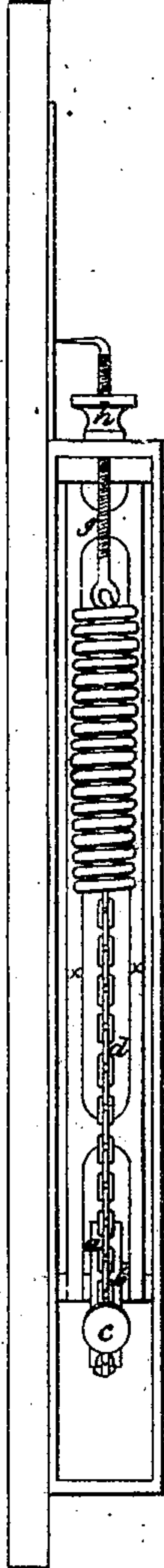
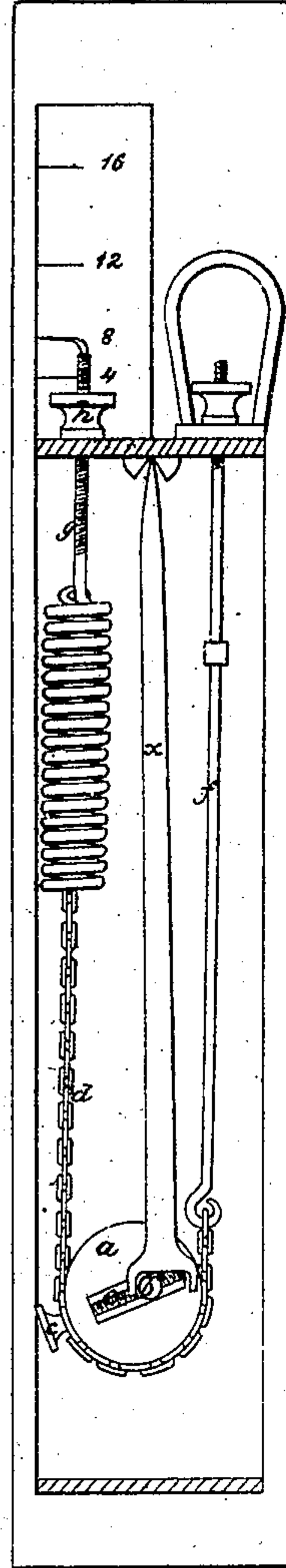


Fig. 1



Witnesses:
W. B. Griffiths
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Inventor:
Thomas Silver

UNITED STATES PATENT OFFICE.

THOMAS SILVER, OF NEW YORK, N. Y.

IMPROVED SPRING-TENSION REGULATOR.

Specification forming part of Letters Patent No. 41,868, dated March 8, 1864.

To all whom it may concern:

Be it known that I, THOMAS SILVER, of the city of New York, in the county and State of New York, have invented a certain new and useful Spring-Tension Regulator; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, and to the letters of reference marked thereon.

When it is desirable to compress or extend a spring, the intensity of the force applied must be constantly increased in proportion to the increased resistance of the spring, as the degree of force which will extend or compress it one inch from its normal position must be greatly increased to move it an additional inch. In the case, for example, of the ordinary application of a spring safety-valve to a boiler, the valve may begin to open by the pressure of steam at the point desired; but it will require a considerable additional pressure to open the valve still farther to permit the escape of an amount of steam sufficient to relieve the boiler. It is this constant increase of tension in a spring that has rendered the application of a weighted lever preferable in many cases, as, for instance, on a sea-going steamer where the motion of the vessel conflicts with the inertia of the weight and materially affects its utility. When a vessel has a stormy voyage, the relief of the load on the safety-valve, owing to the pitching and rolling of the vessel affecting the stability of the weight, may occasion the loss of a large percentage of steam, and it will be understood that this is the more likely to occur because the effect of the weight on the valve is brought into a condition approximating an equilibrium by the slight difference between the working-pressure and the blowing-off point.

The object of my invention is to equalize or to vary in effect the increasing tension of any known form or variety of spring, whether in a state of extension or contraction, as may be required for the different modifications of resistance and power involved in mechanical purposes. When it is desired, for example, to use a spring as a substitute for a weight in the loading of a safety-valve lever of a steam-boiler under circumstances of locomotion which might disturb the action of the force of gravity of a weight, the object of my invention

is to form a means of adjusting a spring to such an equilibrium of force that it shall resist permanently a determined pressure upon the valve; but when the said pressure may be exceeded the valve-lever may be allowed to rise to open the valve in the same manner as if it had been confined by a weight, and the whole throw or motion of the lever will be made without the increase of resistance that would be the case with a spring applied in the ordinary manner. To attain this object my invention consists in combining the spring with an eccentric, through which its power is transmitted in such a manner that it is first applied to the long radius, and continued by the turning of the eccentric, so that the leverage of the eccentric is diminished as the intensity of the spring is increased; the greater force of the spring having a shorter lever to operate upon; and in a similar manner by passing the chain or other flexible connection of the spring and valve (or other machinery to which the spring is applied) around one-half the circumference of the eccentric, the power of the spring is transmitted from the eccentric with a constant increase of leverage in proportion to the increase in tension of the spring, so that the increased force of the spring operating upon its shorter lever has also its resistance placed upon a longer lever, occasioning a conversion of the increased force and lessened range of the spring to a diminished force and extended range. The result of this compensation for the variations of the force of the spring by the leverages through which it is applied is, that when the degree of eccentricity is properly proportioned the entire range of the expansion or contraction of a spring will be rendered uniform and equal, and by changing the amount of eccentricity the equilibrium will be destroyed, on the one hand, by shifting the axis of the eccentric so that it becomes merely a pulley the action of the spring is unchanged, and on the other by shifting the axis beyond the point of equilibrium the action of the spring will be diminished in intensity instead of increased.

To enable others skilled in the art to which it appertains to make and use my invention, I will proceed to describe its construction and operation with reference to the drawings.

Figure 1 is a front view of my said invention with a portion of the frame removed, so as to

exhibit the spring which is in its normal position, and Fig. 2 is a side view of the same. Fig. 3 is a front view with the spring extended and a portion of the frame also removed.

The eccentric *e* is made with a slot, through which passes the axis *b*, which is maintained in any required position of eccentricity by means of the screw *c*. The chain *d* passes over the eccentric and is attached to it at the screw *c* or elsewhere, so that it moves with the eccentric, and it is connected at one side to the spring *e*, and at the other to a rod, *f*, by the loop, in the end of which it may be connected with whatever it may be desired to apply the force of the spring. The opposite end of the spring is furnished with a screw-cut rod, *g*, by which the amount of strain upon the spring may be determined with the thumb screw or nut *h*, according to the index-plate placed at the pointer on the end of the rod. By means of the nut *h* the degree of pressure may be established, and by the screw *c*, which controls the amount of eccentricity of the pulley, the force may be rendered uniform or otherwise regulated as may be required. The axis *b* is supported by the vibrating frame *x*, on which it rolls, instead of being confined in journals in the frames, by which means the friction is greatly diminished.

When it is desirable to have an increased

leverage motion without enlarging the eccentric, two of them may be used on the same axis with the spring drawing upon one and the connection upon the other, and gearing or multiplying levers may also be used for the same purpose, or eccentrics of different sizes may be used, so that an elliptic or india-rubber or other spring of small movement may afford a large range of application. With a chronometer or true spiral spring one end of the spring should be attached to the shaft, and the opposite end to a ratchet-wheel which can be turned and secured in adjusting the tension of the spring.

Having thus described the manner in which I prefer to make and apply my said invention, I wish it to be understood that I do not confine myself to that precise manner of construction or application of the principle of varying the leverages to said different degrees of tension; but

What I do claim as my invention is—

The combination of a spring with an eccentric, substantially as described for the purpose specified.

THOMAS SILVER.

Witnesses:

W. F. GRIFFITHS,
WM. KEMBLE HALL.