(No Model.)

W. A. POWER.

AUTOMATIC TENSION REGULATOR.

No. 519,617. Patented May 8, 1894.

Fig. 1.

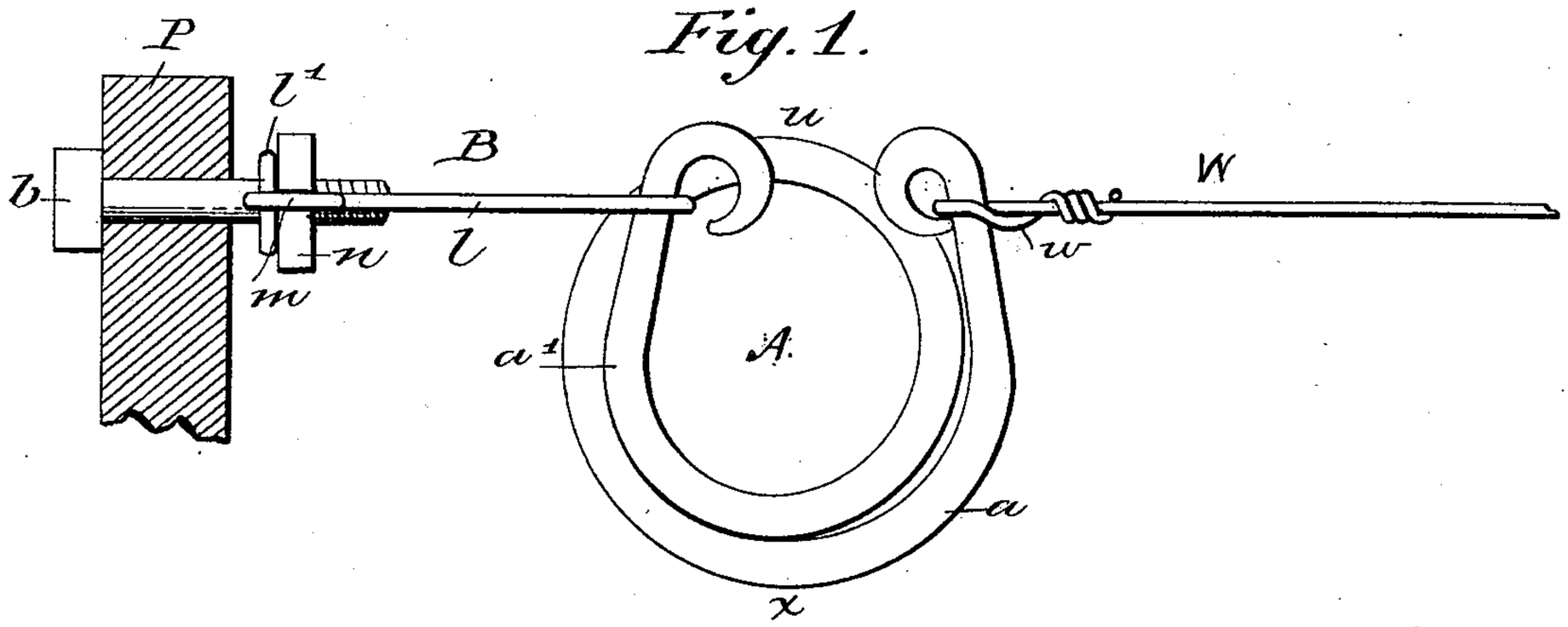


Fig. 2.

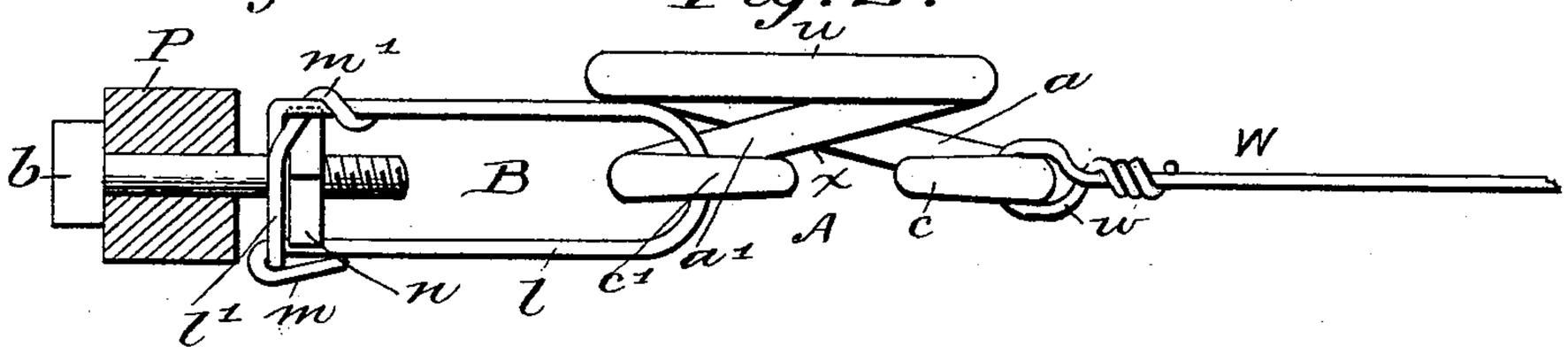


Fig. 3.

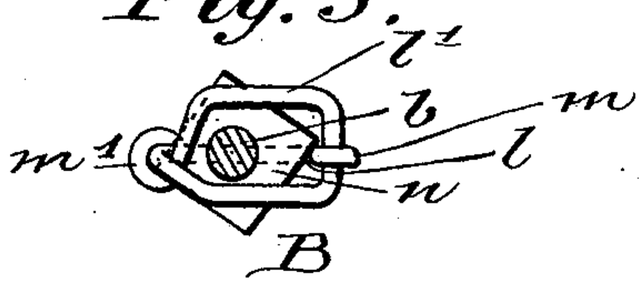
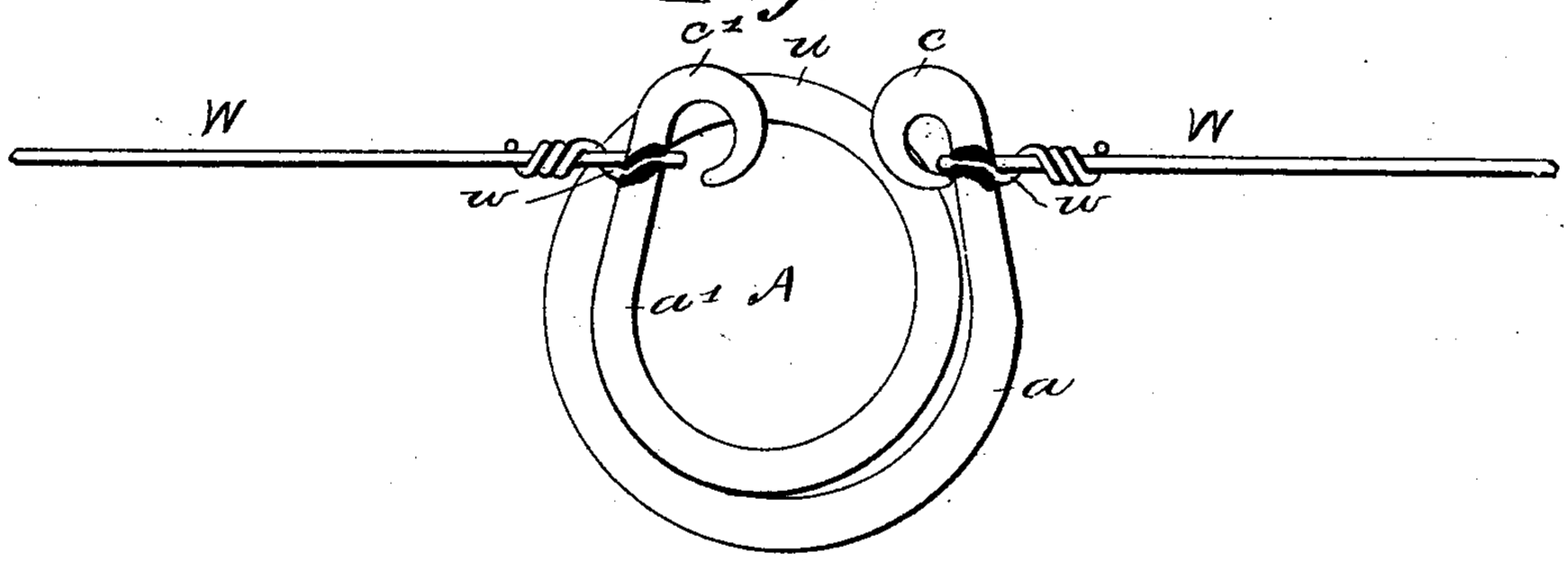


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM A. POWER, OF CHARLOTTE, MICHIGAN, ASSIGNOR OF ONE-HALF TO PARLIAMER M. THOMAS, OF SAME PLACE.

AUTOMATIC TENSION-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 519,617, dated May 8, 1894.

Application filed November 7, 1893. Serial No. 490,276. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. POWER, a citizen of the United States, residing at Charlotte, in the county of Eaton and State of Michigan, have invented certain new and useful Improvements in Automatic Tension-Regulators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to devices for automatically regulating the tension of stretched wires and rods which are exposed to changes in temperature, so as to prevent fracture due to contraction by cold or displacement due to expansion by heat; and the invention consists, first, in an automatic regulating spring having certain novel characteristics hereinafter set forth and claimed, and second, in an improved construction of the adjusting means whereby the tension is manually adjusted when necessary as explained below.

The invention is applicable to fence-wires; guy-rods for bridges, smoke-stacks, towers, and similar structures; telegraph, telephone, electric-light and trolley wires; and any other species of metallic wires, rods or cables which it is desired to keep under tension while exposed to thermotic changes.

The accompanying drawings illustrate the construction.

Figure 1, is a side view of the regulating spring and the manual adjuster as applied to a stretched wire, which may be a fence wire. Fig. 2, is a top or plan view of the same. Fig. 3, is a section taken on the line 3—3, Fig. 2, giving an end view (section through the bolt) of the adjuster by itself. Fig. 4, shows the regulating spring applied to a telegraph wire or other electric conductor without the means for manual adjustment.

In the drawings, A, is the regulating spring.

B is the manual adjuster, and W is the wire whose tension is to be regulated.

P, in Figs. 1, and 2, represents the fence post or other fixed support for the wire. The adjuster B, is attached to the post P, and connects with one end of the spring A, while the wire W is secured to the other end of the spring and extends therefrom to another post or support not shown.

The adjuster B, comprises a square-head bolt *b* which passes through post P, a nut *n* on the threaded end of the bolt, and a link *l* which at one end embraces the bolt behind the nut *n*, and at its other end connects with the regulating spring A. The link *l* is preferably composed of a single piece of wire bent to the required shape. The inner end of the link which connects with spring A is simply rounded as shown. To form the outer end of the link, one end of the wire is bent to constitute a loop *l'* extending at right-angles to the sides of the link, the end of the wire which forms loop *l'* being twisted around the base of the loop at *m'* and the other end of the wire being secured to the extremity of the loop at *m*. The nut *n* is placed against the loop *l'* on the inside so as to register therewith, and the bolt *b* is passed through the post P and through the loop and nut and screwed into the nut, thus securing link *l* to the bolt and therefore to the post. Since the loop *l'* of link *l* is retained upon the bolt *b* by the nut *n*, the position of the nut upon the bolt affects the tension of the wire W and spring A, and the tension of wire W can therefore be adjusted by turning the bolt *b*. The width of link *l* adjacent to the loop *l'* is such that its sides serve as stops to prevent the rotation of the nut when the bolt is turned, (see Fig. 3) thus permitting the required adjustment by the turning of the bolt within the nut. The bolt can be turned by an ordinary wrench applied to the square head of the bolt on the outside of the post.

The adjuster B is used not only for fence-wires, but also for the guy rods or ropes of towers, smoke-stacks and similar structures, the bolt *b* of the adjuster being in that case passed through the anchor-post to which the guy extends in the same manner as through the post P for fence-wires. The object of the adjuster is to originally adjust the wire or rod to the desired initial tension, leaving the tension to be subsequently regulated automatically by the regulating spring. The adjuster also enables the tension to be released while splicing

or mending the wire or rod in case it should become accidentally broken. The described construction of adjuster differs from similar devices heretofore patented in this, that the parts of which it is composed are all very easily produced or procured, and the device can therefore be very cheaply manufactured. The bolt and nut being separate from the connecting link, they can be of ordinary pattern such as are everywhere readily obtainable; and the link *l* is easily formed from a single wire or rod by bending in the manner already described.

For telegraph or telephone lines, electric-light wires, trolley wires, &c., the adjuster B, is omitted, and regulating springs A are alone employed, the springs being placed at such intervals along the wire as will take up all the slack. The main purpose of the springs in that case is to prevent the breaking of the wire when subjected to abnormal pressure, as for example when loaded with ice in winter, or when encountered by falling limbs of trees during storms.

The special form and arrangement of the spring A constitutes the principal feature of the present invention. The drawings clearly indicate the preferred construction. The spring is formed from a bar of some metal possessing the necessary strength and elasticity, bent to form a double coil as shown. The two coils *a a'* of the spring do not lie parallel but cross each other centrally at *x*, and the two ends *c c'* of the spring are thus brought into close proximity and in line with each other at one side of the spring and adjacent to its central point *u* which may be considered the point of union of the two coils *a a'*. The opening between the two ends *c c'*, being adjacent to the point of union of the coils *a a'*, is diametrically opposite to their crossing-point *x*. One end *c* of the spring constitutes an eye to which the end of wire W (or other wire or rod) is connected, and the other end *c'* of the spring constitutes a hook for the attachment of the link *l* of the adjuster B (see Figs. 1 and 2). In case of an electric conductor where the adjuster B is omitted (Fig. 4), the ends of wire are attached to the two ends of the spring; and if desired, especially for electric-light and trolley wires, the ends of wire may be soldered to the spring.

The improved regulating spring is made very strong and quite stiff, and its power of resistance is such that the wire or rod to which the spring is applied may be at first stretched to the desired tension without at all expanding the spring. Any abnormal or further strain however, to which the wire or rod may be subjected, such as contraction by cold, will cause the spring to yield, so that all such further strain will be taken up by the spring and the fracture of the wire or rod prevented.

The form of spring employed enables a spring of maximum strength and resistance to be produced and at the same time gives the necessary elasticity. The force exerted by the stretched wire or rod being applied to the spring laterally in the direction of the coils instead of transversely thereto as in an ordinary spiral spring, the metal of the spring is not subjected to torsional strain but to plane flexure merely. The two coils *a a'* are substantially circular in form, crossing each other centrally, and any strain tending to expand the spring acts uniformly upon both coils throughout their entire extent, thus giving to the spring the greatest power of resistance and endurance in the most compact form. The crossing of the coils at *x* brings the two ends *c c'* into direct line with each other in the direction of their natural flexure, that is, in the direction of lateral expansion of the spring, and consequently the strain of the tension of the stretched wire upon the ends of the spring will only tend to expand the spring laterally without any tendency to twist the spring or to expand it lengthwise in the direction of the axis of the coils.

It is to be noted that in the improved form of spring the ends *c c'* approach each other, so that for a portion of its length the spring extends backward from its point of connection with the wire. As a consequence, when the wire W is expanded by a rise in temperature and the metal of the spring is likewise expanded by the same influence, the resulting increase in the length of the spring will cause its ends to approach more closely together, thus increasing the tension upon the wire and tending to take up the slack which would otherwise be occasioned by the expansion of the wire. Thus the thermal expansion of the spring compensates in a measure for the thermal expansion of the wire, since the two expand oppositely instead of in the same direction as in former devices of this character.

In carrying out this invention, it is proposed to manufacture the improved regulating springs of varying sizes, each accurately tested as to its elasticity and power of resistance, so that there may be provided springs of the proper capacity for any size of wire. Each of the different sizes of spring will be designated to correspond with the kind of wire for which it is designed. In any case the power of resistance to flexure is such that the spring will not be appreciably expanded by the normal tension of the wire or rod with which it is used, so that normally the spring is not bent or under tension.

I claim as my invention—

1. A tension regulator for a stretched wire, consisting of a laterally-expanding spring of general circular form having its ends adapted for the attachment of the wire thereto, the coils or turns of said spring being not in the same plane but its ends being located in direct line with each other in the direction of their lateral expansion, so that tension applied to the ends of the spring will tend to

expand said spring laterally without torsion, substantially as set forth.

2. A wire under tension, and a tension-regulator therefor consisting of a spring of general circular form, having its ends to which the wire is attached approaching the same circumferential point and located so that tension upon the wire will tend to draw said ends apart and expand said spring laterally, substantially as set forth.

3. A tension-regulating spring for a stretched wire or rod, comprising the two coils *a a'* crossing each other centrally and having their ends *c c'* in line with each other on one side of the spring and opposite the crossing of the coils, substantially as set forth.

4. The adjuster B, comprising a link *l* having an open loop at one end thereof, in combination with a threaded bolt adapted to enter said loop, and a nut into which said bolt screws, the width of link *l* adjacent to said loop being such as to prevent the rotation of said nut, substantially as set forth.

5. The adjuster B, comprising the link *l* bent from a single piece of wire and having at one end the transverse loop *l'*, the threaded bolt *b* which passes through said loop *l'*, and the nut *n* fitting the threaded end of the bolt, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM A. POWER.

Witnesses:
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