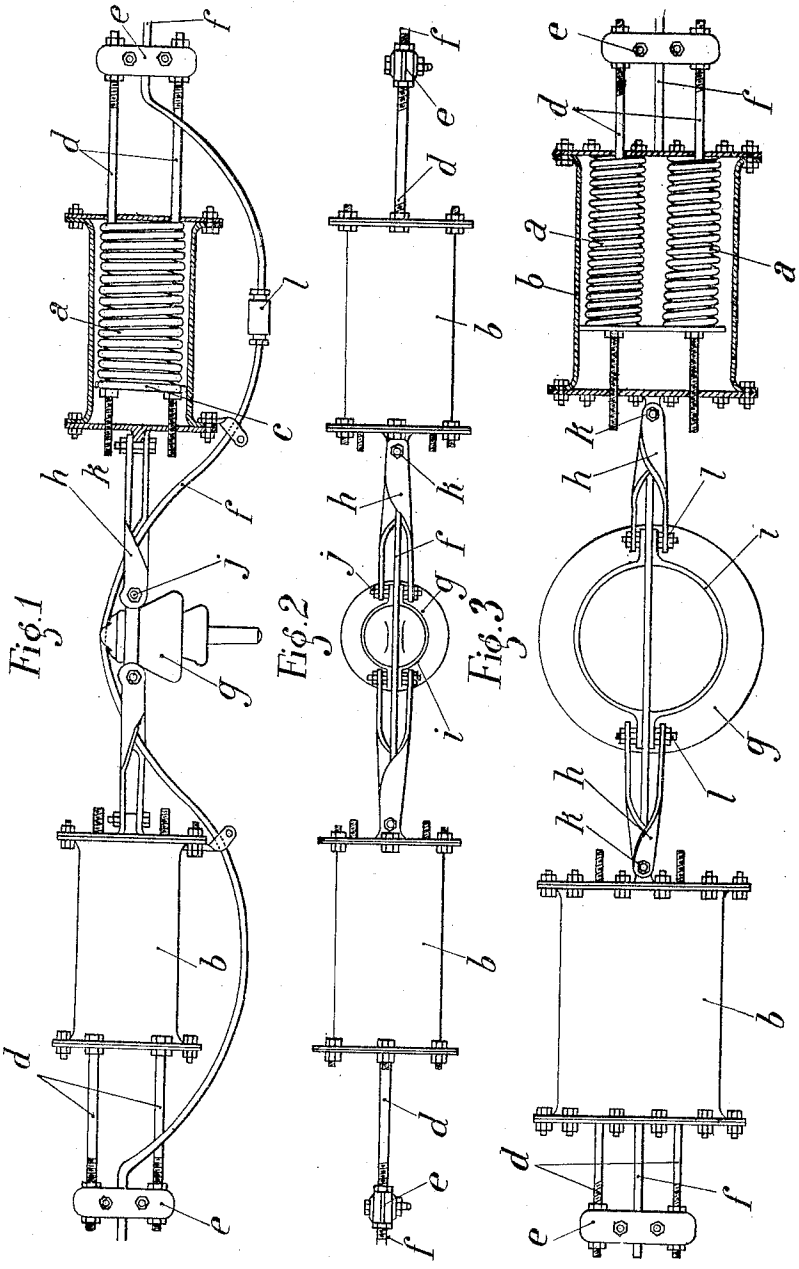
J. O. CAHEN.

DEVICE FOR LIMITING THE MECHANICAL TENSION OF ELECTRIC LINE CONDUCTORS.

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INVENTOR:
Jacques Octave Cahen
By M. Wallace Mills
ATTY.

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JACQUES OCTAVE CAHEN, OF EPINAL, FRANCE.

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To all whom it may concern:

Be it known that I, JACQUES OCTAVE CAHEN, citizen of the Republic of France, residing at 27 Avenue des Templiers, Epinal, Vosges, in the Republic of France, have invented new and useful Improvements in Devices for Limiting the Mechanical Tension of Electric Line Conductors, of which the following is a specification.

In the present state of the electric power supply industry, the overhead power lines are generally made up of a series of spans of wires or cables, each of which is fastened by a solid mounting in the shape of attachment pieces or collars connected to insulators, these being mounted in turn upon fixed supports such as wood poles or ironwork posts of various sizes.

These spans are called on to undergo a tension which is limited in the mechanical sense by the strength of the metal, and as concern official regulations by rules which specify the coefficient of safety which is to be adopted.

This mechanical tension depends upon different causes such as temperature, extra weight due to weather (wind, sleet, etc.,) and varies according to such circumstances. As the supports are supposed to be in fixed position, the tension is affected by the diminution of temperature and increase of overload in such way as to reach considerable values, and if the required precautions are not taken in the first place, such values may exceed the safety limits prescribed by the regulations, and can even go beyond the strength limit of the electric conductors and their supports.

In practice, in order to avoid this drawback, there is given only a small amount of tension to the wire at the time of erection, and the amount of sag is fixed at such point as to provide for the above-mentioned causes of overload, so that upon the action of mechanical effects which produce an excess of tension, the tension under the most unfavorable conditions will not exceed the figure specified by the official regulations.

But in this case it is required to make proper calculations for the supports, iron parts and insulators in order to secure the required strength to be able to support the greatest tension of the wire which it will generally reach at the lowest temperature of the region, while on the other hand in order to determine the height of the above-mentioned parts, it is required to take account of the value of the sag at the highest temperature of the region.

Under these two conditions, the supports have to undergo a very high mechanical strain, and this has the effect of diminishing the mechanical safety and also entails a great cost of construction and even of upkeep for the supports.

The object of the present invention is to overcome these drawbacks, and in consequence it makes use of a device which is employed on electric power lines in order to limit the mechanical tension of wires or cables in such way as to be able to reduce the bending strain on the support, and the tension and the sag of the wire are now maintained at a lower and almost constant value.

The present device comprises essentially an elastic makeup attached on one side to the support and on the other to the wire itself, or again, attached to the wire on both sides, if the device is mounted in a span.

As the length of the wire is calculated for the maximum temperature of the region, the elastic system acts as an expansion device for compensating for the conditions resulting from a lowering of temperature, or in a more general way, for excess of tension due to effects of the weather.

It is understood that the expansion device or tension limiting apparatus is designed to give in all cases an elongation which is of the required amount to keep the tension and the sag of the wire at values which are very near their original values, and this according to the mathematical relations which exist between the tension and the length of the conductor.

As the wire is continuous along the different spans, it is required to employ the elastic system in such manner that it will have a slack wire portion between its extremities, in order to secure a free movement for the elastic action of the system.

On the other hand, the method of making the joint between the wire and the elastic device should be such as to allow for the lateral movement of the line under the action of wind, and to this effect the present method employs a joint which allows a certain movement in the direction perpendicular to the line.

The use of the elastic systems specified in the invention allows of constructing electric lines which have a truly flexible character.

It will be specially noticed that in case of breakage of the wire under the effect of a sudden accidental load or a short circuit, the adjacent spans will be but little affected by this shock, for it will be attenuated by the elasticity of the systems employed, these acting as mechanical damping devices.

The connections, splices or soldering can be carried out in the slack portion of the wire, so as to obtain a line which has no weak point in the portions under mechanical tension.

The accompanying drawing shows an example of two methods of carrying out this invention, and in this case the tension limiting devices are supposed to be attached on one side to the support and on the other to the electric conductor.

Figure 1 is a view in elevation and section of a line provided with tension limiting devices having a single spring.

Fig. 2 is a plan view corresponding to Fig. 1.

Fig. 3 is a plan view, in partial section, of a line provided with tension limiting devices having two springs mounted in parallel.

In the two cases in question, the same letters are employed to designate similar parts.

Referring to the drawing, it is observed that the tension limiting device, which is itself insulated in the same way as the wire, comprises essentially one or more elastic parts *a* which can be made up of springs, Belleville washers or other devices, these being inclosed in a cylinder *b* which may contain an inert substance in order to suppress any oxidizing effect and to prevent condensation of water vapor. The elastic parts bear on one side against one end of the cylinder and on the other against a movable plate *c* fixed to two rods *d* which are guided in holes disposed in the end of the cylinder; these rods carry a wire clamping piece *e* which serves to hold the electric conductor *f*. The cylinder itself is connected to the insulator *g* through an anchoring piece *h* and a collar *i*. The two articulations *j* and *k* have their axes perpendicular to each other, and allow the conductor to take a displacement in all directions.

As will be observed, the conductor has a slack portion lying between the two ends of the apparatus, which carries if need be the connection joint *l*. The extra length of the slack portion is designed to allow for the maximum extension of the apparatus. The amount of displacement of the wire clamp *e* can be changed as desired by adjusting the position of this clamp on the rods *d*.

In the case of an apparatus having several elastic portions, two, for instance, the elastic portions can be mounted in parallel as shown in Fig. 3, or in series.

On the other hand, these elastic portions may be employed in open air instead of being inclosed in cylinders as here represented.

When erecting the electric conductor, it is understood that the elastic apparatus is to be put out of action, and this is effected by the use of nuts which produce a temporary clamping of the rods which carry the plate *c*.

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

1. A device for limiting the mechanical tension of electric lines for power distribution, comprising an insulator adapted to be secured on a post and providing a support for the slack portion of the conductor, a collar secured on said insulator, casings located one on each side of said insulator, provided with opposite end walls, members for mechanically connecting the collar on the insulator to the adjacent end wall of said casings, respectively, said members permitting of a relative displacement of the casings with respect to the collar both vertically and horizontally, a movable member in each of the casings, compression resilient means inside the casings, located between the movable member and the opposite end wall of the casing, wire clamps for the conductor and means for rigidly connecting said wire clamps to the movable members respectively.

2. A device for limiting the mechanical tension of electric line conductors, containing, in combination, a cylinder, a spring working under compression contained within said cylinder and bearing against one end of the same, a thrust plate movable within said cylinder and taking the thrust of the other end of the spring, rods guided in the ends of the cylinders, means for attaching said rods to the movable thrust plate, a wire clamp provided at one end of said rods, means for attaching the cylinder at another point in the electric line, said means being disposed on the end of the cylinder opposite the wire clamp, and a slack portion of the continuous electric line cable provided between said means and the wire clamp, substantially as described and for the purpose set forth.

3. A device for limiting the mechanical tension of electric line conductors, containing in combination: a cylinder, a spring working under compression contained within said cylinder and bearing against one end of the same, a thrust plate movable within the cylinder and taking the thrust of the other end of the spring, rods guided in the ends of the cylinders, means for attaching

said rods to the movable thrust plate, a wire clamp provided at one end of said rods, a pole, an insulator mounted on said pole, a collar attached to said insulator, an anchoring device with two articulations having respectively vertical and horizontal axes, which device connects said collar to the cylinder end opposite the wire clamp, and a slack portion of the continuous electric line cable provided between said anchoring device and the wire clamp, 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.

JACQUES OCTAVE CAHEN.

Witnesses:
CHAS. P. PRESSLY,
HECTOR LEVY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."