

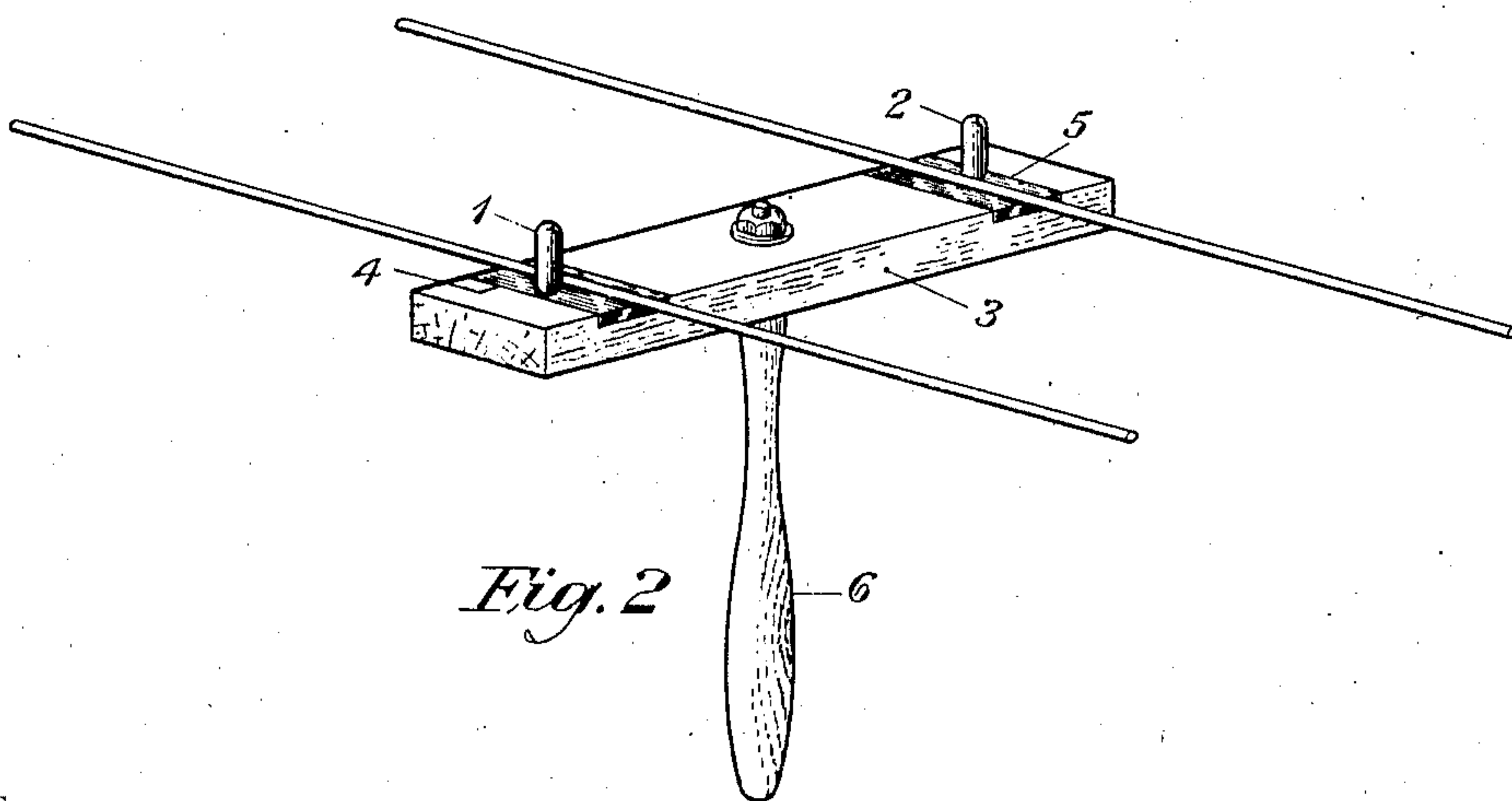
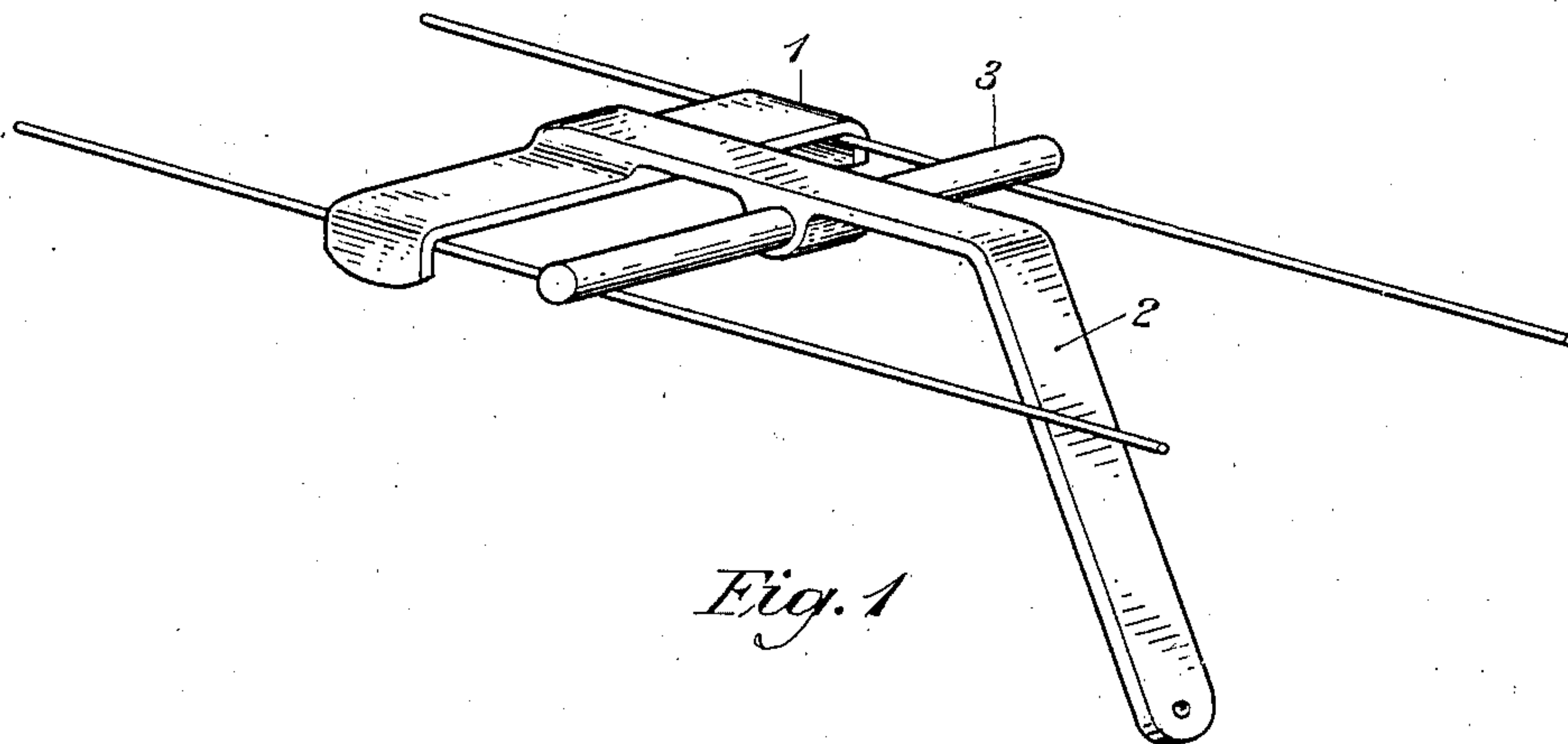
Jan. 12, 1943.

J. J. PILLIOD ET AL

2,307,900

SAG EQUALIZING DEVICE

Filed Jan. 11, 1940



INVENTORS
J.J. Pilliod and E.B. Griffen
BY *William R. Ballou*
ATTORNEY

UNITED STATES PATENT OFFICE

2,307,900

SAG EQUALIZING DEVICE

James Joseph Pilliod, Scarsdale, and Ellwood Burdsall Griffen, Port Chester, N. Y., assignors to American Telephone and Telegraph Company, a corporation of New York

Application January 11, 1940, Serial No. 313,460

2 Claims. (Cl. 73—51)

This invention relates to a device for determining the inequality in magnitude of the sag in the span of two substantially parallel electrical conductors between points of support of the said conductors at the ends of the said span.

In the construction of open wire telephone lines in which the wires are supported upon insulators carried upon cross-arms attached to poles, it is customary to pull up the conductors until the desired tension in the wires is reached and then to tie the wires to the insulators. With the increasing use upon open wire lines of high frequency currents employed in the carrier systems a higher degree of electrical balance between the wires of a given pair and the other wires upon the pole line is required than was formerly necessary. Some of the desired improvement is attained by increasing the number of and by more accurately spacing the transpositions of the various wires upon the pole line. However, in order to obtain the maximum improvement in balance, it is necessary to substantially equalize the amount of sag in the wires of a pair in each of the spans along the pole line.

The sag of a line wire is the distance between an imaginary straight line between the points of support at the end of the span of wire and the lowest point at which the wire hangs in that span. Various methods have been used heretofore to measure the sag of line wires. One method consisted in determining the difference in elevation at the point of support and at the low point by sighting. Another method, heretofore employed, consisted in striking or plucking a wire at a short distance from the cross-arm, thereby setting up a wave which traveled to the point of attachment of the wire at the distant cross-arm and was reflected therefrom. The speed of propagation of the wave was measured by a stop watch. Since the speed is a function of the tension in the wire, the method consisted in adjusting the tension in each wire separately until the same speed was indicated for both wires of a pair. That method, however, required considerable time in order to obtain an average difference in sag of the wires of a pair of less than three-quarters of an inch, which is the limit desired for present-day operations.

The object of the present invention is to expedite the determination of the difference in sag of two wires of a pair and to effect a rapid adjustment of the tensions in the wires, in order to substantially equalize the sag.

When a wire is oscillated in a span of normal

length and of normal sag, the wave usually takes about one second to travel to the far end of the span and to return. At that speed the crest of the wave can readily be followed with the eye. However, we have found that when a wave is started in each of two substantially parallel wires in the same span of the pole line, the waves being set up at the same instant of time, if the tensions in the wires are equal, the crests of the two waves will travel together down the span and together will be reflected backward; and this wave motion with the waves in phase can be seen until the energy is dissipated and the wires return to rest. If the tensions are not equal, but are nearly alike, the waves appear to travel substantially in phase for several seconds and then pull out of phase, which action is readily visible to the observer. Accurate measurement shows that when the waves appear to remain in phase for eight or ten trips down the span and back again, the difference in sag between the two wires, for normal line conditions, is in the order of one-quarter of an inch.

In our investigation of this matter, we first set up the waves in both wires simultaneously by pulling the wires together between the thumb and the fingers of an open hand and then quickly releasing the wires. We found, however, that while that method was an improvement on prior practices, it did not insure the release of both wires at the same instant.

Accordingly, devices were created by which the method of setting up waves substantially simultaneously in both wires of a pair thereby could be performed in a manner that eliminated any error to which the method was susceptible when the wires were plucked by hand.

This invention will be more fully understood from the following description when read in connection with the attached drawing of which Figure 1 shows a form of novel apparatus by which the method may be carried out, in which apparatus a fulcrum is placed across the wires for lifting the gripping or holding member; and Fig. 2 is another form of the new apparatus in which the fulcrum is in effect embodied in the gripping or holding member.

The form of the device shown in Fig. 1 comprises a member 1 which is intended to hold a pair of wires between prongs formed at both ends of the member. The distance between the prongs depends upon the spacing of the wires; for example, where the wires are spaced apart eight inches in the span, the distance between the prongs would be of the order of four to six inches.

Attached to the member 1 is a lever 2 which is bent downward so that it may be gripped at a point below the pair of wires. Attached to the member 2 is a rod that is of such length as to extend across the wires of a pair and to rest upon them. This rod serves as an axis of rotation of the device in carrying out the method by which a wave is set up in each wire at the same instant of time. In operation, the wires are drawn together by hand until they are close enough to be caught under the prongs of the member 1. By tapping the handle suddenly at the point near the small hole at the end of the handle or by gripping the handle by the hand and pulling it downwardly the wires will be released quickly and simultaneously from the prongs of the member 1.

In the form of the invention shown in Fig. 2 the prongs consist of metal posts 1 and 2 that pass through and are bolted onto a member 3. Metal plates 4 and 5 are set into the member 3 at the points where the posts pass through the member 3. A handle 6 is securely bolted to the member 3 at its center. The member 3 is preferably made of wood or fiber in order to provide suitable insulation when the device is being used upon working lines. In operation, wires of a pair are drawn together until their separation is less than the difference between the posts 1 and 2. When the pressure of the hand is removed, they will rest against the inner edge of the posts and the metal plates through which the posts extend. By rotating the handle 6 in a plane midway between the two wires, the wires will be gradually forced to the tops of the posts 1 and 2 and will be released from lateral pressure simultaneously, thus setting up a wave in each wire at the same instant of time.

Throughout this description of our invention we have explained our method and apparatus as applied to a pair of conductors. Since the invention is equally applicable to a greater number of conductors, or pairs of conductors, it must, obviously, not be construed as limited to a single pair.

While this invention has been disclosed as embodied in certain forms, it is capable of embodiment in other and different forms without departing from the spirit and scope of the appended claims.

What is claimed is:

1. The method of determining the difference in the sags of two conductors in substantially parallel planes which consists in setting up a wave in each conductor at the same instant of time and at substantially the same position on each conductor and determining the number of times the waves travel from one end of the span to the other end and back again before appearing to get out of phase.

2. A device for setting up mechanical waves simultaneously in both wires of a pair of electrical conductors comprising a member having prongs thereon, said prongs being adapted to hold both wires at a distance apart less than the normal separation of the wires; a second member adapted to rest upon the said wires, and a third member attached to both of said other members in such manner that when pressure is applied to the free end of the said third member the second member acts as a fulcrum to effect the removal of the first member from engagement with the said wires.

JAMES J. PILLIOD.
ELLWOOD B. GRIFFEN.