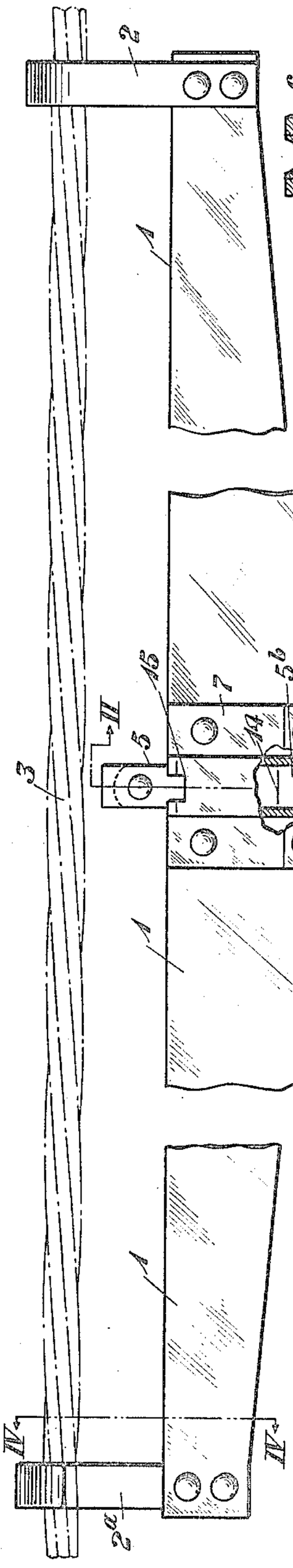
T. C. SMITH.

DEFLECTION DYNAMOMETER.

APPLICATION FILED APR. 11, 1919.

1,400,776.

Patented Dec. 20, 1921.



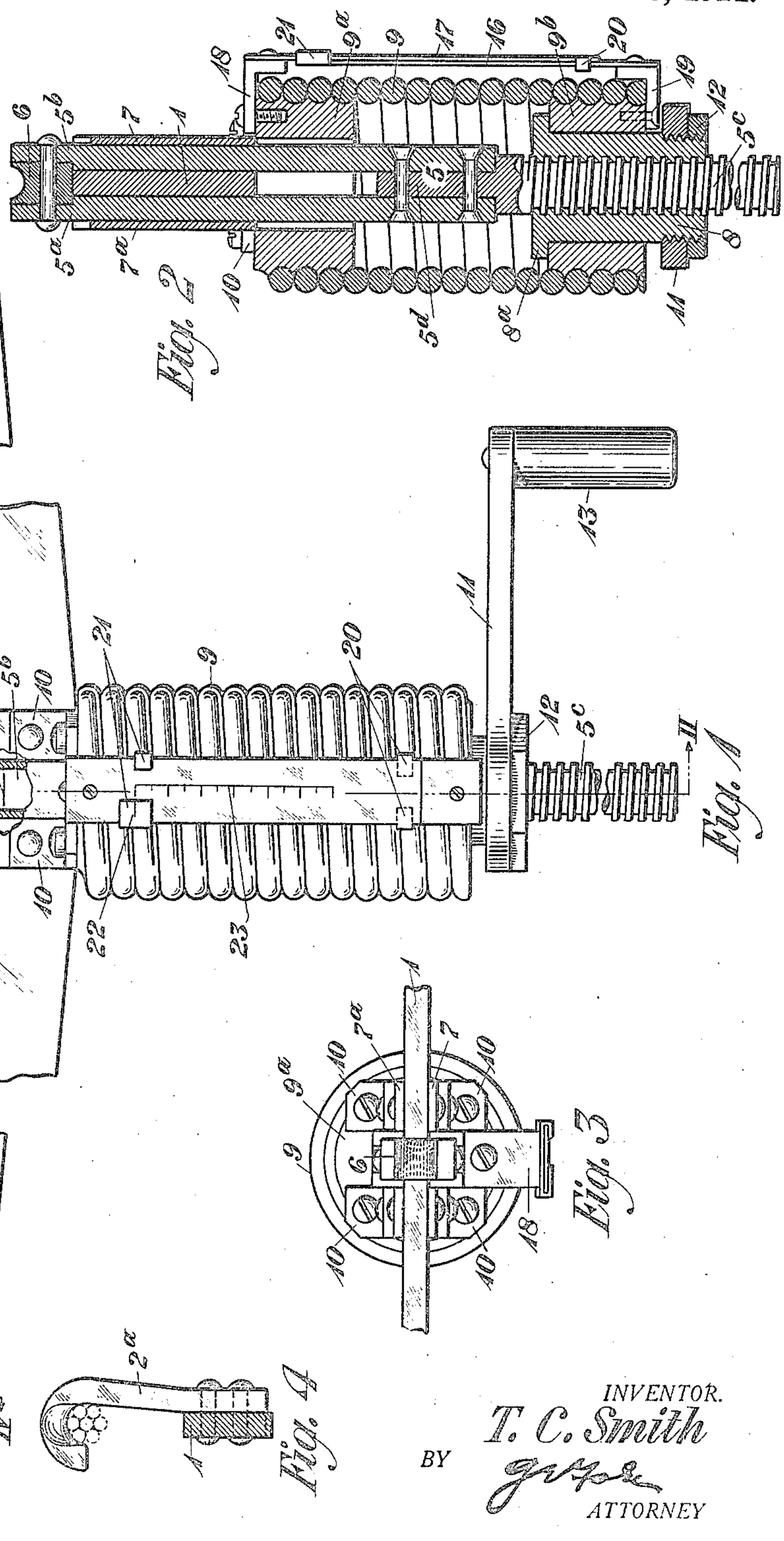


Fig. 2

Fig. 1

Fig. 3

Fig. 4

INVENTOR.

T. C. Smith

BY

ATTORNEY

UNITED STATES PATENT OFFICE.

TEMPLE C. SMITH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

DEFLECTION-DYNAMOMETER.

1,400,776. Specification of Letters Patent. Patented Dec. 20, 1921.

Application filed April 11, 1919. Serial No. 289,393.

To all whom it may concern:

Be it known that I, TEMPLE C. SMITH, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain Improvements in Deflection-Dynamometers, of which the following is a specification.

This invention relates to improvements in deflection dynamometers.

It is an object of this invention to provide a simple and accurate device for determining the tension in a span of wire at an intermediate point of the span without interrupting the continuity of the wire. This is accomplished by causing a portion of the wire or strand under test to be deflected from its normal position and then ascertaining the force necessary to hold the strand thus deflected. Means are provided by this invention whereby in each measurement the distance through which the strand under test is deflected may be made the same, irrespective of the strand tension, so that the force necessary to hold the strand deflected is in each case the same fractional part of the tension in the strand. In the preferred embodiment of the invention, the strand is held in its deflected position by means of a spring, and a gage is provided to show the elongation of the spring, which gage is calibrated preferably to indicate directly the tension in the strand.

A better understanding of this invention may be had by reference to the accompanying drawing, in which Figure 1 is a view showing an elevation of a dynamometer embodying this invention. Fig. 2 is a view showing a longitudinal section of Fig. 1 taken on lines II—II looking in the direction of the arrows. Fig. 3 is a plan view of the central portion of Fig. 1. Fig. 4 is a view showing a section of Fig. 1 on lines IV—IV looking in the direction of the arrows. Similar reference characters refer to similar parts in each of the several views.

In the drawings reference character 1 designates a tapered metal beam which is provided at its ends with hooks 2 and 2^a by means of which the instrument may be suspended from a strand 3, the tension of which is to be determined. Although the strand is shown in the drawing as a twisted cable, it is to be understood that this invention is not limited thereby and the term "strand" is used herein to designate any flexible tension member. Midway between hooks 2 and 2^a is provided a vertical plunger 5 which, as shown in Fig. 2, comprises flat bars 5^a and 5^b, and a threaded shank 5^c, the said bars being riveted at their lower ends to a flat extension 5^d of shank 5^c, which extension is of such thickness that bars 5^a and 5^b are spaced apart the thickness of beam 1. A block 6 is riveted between the upper ends of bars 5^a and 5^b and this block is grooved as shown to provide a rounded surface for engaging the strand 3. On the sides of the beam are fixed guide members 7 and 7^a which inclose bars 5^a and 5^b and thus permit only vertical movement of the plunger with respect to the beam. A helical spring 9 surrounds the plunger and serves as a resilient connection between the plunger and the beam. For this purpose the upper and lower convolutions of the spring are firmly affixed to cylindrical blocks 9^a and 9^b, the block 9^a serving to secure the spring to the beam 1 by means of angle blocks 10, and the lower block 9^b serving to support the plunger 5 by means of a sleeve 8 screwed over the shank 5^c and revolubly supported in block 9^b by means of a collar 8^a. A crank 11, having a handle 13, is screwed on the lower end of block 8 and firmly secured in place by means of a locknut 12.

The device as thus far described may be operated to deflect strand 3 by merely rotating the crank 11 in a clockwise direction, and thus causing sleeve 8 to revolve on plunger 5 and force the same to move upwardly into engagement with the strand 3. During this time no pressure is exerted on the spring other than the weight of the plunger and its associated movable parts and this is not sufficient to cause an appreciable elongation of the spring. After the plunger has engaged the strand a further upward movement thereof causes a deflection of the strand upwardly and this is resisted by the tension in the strand. This resistance is transmitted by collar 8^a to the spring 9 and the spring is thus caused to stretch a corresponding amount.

The extent to which the strand is deflected is indicated by an index 14 placed on the face of bar 5^b (see Fig. 1) which mark coöperates with a corresponding index on the notch 15 of guide 7. In the use of the

instrument the rotation of crank 11 is continued until these indices are opposite each other.

There is further provided a device for indicating the elongation of spring 9, which device comprises an inner and an outer metal strip, 16 and 17 respectively, the inner strip being attached by means of an angle block 19 to the lower block 9^b, and the outer strip being attached by a similar block 18 to the upper block 9^a. Each strip is provided, adjacent its free end, with a pair of ears 20 and 21 respectively, which are folded over the other strip and serve to guide one strip over the other as the spring expands or contracts. The upper left ear (in Fig. 1) of the inner strip is provided with an index 22 which coöperates with a scale 23 impressed on the outer strip to indicate the extent of elongation of the spring.

Since by means of the present invention the strand for each measurement is deflected through a fixed distance, a definite fraction of the tension in the strand is transmitted to the spring in each measurement. Consequently, the elongation of the spring is directly proportional to the tension in the strand and the graduations on scale 23 may be marked directly in terms of strand tension.

The use of the instrument is readily understood from the above description thereof. For each measurement it is necessary merely to suspend the instrument from the strand under test by means of hooks 2 and 2^a, and to rotate crank 11 until plunger 5 has engaged the strand and deflected the same to such extent that index 14 is opposite the corresponding mark on notch 15. The tension in the strand is then read off scale 23 by noting the position of index 22. To remove the instrument from the strand, crank 11 is rotated in the reverse direction until plunger 5 is out of engagement with the strand.

Although only one form of the invention is shown herein, it is understood that various changes and modifications may be made therein within the scope of the following claims without departing from the spirit or scope of the invention.

What is claimed is:

1. A tension dynamometer comprising a member for engaging one side of the strand at a plurality of points and a second member for engaging the opposite side of the strand at an intermediate point, means for preventing rotation of the second member relatively to the first, a tension spring affixed to the first of said members, a threaded connecting device between said spring and said second member, a lever device for operating said connecting device, and means for indicating the extent of the relative movement of said members.

2. A tension dynamometer comprising a member for engaging one side of the strand and a second member for engaging the opposite side of the strand, a spring affixed to one of said members, a threaded connecting device between said spring and said second member, a lever device for operating said connecting device, means for indicating the extent of relative movement of said members, and a device for indicating the stress in said spring.

3. A deflection dynamometer comprising a beam, strand engaging members at each end thereof, a spring fixed to the center of said beam, an intermediate strand engaging member slidable relatively to said beam and threaded at its lower end, a threaded sleeve in operative relation with said threaded part of the intermediate member, means on said spring for engaging said sleeve, a lever device for rotating said block on said intermediate member, means for indicating the relative movement of said strand engaging members, and means for indicating the elongation of said spring.

4. In a deflection dynamometer, a beam, hooks at the ends of said beam for suspending the same from a strand, a plunger for engaging said strand at its lower side, said plunger comprising a pair of parallel bars, one on each side of said beam, guide plates affixed to said beam and inclosing said bars to restrain the said plunger to transverse movement relative to said beam, a helical tension spring, means for affixing the convolutions of one end thereof to said beam, a threaded shank affixed to the said parallel bars of the plunger, a threaded sleeve for coöperating with said shank, a hollow block affixed to the convolutions of the other end of the said spring, a collar on said sleeve for supporting the same in said block, a lever arm for causing rotation of said sleeve on said threaded shank, a pair of members, one associated with one end of the spring and the other with the other end thereof, for coöperating with each other to indicate the tension in said spring, and coöperating indices associated with said plunger and beam, respectively, to indicate the extent of relative movement thereof.

In testimony whereof, I have signed my name to this specification this 9th day of April, 1919.

TEMPLE C. SMITH.