No. 836,977. PATENTED NOV. 27, 1906.

J. KELLEY.

WIRE TENSIONING DEVICE.

APPLICATION FILED JAN. 26, 1903.

Fig. 3.

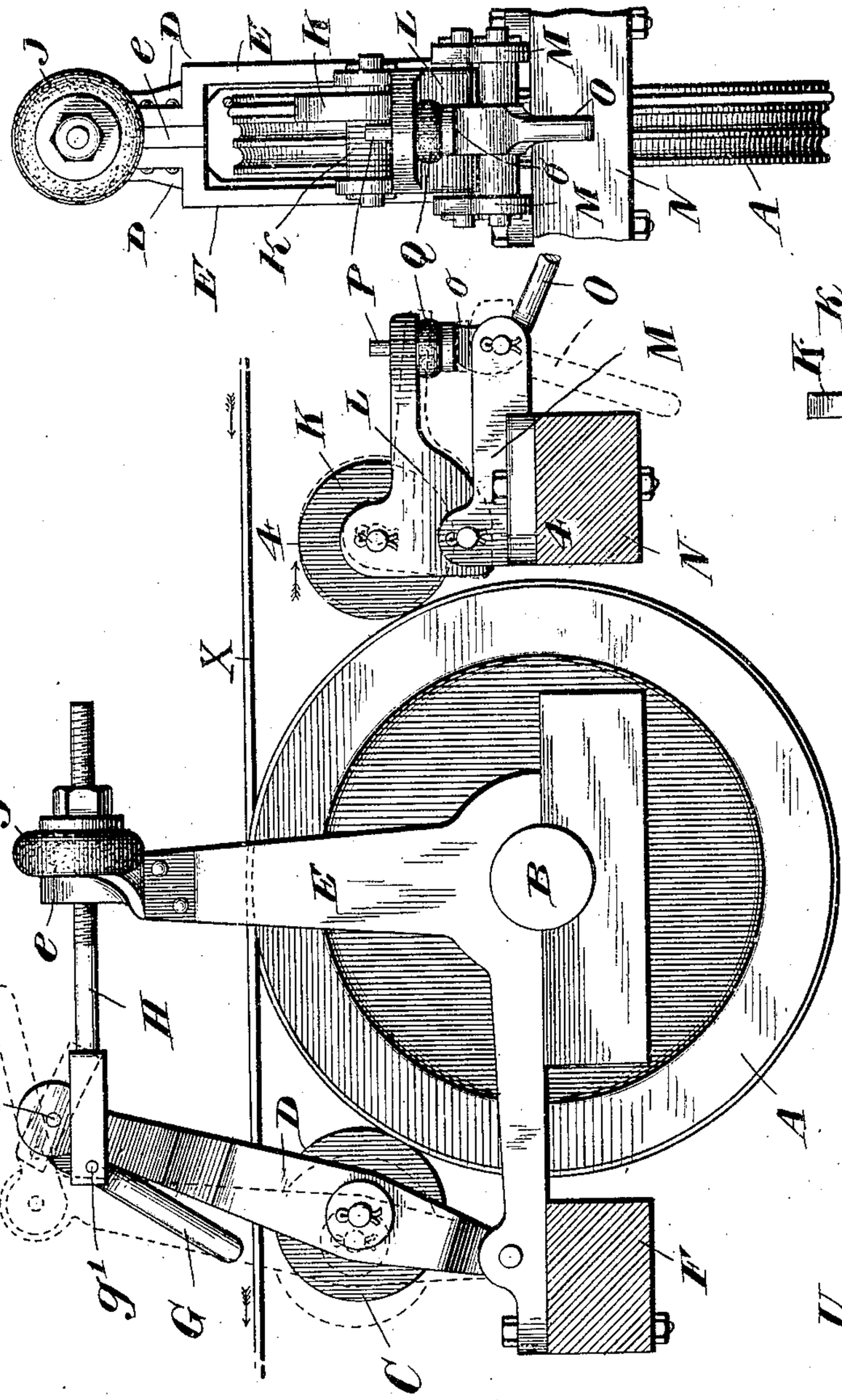

Fig. 4.

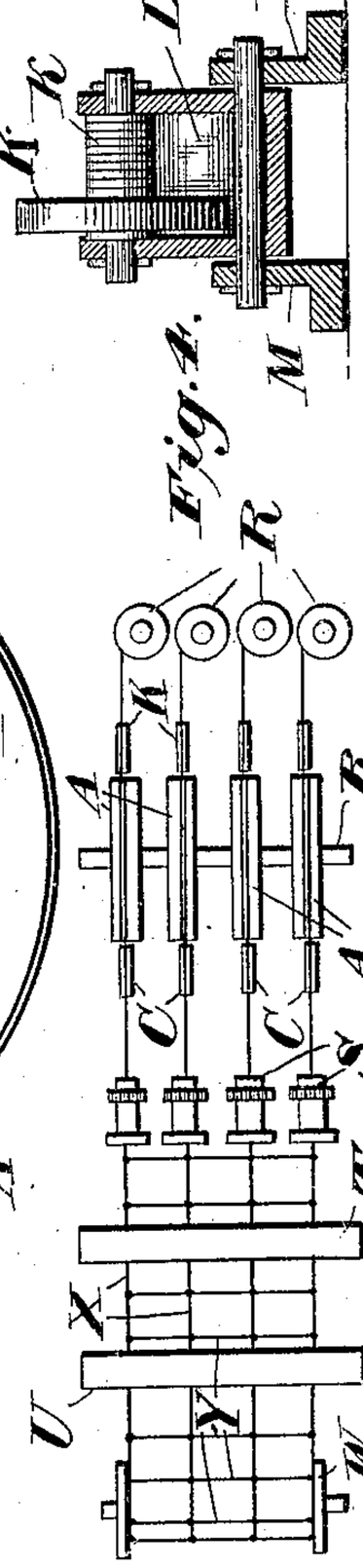

Fig. 2.

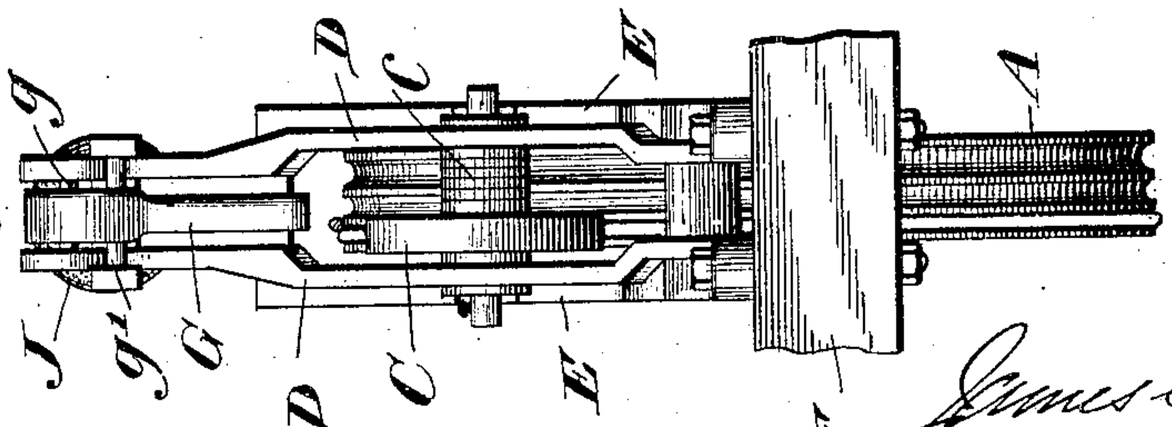

Fig. 5.

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UNITED STATES PATENT OFFICE.

JAMES KELLEY, OF RICHMOND, INDIANA, ASSIGNOR TO PETTIS A. REID, OF RICHMOND, INDIANA.

WIRE-TENSIONING DEVICE.

No. 836,977. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed January 26, 1903. Serial No. 140,587.

To all whom it may concern:

Be it known that I, JAMES KELLEY, a citizen of the United States, residing at Richmond, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Wire-Tensioning Devices; and I do hereby 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.

This invention relates to wire feeding and tensioning devices for wire-fence making, fabric-weaving, and other wire-working machinery.

In the manufacture of wire fencing or other fabric it is necessary that the several strands or line-wires be drawn through the machine in equal lengths and under uniform tension, in order to produce a fabric of uniform tension and elasticity throughout, with every part equally taut, for the slightest variation in the rates of feed of the wires or the degrees of tension with which they are held will result in a great difference in their lengths in any considerable length of the finished fabric, as a furlong or mile, and hence will cause buckling or bagging of the fabric.

Letters Patent of the United States No. 721,605, dated February 24, 1903, to Pettis A. Reid, James Kelley, (myself,) and Walter V. Reid, for a wire-fabric-making machine, illustrate, describe, and claim improved tension devices for the strand-wires consisting of a series of uniformly-rotative disks or guide-rollers over which the wires advance from the supply-spools to the twisting or weaving mechanism and a series of tension-rollers which bear with great pressure against the wires on said guide-rollers, thus preventing the wires from slipping and holding them under high tension against the devices which draw them through the machine. The guide-rollers have circumferential grooves to receive the wires, each roller having preferably a number of such grooves of different sizes, so that where wires of different sizes are to be used in the same fabric the several wires may be fitted in the proper grooves of their respective rollers with the centers of all the wires substantially equidistant from the center of rotation, whereby when the wires are drawn or pulled through the machine they will necessarily be advanced in equal lengths, as explained in the specification of said patent. The tension-rollers are mounted in movable supports connected with pressure devices for forcing the tension-rollers against the guide-rollers and provided with manipulative levers, whereby the tension-rollers may be released from the guide-rollers or forced thereto against resistance by said pressure devices, the parts being self-locking in position to apply the pressure.

In practice it is found that where the machine is managed by careless workmen the tension-rollers may not be forced down against the wires in the grooves with sufficient pressure, while unless a very heavy pressure is maintained the wires will slip more or less, and thus the object of the tensioning devices will be defeated.

The purpose of my present invention is to overcome this objection and to provide a tensioning device which will permit the wire to advance only as the guide-roller is rotated and will prevent any slipping thereof by reason of careless manipulation of the tension-roller.

The invention will first be described with reference to the accompanying drawings, which form a part of this specification, and will then be pointed out more particularly in the annexed claims.

In said drawings, Figure 1 is a side view of a device embodying my invention. Figs. 2 and 3 are left and right hand end views thereof. Fig. 4 is a detail vertical cross-section on line 4 4 of Fig. 1; and Fig. 5 is a small diagrammatic plan of a wire-fabric-making machine, illustrating the application of my invention thereto.

In the drawings accompanying the aforesaid patent the tension-roller is shown located at the front of the guide-roller (speaking with reference to the direction of feed of the wire) and at a point somewhat removed from the point where the wire leaves the guide-roller, so that a substantial length of wire is always confined in the groove of the guide-roller and proper advance of the wire thus assured. My present improved tensioning device is similar to that shown in said application; but the wire is caused to encircle the guide-roller instead of merely passing over a part of it. The position of the tension-

roller is transposed to the rear, where it bears against the wire at a distance of about seven-eighths of the circumference of the guide-roller from the point where the wire leaves the latter, thus causing a positive adhesion of the wire in the groove for nearly the entire circumference of the guide-roller, and preferably an auxiliary tension-roller or suitable pressure device is located at the front of the guide-roller near the point where the wire leaves the same to insure keeping the wire in its groove at all times, as well as to increase the tension on the wire.

In the drawings, A designates a peripherally-grooved disk or guide-roller rigidly mounted on a shaft B, which is journaled in suitable bearings. The wire X, which is to be tensioned, passes around said roller, the direction of its movement being indicated by arrows in Fig. 1, where said wire is shown passing from the right or front to and around said roller and thence to the left or rear, being pulled in such direction by any suitable means. The roller has preferably a number of peripheral grooves of substantially semicircular section and of different depths corresponding to different-sized wires for the purpose already explained of having the center of the wire always at the same distance from the center of the roller, so that a series of wires of different diameters when drawn through the wire-working machine will be advanced in equal lengths.

The letter C denotes a pressure appliance or tension-roller which is preferably located at the rear and bears against the wire just after it reaches the guide-roller. The pull on the wire is thus exerted against the pressure or resistance of said tension-roller, and by reason of the location of the latter the wire is under tension nearly all the way round the guide-roller and is consequently caused to adhere positively in its groove, so that when pressure is applied to the tension-roller the wire cannot slip, but will be drawn out or rearward only as it rotates the guide-roller. This tension-roller C is shown mounted in a rocking frame or support D, which is of such width as to permit adjusting the tension-roller therein to cover any one of the various grooves in the guide-roller, such adjustment being readily effected by means of washers *c*, interposed between the tension-rollers and the sides of the frame D. The lower end of this rocking frame or support is preferably fulcrumed between the rearwardly-extending members of angle-shaped irons or brackets E, which members are secured to a suitable beam or support F. Said angle-shaped brackets are loosely mounted on the shaft B at opposite sides of the guide-roller, their vertices being suitably enlarged and having openings to receive the shaft, and the upright members of said brackets are joined together, as by a connecting-iron *e* and bolts or rivets, and said brackets constitute braces which receive the strain from a manipulative lever G for forcing the tension-roller against the guide-roller or releasing it.

The lever G is pivoted or fulcrumed, as at *g*, to the upper or free end of the frame D, which for the purpose of leverage is preferably longer than the lower end of said frame, and said lever is also eccentrically pivoted, as at *g'*, to a pull-piece H, having connection slightly yieldable under heavy tensile strain with the upright members of the angle-shaped brackets or brace E. In the construction shown said pull-piece consists of a yoke inclosing lever G and the upper end of frame D, between which said lever is pivoted, and a bolt loosely fastened to said yoke and passing through and secured in front of the connecting-iron *e*, a compression-spring, such as the stout hard-rubber buffer J, being interposed between said connecting-iron and the fastening-nut.

When the tension-roller is released or withdrawn from contact with the guide-roller or the wire around it, the parts assume substantially the relative positions indicated by dotted lines in Fig. 1, the lever G being raised and thrown forward with the pivot *g'* in advance of the pivot *g*. To apply the tension, the lever is carried backward, moving the frame D so as to bring the tension-roller in contact with the guide-roller or against the wire, and after such contact by applying sufficient pressure on the lever, and thereby pull on the pull-piece to compress the spring or buffer J, (which is designed to be compressible only under great force,) so as to carry the pivot *g'* past a point behind the pivot *g*, said lever is forced down to the position shown in full lines, the pressure obtained being considerably increased by the leverage acquired through the frame D. In such position the lever is obviously self-locking, so that heavy pressure is always maintained against the wire, and such pressure is constant, being yieldable only by compression of the spring J. It will be observed also that the frames D and E are connected at their adjacent extremities, so that upward pressure on the shaft B is substantially counterbalanced by pressure of the tension-roller against the guide-roller, the device being thus self-bracing.

What has been described so far is substantially similar to the device shown in the aforesaid application except that the wire is carried entirely around the guide-roller and the tension-roller is transposed to the rear, or the whole device is turned round about, the advantages of which have already been explained. The wire is thus held in contact with the guide-roller around its whole circumference and being under tension from the tension-roller onward is caused to adhere to said guide-roller for about seven-eighths of its

circumference, so that the slipping of the wire between the two rollers is absolutely prevented. This construction is particularly advantageous where a series of wires are being drawn through the machine either over the same guide-roller or a number of uniformly-rotative rollers, for each wire can thus advance only as the rollers are turned by the wires, thus insuring feed of all the wires in equal lengths. It will be understood that the invention is not restricted to the particular form of pressure appliance shown and described, though this is preferred, but numerous other devices could be substituted.

As before stated, I preferably employ in conjunction with the device thus described an auxiliary pressure appliance located at the front or opposite side of the guide-roller and bearing on the wire just before it leaves the guide-roller, thus holding the wire in its groove at all times whether it is under tension or not, as well as increasing the pressure or tension against which the wire is to be pulled. This auxiliary appliance is not absolutely essential, but is very desirable for the purposes stated.

The auxiliary pressure device shown consists of a tension-wheel K, mounted in a rocking frame or support L and laterally adjustable therein by means of washers *k*, Fig. 3, so as to cover any desired groove in the guide-roller similarly to the first tension-roller. The frame L is shown fulcrumed between two supports M, secured to a beam N. Said supports have rearward members between which is fulcrumed a manipulative lever O, having its short arm *o* formed as a cam or forwardly curved and terminating in a blunt or flat end. An upright bolt P, having its head resting on said short arm of the lever, passes loosely through an opening in a forwardly-extending arm or member of the rocking frame L, and a stout hard-rubber buffer or compression-spring Q is interposed between said arm and the bolt-head. When said tension-roller K is released or withdrawn from the guide-roller, as indicated by dotted lines in Fig. 1, the lever O is thrown down, its short arm or cam *o* thus extending horizontally forward, so that the bolt P, with the spring Q, are allowed to drop down. To apply the pressure, said lever is pulled up to full-line position, thus turning its short arm or cam to upright position, so that the bolt is forced upward, thereby rocking the frame L, so as to force the tension-roller against the wire on the guide-roller. In this position the tension-roller can yield only as permitted by compression of the spring. The device is also self-locking in position to apply the pressure, since the head of the bolt P then rests on the flat extremity of the short arm *o* of the lever immediately above the pivot or fulcrum thereof. In place of the device thus described such a device as shown at the left of the guide-roller might be employed, or any suitable pressure appliance could be substituted.

In practice after the wire is carried around its guide-roller the main pressure appliance or tension-roller C is first applied, then the wire is pulled backward by the draw or winding devices or the feed mechanism of the machine, thus drawing it taut and causing it to grip the periphery of the guide-roller, and then the auxiliary pressure device or tension-roller K is applied.

Fig. 5 is a diagrammatic plan of a wire-fabric-making machine similar to that shown in the aforesaid patent and representing an application of my present invention. In this machine a series of parallel strand-wires X pass from spools R to and around a series of guide-rollers A, which are shown with the coacting pressure appliances or tension-rollers C and K, and thence rearward through a series of twisters S, which attach cross-wires Y to said strand-wires. From the twisters the fabric passes between a pair of stationary jaws T and between a pair of reciprocating jaws U (only the upper jaws being shown in both cases) and thence to a winding-reel W. The traveling jaws U at the end of each forward movement grip all the strand-wires and then on backward travel pull said wires against the resistance of the tensioning devices. At the end of their backward travel the stationary jaws T grip and hold the wires taut, while the reciprocating jaws release them and move forward for the next grip. The guide-rollers A are all keyed to the same shaft B, so as to be rotatable in unison, and as the strand-wires adhere positively to said guide-rollers and the centers of all the wires, whatever their diameters may be, are equidistant from the axis of rotation by reason of the graduated grooves in the rollers it follows that the centers of all the wires will rotate in exactly equivalent circles, and hence the wires will be advanced in absolutely equal lengths as well as under substantially uniform tension. A single long roller with a series of grooves for all the wires may be employed, though a series of guide-rollers is preferred, since they may be set at different distances apart, and the portions of the shaft B between them may be utilized for mounting thereon the angle-shaped frames or braces E.

In some cases instead of having the pressure appliance or appliances coacting with the guide roller or rollers the wire or wires may be gripped and pulled forward by any suitable tensioning device before it reaches the guide roller or rollers, thus resisting the pull of the device or devices which draw the wire or wires through the fabric-weaving or other machine and causing positive adhesion of said wire or wires in the groove or grooves in the same manner as already explained.

It will be understood that the invention is

applicable to any machine or apparatus wherein either a single wire or a series of wires are to be operated upon under tension.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with means for pulling or drawing a wire, a tensioning device comprising a peripherally-grooved roller encircled by the wire in advance of said pulling means, and a coacting pressure appliance located and operating immediately behind the point where the ongoing portion of the wire reaches said roller, said pressure appliance comprising means for bearing on the wire with a substantially non-yielding pressure, thereby causing an absolute adhesion of the wire in its groove around substantially the whole periphery of the roller, and means for manipulating said pressure appliance to apply or release the pressure.

2. A wire-tensioning device comprising a roller adapted to be encircled by the wire in advance of a pulling device, a pressure appliance coacting therewith shortly behind the point where the ongoing length of the wire reaches said roller, means for releasing said appliance from contact with the wire, means for forcing said appliance against the wire and maintaining a practically non-yielding pressure thereon, and an auxiliary pressure appliance coacting with said roller just before the point where the wire leaves the same.

3. In combination with means for pulling a wire, a tensioning device comprising a roller located in advance of the pulling means, said roller having a peripheral groove and being encircled by the wire lying in said groove, pressure appliances coacting with the roller so as to engage the ongoing and offgoing parts of the wire, and means for sustaining said appliances out of contact with the wire and for forcing them under heavy pressure against the wire at will, substantially as described.

4. In a wire-tensioning device, the combination with a roller over which the wire is drawn, of a pressure appliance comprising a coacting tension-roller, a rocking support therefor, an independently-fulcrumed lever having a cam beneath said support at one side of the pivot of the latter, an inverted bolt inserted through said support with its head resting on said cam, and a stout compression-spring interposed between said bolt-head and support; the arrangement being such that in one position of the lever its cam permits the bolt to drop, while in another position said cam rides under and lifts said bolt, moving the support so as to apply the pressure, substantially as described.

5. In a wire-tensioning device, the combination with a roller over which the wire is drawn, of a pressure appliance comprising a coacting tension-roller, a movable support therefor, and an independently-fulcrumed lever having a cam adjacent to said support, the arrangement being such that in one position of the lever its cam permits said support to release the tension-roller while in another position said cam rides against and moves said support so as to apply the tension-roller, substantially as described.

6. In combination with means for pulling or drawing a wire, a tensioning device comprising a guide-roller encircled by the wire in advance of said pulling means and having its offgoing and ongoing runs crossing, and a pressure appliance coacting with said roller shortly behind the point where the ongoing portion of the wire reaches the same, said appliance comprising a tension-roller, a movable frame therefor, and a manipulative lever adapted to move said frame and in one position hold it locked to bear the tension-roller with practically non-yielding pressure against the guide-roller.

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

JAMES KELLEY.

Witnesses:
WALTER V. REID,
E. G. KEMPER.