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E. S. HINELINE

MEANS FOR MAINTAINING UNIFORM THE TENSION UPON YARN OR THREAD

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Fig. 1.

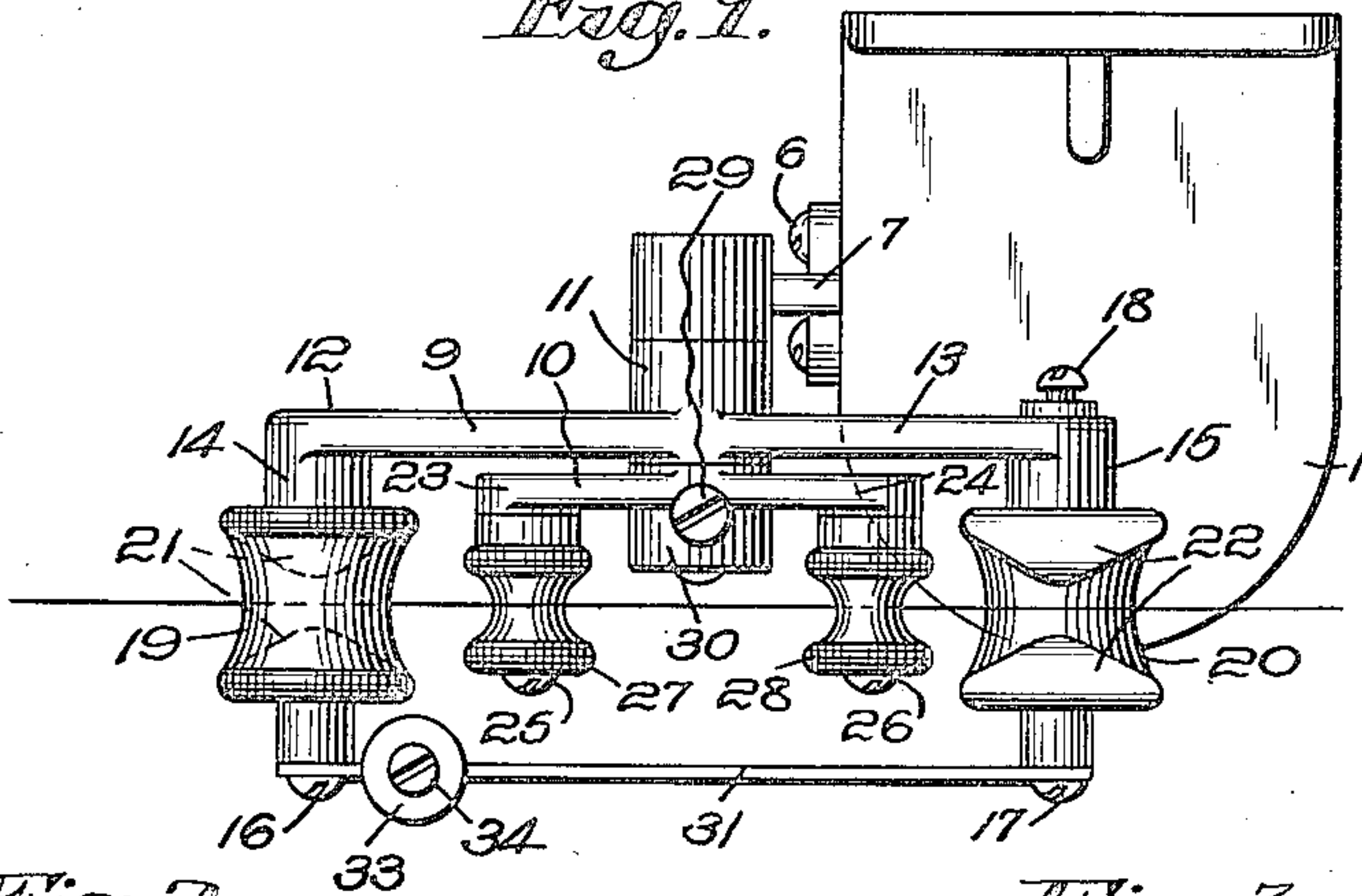


Fig. 2.

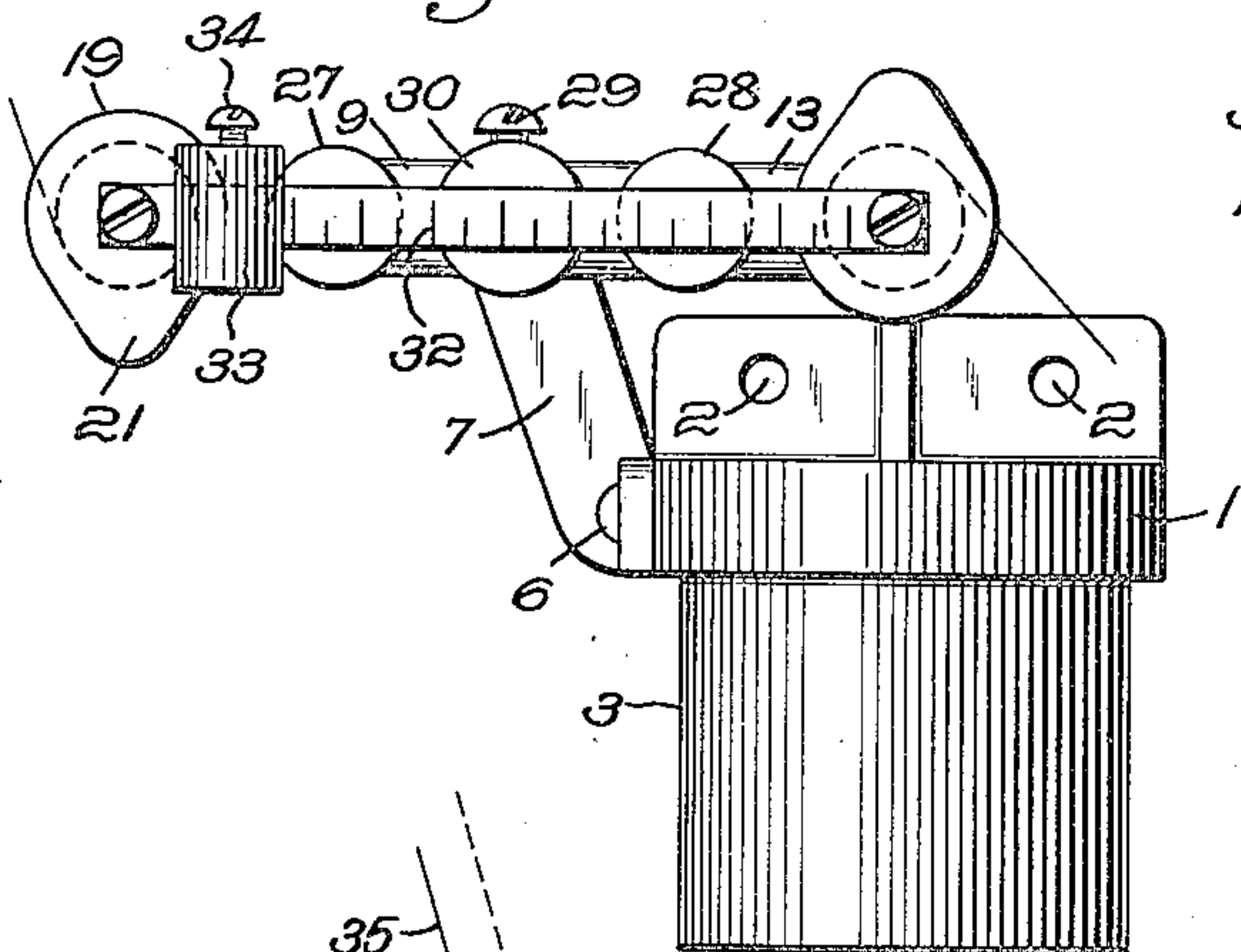


Fig. 3.

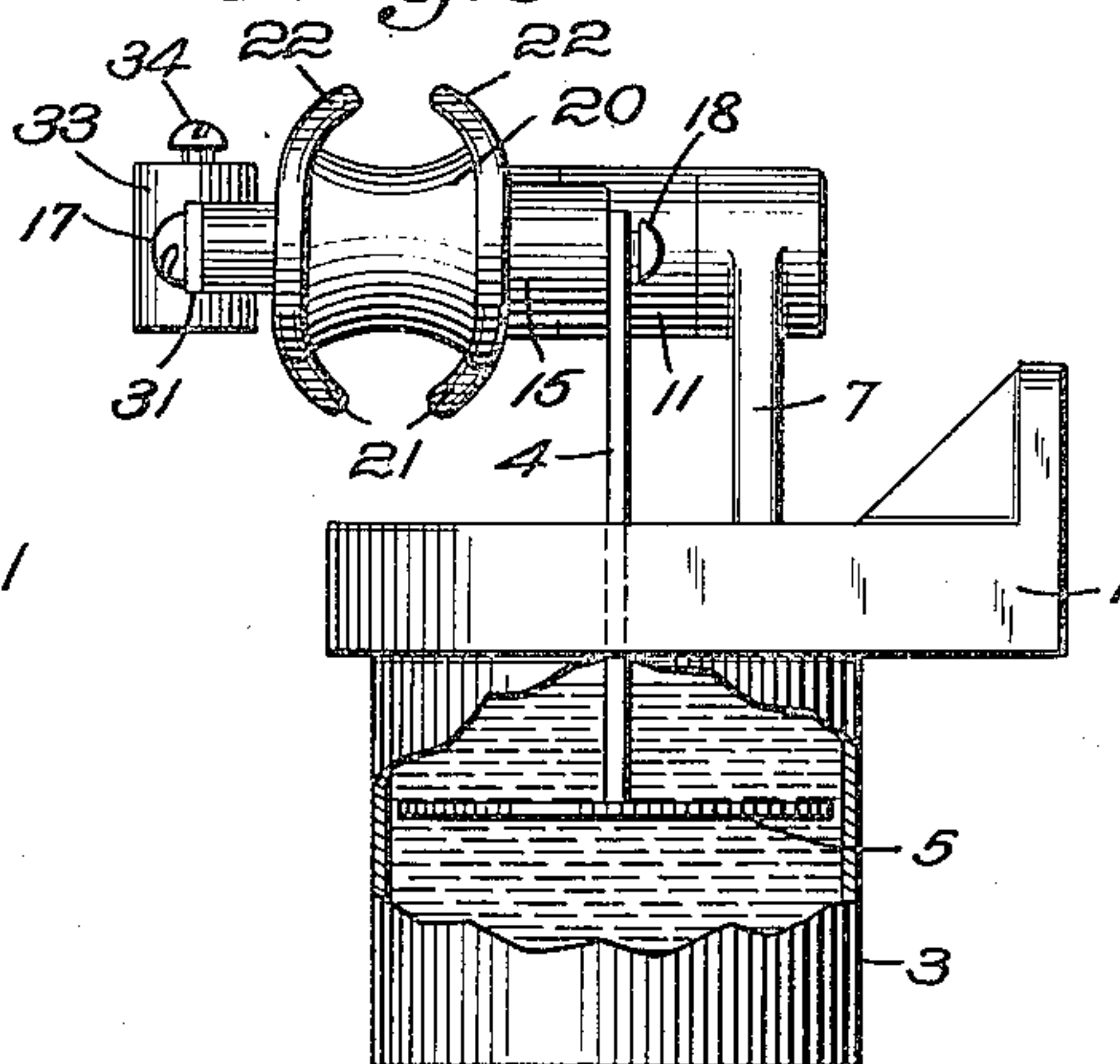
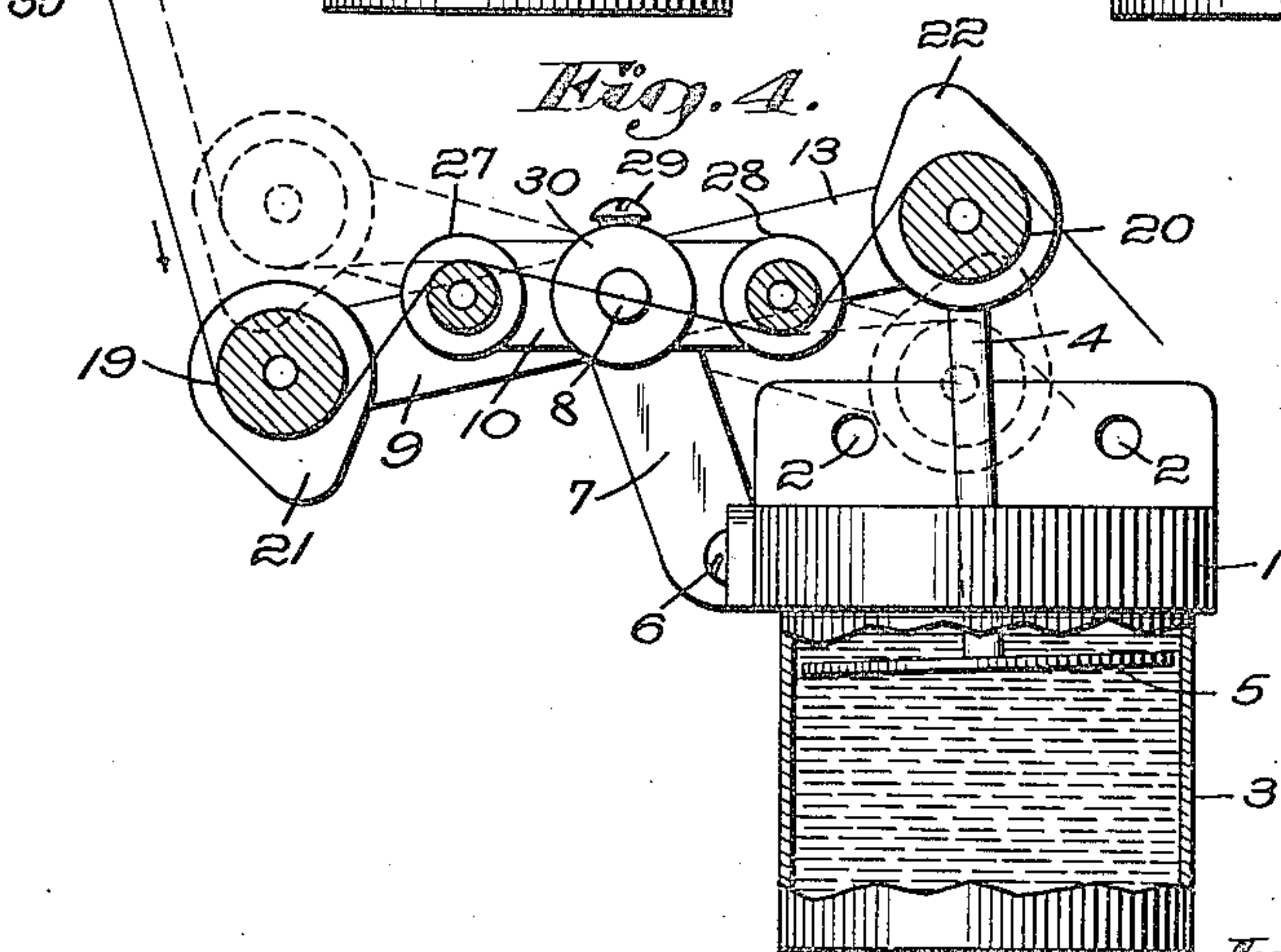


Fig. 4.



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# UNITED STATES PATENT OFFICE.

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MEANS FOR MAINTAINING UNIFORM THE TENSION UPON YARN OR THREAD.

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*To all whom it may concern:*

Be it known that I, EDSON S. HINELINE, a citizen of the United States, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented an Improvement in Means for Maintaining Uniform the Tension Upon Yarn or Thread, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to mechanism for maintaining uniform the tension upon yarn or thread as it is fed to textile machines. In order that the principle of the invention may be readily understood, I have disclosed a single embodiment of means whereby my invention is or may be practiced.

In the drawing,—

Fig. 1 is a plan view of the preferred embodiment of my invention;

Fig. 2 is a side elevation thereof;

Fig. 3 is an end elevation thereof and representing the wall of the liquid-resistance container as broken away; and

Fig. 4 is a view partially in longitudinal section and partially in side elevation and showing in full and in dotted lines respectively two positions of the parts and also representing the wall of the liquid-resistance container as broken away.

My invention is adapted for use with many different types of textile machines, and has been found to be of marked efficiency in connection with knitting machines and especially with hosiery machines or machines wherein separate pieces, such as stockings, are knitted and which pieces should be of the same length, but which heretofore have differed in length as much as one or two inches, owing to the fact that during the knitting thereof, the yarn tension has changed from time to time contrary to the desired operation, thereby changing the stitch length.

So serious has been the factor of unequal length production of stockings in hosiery mills that it is usually necessary in such a mill to have the stockings sorted, placing those of the same length with each other. This means that the product of the mill is not uniform. My invention in practice has remedied this difficulty.

I am aware of the fact that heretofore

many attempts have been made to equalize the tension upon yarn or thread as it is fed to knitting or other machines. Heretofore it has been proposed to employ two frames or members, each having guiding rolls or bars, said members being relatively movable so that under change in yarn tension, they rock with relation to each other. A vital objection to such devices heretofore, so far as they are known to me, has been that when the yarn tension changes, as, for example, when the tension tightens, the movable member is swung with relation to the other member, or both swing, and too far, causing the movable member to "chatter," and thereby causing the yarn to have a jerky motion, and the tension in such jerky movement becomes alternately too slack or excessive.

I am aware that it has been proposed to employ a spring against the action of which the tensioning device moves as illustrated in Swiss Patent No. 22,908, dated November 16, 1900. The coil spring of such device, however, obviously acts unevenly and offers more and more resistance to the movable member under pull upon the yarn and less and less if the yarn slackens. In accordance with my invention, on the contrary, the movements of the movable parts are "dampened," or at all times evenly resisted and preferably by reason of a member movable in a reservoir of a sluggishly moving liquid, such as oil, as hereinafter more fully set forth.

Referring more particularly to the drawing, I have therein represented at 1 a bracket provided with screw holes 2, by which it may be attached to the framing of the machines, such, for example, as a knitting machine. Secured to or forming a part of said bracket is a metal or other container 3 having therein some sluggishly moving liquid, such, for example, as a sufficiently heavy oil. The bracket 1 constitutes a cover for the container 3, but is provided with an opening (not shown), wherein operates a link 4 or like part, to the lower end of which within the container 3 is attached a plunger 5 of slightly less diameter than the internal diameter of the container 3, or if desired, provided with one or more holes. The construction is such that as the plunger 5 is moved in either direction under stress of the yarn or temporary relaxation of the proper tension, the oil or other suitable slug-



gish liquid flows slowly from one face of the plunger to the other, and in doing so retards the movement of the link 4 and the movable member or frame of the tension device, the approved form of which I will now describe.

Desirably secured by screws 6 to the edge of the bracket 1 is an arm or casting 7 having in the upper end thereof a pin 8 rigid therein and of sufficient length to carry two yokes, frames or members respectively shown at 9 and 10. The frame 9 is provided with a hub 11 having formed therewith or attached thereto the arms 12, 13, which are provided at their ends with hubs or enlargements 14, 15, wherein are mounted screws or pins 16, 17. The upper end of the link 4 is connected to the outer end of the arm 13 by a screw 18, but in such a manner as to permit slight relative movement of the member 9 and the link 4. Mounted upon the pins or screws 16, 17 respectively, are two guides 19, 20, desirably formed of porcelain or similar material and desirably shaped as shown in the several figures, thereby providing lateral guides 21, 21, 22, 22, which are so positioned as to cause the incoming thread to pass between them and be guided by them. In Figs. 3 and 4, it will be observed that the guides 21, 21, receive the incoming thread which passes from above down under the guide roll 19, and it will be observed that the guides 22, 22 receive between them the thread that passes over the guide roll 20. Thus both at the point of entrance of the thread to the tension device and the point of exit of the thread therefrom, the thread is properly guided and is prevented from escaping.

The frame or member 9 is loosely mounted at the hub 11 upon the line 8, but its rocking movement is restrained by the action of the sluggishly moving liquid in the container 3.

The yoke or member 10 is provided with two arms 23, 24, each of which at its outer end has secured therein at right angles to the direction of extent of the arms, screws 25, 27 respectively, upon which are positioned either tightly or for slight turning movement the guides 27, 28, which desirably are of porcelain or some like material. Preferably I provide a set screw 29 extending into an opening in the hub 30 of the member 10, so as to engage the pin 8 and hold the frame 10 from rocking movement, though if desired a slight rocking movement thereof may be permitted. Preferably, however, the member 9 is permitted to rock under the tension or slackening of the yarn or thread, but against the resistance of the plunger 5, and preferably member 10 is restrained from rocking movement.

Desirably I provide a member 31 extending between and held in place by the screw 16, 17, and upon said member I mark or

otherwise form a scale 32 along which a weight 33 may be positioned at any desired point, said weight being provided with a set screw 34 by which it can be fixed at the proper position, but permitting adjustment from time to time as may be desired, or as the particular requirement of the machine to which the device is attached requires. The weight in any position has a constant value, and in this respect acts like the weight on the beam of a pair of scales. By this construction I am enabled therefore always to fix the tension upon the yarn as it passes through the device at some known value. This value can be changed at will by moving said weight 33 along the member 31. Where there are a number of installations in a mill, this construction becomes very valuable for the reason that after the proper tension is found for making a certain grade of fabric, one or even a thousand or more machines can be set up to have a tension of like value. This is very important in turning out a uniform fabric.

From the foregoing description, the operation of the device is evident. Viewing Fig. 2, it will be evident that under ideal conditions, the yarn or thread 35 passes under the guide 19, then over the guide 27, then under the guide 28 and then over the guide 20, from which it is conducted to the knitting machine in the usual manner. If, now, the tension upon the yarn momentarily slackens, as, for example, if the yarn feeds off more quickly than is proper from the yarn package, the member 9 tends to move into the full line position shown in Fig. 4, but this movement is restrained by the resistance afforded by the plunger 5 indicated in full lines in Fig. 4. The momentary movement of the frame or member 9 into the full line position shown in Fig. 4, acts to put greater tension upon the yarn, thereby maintaining a uniform tension as fed to the machine. As the tension from the package again becomes normal, the member 9 is slowly moved into the normal position shown in Fig. 2 through the action of weight 33, but against the resistance of the plunger 5. If, on the contrary, the yarn at the package tensions unduly or becomes too taut, then the frame or member 9 tends to move into the dotted line position shown in Fig. 4, but against the resistance of the plunger 5 as indicated in dotted lines in Fig. 4, and this relieves the excessive tension, so that the tension on the yarn remains constant as the yarn is fed into the machine, and when the tension on the package becomes normal again, the frame or member 9 slowly returns to the normal position shown in Fig. 2, but against the resistance of the plunger 5.

In either case the tendency to a quick or chattering movement of the frame or mem-



ber 9 is resisted by the plunger 5, and the result is that the equality of tension upon the yarn is always maintained. In practice, it is found that the equalizing action which I have described occurs with great effectiveness and that in practice knitting machines equipped with my device may be run either fast or slow without change in the stitch length consequent upon the speed. In other words, where the knitting machine is equipped with my device, it is impossible to ascertain from the size of the loops or stitches of the stockings or other fabric whether the machine is run at a high speed or at a low speed, because said device has maintained a constant and perfect tension at all times and of such uniformity as to preserve equality of stitch length notwithstanding changes in speed.

Having thus described one illustrative embodiment of my invention, I desire it to be understood that although specific terms are employed, they are used in a generic and descriptive sense, and not for purposes of limitation, the scope of the invention being set forth in the following claims.

#### Claims—

1. Means for maintaining uniform the tension upon yarn or thread comprising in combination, relatively movable members about portions of both of which the yarn or thread is threaded, said members being adapted relatively to move under excessive tension or undue slackness, so as materially to vary the direction or course of the yarn or thread about said portions of said plurality of members and liquid resistance means to oppose said relative movement.

2. Means for maintaining uniform the tension upon yarn or thread comprising in combination, two elongated members in substantial parallelism, each having guiding means about which the yarn or thread passes in its course lengthwise of both members, said members having a common support and upon which one of said members moves relative to the other to vary the direction or course of the yarn or thread under excessive tension or undue slackness, and liquid resistance means to oppose said movement.

3. Means for maintaining uniform the tension upon yarn or thread comprising in combination, two frames, each carrying yarn or thread guiding means, one of said frames being normally stationary, and the other adapted to rock, a liquid-resistance container, a plunger therein of less diameter than the internal diameter of said container, and means connecting said plungers to said frame that is adapted to rock.

4. Means for maintaining uniform the tension upon yarn or thread comprising in

combination, a pair of yoke-like members, each having a plurality of yarn guiding means, said guiding members being co-axially pivoted, means whereby one of said members may be held rigidly, and a liquid-resistance container having therein a plunger operatively connected to the other of said members.

5. Means for maintaining uniform the tension upon yarn or thread comprising in combination, two co-axially pivoted, yoke-like members each having yarn guiding means, a liquid-resistance container mounted in proximity to said members, a plunger positioned in said container and shaped to permit the liquid to pass from one face thereof slowly to the other face, and means connecting said plunger to one of said members.

6. Means for maintaining uniform the tension upon yarn or thread comprising in combination, a bracket, a liquid-resistance container carried thereby, an arm extending from said bracket, two yoke-like pieces carried by said arm, said yoke-like pieces being co-axially pivoted and having relative movement, guides carried by said pieces, a plunger within said container, and a piston rod pivotally connecting said piston and one of said members.

7. Means for maintaining uniform the tension upon yarn or thread comprising in combination, two relatively movable members co-axially mounted and each provided with a plurality of yarn guides, a piece connecting the ends of one of said members and constituting a scale along which a weight may be adjusted, a liquid-resistance container in operative relation to said members, a plunger positioned in said container, and means connecting said plunger and one of said members.

8. Means for maintaining uniform the tension upon yarn or thread comprising in combination, two yoke-like members co-axially mounted, means rigidly to hold one of said members in position, the other member being adapted to rock, each of said members being provided with a pair of spaced guide rolls, about which the yarn or thread is adapted to be passed, a bracket adapted to be attached to the machine frame and supporting said members, a liquid-resistance container carried by said bracket, a plunger within said container and adapted to permit the liquid to pass slowly from one face to the other thereof, and means connecting said plunger to one of said members.

In testimony whereof, I have signed my name to this specification.

EDSON S. HINELINE.