S. W. WARDWELL & E. F. PARKS.

TENSION DEVICE FOR BRAIDING MACHINES.

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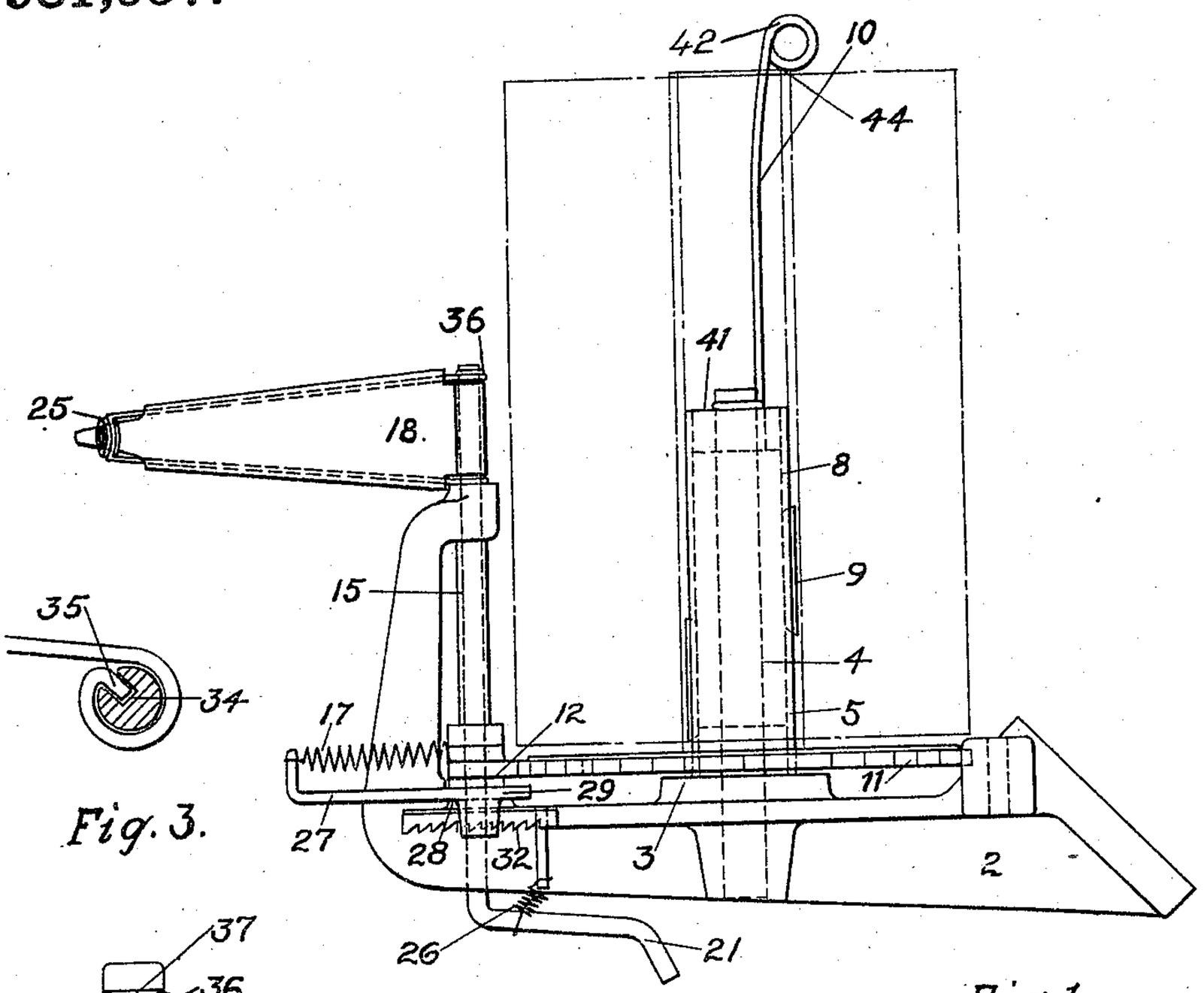

Fig. 1.

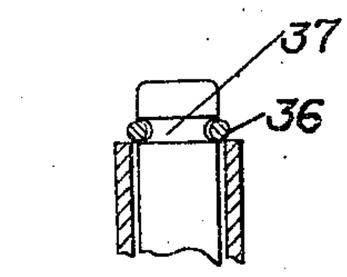

Fig. 4.

Fig. 2.

Fig. 5.

WITNESSES

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TENSION DEVICE FOR BRAIDING-MACHINES.

981,957. Specification of Letters Patent. Patented Jan. 17, 1911.

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To all whom it may concern:

Be it known that we, SIMON W. WARDWELL and EDWARD F. PARKS, citizens of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Tension Devices for Braiding-Machines, of which the following is a specification.

Our invention is an improved tension device for braiding machines and its purpose is to produce a device which shall sensitively respond to the demands of high speed braiding without loss of strength or durability.

The novel and meritorious features of my invention are fully disclosed in the following specification and accompanying drawings, which latter show respectively: Figure 1, a front elevation of my device; Fig. 2, a plan view of the same; Figs. 3, 4 and 5, details of construction.

The tension device consists of a bracket 2 having a hub 3 in which is secured a stud 4, on which is mounted the supply holder 5. The latter consists of a stem 8 with blades or spurs 9 to rotatively secure the supply, a spring latch 10 to secure the yarn supply from longitudinal displacement, and a base 11. Adjoining this base is a detent or pawl 12 which, controlled in position by the varying tension of the yarn delivered by the supply, either permits or prevents rotation of the supply holder by disengagement from or engagement with the teeth 13 that are formed in the rim or periphery 14 of the base.

The pawl is mounted to turn on the rock shaft 15, a U-shaped stop pin 16 preventing excessive movement, either to or away from the base 11 and its teeth 13, and a spring 17 tending to hold the pawl 12 in engagement with the teeth 13. At the upper end of the rock shaft 15 is an arm 18 made preferably of thin, resilient material in behalf of lightness as well as elasticity, and at the bottom is an arm 21 for actuating stop devices which are not subject of this application, therefore not here described. Adjacent the pawl 12, there is secured to the rock shaft 15 an arm 19, and on the pawl 12 there is a projection or pin 20 opposed to the arm 19 and by which the pawl may be moved or controlled from the rock shaft 15. Adjacent the arm 18 is a yarn guide mounting or arm 23, preferably of spring wire in substantially hair pin form, the loop 24 of which is drawn together to conform to the yarn guide or eyelet 25, Fig. 5. The arm 18 is curved and the guide arm 23 extends substantially tangent thereto. The extremity of the arm 18 extends behind the yarn guide 25 so the two arms cannot entirely separate but their resilience and tangential contact keep their extremities apart. Under the minor fluctuations of yarn tension, particularly those due to the passage of the yarn from the supply over and under the passing carriers, the light resilient arm 23 alternately yields and recovers, thus maintaining the yarn taut, in action, like a fishing pole which by its elasticity accommodates itself to the pull on the line. The arm 18 also bends resiliently, but less readily than the arm 23 so that with increasing tension or pull on the yarn, the arm 23 gradually conforms to the curvature of the arm 18 until, under extreme tension, there is entire conformation and the two arms act as one, like a laminated spring. The arm 18 is opposed to the action of the guide arm 23 by a spring 26 suitably anchored and connected with the arm 21, and also by the pawl spring 17. In case resistance to delivery of the yarn occurs, sufficient to move the arm 19 against the pin 20 to move the latter, the pawl 12 is thereby disengaged from the ratchet teeth of the supply holder 5, permitting the latter to turn and give off yarn. Should the yarn deliver with undue freedom the arm 18 will return under action of the spring 26 in the direction of the arrow A, thereby removing the arm 19 from the pin 20, releasing the pawl 12 so that it moves under the action of the spring 17 again into engagement with the teeth of the supply holder to restrain the latter from giving off yarn.

By varying the intensity of action of the pawl spring 17 the tension on the yarn may be adjusted. This variation might be secured by a change of springs, but I prefer to accomplish it otherwise. The spring 17 is anchored to an arm 27 which is adjustable in position. It is preferably formed of sheet metal with a bearing 29 on the rock shaft 15 between the pawl 12 and the face 28 of the bracket 2. From this bearing, the arm extends to and is formed over the edge 30 of the bracket, which edge is concentric with the rock shaft 15. The under surface

of the bracket, at or near its edge 30, is formed with detent notches 32 with which the arm 27 engages, and the upper surface is correspondingly graduated, the arm 27 having an index portion 31 to register with the graduations.

The arm 27 is so formed that it must be sprung down in order to disengage from the notches 32. The elastic engagement of the arm 27 with the notches 32 suffices to resist the action of the pawl spring 17, and by varying the position of the arm the degree of extension, and therefore the intensity of action of the pawl spring 17, can be varied.

The arm 18 is secured by novel means to its rock shaft. In the latter is made a small key-way or spline-way 34, see Fig. 3. The arm is of substantially triangular form and the extremity of the wide or base end is formed sharply at right angles to constitute a key 35, while the metal adjacent this key is wrapped cylinderwise around the rock shaft to form a hub. The arm 18 is secured longitudinally on the rock shaft by the ring 36 which constitutes one of the hubs of the guide arm 23, sprung into a groove 37 in the rock shaft, see Fig. 4.

The supply holder stem 8 extends only part way through the supply (indicated by dotted lines) and is surmounted by a spring latch 10 which is secured in the cap 41 of the stem 8. This latch is of substantially hair pin form, the loop of which is formed over at 42 to easily enter the supply, and to form the abutment 44 for the end of the supply, to hold it in place.

The construction described is believed to be entirely novel; its merit is manifest. By combining a sensitively responsive resilient arm with another resilient arm which yields less readily and by making the two of different form so they gradually conform under increasing tension, a cumulative tension is produced. The term cumulative tension is employed, not in the sense of increasing tension such as might be secured by extension of a spring, with concurrent increase in intensity of reaction, but rather in the sense of employing a member 23 which, within its range of individual action, is adequate to control tension conditions falling within that range, but which, beyond that range is reinforced by another member which accumulates or adds to the tension resistance to the pull of the yarn.

The curved arm 18 is a reinforcement in a double sense; it augments the tension imparted by the light arm 23 and also supports the arm so it cannot be bent out of shape. Without the support of the arm 18 the arm 23 would bend with the strain of resistance always at one point, tending to bending about that point and consequent crystallization and breakage. By curving one of the two arms so the light arm 23 shall gradually conform to the arm 18, this straining effect is prevented, and the bending point of the light arm 23 is caused to gradually approach its guide eye, and thus it opposes an increasing resistance which gradually builds up to that of the stiffer arm 18.

By adjusting the spring 17 the pawl is made to respond sensitively to variations of yarn tension or unresponsive except to extreme pull of the yarn; so that the light arm 23 suffices to release the pawl or so that both the arm 18 and the arm 23 combined are required to perform that function. It follows that adjustment of the spring 17 causes a variation in the degree of conformation of the arm 23 to the arm 18.

Without limiting ourselves to the precise form of construction described, we claim:

1. In a tension device for braiding machines, the combination with a yarn supply holder and detent to control the same, of an arm and connections to control the detent, a guide and resilient mounting therefor having a movement independent of the arm, and means to resist such movement with relation to the arm.

2. In a tension device for braiding machines, the combination with a yarn supply holder and a detent actuating rock shaft having a spline 34, of a thin metal arm, one extremity of which is formed as a key 35 with the adjacent portion formed as a hub to receive the rock shaft, means to secure the arm longitudinally of the rock shaft and means to actuate the arm from the yarn.

3. In a tension device for braiding machines, the combination with a yarn supply holder and a detent actuating rock shaft having a key way 34 and groove 37, of a thin metal arm, one extremity of which is formed as a key 35 to fit said key way with the adjacent portion formed as a hub to receive the rock shaft, a retaining ring sprung into the groove 37 and means to actuate the arm from the yarn.

4. In a tension device for braiding machines, the combination with a yarn supply holder and a detent, of a rock shaft having a key way 34 and a groove 37, a thin metal arm 18 to act on the detent, having a bow-shaped portion one extremity of which is formed as a key 35 to fit the key way aforesaid with the adjacent portion formed as a hub to receive the rock shaft, a wire arm 23 having loops about the rock shaft, one of which 36 engages the groove 37, said wire arm extending from the rock shaft adjacent the arm 18, means to vary the resistance of the arm 18 to movement by the arm 23, and devices through which the arm 18 acts on the detent.

5. In a tension device for braiding machines, the combination with a yarn supply holder and a detent engaging the same, of

instrumentalities for controlling the detent, including a rock shaft, an arm formed with a bow-shaped portion and secured to the rock shaft, a yarn guide, and a resilient arm therefor mounted adjacent the bowed arm to act thereon, and resilient means acting through the bowed arm to resist the action of the yarn guide arm.

6. In a tension device for braiding machines, the combination with a yarn supply holder and a detent engaging the same, of instrumentalities for controlling the detent, including a rock shaft, a yarn guide, a resilient arm for the yarn guide mounted on the rock shaft, and a bowed arm adjacent the yarn guide arm, to which the latter conforms to a varying degree under varying yarn tension.

7. In a tension device for braiding machines, the combination with a yarn supply holder and a detent engaging the same, of instrumentalities for controlling the detent including a yarn guide, a resilient arm for the yarn guide, a bowed arm to which the resilient arm on the rock shaft extending adjacent to the yarn guide conforms, to different extents with varying degrees of yarn tension, and means on the rock shaft to operate the detent.

8. In a tension device for braiding machines, the combination with a cop holder and detent engaging the same, of instrumentalities for controlling the detent including a yarn guide, a resilient arm therefor, an arm on the rock shaft formed with a bow-shaped portion to which the resilient arm conforms under tension to an extent dependent on the degree of yarn tension and of resistance opposed by the bowed arm, and means to yieldingly oppose the bowed arm to the resilient guide arm.

9. In a tension device for braiding machines, the combination with a cop holder and detent engaging the same, of instrumentalities for controlling the detent including a yarn guide, a resilient arm therefor, an arm on the rock shaft formed with a bow-shaped portion to which the resilient arm conforms under tension to an extent dependent upon the degree of yarn tension and of resistance opposed by the bowed arm, means to oppose the bowed arm to the resilient guide arm and means to vary the intensity of such opposition.

10. In a tension device for braiding machines, the combination with a bracket 2 having a graduated notched edge 30, a yarn supply holder and detent engaging the same, of means for varying the action of the detent including an arm 18 through which the yarn acts, of a spring 17 acting on the detent to oppose the action of the arm 18, a second arm 27 to which the spring is anchored and whose extremity is formed over the edge 30 to engage the notches of said edge.

11. In a braiding carrier, a rotatable yarn supply holder, means to lock said holder against rotation, a shaft parallel to the axis of the holder and means on the shaft operated by the tension of the yarn to release said locking means.

12. In a braiding carrier, a rotatable yarn supply holder, a detent to lock said holder against rotation, a plurality of separated bearings in the frame of the carrier, a shaft journaled in said bearings parallel to the axis of the holder and means on the shaft operated by the tension of the thread to release the detent.

13. In a braiding carrier, a rotatable yarn supply holder, a detent to lock said holder against rotation, a plurality of separated bearings in the frame of the carrier, a spring controlled shaft journaled in said bearings parallel to the axis of the holder and an arm on the shaft operated by the tension of the thread to rotate the shaft and thereby effect the release of the detent.

14. In a braiding carrier, a rotatable yarn supply holder, a detent to lock said holder against rotation, an engaging member on said detent, a spring-controlled shaft parallel to the axis of the holder, means on the shaft to rotate the same by the tension of the thread and a member on the shaft to engage the first named member when the shaft is rotated and release the detent.

In testimony whereof we affix our signatures in presence of two witnesses.

SIMON W. WARDWELL.
EDWARD F. PARKS.

Witnesses:
GRACE W. BROWN,
FRANK E. DYSON.