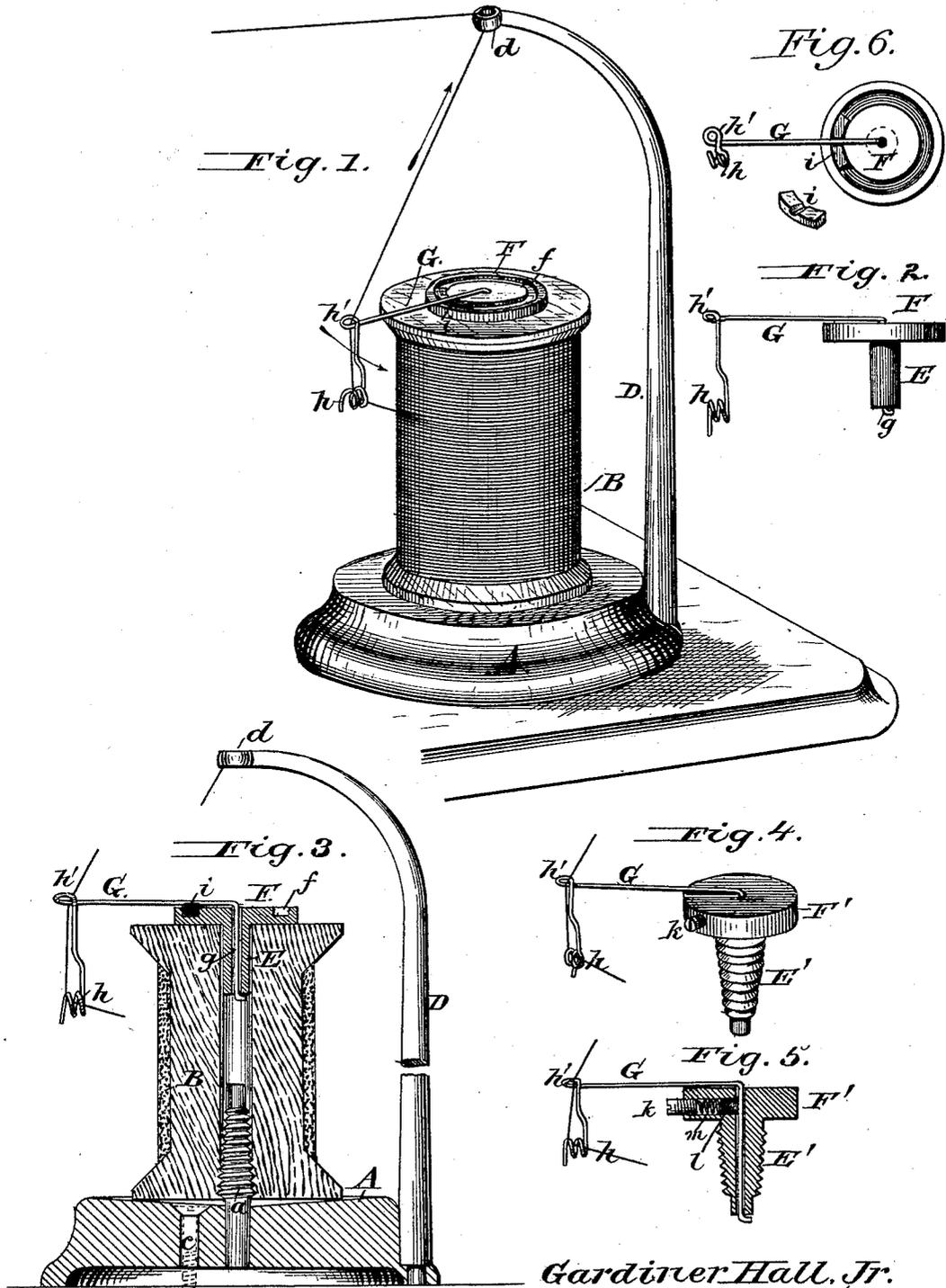


G. HALL, Jr.
Tension-Regulator for Sewing-Machines.

No. 223,133.

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Attest:
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN TENSION-REGULATORS FOR SEWING-MACHINES.

Specification forming part of Letters Patent No. **223,133**, dated December 30, 1879; application filed December 31, 1878.

To all whom it may concern:

Be it known that I, GARDINER HALL, JR., of South Willington, in the county of Tolland and State of Connecticut, have invented certain new and useful Improvements in Tension-Regulators for Sewing-Machines, of which the following is a specification.

This invention relates to an improvement in tension devices for the needle-thread of sewing-machines, its object being to enable the use of spools of large size containing a great length of thread, and to thereby prevent loss of time in changing spools to replenish the supply of thread; further, to obviate the necessity of thread dealers and manufacturers keeping in stock a great variety of sizes of spools, by rendering all sizes alike easily unwound, and therefore equally desirable to operatives.

In manufacturing establishments using sewing-machines it is, of course, desirable that there shall be as little occasion as possible for stoppage of the machines; but where small spools are used they are easily emptied, and stoppage must frequently be made to replace them.

The use of large spools containing great lengths of thread has heretofore been found impracticable on account of the great variation of the resistance to their unwinding. For instance, a spool containing two thousand four hundred yards of No. 30 cotton thread, when first placed upon the ordinary spool-spindle of a sewing-machine, requires a force to unwind it and draw off the thread which causes a very strong tension on said thread, on account of the weight of the spool; but when a single coil or layer of thread has been removed the weight of the spool is materially decreased, and the consequent decrease of the needle-thread tension requires that the shuttle-tension shall be regulated to correspond thereto; otherwise the shuttle-thread will draw the needle-thread entirely through the material, while the said shuttle-thread will lie straight along the surface.

In small light spools holding about two hundred yards of thread the draft is practically the same during the whole unwinding, and the time consumed in placing twelve of these spools in use upon a machine has been

found so far less than the time lost in regulating the tension devices for one large spool of two thousand four hundred yards that, as before said, the use of large spools of all numbers of thread has been found impracticable.

In fine numbers a single coil or layer of thread will not weigh so much as a layer or coil of a coarse number, and consequently the required adjustments of tension would not succeed each other so rapidly as in using coarse numbers; but they are too frequent to permit hitherto the profitable use of large spools.

In endeavoring to obviate the disadvantages heretofore attendant upon the use of large spools upon sewing-machines, and to render the draft on the unwinding thread of such spools uniform throughout, my invention consists, first, in the combination, with a spool, a stud for holding the spool stationary while the thread is delivered over its head, a stationary eye for the passage of the thread to a sewing-machine, and a bent arm provided with a thread-eye, of a plug constructed to be inserted into the central opening of the spool, and be held rigidly therein by frictional contact, and having a central aperture for receiving and permanently connecting with the bent end of the arm which carries the thread-eye, whereby said arm is free to rotate in its seat, but prevented from having any vertical movement, as will be hereinafter more fully described; second, the combination of a spool, a stud on the base-plate, a stationary eye, a plug having a central socket and provided with a head or disk, and an arm having its inner end bent to fit in said socket, while the horizontal portion of said arm is provided at its outer end with a thread-eye, and is supported by said disk or head, as will more fully hereinafter appear; third, in the combination, with the revolving bent arm and the plug having the annularly-grooved disk, of an adjustable tension device arranged to operate on said bent arm, as hereinafter set forth.

Heretofore a hollow cylinder for receiving and holding a spool or bobbin for delivering yarn to a loom through the medium of an eyed and weighted revolving flier has been employed, said cylinder being permanently fixed upon the flooring supporting a loom, or upon the framing of the loom itself; but in

such the hollow cylinder has been made of a length equal to or in excess of the length of the spool or bobbin, so that the bent arm of said flier could be placed in the top of the hollow cylinder, and thus revolve over the head and around the head of the spool, and thus unwind the yarn for delivery to the loom. This construction necessitates a spool support of a length greater than that of the spool, for otherwise the flier would rest and drag upon the face of the spool; and, further, it requires a weighting of the flier to hold it in its seats and prevent climbing or vertical movement or displacement when under a rapid rotary motion, and thus a drag on the yarn occurs; and, further, but one length of spool or bobbin can be employed, unless there be provided a series of hollow cylinders of a length equal to the various lengths of spools or bobbins now in use.

By my invention the stud will receive and hold in a stationary position by frictional contact any of the various sizes or lengths of spools, for the bent arm with its eye, which is an eyed flier, has no connection with said stud, but it is connected with the plug that is inserted in the end of the spool, so as to be incapable of accidental detachment when the plug is detached from the spool, or when the flier is under a rapid rotary motion, delivering the thread over the head of the spool to the needle of a sewing-machine through an eye fixed above the spool.

I do not claim anything shown in the Letters Patent No. 205,320, granted June 25, 1878, to Turner.

In the accompanying drawings, Figure 1 is a perspective view of my invention as when in use, though the precise form of the various parts is not material. Fig. 2 is a view, in elevation, of the spool-plug and revolving arm. Fig. 3 is a vertical central section of Fig. 1. Fig. 4 is a perspective view of a modified form of the top plug of the spool and tension device of the revolving arm. Fig. 5 is a central section of Fig. 4. Fig. 6 is a top view of the plug of the spool, showing the groove, a portion of the revolving arm, and an elastic tension device.

The letter A indicates the base-plate, from the center of which rises a screw-threaded stud, *a*, upon which the spool B is screwed and held firmly. Through this base-plate is a hole for a screw, *c*, by which said plate is secured to a table. From one side of the base-plate rises a standard, D, having its upper end curved, and terminating above the center of the spool in a thread-eye, *d*.

The letter E designates a plug, of suitable material, projecting from the center of a disk, F, having an annular concentric groove or recess, *f*, in its face.

Through the center of the plug E and disk F is a small opening, in which fits loosely the downwardly-bent end *g* of an arm, G, which extends outward beyond the edge of the spool-head, and is bent downward a short distance,

terminating in an eye or coil, *h*, for the passage of a thread. Said arm has also a thread-guide, *h'*, at the elbow, where it is bent downward at its outer end.

The bent arm G is permanently connected with the plug E, and said arm is perfectly free to rapidly rotate, but is prevented from having any vertical movement in the plug by reason of its connection with the latter, this connection in the present example being made by simply bending the end of the bent arm so as to form a shoulder. (See Figs. 3 and 5.)

When in use the base-plate A is secured by the screw *c* to a table in convenient position. The spool, which may be of any desired size, is fixed upon the stud *a*. The plug E is inserted in the top of the spool, with the arm G projecting outward beyond the spool-head. The thread is then led from the spool through the eye *h* and guide *h'*, up through the eye *d*, and thence to the thread-guides and needle of the sewing-machine. When a draft is exerted upon the thread the arm G revolves, following the thread around the spool, unwinding and holding it off clear of the spool-head, the spool remaining perfectly stationary, so that its weight or size or the quantity of thread upon the spool does not affect the operation of the invention, as the thread is delivered with the same uniformity, whether the spool be heavy or light, large or small, and whether it is a full spool or partially empty.

In the groove *f* in the disk F is arranged a segmental pad, *i*, of leather or other suitable material, and in the top of this pad is a notch to receive the arm G. This pad, as the arm G revolves, follows the groove *f*, and serves to counteract the momentum of said arm, thus preventing it from unwinding the thread too rapidly. The tension of the thread is also regulated by increasing or decreasing the length or thickness of this pad.

In Figs. 4 and 5 is illustrated a modification of the top spool-plug, it being shown at E' screw-threaded and conical, so as to be firmly attached to spools having different-sized bores. Radially through the disk F' is tapped a screw-threaded hole, in the outer portion of which fits a screw, *k*, and in the inner portion is a sliding plug, *l*. Between this screw *k* and the plug *l* is a spiral spring, *m*, and by increasing or decreasing the compression of this spring by means of the screw *k* the plug *l* is caused to bear with more or less force upon the downwardly-bent portion *g* of the arm G, thus regulating the resistance to the revolution of the said arm.

Although I have in Fig. 3 shown the stud *a* of the base-plate screw-threaded, it may be smooth and retain the spool by friction; or it may have one or more longitudinal ribs or serrations to assist in retaining the spool from turning. This stud *a* may also be extended below the base-plate and be screw-threaded, so as to form the means of attaching the base-plate to the table, in which case the screw *c* may be dispensed with.

In practice it is found that very few spools of thread are twisted exactly as they should be in order to loop properly without twisting, a slight further twisting or a slight untwisting being desirable. Now, the arm G acts upon the thread somewhat in the nature of a flier in spinning-machines, and when it is found, in using the device, that the thread is too tightly twisted it is only necessary to reverse the ends of the spool, when the arm will travel in the opposite direction, and at each revolution will take one twist out of the thread, so that the common fault of too tight and too loose twisting can be readily remedied by the use of my invention at the will of the operator.

What I claim is—

1. The combination, with the spool-stud for holding the spool stationary while the thread is delivered over its head, a stationary eye for the passage of the thread to a sewing-machine, and a bent arm provided with a thread-eye, of a plug constructed to be inserted into the central opening of the spool and be held rigidly therein by frictional contact, and having a central aperture for receiving and permanently connecting with the bent end of the

arm which carries the thread-eye, substantially as described, whereby said arm is free to rotate in its seat, but prevented from having any vertical movement, as set forth.

2. The combination, with the spool, the stud on the base-plate for holding the spool, and the stationary eye for delivering the thread therefrom, of the plug E, having a central socket and provided with head or disk F, and the arm G, having its inner end bent to fit in said socket, while the horizontal portion of said arm is provided at its outer end with a thread-eye, and is supported by said disk or head, substantially as described.

3. The combination, with the revolving bent arm G and the plug having the annularly-grooved disk F, of an adjustable tension device arranged to operate upon said arm, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of the subscribing witnesses.

G. HALL, JR.

Witnesses:

JAMES L. NORRIS,
ALBERT H. NORRIS.