No. 625,855. Patented May 30, 1899.

# G. F. STURGESS.

## WINDING MACHINE.

(Application filed Oct. 21, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

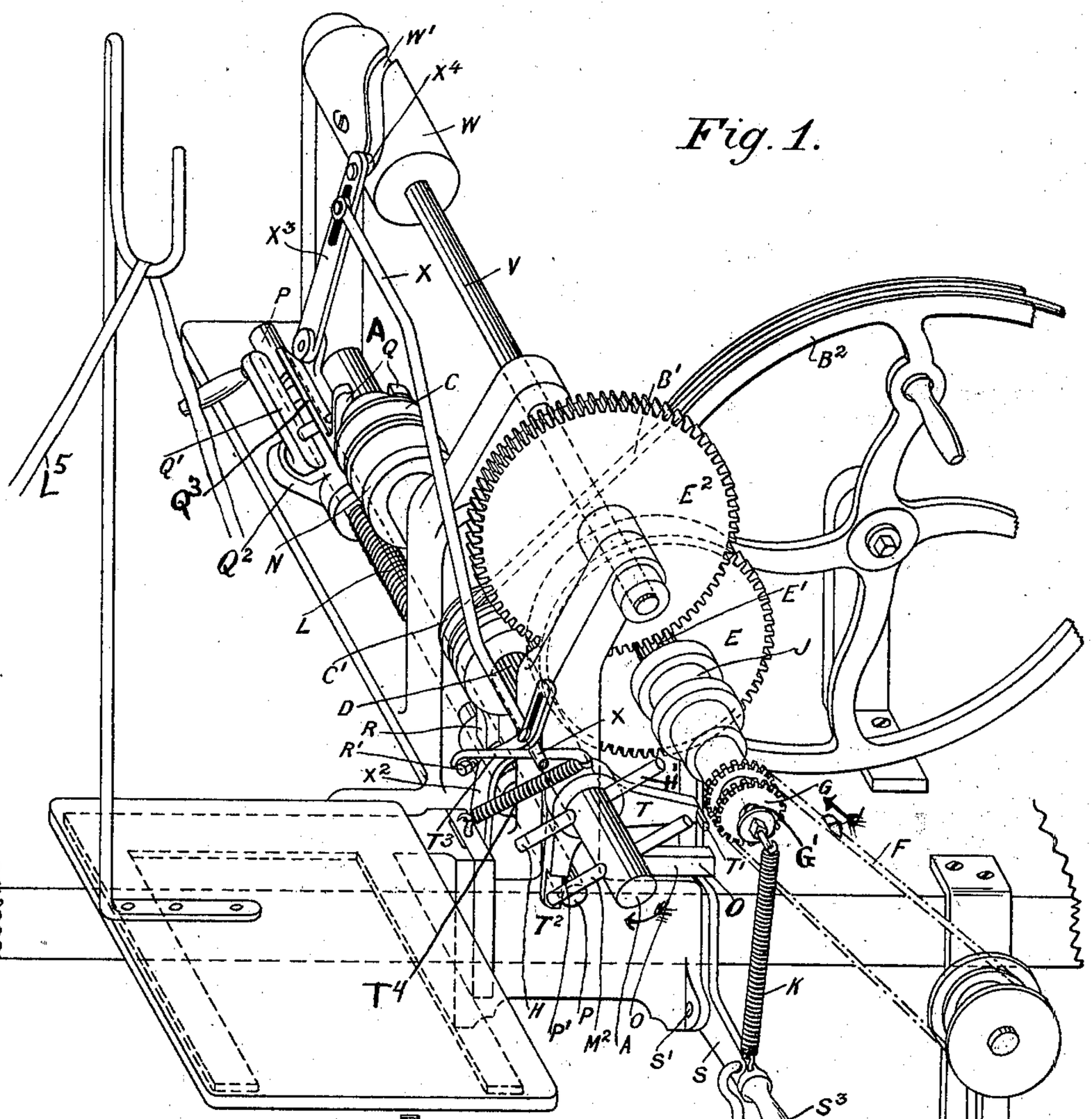
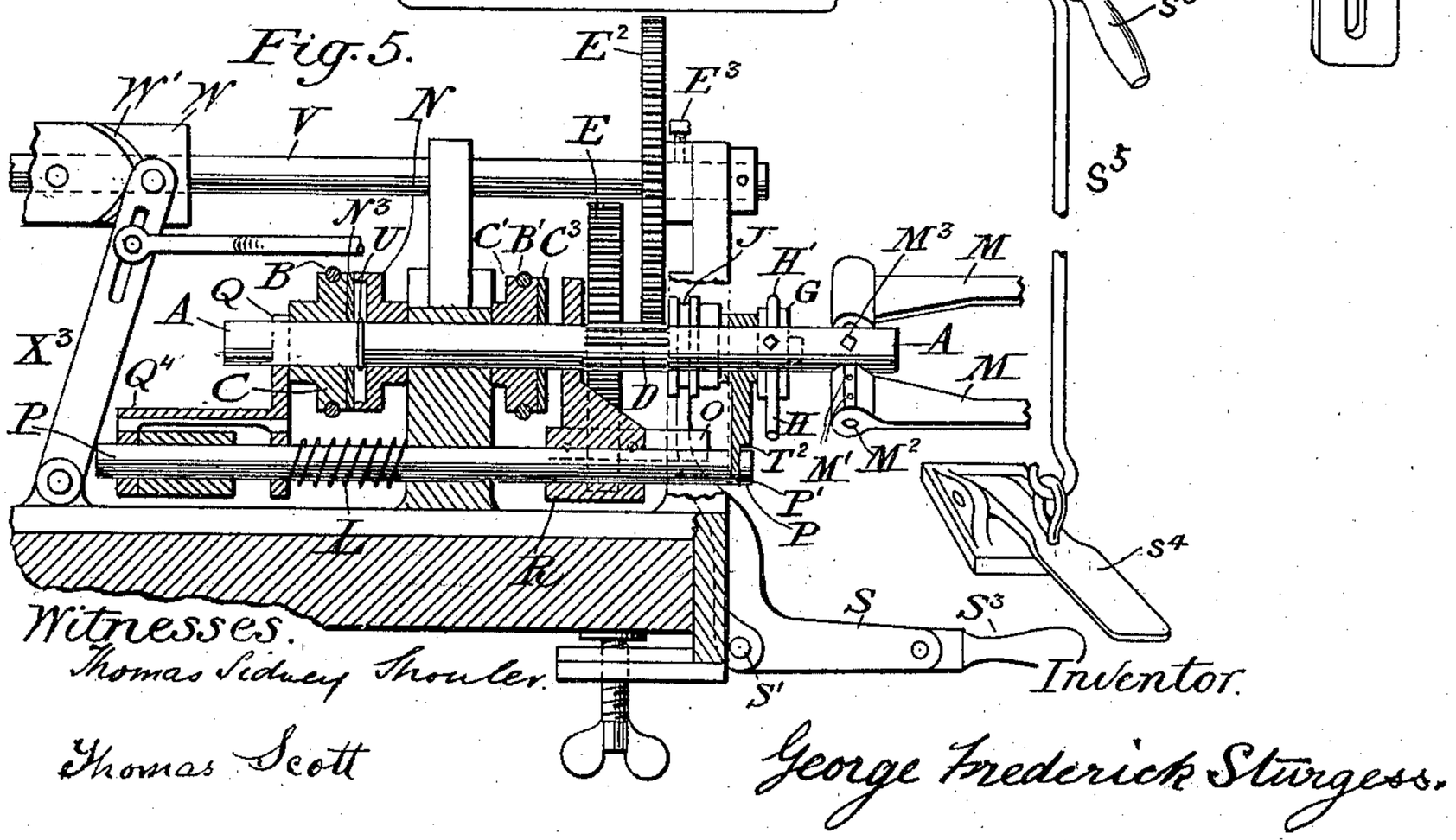



Fig. 5.




Witnesses.
Thomas Sidney Shoulder.
Thomas Scott

Inventor.
George Frederick Sturgess.

No. 625,855.

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2 Sheets—Sheet 2.

Fig. 2.

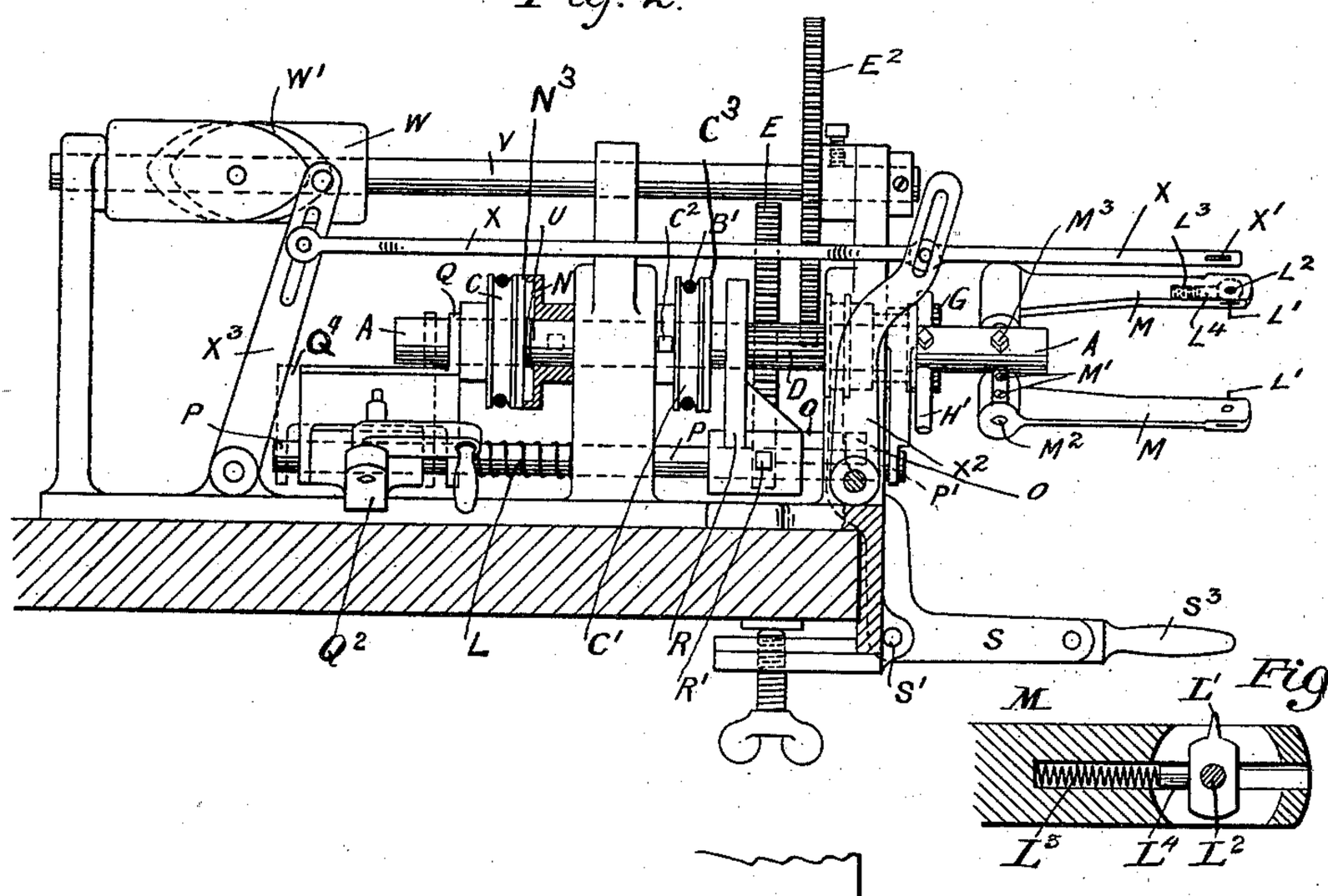
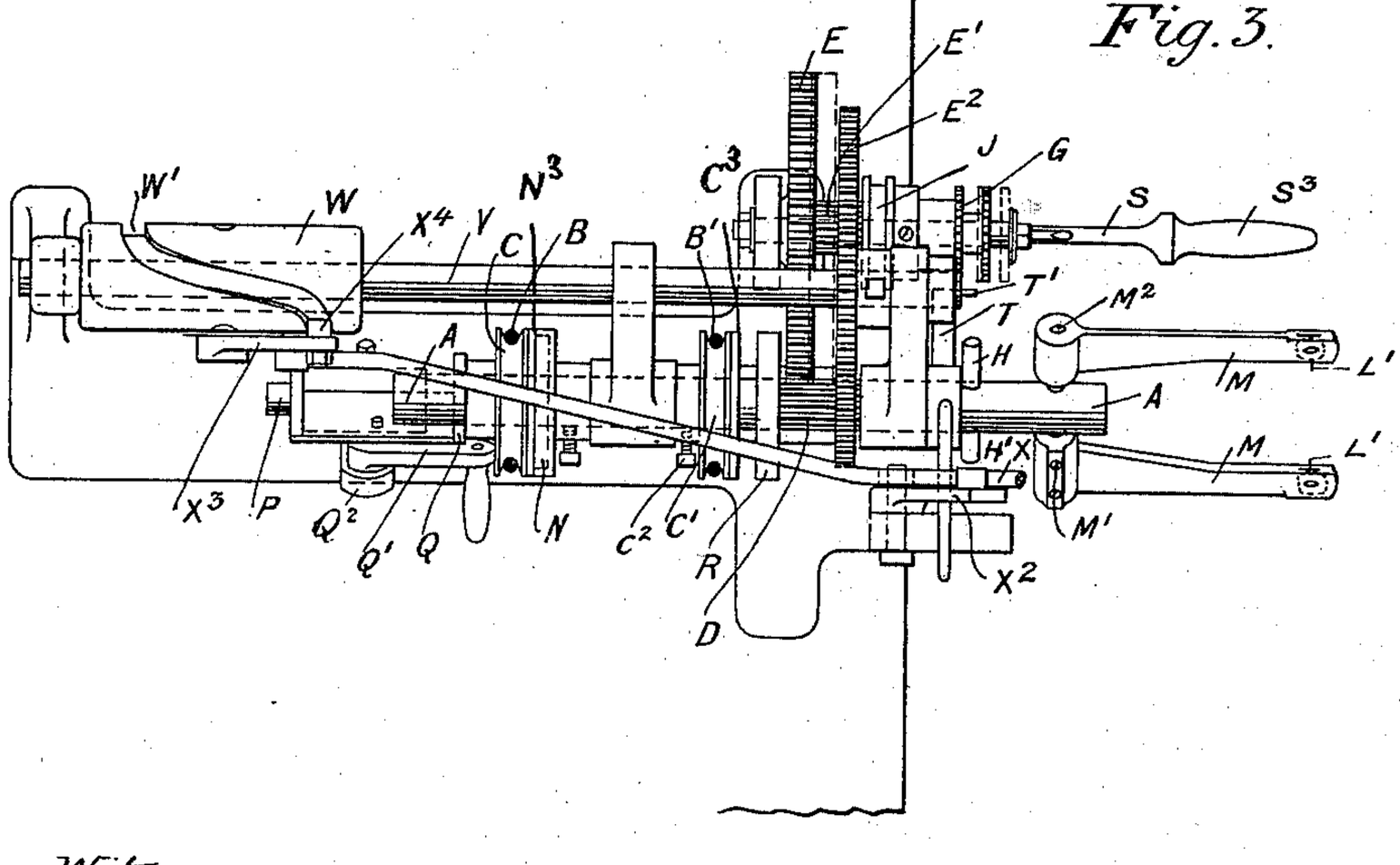



Fig. 4.

Fig. 3.




Witnesses.

Thomas Sidney Moulder.

Thomas Scott

Inventor.

George Frederick Sturgess.

# UNITED STATES PATENT OFFICE.

GEORGE FREDERICK STURGESS, OF LEICESTER, ENGLAND.

## WINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 625,855, dated May 30, 1899.

Application filed October 21, 1897. Serial No. 655,983. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE FREDERICK STURGESS, hosiers' engineer, of the Inglenook, Leicester, in the county of Leicester, England, have invented a Winding-Machine, of which the following is a specification.

This invention relates particularly to winding-machines specially adaptable for winding all classes of small ware in the length—such as tape, braid, elastic ware, lace trimmings, cotton, wool, and string—to a given weight and length. The machine is driven by friction and timed to stop at any predetermined interval by the action of a chain traveling one link to each half-turn of the article being wound in a manner that the total length of the said article can be increased or decreased by a very small degree. The variation in widths of tapes and braids is very small, although the range is very large. Therefore it is necessary to be able to adjust the total length of a knot of tape to less than half a layer (equal to a half-turn of the fork upon which it is wound) to insure all knots or skeins of tape or braid of any width being of equal weight. The calculation or reduction of a given weight of tape to a given number of half-turns of any mechanical device has not been possible before the introduction of my invention, owing to the impossibility of precisely reducing the total length to a given number of half-turns of any positive stopping means or gear heretofore known to mechanics. It may here be said that the same facility to slightly vary the total length of material wound is an advantage much desired in all departments of the small-ware trade.

Figure 1 is a view in perspective of my winding-machine. Fig. 2 is a side elevation, and Fig. 3 is a plan of Fig. 2. Fig. 4 is a sectional plan view of the tacker. Fig. 5 is a vertical plan through the spindle A.

The machine is adapted to be screwed to a table and is used in a factory by power or in a home by the hand-wheel $B^2$. Spindle A rotates in the direction of the arrow, Fig. 1, in the parallel uprights of the framing, which are bored to receive it, and is adapted to carry the ordinary skein-holder, card-holder, ball-holder, or reel-holder commonly used for winding lengths of such material. The spindle A has screwed to it stop-arms H and H′ and the driving-disk N and a combined driving-pulley and brake-disk C′, which answer the additional purpose of collars, one being on either side of an upright and holding the spindle A in position longitudinally. The spindle A also has teeth D cut in it and carries a brake-catch T, also a free pulley C and a spiral spring U, which serves to throw the pulley C out of contact with the driving-disk N. The driving-disk N is furnished with a leather facing $N^3$, and the combined driving-pulley and brake-disk C′ by a similar leather facing $C^3$. When driven by hand, the power-belt B is dispensed with, and when driven by power the hand-belt B′ is dispensed with. A chain F, adapted to carry stop-lugs, such as I, meshes with teeth G and is carried by the wheel E around the pin G′, upon which the wheel E and teeth G and chain F can be shogged from working position (see dotted lines) to stopping position, (shown in full lines, Fig. 3,) in which latter position the lug I will enter the line of travel of the brake-catch finger T′ and the stop-arms H and H′. The wheel E meshes with the teeth D, and the number of its teeth are such in relation to the total number of teeth D that to every half-turn of the spindle A the chain is advanced the distance of one link. The spindle A is driven by the friction of either belt. Consequently when the lug I enters the line of travel of the stop-arms one of the stop-arms strikes it and the machine is stopped. To minimize the shock caused by the striking of a stop-arm on the lug I, the lug I first applies the brake, next referred to, to the rotating spindle.

A brake-bolt P is mounted as to be slidable longitudinally in the parallel uprights, which are bored to receive it, and has secured to it by screw R′ brake-shoe R, with its attachment or L-shaped bar O, and a bracket $Q^2$, which carries an ordinary shipper $Q^3$ and its lever or handle Q′. The brake-bolt also has a small opening P′ for the tail $T^2$ of the brake-catch T to enter and hold it in working position (shown in full lines, see Fig. 1) and carries a spiral spring L, which serves to shoot and hold the released bolt in non-working position. (Shown in dotted lines of the shipper $Q^4$, Fig. 2.) The starting-lever S is pivoted to the framing by pin S′ and can be actuated by the handle $S^3$ or by an ordinary pedal, such

as $S^4$, connected by a rod $S^5$ to the starting-lever S, and by depressing either the handle or pedal the machine starts, provided one or other of the belts is running. The other end of the starting-lever passes up immediately in the rear of the bar O, which is connected to brake-shoe R, and enters a groove J in the boss of the wheel E, and the spiral spring K, with which the lever S is furnished, serves to hold the wheel E and chain F in full-line position with the lug I in line with the stop-arms H and H′ when the handle $S^3$ is released. When the lever S is depressed, the lug I is thrown laterally out of engagement with the bolt-catch finger T′ and stop-arms H and H′, releasing the spindle, and the brake-bolt P is, by the engagement of lever S with bar O, simultaneously drawn forward against the action of spring L into position shown in Figs. 2 and 3, the tail $T^2$ of the brake-catch T having fallen into the opening P′ of the bolt P, the brake-shoe R being disengaged from the combined driving-pulley and brake-disk C′, and the belt-pulley C thrown into engagement with the driving-disk N against the action of spring U by the fork Q of the shipper $Q^3$. In this position the spindle will rotate by the action of either belt until the lug I stops it. The number of half-turns of the spindle before stopping is determined by the number of links in the chain or the number of links intervening between one stop-lug and another stop-lug, (when a plurality of lugs are used on one chain.) The length of material wound may be increased or reduced equal to one half-turn of the spindle A by exchanging the chain for a chain a link shorter or longer, as the case may be. A given length of tape is reduced to a definite number of half-turns by making the knot or skein of suitable length by varying the width of the adjustable holder referred to later.

When starting the machine, the starting-lever S or pedal $S^4$ is depressed, as previously described, and the first half-turn of the spindle A will carry the lug I forward out of reach of the bolt-catch finger T′ and the stop-arms H and H′, whereupon the lever or pedal $S^4$ having been released and the wheel E and chain F shogged back by the action of spring K into working position, (full lines,) the spindle will rotate until the lug I has completed another turn, when it depresses the catch T, thereby withdrawing the tail $T^2$ out of the opening P′, releasing the bolt P, which springs back and releases the driving-pulley C from engagement with driving-disk N and applies brake-shoe R to brake-disk C′, operating to check the rotation of the spindle A at the approach of one of the arms H or H′, which thereupon engages the lug I and brings the spindle A to a dead-stop. The lug I engages first the finger T′ and then a stop-arm. The stop-arm never engages the finger T′, because it is carried close up to the chain and out of reach of the stop-arms.

When driven by the hand-belt B′, after the spindle A has been stopped by the lug I the belt runs over the pulley C′, whereas when the belt B′ is dispensed with and the machine driven by the power-belt B the pulley C runs loose on the spindle A after the spindle has stopped, because the bolt P when the brake is applied carries the pulley C out of contact or engagement with the frictional driving-disk N, as indicated. To prevent the machine being accidentally started by any one treading on the pedal $S^4$ or catching the handle $S^3$, the pulley C is put entirely out of action by passing the shipper-lever Q′ over to the position shown in Fig. 1, where it will be seen the fork Q holds the pulley C entirely out of contact with the driving-disk N, notwithstanding that the brake-bolt is in its forward or working position. In Fig. 1 the spindle is being driven by the hand-belt B′ and the stop-lug I is approaching in the direction of the arrow to release the brake and stop the spindle A.

The bolt-catch T is provided with a spring $T^4$ to pull its tail $T^2$ into the groove or slot P′ of the bolt P and is furnished with a handle $T^3$, whereby the operator can stop the machine, when required, by the lifting of the said handle $T^3$.

When winding up material in the form of a card of wool, it is necessary to guide the material back and forth across the card, in order to do which I have adapted the well-known guiding mechanism in the manner next referred to; but such mechanism is not necessary for winding material in the form of knots or skeins of tape, as is well understood.

A rotatable spindle V is mounted in the uprights of the machine, which are bored to receive it, and driven in suitable time by wheel $E^2$, meshed to the teeth E′, cut in the sleeve of the wheel E, and carries a cam W in the track W′, of which the runner $X^4$ on lever $X^3$ traverses. Levers $X^2$ and $X^3$ are pivoted to the framing and carry a connecting-rod X, having at its forward end a slot X′, wherethrough thread may pass onto the holder. By the rotation of spindle or shaft V the runner $X^4$ traverses the track W′ of the cam W, rocking the levers $X^2$ and $X^3$ and traversing the thread of material across the holder. When, however, as in the winding of a knot of tape, the guide-hole X′ is required to be stationary, the screw $E^3$ is loosened from the shaft V, rendering the cam W inactive.

When winding material in the form of a card of wool, the width made, and consequently the total length of material, is determined or varied by the size of the card. I obtain the same results in the case of knots or skeins of tape and such like flat material by the employment of a holder that is adjustable as to width. This holder is also provided with a fastening device, by which the free end of the material can be readily tacked onto the holder and readily released therefrom. The holder consists of two bars or arms M, adjustably secured in a line parallel

to each other by screws M′ to a cross-bar $M^2$, making a fork or T-shaped holder, which is secured by screws $M^3$ to the spindle A, the bar $M^2$ being first passed through a hole in the spindle. Each arm M is provided with a yielding tacker L′, which can be turned around until the point protrudes from either side of the bar. The tacker is a flat plate having a point and two flats situated opposite to each other. As shown in the enlarged view, Fig. 4, the bar is first bored to receive a pivot-pin $L^2$ and also bored to receive a spring $L^3$ and plunger-pin $L^4$ and slotted to receive the tacker L′. The tacker is put upon the pivot $L^2$, with the spring $L^3$ under compression and the plunger-pin $L^4$ pressing on a side flat, thereby holding the tacker-point yieldingly extending from the slot in the bar M in a manner that when the knot of material is drawn from the holder or bars M the point of the tacker yields sidewise in either direction and releases the material, whereupon the point of the tacker resumes its position by the action of the spring and plunger-pin.

As any one with a knowledge of the textile trade will readily understand the application and advantages of this machine for the purpose described, it will suffice to describe its operation in the winding of a knot of tape by power. The free end of the tape $L^5$ is secured to a tacker L′. The handle S is then depressed, which slides the lug I forward or laterally out of line or engagement with the stop-arms H and H′, and the bolt-catch finger T′, the brake-bolt P being at the same time brought forward by the action of the lever S on the bar C, releasing the brake-shoe R from the combined driving-pulley and brake-disk C′ and bringing the driving-pulley C forward into engagement with the driving-disk N. Thereupon the tail $T^2$ of the bolt-catch T is pulled back into the slot P′ by the action of spring $T^4$, securing the brake-bolt, whereupon the spindle rotates, the handle being released and the lug I taking up its working position in line with the stop-arms H and H′, one of which strikes it and stops the machine as soon as the lug has completed a turn. The tape is then cut, the loose end being secured to the knot, and the skein thus made is withdrawn from the holder-bars M.

Having now particularly described and ascertained the nature and objects of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a winding-machine, a frictionally-rotatable spindle provided with a head or holder upon which material may be wound and carrying a stop-arm, a chain carrying a stop-lug and adjustable laterally in relation to and driven by the spindle, and means adapted to bring the lug and spindle into engagement through an intervening stop-arm to stop the machine, operating to wind a predetermined length of material, substantially as and for the purposes set forth.

2. In a winding-machine, a frictionally-rotatable spindle having a stop-arm and provided with means to wind material, a chain driven by the spindle and carrying a stop-lug, the stop-lug adapted to traverse across the line of travel of the stop-arm as to engage the said stop-arm and stop the spindle, the stop-lug and its carrying parts withdrawable laterally from engagement with the stop-arm, as to release the spindle, substantially as and for the purposes set forth.

3. In a winding-machine, a rotatable spindle carrying a stop-arm and provided with means to wind material, a link chain carrying a stop-lug and driven by the spindle, means for adjusting the stop-lug laterally in relation to the stop-arm, the stop-lug timed to register with the stop-arm and stop the spindle at a predetermined interval corresponding to the number of links in the chain, the chain timed to advance at the rate of one link to every half-turn of the spindle, substantially as and for the purposes set forth.

4. In a winding-machine, in combination, a rotatable spindle carrying a stop-arm and provided with means to wind material, a chain carrying a stop-lug, said lug adapted to engage the stop-arm to stop the spindle at a predetermined point, and a brake to slow up the spindle before the said stop-arm and stop-lug engage, comprised of a brake-disk secured to the spindle, a slidable brake-bolt carrying a brake-shoe, and brake-spring on the bolt for applying pressure to the disk, means whereby the stop-lug puts the brake in action before stopping the spindle, and means whereby the brake is disengaged simultaneously with the release of the spindle, substantially as and for the purposes set forth.

5. In a winding-machine of the character described, in combination, a rotatable spindle carrying a stop-arm and provided with means to wind material, a combined spring-actuated brake and pulley-shipper, a chain carrying a traversable stop and adjustable laterally, and means operated by the stop-lug for applying the brake and stopping the machine automatically, the said chain adapted to determine the number of half-revolutions to be turned before stopping, and an adjustable holder for the material to be wound on, whereby the length of the knot or skein wound may be reduced or increased a distance corresponding to a part revolution of the spindle, substantially as and for the purposes set forth.

6. In a winding-machine of the character described, in combination, a rotatable spindle carrying a stop-arm and provided with means to wind material, a combined spring-actuated brake and pulley-shipper, a chain carrying a traversable stop and adjustable laterally and means operated by the stop-lug for applying the brake and stopping the machine automatically, the said chain adapted to determine the number of half-revolutions to be turned before stopping, and an adjustable holder for the material to be wound on, whereby the

length of knot or skein wound may be reduced or increased, a distance corresponding to a part revolution of the spindle, and means of guiding or traversing the thread of material into suitable shape, comprised of a reciprocating guide-box and connecting means therefor, substantially as and for the purposes set forth.

7. In a winding-machine of the character described provided with means to wind a thread of material, a yielding tacker comprising a pointed member upon which the material may be tacked or held, a pivot for the pointed member, a bolt pressed by a spring on the pointed member to hold it yieldingly in tacking position, operating to allow of the withdrawal of material from the pointed member, substantially as and for the purposes set forth.

Dated this 9th day of October, 1897.

GEORGE FREDERICK STURGESS.

Witnesses:

THOMAS S. SHOULER,

THOMAS SCOTT.