Sheet 1-2 Sheets.

Ermen & Smith.
Spooling Cotton.

No. 44,052. Patented Aug. 30, 1864.

Fig. 1.

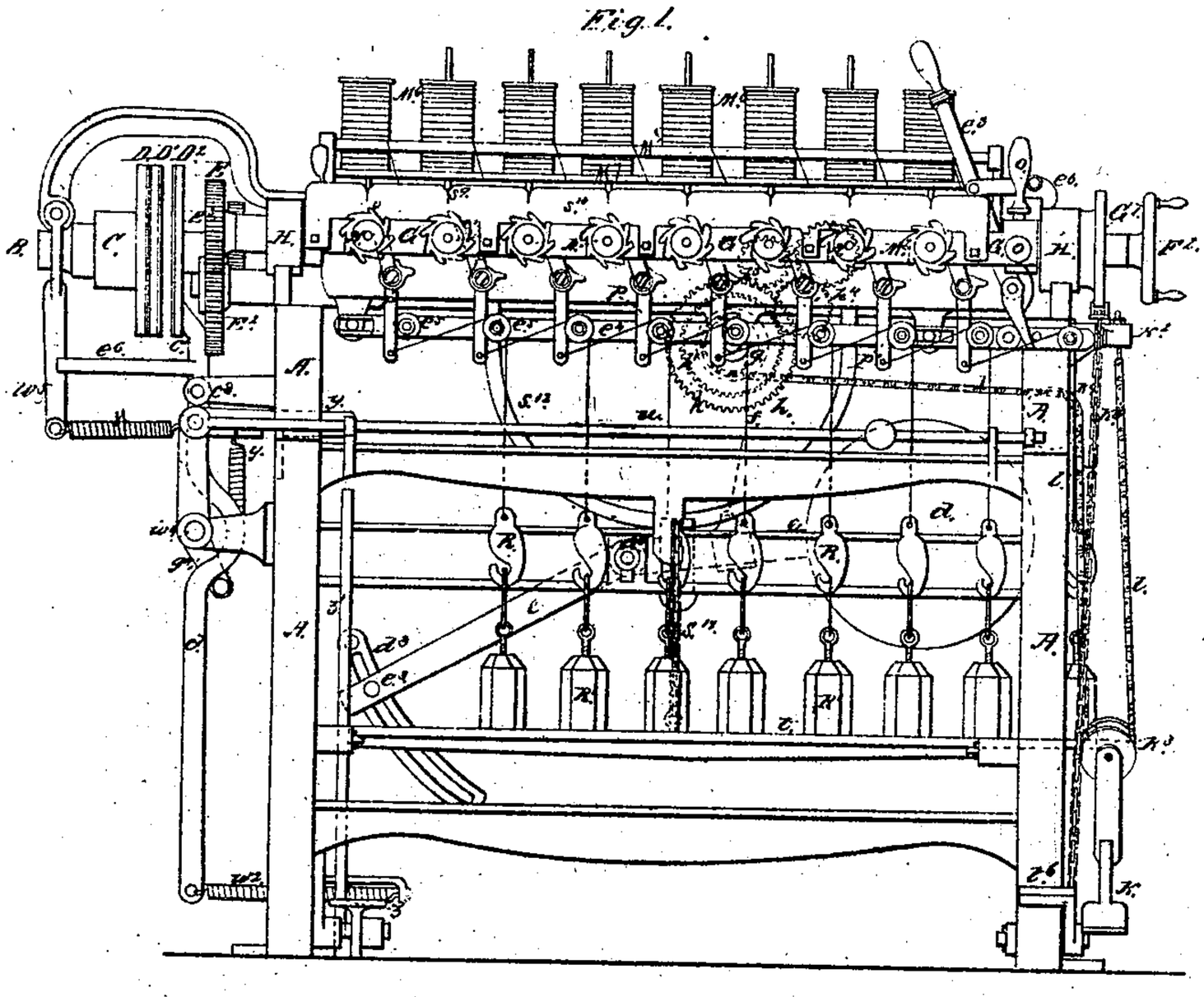


Fig. 2.

Witnesses:
Alfred Smith
Jos. Wilcox

Inventors:
Godfrey Ermen
Robert Smith

Sheet 2 - 2 Sheets.

Ermen & Smith.
Spooling Cotton.

No. 44,052. Patented Aug. 30, 1864.

Fig. 3.

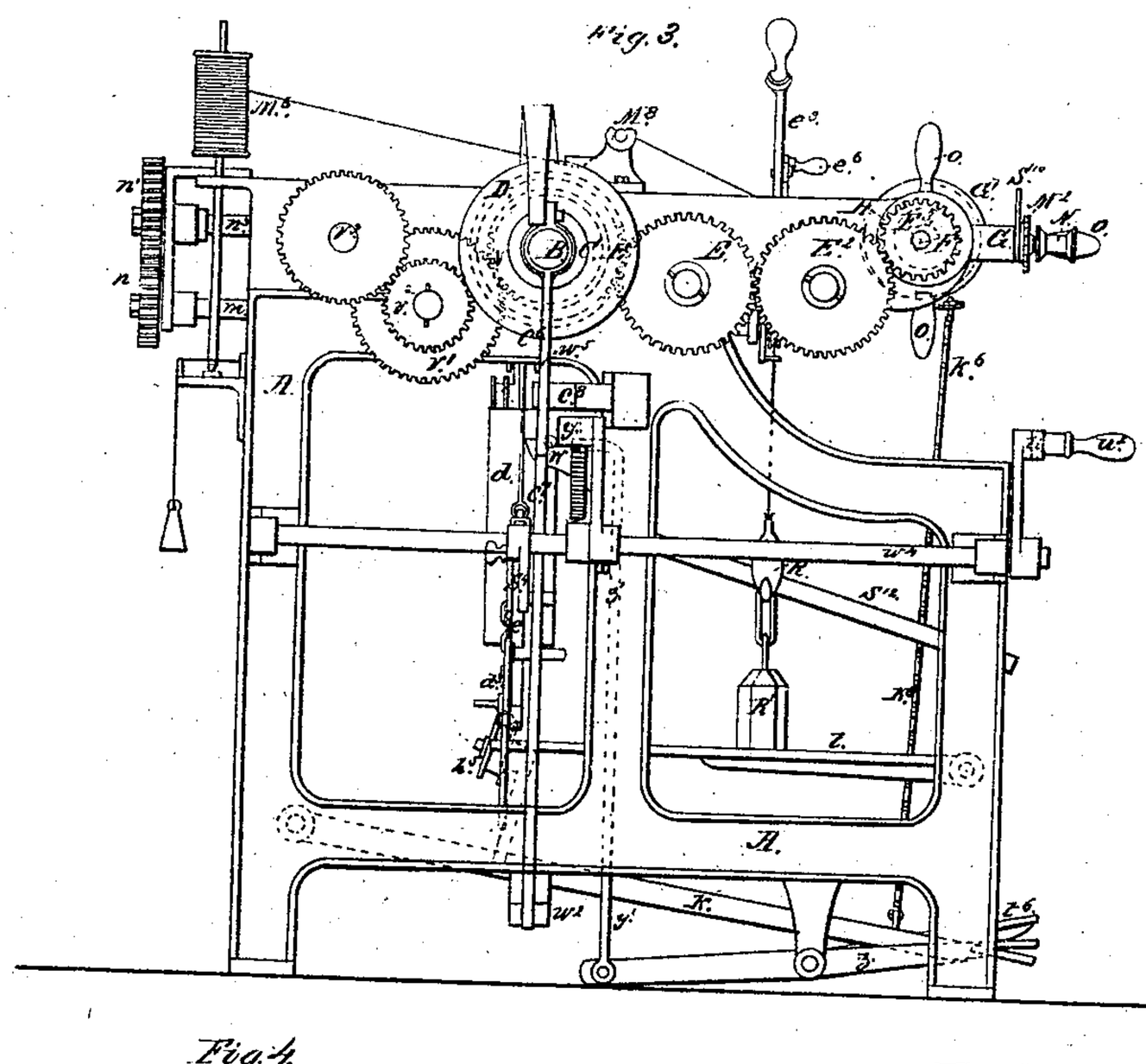


Fig. 4.

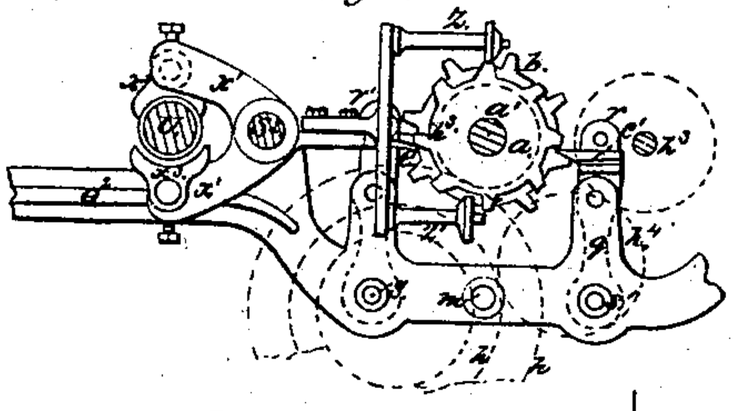


Fig. 5.

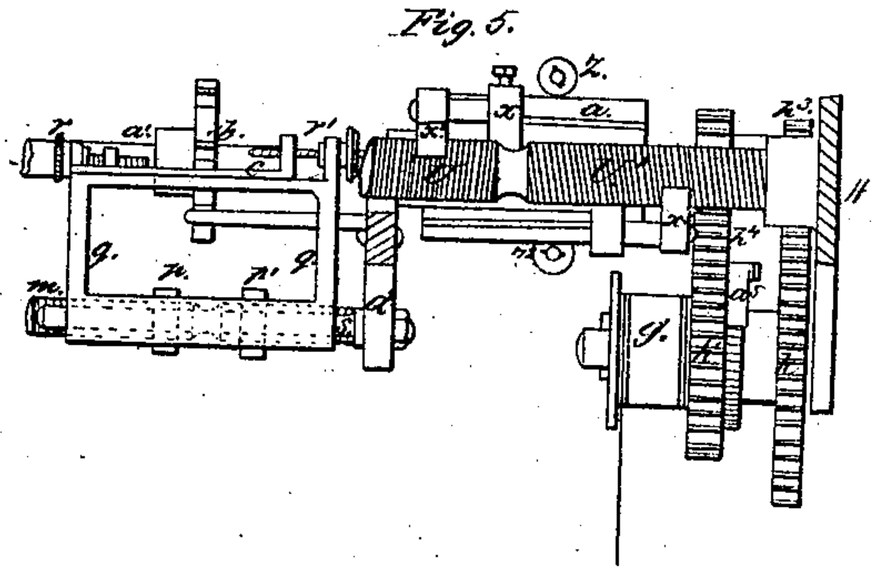


Fig. 6.

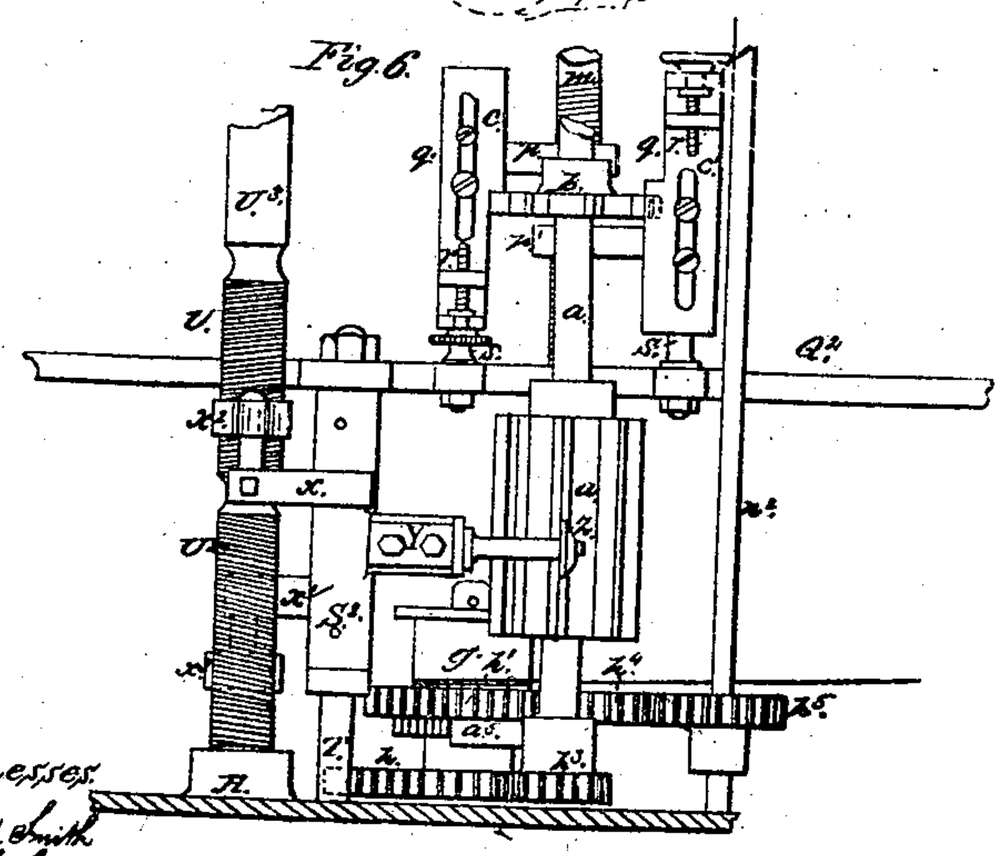
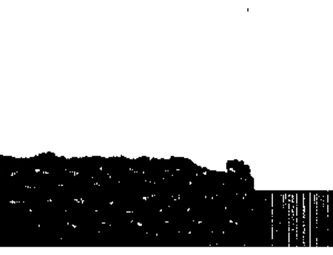


Fig. 7.



Witnesses.
Alfred Smith
Jos. Pillsbury

Inventors
Godfrey Ermen
Robert Smith

UNITED STATES PATENT OFFICE.

GODFREY ERMEN AND ROBERT SMITH, OF MANCHESTER, ENGLAND.

IMPROVEMENT IN MACHINES FOR SPOOLING COTTON, &c.

Specification forming part of Letters Patent No. **44,052**, dated August 30, 1864.

To all whom it may concern:

Be it known that we, GODFREY ERMEN, manufacturer, and ROBERT SMITH, machinest, both of the city of Manchester, county of Lancaster, United Kingdom of Great Britain, have invented certain new and useful Improvements in Machinery for Spooling Cotton, Silk, and other Like Fibrous Materials; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed sheets of drawings, making a part of this specification.

Letters Patent on this invention have been granted in Great Britain, and the specification sealed November 25, 1862, and numbered No. 1,639.

This invention relates to machinery for spooling a number of spools at one operation; and our improvements chiefly apply to the description of machine for which Letters Patent in Great Britain were granted to William Young, of the firm of H. Bannerman & Sons, of Manchester, merchant, on the 2d day of December, 1848, No. 12,353.

These improvements consist, first, in an improved plan or arrangement of the spindle upon which the spools are filled with thread. These spindles we fix in a frame which can be made to revolve upon bearings. This frame contains two rows of spindles to which motion is imparted by suitable gearing, each row corresponding with the number of spools required, and they are so arranged that while one row of spools is being filled with thread the attendant can be doffing or taking off the full spools and putting on empty ones on the other row of spindles, so that little loss of time takes place between the sets, and the machine will thus do a greater quantity of work. Secondly, in an improved plan of varying the length of the traverse of the frame carrying the thread-guides as the spools are filled, by means of right and left handed screws cut upon a shaft to which motion is given by the descent of a weight.

We will now proceed to describe the mode of carrying these improvements into practical effect, as shown in the accompanying sheets of drawings.

Figure 1 represents a front elevation; Fig. 2, a plan; and Fig. 3, an elevation of the drawing end of a machine constructed according to our invention. Figs. 4, 5, 6, and 7 represent details to a larger scale of the motion for varying the length of the traverse of the frame carrying the thread-guides.

In each of the above figures the same letters of reference indicate like parts. The thread is indicated by red lines. In Figs. 4, 5, 6, and 7 the pitch-lines of the spur-wheels are indicated by dotted blue lines.

To the main framing of the machine A A is fixed a stud, B, upon which the main driving-pulley C constantly rotates, being driven by a belt from the motive power. To the side of this pulley is fixed a friction plate, D, and beside it is another similar friction-plate, D′, which is fixed to the boss of the first driving-wheel, E, giving motion to the shaft F by means of the carrier-wheels E′ and E^2, and wheel E^3, fixed on the end of the said shaft F. The shaft F passes through the rectangular revolving frame G, which is carried by bearings or axles at H, made eccentric to the center of the shaft F, in such a manner that when the bevel-wheels J J, fixed upon the said shaft, are in gear with the bevel-wheels K, carried by the frame G they are out of gear with the bevel-wheels L on the other side of the frame G, and if we turn the rectangular frame G one-half revolution by pulling the handle O the wheels L will be in and the wheels K K out of gear with the wheels J J. The bevel-wheels K and L are fixed upon the spindles carrying the spools M M M and N N N. The spools M M M are in the position where they are filled with thread, the spools N N N are empty ones which have been substituted for full ones taken off during the filling of the set M M M. The thread passes from the supply-bobbins M^6, round the rods M^7 and M^8 to the eyes M^9 thence to the guides P P, turning upon centers fixed to the traversing frame Q, and are kept constantly pressing upon the spools or bobbins M M M by means of the weights R R R and R′ R′ R′.

S^2 is the reversing traveler carried on the bar T, fixed to the traversing frame Q^2. The traveler S^2 can turn angularly upon the bar T, but is fixed longitudinally.

U is a right and U′ a left handed screw, both cut on the shaft U^3, (see Fig. 6,) having a continuous rotatory motion when the machine is working. It is driven from the friction-plate D′, through the spur-wheels V V′, and

bevel-wheels W W′, Fig. 2. The wheels V′ V² are change-wheels, which can be replaced by others to suit the various thicknesses of thread. The traveler S² has two projecting arms, *x x′*, with faces x^2 and x^3, (see Fig. 4,) cut to fit the right and left handed screws U U′—one above, the other below. The traveler also carries a projecting arm, Y, to which are fixed studs carrying the friction-bowls Z Z′ on opposite sides of the cam-wheel *a*, keyed on the change-shaft *a′*. The angular or vibrating motion of the traveler is produced from the gravity of a weight, *d*, as follows: The weight *d* is fixed upon an oscillating lever, *e*, to which is attached a cord or chain, *f*, passing around a barrel, *g*, (refer in the drawings to Figs. 4, 5, 6, and 7, in which the reversing and variation of traverse is shown on a larger scale,) carried upon a stud fixed to the main frame of the machine. As the weight descends, the barrel rotates, and with it the spur-wheels *h h′*. The wheel *h* drives the wheel h^3, fixed on the shaft *a′*, and the wheel *h′* drives the wheel h^5 through the carrier h^4.

Upon the shaft *a′* is fixed an escapement-wheel, *b*, with the same number of teeth as the cam-wheel *a*. This escapement-wheel is prevented turning by the pallets *c c′* in a similar manner to a clock escapement, excepting that the pallets have an alternating rectilinear motion, and when at either end the wheel escapes and turns half the pitch of a tooth like an ordinary escapement. It is this escapement-wheel that prevents the descent of the weight *d* except by gradual stages. At each slip of the escapement-wheel the shaft *a′* receives a slight rotatory motion, and the cam-wheel *a* raises alternately the friction-bowls Z Z′, and thus brings the arms *x x′* alternately in contact with U and U′. By this means the frame Q receives an alternating rectilinear motion. The weighted lever *e* is raised by depressing the treadle-lever K by means of the chain *l*, one end of which is fixed to the framing of the machine at k^2, and passes round the pulley k^3, fixed to the treadle-lever over another pulley k^4 fixed to the framing A, and thence round the barrel *g*. The weight is raised by the attendant previous to filling each set of spools. The change-shaft *a′* does not turn when the weight is lifted as a ratchet, a^5, attached to the barrel *g*, allows it to turn without turning the wheels *h* and h^3.

We will now show how the length of the traverse is increased as the spool is filled, so as to follow the bevel ends of the spools. For this purpose refer to Figs. 4, 5, 6, and 7, where it is shown on a larger scale.

m is a right and left handed screw, which we will afterward refer to as "lengthening-screw," and traverses with the frame Q, which also supports one end. The other end is carried on slides through the spur-wheel *n*, (see Fig. 2,) which turns it by means of a feather-key. The said wheel *n* gears into *n′* on end of the shaft n^3. These wheels *n* and *n′* are change-wheels to regulate the lengthening of the traverse, and receive motion from the rotation of the barrel *g*, driven by the descent of the weighted lever *e*.

Upon the lengthening-screw *m* are two nuts, *p p′*, one on the right the other on the left handed screw-thread. These nuts form part with the fixings or frames *q q*, which support the pallets *c c′*. These pallets can be adjusted so that the change will take place at the end of the traverse when the first layer of thread is put on the spool by means of the two adjusting screws *r r′*. It will be also seen that the fixings or frames *q q* are carried and slide upon the studs *s s′*, attached to the bar Q², which is fixed on the guide-rods Q³ Q⁴, Fig. 2, and moves with them and the traversing frame Q.

Fig. 4 shows the traveler S² with one arm, *x*, in contact with the screw U, being held in that position by the cam-wheel *a*, pressing against the friction bowl Z. Immediately the escapement-wheel slips past a pallet the cam-wheel makes one sixteenth of a revolution, the point of the cam then passes from beneath the friction-bowl Z, and another point below pushes out the friction-bowl Z′, and the arm *x′* is in contact with U′. When the arm *x′* is lifted, x^3 is in contact with U′. Thus is effected the alternating rectilinear motion of traversing frame Q and traveler S². The escapement-wheel is shown pressing against the pallet *c*, as the pallet traverses with the frame Q. It is drawn past the escapement-wheel, and the weight on lever *d* pulls the escapement round until the tooth on opposite side is arrested by the pallet *c′*. At every motion of the escapement-wheel the shaft n^3 receives also a movement from the barrel-shaft. This is transmitted through the wheels *n′* and *n* to the lengthening-screw *m*, which draws the nuts *p p′* apart, and consequently the pallets *c c′*, thus lengthening the distance the pallets must travel before the direction of motion of the traversing bar Q is changed. It will be seen that the threads-guides P P P are pressed against the spools by the pull of the weights R R′ against the lower arms P′ P′, fixed to said thread-guides. The force exerted by these weights is varied in the following manner:

Before the machine is started it has been mentioned that the weighted lever *e* is wound up. The same operation lifts the platform *t*, to which it is attached by a cord or chain, and takes off the weight of the large weights R′, the weights R only remaining in operation. As the spools are filled and the lever *e* descends, the platform *t* descends with it, and the weights R′ R′ are left hanging and exerting their force upon the thread-guide in conjunction with R. The object of this additional weight is to give finish and luster to the last layers of thread.

The machine is started by pulling the bar *u* lengthwise, turning the shaft w^5, and by the arm s^4 moving the lever c^7. This motion pulls the friction-plate D² away from D′, as shown in the drawings, at the same time the continuously-revolving friction plate D is

pulled against D′ by the spiral spring W acting on a lever, w^5, and the machine is started. At the time this brake friction-plate D^2 is separated from D′ by the lever s^4 pressing against the lever c^7, a notched latch, y, drops on a projection fixed to the frame and prevents the brake plate D^2 returning. To stop the machine this notched latch y must be released by lifting it. The attendant does it by pressing upon the treadle z, which lifts the bar z', and raises the notched latch y from the catch. The brake friction-plate D^2 is then pressed against and stops the plate D^1 by the spring W^2 acting upon the lever c^7, (which turns upon a pivot at c^8, the friction-plate being fixed to the upper extremity,) at the same time the bar c^6 presses against the lever w^5, and relieves the pressure of the spring w, and the friction-plates D and D′ are separated. The machine is also stopped when each set of spools is filled by self-action. At one extremity of the lever e is a sector, d^3, a stud on which strikes the notched latch y as the weight descends, the lever e turning upon the center d^4. This sector is adjusted to stop the machine at any time by a set-screw, e^2, on the lever e.

The lever e^3 is for the purpose of taking off the pressure of the thread-guides, and raises them all at a time by pushing the bar e^4 along, the studs carrying the pulleys e^5, pressing against the levers P′, fixed to the thread-guide. The bar e^4 is carried by the traversing bar Q.

We will now proceed to describe the process of filling spools with thread, supposing the machine has just stopped and completed a set of spools. We first pull the lever e^3 and a catch, e^6, drops over the side of the frame. This takes off the pressure of the thread-guides on the spools. Then take hold of either of the handles O, fixed to revolving frame G, and pressing down with the foot the treadle t^6, to which the chain K^6 is attached, we draw a spring-stop from a notch in the flange G^7, fixed to the frame G. We then pull the frame round one-half revolution, and releasing the treadle t^6, the stop enters another notch in the flange G^7, and the frame G is held fast. The position of the spools is thus reversed, the full ones being outside, the empty ones inside. We now drop the lever S^{12}, which pushes the bar S^{13} along the guide-rods S^{15}, and the studs S^{14} enter the ends of the bobbins and steady them. The lever e^3 is now released, which allows the thread guides P to press against the empty spools, the thread still extending from them across the frame G through the notches s^9 to the full spools. The hand-wheel F^2, which is fixed on the shaft F, is turned one or two revolutions, revolving the spools and the toothed circular plates M^2, which plates M^2, catching the thread, secure it, and it is wound round the empty spools. Then the thread is severed between the empty spools and full ones. On turning the frame G the thread slips in the slots s^9 in the plate s^{10}, and it is held in this way after the thread is cut until the spools are taken off. The treadle-lever k is then depressed to lift the weighted lever e, the bar u pulled to the right by a handle, u^2, and the machine is started. The same movement that has raised the lever e turns the shaft n^3 by means of the barrel g and intermediate gear, and from the shaft n^3 the motion is transmitted through the wheels n' and n to the lengthening-screw until the pallets c c' are in their proper position for the commencement of winding. It will be readily seen that as each traverse of the bar Q is made the pallets c c' allow the escapement-wheel b to make an intermittent motion, and by means of the cam-wheel a effect the reverse or change motion by throwing the arms on the traveler S^2 out of the right-handed thread into the left-handed thread, or vice versa on the shaft U. When there are sufficient layers of thread on the spools, the attendant can stop the machine by depressing the treadle z, or it will stop itself by the stud on the sector d^3, lifting the notched latch y, as hereinbefore described. The operation is then completed. While these spools have been filling we have taken off the full spools on the other row of spindles and replaced them by empty ones.

We do not claim the principle of a self-acting spooling-machine, either for one or more spindles, as it is not novel.

What we claim, and desire to secure by Letters Patent, is—

1. The reversible or revolving frame G, set on eccentric bearings and carrying the gearing that drives the spools, as specified, so that one range of spools is in gear while the other is stationary, as and for the purposes set forth.

2. The sliding frame Q Q^2, escapement b, pallets c c', and screw m, for regulating the extent of travel of the thread-guides P, substantially as specified.

3. The weights R′ and platform t, in combination with the thread guides P and weighted lever e, for the purposes and substantially as specified.

4. The latch y and disk D^2, in combination with the lever e and adjustable sector d^3 for stopping the machine, as set forth.

GODFREY ERMEN.
ROBERT SMITH.

Witnesses:
ALFRED SMITH,
JOSH. WILLCOCK.