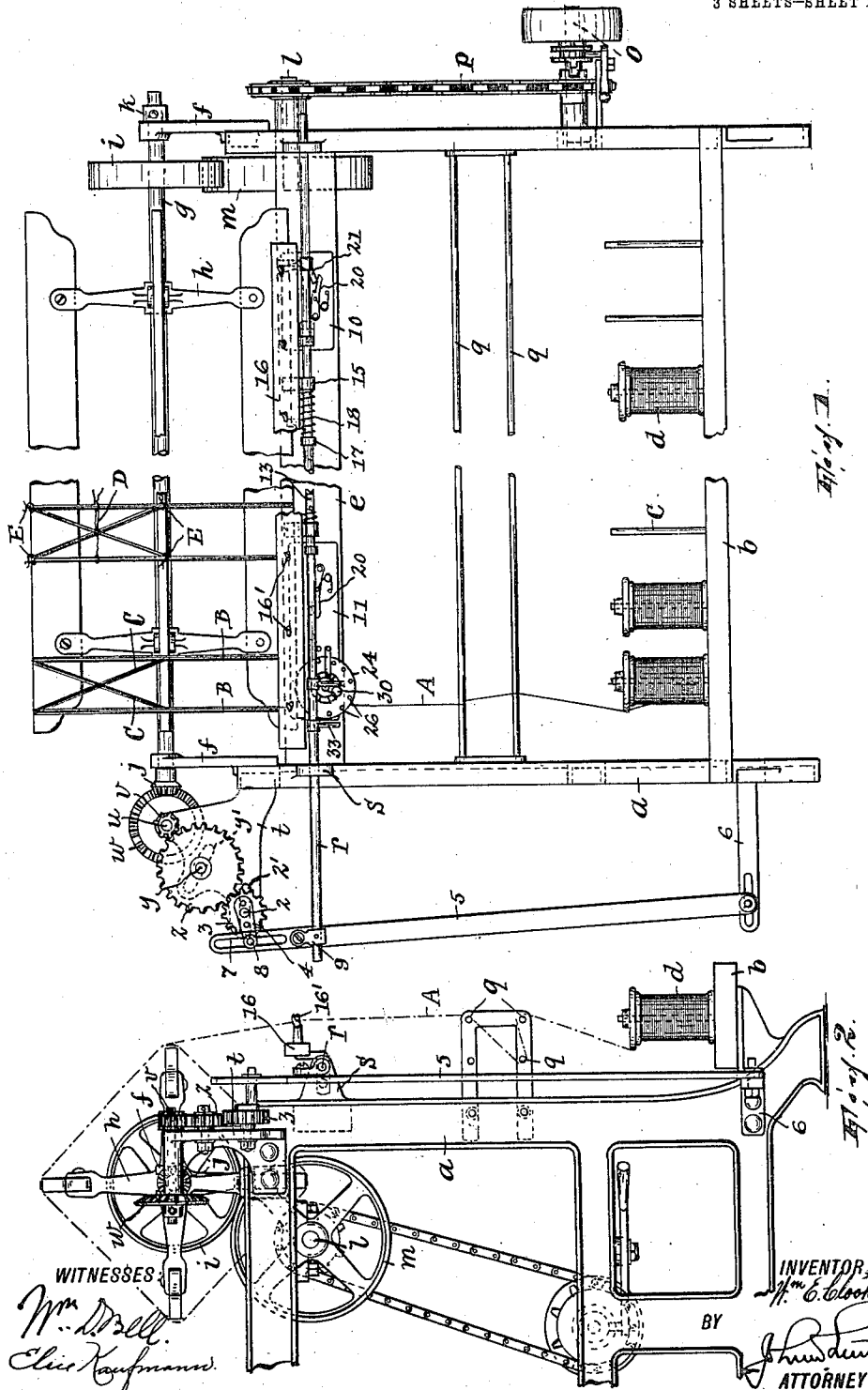


W. E. CLOOKIE.
WINDING MACHINE.
APPLICATION FILED JUNE 7, 1910.

995,768.

Patented June 20, 1911.

3 SHEETS—SHEET 1.

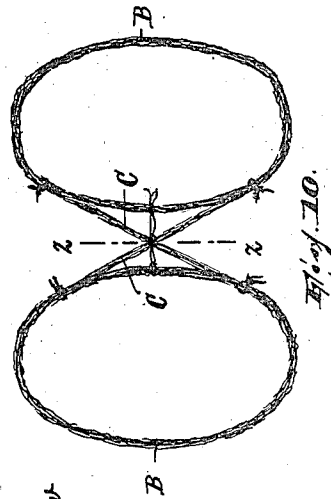
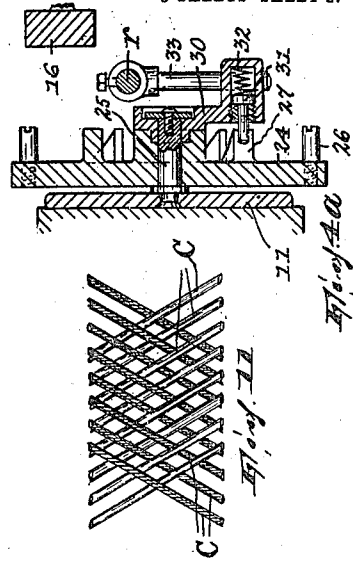
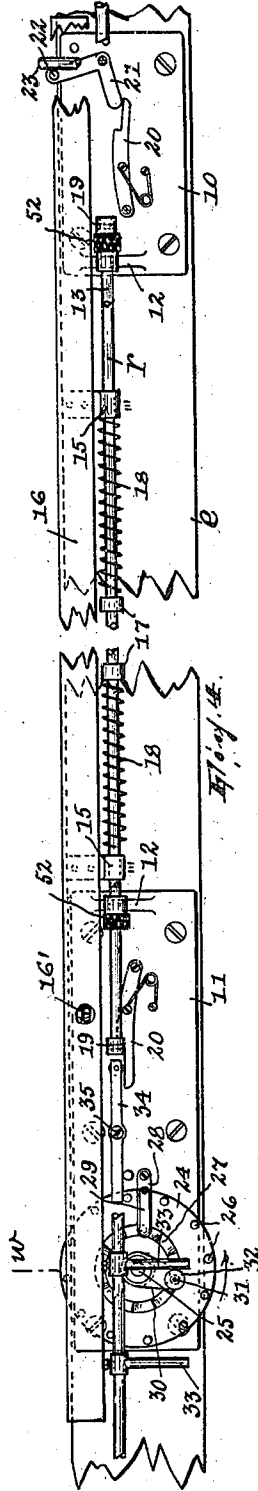
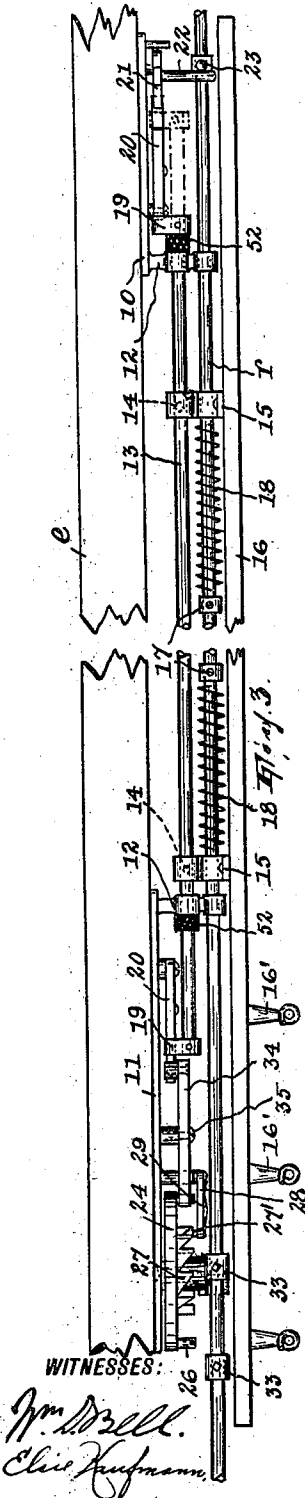


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3 SHEETS-SHEET 2.

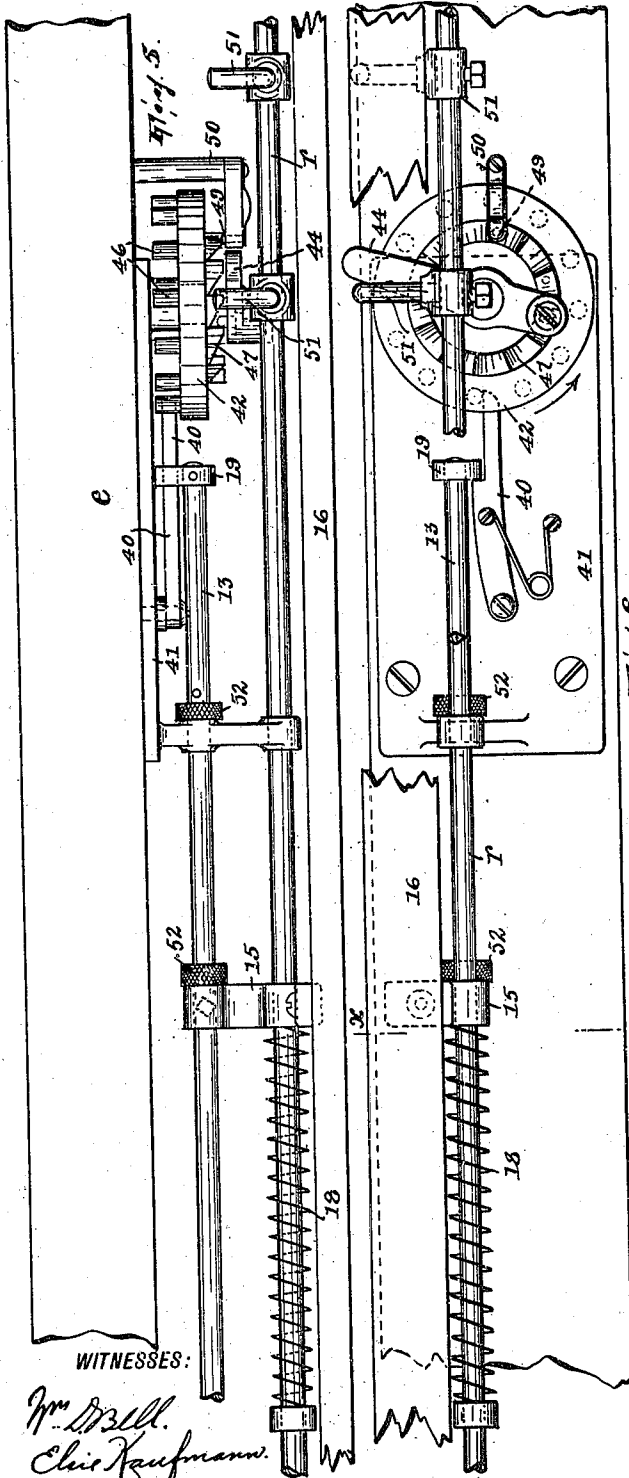


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3 SHEETS—SHEET 3.

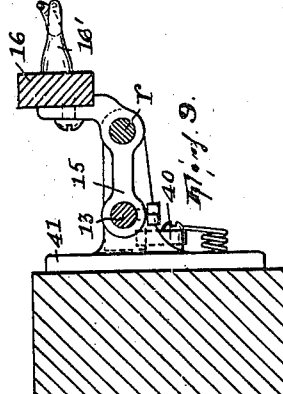
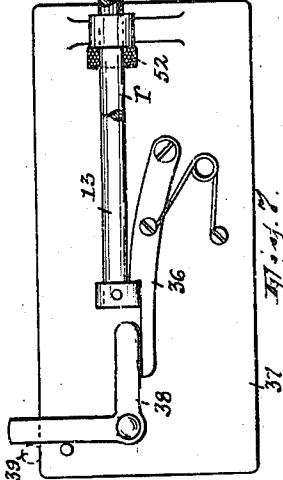
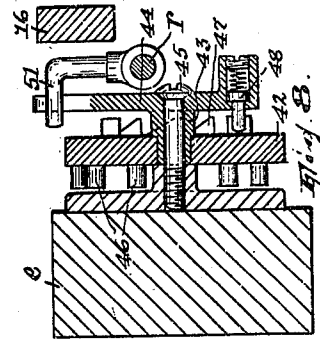
995,768.



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Fig. 6.



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WINDING-MACHINE.

995,768.

Specification of Letters Patent. Patented June 20, 1911.

Application filed June 7, 1910. Serial No. 565,590.

To all whom it may concern:

Be it known that I, WILLIAM E. CLOOKIE, a citizen of the United States, residing in Lakeview, county of Passaic, and State of New Jersey, have invented a certain new and useful Improvement in Winding-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to the winding of thread or yarn into the form of a skein or the like and it has for its object so to wind the skein that the relation of the various strands thereof may be such as to make possible the dyeing of the skein so that it will present different colors, (that is, a part of the skein one color and the rest another, whereby when the skein is unwound the colors will appear as alternating with each other), the extent (or lengths) of the thread which possesses either color being substantially precisely as predetermined. The purpose of dyeing a skein in this manner, *i. e.*, so as to produce in the thread or yarn alternating colors may, for example, be illustrated by stating that when the thread or yarn is wound from the skein onto quills to be used as the filling or weft in a loom checks or stripes may be produced in the goods into which said filling is incorporated by the use of only a single shuttle, in place of a plurality of shuttles equipped with quills wound with differently colored fillings, thereby producing a saving in the cost of production which, as will be apparent at once to the manufacturer, is considerable.

So far as I am aware, although it has heretofore been suggested to dye one-half of a skein one color and have the rest another, this object has never heretofore been successfully accomplished, the reason being that the proposed methods of winding were not such that the strands of the resulting skein could be retained in such relation with each other, in the handling which intervenes between the forming of the skein and the dyeing operation, that it could be positively forecasted that any given length of the thread, and not more or less, would have the color desired. It is quite obvious that unless this condition could be forecasted with sub-

stantial accuracy the product would be useless for the purpose in hand because, otherwise, when the thread comes to be incorporated into a fabric as the filling or weft thereof, the checks, stripes or other figures contemplated would not appear, or at least would be irregular and distorted in form.

According to my invention the skein is formed by first winding a coil of the thread (the word "thread" being herein used to include various attenuated materials capable of being wound) around one part of a suitable former, then, winding a second coil of the thread around another part of said former in spaced relation to the first coil, and then winding a coil of the thread around said former in substantial coincidence with the first coil, keeping the thread intact during the winding of the several coils and causing the parts of the thread which connect the three succeeding coils to cross each other between the first and third coils, on the one hand, and the second coil on the other. In actual practice this operation will be continued, so that a fourth coil is wound in substantial coincidence with the second, a fifth in substantial coincidence with the third, and so on, the parts of the threads which connect succeeding coils being crossed or decussated in the manner already sufficiently indicated above with respect to the first three coils. The decussating or crossing of the parts of the thread which connect the several coils is an important feature of this method, of winding a skein, it being well known in the textile art that such an arrangement of threads permits the threads to be tied together so that they may be successfully held each against any material longitudinal displacement. With such a cross (that is, a decussation) formed in the threads between the two sets of coils, when the threads are tied or otherwise secured at the cross the skein may be manipulated after it is formed and before it leaves the dye vat with practical assurance that the threads will not be displaced longitudinally and cause a change in the dimension of each convolution of the skein at either side of the cross, which condition is absolutely essential, as pointed out above, if exactly one-half of the skein is to be dyed one color and the other half remain or be dyed another color with the ultimate object that when the skein is unwound, all those portions thereof which are one color shall correspond in length ex-

actly with the length they were intended to have.

I now proceed to describe the mechanism which I have devised for winding a skein in accordance with my invention.

In the drawings, Figure 1 is a view in front elevation of a winding machine constructed in accordance with my invention; Fig. 2 is a side elevation thereof; Fig. 3 is a top plan view of a part of the frame, the thread guide rail and the part of the means for controlling the thread guide rail which is contiguous thereto; Fig. 4 is a front elevation of what is shown in Fig. 3; Fig. 4^a is a vertical sectional view on a larger scale on substantially the line *w-w* of Fig. 4; Fig. 5 is a fragmentary plan view of a modification of what is shown in Figs. 3 and 4; Fig. 6 is a front elevation of what is shown in Fig. 5; Fig. 7 is a front elevation of certain parts which coöperate with what is shown in Figs. 5 and 6; Fig. 8 is a vertical sectional view through what is shown in Figs. 5 or 6 taken in a plane coinciding with the axis of a certain disk shown in said figures; Fig. 9 is a vertical sectional view on the line *x-x* of Fig. 6 and looking toward the right in said figure; Fig. 10 shows the improved skein when removed from the reel and laid out flat; and, Fig. 11 shows the decussations in the portions of the thread which connect the coils of the skein.

In the drawings, *a* is a frame comprising a support *b* having the vertical skewers *c* for the supply bobbins *d* and also comprising the fixed rail *e* rigidly connecting the ends of said frame. Above the rail *e* there is journaled, in forked brackets *f*, a rotary horizontal shaft *g* carrying a reel *h* or other former for the skeins and also carrying a friction wheel *i* at one end thereof and a bevel pinion *j* at the other end thereof, said pinion and a collar *k* on the shaft preventing endwise movement thereof by abutting against the outer sides of the brackets *f*. In the frame *a* is journaled another rotary horizontal shaft *l* carrying a friction wheel *m* on which the friction wheel *i* rests, rotary motion being transmitted from shaft *l* to the reel through the peripheral contact of the friction wheels *m* and *i*. Shaft *l* may be driven from the drive shaft *o* suitably journaled in the frame through a sprocket-and-chain connection *p* or in any other desired manner.

q designates horizontal rods suitably supported in the frame and serving to impose a drag on the threads, which are arranged with relation to said rods, for illustration, in the manner shown in Fig. 2.

r is a horizontal rod designed to reciprocate longitudinally in the arms *s* projecting from the frame. This rod may be reciprocated from the reel shaft or otherwise, but however its motion may be derived I pre-

fer that the ratio of its reciprocations with respect to the revolution of the reel may be varied for certain reasons which will appear later herein. To this end the means for actuating said rod shown best in Fig. 1 may comprise a bracket *t* attached to the frame *a*, a shaft *u* journaled in the bracket and carrying a pinion *v* and a bevel gear *w* (the latter meshing with the bevel pinion *j*), a shaft *y* arranged in said bracket and having journaled upon it a gear *z* meshing with pinion *v*, a stud 2 arranged in the bracket and having journaled upon it a pinion 3 meshing with gear *z* and carrying a crank 4, a lever 5 fulcrumed in a bracket 6 and having a slot 7 receiving the crank-pin 8 of crank 4 and a coupling 9 pivotally connecting rod *r* with the lever; *y'* and 2' designate slots in bracket *t* permitting the shaft *y* and stud 2 to be shifted whenever it is desired to vary the ratio of the reciprocations of rod *r* to the revolutions of the reel by substituting a different size of gear *z*.

Two plates 10 and 11 are secured to the front face of the rail *e* and they carry arms 12 in which the rod *r* slides. In these arms 12, back of the rod *r*, is arranged another longitudinally movable horizontal rod 13 on which are secured, by set screws 14, the brackets 15 which are freely penetrated by the rod *r* and carry, in front of rod *r*, the thread guide rail 16 having the pig-tails 16' or other thread-guides. Between the brackets 15 there are secured on the rod *r* the adjustable collars 17 between which and each of the brackets 15 there is interposed a spring 18 coiled about the rod *r*. Thus, when rod *r* moves to the right its movement will be transmitted through the right-hand spring 18 to the right-hand bracket 15 and hence rod 13 and the thread guide rail will be moved to the right; when rod *r* is moved to the left rod 13 and the thread guide rail will be moved in the same direction through the medium of the left hand spring 18 and left hand bracket 15.

At the ends of the rod 13 there are secured the abutments or heads 19; each of these, when the rod has been moved far enough to the right (or left), will engage the adjoining one of two spring-actuated detents 20 pivoted in the plates 10 and 11 whereby the rod will be held temporarily against return movement. In order to explain the operation of the parts with respect to these detents 20 it may be well preliminarily to state that when rod *r* has moved to one of its limits of movement, carrying rod 13 with it, and then returns, the detent 20 which corresponds to the end of such movement of the two rods restrains the rod 13 against at once returning with rod *r*; rod 13 thus assumes a condition of pause or dwell, and this pause or dwell is, in the present adaptation, limited by the rod *r* in its

movement, affecting such movement of the detent as will release rod 13. To this end, on the right hand plate 10 is fulcrumed a bell-crank lever 21 adapted to press downwardly by one arm thereof on the detent and having on its other arm a pin 22. To the right of the pin 22 there is arranged on the rod *r* a pin 23 which, when the rod *r* moves to the left, engages the pin 22 and so causes lever 21 to move the detent 20 out of restraining relation to the abutment 19 on rod 13.

For moving the left-hand detent 20 out of restraining relation to the left hand abutment 19 on rod 13 there is a mechanism similar to that already described but having functions in addition to that of merely releasing the rod 13. In this mechanism, 24 is a disk journaled on a stud 25 projecting from the plate 11 and carrying on its front face a series of pins 26 (any one of which may be removed at will) and also having on its front face a ratchet 27. This ratchet is restrained against backward rotation by a pin 27' guided in an arm 28 secured to the plate 11 and pressed against the ratchet by a plate spring 29. On a crank 30 pivoted on the stud 25 is arranged a spring-actuated pin 31 which engages the ratchet, the crank having a projection 32 extending outwardly. Said crank and its spring-actuated pin constitutes a pawl adapted to advance the ratchet, and hence the disk 24, step by step. In order to oscillate the ratchet two arms 33 are suspended from the rod *r*, one at each side of the projection 32, so that as the rod reciprocates said arms will alternately engage the projection and thus move the pawl back and forth.

34 is a lever fulcrumed between its ends in a screw 35 in the plate 11, one end of the lever extending over the left hand detent 20 and the other projecting into the path of movement of the pins 26. Thus, each time the arm 33 moves the pawl and so advances the ratchet and disk, one of the pins 26 (if present) will actuate lever 34 and cause it to depress the detent 20 out of restraining engagement with the rod 13. Such actuation of the detent 20 of course occurs after rod *r* has begun to move to the right, thus producing the desired pause or dwell at the termination of the left hand movement of rod 13.

Operation: The rod *r* is reciprocated constantly and in its advance in each direction it tends through one of the springs 18 to advance the rod 13 in the same direction. When the rod *r* reaches the end of its throw in either direction, however, rod 13 cannot return with it because one or the other of the detents 20 restrains it. Assuming that the rod *r* is returning to the left, then, during such movement, its arm 23 will engage lever 21 and cause it to trip the right-hand

detent 20. Rod 13 will thus be released and, influenced by the now compressed left-hand spring 18, will execute a quick movement to the left, being immediately held against return by the left-hand detent 20. In the movement of rod *r* to the left, its right-hand arm 33 has moved the pawl backward over the ratchet 27, ready to advance the latter another step as soon as the pawl is moved in the opposite direction. When rod *r* now moves to the right, the ratchet and disk are advanced by the pawl, one of the pins 26 moving lever 34 to trip the detent 20, so that rod 13 is again released, following a dwell, and, under the pressure of the right-hand spring 18, moves quickly to the right to be again caught by the right-hand detent 20. In this operation each thrust of the rod 13 is followed by a dwell; the thread-guide rod being movable with rod 13, its action corresponds precisely to that of said rod. Assuming that threads A are therefore being wound on the reel *h* from the supply spools *d*, separated coils B of thread will be formed on the reel, the same being joined by the portions C of the thread; the coils B are produced by the rotation of the reel during the dwell periods of the thread-guide rod, while the crossing portions C result from the rotation of the reel simultaneously with the shiftings of the thread-guide rail. The movements are so timed that each shifting of the thread-guide rail begins when one of two given staves of the reel is at the front horizontal position and ends when the other (or next succeeding one) of such two staves reaches the same position, whereby the cross-over portions C of the threads are held or bound to the coils at the angles in the skein formed by said staves. In view of the foregoing, it will be apparent that the portions C of the thread which connect the coils B stand decussated, that is, as shown in Fig. 11. When the reeling of a series of skeins has been completed in this manner, each skein is tied, as at D, and also preferably, as at the points E E, the tying being effected with a careful view to prevent independent longitudinal movements of the strands. The skeins may now be removed from the reel and if laid out flat would appear as in Fig. 10. Being formed and tied as described, one half of the skein (from line *z-z* in Fig. 10 to the right or left) may be dyed one color and the rest dyed another color, and when the skein is unwound all lengths of either color will measure precisely the same and as predetermined.

By removing certain of the pins 26, say alternating pins, or every second and third pin, or every other two pins, the dwells of the rail in its left-hand position may be varied at will, so that there would result more convolutions in one set of coils B than in the other; in consequence, when the skein

is dyed in the manner set forth above, there would be longer lengths of one color than the other, making a variety of patterns possible when the thread comes to be incorporated into a fabric.

By changing gear z for one of different size the ratio of the cycles of movement of the thread-guide rail and reel will be changed, so that more or less revolutions of the reel would correspond to a given number of reciprocations of the thread guide rail.

The modified construction shown in Figs. 6, 7, 8 and 9 operates substantially the same as that already described. In this form, the position of the detents is reversed, that which is controlled by what I term the "clock" (*i. e.*, the disk carrying the removable pins and serving in varying the dwell of the thread-guide at one limit of its movement) being at the right and the other at the left of the machine. In Fig. 7, 36 is the left-hand spring-actuated detent adapted to engage and restrain the rod 13 when it moves to the left against return movement to the right, the same being pivoted in the plate 37; and 38 is the lever which, when engaged by the arm 39 on rod r as the latter moves to the right, depresses the detent to release the rod 13. In Figs. 5, 6, 8 and 9, 40 is the right-hand spring-actuated detent adapted to engage and restrain rod 13 when it moves to the right against return movement to the left, the same being pivoted in the plate 41; 42 a disk, journaled on the shank 43 of a lever 44 which is fulcrumed on a stud 45 projecting from the plate, the disk having a series of removable pins 46 adapted to engage and depress the detent 40; 47 a ratchet formed on said disk and engaged by the spring-actuated pin 48 in lever 44 (which thus coacts as a pawl with the ratchet); 49 a spring-actuated pin arranged in a mounting 50 and preventing backward rotation of the ratchet; and 51 two arms arranged on the rod r one at each side of the free or upwardly projecting arm of the pawl, the left-hand one of which causes the pawl to click reversely over the ratchet and the right-hand one of which, when the rod r moves to the left, moves the pawl in the direction to advance the ratchet and causes one of the pins in the disk to depress the detent.

Suitable buffers may be arranged on the rod 13 between each of its heads 19 and the arms of the plates 10 and 11 (or 37 and 41), as indicated by 52 in the drawings, to deaden the shock upon the shifting of rod 13.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine for winding skeins, the combination, with a frame, of mechanism arranged therein for forming the thread into a succession of convolutions and incorporating said convolutions alternately in

distinct coils comprising a rotary skein-holder member and means for imparting, synchronously with the rotation of said member and in the direction of the length of the axis of said member, a shift and pause movement to the thread, substantially as described.

2. In a machine for winding skeins, the combination, with a frame, of mechanism arranged therein for forming the thread into a succession of convolutions and incorporating said convolutions alternately in distinct coils comprising a rotary skein-holder member, a thread-guide member movable substantially parallel with the axis of the skein-holder member, and means for imparting a shift-and-pause movement to the thread-guide member synchronous with the rotation of the skein-holder member, substantially as described.

3. In a machine for winding skeins, the combination, with a frame, of mechanism arranged therein for forming the thread into a succession of convolutions and incorporating said convolutions alternately in distinct coils comprising a rotary skein-holder member, a thread-guide member movable substantially parallel with the axis of the skein-holder member, intermittently acting means for restraining the thread-guide member against movement, and means for moving the thread-guide member and tripping the restraining means, substantially as described.

4. In a machine for winding skeins, the combination, with a frame of mechanism arranged therein for forming the thread into a succession of convolutions and incorporating said convolutions alternately in distinct coils comprising a rotary skein-holder member and means for imparting, synchronously with the rotation of said member and in the direction of the length of the axis of said member, a reciprocating shift and pause movement to the thread, substantially as described.

5. In a machine for winding skeins, the combination, with a frame, of mechanism arranged therein for forming the thread into a succession of convolutions and incorporating said convolutions alternately in distinct coils comprising a rotary skein-holder member, a thread-guide member movable substantially parallel with the axis of the skein-holder member, and means for imparting a reciprocating shift-and-pause movement to the thread-guide member synchronous with the rotation of the skein-holder member, substantially as described.

6. In a machine for winding skeins, the combination, with a frame, of mechanism arranged therein for forming the thread into a succession of convolutions and incorporating said convolutions alternately in distinct coils comprising a rotary skein-

holder member, a thread-guide member movable substantially parallel with the axis of the skein-holder member, intermittently acting means for restraining the thread-guide member against movement, and means for reciprocating the thread-guide member and tripping the restraining means, substantially as described.

7. In a machine for winding skeins, the combination, with a frame, of mechanism arranged therein for forming the thread into a succession of convolutions and incorporating said convolutions alternately in distinct coils comprising a rotary skein-holder member, a thread-guide member movable substantially parallel with the axis of the skein-holder member, an actuating member for the thread-guide member, oppositely acting springs interposed between the thread-guide member and the actuating member, detents engageable with the thread-guide member and controlled by the actuating member, and means for reciprocating the actuating member, substantially as described.

8. The combination of the frame, a reel journaled therein, a thread-guide member reciprocatory substantially parallel with the reel axis, an actuating member for the thread-guide member movable back and forth substantially parallel with the thread guide member, means for actuating the actuating member, oppositely acting elastic means interposed between the actuating member and the thread guide member, detents each engageable with the thread guide

member to restrain the same against return movement upon movement in either direction imparted thereto from the actuating member, one of said detents being controlled by the actuating member, and means, operatively interposed between the actuating member and the other detent, for controlling said other detent, substantially as described.

9. The combination of the frame, a reel journaled therein, a thread-guide member reciprocatory substantially parallel with the reel axis, an actuating member for the thread-guide member movable back and forth substantially parallel with the thread guide member, means for actuating the actuating member, oppositely acting elastic means interposed between the actuating member and the thread guide member, detents each engageable with the thread guide member to restrain the same against return movement upon movement in either direction imparted thereto from the actuating member, one of said detents being controlled by the actuating member, and means, operatively interposed between the actuating member and the other detent and regulable at will, for controlling said other detent, substantially as described.

In testimony, that I claim the foregoing I have hereunto set my hand this 31st day of May, 1910.

WILLIAM E. CLOOKIE.

Witnesses:

JOHN W. STEWARD,
WM. D. BELL.