

Aug. 10, 1943.

B. A. PETERSON

2,326,307

YARN WINDING MECHANISM

Filed Jan. 31, 1942

5 Sheets-Sheet 1

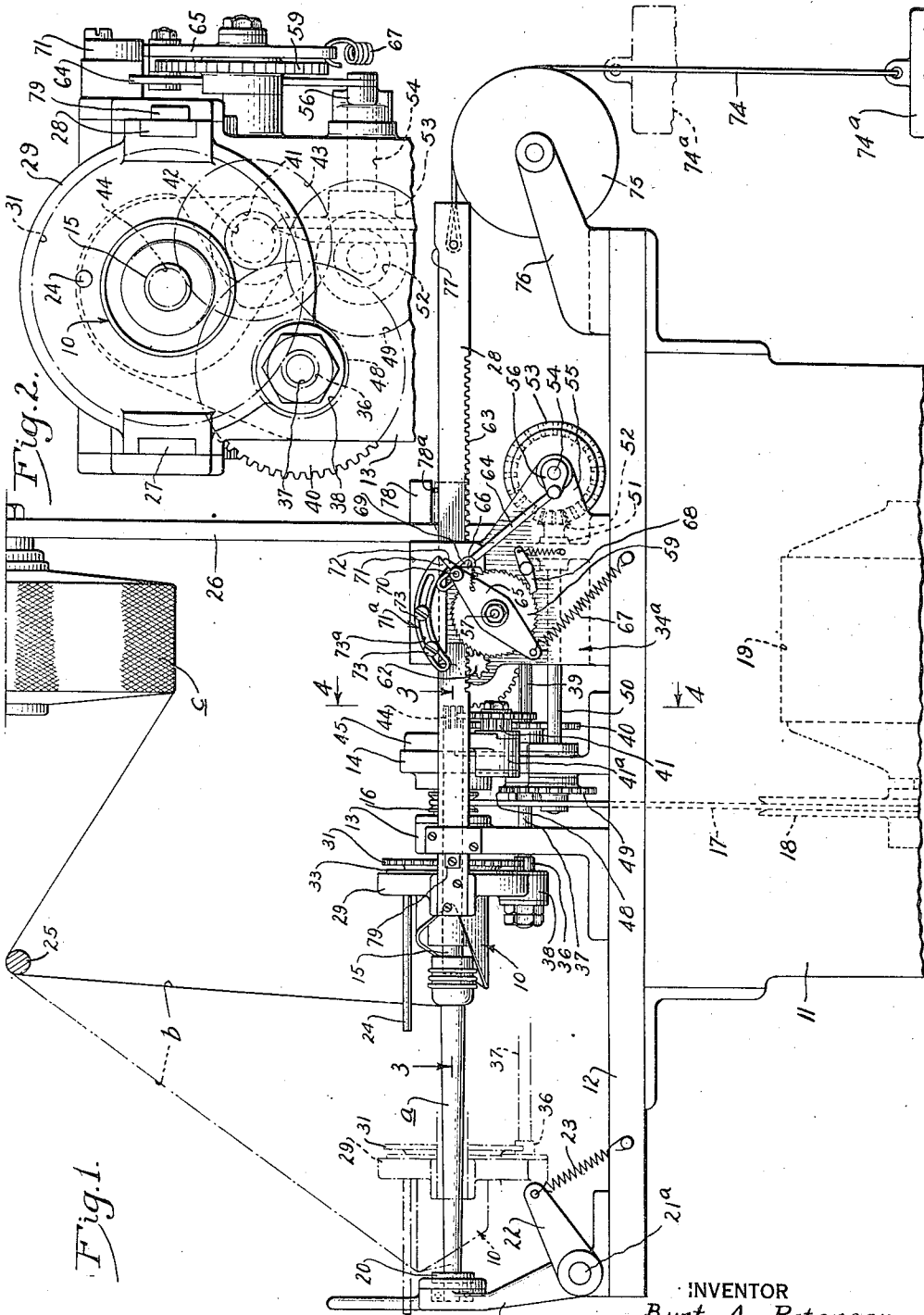


Fig. 1.

Fig. 2.

INVENTOR

Burt A. Peterson

BY

Parker Gordon Peterson & Halstead

ATTORNEYS

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B. A. PETERSON
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Fig. 3.

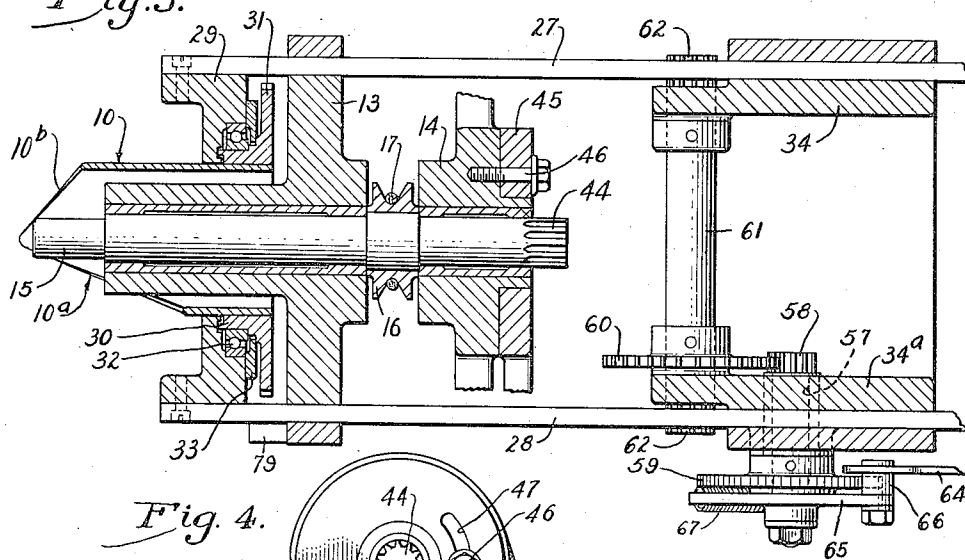


Fig. 4.

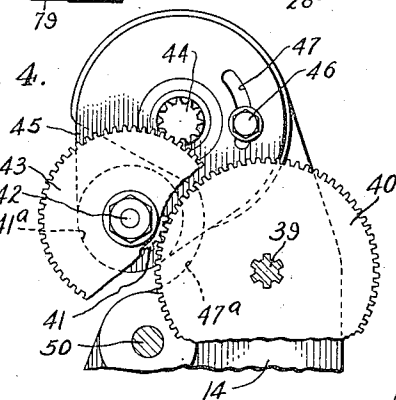


Fig. 6.

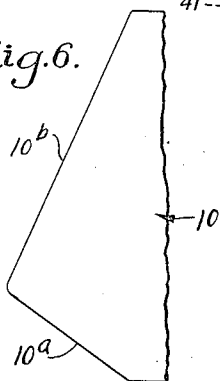


Fig. 5.

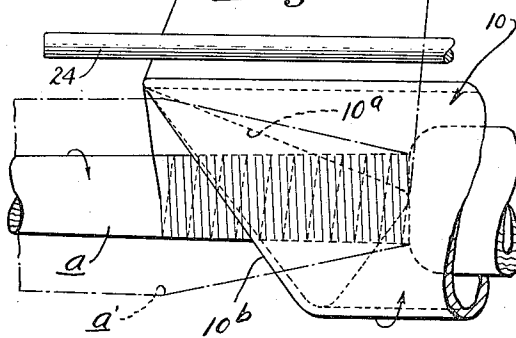
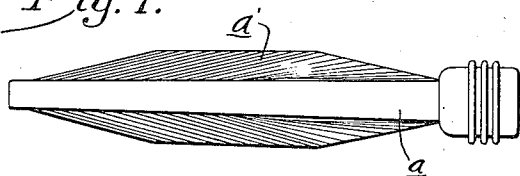


Fig. 7.



INVENTOR
Burt A. Peterson
BY
Parker, Bacon & Peterson
ATTORNEYS

Aug. 10, 1943.

B. A. PETERSON

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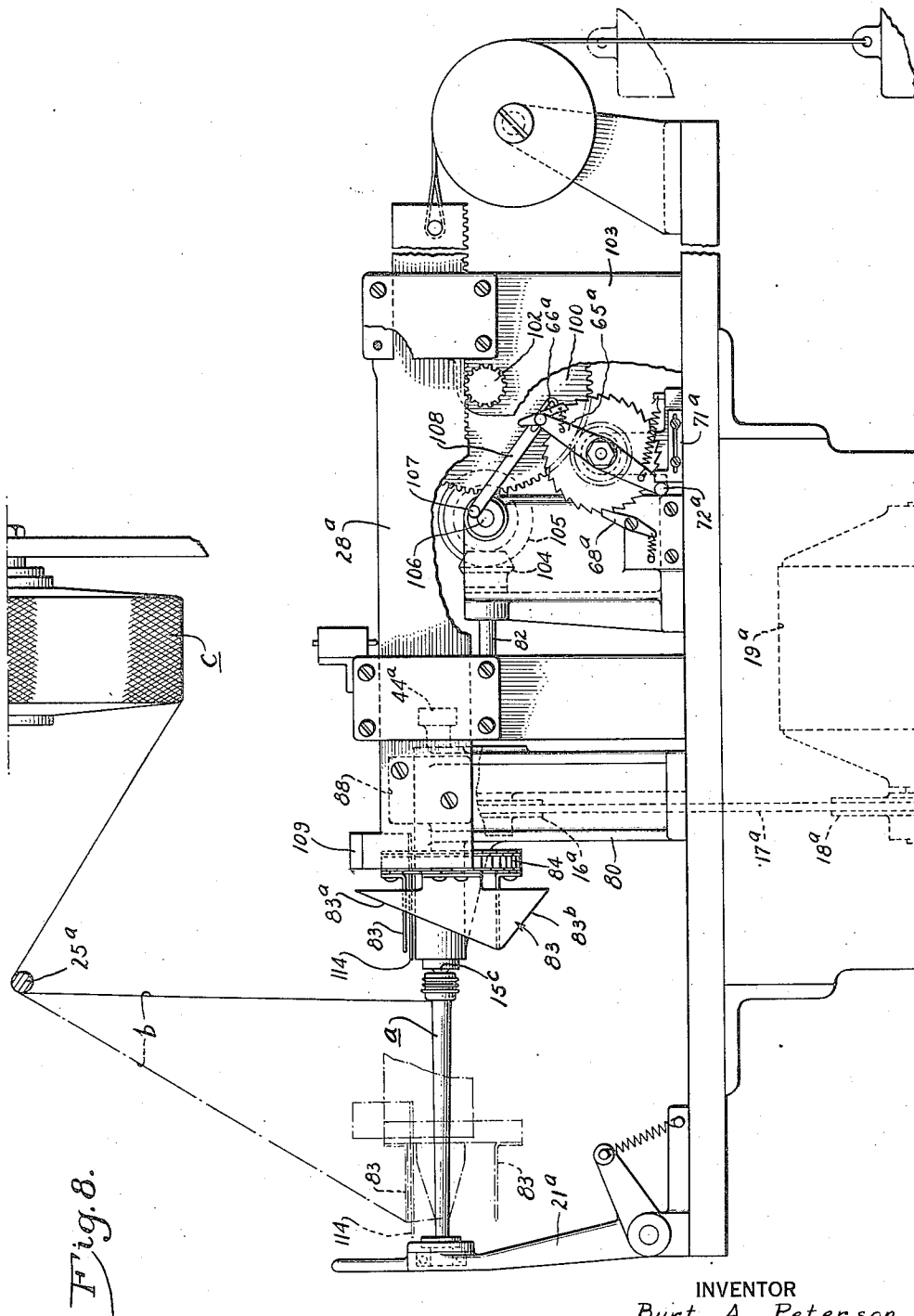


Fig. 8.

INVENTOR
Burt A. Peterson
BY *Robert B. Peterson*
ATTORNEYS

Aug. 10, 1943.

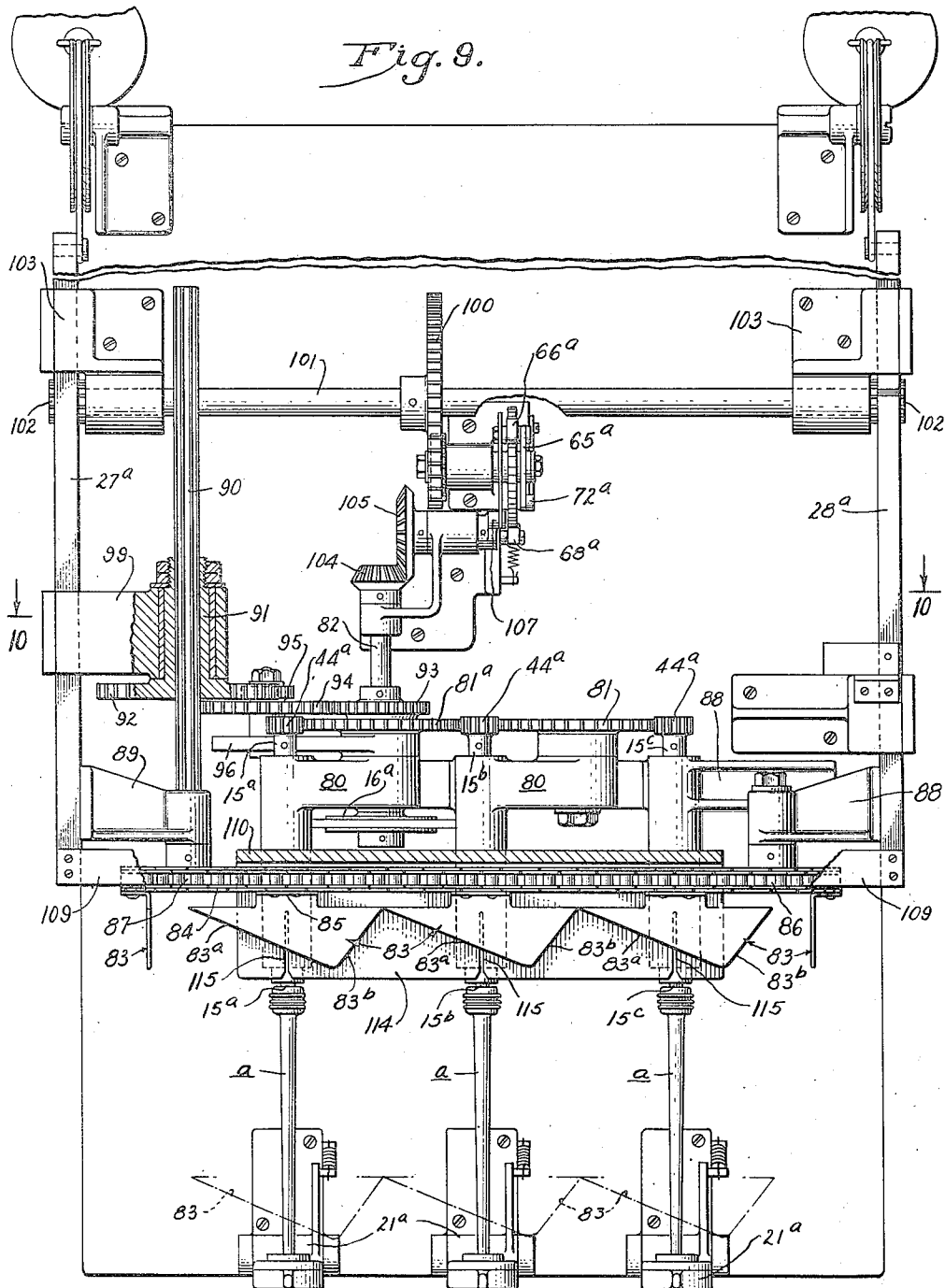
B. A. PETERSON

2,326,307

YARN WINDING MECHANISM

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INVENTOR

Burt A. Peterson

BY *Parker, Loomis, Peterson & Shulbass*

ATTORNEYS

Aug. 10, 1943.

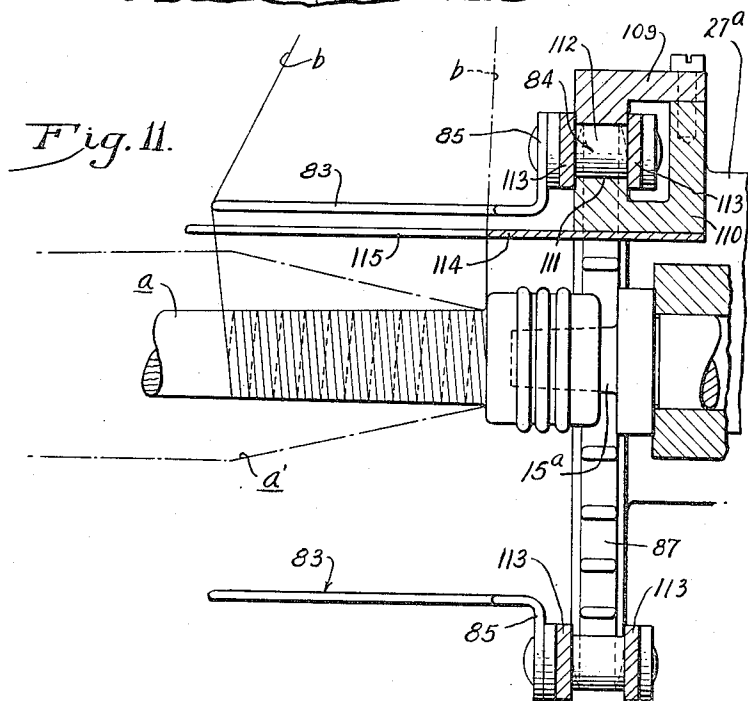
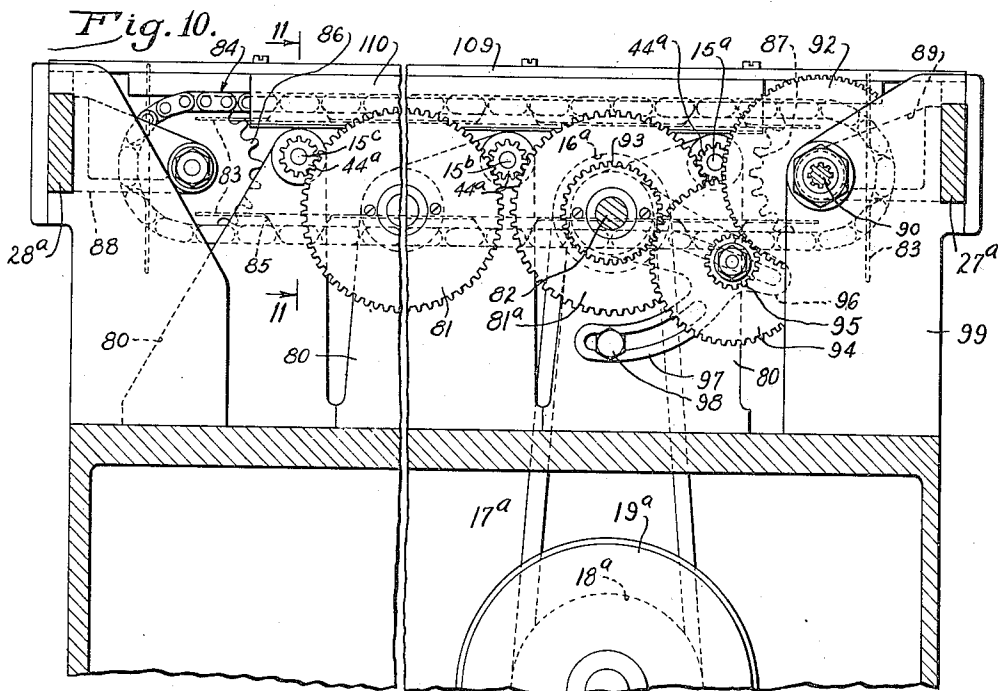
B. A. PETERSON

2,326,307

YARN WINDING MECHANISM

Filed Jan. 31, 1942

5 Sheets-Sheet 5



INVENTOR

Burt A. Peterson

BY *Parker Gordon, Pitman & Shultz*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,326,307

YARN WINDING MECHANISM

Burt A. Peterson, Rockford, Ill., assignor to Barber-Colman Company, Rockford, Ill., a corporation of Illinois

Application January 31, 1942, Serial No. 428,993

17 Claims. (Cl. 242—32)

The invention pertains to winders and has more particular reference to winding machines of the type commonly known as "cop" or "pirn" winders wherein yarn or thread is wound upon bobbins to be used in a loom.

The primary object of the invention is to provide for the winding of bobbins or the like with a "filling" wind at speeds higher than has heretofore been possible.

Another object is to provide a winder having a traversing mechanism embodying a unidirectionally driven cam means having differently sloping cam surfaces adapted to vary the lay of the thread in its traverse in opposite directions.

A further object is to provide a bobbin winding mechanism advantageously combining a traverse mechanism comprising continuously moving oppositely sloping yarn-engaging cam surfaces, with a feed or building motion in a direction axially of the bobbin.

The objects of the invention thus generally stated together with other and ancillary advantages are attained by the construction and arrangement shown by way of illustration in the accompanying drawings, in which

Figure 1 is a fragmentary side elevational view of a winder embodying my invention.

Fig. 2 is a fragmentary end elevational view on a somewhat larger scale than Fig. 1 and looking from the left in the latter figure.

Fig. 3 is a fragmentary horizontal sectional view taken approximately in the plane of line 3—3 of Fig. 1 but on a larger scale.

Fig. 4 is a fragmentary transverse sectional view taken approximately in the plane of line 4—4 of Fig. 1.

Fig. 5 is a fragmentary elevational view of a rotary cam arranged coaxially of the bobbin and forming the thread-guiding means of the traversing mechanism.

Fig. 6 is a fragmentary schematic view showing a development of the traverse cam.

Fig. 7 is a longitudinal sectional view through a completed yarn mass formed in the operation of the machine, the spool or bobbin upon which the mass is wound being shown in elevation.

Fig. 8 is a fragmentary side elevational view illustrating another embodiment of my invention in which a plurality of bobbins are formed simultaneously.

Fig. 9 is a fragmentary plan view of the machine shown in Fig. 8 with portions broken away and shown in section.

Fig. 10 is a fragmentary sectional view taken

approximately in the plane of line 10—10 of Fig. 9.

Fig. 11 is a fragmentary vertical sectional view on an enlarged scale taken approximately on the line 11—11 of Fig. 10.

The improved winder comprises generally means for rotating a core such as a quill or bobbin *a* (Fig. 1) upon which is to be wound a thread *b* from a suitable source such as a cheese *c* or other relatively large yarn mass; a traversing mechanism acting upon the thread and adapted to shift it alternately in opposite directions lengthwise of the bobbin; and means producing a relative feed motion in a direction axially of the bobbin so as to cause successive layers of thread to shift progressively from the butt toward the tip end of the bobbin as in the case of the well known "filling" wind.

Machines for producing filling wound bobbins have heretofore commonly employed traversing mechanisms of the reciprocatory type. In such mechanisms the running strand passes through an eye or other suitable guide which is reciprocated in a direction parallel to the axis of the core of the package. To insure a uniform effective range of traverse, the guide is mounted upon a follower held in constant contact with the surface of the package. The reciprocatory character of the device is objectionable because it definitely limits the winding speed due to the excessive strains which would be imposed upon the parts, and further because at high winding speeds the yarn has a tendency to pile up during the time interval required for each reversal of the guide. Also, the rubbing or rolling contact of a thread guide with the surface of the yarn mass is impracticable at high speeds.

In producing a high speed winder, I employ a traversing mechanism comprising unidirectionally moving cam surfaces acting upon the running strand successively to shift it alternately in opposite directions. Thus, in the embodiment of the invention shown in Figs. 1 to 5, the traversing mechanism comprises a tubular cam member *10* driven continuously in a direction opposite that of the bobbin and having one end shaped to provide two oppositely sloping spiral cam surfaces *10^a* and *10^b* merged at opposite ends to form a continuous thread-guiding edge. As the cam is rotated, the surface *10^a* and *10^b* successively engage the thread to shift it along the bobbin first toward the tip end thereof and then reversely toward the butt end, and due to the absence of reciprocating parts, an exceedingly fast rate of movement for the thread alone is entirely prac-

ticable. The lay of the thread as the same is wrapped about the bobbin is determined by the relative rotational speeds of the bobbin and the cam and by the slope of the two guiding surfaces 10^a and 10^b .

The cam-guiding surfaces are of necessity spaced from the core of the package, a distance somewhat in excess of the maximum radial distance of the yarn mass being formed. As a result, the effectiveness of these surfaces in shifting the running strand increases as the distance between the winding and the guiding surfaces decreases. In other words, the running strand has a tendency to lag behind the active guiding surfaces to a greater or less degree, depending on the diameter of the package at the winding point and also upon the winding speed, with the result that the effective range of traverse is changing constantly.

It would appear that such constantly changing effective range of traverse incident to the fixed spacing between the thread-guiding surfaces and the bobbin core would render the use of such a traversing cam impracticable. I have discovered, however, that when such a traverse is combined with an axial feed or building motion for the purpose of producing filling wound bobbins, the changing effective range of traverse is of no consequence. This is for the reason that as the traversing cam is moved gradually from the butt end of the bobbin (Fig. 1) to the tip end thereof, the yarn is wound in successive conical layers gradually progressing from one end of the bobbin to the other, so that the effective range of traverse of the strand, while constantly changing, is nevertheless uniform in the case of successive conical layers. As a result, it is possible to obtain full advantage of a yarn traversing mechanism in which oppositely sloping cam surfaces are moved unidirectionally in rapid succession into engagement with the running strand to shift it alternately in opposite directions.

The feed or building motion is produced as above indicated by a gradual movement of the traversing cam in a direction axially of the bobbin, so that the range of traverse shifts gradually from the butt end thereof to the tip. The amount or rate of shift to be employed is determined by the size of the yarn being wound, the diameter of the full bobbin desired, and in some measure also by the closeness of the lay. In any case, however, the continued operation results in the production of a yarn mass a' of the shape and character shown in Fig. 7, the length of taper at opposite ends corresponding to the effective length of traverse.

By the use of a cam having differently sloping surfaces the lay of the thread in successively wound layers may be varied as desired to facilitate the unwinding of the thread. Thus in the case of the cam herein shown (Figs. 5 and 6), when the cam is rotated in the direction indicated by the arrow (Fig. 5) the cam surface 10^a acts upon the thread to shift it rapidly toward the tip end of the bobbin thereby producing a relatively coarse wind, the lay or the distance between the successive wraps being shown in broken lines in Fig. 5. On the other hand, the thread surface 10^b is made relatively long with a more gradual slope, thereby producing in the return traverse stroke a relatively fine wind, the lay in this case being indicated in full lines in Fig. 5. In both instances the length of the traversing stroke is the same.

It will be understood that my invention resides primarily in a traverse and feed mechanism of the general character above indicated, and that any suitable or preferred machine structure may be employed for the purpose of producing the rotational movements of the bobbin and the traverse cam, as well as the feeding motion of the latter. Herein shown by way of example is a machine structure comprising a base 11 having a generally horizontal top plate or bed 12 with spaced standards 13 and 14 equipped with suitable bearings for a bobbin driving spindle 15 (Figs. 1 and 3). One end of the spindle projects beyond its bearing for reception into a driving socket in the end of the bobbin, and fast on the spindle between the two standards is a driving pulley 16. The latter is driven by means of a belt 17 running over a sheave 18 on the shaft of an electric motor 19 located in the base 11. The tip end of the bobbin is rotatably supported in a cup-shaped member 20 mounted in a suitable ball bearing in the upper end of an arm 21 carried by the bed plate 12. The arm 21 is mounted on a rock shaft 21^a carrying a second arm 22 acted upon by a spring 23 to hold the supporting member 20 yieldably against the tip end of the bobbin, thereby holding the butt end of the bobbin in driving engagement with the spindle 15.

The thread b being wound extends from the butt end of the bobbin to which it is fastened past a guide rod 24 disposed parallel to the bobbin immediately above the cam 10. From this rod the thread runs over a perpendicularly disposed guide bar 25 spaced a substantial distance above the bobbin, and finally to the cheese c , the latter being suitably supported upon a standard 26 rising from the bed plate 12. The guide bar 25 is positioned in a vertical plane somewhat rearwardly of the point to which the thread is secured to the butt end of the bobbin, so that the running thread will be held yieldably against the guide surfaces of the traverse cam 10 when the latter is advanced into engagement with the thread.

As above indicated the cam 10 is mounted coaxially of the spindle 15 and is continuously driven unidirectionally while being fed axially toward the tip end of the bobbin. The rotative speed of the cam is slow as compared with that of the bobbin, while the rate of feed of the cam is rather gradual; and the machine structure includes means for producing these relative movements in proper timed relation to each other.

In the present embodiment, the traverse cam 10 is rotatably mounted at the forward end of a generally U-shaped frame (Fig. 3) mounted for movement axially of the spindle.

This supporting frame herein comprises a pair of spaced parallel slide bars 27 and 28 connected at their front ends to a cross plate or head 29 which is centrally apertured to receive the rear end portion of the traverse cam. Fixed on the latter is the hub 30 of a driving gear 31, this hub being mounted in the head 29 through the medium of ball bearings 32 held in position by means of a ring 33. The slide bars 27 and 28 of the U-shaped frame are mounted slidably at their forward ends in the standard 13 and at their rear ends in the upper ends of a pair of standards 34 and 34^a fixed to the bed 12. In addition to carrying the traverse cam, the head 29 provides a support for the guide rod 24.

The driving connection between the cam 10

and the spindle 15 includes in the present instance a shaft 37 disposed below and parallel with the spindle 15 and connected by separate gear trains with the cam and spindle respectively. At its forward end the shaft 37 is mounted in a bearing 38 carried by the cross head 29, and has fast thereon a spur pinion 36 meshing with the cam gear 31 and forming one of said trains. The shaft 37 is additionally supported in suitable bearings in the standards 13 and 14 and has a projecting rear end portion cut to form an elongated pinion 39 slidable through a splined hole in a spur gear 40 having a hub portion bearing in the standard 14. The gear 40 meshes with a spur pinion 41 mounted upon a stud 42, and rigid with the pinion 41 is a spur gear 43 meshing with a spur pinion 44 cut in the rear end portion of the driving spindle 15, this gearing forming the other one of said gear trains.

The bearing 38 for the forward end of the shaft 37 is of a construction adapted to hold the shaft against axial movement relative to the head 29, and the splined connection with the gear 40 permits of movement of the shaft with the head while maintaining the driving connection between the shaft and the spindle 15.

To enable the speed ratio to be changed so as to vary the rotating speed at which the traverse cam 10 is driven by the spindle 15, the stud 42 carrying the pinion 41 is mounted in a bearing 41^a carried by an arm 45 pivotally supported in the standard 14 so as to turn about the axis of the spindle 15 (Fig. 4). The arm is adapted to be clamped to the bearing standard 14 by means of a clamp screw 46 entered through an arcuate slot 47 in the arm and then into the standard. To receive the bearing 41^a the standard 14 is cut away at its outer side edge as shown in Fig. 4 to form a recess 47^a. By this construction pick-off gears 41 of different sizes may be employed to change the speed at which the cam 10 is driven.

The means for imparting an axial feeding or bobbin-building movement to the traverse cam in timed relation to the relative speeds of the bobbin and cam comprises in the present embodiment a drive mechanism operatively associated on the one hand with the supporting frame upon which the cam is mounted, and on the other hand with the spindle 15. Since the rate of axial feeding motion of the cam depends upon the winding speed and also upon the size of the yarn being wound this feed mechanism is constructed for adjustment at will. Moreover the said mechanism constitutes a driving connection adapted to be broken or disengaged to permit of a return movement of the supporting frame, this being accomplished in the present instance through the provision of a pawl and ratchet device to be presently described.

Referring first to Fig. 1, the feed motion for the traverse cam is derived from the shaft 37 forming a part of the driving connection between the spindle 15 and the cam 10. For this purpose the shaft 37 has fixed thereto a spur pinion 48 meshing with a spur gear 49 on a parallel shaft 50. The latter is journaled at its forward end in the standard 14 and at its rear end in a stationary frame member 51. A beveled pinion 52 on the rear end of the shaft 50 meshes with a beveled gear 53 fast on a transverse shaft 54, the latter being journaled in a bracket 55 and carrying at its outer end a crank arm 56.

Parallel with the transverse shaft 54 is a stud

shaft 57 mounted in the standard 34^a (Fig. 3) and having at its inner end a spur pinion 58 and at its outer end a ratchet disk 59. The shaft 57 has a driving connection with the slide bars 27 and 28 of the U-shaped frame, which connection is provided by the pinion 58 and a spur gear 60 fast on a cross shaft 61 journaled in the standards 34 and 34^a. Integral pinions 62 on this cross shaft 61 mesh with racks 63 cut in the bottom edges of the slide bars 27 and 28.

A step by step rotational movement is imparted to the disk 59 by the crank arm 56 acting through a pitman 64 (Fig. 1) which is operatively connected with a rocker arm 65 associated with the ratchet disk. This arm is mounted in the present instance on the forward end of the disk-carrying shaft 57 and carries at one end a feed pawl 66 yieldably held in engagement with the periphery of the disk. In the rotation of the crank arm 56, the pawl-carrying arm 65 is oscillated against the action of a spring 67 to impart successive feeding movement to the pawl 66. Beneath the latter pawl is a holding pawl 68 suitably mounted on the standard 34^a.

For the purpose of rendering the pawl and ratchet feed adjustable, a pin and slot connection is provided between the pitman 64 and the rocker arm 65, comprising a slot 69 in the end of the pitman and a pin 70 on the end of the arm; and an adjustable stop 71 is mounted for engagement by an extended end portion or finger 72 on the rocker arm to limit the return movement of the arm by the spring 67. It will be understood that the teeth of the ratchet disk are proportioned so that in the movement of the feed pawl by the crank arm 56 and pitman 64, the ratchet disk is advanced a distance of one or more teeth depending upon the extent of return movement of the arm 65 with its pawl 66 as determined by the position of the stop 71.

The stop 71 may be of any suitable character. That herein shown is in the form of an arcuate bar 71^a adjustably secured to the upper end portion of the standard 34^a by screws 73 entered through an elongated slot 73^a in the bar. By changing the position of the stop and thereby governing the extent of return movement of the rocker arm and its feed pawl, the number of teeth over which the pawl traverses in its return movement may be changed and therefore the extent of rotational movement of the ratchet disk varied.

The feed motion imparted to the traverse cam by the operation of the pawl and ratchet mechanism occurs against the action of a weight 74^a suspended by a cord 74 which is connected with the rear end of the rack bar 28 and extends over a sheave 75 suitably mounted upon a bracket 76. When the winding operation has progressed to the tip end of the bobbin and the latter has been completely formed as shown in Fig. 7, the operation of the spindle 15 is interrupted and the cam member returned to its innermost position. Preferably the winding operation is stopped automatically and for this purpose the rack bar 28 is formed at its rear end with a cam 77 so positioned as to engage the operating member 78^a of a switch 78 interposed in the circuit to the motor 19. Return movement of the frame carrying the cam 10 is accomplished by disengaging the driving connection between the frame and the spindle 15. In the present instance, the feed and holding pawls 66 and 68 are manually withdrawn from engagement with the ratchet disk so as to permit free rotation of the disk by the

action of the weight 74^a. To limit the extent of return movement a stop 78 is provided on the rack bar 28 for engagement with the standard 13. The switch 78 is of the over-center type so that when opened by the cam 77 it will remain open subject to manual reclosure to initiate the succeeding winding operation.

To start the operation of winding a yarn mass onto a bobbin or quill, the operator places a bobbin *a* in position on the drive spindle 15 with its tip end supported by the cup member 20, and then fastens to the butt end of the bobbin a thread *b* leading over the guide rod 24 and bar 25 and thence to the cheese *c*. The frame supporting the traverse cam 10 is then advanced manually to the position shown in Fig. 5, and the switch 78 closed to start the motor 19 and hence the spindle 15 in operation. In the ensuing rotation of the bobbin, the traverse cam 10 is rotated continuously at a relatively slow speed to shift the running thread in a direction lengthwise of the bobbin, the rate of traverse in opposite directions for a given rotational speed of the cam being determined by the spiral slope of the cam surfaces 10^a and 10^b. Where the cam surfaces are of the shape herein shown, the rate of traverse outwardly from the butt end of the bobbin to the tip thereof is substantially greater, so that in the outward stroke the thread is wound with a coarse wind and on the return stroke with a relatively fine wind. It will be understood, of course, that by the use of traverse cams of appropriate shape, any desired lay of the thread may be obtained.

The traverse cam is driven relatively slowly by and in timed relation to the spindle by the shaft 37 and its associated gear trains. The rotational speed of the cam may be varied at will by the substitution for the pick-off gear 41 of another gear of different size, as is permitted by the mounting of the gear 41 on the swingable arm 45.

As the winding operation progresses, the traverse cam is advanced gradually toward the tip end of the bobbin for the purpose of effecting the desired bobbin-building motion. In this operation, the ratchet disk 59 is advanced step by step by the feed pawl 66. The latter is actuated by the pitman 64 and crank 56 continuously driven from the shaft 50 by bevel gearing 52 and 53, the shaft 50 being driven by the shaft 37 through spur gearing 48, 49. The advancing movement thus imparted to the ratchet disk is transmitted to the frame carrying the traverse cam by shaft 57 (Fig. 3) connected with cross shaft 61 operatively connected with the rack bars 27 and 28 of said frame. By adjusting the stop 71, the extent of return movement of the feed pawl 66 may be varied so as to permit of a change in the rate of feeding movement of the traverse cam.

When the bobbin has been completely wound the operation is interrupted automatically by the action of cam 77 on the rack bar 28 engaging with the switch 78 to open the motor circuit 19. Thereupon, the operator disengages the feed and holding pawls 66 and 68 of the pawl and ratchet feed mechanism, and the traverse cam together with its supporting frame are retracted by the weight 73 to the position shown in full lines in Fig. 1.

In Figs. 8 to 11 I have shown my invention as embodied in a multiple spindle machine in which a plurality of cops or bobbins may be wound simultaneously. Moreover, in this embodiment,

the yarn traversing cam means comprises a series of flat cam plates corresponding in shape to the cam development shown in Fig. 6 and mounted for continuous unidirectional movement so as to present oppositely sloping cam surfaces in the paths of the running strands, thereby causing the latter to be shifted alternately in opposite directions lengthwise of the bobbins.

Apart from the provision for winding a plurality of bobbins simultaneously and the modified character of the traversing cam means, the machine structure is generally similar to that hereinbefore described in connection with Figs. 1 to 5. In this instance, I provide three spindles 15^a, 15^b, and 15^c, journaled in suitable bearings in the upper portion of a standard 80 and adapted to support the rear ends of the bobbin cores *a*, the forward ends of the cores being mounted in the upper ends of yieldably supported arms 21^a as in the previously described embodiment. The spindles are driven in unison by a motor 19^a, sheave 18^a, belt 17^a and sheave 16^a, each of the spindles being provided at its rear end with a driving pinion 44^a forming part of a gear train including a pair of spur gears 81 and 81^a (Fig. 10). The gear 81^a is fast upon a shaft 82 which carries the sheave 16^a so that this gear 81^a constitutes the driver for the gear train.

The traversing cam means comprises a series of cam plates 83 mounted on an endless chain 84 for continuous unidirectional movement transversely of the running strand. The chain may be of any ordinary or preferred construction, and the cam plates 83 are provided with flanges 85 at their rear ends which are suitably secured to the forward side of the chain as best shown in Fig. 11.

As will be seen from Figs. 9 and 10, the chain is mounted upon a pair of sprockets 86 and 87 suitably journaled in brackets 88 and 89 fixed to the forward ends of the slide bars 27^a and 28^a respectively. One of the sprockets 87 is mounted on the forward end of a shaft 90 driven in synchronism with the spindles. As shown in Fig. 9, the shaft 90 has a splined connection with the hub 91 of a driving gear 92, so that movement may be imparted to the chain as the supporting frame is advanced to feed the cam elements forwardly or longitudinally of the axes of the spindles.

As shown in Fig. 10, the gear 92 is driven from the motor driven shaft 82 by a spur gear 93 fast on the shaft 82, a spur gear 94, and a pinion 95 rigid therewith and meshing with the gear 92. The gear 94 and pinion 95 are mounted upon a bracket arm 96 so as to swing upon the shaft 82, the bracket 96 having a slotted arm 97 for the reception of a fastening screw 98 by which the pinion 95 may be held in meshing engagement with the spur gear 92. The pinion 95 is removably mounted so as to be capable of replacement for speed change purposes. The bearing sleeve 91 for the gear 92 is suitably journaled in a stationary bearing member 99.

The means for imparting a gradual feeding movement to the frame which supports the traverse cams, is substantially similar to that hereinbefore described in connection with Figs. 1 to 5. Briefly, it comprises a spur gear 100 mounted on a cross shaft 101 carrying rack-engaging pinions 102 at its opposite ends and mounted in the upper ends of standards 103. The gear 100 is driven from the motor driven shaft 82 through the medium of bevel gears 104,

105, the latter being fast on a transverse shaft 106 (Fig. 8) carrying a crank pin 107 for the actuation of a pitman 108 of a pawl and ratchet feed mechanism. As in the previous instance, the latter comprises a feed pawl 66^a mounted upon a swinging arm 65^a, the extent of rocking motion of which is determined by an adjustable stop 71^a cooperating with a pin 72^a rigid with the arm 65^a. 68^a designates the holding pawl.

It will be understood that the cam plates 83 travel in an endless path determined by the chain. The upper run of the chain is spaced a short distance above the horizontal plane containing the axis of the bobbins being wound, and the chain is effectually guided so as to maintain the distance between the cam surfaces and the spindle axes uniform. For this purpose guide means is provided at the front end of the cam-supporting frame which, in this instance, consists of the slides 27^a and 28^a, and a cross rail 109 rigidly connecting the forward ends of the slide bars. To the underside of this rail 109 is secured a guide member 110 providing a guideway 111 dimensioned to receive the roller studs 112 of the cam-supporting chain with the inner connecting bars 113 of the chain slidably engaging the member 110 at the edges of the guideway 111 as shown in Fig. 11.

To assist in controlling the running strands while acted upon by the cam plates, I provide a guide plate 114 disposed between the bobbins and the cam plates 83 when in their uppermost positions. This guide plate is secured to the underside of the member 110 and is provided with slots 115 (Fig. 9) disposed vertically above the axis of the spindles and extending parallel thereto.

In the operation of the machine shown in this embodiment (Figs. 8 to 11), the cam plates 83 form in effect a continuous thread-guiding edge which, in cooperation with the guide slots 115, cause the running strands to be shifted alternately in opposite directions lengthwise of the respective packages being formed. Figs. 8 and 9 show the parts in the position occupied at the beginning of the winding operation, it being understood that a suitable source of supply, such as a cheese *c* is provided for each spindle, and that the yarn, as in the previous embodiment, passes over a guide bar 25^a in its passage to the spindle. In this relation of the parts, the traversing cam plates are in retracted position so as to facilitate the donning and doffing of the bobbins. As the winding operation proceeds, the supporting frame upon which the cam plates are mounted is advanced gradually and a continuous motion imparted to the chain 84 so as to present the sloping cam surfaces 83^a and 83^b of each plate successively to the running strands. Accordingly, the strands are traversed alternately in opposite directions and the range of traverse is gradually shifted lengthwise of the bobbins so as to produce filling wound bobbins as shown in Fig. 7. At the end of the winding operation, the driving mechanism is stopped in the manner hereinbefore set forth, and the frame, together with its traversing cams, returned to its initial position.

It has been found that through the provision of traverse mechanisms of the character described in which thread-guiding cam surfaces are moved in rapid succession unidirectionally across the path of the running strand, winding speeds substantially higher than those heretofore attainable are entirely practicable; and

while such mechanisms when used alone are impractical because of a constantly changing effective range of traverse, this objectionable characteristic is entirely overcome when combined with an axial feed whereby the range of traverse is gradually shifted along the bobbin.

This application is a continuation in part of my copending application, Ser. No. 352,220, filed August 12, 1940, and which is now abandoned.

I claim as my invention:

1. In a winder, means for supporting the core of a package to be wound, means rotating said core, a traversing device providing thread-guiding surfaces spaced from the core laterally thereof and movable in a direction transversely of the axis of the core, means imparting unidirectional movement to said device, means for effecting relative feeding movement between the device and said core axially of the latter, said guiding surfaces being operative with a cam action upon a thread held against the device to shift the thread longitudinally of the core, and guide means for the thread opposing movement thereof by said device transversely of the core.

2. A bobbin winder comprising, in combination, a supporting spindle for the core of a package to be wound, a traversing device providing oppositely sloping cam surfaces adapted to engage successively with a running strand to shift it alternately in opposite directions, means for rotating said supporting spindle and imparting a unidirectional movement to said device in a predetermined timed relation to each other, and means for imparting a gradual relative feeding movement between said spindle and said traversing device in timed relation to the rotation of said spindle and said traversing device.

3. A winder having, in combination, means for rotatably supporting a bobbin or the like, including a spindle, a traverse cam supported for movement about the bobbin and also axially thereof, means for rotating said spindle and said cam, and means for imparting a gradual feeding movement to said cam axially of the bobbin.

4. A machine for producing filling wound bobbins comprising, in combination, means for rotatably supporting the core of a package to be wound, cam means mounted adjacent said core and providing cam surfaces inclined in opposite directions relative to the axis of the core, means for rotating said core to wind a thread thereon, means for unidirectionally moving the cam means in timed relation to the core whereby when the thread being wound is held against said surfaces it is shifted longitudinally of the core in opposite directions, and means for gradually moving said cam means lengthwise of the core during the winding operation.

5. In a bobbin winder, means for rotating the core of a package to be wound, a thread-traversing device having a plurality of oppositely inclined thread-guiding surfaces respectively operative to cause a shifting of a thread longitudinally of the core in opposite directions, and means for imparting a unidirectional movement to said device to carry said cam surfaces across the path of the running thread transversely of the axis of the core, one of said cam surfaces being relatively shorter and disposed at a relatively sharper angle to the axis of the core than the other surface whereby said device is operative to shift the thread more rapidly in one direction than in the other.

6. In a bobbin winder, means for traversing a thread being wound, comprising cam means operative upon the thread to shift it in opposite directions longitudinally of a core, said cam means providing oppositely sloping cam surfaces engageable with the thread successively, the length of one of said surfaces being greater than the other and the degree of slope thereof proportionately less whereby to impart shifting movements to the thread at different speeds in opposite directions, and means for imparting a relative feeding motion between said cam means and said core axially of the latter.

7. A winder having, in combination, means for rotating the core of a package to be wound, an annular member having a guiding edge encircling the core, means for rotating said member unidirectionally in timed relation to said core, means yieldably holding a running strand against said guiding edge, and means for imparting gradual feeding movement to said member in a direction axially of said core, said guiding edge having oppositely sloping spiral surfaces operative upon said strand to shift it in opposite directions longitudinally of the core.

8. A winder having, in combination, means for rotating the core of a package to be wound, an annular member having a guiding edge encircling the core, means for rotating said member unidirectionally in timed relation to said core, means yieldably holding a running strand against said guiding edge, and means for imparting a gradual feeding movement to said member in a direction axially of said core, said guiding edge having oppositely sloping spiral surfaces operative upon said strand to shift it in opposite directions longitudinally of the core, and one of said surfaces being relatively shorter and disposed at a relatively sharper angle to the axis of said core than the other surface whereby the strand is shifted more rapidly in one direction than in the other.

9. In a bobbin winding machine, the combination of a spindle adapted to support a bobbin to be wound, a traversing mechanism comprising a series of cam plates each having oppositely sloping cam surfaces, means supporting said plates for movement in a path spaced from the axis of the spindle and in a direction transversely thereof, and means for imparting a continuous unidirectional movement to said plates and a rotative movement to said spindle in a predetermined timed relation to each other.

10. A bobbin winding machine comprising, in combination, means for supporting the cores of a plurality of bobbins to be wound, including a plurality of spindles rotatably mounted in spaced parallel relation, a traversing mechanism comprising a series of cam members each having oppositely sloping cam surfaces for engagement successively with a running strand, a carrier for said cam members operative to support the same for movement in a path disposed at one side of the bobbins, means for rotating the spindles, and means operative in timed relation to the spindle rotating means to impart a unidirectional movement to said carrier.

11. A bobbin winder comprising, in combination, means for rotatably supporting a plurality of bobbins in spaced parallel relation, a traversing device comprising a series of cam members, an endless conveyor supporting said cam members for movement in a path spaced radially from each of said bobbins and in a direction transversely of the axes of the bobbins, said cam members each having oppositely sloping surfaces arranged to

engage successively each of the strands leading to the respective bobbins, and a drive mechanism for rotating said bobbins and imparting a continuous unidirectional movement to said conveyor in timed relation to each other.

12. A bobbin winding machine comprising, in combination, a rotary bobbin-supporting spindle, a traversing mechanism comprising a series of cam plates, a carrier for supporting said plates for movement transversely of the spindle and at one side thereof, said carrier comprising an endless chain, a support providing a guideway for said chain, and means on said support for positioning the running strand being wound, said cam plates providing oppositely sloping cam surfaces successively engageable with said strand to shift the same lengthwise of the bobbin.

13. A bobbin winding machine having, in combination, a plurality of bobbin-supporting spindles mounted for rotation in a common plane, a traversing mechanism comprising a plurality of cam plates and a carrier for supporting said plates for movement in a path spaced laterally to one side of said plane, said cam plates providing a series of cam surfaces with the adjacent ones of said surfaces sloping in opposite directions and with the surfaces of adjacent plates cooperating to provide a substantially continuous thread-guiding surface, means for rotating said spindles in unison, and means for actuating said carrier to move said cam plates unidirectionally in said plane, said plates being operative upon threads being wound upon the respective bobbins to shift such threads lengthwise of the bobbins first in one direction and then in the other.

14. A winder having, in combination, means for rotatably supporting a core, means for traversing a running strand being wound upon said core comprising a member having a guiding edge, means for actuating said member unidirectionally to move its guiding edge continuously into engagement with the running strand at one side of the core and moving at the point of engagement with the strand in a direction across the path of the strand at one side of the core, said guiding edge being operative in said continuous movement to impart short shifting movements to the strand in opposite directions longitudinally of the core, and means for imparting relative movement between said member and said core in a direction axially of the core.

15. A winder having, in combination, means for rotatably supporting a bobbin or the like including a spindle, a traverse cam supported for movement about the bobbin and also for movement axially thereof, means including a power driven shaft for actuating said spindle and said cam, a rack bar operatively associated with said cam to move it, a pinion meshing with said rack bar, and means driven by said shaft for imparting rotational movements to said pinion.

16. A winder having, in combination, means for rotatably supporting a bobbin or the like including a spindle, a traverse mechanism including a thread guiding means and a support therefor, power driven means for imparting a gradual feeding movement to said support axially of the bobbin comprising a drive shaft, a driven shaft operatively connected with said support to move it, a ratchet device interposed between said shafts and operative in the rotation of the drive shaft to impart incremental rotational movements to the driven shaft, and manually oper-

able means for varying the length of each such incremental movement.

17. A winder having, in combination, a bobbin support, a traverse mechanism including thread guiding means and a support therefor, said supports being mounted for relative movement in a direction axially of a supported bobbin, and drive means for moving one of said supports comprising a drive shaft, a driven shaft operatively connected with the movable support and a ratchet

device interposed between said shafts and operative in the rotation of the drive shaft to impart incremental rotational movements to the driven shaft, said device comprising an oscillatory drive member, a rotary driven member, and a cooperating motion-transmitting element, and manually operable means for varying the length of each such incremental movements imparted by said element to the rotary driven member.

BURT A. PETERSON.