Dec. 22, 1936. E. G. CROOKS 2,065,363

WINDING MACHINE

Filed Jan. 29, 1935 2 Sheets-Sheet 1

Fig. 1.

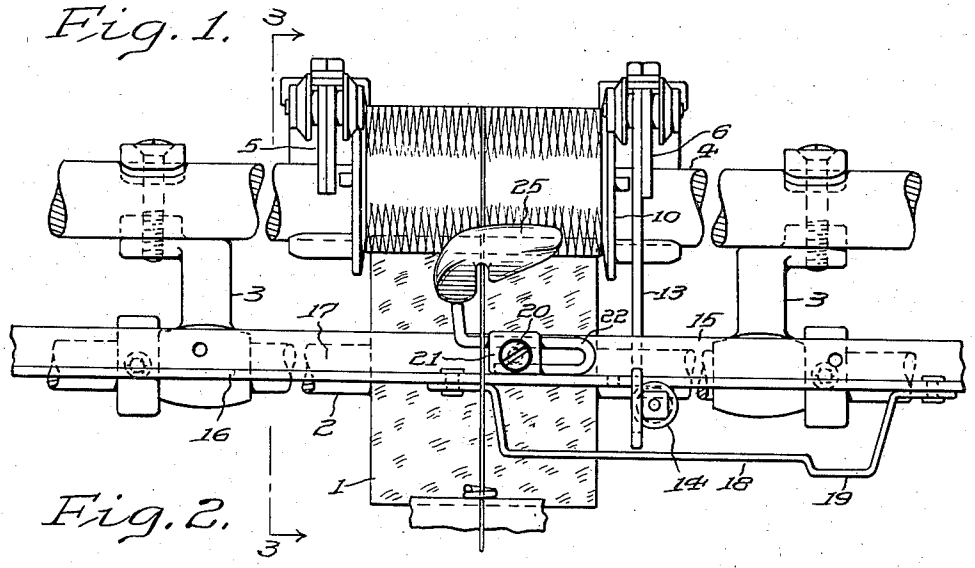
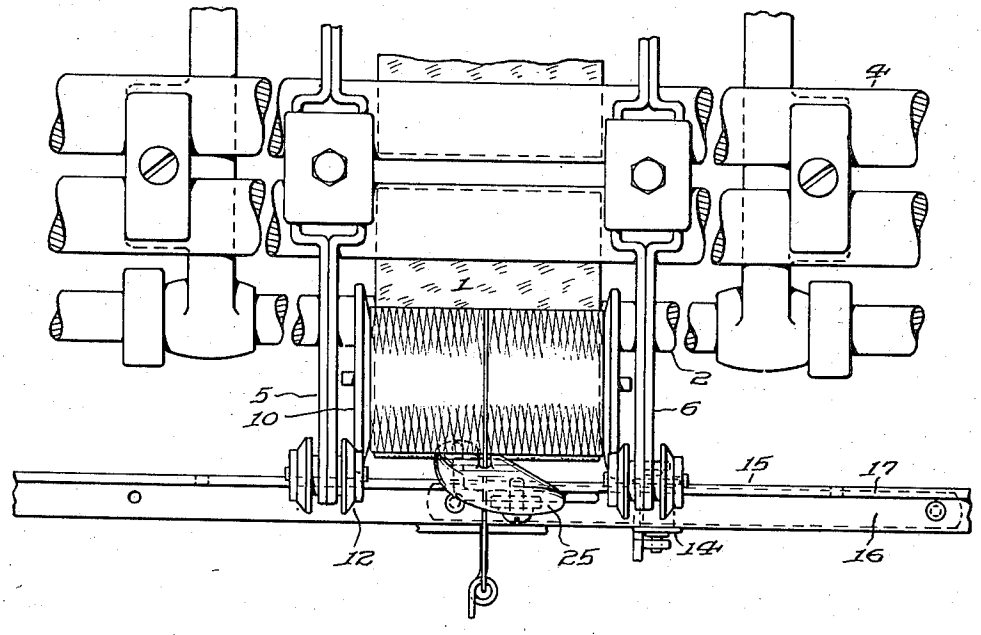


Fig. 2.



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Fig. 3.

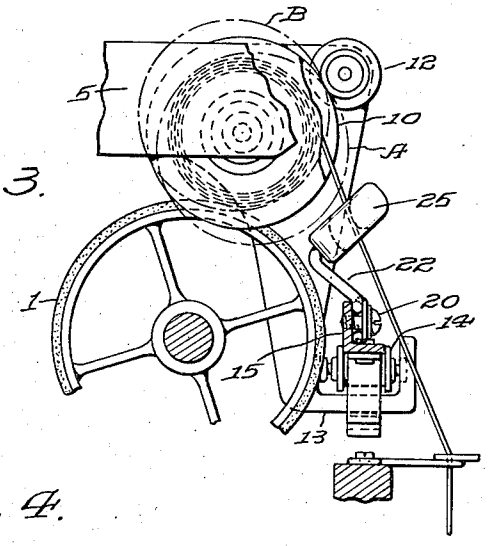


Fig. 4.

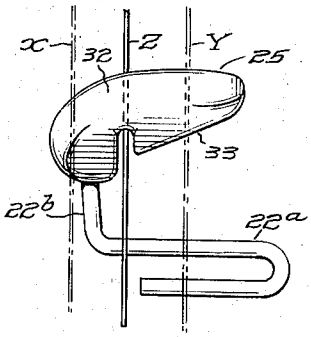


Fig. 5.

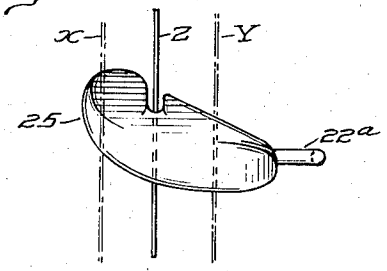


Fig. 7.

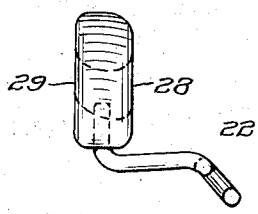


Fig. 6.

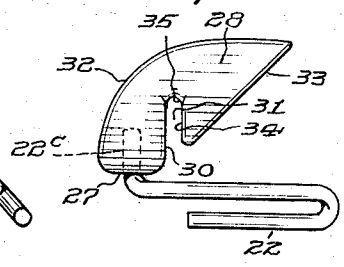
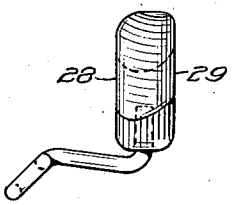


Fig. 8.



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UNITED STATES PATENT OFFICE

2,065,363

WINDING MACHINE

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Application January 29, 1935, Serial No. 3,927

11 Claims. (Cl. 242—157)

This invention relates to machines used for winding threads or yarns on spools, bobbins or the like.

The invention therefore contemplates the provision of novel means of guiding the thread, which term I herein employ generically to designate any thread, strand, yarn, filament or the like, to the spool and of a novel form of traverse bar for effecting the reciprocation of the thread guiding means relatively to the spool, and is of particular utility when incorporated in machines intended for winding the spun yarn upon a spool or the like in the operation of imparting to the thread a desired degree of twist, the spool normally being provided with circular end flanges and the point of draw or lead of the thread being constantly changed by reciprocation of the thread guide parallel to the spool axis through the medium of the traverse bar so as to lay the thread on the spool uniformly throughout the length of the spool barrel.

Machines of this general character usually comprise a wooden traverse bar of rectangular cross section suitably supported and arranged for reciprocation parallel to the axis of the spools which are arranged somewhat above and behind the bar in a longitudinally extending row, the thread being led to each spool from the source of supply through a V-shaped notch in the upper face of a porcelain guide seated on the upper surface of the bar and held in position by flat springs secured thereto at one end and bearing on the ends of the guide at the other, so that a limited capacity for adjustment of the guide longitudinally of the bar is afforded. The use of guides of this general character entails considerable difficulty and loss of time in that the thread must initially be guided manually by the operator until it is properly seated on the spool before it can be laid in the V-shaped notch in the moving guide, as otherwise it frequently becomes dislodged from the notch or catches in the retaining springs with consequent breakage. Particularly in the winding of silk or artificial silk thread, the material is drawn onto the spool at a relatively high speed and therefore frequently cuts the finger of the operative over which he permits it to run while accommodating its lead to the guide, and cuts so produced often result in infection from the dressing carried by the thread so that the operative is necessarily constrained to exercise considerable care or to employ protective devices for his fingers when setting the winding machines into operation. A further, and perhaps more serious, disadvantage of the winding machines and guides heretofore generally in use resides in the fact that their construction is normally such that the point of lead, to wit, the V-shaped notch, in the guide is at a relatively great distance, measured radially, from the spool and the guide must consequently be made to overrun the ends of the spool a considerable distance in each direction in order to wind the thread on the barrel of the spool adjacent the end flanges; this frequently results, particularly with the heavier silk and artificial silk threads now coming into vogue, in a piling up of the thread toward the extremities of the body thereof on the spool so that the diameter of the body is greater near its ends than near its center, and when the thread is thereafter unwound from the spool it is likely to break, due to the overlapping or wedging together of two or more convolutions. Moreover, since each spool is customarily driven from a cork faced drum contacting the body of thread as it is progressively wound on the spool, this piling up of the thread near the ends of the spool reduces the area of the contact with the drum facing since the thread at the center of the spool either does not rest on the drum or rests on it more lightly than that near the ends whereby slippage between the drum and the spool is induced with consequent burning and fraying of portions of the thread.

The present invention not only renders the thread guide self-loading with consequent elimination of the customary manual feeding of the thread at the initiation of the winding operation, but also enables the point of lead to be disposed considerably closer to the barrel of the spool than has heretofore been practicable whereby uniform and even winding of the thread on the spool is brought about and the piling up of the thread adjacent the spool ends substantially prevented, with resultant avoidance of the slippage and burning of the thread to which reference has been made.

A principal object of the invention, therefore, is the provision of a thread guide, preferably in combination with a traverse bar of novel construction, which is adapted when reciprocated in the operation of the winding machine to automatically pick up the thread and effect its entrance into the guide slot of the guide without the necessity for manually introducing it thereinto.

A further object of the invention is the provision of a thread guide of improved form which is self loading and can be positioned closely adja-

cent the barrel of the spool on which the thread is to be wound.

Another object of the invention is the provision of a thread guide which in combination with the traverse bar of a winding or spooling machine is effective to lay the thread on the spool in uniform spiral layers as the spool is rotated and the guide reciprocated, and to maintain a substantially continuously varying point of lead reciprocating relatively to the spool at a constant and uniform rate longitudinally thereof without material overrunning beyond the ends of the spool, whereby contact of the led thread with the spool flanges toward the ends of the path of movement of the guide is materially lessened or substantially eliminated, uniformity of the winding longitudinally of the spool barrel is materially enhanced so that the diameter of the body of thread as it is progressively wound on the spool remains substantially constant throughout its length, and wear on the guide itself is materially reduced.

A still further object of the invention is the provision of a traverse bar of novel construction and of novel means for adjustably supporting therefrom a plurality of thread guides, one for each spool disposed adjacent thereto, in such manner that each guide is located above and inwardly of the bar and relatively remote therefrom whereby it is possible to dispose each guide in closer proximity to its spool than has heretofore been practicable with the traverse bars, guides and guide supporting means of the prior art.

Other objects, purposes and advantages of the invention will hereinafter more fully appear or be understood from the following description of a preferred embodiment thereof as shown in the accompanying drawings in operative association and combination with a winding machine of usual character, only such parts of which, however, as are necessary for an adequate comprehension of the invention are illustrated.

In the said drawings, Fig. 1 is a fragmentary front elevation of the machine showing a thread being wound onto a spool;

Fig. 2 is a top plan view thereof;

Fig. 3 is a section on line 3—3 in Fig. 1 looking in the direction of the arrows and with certain parts broken away to assist in clearness of illustration; and

Figs. 4–8 inclusive are enlarged detail views of the thread guide removed from the machine, of which

Figs. 4 and 5 are respectively front elevation and top plan views in which the thread is shown in operative position in the guide and certain other positions of the thread relatively thereto are indicated in dot and dash lines;

Fig. 6 is a view in elevation on a plane parallel to the front face of the guide, i. e., looking upwardly at the guide from approximately the lower right hand corner of Fig. 3;

Fig. 7 is an end elevation looking from the left of Fig. 6, and

Fig. 8 is an opposite end elevation looking from the right of Fig. 6.

In the several figures, like characters are used to designate the same parts.

Referring now more particularly to the drawings, the winding machine fragmentarily shown therein is of ordinary type comprising a spaced series of cork faced rotatable driving drums 1 (only one of which is shown), supported on and driven by a shaft 2 extending longitudinally of the machine; this shaft is journaled in brackets 3 depending from the main frame 4, and spool retaining fingers 5, 6 are secured to the frame at longitudinally spaced points lying beyond the ends of each drum, and extend forwardly from the frame in parallelism above the drum to removably maintain a spool 10 in operative relation therewith during the winding operation. These fingers as shown are substantially like those disclosed in U. S. Letters Patent 1,964,785, issued to me on July 3, 1934, and include rollers 12 near their outer ends respectively contacting the fingers at the ends of the spool while the spool barrel rests on the cork face of the drum and thus, in cooperation with the drum, serving to rotatably support the spool, as more fully explained in my said patent. One of these fingers 6 has formed integrally with it a downwardly directed extension 13 supporting a flanged roller 14 upon which the traverse bar 15 rests, fingers having similar extensions being provided at suitable intervals longitudinally of the machine to afford adequate support for the bar.

It will be understood, however, that while this manner of supporting the spool and the traverse bar I consider as preferable, it is by no means essential to the practice of the present invention and that consequently, if desired, the spool may be supported on its trunnions or in any other convenient way and/or means other than rolls mounted on extensions on the fingers provided for supporting the traverse bar without in any way sacrificing the benefits of the invention.

The novel form of traverse bar which I prefer to utilize is integrally formed of metal of L-section and thus comprises a web 16 which rests on the rollers 14 and a web 17 projecting upwardly at right angles thereto from its inner edge, the bar, as usual, extending substantially from one end of the machine to the other. A keeper 18 may be secured to the traverse bar adjacent each roller 14 to prevent the traverse bar from jumping off the machine during its normal operation, the keeper having an enlarged portion 19 at one end to permit the traverse bar to be lifted slightly to clear the flanges of rollers 14 when removing it from the machine, after it has been disconnected from its actuating mechanism (not shown) disposed at one end of the machine in the usual way.

Adjacent each spool the upstanding web 17 of the traverse bar is drilled and threaded for the reception of a lock screw 20 which, by means of a clamp 21, secures a thread guide supporting bracket 22 to the traverse bar in longitudinally adjustable relation. This bracket, which is preferably made of heavy wire, comprises a substantially U-shaped part 22*a* adapted to lie against the outer face of web 17 and to be held thereto by the clamp when it is set up, and an arm 22*b* extended from the upper leg thereof and bent angularly in two planes as shown in Figs. 4–8 with its extremity 22*c* fixed in the lower part of the guide block.

This guide block 25 is of peculiar conformation and is preferably formed of glazed porcelain or other suitable relatively hard material having a smooth surface or capable of having such surface imparted to it, desirably molded in one piece about the end 22*c* of the bracket arm. It is defined by a lower face 27, into which the said end of the bracket 22 extends, which is substantially rectangular and merges at opposite sides into substantially parallel plane faces 28, 29; one of its other sides merges into one side face 30 of a guide slot 31, and its fourth side merges into a transversely and longitudinally curved surface 32 forming a sweeping arc as clearly shown in Fig. 6.

The opposite extremity of this arcuate surface 32 meets at an acute angle one end of a guide face 33 whose general plane is oblique to the side faces 28, 29 so as to form a slightly greater angle to the plane of the latter than to that of the former. The other end of the guide face 33 forms an acute angle with the other side face 34 of guide slot 31, and the faces 30, 34 of the guide slot are joined at their inner ends by a curved surface 35. All the lines of junction of the several faces are preferably smoothly rounded except that the edge formed by the arcuate face 32 and the guide face 33 is fairly acute.

The traverse bar and thread guides, irrespective of their particular form and arrangement, must necessarily clear the driving drums 1 and the flanges of the spools, and these parts have heretofore been arranged so that the point from which the thread is led from each guide to its spool is at a considerable distance from the latter since with the traverse bars and guides heretofore employed it has been impossible to dispose the point of lead in any other manner with relation to the spool, and this, for the reasons heretofore explained, results in uneven winding and piling up of the thread adjacent the ends of the spools. However, as my metal traverse bar of L-shaped or generally similar section is much less bulky than the wooden bars heretofore used, it, as well as the thread guide proper which is supported by arm 22 entirely clear of the bar, can be located relatively closely to the spool body, the limiting factor being merely the requirement that the guide and the bar will clear the spool flanges during reciprocation. Thus, as best shown in Fig. 3, the guide block supporting arm 22 is directed inwardly as well as upwardly from the traverse bar to support the guide block so that its rear face 29 lying in a plane parallel to the axis of the spool is so disposed that it will just clear the spool flanges when the spool is first put in position on the machine with substantially no thread on its barrel, as indicated by the dot and dash circle A in said figure, with the result that the distance between the point at which the thread leaves the guide slot 31 in the guide and that at which it reaches the barrel is relatively short. As the spool becomes progressively loaded with thread it gradually moves upwardly through an arc whose center is coincident with the axis of the rollers 12 so that the center of the spool moves away from the guide. However, the periphery of the body of thread on the spool moves away from the center of the spool as the quantity of thread thereon increases, so in reality the distance through which the thread travels in its passage from the guide slot to the body of thread on the spool is not correspondingly increased by apparent movement of the spool itself away from the guide, and even when the spool is substantially fully loaded with thread and thus occupies the position indicated by the dot and dash line B in Fig. 3, the said distance is still relatively small; consequently, throughout the loading of the spool the guide is continuously maintained in closely spaced relation to the periphery of the body of thread on the spool with resultant substantially uniform and level winding of the thread thereon as the traverse bar moves back and forth longitudinally of the machine during rotation of the spool, and material overrunning of the ends of the spool by the lead thread is not required in order to fill the spool from one flange to the other.

An important feature of the thread guide of my invention, however, is its ability to pick up the thread and thereafter maintain it in the guide slot automatically without manual attention. This function is made possible through the conformation of the guide block itself; as hereinbefore mentioned, its upper and outer surface 32 is curved toward a point and its under surface forming the guide face 33 extends from this point to one side of the guide slot 31 so that when at the initiation of the winding operation the tread is tied to the barrel of the spool by the operative and the spool laid in position in the machine while the drum 1 is rotating, the winding of the thread immediately begins and the thread is drawn more or less taut. Let it now be assumed the thread is in the position relatively to the guide block indicated by the broken line X in Figs. 4 and 5 at this point in the operation and that the movement of the traverse bar and hence of the guide is toward the left in said figures; this movement causes an apparent movement of the thread upwardly over the outer curved surface 32 of the guide block until the block, still moving to the left, clears the thread, and upon the subsequent return of the traverse bar and block the guide face 33 of the latter first engages the thread about the position indicated by the broken lines Y and as the movement continues the guide slot 31 is ultimately brought into registry with the thread lead, whereupon the thread slips into the slot to the position Z and is thereafter maintained therein by the parallel side faces of the slot Of course, if the guide is to the left of the thread lead at the moment the spool is placed in position, its first movement to the right almost immediately picks up the thread through initial engagement thereof with the guide face 33 and further movement of the block to the right ultimately aligns the thread lead with the guide slot in a similar way.

The guide slot is desirably made considerably wider than the diameter of the thread to be wound and, as it draws the thread in opposite directions during its reciprocation under normal operating conditions, the point of engagement of the thread with the guide surfaces 35 at the inner end of the guide slot moves across the surface from one side to the other during each reciprocation so that a substantial area of contact between the thread and guide is afforded, thereby minimizing wear on the guide block and imparting thereto substantially longer life than has heretofore been attainable in guides having V-shaped grooves in which the engagement of the thread with the block is substantially along a single line whereby the guide is subjected to substantially continuous wear at one point.

It is evident from the foregoing that my improved thread guide not only eliminates the necessity for manually feeding the thread thereinto and therefore the danger of cutting and infection of the operative's hand, but also renders it unnecessary for the operative to give personal attention to the starting of the thread on the guide after he has placed the spool in position with the thread tied thereto whereby the time required for loading a machine or for resuming the winding of any spool after it has been interrupted for any reason such as thread breakage is therefore materially reduced. Moreover, since the nature of the guide and manner of adjustably mounting it on the traverse bar enables it to be so disposed as to maintain a point of lead in close proximity to the spool barrel, use of the invention insures uniformity in the winding and eliminates the

necessity of having the guide overrun the end flanges of the spool a considerable distance in order to wind the thread close up to the flanges, so that the amplitude of travel of the traverse bar is thereby appreciably reduced, and breakage and burning of the thread through friction between it and the driving drum, resulting from uneven or nonuniform winding, are substantially eliminated.

While I have herein described the invention with considerable particularity as applied to a winding machine of a specific form, it will be understood that thread guides and/or traverse bars of similar character may be utilized in machines of other types and in any circumstances in which some of or all their advantages are desired, and furthermore that while the thread guide of the form specifically shown and described has been demonstrated to be highly satisfactory in actual use, changes and modifications in the structural details and arrangement thereof as well as in its operative relation to the other parts of the winding or other machine with which it is associated will readily occur to those skilled in the art and may be made if desired, without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. A thread guide of the character described comprising a body having two substantially parallel faces, a curved surface having its extremities substantially at right angles to each other extending therebetween, a substantially flat face extending angularly from one extremity of the curved surface, a guide slot extending substantially parallel to the other extremity thereof and terminating at the outer edge of one of its sides in the adjacent end of the angular face, and means secured to the body adjacent the opposite side of the slot for operatively supporting the guide upon a traverse bar.

2. A thread guide of the character described comprising a body having a curved surface terminating at its ends in relatively flat faces arranged in planes lying substantially normal to each other, a guide slot extending substantially parallel to one of the flat faces, a substantially flat guide surface extending between the outer end of the slot and the other flat face, and substantially parallel front and rear faces defining the sides of all said faces and of said slot, and means for securing the body to a traverse bar.

3. A thread guide of the character described comprising a body having a substantially rectangular base, a pair of substantially parallel plane surfaces merging into the base on opposite sides thereof, a guide slot having one of its sides merging at its outer extremity into an intermediate side of the base, a substantially plane surface terminating at one end in the outer extremity of the other side of the slot, and extending angularly thereto and to said parallel surfaces, and a curved surface having its ends in substantially normal relation interconnecting the opposite end of said angular plane surface with the other intermediate edge of the base, and supporting means projecting outwardly from the base.

4. A thread guide of the character described comprising a body having a substantially rectangular base, a pair of substantially parallel plane surfaces merging into the base on opposite sides thereof, a guide slot having one of its sides merging at its outer extremity into an intermediate side of the base, a substantially plane surface terminating at one end in the outer extremity of the other side of the slot, and extending angularly thereto and to said parallel surfaces, a curved surface having its ends in substantially normal relation interconnecting the opposite end of said angular plane surface with the other intermediate edge of the base, and a body-supporting bracket having a portion adapted for engagement with a supporting element and an arm extending therefrom, bent in two planes and fixed to the body.

5. In a thread winding machine comprising a frame and a spool rotatably supported thereon, a traverse bar mounted for reciprocation longitudinally of the machine parallel to the axis of the spool, a guide supporting bracket adjustably secured to the bar and a thread guide carried by the bracket in spaced relation to the traverse bar, the guide defining a thread-receiving slot including side faces extending inwardly toward the bar from and joined by an arcuate end face of materially greater width than the diameter of the thread so disposed as to overlie the thread in its passage to the spool and a guide face extending from an inner extremity of one of said side faces adjacent the bar angularly outwardly from the bar operable to engage thread and guide it into the slot when the bar is moved longitudinally in one direction relatively to the thread.

6. In a thread winding machine comprising a frame and a spool rotatably supported thereon, a traverse bar mounted for reciprocation longitudinally of the machine parallel to the axis of the spool, a guide supporting bracket adjustably secured to the bar and a thread guide carried by the bracket in spaced relation to the traverse bar, the guide having two substantially parallel faces, a slot interposed therebetween, the inner end of the slot being adapted to overlie a thread on its passage to the spool, an arcuate outer face and a guide face extending angularly from one end of the arcuate face to one side of the slot, the arcuate face and the guide face being so disposed as to direct the thread into the slot during reciprocation of the traverse bar while the spool is rotating with the thread in lead thereto.

7. In a winding machine, a metal traverse bar arranged for longitudinal reciprocation comprising a pair of webs disposed in substantially normal relation, means engaging one of the webs operative to support the bar, a thread guide, and means carried by the other web operative to support the guide in vertically and horizontally offset spaced relation to the bar and on the opposite side therefrom of a thread in lead to the machine.

8. In a winding machine, a metal traverse bar arranged for longitudinal reciprocation comprising a pair of webs disposed in substantially normal relation, means engaging one of the webs operative to support the bar, a thread guide, and means supporting the guide on the bar in spaced relation thereto, said guide having a guide slot extending inwardly from an edge thereof and away from the bar operative to receive and overlie a thread interposed between the guide and the bar and to thereafter guide the thread in lead to the spool.

9. In a winding machine comprising a rotatable spool and a traverse bar longitudinally reciprocable parallel to the spool axis, a thread in lead to the spool and a thread guide supported from the bar having a curved surface adapted to engage and slide under the thread when the guide is

moved in one direction with the bar, an angular surface adapted to ride over the thread when the guide is moved in the opposite direction, and a guide slot disposed adjacent one end of the angular surface extending therefrom outwardly with respect to the bar and adapted to receive and retain the thread and guide it to the spool after passage of the angular surface thereover.

10. In a winding machine comprising a rotatable spool, a transverse bar longitudinally reciprocable parallel to the spool axis, and means for actuating the spool and bar respectively, a thread in lead to the spool extending generally transversely of the bar, a thread guide supported from the bar having a thread-receiving slot opening in the direction of the bar and extending from its open end outwardly with relation thereto, a guide surface adjacent one side of the slot extending angularly outward therefrom operative when the bar is moved in one direction to engage the thread and guide it into the slot, and a curved surface forming the outer boundary of the guide adapted to slide in engagement with the thread when the bar is initially moved in the opposite direction to thereby move the thread relatively to the guide and ultimately position it for engagement by the guide surface to effect its entrance into the slot on the return movement of the bar.

11. In a winding machine comprising a rotatable spool, a traverse bar longitudinally reciprocable parallel to the spool axis, and means for actuating the spool and bar respectively, a thread in lead to the spool extending generally transversely of the bar, a thread guide supported from the bar having a thread-receiving slot opening in the direction of the bar and extending from its open end outwardly with relation thereto, a guide surface adjacent one side of the slot extending angularly outward therefrom operative if the bar is initially moved in one direction to engage the thread and guide it into the slot, and a curved bounding surface extending from the extremity of the guide surface remote from the slot into substantial parallelism with the slot adjacent the opposite side thereof from the guide surface adapted if the bar is initially moved in the opposite direction to engage and form a support for the thread until the guide reaches a position in which the thread can be engaged by the angular guide surface on the return movement of the bar and be thereby guided into the slot.

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