F. KLEIN.

BOBBIN CARRIER FOR BRAIDING MACHINES.

APPLICATION FILED SEPT. 13, 1919.

1,358,216. **Patented Nov. 9, 1920.**

3 SHEETS—SHEET 1.

Fig. 1.

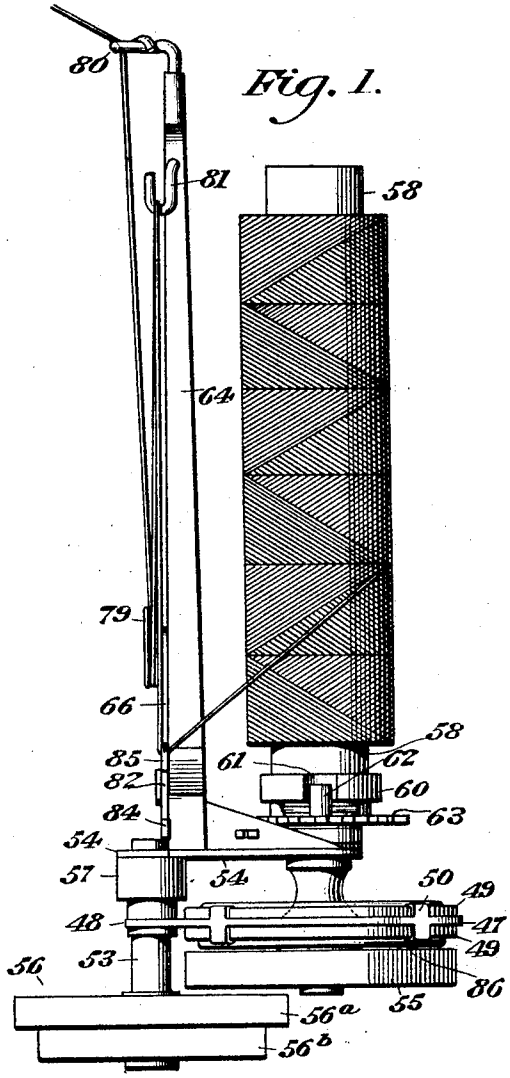


Fig. 2.

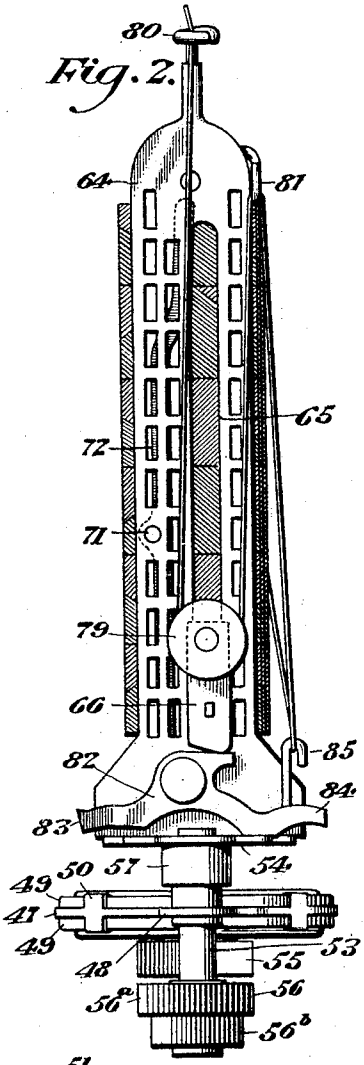
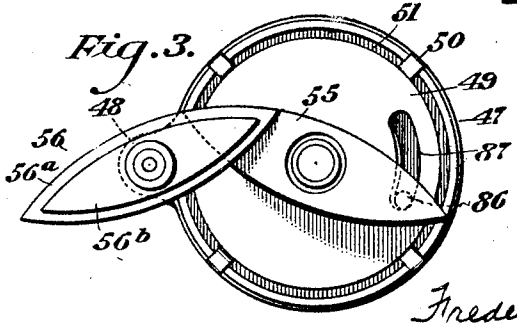


Fig. 3.



Inventor

Frederick Klein

By Cromwell & Davis

Attorneys

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3 SHEETS—SHEET 2.

Fig. 4.

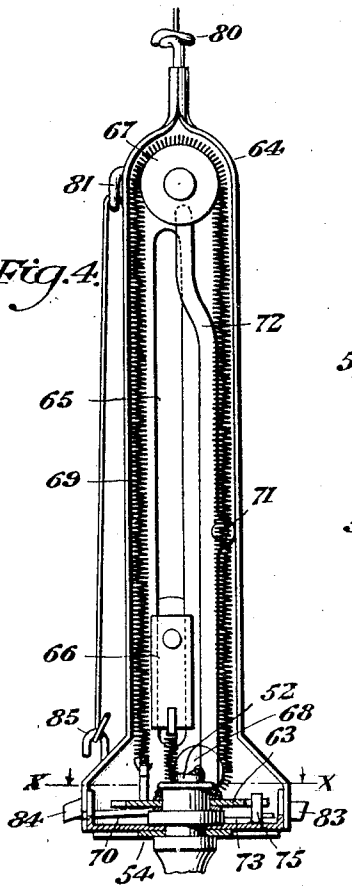


Fig. 9.

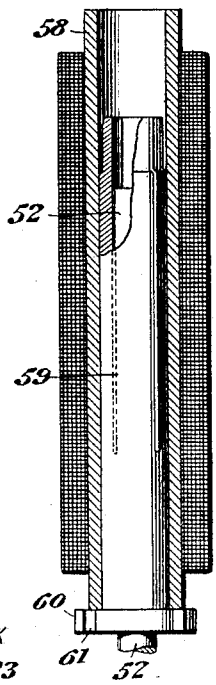


Fig. 6.

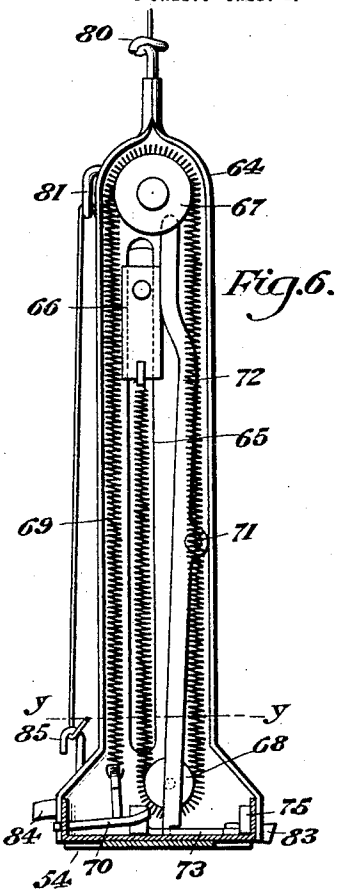


Fig. 5

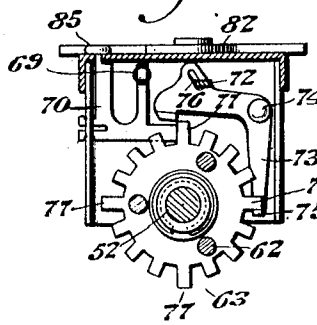


Fig. 8

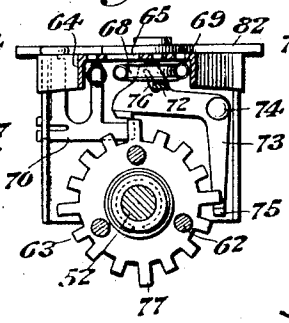
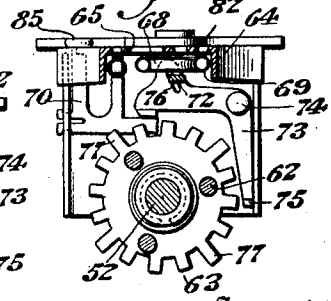


Fig. 7



Inventor

Frederick Klein

By Cromwell & Davis

Attorney

F. KLEIN.

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3 SHEETS—SHEET 3.

Fig. 10.

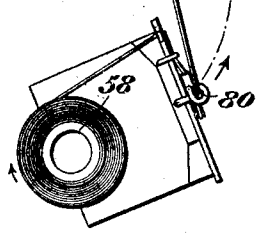


Fig. 10a

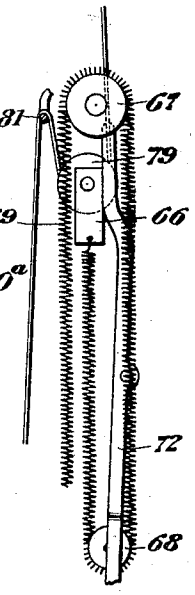


Fig. 11.

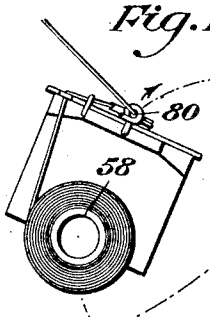
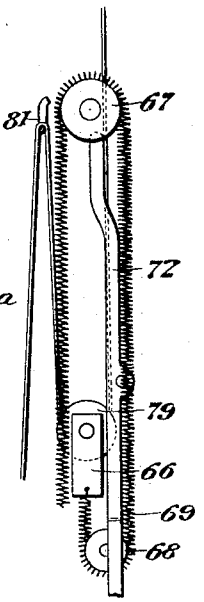


Fig. 11a



Inventor

Frederick Klein

By Crimmel & Davis

Attorney

UNITED STATES PATENT OFFICE.

FREDERICK KLEIN, OF NEW YORK, N. Y., ASSIGNOR TO NATIONAL INDICATOR COMPANY, OF LONG ISLAND CITY, NEW YORK, A CORPORATION OF NEW YORK.

BOBBIN-CARRIER FOR BRAIDING-MACHINES.

1,358,216. Specification of Letters Patent. Patented Nov. 9, 1920.

Application filed September 13, 1919. Serial No. 323,487.

To all whom it may concern:

Be it known that I, FREDERICK KLEIN, a citizen of the United States, and resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Bobbin-Carriers for Braiding-Machines, of which the following is a specification.

This invention relates to a bobbin carrier for that type of machines designed for producing a tubular braided structure, either in the form of a covering for a core, or as a tubular braided cord or rope.

The bobbin carrier herein described was especially designed for use in the braiding machine shown in the joint application filed by Marius E. Penso and myself, on the 13th day of September, 1919, Serial No. 323,466, but of course it may be adapted for use in any other braiding machine of the same type.

One of the main objects of this invention is to provide a bobbin carrier wherein the braiding thread will be relieved of the stress of rotating the bobbin or spool, said rotation being brought about automatically by means of the rotation of the carrier about the braiding machine, whereby the said carrier will be especially adapted for use in high-speed braiding machines. It has been found that where the bobbin or spool is rotated through the tension placed upon the thread, the thread is frequently broken when the machines are run at high speed. The bobbin carrier described herein relieves the thread of the sudden stresses and strains which are brought upon it when the tension on the thread is relied upon as the means for causing the rotation of the bobbin or spool, and thereby avoids the frequent breaking of the bobbin thread.

Another important object of the invention is to provide a bobbin carrier wherein the tension on the braiding thread will merely release the bobbin and permit it to turn independently of the stress on the braiding thread. As the bobbin-releasing means will be operated by a slight tension on the thread, the danger of the thread breaking is very remote.

Another object of the invention is to provide a bobbin carrier which is normally locked against rotation, but which will be released for a predetermined rotary movement when the stress on the braiding thread is sufficient to release the bobbin-locking means, means being provided to automatically lock the bobbin against rotation after the same predetermined rotary movement.

Another important object of the invention is to provide means whereby a substantially uniform tension will be maintained on the braiding thread throughout all the movements of the carrier about the braiding machine.

Other important objects and advantages of the invention will appear hereinafter.

In the drawings, Figure 1 is a side elevation of the bobbin carrier;

Fig. 2 a front elevation thereof;

Fig. 3 a bottom view;

Fig. 4 a rear view with the base of the carrier partly in section and partly broken away;

Fig. 5 a horizontal sectional view taken approximately on the line x—x of Fig. 4;

Fig. 6 a view similar to Fig. 4, showing the bobbin-releasing slide in its upper position;

Fig. 7 a horizontal sectional view taken on the line y—y of Fig. 6, showing the parts in their bobbin-releasing position;

Fig. 8 a view similar to Fig. 7, with the parts in their bobbin-locking position;

Fig. 9 a vertical sectional view partly broken away of the bobbin-supporting sleeve, with the bobbin thereon;

Fig. 10 a diagrammatic view showing the movement of the bobbin carrier and the thread take-up;

Fig. 10^a a diagrammatic view showing the position of the bobbin-releasing slide when the bobbin carrier is in the position indicated in Fig. 10;

Fig. 11 a view similar to Fig. 10, showing the bobbin carrier in a slightly different position; and

Fig. 11^a a view showing the position of the bobbin-releasing slide when the bobbin is in the position shown in Fig. 11.

Referring to the various parts by numerals, 47 designates a circular base plate provided with a lateral or radial extension 48. Concentrically mounted on the base plate are upper and lower circular plates 49, preferably formed of wood, suitably treated with a lubricating material, such as paraffin. These upper and lower plates are secured to the main base plate by means of

inwardly bent integral fingers 50, which grasp the peripheries of the said plates, as clearly indicated in the drawings. The inner end of these fingers are bent into annular grooves 51, formed in the plates 49, as clearly indicated in Fig. 3 of the drawings. In the center of the base plate is rigidly mounted a vertical stud 52, on which the bobbin is supported, as will be fully hereinafter described. In the radial extension 48 of the base plate is rigidly mounted a pilot post 53, said post extending slightly above the extension 48 and forming a support for the outer end of a horizontal plate 54, the inner end of said plate being rigidly mounted on the bobbin stud 52, as clearly shown in Fig. 1 of the drawings. Rotatably mounted on the lower end of the bobbin stud close to the lower plate 49 is a large guide shoe or shuttle 55, said shoe being of a general ovate form narrowed at its ends to sharp points, the curved sides thereof being on arcs having the same curvature as the annular walls of the pockets in which they are adapted to move, so that the sides of said guide shoes will fit accurately against said side walls and travel thereabout, as described in the herein-mentioned application. Said guide shoes are substantially equal in length to the diameter of the base plate 47, as clearly shown in Fig. 3 of the drawings. Rotatably mounted upon the lower end of the pilot post 53 is a double pilot shoe 56 having an upper shoe 56^a and a lower shoe 56^b, both of these shoes being just below the main guide shoe 55, as clearly shown in Fig. 1 of the drawings. The double pilot shoe is of the same shape as the main guide shoe, and operates as described in the aforesaid application.

The thread is wound upon a spool 58, and said spool is adapted to be fitted snugly over a split wooden sleeve 59, which is adapted to fit over the stud 52. Sleeve 59 is split near its upper end to form yielding spring-like sections, and is provided at its lower end with a flange 60, which is formed with peripheral notches 61, adapted to receive upstanding pins 62 carried by a ratchet wheel 63, so that the sleeve carrying the bobbin will be locked to the ratchet wheel and can only rotate therewith. It may be readily removed, however, by lifting it off of the bobbin stud 52. The ratchet wheel rotates freely on the bobbin stud, said stud being rigidly connected to the base 47, as hereinbefore described. The purpose of splitting the sleeve 59 is to provide a yielding gripping connection between the bobbin spool 58, so that said spool will run with the sleeve 59 when the ratchet wheel is free to rotate, but will also be free to rotate slightly under the strain of the rapid movement of the carriers about the machine without injuring the bobbin spool or the sleeve. This independent movement between the bobbin spool and the sleeve is very slight, but it has been found to be sufficient to destroy the spool, unless the spool is permitted to slip on the sleeve under considerable stress. The frictional engagement between the spool and the sleeve is sufficient to cause the sleeve and the ratchet wheel to rotate with the spool when the ratchet wheel is freed, as will be hereinafter described.

Mounted rigidly on the plate 54 is a vertical post 64 in which is formed a vertical slot 65. In this slot is arranged to reciprocate vertically a bobbin-releasing slide 66. In the upper and lower ends of the post are mounted guide rollers 67 and 68, over which is run a long delicate coiled spring 69, one end of said spring being connected to the bobbin-releasing slide, the other end thereof being connected to a pawl 70, which is pivotally supported by the plate 54, the spring 69 serving as means to hold the said pawl up into engagement with the teeth of the ratchet wheel 63. This pawl serves at all times to prevent backward or anti-clockwise rotation of the spool and the sleeve on the bobbin stud. Pivotally mounted on the post at 71 is a ratchet-releasing lever 72, whose upper end is normally in the path of the bobbin-releasing slide 66 when said slide nears the limit of its upward movement, as indicated in Fig. 6. Pivoted on the plate 54 is a horizontal escapement dog 73, said dog being in the form of a bell-crank pivoted at 74, and provided with an upstanding finger 75 on one arm thereof. The lower end of the bobbin-releasing lever 72 engages an angularly disposed slot 76, in the other arm of the bell-crank escapement dog, as shown clearly in Fig. 5, so that as the bobbin-releasing lever is rocked by means of the slide 66, the escapement dog 73 will be rocked on its pivot and the finger 75 will be moved out of engagement with the teeth of the ratchet wheel, as indicated clearly in Fig. 7 of the drawings. The ratchet wheel is provided with four teeth 77, which are longer than the other teeth of the wheel, these longer teeth being arranged equal distances apart around the wheel. The finger 75 of the escapement dog is adapted to engage the teeth 77 but not to engage the intermediate shorter teeth. The slotted end of the bell-crank escapement dog is provided with a contact lug 78, which is adapted to be engaged by the long teeth 77 of the ratchet wheel. As shown in Fig. 8 of the drawings, when said lug is engaged by one of the long teeth of the ratchet wheel the escapement dog is rocked on its pivot, and the stop finger 75 is brought into engagement with one of the other long teeth of the ratchet wheel to lock the ratchet wheel and consequently, the bobbin, against further rotation. Mounted on the slide 66 is a roller

79, and on the upper end of the post are mounted two thread guides 80 and 81. On the post near the lower end thereof is pivoted a vertically disposed throw-off bar 82, provided with two outwardly extending arms 83 and 84. On the arm 84 is mounted a hook 85. The lower end of the slide 66 is adapted to bear on the upper edge of the throw-off bar at one side of the pivot thereof, and between the pivot and the hook 85, as clearly shown in Fig. 2. The thread from the bobbin is carried under the hook 85, then up over the hook 81, then down under the roller 79, and up through the open thread guide 80 at the top of the post 64.

When the tension on the braiding thread is sufficient to draw the slide 66 to the upper end of its guide slot, the said slide will move the bobbin-releasing lever on its pivot and cause the lower end of said lever to swing the escapement dog 73 to the position shown in Fig. 7, thereby releasing the ratchet wheel and the bobbin or spool carried by the ratchet wheel. This will permit the bobbin to rotate, and thereby permit the spring 69 to pull the slide downwardly in the guide slot. The rotation of the spool and the ratchet wheel will bring one of the long teeth 77 into engagement with the lug 78, thereby forcing the escapement dog 73 back to its normal position and swinging the stop finger 75 into the path of one of the long teeth 77, thereby stopping the ratchet after a one-quarter turn. The bobbin is then locked against rotation in both directions, the dog 70 holding it against back or anti-clockwise rotation, and the finger 75 holding it against clockwise rotation. The parts will now remain in this position until the tension on the thread is sufficient to again lift the slide 66 to the upper end of its guide slot.

In the operation of a machine constructed as shown in the herein-mentioned application, it was found that the bobbin tended to rotate when the bobbin carrier changed its direction of movement and was switched from one carrier disk to the next carrier disk of the series. To prevent it rotating in the wrong direction, the detent pawl 70 was provided. By providing the bobbin-releasing slide 66 and the bobbin-releasing lever 72, the bobbin was released and permitted to rotate in a clockwise direction whenever the tension on the braiding thread was sufficient to move the slide 66 to the upper part of its guide slot. When the escapement dog 73 is released from the ratchet wheel it remains out of engagement therewith until the bobbin and the ratchet wheel has made a one-quarter turn to bring the next long tooth 77 into engagement with the lug 78. This turning of the bobbin will take place at the first reversal in the direction of movement of the bobbin carrier around the machine; that is to say, at the first change of the bobbin carrier from one carrier disk to the next carrier disk of the series. This tendency of the bobbin to rotate is due to the momentum of the bobbin carrier, as it is moved rapidly about the machine. It is very important that the braiding thread be relieved of the strain of rotating the bobbin. It is manifest that in a high-speed braiding machine such as that disclosed in the said application, the braiding threads are apt to be broken if the tension thereon is relied upon to bring about the rotation of the spool or bobbin. For that reason it is desirable that the rotation of the bobbin be brought about by some other means. By freeing the bobbin and permitting it to be rotated by its own momentum as its direction of movement is changed, the braiding thread is relieved almost entirely of strain, with the result that the breaking of the threads is avoided.

As the bobbin carriers are moved in and out in their undulating path around the machine, the slide 66 will move up and down in its guide slot to take up the slack in the thread caused by the said in-and-out movement. As the thread is used up in the braiding operation, the slide will gradually approach the top of its guide slot and will finally engage the bobbin-releasing lever and thereby free sufficient of the braiding thread to permit the slide to move downwardly under the influence of its spring. Thereafter it will move up and down in its guide slot, gradually approaching the upper end thereof as the thread is used up. By providing the long delicate spring 69 the tension on the thread is substantially uniform at all points in the travel of the carrier. By providing the open hooks 80, 81 and 85, and the roller 79, the thread from the bobbin may be threaded through the bobbin carrier readily and without the necessity of passing it through guide apertures.

What I claim is:—

1. A carrier for a braiding machine comprising a base, means for rotatably supporting a spool above said base, a ratchet wheel connected to said spool and rotatable therewith, a locking pawl adapted to engage said ratchet wheel to prevent the rotation thereof in one direction, a pivoted stop pawl adapted to engage said ratchet wheel to prevent its rotation in the other direction, a releasing slide supported by the base and mounted to move vertically, a spring connected to said slide and normally holding it at the lower end of its movement, a pawl-releasing lever supported by the base and adapted to be engaged by the releasing slide when said slide approaches the upper end of its movement, the lower end of the releasing lever engaging the pivoted stop pawl, stationary thread guides supported on the base, and a

movable thread guide mounted on the releasing slide, whereby the tension on the thread will tend to move the releasing slide upwardly.

2. A carrier for a braiding machine comprising a base, a vertical central spool-supporting stud rigidly mounted thereon, a vertical post carried by said base, a spool-supporting sleeve mounted on said stud, a ratchet wheel loosely mounted on said stud, means for locking the sleeve to said ratchet wheel, a locking pawl adapted to engage said ratchet wheel, a pivoted stop pawl adapted to engage said ratchet wheel, a releasing slide mounted in the post to move vertically, a spring connected to said slide and normally holding it at the lower end of its movement, a releasing lever pivotally mounted on the post and adapted to be engaged by the releasing slide when said slide approaches the upper end of its movement, the lower end of said lever engaging the ratchet stop pawl, stationary thread guides mounted on the post, and a thread guide mounted on the releasing slide, whereby the tension on the thread will tend to move the releasing slide upwardly.

3. A carrier for a braiding machine comprising a base, means for rotatably mounting a spool thereon, a ratchet means for releasing and locking the spool, a releasing lever connected to said ratchet means, a vertically movable releasing slide carried by the base and adapted to engage the releasing lever, a thread guide mounted on said slide, a long coiled spring connected at one end to the base and at its other end to the releasing slide, and a pair of rollers interposed between said points of connection to receive and support said spring intermediate its ends.

4. A carrier for a braiding machine comprising a base, a vertical central spool-supporting stud rigidly mounted thereon, a vertical post carried by said base, a spool-supporting sleeve mounted on said stud, a ratchet wheel loosely mounted on said stud, means for locking the sleeve to said ratchet wheel, a locking pawl adapted to engage said ratchet wheel, a pivoted stop pawl adapted to engage said ratchet wheel, a releasing slide mounted in the post to move vertically, a spring connected at one of its ends to said slide and at its other end to the locking pawl, a pair of guide rollers mounted in the post near the upper and lower ends thereof and adapted to be engaged by the spring intermediate its points of connection to the slide and the locking pawl, said spring normally holding the slide at the lower end of its movement, a releasing lever pivotally mounted on the post and adapted to be engaged by the releasing slide when said slide approaches the upper end of its movement, the lower end of said lever engaging the ratchet stop pawl, stationary thread guides mounted on the post, and a thread guide mounted on the releasing slide, whereby the tension on the thread will tend to move the releasing slide upwardly.

5. A carrier for a braiding machine comprising a base, means for rotatably mounting a spool thereon, a ratchet means for releasing and locking the spool, a releasing slide supported by the base adapted to be moved by the braiding thread, means operated by said slide to release the ratchet means, and means operated by the rotation of the spool to lock the spool against rotation.

6. A carrier for a braiding machine comprising a base, means for rotatably mounting a spool thereon, a ratchet wheel mounted thereon, means for locking the spool to the ratchet wheel, a stop pawl adapted to engage said ratchet wheel to prevent the unwinding of the thread from the spool, a releasing slide mounted on the base, means adapted to be operated by said slide to release the stop pawl from the ratchet wheel, and means operated by the ratchet wheel to bring the stop pawl into engagement therewith.

7. A carrier for a braiding machine comprising a base, means for rotatably mounting a spool thereon, a ratchet wheel mounted on the base, means for locking the ratchet wheel to the spool, a stop pawl adapted to engage the ratchet wheel to prevent the unwinding of the thread from the spool, means adapted to be operated through tension on the thread to release the stop pawl from the ratchet wheel, and means operated by the ratchet wheel to bring the stop pawl back into engagement with the ratchet wheel.

8. A carrier for a braiding machine comprising a base, means for rotatably mounting a spool thereon, means for locking said spool to prevent the unwinding of the thread from the spool, means adapted to be operated by tension on the thread to release said spool-locking means, and means operated through the rotation of the spool to restore the spool-locking means to its locking position.

9. A carrier for a braiding machine comprising a base, means for rotatably supporting the spool above said base, a ratchet wheel connected to said spool and rotatable therewith, some of the teeth of said ratchet wheel being longer than others, a locking pawl pivoted on the base and adapted to engage said ratchet wheel, a pivoted bell-crank stop pawl pivoted on the base and provided with a stop finger on one of its arms adapted to engage the long teeth of the ratchet wheel, a lug being formed on the end of the other arm of said bell-crank and adapted to be engaged by the said long teeth of the ratchet wheel to throw the stop

finger into the path of said long teeth, and means adapted to be operated through the tension on the thread to release the bell-crank stop pawl from the ratchet wheel.

10. A carrier for a braiding machine comprising a base, means for rotatably mounting a spool thereon, a ratchet wheel mounted on the base and rotatable with the spool, a bell-crank stop pawl adapted to engage said ratchet wheel to prevent the unwinding of the thread from the spool, means operated through the tension on the thread to release said stop pawl from the ratchet, and means operated by the rotation of the ratchet to move said stop pawl into engagement with the ratchet.

11. A carrier for a braiding machine comprising a base, a vertical post for supporting the spool, a split sleeve mounted on said post, a ratchet wheel loosely mounted on said post, means for connecting the ratchet wheel to said split sleeve, and a spool sleeve to receive the thread and adapted to fit snugly over the split sleeve whereby the ratchet wheel and the split sleeve will rotate together and the spool sleeve will be frictionally held on the split sleeve.

12. A carrier for a braiding machine comprising a base, a vertical post for supporting the spool, a ratchet wheel loosely mounted on said post, thread operated means for controlling the rotation of said ratchet wheel, a split sleeve mounted on said post and adapted to be detachably locked at its lower end to said ratchet wheel, and a spool sleeve adapted to receive and frictionally engage the split sleeve and carrying the thread.

This specification signed this tenth day of September, A. D. 1919.

FREDERICK KLEIN.