MACHINE FOR PRODUCING THREAD BOBBINS

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7 Claims.

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This invention relates to a machine and method for producing thread bobbins.

Herein are machines for making thread bobbins it has been deemed necessary to assemble the heads on the opposite ends of the core of a bobbin by one set of mechanisms, and to press the bobbin to shape and secure the heads to the core in a separate operation by a separate set of mechanisms. By my present invention, I have simplified the procedure by accomplishing all of the above in a simple set of mechanisms and in essentially one step of operation. Also in said prior machines the core of the bobbin was compressed to a certain extent together with the core of the bobbin producing a distortion of the core which tended to bind some of the thread onto the core, and prevent the free withdrawal of the final portion of the thread from said core.

An object of this invention is to produce a machine which by a single unitary arrangement of mechanisms assembles the end heads on a thread bobbin, presses said bobbin to its final shape, and secures said end heads to the core of said bobbin in a single operation of said machine.

Another object is to produce a bobbin with a minimum distortion of the core thereof.

A further object is to provide various novel mechanisms to be incorporated into a machine producing thread bobbins.

The foregoing and other objects of my invention will be best understood from the following description of the claims and a reference to the accompanying drawings wherein:

Fig. 1 is a cross-sectional view of one embodiment of my novel mechanism showing the initial operation thereof;

Figs. 2, 3, 4 and 5 are views similar to Fig. 1, showing the mechanism in different successive stages of producing a bobbin;

Fig. 6 shows a modified arrangement for holding the heads for the bobbins in place in the mechanism by pneumatic means;

Fig. 7 shows a modification of my mechanism in which two mandrels are used instead of one as illustrated in Figs. 1 to 5;

Fig. 8 shows another modification in which the heads for the bobbins are supported by the mandrel; and

Fig. 9 shows a further operation of the mechanism shown in Fig. 8.

My novel mechanism illustrated in Figs. 1 to 5 consists of an elongated mandrel 1 having a tapered nose 2. The mandrel 1 moves inside of a pressing die 3 arranged concentrically with said mandrel 1. A space is left between the said mandrel 1 and the pressing die 3 in which space is placed a crimping tool 4. Thus the crimping tool 4 is also concentric with the mandrel 1 and the pressing die 3. Around the face of the pressing die 3 is provided a head-supporting ring 5 also concentric with the mandrel 1 and the crimping tool 4. The ring 5 is adapted to receive a head 6 for the bobbin to be formed. The head 6 fits snugly within the ring 5, and thus is supported by its periphery in position to be forced onto the core of a bobbin, as will be described below. The head 6 is made of some suitable material, such as paper, cellulose products, or the like, and is provided with a central opening 7 somewhat less in size than the outer diameter of the crimping tool 4.

Facing the mandrel 1, the pressing die 3 and the crimping tool 4 is a similar pressing and crimping assembly consisting of a pressing die 8 and a crimping tool 9 substantially identical with the pressing die 3 and the crimping tool 4, respectively. The pressing die 8 is likewise provided with a head-supporting ring 10 similar to the ring 5. The ring 10 is also adapted to receive and support a head 11 in the same manner as the ring 5 supports the head 6. The head 11 is substantially identical with the head 6, and is likewise provided with a central opening 12. The crimping tool 9 is provided with a bore 13 into which the mandrel 1 projects during a portion of the operation. Of course it is to be understood that each of the members 1, 3, 4, 8 and 9 are actuated by any suitable operating mechanism to produce the motions to be described below.

In order to produce a finished bobbin, a core 14 having a thread mass 15 wound thereon is fed into position between the two pressing assemblies. The core 14 consists of a short tube 6 of paper or similar material usually used in bobbins. Instead of having the ends of the core 14 project substantially beyond the ends of the thread mass 15, the ends of said core 14 are made substantially flush with the ends of said thread mass 15. In order to facilitate the initial threading of the heads 6 and 11 upon the ends of the core 14, a very slight amount of said core may be permitted to extend beyond the end faces of said thread mass 14. Prior to the pressing operations to be described, the heads 6 and 11 are fed into position within the rings 5 and 10 by any suitable feeding mechanism.

When the elements have been fed into the re-
spective positions shown in Fig. 1, the mandrel 1 is moved to the left in the direction of the arrow, and by the action of the tapered nose 2 thread itself through the tubular core 14. The diameter of said mandrel 1 is substantially the same as that of the inner diameter of said core 14, and thus the core 14, carrying the thread mass 15 is accurately centered in the machine. As the mandrel 1 moves further to the left, it enters the bore of the

tool 9, and thereupon serves as a guide for the members 3, 4, 8 and 9 so as to insure an accurate impingement of these members on the bobbin.

The pressing dies 3 and 8 are then actuated to approach the bobbin, thus moving the heads 6 and 11 toward the bobbin and sliding said heads over the ends of the core 14. The diameters of the openings 1 and 12 are made substantially the same as the outer diameter of the core 14, and thus fit snugly over the ends of said core. Since the ends of the core 14 do not project substantially beyond the ends of the thread mass 15, only an initial engagement of the ends of the core 14 and the heads 6 and 11 occur before, upon further movement of the pressing dies 3 and 8, the thread mass 15 is compressed, exposing a greater length of core material upon which the heads 6 and 11 may be supported. When the pressing motion of the dies 3 and 8 has been completed, the thread mass 15 has been pressed to its final shape and size, and the heads 6 and 11 have been moved into position on the ends of the core 14, as shown in Fig. 2.

During the above travel of the dies 3 and 8, the crimping tools 4 and 9 travel with said dies lagging behind them substantially to the degree as shown in Fig. 2. During the final portion of the pressing movement of the dies 3 and 8, the crimping tools 4 and 9 are brought forward so that at the end of the pressing operation they are substantially flush with the outer ends of the pressing dies 3 and 8, as shown in Fig. 3. The crimping tools therefore turn over the ends of the core 14 onto the outside faces of the heads 6 and 11, and in this way secure the heads 6 and 11 to the ends of the bobbin.

Upon completion of the bobbin as described above, the mandrel 1 is given an initial movement to the right in the direction of the arrow, as shown in Fig. 3, thus disengaging the core 14 from any tendency to stick to the mandrel 1. As the mandrel 1 leaves the core 14, the crimping tools 4 and 9 are backed away from the bobbin, as shown in Fig. 4. Since the pressing dies are still holding the bobbin, this motion pulls the crimping tools out of engagement with said bobbin despite any tendency for said bobbin to stick to either of said crimping tools. After the crimping tools have been withdrawn to the position substantially as shown in Fig. 4, the pressing dies 3 and 8 are withdrawn from the bobbin while the crimping tools 4 and 13 remain substantially stationary. As the dies 3 and 8 travel outwardly, the ends of the crimping tools 4 and 13 project beyond the faces of said pressing dies, and if the bobbin tends to be held either within the rings 5 or 10, said crimping tools will push the bobbin and disengage it from the particular pressing die involved.

From the foregoing it will be seen that the mechanism accomplishes a complete disengagement of the completed bobbin without any tendency for sticking of the bobbin to any of the elements of said mechanism.

The provision of the shortened core 14 as described above eliminates the distortion of said core which previously occurred. Only a sufficient length of core is exposed during the pressing to adequately support the heads, and so when the crimping tools 4 and 13 crimp the ends of said core 14, there is substantially no tendency for compression of the core 14 to occur and the surfaces of said core are left smooth. If such compression as heretofore produced were allowed to occur, the surfaces of the core would not be smooth but would be provided with ridges and wrinkles into which the inner layers of thread would pack. This would prevent such inner layers from being unwound freely, and would result in a loss of thread. As indicated above, by limiting the length of the core 14 to substantially the final length of the bobbin with only a sufficient excess to allow for the crimping on the heads, the difficulty described is eliminated.

Instead of supporting the heads within rings such as 5 and 10 in Figs. 1 to 5, other supporting means may be used. For example, as shown in Fig. 6, the pressing die 3 may be provided with a number of ports 16 communicating by means of passages 17, with a suction pump or some other suitable source of low pressure. By this arrangement, when the head 6 is fed onto the face of the pressing die 3, the suction created at the ports 16 will retain the head 6 firmly in position on the die 3 until it has been assembled on the bobbin. Of course it is to be understood that pressing die 3 would likewise be modified when the arrangement shown in Fig. 6 is used.

If desired, a pair of mandrels 18 and 19, as shown in Fig. 7, could be used instead of the single mandrel shown in Figs. 1 to 5. In Fig. 7 the mandrels 18 and 19 would be actuated toward each other to pick up and center the bobbin, and would be actuated away from each other to release the bobbin. The rest of the operation of the arrangement of Fig. 7 is exactly the same as described in connection with Figs. 1 to 5. If desired, the point at which the mandrels 18 and 19 meet may be selected on one side beyond the core 14, thus allowing one of said mandrels 18 to support the core 14. This is desirable if the pressure created during the pressing operation is sufficient to cause distortion of the central unsupported section of core 14 shown in Fig. 7.

When bobbins are to be made in accordance with my patent, No. 2,097,305, the arrangement shown in Fig. 8 may be used for supporting and centering the bobbin heads. In Fig. 8 the openings in the heads 6 and 11 have the same diameter as that of the mandrel 1, and thus as the mandrel moves to the left, it threads itself through the openings in the heads 6 and 11, and thus supports them centered in position to be engaged and pushed over the ends of the core 14 by the subsequent motion of the pressing dies 3 and 8. For this reason it is not necessary to provide the dies 3 and 8 either with the rings 5 and 10 of Figs. 1 to 8, or with the ports 16 of Fig. 6. As the dies 3 and 8, as shown in Fig. 8, are moved further toward the bobbin, the thread mass 15 is compressed, and the edges of the openings of the heads 6 and 11 are bent outwardly as the heads are forced over the ends of the core 14. The subsequent crimping action of the crimping tools 4 and 9 produce the interlocking combinations 20 between the core 14 and the heads 6 and 11, as shown in Fig. 9, and as described more fully and claimed in my Patent No. 2,097,305.

This invention is not limited to the particular details of construction or operation, as described...
above, as many equivalents will suggest themselves to those skilled in the art. For example, instead of the pressing dies being formed in one part, the various components thereof could be made separately and could be made to move separately. Thus the rings 5 and 10 in Figs. 1 to 5 could be formed separate from the main pressing dies 3 and 8, and could move independently therefrom. Likewise, the crimping dies 4 and 9 could be made in two or more independently moving parts to accomplish crimping in two or more steps if so desired.

What is claimed is:

1. A mechanism for operating upon a bobbin which comprises an elongated mandrel adapted to move longitudinally along its axis, a pair of crimping tools mounted concentrically with said mandrel and adapted to move independently of said mandrel in a longitudinal direction along the same axis as said mandrel, and a pair of pressing dies mounted concentrically with said mandrel and adapted to move independently of said mandrel and crimping tools in a longitudinal direction along the same axis as said mandrel and crimping tools.

2. A mechanism for operating upon a bobbin which comprises an elongated mandrel adapted to move longitudinally along its axis, a pair of crimping tools mounted concentrically with said mandrel and adapted to move independently of said mandrel in a longitudinal direction along the same axis as said mandrel, said crimping tools adapted to move independently of said mandrel and crimping tools in a longitudinal direction along the same axis as said mandrel and crimping tools, said crimping tools adapted to move independently of said mandrel and crimping tools in a longitudinal direction along the same axis as said mandrel and crimping tools, means for supporting a disk head adjacent each end of said core, said mandrel being also adapted to move along the axis of said core, whereby as said mandrel moves it threads through said core and supports said bobbin in a centered position, a pair of pressing dies adapted to move in a direction to force said heads along said mandrel and over the ends of said core and compress said thread mass, and a pair of crimping tools adapted to move to crimp said heads in position on said core while said thread mass is under compression by said pressing dies.

3. A mechanism for operating upon a bobbin which comprises an elongated mandrel adapted to move longitudinally along its axis, a pair of crimping tools mounted concentrically with said mandrel and adapted to move independently of said mandrel and crimping tools in a longitudinal direction along the same axis as said mandrel, said crimping tools adapted to move independently of said mandrel and crimping tools in a longitudinal direction along the same axis as said mandrel and crimping tools, said crimping tools adapted to move independently of said mandrel and crimping tools in a longitudinal direction along the same axis as said mandrel and crimping tools, means for supporting a disk head adjacent each end of said core, said mandrel being also adapted to move along the axis of said core, whereby as said mandrel moves it threads through said core and supports said bobbin in a centered position, said pair of pressing dies being also adapted to move in a direction to force said heads along said mandrel and over the ends of said core, said pair of crimping tools being adapted to crimp said heads in position on said core, said mandrel being further adapted to be withdrawn to release the core from said mandrel, said crimping tools being further adapted to be withdrawn to release the crimped ends of the bobbin from said crimping tools, said pressing dies being further adapted to be withdrawn at a rate to pass the crimping tools and cause the ends of said crimping tools to project beyond the faces of said pressing dies to force the bobbin from any retentive engagement with the pressing dies.

4. A mechanism for operating upon a bobbin which comprises means for supporting a bobbin in operative relation to said mechanism, a pair of pressing dies adapted to move in a longitudinal direction along the axis of said bobbin when so supported, and means comprising suction ports in the faces of said pressing dies for supporting a head for said bobbin adjacent the face of each pressing die.

5. A mechanism for operating upon a thread mass wound upon a tubular core comprising means for supporting a disk head adjacent each end of said core, each of said heads having a central opening adapted to be forced over an end of said core, an elongated mandrel adapted to move along the axis of said core, said mandrel having a cross-sectional diameter substantially the same as that of said opening, whereby as said mandrel moves it threads through said heads and said core and supports said heads and bobbin in a centered relation with each other, a pair of pressing dies adapted to move in a direction to force said heads along said mandrel and over the ends of said core and compress said thread mass, and a pair of crimping tools adapted to move to crimp said heads in position on said core while said thread mass is under compression by said pressing dies.

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