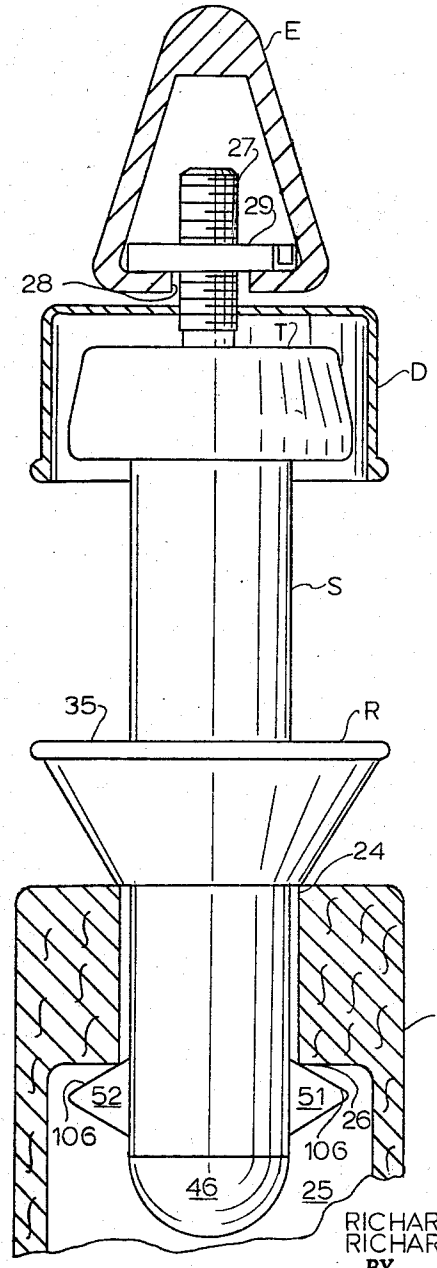
Nov. 22, 1966 R. K. WHITEHEAD, SR., ETAL 3,286,949

UNIVERSAL BOBBIN HOLDER

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FIG. 1



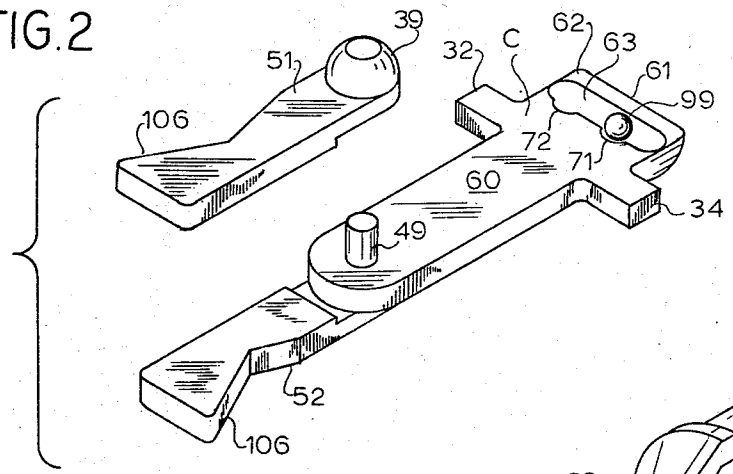
INVENTORS
RICHARD K. WHITEHEAD SR.
RICHARD K. WHITEHEAD JR.
BY
Newton, Hopkins & Jones
ATTORNEYS

Nov. 22, 1966 R. K. WHITEHEAD, SR., ETAL 3,286,949

UNIVERSAL BOBBIN HOLDER

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FIG. 2



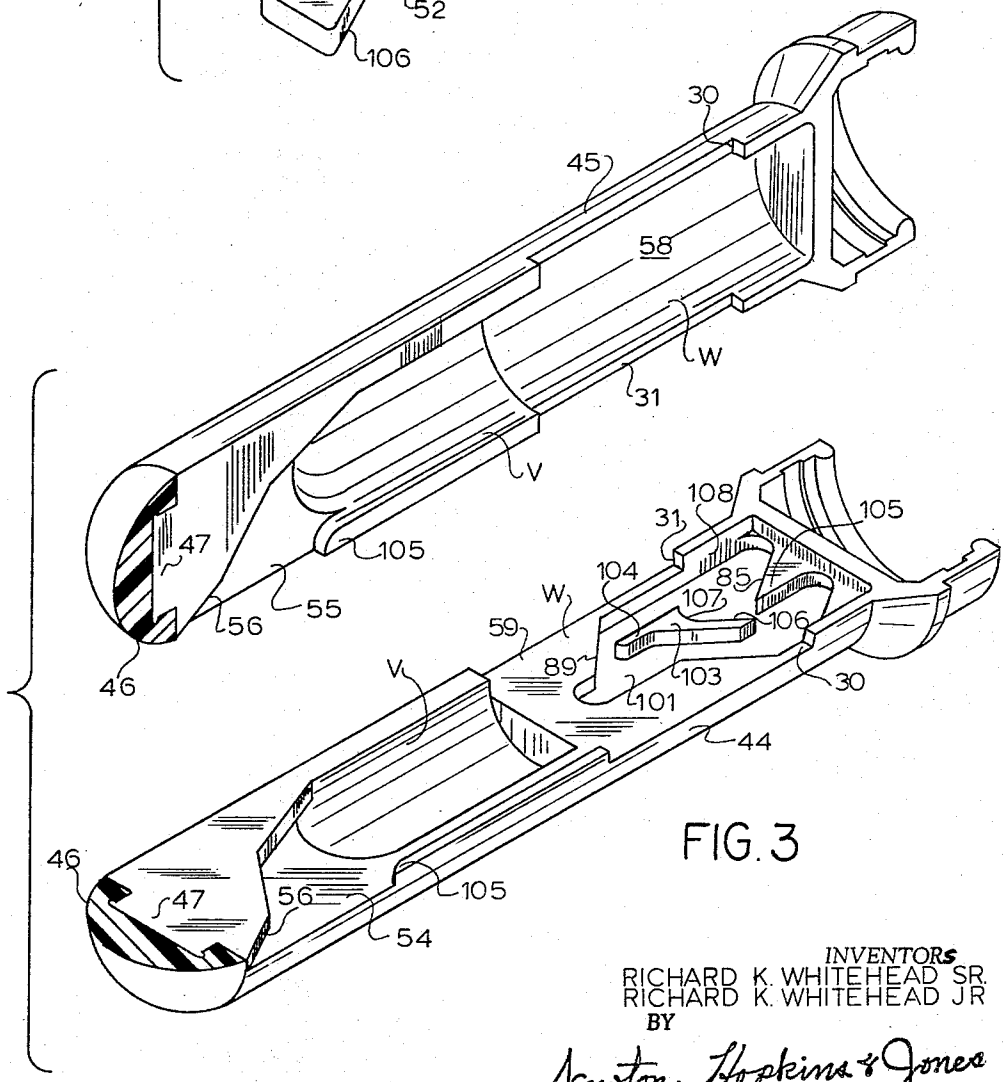


FIG. 3

INVENTORS
RICHARD K. WHITEHEAD SR.
RICHARD K. WHITEHEAD JR.
BY
Newton, Hopkins & Jones
ATTORNEYS

Nov. 22, 1966 R. K. WHITEHEAD, SR., ETAL 3,286,949

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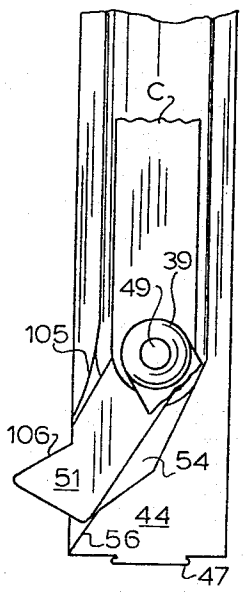


FIG. 4

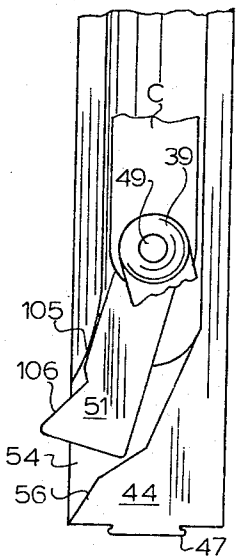


FIG. 5

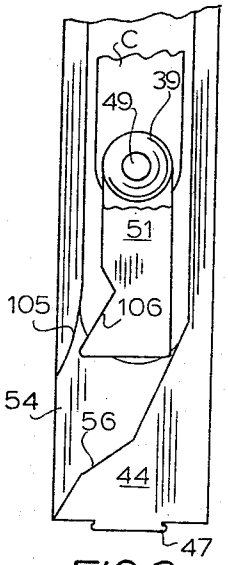


FIG. 6

INVENTORS
RICHARD K. WHITEHEAD SR
RICHARD K. WHITEHEAD JR.
BY
Newton, Hopkins & Jones
ATTORNEYS

Nov. 22, 1966 R. K. WHITEHEAD, SR., ETAL 3,286,949

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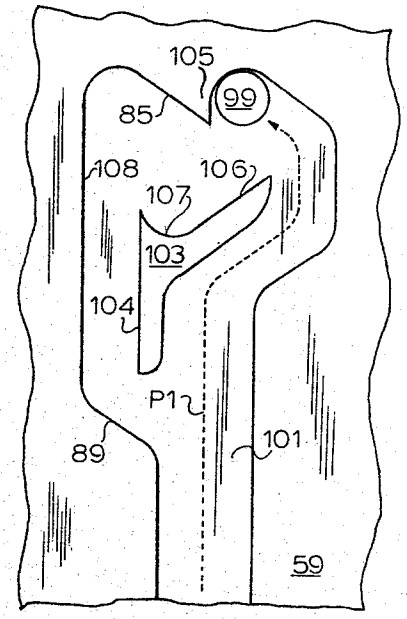


FIG.7

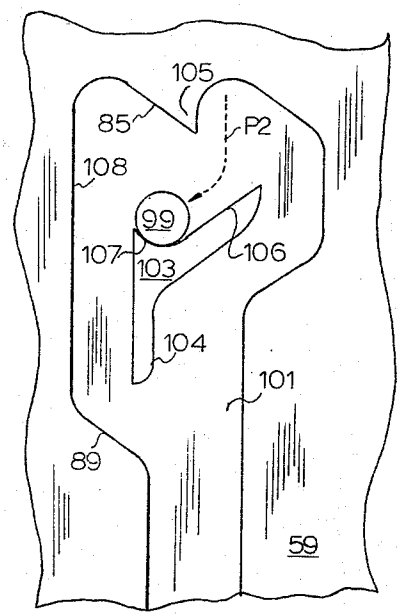


FIG.8

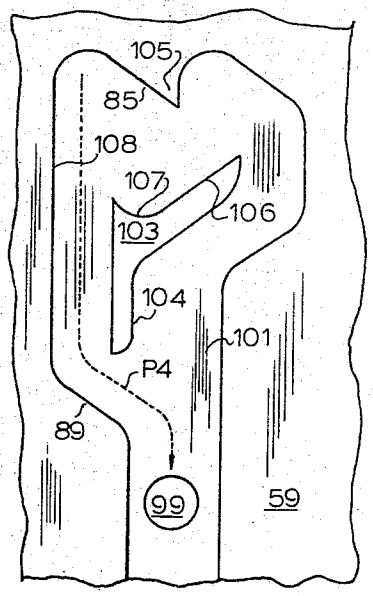


FIG.10

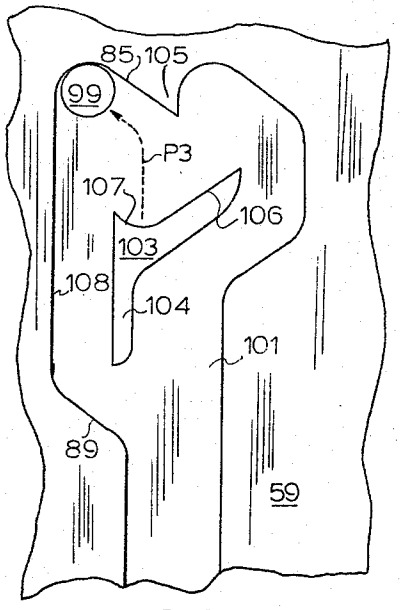


FIG.9

INVENTORS
RICHARD K. WHITEHEAD SR
RICHARD K. WHITEHEAD JR
BY
Newton, Hopkins & Jones
ATTORNEYS

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3,286,949

UNIVERSAL BOBBIN HOLDER

Richard K. Whitehead, Sr., De Kalb County, Ga. (1631 N. Gatewood Road NE., Atlanta, Ga.), and Richard K. Whitehead, Jr., 1365 Monroe Drive NE., Atlanta, Ga.

Filed Dec. 3, 1963, Ser. No. 327,652
12 Claims. (Cl. 242—130.2)

This invention relates to bobbin holders and more particularly, to a suspension type bobbin holder by which a standard type bobbin for thread, sliver, or roving is releasably suspended for free rotation from the creel board or creel rail of a spinning machine or the like.

Bobbins suspended for free rotation from the creel boards or creel rails of spinning or similar machines must be frequently changed since the thread, sliver, or roving on a bobbin is quickly used by the high speed machines which have been developed for the textile industry. As a result, the textile industry has developed a variety of suspension type bobbin holders in an effort to provide for rapid and efficient changing of bobbins.

Most of these previous bobbin holders have characteristically permitted the slidable positioning of a bobbin on the bobbin holder and the slidable removal of a bobbin from the bobbin holder to be accomplished with substantially the same basic motions by the operator of the machine. This is because such a feature avoids the possibility of operator confusion and permits an operator to develop a standardized, efficient pattern of motions.

Bobbins used with suspension type bobbin holders usually have a shoulder formed at the upper end of a cylindrical recess and previous suspension type bobbin holders have generally suspended a bobbin of this type by expanding and contracting the lower end of the bobbin holder within the recess and below the shoulder with pawls which move between fixed outwardly extending positions and retracted positions. The pawls extend outwardly when a bobbin is in position on the bobbin holder and are retracted when a bobbin is being positioned on the bobbin holder or removed from the bobbin holder. The shoulder of a bobbin resting on the pawls when the pawls are extended holds the bobbin in position on the bobbin holder and the bobbin is easily positioned on and removed from the bobbin holder when the pawls are retracted.

The difficulty with most of these previous bobbin holders is that the pawls must extend to a fixed extent and must be locked in positioned when a bobbin is on the bobbin holder. Thus, if the diameter of the recess in a bobbin is not at least as great as the distance between the extending tips of the pawls of the bobbin holder, the pawls of the bobbin holder cannot extend and lock and will retract and release the bobbin because of the weight of the bobbin. Moreover, when an operator attempts to lock the pawls in bobbin holding position in a bobbin having a recess too small to receive the fully extended pawls, the bobbin is frequently damaged or it may become jammed on the bobbin holder. Thus, most previous bobbin holders have generally not been well adapted to holding bobbins of various sizes having recesses of varying diameter. Yet, for maximum utilization of spinning or similar machines, it is frequently necessary that bobbins of various sizes be easily and efficiently positioned on and removed from a single bobbin holder.

This problem with most previous bobbin holders has resulted in the development of universal suspension type bobbin holders capable of holding and releasing bobbins of various sizes. However, even though these previous universal bobbin holders will receive, hold and release bobbins of various sizes, they have not been wholly satisfactory. This is because they have characteristically required a particular motion on the part of the operator

when a bobbin is being positioned on a bobbin holder and an entirely different motion on the part of the operator when a bobbin is being removed from the bobbin holder.

Since the changing of bobbins in the textile industry must be accomplished at a highly rapid rate, these different operator motions frequently cause operator error such as the attempted positioning of a bobbin with a releasing motion or the attempted releasing of a bobbin with a positioning motion. If the wrong motion is used in positioning a bobbin on the bobbin holder, the bobbin drops from the bobbin holder, and if the wrong motion is used to release a bobbin, the bobbin is not released, and an additional time-wasting attempt to remove the bobbin must be made before the removal of the bobbin is accomplished.

The bobbin holder disclosed herein is a universal bobbin holder in that it will receive, hold and release bobbins varying in size over a relatively wide range and having recesses and shoulders varying in diameter over relatively wide ranges. In addition, the bobbin holder disclosed herein completely overcomes the above described difficulty with previous universal bobbin holders in that the positioning of a bobbin on and the releasing of a bobbin from the bobbin holder are accomplished by the same motion of the bobbin relative to the bobbin holder. The required motion is simply an upward motion of the bobbin relative to the bobbin holder. This motion is easily mastered by the operator of a machine and does not require the operator to remember and master the motion of a bobbin relative to the bobbin holder when the bobbin is to be positioned and an entirely different motion of a bobbin relative to the bobbin holder when the bobbin is to be released. Moreover, the bobbin holder disclosed herein is durable in construction and relatively easy and inexpensive to manufacture.

These improvements in bobbin holders are achieved by a bobbin holder having the customary bullet shaped outer shell which extends into the recess of a bobbin and which is rotatably suspended downward from the creel board or creel rail of a spinning or similar machine, having a central body slidably movable within the outer shell, having pawls which retract into the outer shell as the central body moves upward within the outer shell and which extend outwardly from the outer shell as the central body moves downward within the outer shell, having a sleeve slidably movable along the outer surface of the outer shell when moved by the upper edge of a bobbin as the bobbin is moved for positioning on or releasing from the bobbin holder, and having an operating means for alternately checking the downward motion of the central body and permitting the downward motion of the central body in response to repeated upward motions of the sleeve. The pawls remain retracted into the outer shell when the downward motion of the central body is checked and they extend from the outer shell when the downward motion of the central body is permitted. Thus, the operating means for alternately checking the downward motion of the central body and permitting the downward motion of the central body in response to the motion of the sleeve serves alternately to hold the pawls in retracted position and to permit the pawls to extend as the sleeve is repeatedly moved by a bobbin. The pawls extend until they are fully extended or until they engage the walls of the recess in a bobbin, and regardless of the extent to which extended, the pawls support a bobbin having a recess permitting them to extend and a shoulder above the pawls when extended.

With the operating means checking the downward motion of the central body, a bobbin may be positioned on the bobbin holder disclosed herein by simply sliding the bobbin upward along the outer shell so as to move

the sleeve upward. This upward motion of the sleeve causes the operating means to release the central body for downward motion within the outer shell. As a result, the pawls extend to the extent permitted by the size of the recess in the bobbin and hold the bobbin in position on the bobbing holder.

When it is desired to subsequently release the bobbin from the bobbin holder, it is simply necessary to once again move the bobbin upward along the outer shell of the bobbin holder so as to move the sleeve upward along the outer shell of the bobbin holder. This upward motion of the sleeve causes the alternate response of the operating means so that the downward motion of the central body is once again checked and the pawls are retracted into the outer shell of the bobbin holder for easy removal of the bobbin and positioning of the next bobbin. The upward motion of the sleeve as the next bobbin is positioned on the bobbin holder will once again cause the operating means to release the central body so as to permit the pawls to extend and hold the new bobbin in position on the bobbin holder.

The positioning of a bobbin on and the removal of a bobbin from the bobbin holder disclosed herein is accomplished by the same upward motion of the bobbin relative to the bobbin holder and this upward motion of the bobbin relative to the bobbin holder alternately causes the bobbin to be firmly positioned on the bobbin holder or quickly released from the bobbin holder. Thus, the bobbin holder disclosed herein permits bobbins to be positioned on or released from it with a single efficient motion by the operator and avoids all possibility of operator confusion and of time lost while several attempts are made to achieve the correct motion for the releasing of a bobbin from or the positioning of a bobbin on the bobbin holder.

These and other features and advantages of the invention will be more clearly understood from the following detailed description and the accompanying drawings in which like characters of reference designate corresponding parts in all figures and in which:

FIG. 1 is a side elevation view, partially in section, of the bobbin holder suspended from a creel rail and having a bobbin positioned on its lower end.

FIG. 2 is an exploded perspective view of the central body, the right pawl, and the left pawl of the bobbin holder.

FIG. 3 is a perspective view of the right half and the left half of the outer shell of the bobbin holder.

FIG. 4 is an elevation view of the inside of the lower end of the right half of the outer shell of the bobbin holder and shows the positions of the central body and of the right pawl when the right pawl is extended to a bobbin holding position.

FIG. 5 is an elevation view of the inside of the lower end of the right half of the outer shell of the bobbin holder and shows the positions of the central body and of the right pawl as the right pawl is being extended or retracted by the central body.

FIG. 6 is an elevation view of the lower end of the right half of the outer shell of the bobbin holder and shows the positions of the central body and of the right pawl when the right pawl is retracted into the outer shell.

FIG. 7 is a fragmentary elevation view of the inside of the right half of the outer shell and shows the path of the camming ball in the camming channel in response to upward motion of the central body as a bobbin is moved upward to be released from the bobbin holder.

FIG. 8 is a fragmentary elevation view of the inside of the right half of the outer shell and shows the path of the camming ball in the camming channel in response to downward motion of the central body as a bobbin is removed from the bobbin holder.

FIG. 9 is a fragmentary elevation view of the inside of the right half of the outer shell and shows the path

of the camming ball in the camming channel in response to upward motion of the central body as a bobbin is positioned on the bobbin holder.

FIG. 10 is a fragmentary elevation view of the inside of the right half of the outer shell and shows the path of the camming ball in the camming channel as the central body moves downward to extend the pawls for holding a bobbin on the bobbin holder.

These figures and the following detailed description disclose a preferred specific embodiment of the invention but the invention is not limited to the details disclosed herein since it may be embodied in other equivalent forms.

The bobbin holder disclosed herein is best understood as comprising a tubular outer shell S suspended by suspension assembly T from a creel rail E and having a sleeve R slidably movable along its length. The lower end of the outer shell S is insertable through a hole **24** in the upper end of a bobbin B so as to position the lower end of the outer shell S within a cavity **25** in the bobbin B and beneath a shoulder **26** formed in the bobbin B where the hole **24** is continuous with the cavity **25**. The suspension assembly T is suspended from the creel rail E by a bolt **27** which extends upwardly from the suspension assembly T through a hole **28** in the creel rail E and which is threadably engaged at its upper end by a locking plate **29** positioned within the creel rail E.

The suspension assembly T is of known type and supports the upper end of the outer shell S of the bobbin holder so as to permit the outer shell S to be freely rotatable about its lengthwise axis. A dust cover D extends downward over suspension assembly T and insures that dust does not enter the suspension assembly T and prevent the free rotation of the outer shell S. The outer shell S has a right half **44** and a left half **45** held together to form the outer shell S by the insertion of the outer shell S into the suspension assembly T and by a button **46** of resilient material enclosing nubs **47** at the lower ends of the halves **44** and **45** of the outer shell S. The button **46** is hemispherical in shape and also serves to provide a rounded end of resilient material at the lower end of the outer shell S.

The right half **44** and the left half **45** of the outer shell S define a lower cavity V and an upper cavity W continuous with the lower cavity V. A central body C is slidably movable within the cavities V and W in response to motion of the sleeve R along the outer shell S. A pin **49** is fixedly inserted through the lower end of the central body C and through the upper end of a right pawl **51** and the upper end of a left pawl **52**. The right pawl **51** and the left pawl **52** are on opposite sides of the central body C and are pivotable about the pin **49**. Thus, as the central body C slidably moves within the cavities V and W in response to motion of the sleeve R, the pawls **51** and **52** move upward and downward relative to the suspension assembly T. Hemispherical spacers **39** integral with the pawls **51** and **52** and concentric with the pin **49** extend outwardly from the pawls **51** and **52** to engage the walls of the cavity V so as to hold the pawls **51** and **52** on the pin **49** and guide the lower end of the central body C as it moves within the cavity V.

The right half **44** of the outer shell S has a right pawl channel **54** continuous with that half of the lower cavity V formed by it and the left half **45** of the outer shell S has a left pawl channel **55** continuous with that portion of the lower cavity V formed by it. The pawl channels **54** and **55** extend in opposite directions and when the halves **44** and **45** of the outer shell S are placed together to form the outer shell S, the lower end of the right pawl **51** is in the right pawl channel **54** and the lower end of the left pawl **52** is in the left pawl channel **55**. The lowermost surfaces **56** of the pawl channels **54** and **55** are inclined outwardly so as to move the pawls **51** and **52** progressively outward as the pawls **51** and **52**

move downward in the pawl channels **54** and **55**. Thus, the extent to which the pawls **51** and **52** extend depends upon the extent to which the central body moves downward within the cavities V and W. The uppermost surfaces **105** of the pawl channels **54** and **55** permit this outward motion of the pawls **51** and **52** and serve to force the pawls **51** and **52** inward when the central body moves upward within the cavities V and W.

The weight of a bobbin B or downward force exerted on a bobbin B by the operator of a machine causes the bobbin as it engages the holding edges **106** of the pawls **51** and **52** to force the pawls **51** and **52** inward and downward against the lowermost surfaces **56** of the pawl channels **54** and **55**. There is no tendency for the pawls **51** and **52** to be forced into the outer shell S by the weight of a bobbin B or even by the downward force exerted on a bobbin B by the operator of a machine. This is because it requires inward and upward motion of the pawls **51** and **52** for the pawls **51** and **52** to be retracted. The result of this arrangement is that holding action of the pawls **51** and **52** is obtained regardless of the extent to which the pawls **51** and **52** are extended. Thus, when the central body C is free to move downward so as to permit the pawls **51** and **52** to extend outwardly from the outer shell S, a bobbin B having a shoulder **26** engaging the pawls **51** and **52** will be firmly held by the bobbin holder.

The outer shell S has a right slot **30** extending through it from the upper cavity W and a left slot **31** extending through it from the upper cavity W on the opposite side from the right slot **30**. The upper end of the central body C has a right arm **32** and a left arm **34** integral with and extending outwardly from it in opposite directions and when the upper end of the central body C is positioned within the cavity W, the right arm **32** extends through the right slot **30** and the left arm **34** extends through the left slot **31**. The extending ends of the arms **32** and **34** are received in recesses (not shown) in the upper surface **35** of the sleeve R. Thus, as the sleeve R moves along the outer shell S, the sleeve R moves the arms **32** and **34** and the central body C within the cavities V and W. The slots **30** and **31** extend parallel to the centerline of the outer shell S and the arms **32** and **34** within the slots **30** and **31** serve to cause the central body C to move upward and downward within the cavity W in a fixed plane of reference extending between the slots **30** and **31**. Moreover, the arms **32** and **34** striking the upper ends and the lower ends of the slots **30** and **31** serve to limit the upward and downward motion of the central body C within the outer shell S.

The diameter of the sleeve R is greater than the diameter of the hole **24** in a bobbin B and the sleeve R is engaged and moved upward along the outer shell S by a bobbin B as the bobbin B is moved upward along the length of the outer shell S. In turn, the sleeve R moves the central body C upward within the outer shell S. When the sleeve R is not being held in an upward position by a bobbin B or other means, the sleeve R has sufficient weight to slide downward along the outer shell S causing the central body C to move downward also and to extend the pawls **51** and **52** from the outer shell S. Thus, downward motion of the sleeve R as it follows a bobbin B downward along the outer shell S causes the pawls **51** and **52** to extend within the recess **25** of the bobbin B and hold the bobbin B on the bobbin holder, and upward motion of the sleeve R causes the pawls **51** and **52** to retract and permit a bobbin B to be easily positioned on or removed from the bobbin holder.

The bobbin holder has an operating means responsive to the upward motion of the sleeve R and the central body C which alternately holds the central body C in an upward position at which the pawls **51** and **52** are retracted and releases the central body C for downward motion with the sleeve R so as to extend the pawls **51** and **52**. It will now be seen that with the pawls **51** and **52** retracted by the operating means holding the central body C in an upward position, a bobbin B may be easily positioned on the bobbin holder with an upward motion along the outer shell S. As the bobbin B moves upward along the outer shell S it engages the sleeve R and forces the sleeve R upward. This upward motion of the sleeve R causes upward motion of the central body C and the operating means to release the central body C for downward motion. The downward motion of the central body C causes the pawls **51** and **52** to extend to the extent permitted by the size of the recess **25** in the bobbin B and causes the bobbin B to be held by the bobbin holder regardless of the extent to which the pawls **51** and **52** are extended.

When it is subsequently desired to remove the bobbin B from the bobbin holder, the bobbin B is once again moved upward toward the suspension assembly T. This causes the sleeve and the central body C to move upward and cause the alternate response of the operating means which holds the central body C in an upward position at which the pawls **51** and **52** are retracted into the outer shell S. The result is that the bobbin B is easily removed from the bobbin holder and when another bobbin B is placed on the bobbin holder with upward motion sufficient to raise the sleeve R and the central body C, the operating means releases the central body C and the bobbin holder will hold the new bobbin B in position.

The upward motion of a bobbin B relative to the bobbin holder as it is positioned on the bobbin holder and as it is released from the bobbin holder is identical. In each case the bobbin holder engages the sleeve R and carries the sleeve R and the central body C upward until the upward motion of the central body C is checked by the operating means.

The operating means of the bobbin holder is best shown in FIGS. 2 and 3. The upper cavity W is defined by a cylindrical recess **58** in the left half **45** of the outer shell S and by a flat surface **59** formed in the right half **44** of the outer shell S. The flat surface **59** is in a plane of reference extending between the edges of the slots **30** and **31** defined by the right half **44** of the outer shell S. Thus, the flat surface **59** is adjacent to the right side **60** of the central body C as the upper end of the central body C moves within the upper cavity W.

Above the arms **32** and **34**, the central body C is integral with a carrier member **61**. The carrier member **61** is a half-cylinder having its axis of revolution perpendicular to the centerline of the outer shell S and having its flat surface **62** containing its axes of revolution continuous with the flat surface **59** formed in the right half **44** of the outer shell S. This positioning of the carrier member **61** causes the flat surface **62** of the carrier member **61** to move adjacent to the flat surface **59** in the right half **44** of the outer shell S when the central body C moves within the outer shell S.

A transverse groove **63** is formed in the flat surface **62** of the carrier member **61** and a camming channel **101** is formed in the flat surface **59** in the right half **44** of the outer shell S and the result of this arrangement is that a camming ball **99** positioned partly in the transverse groove **63** and partly in the camming channel **101** moves in both the transverse groove **63** and in the camming channel **101** as the central body C moves upward and downward within the outer shell S. The transverse groove **63** extends perpendicular to the centerline of the outer shell S and permits motion of the camming ball **99** only in a direction perpendicular to the centerline of the outer shell S.

Thus, the position of the camming ball **99** and of the central body C within the outer shell S is defined by the motion of the camming ball **99** parallel to the centerline of the outer shell S permitted by the camming channel **101**. The camming channel **101** is shaped to permit such motion by providing a plurality of paths in which the camming ball **99** moves with components of motion both parallel and perpendicular to the centerline of the outer shell

S as the central body C moves within the outer shell S. The transverse groove **63** is of sufficient length to accommodate the motion of the camming ball **99** perpendicular to the centerline of the outer shell S required for the camming ball to follow the camming channel **101** as the central body C moves within the outer shell S and it will be understood that the position of the camming ball **99** in the camming channel **101** defines the position of the central body C in the outer shell S. This is because the central body C moves downward when the camming channel **101** permits the camming ball **99** to move downward and because the central body C is held in an upward position when the camming channel **101** prevents the camming ball **99** from moving downward.

The camming channel **101** forms an island member **103** which together with the outer edges of the camming channel **101** defines a path P–1 in which the camming ball **99** moves as a bobbin B moves upward along the outer shell S to be released from the bobbin holder, a path P–2 in which the camming ball **99** moves as a bobbin B moves downward along the outer shell S to be removed from the bobbin holder, a path P–3 in which the camming ball **99** moves as a new bobbin B is slid upward along the outer shell S for positioning on the bobbin holder, and a path P–4 in which the camming ball **99** moves as the bobbin B is released to slide downward along the outer shell S for positioning on the outer shell S by the pawls **51** and **52**.

The path P–1 is best seen in FIG. 7, and it will be seen that the path P–1 serves to permit the camming ball **99** to move upward past the island member **103** into a position above the island member **103** where upward motion of the camming ball **99** and of the central body C is checked by a finger **105** extending downwardly toward the island member **103**. This serves to limit the upward motion of the sleeve R and the bobbin B along the outer shell S of the bobbin holder as the bobbin B is being moved upward for release from the bobbin holder.

When the bobbin B is subsequently moved downward for removal from the bobbin holder, the path P–2 of the camming ball **99** resulting from the downward motion of the central body C and shown in FIG. 8 causes the camming ball **99** to strike an upper guide surface **106** of the island **103**. An indentation **71** in the lower edge of the transverse groove **63** into which the camming ball **99** seats itself when it is checked by the finger **105** serves to insure that the camming ball **99** engages the guide surface **106** rather than rolling in the transverse groove **63** and retracing the path P–1. This prevents an inclined position of the bobbin holder from altering the motion of the camming ball **99** in the camming channel **101**. After striking the guide surface **106**, the camming ball **99** is forced upward out of the indentation **71** and rolls downwardly along the upper guide surface **106** of the island member **103** until it reaches a holding surface **107** of the island **103** where the downward motion of the camming ball **99** and the central body C is checked. This checking of the downward motion of the central body C causes the pawls **51** and **52** to remain retracted so that a used bobbin B is easily removed from the bobbin holder and a new bobbin B is easily positioned on the bobbin holder.

When a new bobbin B is positioned on the bobbin holder, it is slid upwardly along the outer shell S causing the sleeve R and the central body C to move upward. This causes upward motion of the camming ball **99** as shown by a path P–3 in FIG. 9. The path P–3 of the camming ball **99** carries the camming ball **99** upward until it engages the sloping surface **85** of the finger **105** which causes the camming ball **99** to roll along the sloping surface **85** of the finger **105** until motion of the camming ball **99** is checked by the wall **108** of the right camming channel **101** in a position at which the island **103** is no longer below the camming ball **99**. Thus, when the bobbin B is released and allowed to drop along the outer shell S after the foregoing described upward motion of the bobbin B along the outer shell S, the camming ball **99** drops along the path P–4 as shown in FIG. 10 and passes beneath a lower extension **104** of the island **103** so as to permit the central body C to move downward and extend the pawls **51** and **52** to the extent permitted by the recess **25** in the bobbin B, thus holding the bobbin B in position on the bobbin holder. An indentation **72** in the lower edge of the transverse groove **63** into which the camming ball **99** seats itself when it is checked by the wall **108** prevents the camming ball **99** from rolling in the transverse groove **63** and retracing path P–3 even though the bobbin holder is in an inclined position. The edge **89** of the camming channel **101** forces the camming ball **99** out of the indention **72** as the camming ball **99** follows path P–4.

It will be seen that the camming channel **101** imparts a primary holding motion as defined by path P–1 and a secondary holding motion as defined by the path P–2 to the camming ball **99**. These holding motions are in response to an upward and downward movement of the bobbin B along the outer shell S as the bobbin B is removed from the bobbin holder and the pawls **51** and **52** are retracted within the outer shell S to permit the easy removal of this bobbin and the easy positioning of a new bobbin on the bobbin holder. Similarly, it will be understood that the camming channel **101** imparts a primary releasing motion as defined by the path P–3 and a secondary releasing motion as defined by the path P–4 to the camming ball **99**. These releasing motions serve to release the central body C for downward motion so as to extend the pawls **51** and **52** into the recess **25** of a bobbin B and are responsive to an upward and downward motion of the bobbin B along the outer shell S substantially identical to the upward and downward motion of a bobbin B along the outer shell S required for the holding motions described above. It will also be understood that the secondary releasing motion as defined by the path P–4 places the camming ball **99** in position so that the next motion imparted to the camming ball **99** must be the primary holding motion as defined by the path P–1. Thus, the operating means serves to alternately hold the pawls **51** and **52** for outward extension in response to repawls **52** and **52** for outward extension in response to repeated upward and downward motions of a bobbin B relative to the outer shell S.

Operation

From the foregoing description of the bobbin holder disclosed herein, it will be understood that the operating means of the bobbin holder is responsive to the upward motion of a bobbin B along the outer shell S and that the operating means will alternately cause the pawls **51** and **52** to be retracted within the outer shell S and to be extended outwardly from the outer shell S in response to this upward motion of a bobbin B. Thus, the operation of the bobbin holder simply requires that a bobbin B be slid upwardly along the outer shell S until checked and then released. Whether the bobbin is to be removed from the bobbin holder or positioned on the bobbin holder, the bobbin B is always slid upward along the outer shell S until its upward motion is checked by the sleeve R and released. The result is that bobbins B are positioned on or removed from the bobbin holder by a single efficient pattern of motion.

Moreover, it will be understood that when a bobbin B is positioned on the bobbin holder by an upward motion of the bobbin B along the outer shell S of the bobbin holder, the pawls **51** and **52** extend outwardly from the outer shell S until they engage the walls of the recess **25** in the bobbin B and that regardless of the extent to which the pawls **51** and **52** are extended, the bobbin B is firmly positioned on the bobbin holder. This is because the pawls **51** and **52** are extended by the downward motion of the central body C and because the pawls **51** and

52 will move inwardly only if the central body C is moved upward within the outer shell S. Thus, until the central body C is subsequently raised at the time the bobbin B is removed from the bobbin holder, the pawls 51 and 52 remain in position to firmly hold the bobbin B in position.

It will be obvious that many variations may be made in the embodiment here chosen for the purpose of illustrating the present invention without departing from the scope thereof as defined by the appended claims.

What is claimed as invention is:

1. A holder for a bobbin, said holder comprising a tubular member, a central body slidably movable within the tubular member relative to a predetermined position, a bobbin holding member mounted on and slidable with the central body and having an inward position when the central body is in the said predetermined position and a plurality of outwardly extending bobbin holding positions when the body is released from the predetermined position, means responsive to a particular motion of the bobbin relative to the tubular member for retaining the central body in the said predetermined position, and means responsive to the said particular motion of the bobbin relative to the tubular member for releasing the central body from the said predetermined position.

2. A bobbin holder for alternately holding a bobbin in response to a particular upward motion of the bobbin relative to the bobbin holder and releasing the bobbin in response to the particular upward motion of the bobbin relative to the bobbin holder, said bobbin holder comprising a tubular member having an outwardly extending channel therein, a body slidably movable within said tubular member and having a predetermined position, a bobbin holding member mounted on and slidable with said body so as to be retracted inwardly when the said body is in the said predetermined position and so as to be extended outwardly by the said channel to varying extent as the said body means downward from the said predetermined position, and means responsive to the said particular motion of the bobbin for alternately retaining the said body in the said predetermined position and releasing the said body for downward motion from the said predetermined position.

3. A bobbin holder for alternately holding a bobbin in response to a particular upward motion of the bobbin relative to the bobbin holder and releasing the bobbin in response to the said particular upward motion of the bobbin relative to the bobbin holder, said bobbin holder comprising a tubular member, a bobbin holding member having a bobbin releasing position in which it does not engage a bobbin encircling the tubular member and a plurailty of bobbin holding positions in which it engages a bobbin encircling the tubular member and to which it moves when not in the bobbin releasing position, and means responsive to the particular upward motion of the bobbin relative to the bobbin holder for alternately holding the bobbin holding member in said bobbin releasing position and releasing the bobbin holding member from said bobbin releasing position.

4. In a bobbin holder, a tubular member, a central body slidably movable within the tubular member and fixed against rotation with respect thereto, a bobbin holding member mounted on and slidable with the central body, a slidable member releasably engageable with said central body movable along the tubular member and having a single operating cycle of motion on the tubular member, and means responsive to the operating cycle of motion of the slidable member for alternately retaining the central body in a predetermined position within said tubular member and releasing the central body from the said predetermined position when the said operating cycle of motion of the slidable member is repeated.

5. In a bobbin holder, a tubular member, a central body slidably movable within the tubular member and fixed against rotation with respect thereto, a bobbin holding member mounted on and slidable with the central body so as to be retracted inwardly to bobbin-release position when the central body is in a predetermined position and so as to be extended outwardly to bobbin-holding position in response to other positions of the central body relative to the said predetermined position, a slidable member releasably engageable with said central body movable along the tubular member, and means responsive to the same operating cycle of motion of the slidable member for alternately retaining the central body in the said predetermined position and releasing the central body from the said predetermined position when the said operating cycle of motion of the slidable member is repeated.

6. A bobbin holder comprising a tubular member, a central body slidably movable within the tubular member and fixed against rotation with respect thereto, a bobbin holding member mounted on and slidable with the central body and having an inward bobbin-release position and a plurality of different outwardly extending bobbin-holding positions, means for alternately retaining the central body in the said bobbin release position and freeing the central body from the said bobbin release position in response to repetition of the same motion of a bobbin relative to the tubular member.

7. In a bobbin holder having a bobbin holding member for holding and releasing a bobbin in response to motion of an inner body within an outer shell, a camming ball positioned in the inner body for motion substantially perpendicular to motion of the inner body within the outer shell and having a position in which it stops downward motion of the inner body within the outer shell, and means for moving the camming ball to and from said position in response to two successive and substantially identical upward motions of the inner body within the outer shell.

8. In a bobbin holder having a bobbin holding member for holding and releasing a bobbin in response to motion of an inner body within an outer shell, a positioning member positioned in the inner body for motion independently of said bobbin holding member, substantially perpendicular to motion of the inner body within the outer shell and having a position in which it stops downward motion of the inner body within the outer shell, and means for moving the positioning member independently of said outer shell but responsive to motions of said inner body, to and from said position in response to two successive and substantially identical upward motions of the inner body within the outer shell.

9. A holder for a bobbin comprising an outer member; an inner body slidably movable within the outer member in response to motion of a bobbin relative to the outer member and fixed against motion with respect thereto; a bobbin holding member operably connected to the inner body and having an outwardly extending bobbin holding position as the inner body moves downward within the outer member; a positioning member positioned in the inner body interengaging said inner member and outer body through relative motion with respect to both, for motion substantially perpendicular to the motion of the inner body within the outer member; a first camming means for moving the positioning member within the inner body from a first position relative to said outer member to a second position relative to said outer member as the inner body moves downward within the outer member and for stopping the downward motion of the positioning member and the inner body when the positioning member is in the said second position; and a second camming means for moving the positioning member within the inner body from the second position to the first position in response to two successive upward motions of the bobbin relative to the outer member.

10. A holder for a bobbin comprising a shell member; a body slidably movable within the shell member in response to motion of a bobbin relative to the shell

member; a bobbin holding member operably connected to the body and having an outwardly extending bobbin holding position as the body moves downward within the shell member; a positioning member positioned in the upper end of the body for motion substantially perpendicular to motion of the body; a first camming means for moving the positioning member within the body from a first position to a second position as the body moves downward within the shell member and for stopping the downward motion of the positioning member and body when the positioning member is in the said second position; a second camming means for moving the positioning member within the body from a third position to a fourth position as the body moves downward without restriction within the shell member; and a third camming means for alternately moving the positioning member within the body from its fourth position to its first position and from its second position to its third position in response to upward motion of the body within the shell member.

11. A holder for a bobbin comprising a tubular member; a central body slidably movable within the tubular member in response to motion of a bobbin relative to the bobbin holder; a bobbin holding member operably connected to the central body, said bobbin holding member being retracted into the tubular member when the central body is in an upward position within the tubular member and having a plurality of outwardly extending bobbin holding positions as the central body moves downward within the tubular member; a camming ball positioned in the upper end of the central body for motion with the central body and for independent motion substantially perpendicular to the motion of the central body; a first camming means for moving the camming ball with said independent motion from a first position to a second position as the camming ball moves downward with the central body and for stopping the downward motion of the camming ball when it is in the said second position; a second camming means for moving the camming ball with said independent motion from a third position to a fourth position as the camming ball moves downward without restriction with the central body; and a third camming means for alternately moving the camming ball with said independent motion from its fourth position to its first position and from its second position to its third position in response to upward motion of the central body within the tubular member.

12. A holder for a bobbin comprising a tubular member; a body slidably movable along a centerline within the tubular member in response to motion of the bobbin relative to the bobbin holder; a bobbin holding member operably connected to the body, said bobbin holding member being retracted into the tubular member when the body is in an upward position within the tubular member and having an outwardly extending bobbin holding position when the body is in a downward position within the tubular member; a carrier member fixedly attached to the upper end of the body within the tubular member and having a groove extending substantially perpendicular to the centerline of the body; a camming ball rotatably movable within the said groove; first camming means for moving the camming ball from a first position to a second position within the said groove as the camming ball moves downward within the tubular member and for checking the downward motion of the camming ball when it is in the second position; second camming means for moving the camming ball from a third position to a fourth position within the said groove in which the camming ball moves downward without restriction within the said tubular member; and a third camming means for alternately moving the camming ball from its fourth position to its first position and from its second position to its third position within the said groove in response to upward motion of the central body within the tubular member.

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FRANK J. COHEN, *Primary Examiner.*

MERVIN STEIN, *Examiner.*

L. D. CHRISTIAN, *Assistant Examiner.*