Oct. 13, 1942. D. A. CUMFER 2,298,871

SEWING MACHINE

Filed Nov. 8, 1940 2 Sheets-Sheet 1

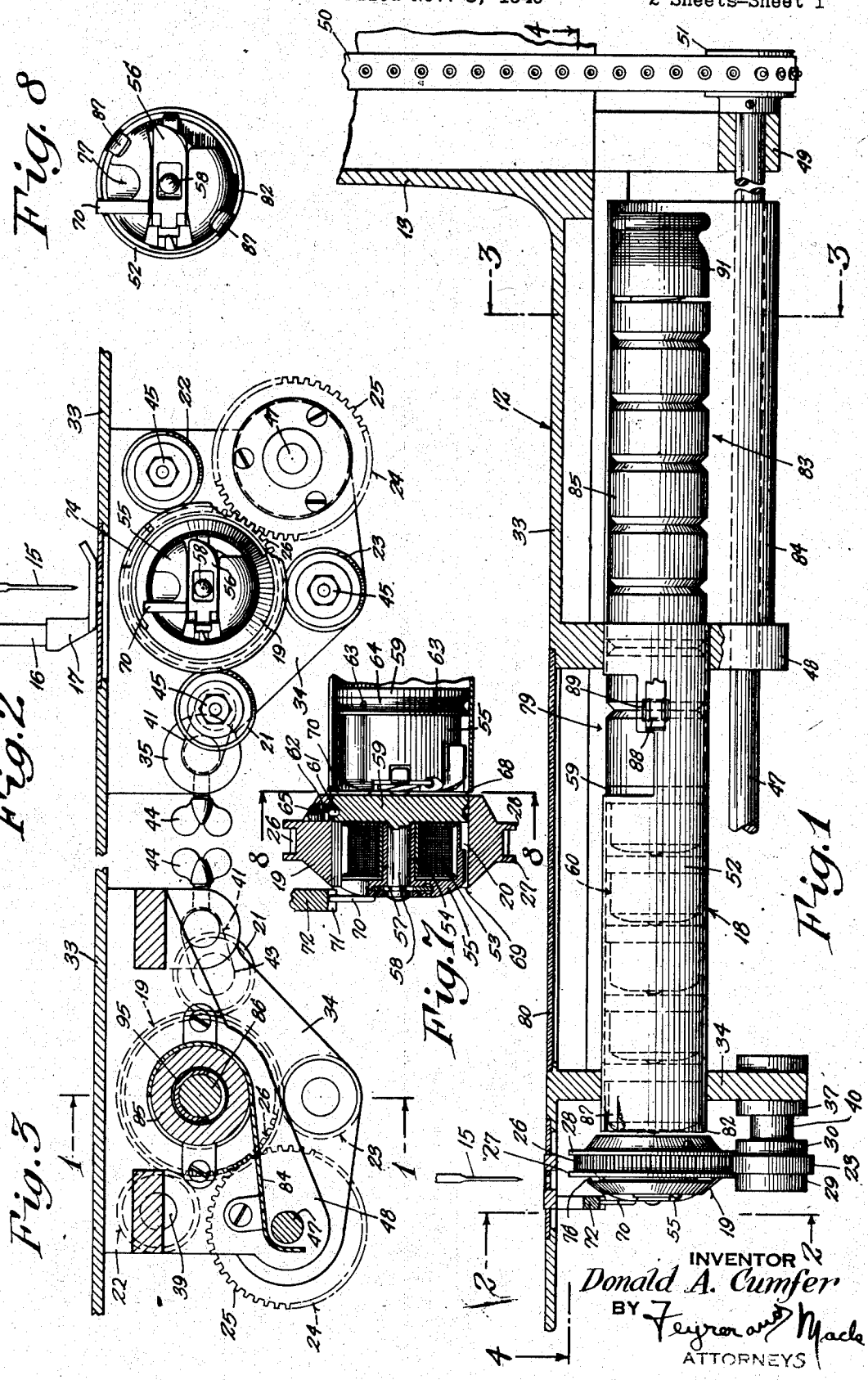


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 8

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SEWING MACHINE

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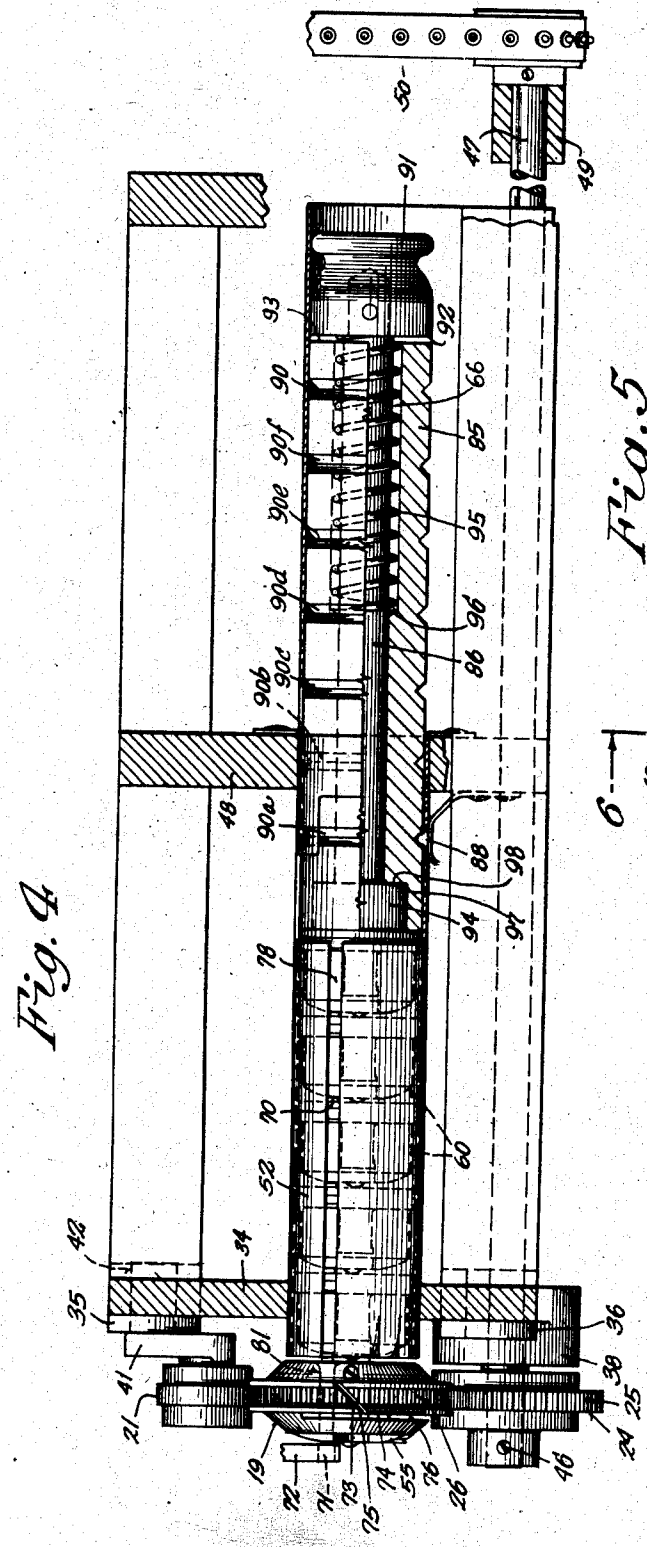


Fig. 4

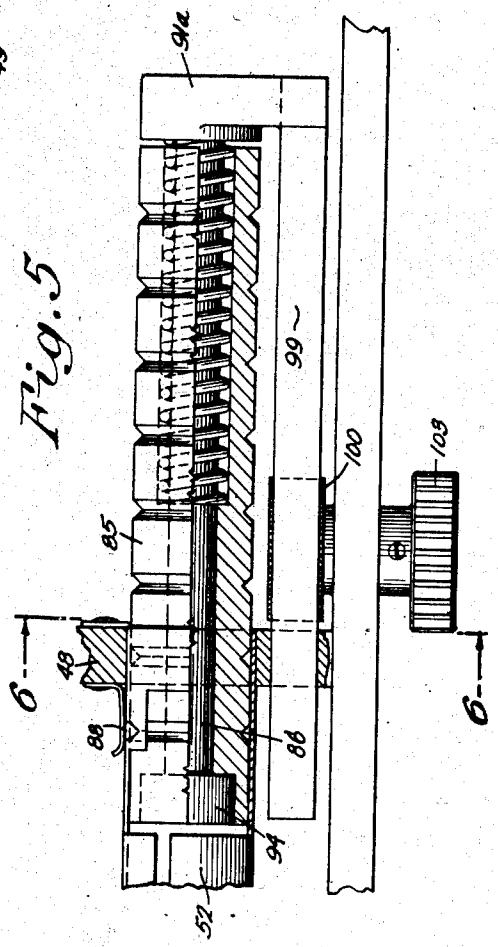


Fig. 5

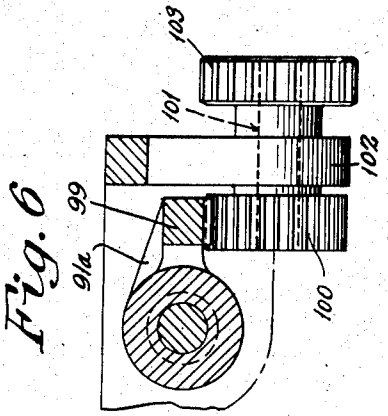


Fig. 6

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UNITED STATES PATENT OFFICE

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SEWING MACHINE

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Application November 8, 1940, Serial No. 364,760

19 Claims. (Cl. 112—186)

This invention relates to sewing machines and more particularly to sewing machines of the rotary hook or shuttle type where a lock stitch is formed by carrying a needle thread loop around a bobbin thread fed from a bobbin located in a chamber in a rotary hook or shuttle.

Sewing machines of the general type mentioned above have been in use for a number of years. However, a shortcoming of many of these machines has been the necessity of the time-consuming operation of manually removing an exhausted bobbin from a shuttle and then inserting a fresh bobbin.

It, therefore, is an object of the present invention to provide a sewing machine of the rotary shuttle type in which an exhausted bobbin may be most easily expelled from and a fresh bobbin inserted in a rotary shuttle.

Another object of the invention is to provide a particularly effective mechanism for supplying the rotary shuttle with fresh bobbins.

Another object of the invention is to provide a very effective mounting and drive for the rotary shuttle.

A feature of the invention, therefore, resides in the provision of mechanism in which through a single movement of a plunger a fresh bobbin may be inserted in a rotary shuttle from a supply and an exhausted bobbin expelled from the shuttle.

Another feature of the invention resides in the provision of mechanism for feeding loaded bobbin cases to the rotary shuttle of a sewing machine, and in the provision of means for guiding those bobbin cases into a predetermined position relative to the sewing machine needle when they are fed to the shuttle.

Another feature of the invention resides in the provision of a rotary shuttle, wholly supported by a plurality of rotary elements positioned about the periphery thereof, the shuttle having spaced peripheral flanges adapted to cooperate with the rotary supporting elements in arresting lateral movement of the shuttle in both directions axially thereof.

A further feature of the invention resides in the provision of a magazine for receiving and directing bobbins to a rotary shuttle, the magazine being spaced from the shuttle so as not to interfere with the needle thread loop as the latter is carried around by the shuttle.

Other objects, features and advantages will hereinafter appear.

In the drawings:

Figure 1 is a sectional view taken substantially on the line 1—1 of Fig. 3 showing in the main the lower arm of a rotary shuttle sewing machine embodying the present invention.

Fig. 2 is a view taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a view taken on the line 3—3 of Fig. 1.

Fig. 4 is a view taken on the line 4—4 of Fig. 1.

Fig. 5 is a fragmentary view, similar to Fig. 4 but showing a mechanical means for advancing the bobbin-feeding plunger.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 5.

Fig. 7 is a detail sectional view of the shuttle and the delivery end of the magazine.

Fig. 8 is a view taken on the line 8—8 of Fig. 7.

Before describing the present improvements and mode of operation thereof in detail it should be understood that the invention is not limited to the details of construction and arrangement of parts shown in the accompanying drawings, which are merely illustrative of the present preferred embodiments, since the invention is capable of other embodiments, and the phraseology employed is for the purpose of description and not of limitation.

Referring now more particularly to the drawings, and first to Figs. 1, 2, 3, 4, 7 and 8, there is shown for the purpose of illustrating the present invention a portion of a frame of a sewing machine, including a lower arm 12 from which, as is conventional, a trunk 13 extends upwardly to an overhanging arm, not shown. A needle bar 14 carrying a needle 15, and a presser bar 16 carrying a presser foot 17, may be supported in a now well-understood manner by a sewing head, not shown, on the free end of the overhanging arm.

For convenience of illustration and because the details thereof constitute no part of the present invention, the lower arm portion of the frame is shown with the lower supporting or base structure thereof omitted. It will be readily understood that any suitable base structure may be employed.

Of particular importance there is provided by the present invention a magazine feed 18 for supplying a rotary hook member or shuttle 19 with fresh bobbins when a bobbin within a receiving and holding chamber 20 in the shuttle 19 becomes exhausted of thread.

Advantageously, the rotary shuttle 19, instead of being supported in a usual raceway, is wholly supported in a vertical plane by a plurality of rotatably mounted members 21, 22, 23 and 24 adapted to engage the periphery of the rotary

shuttle. One of these rotatably mounted members 24 preferably and advantageously may constitute the driving member for the shuttle and have formed completely around the periphery thereof gear teeth 25 adapted to engage with complementary teeth 26 formed completely around the periphery of the rotary shuttle.

Laterally spaced radially projecting peripheral flanges 27 and 28 located at opposite sides of the gear teeth 26, lap opposite sides of the driving member 24 and serve to maintain the shuttle and the driving member in lateral alignment. These same flanges 27 and 28, by engaging inwardly offset peripheral shoulders 29 and 30 and by lapping the outer lateral sides of each of the rotatably mounted members 21, 22 and 23 also serve to support the shuttle and to maintain the latter against any adverse lateral movement.

For mounting the rotatable members 21, 22, 23 and 24 there may be conveniently formed to extend downwardly from a top or work plate 33 of the lower arm a transversely disposed supporting section 34 formed with bosses 35, 36, 37 and 38. Stub shafts 39 and 40 in the bosses 36 and 37 serve to directly mount the rotatable members 22 and 23, while an offset arm 41 having a pivot pin portion 42 rotatably mounted in the boss 35 and having a stub shaft portion 43 for rotatably mounting the rotatable member 21 enables the latter member to be adjusted from an inner operative position as shown in Figs. 2, 3 and 4 to an outer inoperative position. It will be readily apparent that by so adjusting the position of the member 21, the shuttle advantageously may be either positively maintained in its operative position, or released so that it may be removed, as for replacement, cleaning or repair. A wing screw 44 may be provided for locking the offset arm 41 and the member 21 carried thereby in the operative position. Axial movement of each of the rotatable members 21, 22 and 23 on its shaft is preferably arrested, as by a suitable shoulder, not shown, on each of the shafts and by a holding or end nut 45.

The driving member 24 is fixed, as by a screw 46, on one end of a rotatable drive shaft 47 which is supported by the section 34, by a section 48 which like the section 34 may extend downward from the top plate 33, and by a support 49 which conveniently may be formed integral with the sewing machine frame. A suitable driving connection for the drive shaft may be provided by an eyeletted belt or chain 50 which passes around a sprocket wheel 51 fixed to one end of the drive shaft and then upwardly through the trunk 13 to pass around a suitable sprocket wheel, not shown, on a drive shaft in the overhanging arm connected to some suitable source of power.

The support and drive for the rotary shuttle, described above is advantageous and, moreover, it is admirably adapted to have associated therewith the novel magazine feed 18 provided by the present invention.

As shown, this magazine feed 18 includes a magazine or holding tube 52 for receiving a supply of bobbins 53 and directing the same to the receiving chamber 20 in the rotary shuttle.

With the present preferred embodiment of the invention each of the bobbins 53 in the magazine 52, like the bobbin in the rotary shuttle 19, is rotatably mounted on a usual hollow stud 54 on a bobbin case 55 which, in general, may be of ordinary construction including a latch 56 adapted to engage a groove 57 at the outer end of a stud 58 extending from a supporting plate 59. However, as distinguished from the usual construction wherein the supporting plate is formed integral with the rotary shuttle, the supporting plate 59 is formed as an element separate from the shuttle and forms with the bobbin case proper 55 a bobbin case assembly 60 adapted as a unit to be advanced into position within the receiving chamber 20 in the shuttle.

As shown most clearly in Fig. 7, when a bobbin case assembly 60 is transferred from the magazine 52 and operatively associated with the rotary shuttle, the supporting plate is releasably locked to the shuttle for rotation therewith in a predetermined position axially of the chamber, by a plurality of circumferentially disposed spring pressed detents 61 supported and guided in suitable bores 62 in the shuttle and adapted to engage in complementary depressions 63 formed in a peripheral groove 64 in the supporting plate 59. Suitable screw plugs 65 in the bores 62 are adapted to confine spring elements therein which engage enlarged heads on the detents 61 to yieldingly urge the latter into the complementary depressions 63 in the periphery of the supporting plate 59.

With the supporting plate 59 locked in position it will be readily apparent that the entire bobbin case assembly 60 is held in a predetermined position axially of the chamber 20 and relative to opposite ends of the chamber which are initially open to respectively provide a bobbin case receiving opening 68 and a bobbin case expelling opening 69.

The telescoping hollow stud 54 and stud 58 connection between the supporting plate 59 and the bobbin case 55 permits relative rotation of these two parts, the bobbin case itself being maintained against rotation by the engagement of a finger 70 thereon in a notch 71 formed in a suitable retaining element 72 which may be suitably secured to the sewing machine frame and is so shaped and supported as to not block the expelling opening 69. The effective lever arm for friction between the hollow stud 54 and stud 58 is so small that the pressure exerted between the finger 70 and retaining element 72 is relatively light. Hence, the needle thread may readily pass between the finger and retaining element in the slightly oversize notch 71 during the operation of the sewing machine and when the needle thread loop is engaged in a slot 73 formed in the periphery of the shuttle and extending from one side to the other thereof at an angle to the axis of the shuttle.

A slight cutout 74 in the shuttle at the leading end of the slot 73 provides a thread catching hook 75 for engaging the needle thread and directing the same into the thread carrying slot. A needle clearance slot 76 also is advantageously provided in the shuttle.

In order that each bobbin case asssembly in the magazine may be properly guided to position in the shuttle with the retaining finger 70 in alignment with the retaining notch 71 and with the bobbin case in position with its needle clearance aperture 77 in alignment with the needle, a guide slot 78 is formed in and to extend longitudinally of the magazine tube. Thus, when a complete bobbin case assembly 60 is inserted in a top opening 79 in the magazine tube, the finger 70 on the bobbin case engages in the guide slot 78 and the bobbin case is guided in a predetermined manner toward the bobbin case

receiving opening 68 of the chamber. A movable closure plate 80 may be advantageously provided to close an opening in the work plate 33 through which bobbin case assemblies may be conveniently placed in the opening 79 in the magazine tube. Preferably and advantageously this closure plate 80 is made transparent in order that the number of assemblies in the magazine tube may be readily seen at all times and without removing the closure plate.

To complete the guiding of the respective bobbin cases into a predetermined position with respect to the shuttle and with the retaining finger 70 engaged in the notch 71 in the retaining element 72, there is provided a guide groove 81, preferably flared at the receiving end, in the wall of the chamber, adapted to be aligned with the guide slot 78 in the magazine tube when the shuttle is in the position shown in Fig. 4 with the needle 15 in a raised position. As is conventional, the mechanism correlating the operation of the needle 15 and of the shuttle 19 is such that for each complete cycle of needle movement the shuttle will rotate twice and the rotative position of the shuttle will always bear a definite and predetermined relation to the position of the needle at any given time. Hence, when the needle is in a raised position the guide groove in the shuttle will be aligned or substantially aligned with the guide slot 78 in the magazine tube and with the notch 71 in the retaining element 72.

The same supporting sections 34 and 48 previously described as supporting the drive shaft 47 may, as shown most clearly in Figs. 1 and 4, serve as the means for supporting the magazine tube 52 in longitudinal alignment with the bobbin case receiving opening 68 in the chamber and with the delivery end 82 of the magazine tube spaced from the shuttle. This spacing of the delivery end of the magazine tube from the shuttle is of importance in providing a clearance for the needle thread loop as it is carried around by the shuttle during its rotation.

For advancing the bobbins and their associated bobbin case assemblies through the magazine tube and toward the shuttle, there is provided by the present invention a particularly advantageous and effective plunger 83. This plunger 83, which may be readily located in position by rolling the same up and into the magazine tube on a shelflike portion 84 extending laterally from an open side of the latter and then advancing the plunger to locate the leading end thereof in the tube in a position as shown in Fig. 1, includes not only a main outer or sleeve section 85 but also an inner ram 86 adapted to be moved forwardly a predetermined distance beyond the forward end of the main section 85. The purpose of this inner ram 86, the details of the operation of which will be hereinafter explained, is to enable a pushing of an end bobbin case assembly completely into the shuttle chamber 20 while at the same time permitting a subsequent return of the next adjacent bobbin assembly from engagement with the delivered assembly and into a position in the magazine tube spaced from the shuttle.

In the operation of the magazine feed 18, after a supply of assemblies 60 with loaded bobbins therein and with the bobbin threads of the respective bobbins properly threaded through and engaged by the usual thread retaining spring fingers of the bobbin cases, the plunger is advanced to an initial station as shown in Figs. 1 and 4. In this station a plurality of successive aligned and touching bobbin case assemblies are confined longitudinally of the magazine tube between spring fingers 87, which may be advantageously formed integral with the delivery end 82 of the magazine tube, and the forward end of the plunger. A spring pressed detent 88 extending through an aligned aperture 89 in the side of the magazine tube and into one of a plurality of indexing grooves 90*a*, 90*b*, 90*c*, 90*d*, 90*e*, 90*f*, and 90*g*, spaced apart predetermined distances longitudinally of the plunger serves to retain the latter in this initial station.

With the magazine tube thus loaded with a supply of bobbins, when a bobbin in the shuttle becomes exhausted or substantially exhausted of thread, the sewing machine is operated to move the shuttle into position with the guide groove 81 therein aligned with the notch 71 in the retaining element and with the guide slot 78 in the magazine tube. When the shuttle is thus positioned a plunger operating head or knob 91 is moved to advance the plunger from an initial station to an immediately succeeding and predetermined station toward the shuttle. An arresting of the movement of the main section 85 of the plunger in this next station is effected by the engagement of the spring pressed detent 88 in the indexing groove 90*b* determining this next station.

However, because the operating knob 91 is connected directly to the inner ram 86 and because the base 92 of the knob is initially spaced rearwardly from the cooperating outer end 93 of the main section 85 of the plunger, the forward end 94 of the ram is advanced a predetermined distance from a retracted position determined by the engagement of a rearwardly facing shoulder 97 on the forward end 94 and a complementary forwardly facing inner shoulder 98 on the main plunger section, as shown in Figs. 1 and 4, to an advanced position beyond the station determined by the indexing groove 90*b*. The extra advance of the assemblies in the magazine tube causes the bobbin case assembly which was initially forwardmost in the magazine tube to fully enter the chamber 20 in the shuttle, be retained by the detents 61 therein, and to force the bobbin case assembly initially in the shuttle to be ejected through the expelling opening 69.

Upon release of the operating knob 91, after the loading of the shuttle with a new bobbin case assembly including a new bobbin, and the ejection of the assembly including a thread exhausted bobbin, the spring fingers 87 which have been distorted forwardly by, but have not disengaged from, the what has now become the forwardmost assembly in the supply, act upon this assembly to force it rearwardly back into the delivery end of the magazine tube from the position shown in Fig. 7 to a position, as shown in Fig. 1, spaced from the delivered assembly and the shuttle. This forced rearward movement of the now forwardmost assembly in the supply forces the following assemblies in the supply rearwardly and the spacing ram 86 thus is pushed back into its retracted position in the station determined by the indexing groove 90*b*.

A spring 95 located in an enlarged bore 66 and interposed between an inner shoulder 96 on the main plunger section 85 and the base 92 of the operating knob may and preferably is provided to supplement the action of the spring fingers 87 in returning the inner ram to its initial retracted position with respect to the main plunger

section as shown in Figs. 1 and 4 and with the rearwardly facing shoulder 97 on the enlarged forward end 94 of the ram engaging the complementary forwardly facing inner shoulder 98 on the main plunger section.

It will be readily understood that the advance of successive new bobbins and their associated cases may be effected by merely repeating the operations described above.

If desired, any suitable mechanical or other means may be provided for advancing the plunger 83. One particularly advantageous means for thus advancing the plunger is shown in Figs. 5 and 6 wherein a gear rack 99 connected to a modified operating head or knob 91a is shown as extending longitudinally of the plunger and engaging with a mating gear 100 mounted on a shaft 101 extending through a depending side wall 102 of the sewing machine frame. An operating member 103 on the shaft 101 is advantageously provided exteriorly of the sewing machine frame for turning the gear and advancing the plunger 83.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

Having thus described the invention what is claimed as new is:

1. In a sewing machine the combination of a rotary hook member for engaging a needle thread loop, having a bobbin receiving chamber therein with a bobbin receiving opening and a bobbin expelling opening, said openings being opposed to each other; means for receiving a plurality of bobbins and directing the same to said receiving opening in said chamber; and a single means for, in a single movement in one direction, urging a bobbin from said receiving and directing means into said bobbin receiving opening and said chamber and ejecting a bobbin initially in said chamber from said chamber and said expelling opening and said rotary hook member.

2. In a sewing machine the combination of a rotary hook member for engaging a needle thread loop, having a bobbin case receiving chamber therein, said chamber having opposed bobbin case receiving and bobbin case expelling openings; means for receiving a plurality of bobbin cases and directing the same to said chamber; means for releasably maintaining a bobbin case in a predetermined position axially in said chamber; and a single means for, in a single movement in one direction, urging a bobbin case from said receiving and directing means through said receiving opening into said predetermined position in said chamber and for ejecting a bobbin case initially in said chamber through said expelling opening from said chamber and said rotary hook member.

3. In a sewing machine having a needle, the combination of a rotary shuttle having a bobbin case receiving chamber therein with a bobbin case receiving opening; means for receiving and directing a bobbin case to said chamber; means, having a line of movement, for urging said bobbin case from said receiving and directing means into said chamber; and guide means on said receiving and directing means and extending in the direction of the axis of the chamber, toward said receiving opening and in the direction of said line of movement, for presenting said bobbin case to said chamber in a predetermined position relative to said needle.

4. In a sewing machine the combination of a rotary hook member for engaging a needle thread loop, having a bobbin receiving chamber therein; means for receiving a plurality of bobbins and directing the same axially into said chamber; plunger means movable into a plurality of successive predetermined stations, for forcing bobbins in said receiving means toward said chamber; and indexing means including a movable detent, for controlling a step-by-step unidirectional advance of said plunger means toward said chamber in said successive predetermined stations.

5. In a sewing machine the combination of a rotary hook member for engaging a needle thread loop, having a bobbin receiving chamber therein; means for receiving a plurality of bobbins and directing the same axially into said chamber; plunger means movable into a plurality of successive predetermined stations, for forcing bobbins in said receiving means toward said chamber; indexing means including a movable detent, for controlling a step-by-step unidirectional advance of said plunger toward said chamber in said successive predetermined stations; and means for advancing said plunger means.

6. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin; means for receiving a supply of bobbins for said shuttle, said receiving means having a delivery end axially aligned with said chamber and spaced from said shuttle; means for urging bobbins in said receiving means towards said delivery end and an end bobbin into said chamber; and means for retracting the bobbin in the said receiving means next to said end bobbin, into said delivery end and spaced from said shuttle after the end bobbin has been urged into said chamber.

7. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin; means for presenting a supply of unused bobbins to said chamber; means for urging said supply of bobbins toward said chamber; and means for retracting the next to the first bobbin in said supply from said first bobbin and into a position in said presenting means spaced from said shuttle after the first bobbin is urged into said chamber.

8. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin, said chamber having opposed bobbin receiving and bobbin expelling openings; means for supporting and directing an unused bobbin to said receiving opening; and a single means for urging said unused bobbin from said supporting and directing means into said receiving opening and simultaneously urging a used bobbin from said chamber and out of said expelling opening.

9. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin, said chamber having opposed bobbin receiving and bobbin expelling openings; means for presenting a supply of unused bobbins to said receiving opening; and a single plunger means for urging said supply of bobbins toward said chamber and the first bobbin in said supply through said receiving opening and into said chamber to replenish said shuttle and to force a used bobbin initially in the shuttle from said chamber and out of said expelling opening.

10. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin; means for guiding a supply of

unused bobbins to said chamber; plunger means for forcing said supply of bobbins relative to said guiding means, toward said chamber; indexing means for controlling a step-by-step advance of said plunger means to sequentially force bobbins from said guiding means into said chamber; and means for retracting the next to the first bobbin in said supply from said first bobbin and into a position spaced from said shuttle after the first bobbin is forced into said chamber.

11. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin; means for guiding a supply of unused bobbins to said chamber; plunger means for forcing said supply of bobbins relative to said guiding means, toward said chamber; gear and rack means for advancing said plunger means; indexing means for controlling a step-by-step advance of said plunger means to sequentially force bobbins from said guiding means into said chamber; means for retracting the next to the first bobbin in said supply from said first bobbin and into a position spaced from said shuttle after the first bobbin is forced into said chamber.

12. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin, said chamber having bobbin receiving and bobbin expelling openings; means for receiving a supply of bobbins for said shuttle, said receiving means having a delivery end aligned with said receiving opening and spaced from said shuttle; plunger means having relatively movable members, for advancing bobbins in said supply toward said delivery end and receiving opening and into said chamber; indexing means for controlling a step-by-step advance of said plunger means to sequentially present bobbins to said delivery end and said chamber; and means for retracting the bobbins in said supply into a position spaced from said shuttle and from a bobbin forced into said chamber.

13. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin; a magazine for holding a supply of bobbins, having a delivery end for directing bobbins to said chamber, said delivery end being spaced from said shuttle; plunger means for advancing bobbins from said magazine into said chamber; detent means for arresting the advance of said plunger means in successive predetermined stations, said plunger means including a spacing element movable from a retracted position to an advanced position and back again, said spacing element in its advanced position serving to initially advance said bobbins beyond a given predetermined station and in its retracted position to permit a return of said bobbins to said given predetermined station; and means for retracting all of the bobbins, except the bobbin advanced into said chamber, to a position in said magazine spaced from said shuttle.

14. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin; a magazine for holding a supply of bobbins, having a delivery end for directing bobbins to said chamber, said delivery end being spaced from said shuttle; plunger means for advancing bobbins from said magazine into said chamber; detent means for arresting the advanve of said plunger means in successive predetermined stations, said plunger means including a spacing element movable from a retracted position to an advanced position and back again, said spacing element in its advanced position serving to initially advance said bobbins beyond a given predetermined station and in its retracted position to permit a return of said bobbins to said given predetermined station; and resilient means for retracting all of the bobbins, except the bobbin advanced into said chamber, to a position in said magazine spaced from said shuttle.

15. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin case, said chamber having opposed bobbin case receiving and expelling openings; a bobbin case assembly including a bobbin case and a supporting member for said bobbin case, said supporting member being rotatable with respect to said bobbin case; cooperable means on said shuttle and said supporting member for releasably holding the latter in a predetermined position relative to the shuttle when the assembly is inserted in said chamber; and means for guiding said bobbin case assembly to said shuttle and said chamber.

16. In a sewing machine having a needle, the combination of a rotary shuttle; a bobbin case having a finger projecting therefrom; means for holding said bobbin case and directing the same to said shuttle; means cooperable with said finger for retaining said bobbin case against rotation with said shuttle when associated therewith in a predetermined position relative to said needle; means having a line of movement, for urging said bobbin case from said holding and directing means into association with said shuttle; and means on said shuttle and said holding and directing means, extending in the direction of said line of movement and cooperable with said finger, for guiding said bobbin case to said predetermined position with said retaining means and said finger in cooperative relation with respect to each other.

17. In a sewing machine the combination of a rotary shuttle having a bobbin receiving chamber therein, said chamber having a bobbin receiving opening; means aligned with said receiving opening for holding a supply of bobbins and presenting the same to said chamber, said holding and presenting means being spaced from said shuttle; plunger means for advancing bobbins in said holding means toward said shuttle and into said receiving opening; means for controlling a step-by-step advance of said plunger means and said bobbins into predetermined stations, said plunger means including a spacing element having a normal bias into a retracted position and being movable into an advanced position to initially urge said bobbins beyond each of the predetermined stations; and means for returning said bobbins in the supply to each of the respective predetermined stations and spaced from said shuttle, after an end bobbin in said supply has been advanced into said chamber.

18. In a sewing machine the combination of a rotary shuttle, having a bobbin receiving chamber therein; rotatable members engageable with the periphery of the shuttle and wholly supporting the latter, at least one of said rotatable members being a driving member; means for holding a supply of unused bobbins and presenting the same to said chamber; means for advancing said supply of bobbins toward said chamber; and means for retracting the next to the first bobbin in said supply from said first bobbin and into a position in said presenting means spaced from

said shuttle after the first bobbin is urged into said chamber.

19. In a sewing machine the combination of a rotary shuttle having a chamber therein for receiving a bobbin; means for receiving a supply of bobbins for said shuttle, said receiving means having a delivery end aligned with said chamber and spaced from said shuttle; plunger means for urging bobbins relative to said receiving means toward said delivery end and an end bobbin into said chamber; means for controlling a step-by-step advance of said plunger means into successive predetermined stations toward said shuttle and chamber, said plunger means including a spacing element having an advanced and a retracted position, for initially urging bobbins beyond each of said predetermined stations; actuating means connected to said spacing element, for advancing said plunger means; and means for retracting the bobbin in said receiving means next to said end bobbin, into said delivery end and spaced from said shuttle after the end bobbin has been urged into said chamber.

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