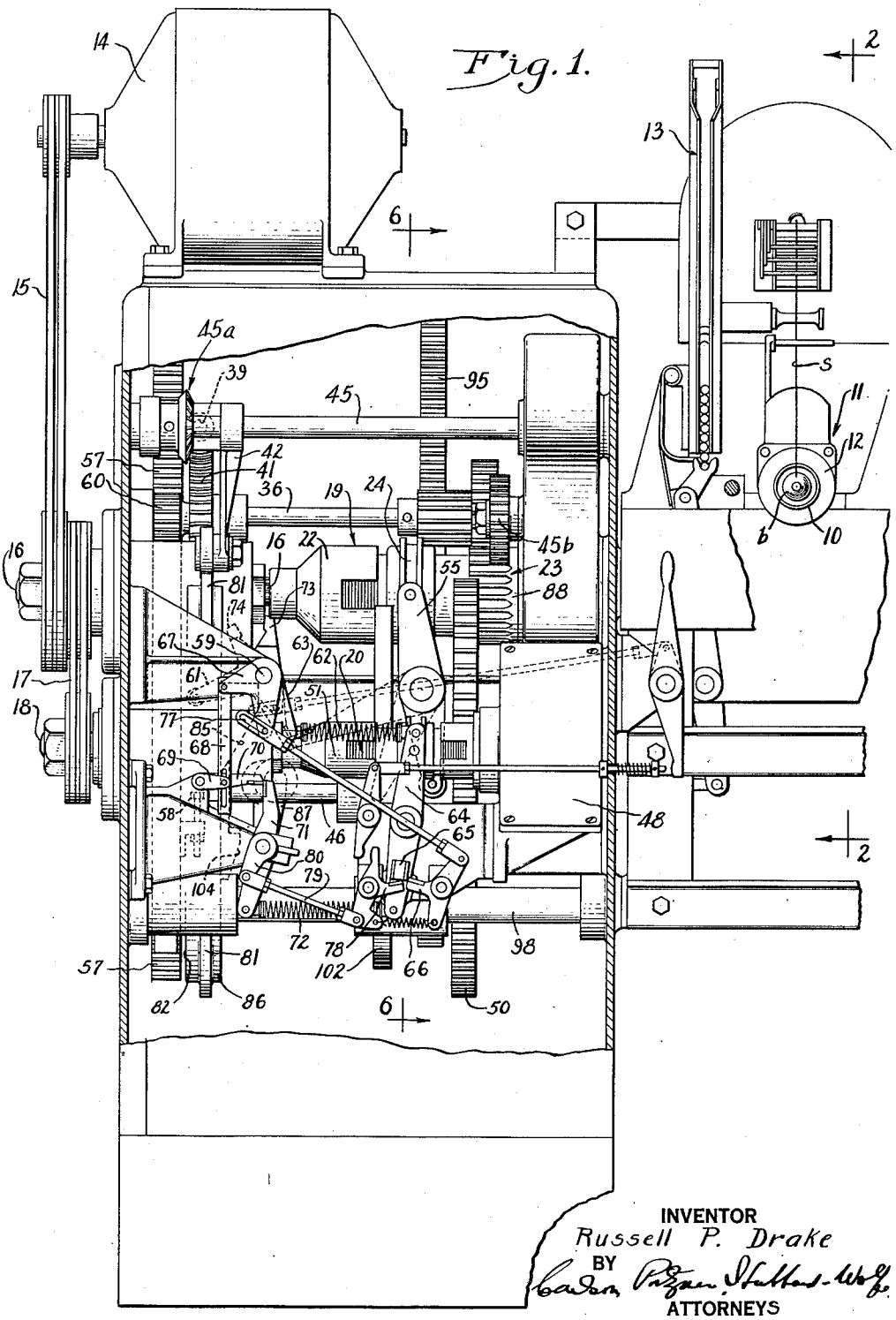
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BOBBIN WINDING MACHINE

Filed March 30, 1946 5 Sheets-Sheet 1

Fig. 1.



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BOBBIN WINDING MACHINE

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Fig. 2.

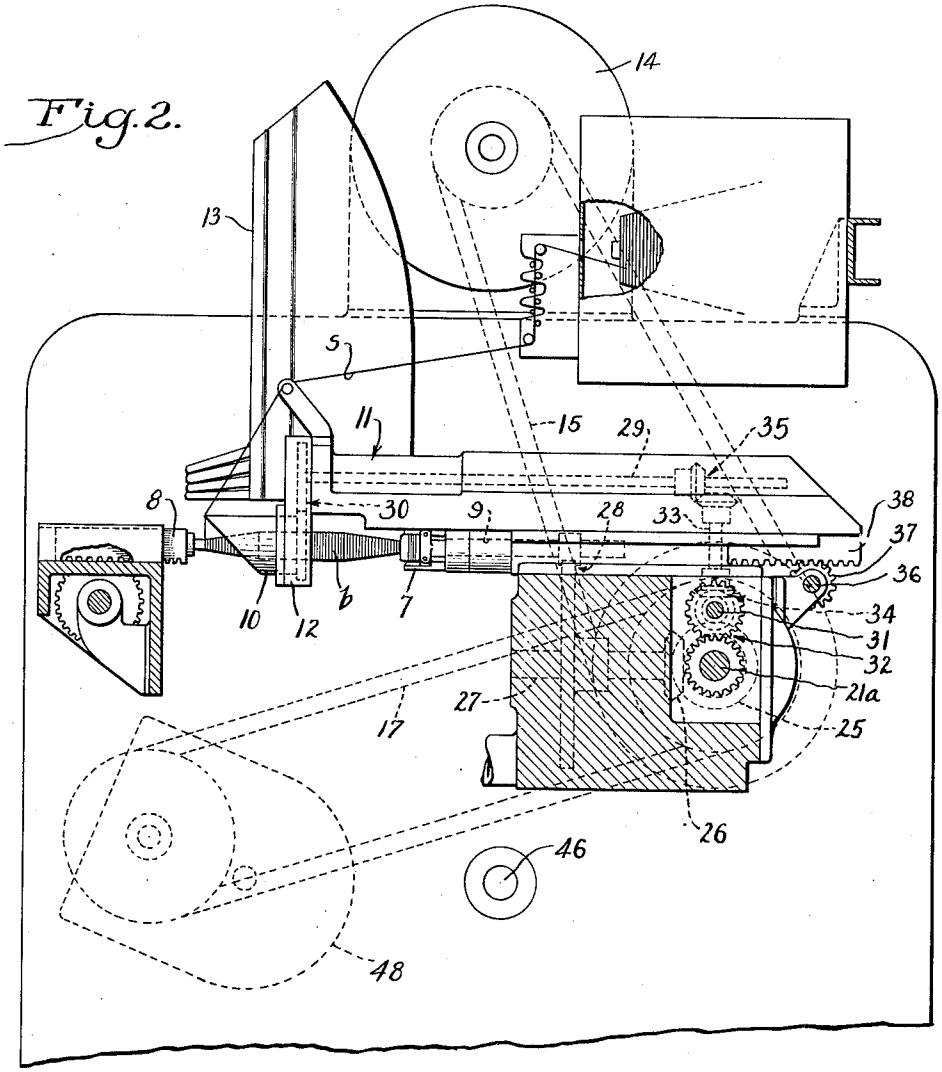
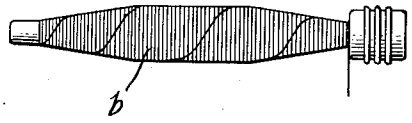


Fig. 3.



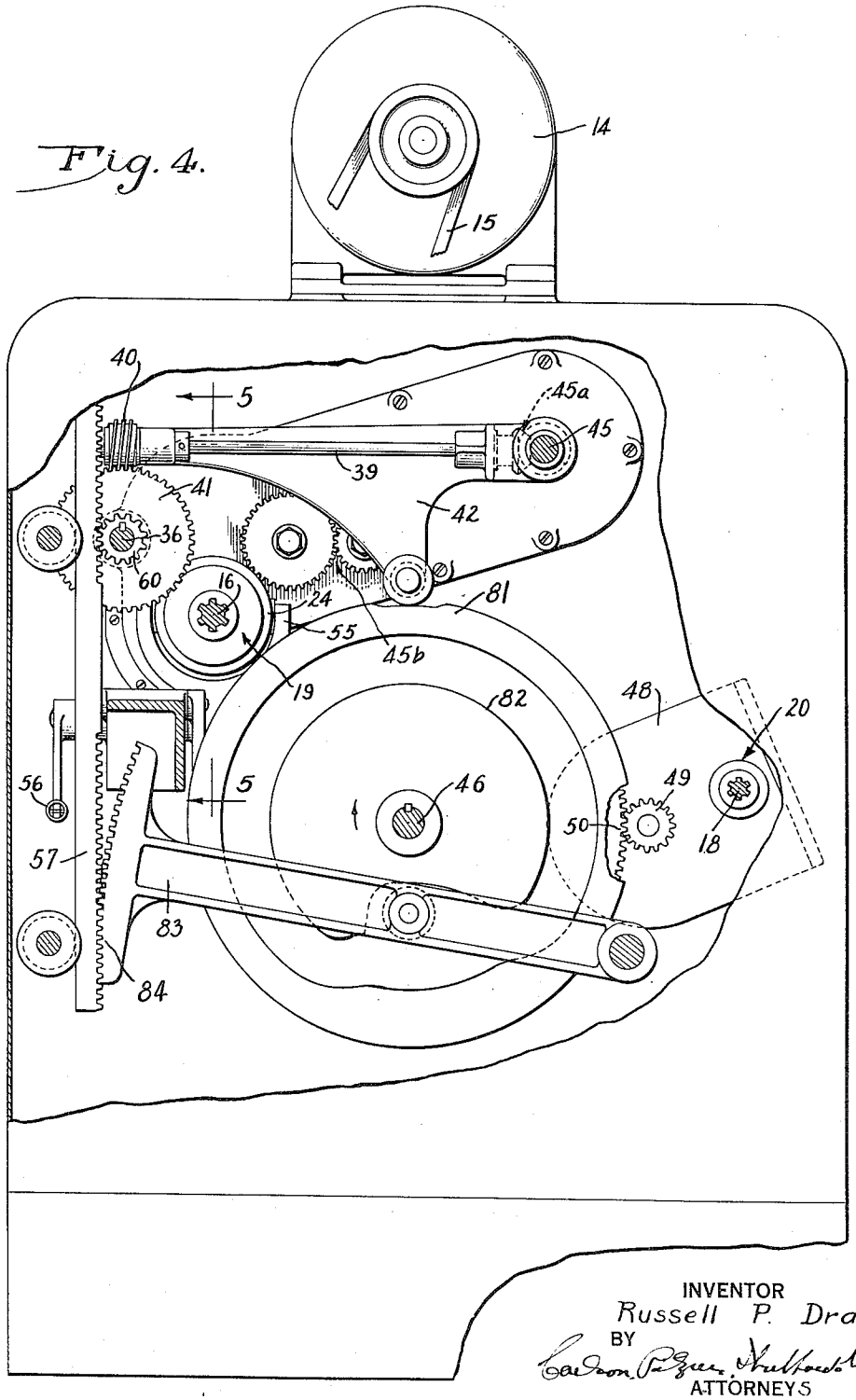
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BOBBIN WINDING MACHINE

Filed March 30, 1946 5 Sheets-Sheet 3

Fig. 4.



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BOBBIN WINDING MACHINE

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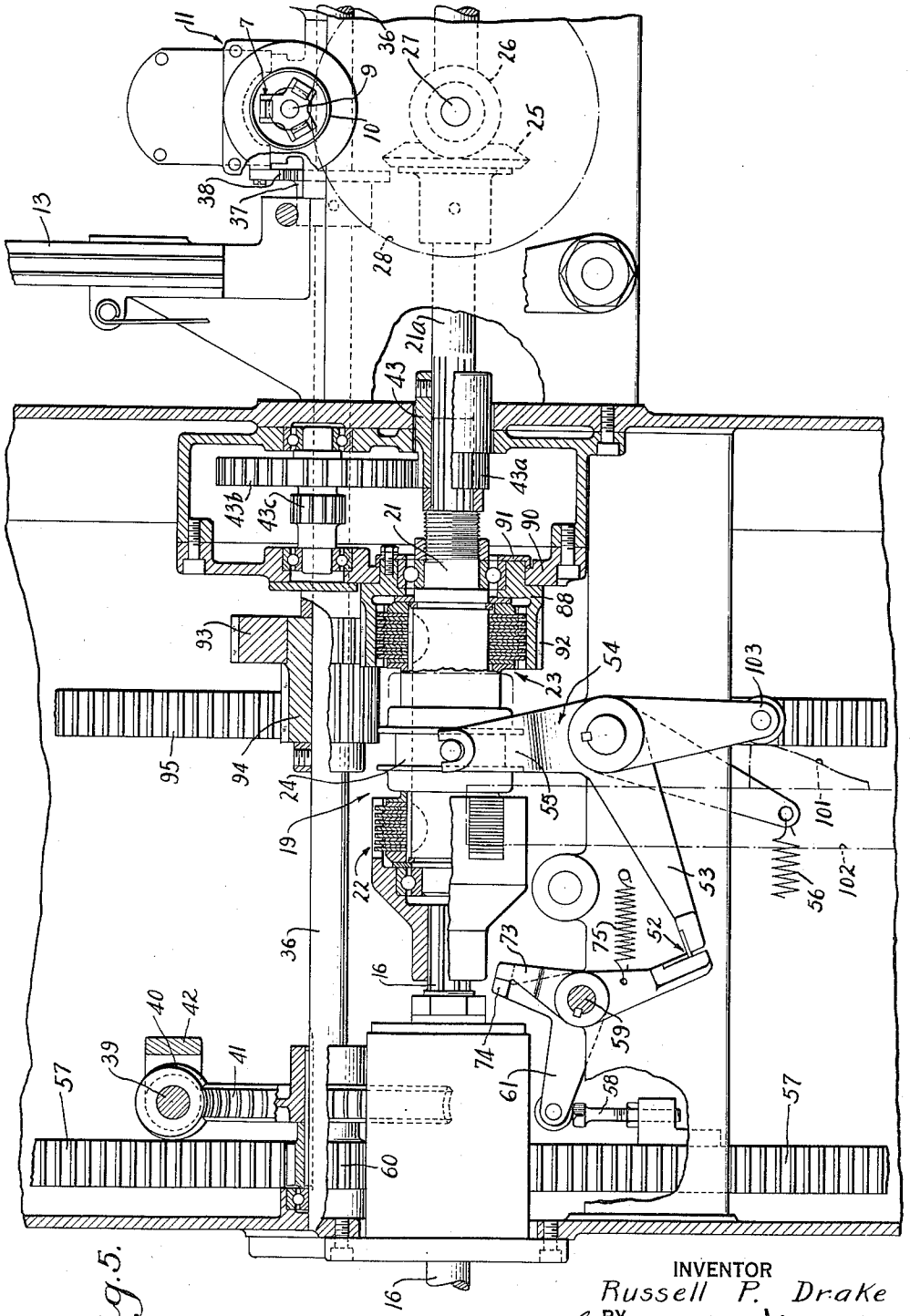


Fig. 5.

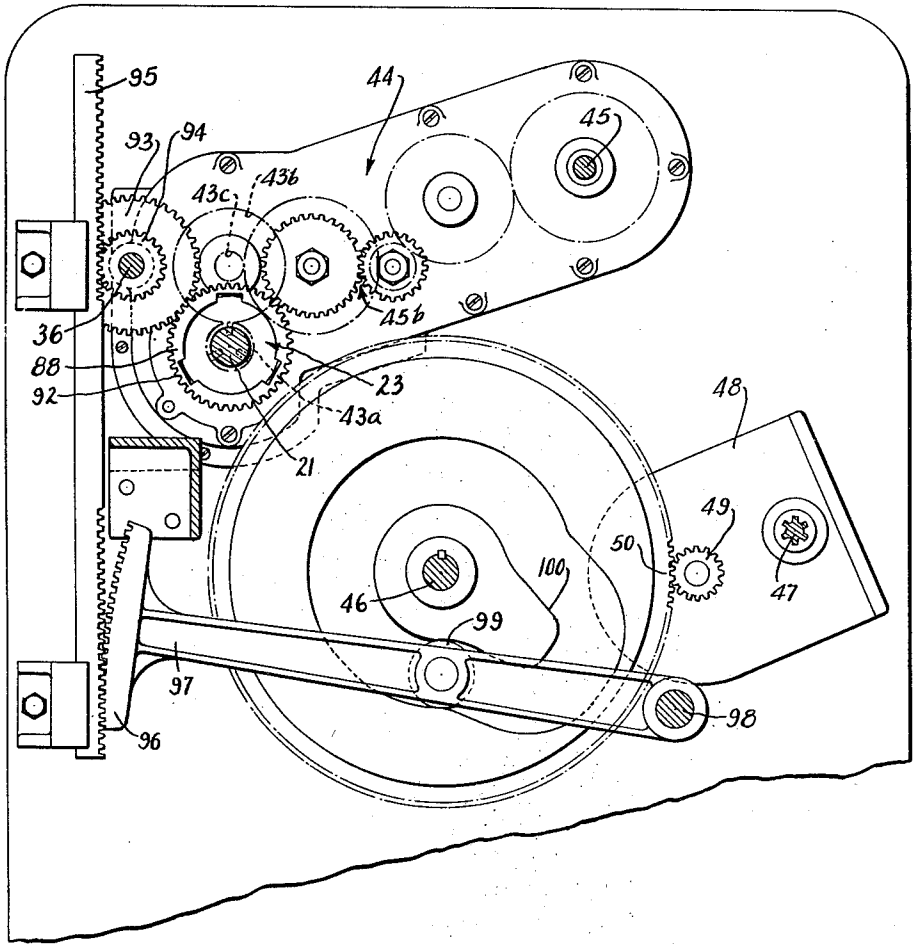
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BOBBIN WINDING MACHINE

Filed March 30, 1946 5 Sheets-Sheet 5

Fig. 6.



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2,569,661

UNITED STATES PATENT OFFICE

2,569,661

BOBBIN WINDING MACHINE

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Application March 30, 1946, Serial No. 658,491

2 Claims. (Cl. 242—27)

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The invention pertains to machines for winding yarn masses of the type generally known as filling wound bobbins, and has more especial reference to improvements in the driving and control mechanism for such machines.

The primary object of the invention is to provide a bobbin winding machine having means of a practical character operative during the return movement of the yarn traversing device to wind a plurality of turns of yarn on the bobbin to effect a so called back winding operation.

The object of the invention thus generally set forth, together with other and ancillary advantages, are attained by the construction and arrangement shown by way of illustration in the accompanying drawings, in which:

Figure 1 is a fragmentary front elevational view of a bobbin winding machine and showing in particular the driving and control mechanism and one of a series of winding units.

Fig. 2 is a fragmentary transverse sectional view through the machine, taken substantially in the plane of line 2—2 of Fig. 1.

Fig. 3 is a side elevational view of a bobbin having a back wind produced in the operation of the machine.

Fig. 4 is a side elevational view of the driving and control mechanism for the machine, looking from the left in Fig. 1, a portion of the housing therefor being broken away and certain parts of the drive shafts and a part of the frame being shown in section.

Fig. 5 is a fragmentary longitudinal sectional view taken approximately in the plane of line 5—5 of Fig. 4, one of the winding units adjacent to the driving and control mechanism being shown in front elevation.

Fig. 6 is a fragmentary transverse sectional view on line 6—6 of Fig. 1 and illustrating in particular an auxiliary cam operated means for imparting rotation to the winding spindle during the wind back operation.

The improved driving and control mechanism is herein shown as applied to a machine of the type disclosed and claimed in the copending application of Brooks Marcellus, Serial No. 527,702, filed March 23, 1944, now Patent No. 2,439,519, dated April 13, 1948. In such machine the yarn traversing device is in the form of a cylindrical cam mounted for rotation axially of the winding spindle and reciprocable along the bobbin, the cam being provided with oppositely sloping yarn guiding surfaces operative in the rotation of the cam and in its gradual movement along the bobbin to produce a package of the filling wound type.

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As shown in Figs. 1 and 2 of the drawings, the bobbin *b* is clamped between a chuck 7 and a tailstock or center 8. The chuck is mounted upon a winding spindle 9 and the cylindrical yarn traversing device, indicated at 10, is mounted upon a slide 11 for reciprocation axially of the spindle, the cam being rotatably supported in a gear housing 12 carried by the slide 11. Empty bobbins contained in an upright magazine 13 are shifted laterally one by one into position for clamping between the chuck 7 and tail center 8 and when thus clamped in position, a running strand *s* of yarn leading from a suitable source of supply is wound upon the bobbin.

Power for operation of the machine is derived from an electric motor 14 (Figs. 1 and 2) having a belt and pulley connection 15 with a shaft 16 and a second belt and pulley connection 17 between the shaft 16 and a parallel shaft 18. The shaft 16 forms a part of the means for driving the spindle 9 and for rotating the traversing cam 10 during the normal winding operation. This drive is effected through the medium of a dual clutch unit 19. The shaft 18 drives the control mechanism of the machine through the medium of a combined clutch and brake unit 20.

The dual clutch unit 19 (Fig. 5) is interposed between the shaft 16 and an alined shaft 21 hereinafter referred to as the main drive shaft of the winding mechanism. Said unit comprises in effect two clutches 22 and 23 and a sliding or shiftable collar 24 therebetween. When the collar is shifted to the left, the clutch 22 is engaged to drive the shaft 21, and when shifted in the opposite direction this clutch is disengaged and the clutch 23 engaged for a purpose which will presently appear.

The shaft 21 is coupled to a shaft 21*a* extending longitudinally through the machine and having at each unit a bevel gear 25 meshing with a bevel gear 26 on a transverse stub shaft 27 (Fig. 2), the latter being connected by spur gearing 28 with the spindle 9. The traversing cam 10 is also driven from the shaft 21*a* through the medium of a transverse shaft 29 connected with the cam by spur gearing 30 in the housing 12 and with a shaft 31 parallel to and connected with the shaft 21*a* by suitable spur gearing 32 (Fig. 2). The driving connection between the shafts 29 and 31 comprises a vertical stub shaft 33 and two sets of bevel gearing 34 and 35.

Axial feeding movements are imparted to each traverse slide 11 by a traverse shaft 36 extending longitudinally of the machine and equipped with a spur gear 37 for each winding unit, meshing

with a rack 38 rigid with one of the slides 11. Power for actuating the traverse shaft 36 is derived from a transverse feed shaft 39 (Fig. 4) having at its rear end a worm 40 meshing with a worm wheel 41 on the traverse shaft 36. The shaft 39 is journaled in a swinging bracket 42 so that the worm is disengageable from the worm wheel to interrupt the feed.

In the present instance, the shaft 39 is driven continuously at a substantially reduced speed from the main drive shaft 21. For this purpose, a shaft coupling 43 between the shafts 21 and 21*a* (Fig. 5) is formed with gear teeth 43*a* driving a gear 43*b* and pinion 43*c* forming part of a reducing gear train 44 (Fig. 6) the terminal gear of which is fast on a shaft 45 connected with the feed shaft 39 by bevel gearing 45*a*. Preferably, the gear train 44 includes a pair of pick-off gears 45*b* located externally of the gear housing so as to be readily removable when it is desirable to change the feed rate. The feeding movement is interrupted by the disengagement of the worm 40 from the worm wheel 41 by the control mechanism as hereinafter more fully set forth.

The control mechanism is of the character set forth in said Marcellus application. Briefly, it comprises a cam shaft 46 having a series of cams for controlling the operation of the machine and initiated in operation upon completion of the normal winding cycle and stopped at the beginning thereof. The cam shaft is driven from a shaft 47 coupled with the power driven shaft 18 by the combined clutch and brake unit 20. The driving connection between the shaft 47 and the cam shaft 46 is through the medium of reduction gearing (not shown) in a gear box 48 terminating in a spur gear 49 meshing with a gear 50 rigid with the cam shaft.

While the bobbin is being wound, the cam shaft 46 is idle, its clutch 51 being disengaged, but the main or spindle drive shaft 21 is in operation. For this purpose, the clutch 22 of the dual clutch unit 19 is held engaged by a latch 52 (Fig. 5) coacting with one arm 53 of a bell crank 54, the other arm 55 of which is connected with the clutch collar 24. The bell crank is biased by a spring 56 out of such clutch engaging position.

At the same time, the feed shaft 39 is driven from the main shaft 21, causing the traverse drive shaft 36 to actuate the traverse cam slides 11 through the connections formed by the gears 37 and slide racks 38. Also, each traverse cam is driven unidirectionally through its connection with the main drive shaft.

As the end of the winding operation approaches, the connection between the feed shaft 39 and the longitudinal traverse shaft 36 is interrupted and the cam shaft 46 started. This is accomplished by means of a vertically slidable rack bar 57 operatively connected with the traversing shaft 36 and carrying a stud 58 operative in the movement of the bar to rock a transverse control shaft 59 (Figs. 1 and 5). The rack bar 57 is connected with the traverse shaft by a spur pinion 60, and near the end of the normal winding operation the stud 58 on the bar moves into engagement with a roller arm 61 fast on the rear end of the control shaft 59, thereby rocking the control shaft in a clockwise direction (Fig. 5).

In the initial turning movement of the control shaft 59, a spring 62 (Fig. 1) for the combined clutch and brake unit 20 is placed under tension. This spring is connected at one end to an arm 63 on the forward end of the control

shaft, and at its other end to the upper end of a lever 64 having a stop lug 65 for coaction with a latch 66, the latch being shown in Fig. 1 in blocking relation to the lever, having been moved into such position at the termination of the previous cycle of the cam shaft.

The arm 63 on the forward end of the control shaft has a second arm 67 rigid therewith connected to a link 68 having a lost motion connection with an arm 69 rigid with a second latch 70. After an initial rocking movement of the control shaft, the latch 70 is moved upwardly to release a rocker 71. This movement relieves the tension on a spring 72 connecting the lower end of the rocker 71 with the clutch shifting lever 54.

In such continued movement of the control shaft, a lever arm 73 (Fig. 5) loose on the rear end of the control shaft is engaged by a lug 74 on the roller follower arm 61 and swung thereby against the action of a spring 75 to carry the latch 52 out of blocking relation to the arm 53 of the clutch shifting lever 54. As a result, the clutch lever 54 is released to the action of its spring and the clutch collar 24 shifted so as to disengage the clutch 22 and engage the clutch 23.

Upon the disengagement of the clutch 22, the drive of the spindle and traverse shaft by the shaft 16 is interrupted, but momentum carries the traverse slide forwardly far enough to take up a pin and slot connection (Fig. 1) between the arm 67 on the forward end of the control shaft 59 and a link 77 connected with the latch 66. Operation of this latch releases the cam shaft clutch lever 64 to the action of the spring 62 to cause the cam shaft clutch 51 to be engaged. It is held engaged by a latch 78 connected by a link 79 with an arm 80 rigid with the rocker 71.

At the beginning of the cam shaft cycle, the driving connection between the feed drive shaft 39 and the traverse drive shaft 36 is disengaged by operation of a cam disk 81 (Fig. 4) on the cam shaft, said disk acting upon the swingable bracket 42. Thereupon, the traverse slide is returned by a cam 82 on the cam shaft. This is accomplished by a lever 83 having a cam follower engageable with the cam 82 and carrying a gear segment 84 meshing with the rack bar 57, the arrangement being such that as the cam rotates, the rack bar is moved downwardly, turning the traversing shaft 36 in a direction to return the traverse slide.

The downward movement of the rack causes the control stud 58 to move away from the roller arm 61 so as to permit the control shaft to turn clockwise and thereby relieve the tension on the control shaft spring 62. Immediately after the cam shaft is started, a rib cam 85 on a cam disk 86 rocks a member 87 rigid with the rocker 71 to place the spring 62 under tension, the latch 70 having been lowered in the counterclockwise movement of the control shaft so as to enter relative to the rocker 71 and hold the spring under tension preparatory to stopping the cam shaft.

It will be understood that during the advance of the traverse cam 10 during the normal winding cycle, the spindle 9 is driven at high speed. At the end of such operation, the spindle would normally be stopped as a result of the disengagement of the clutch 19 under the control of the cam shaft. In accordance with the present invention, auxiliary means is provided for continuing the rotation of the spindle at a slow speed during the return movement of the traversing de-

vice. This is accomplished by transferring the drive of the spindle from the power driven shaft 15 to an auxiliary drive means, herein by cam means forming part of the control mechanism. For this purpose, the clutch 23 of the dual clutch unit 19 has its housing 88 mounted for rotational movement, and provision is made for rotating this housing at slow speed while the clutch 23 is engaged so as to turn the drive shaft 21 slowly during the return movement of the traverse slide whereby to effect a back winding of the yarn upon the bobbin as indicated in Fig. 3.

As herein shown, the clutch housing 88 is formed with an annular flange journaled in a stationary frame member 90 and retained in position by means of a ring 91. The clutch housing is provided on its periphery with gear teeth 92 meshing with a spur gear 93 loose on the traverse shaft 36 and having rigid therewith a spur pinion 94 meshing with a vertically slidable rack 95 (Fig. 6). Engaging with the lower end of this rack is a gear segment 96 on a lever arm 97 pivoted at 98. Intermediate the ends of the lever is a roller follower 99 coacting with a cam 100 on the cam shaft 46. The arrangement is such that during the return movement of the traverse slide in the operation of the cam shaft, the cam 100 operating through the lever 97, rack 95, and gearing 94, 93, 92 revolves the housing 88 so as to drive the shaft 21 through the clutch 23. As shown, the clutch is of the multiple disk type, certain of the disks being keyed to the shaft 21 and the remaining disks being keyed to the housing so that when the clutch is engaged the rotation of the housing by the cam means is transmitted to the shaft 21 and its alined shaft 21*a* operatively associated with the spindle and rotary traverse cam.

Near the end of the cam shaft cycle, a rib cam 101 (Fig. 5) on a cam disk 102 engages with a roller follower on the end of a lever arm 103 rigid with the main clutch shifting bell crank 54. The lever is thus shifted to disengage the clutch 23 and to reengage the clutch 22 so as to start a new winding cycle.

The cam shaft is brought to rest by an additional cam 104 on the cam disk 86 acting upon the member 87 so as to actuate the rocker 71, thereby disengaging latch 78 so as to free the clutch lever 64 to the action of its spring 79. As a result, the cam shaft 51 is disengaged and the brake engaged to stop the cam shaft.

I claim as my invention:

1. A bobbin winding machine comprising, in combination, a winding spindle, a yarn traversing device reciprocable along the spindle, drive mechanism comprising a power driven shaft, a main drive shaft operatively connected with the spindle and a dual clutch unit interposed between said shafts and including a first clutch operative when engaged to drive the spindle and a second clutch engageable as an incident to the disengagement of the first clutch, said second clutch having a rotatable housing connected with said main drive shaft when said second clutch is engaged, feed means for the traversing device having a disengageable connection with said drive mechanism, a cam shaft having a clutch controlling the operation thereof by said drive mechanism, means operative at a predetermined point in the advance of the traversing device to actuate the cam shaft clutch to start the cam shaft and substantially concurrently therewith to actuate said dual cluch unit to interrupt the drive of the spindle by said power driven shaft, means operative by the cam shaft to disengage the connection between the feed means and said drive mechanism and to return the traversing device, an auxiliary drive means for the spindle actuated by the cam shaft to impart a slow rotational movement to the main drive shaft through the second clutch and said clutch housing during such return of the traversing device, and means for interrupting the rotation of the cam shaft and actuating said dual clutch unit to interrupt the spindle drive by said auxiliary means and to start said main drive shaft.

2. A bobbin winding machine comprising, in combination, a winding spindle, a yarn traversing device reciprocable along the spindle, drive mechanism comprising a power driven shaft, a main drive shaft operatively connected with the spindle and a dual clutch unit interposed between said shafts and including a first clutch operative when engaged to drive the spindle and a second clutch engageable as an incident to the disengagement of the first clutch, feed means for the traversing device having a disengageable connection with said drive mechanism, a cam shaft having a clutch controlling the operation thereof, means operative at a predetermined point in the advance of the traversing device to cause engagement of the cam shaft clutch to start the cam shaft and substantially concurrently therewith to actuate said dual clutch unit to interrupt the drive of the spindle by said power driven shaft, means operative by the cam shaft to disengage the connection between the feed means and said drive mechanism and to return the traversing device, an auxiliary drive means for the spindle actuated by the cam shaft to impart a slow rotational movement to the main drive shaft through the second clutch during such return of the traversing device, and means for interrupting the rotation of the cam shaft and actuating said dual clutch unit to interrupt the spindle drive by said auxiliary means and to start said main drive shaft.

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