Dec. 20, 1938. G. C. WARNER 2,141,144

CARTRIDGE WINDING MACHINE

Filed Sept. 13, 1937 4 Sheets-Sheet 1

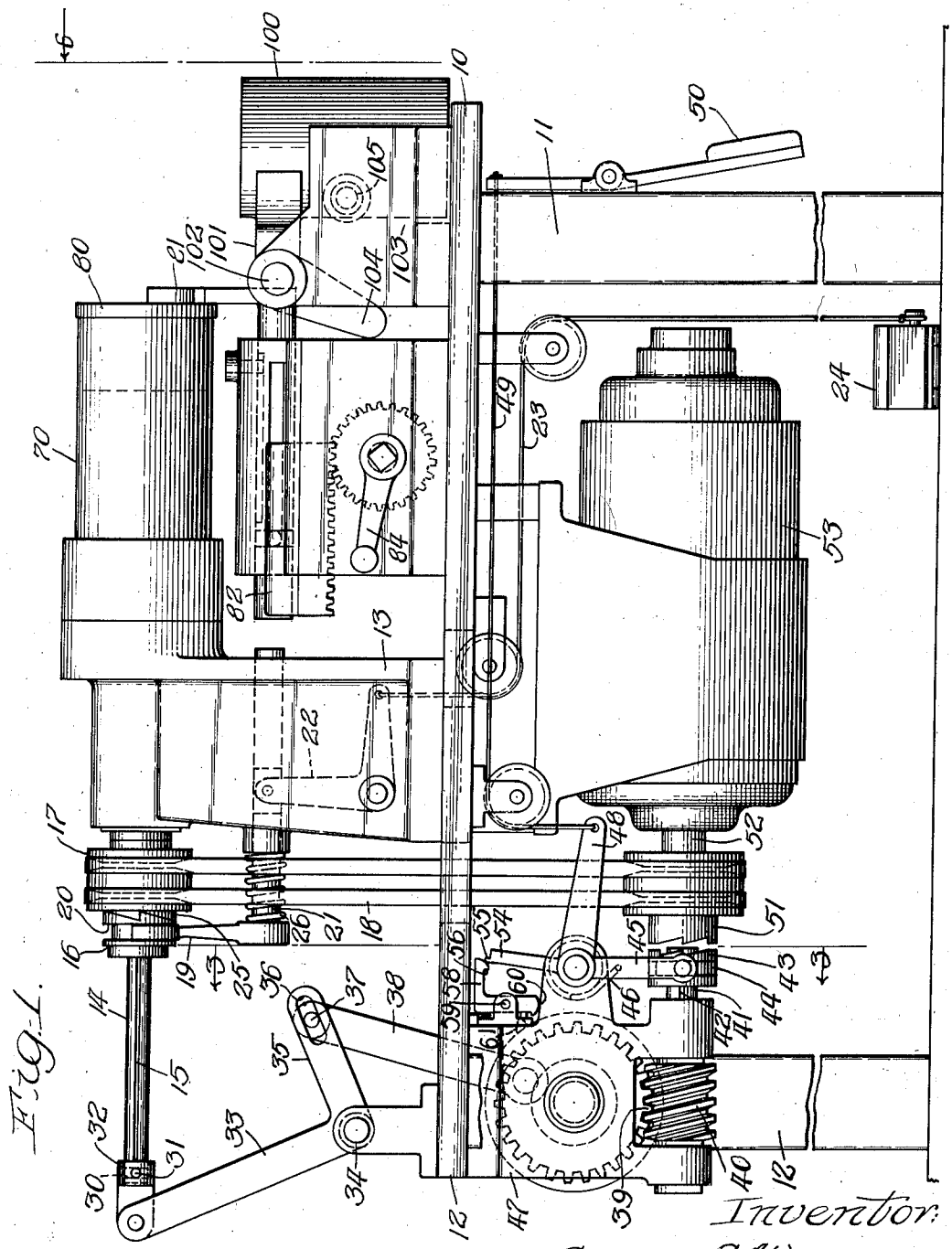


Fig. 1.

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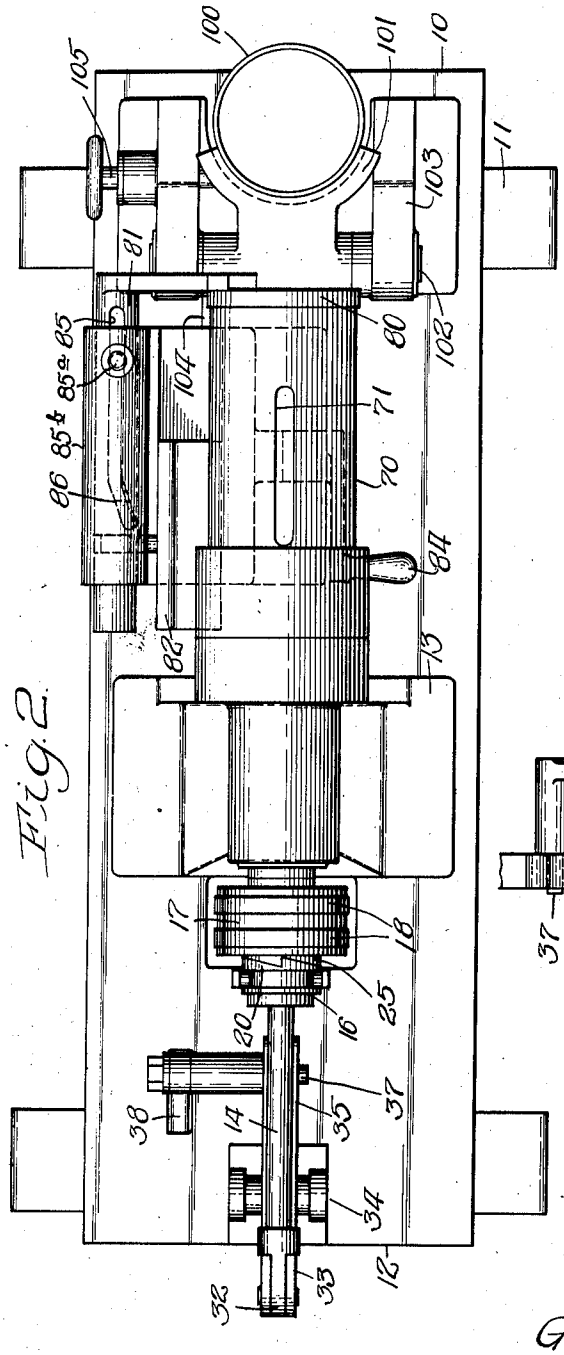


Fig. 2.

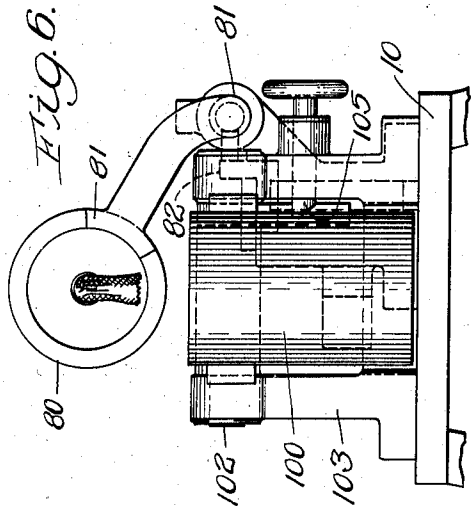


Fig. 6.

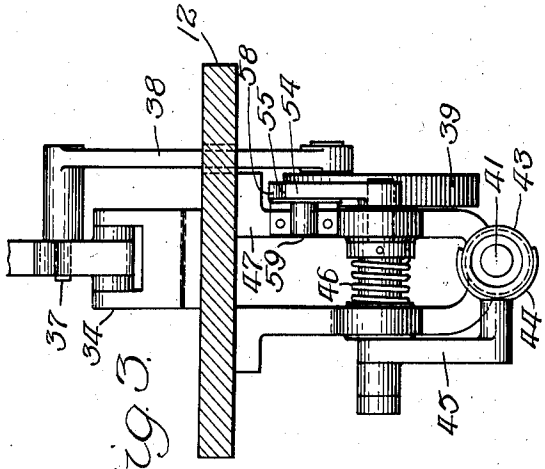


Fig. 3.

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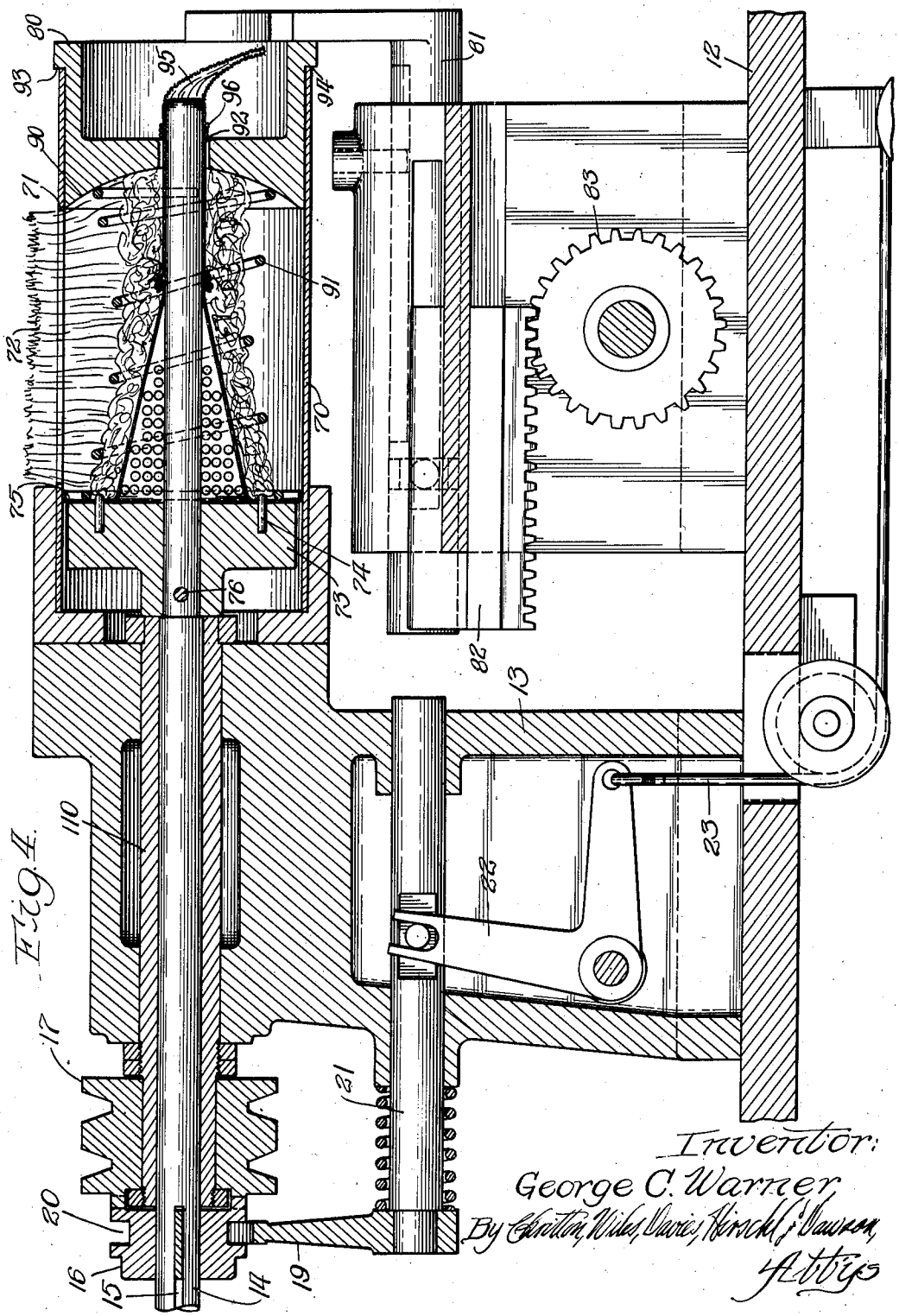


Fig. 4.

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CARTRIDGE WINDING MACHINE

Filed Sept. 13, 1937 4 Sheets-Sheet 4

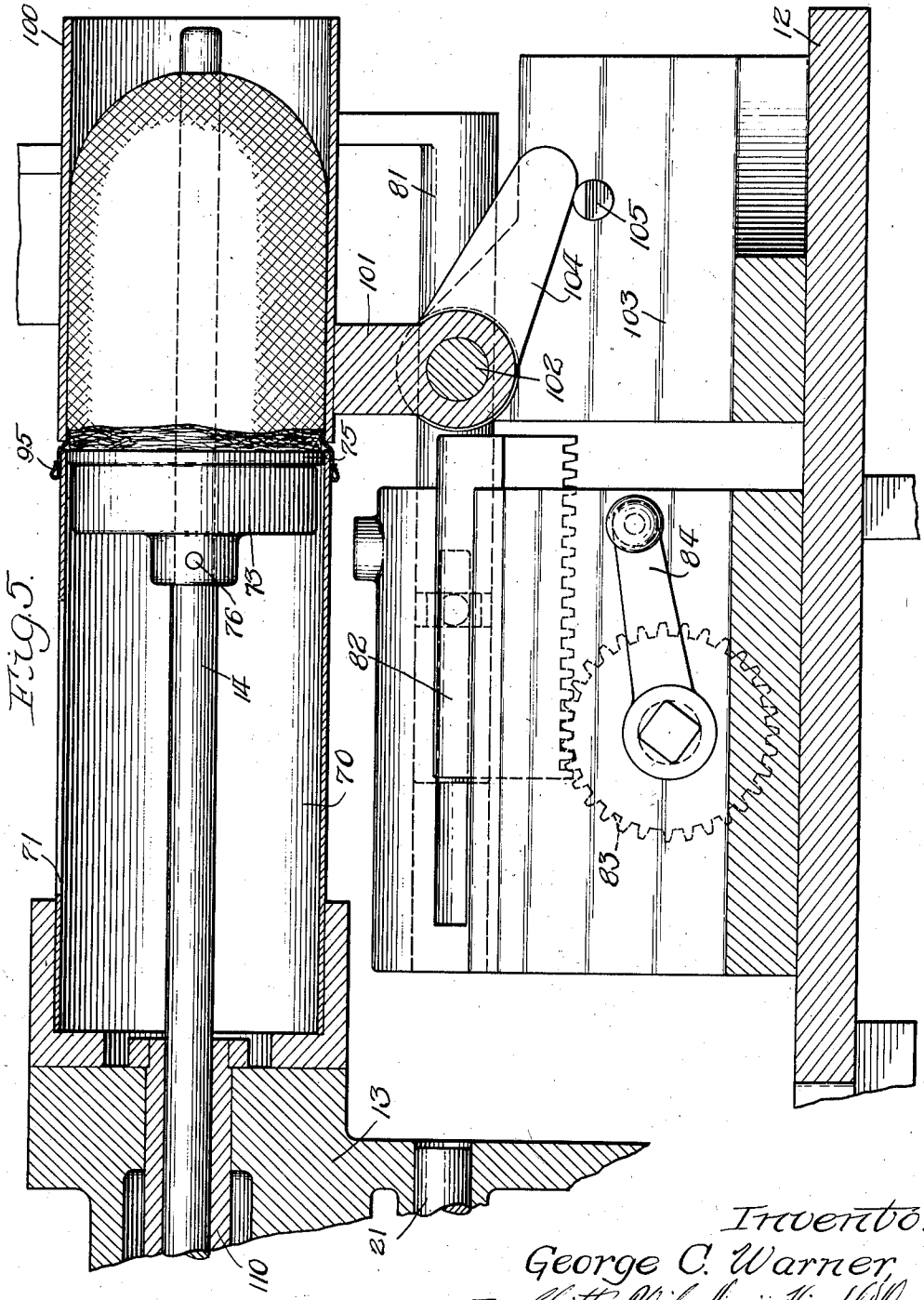


Fig. 5.

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Patented Dec. 20, 1938 2,141,144

UNITED STATES PATENT OFFICE

2,141,144

CARTRIDGE WINDING MACHINE

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Application September 13, 1937, Serial No. 163,657

11 Claims. (Cl. 242—11)

This invention relates to a cartridge winding machine and particularly to a machine adapted for the manufacture of oil filters from long threads of cellulosic material.

The invention is illustrated in the drawings, in which Figure 1 is a side elevation, partly in section and partly broken away, of the machine; Figure 2 is a plan view of the machine; Figure 3 is a detailed vertical transverse section taken along the line 3—3 in Figure 1; Figure 4 is a sectional side elevation in enlarged form showing a cartridge in the process of winding; Figure 5 is a similar enlarged view of the upper right hand portion of the apparatus shown in Figure 1; and Figure 6 is an end view taken along the line 6 in Figure 1.

The machine is particularly designed to manufacture cartridges of the type set forth in Hurn application 69,217, filed March 16, 1936.

As therein described, it is important that the filter cartridge be entirely uniform throughout and particularly that it should be incompressible under high operating oil pressure.

The formation of the cartridge is of great importance in the production of a successful filter. The material of the cartridge should be such that strong acids such as sulfuric, which may be formed in an internal combustion engine, will be chemically removed by the filtering material. Cellulosic fibers, such as cotton, paper and the like, will remove such acids, when formed, by reacting therewith. The material and its method of agglomeration must likewise be such as to prevent any substantial channeling of oil through the filter upon use. Channeling is extremely difficult to prevent, and any loose heterogeneous mass of material will channel badly unless special precautions are taken to prevent it. The cartridge should also be of such a density that it will permit oil to flow through it freely and yet remove from it the impurities, and likewise must have sufficient elasticity or rigidity that it will not compress markedly under the permitted stresses to which it is subjected.

The string material is pure cotton thread, free from lint and short ends and is what is known in the trade as thread stock in knotted form, which consists of broken bobbins of various sized threads. This material, for example, is known as 659 white yarn twist, preferably with a minimum thread size of 70, and a maximum of not over 40. These threads form loose yarns containing about 10 to 200 threads in each strand. These strands are passed through rollers to crush the knots, and then are ginned upon a large rotating wheel, having rows of teeth four to five inches apart and about an inch apart in the rows. The speed of the wheel is very important because if it is too great, the threads will be broken into short pieces, whereas it is of importance that they be in long strands, preferably many feet in length. The broken masses of threads are stretched out but do not lose their identity and may be in ribbons having the circumference of the wheel. Loose ends or short ends are discarded and the material is then weighed out in the desired amounts. A seven foot section of the material contains about enough thread for one cartridge. The rope of material is then divided in half to form a fourteen foot rope of half the size and is fed through the winding device.

The cartridge winding machine 10 comprises supports 11 carrying a platform 12, upon which is mounted the housing 13. Within the housing is an elongated shaft 14 provided with a longitudinal slot 15 into which the dog 16 is splined.

A sheave 17 driven by belts 18 rotates freely about the shaft. The clutch shoe 19 rides freely in an annular groove 20 in the dog 16. The shoe 19 is carried by the arm 21, which is actuated by the bell crank 22, which is operatively connected through the cable 23 to the foot pedal 24.

When the foot pedal is depressed, as shown in Figure 1, the arm 21 is retracted and the dog 16 registers with the teeth 25 carried by the sheave 17 and causes the shaft 14 to rotate. A spring 26 on the arm 21 urges the clutch shoe 19 into disengaged position upon release of the foot pedal 24.

At the outer end of the shaft 14, is a circumferential groove 30 within which the pin 31 carried by the bushing 32 is free to travel. Bushing 32 is pivotally attached to the bell crank 33, which is pivotally mounted at 34 on the platform 12. The arm 35 of the bell crank is provided with a slot 36 at its end portion and a lug 37 is mounted within this slot to provide a lost motion connection for the arm 38, which carries the lug. Arm 38 is pivotally mounted on the toothed wheel 39, which is driven by the worm gear 40. Gear 40 is on a shaft 41 provided with a groove 42, within which the dog 43 is splined. The dog 43 is provided with an annular groove 44 within which the clutch shoe 45 is carried. Clutch shoe 45 is urged into disengaged position by the spring 46, one end of which is carried by the shoe and the other by the frame 47.

The clutch shoe has an angle arm 48 connected through the cable 49 to the knee pedal 50. On actuation of the knee pedal, the clutch shoe forces

the dog 43 into engagement with the toothed member 51 carried by the shaft 52 of the motor 53. The clutch shoe is likewise provided with an extension 54, having a lug 55 which, upon actuation of the knee pedal, is forced under the catch 56 of the crank 58. This crank is pivotally mounted at 59 and its opposite end is provided with a cam surface 60. The wheel 39 carries a lug 61, which after one rotation of the wheel, engages the cam surface 60 and releases the lug 55, allowing the clutch to be forced into disengaged position by shoe 45. During the rotation of the wheel, the shaft 14 is first forced to the right to eject a cartridge from the machine, and is then withdrawn to its original position. By this means, it is impossible to stop the machine from making a complete ejection of the cartridge and return of the shaft, once the ejection has begun.

The housing 13 carries a cartridge receiving cylinder 70 provided with a longitudinal slot 71 in its upper surface. This slot is ordinarily about ⅜ths of an inch in width and is adapted to receive a ribbon of cellulosic material 72.

Within the cylinder is a chuck 73 carrying a pair of pins 74 adapted to register with openings in the base 75 of a cartridge. The chuck 73 is mounted by any suitable means, such as a pin 76, on the shaft 14, which extends completely through the cylinder 70. A closure member 80 is carried on the arm 81, which, in turn, is carried by the rack 82 which is operated by the pinion 83 upon actuation of the lever 84. The arm 81 is provided with a longitudinal slot 85, which is curved at 86. A pin 85*a* is positioned in the slot 85 and is carried by the sleeve 85*b*. Upon operation of the lever 84 the arm 81 (shown in Figure 2) is first moved to the right, withdrawing the closure member from the cylinder 70 and when the point 86 is reached, the closure member is swung upwardly and rearwardly out of the way.

The forward face of the closure member is dished as shown at 90 to provide a convenient means of centering the helix 91 carried by the base 75 of the cartridge. The face is likewise provided with a central opening 92 registering with the shaft 14 as shown in Figure 4.

A manually operable sleeve 100 is mounted upon the arm 101, which is pivotally mounted at 102 upon the support 103 carried by the platform 12. The arm 101 has an extension 104, which, upon movement of the sleeve into raised position, engages the detent member 105 and is frictionally held in raised position thereby.

The shaft 14 rotates within the sleeve 110 in the housing 13.

In the operation of the device, both clutches are thrown out, the sleeve mechanism 100 is lowered to its depressed position, and the closure member 80 is, of course, in its retracted position. A cartride base 75 is then placed into registration on the pins 74, the lever 84 is then actuated to swing the closure member into the cylinder 70 until the shoulder 93 thereof registers with the end 94 of the cylinder 70. In this position, the shaft 14 protrudes somewhat beyond the dished portion 90 as shown in Figure 4. A stocking 95 has preliminarily been attached to the base 75 of the cartridge and is now pulled out through the opening 92 of the closure member and allowed to hang, as shown in Figure 4. A rubber band 96, however, is fastened around the shaft 14 and about the stocking member snugly against the rear face of the closure member 80.

The closure member is then withdrawn in part, or it may be withdrawn as the winding operation proceeds.

In order to start the winding operation, the foot pedal 24 is depressed, bringing the clutch shoe 16 into engagement and rotating the shaft 14, which, in turn, rotates the chuck 73 and the cartridge base 75.

In many instances, a small amount of thread material is wrapped about the base of the cone and under the helix 91 before the cartridge base is inserted in the cylinder 70, because there is sometimes difficulty in securing complete and uniform stuffing at this point.

The spindle rotates at about 60 R. P. M. in such direction, depending upon whether the helix is left or right handed, that the end of the cotton fibers will be caught under the spring and held there. The cotton fibers are spread in a ribbon having a width approximately the length of the cartridge which is fed through the slot 71 while held by the workman under considerable tension. The material is fed to produce a uniform cartridge, the ribbon or strand being moved from side to side, if necessary, as one portion of the cartridge becomes more filled than another. The tension provided is sufficient that 7½ ounces of cotton fibers will occupy 62 cubic inches of cartridge space, although this may be varied depending upon the purpose to which the cartridge is to be put, from 6 to 11 ounces. If the material is wound too hard, it will expand after removal from the cylinder. The cartridge preferably should be able to stand with the spring and when in a housing, a pressure of 40 pounds per square inch without substantial compression.

When the material has been filled in, it will be in the form of spirally wound fibers in such manner that channeling does not occur on use of the cartridge.

During the winding operation, the closure member 80 may be moved in and out of the cylinder 70 to facilitate uniform winding. When the winding operation has been completed the closure member is completely retracted, the clutch, of course, being released. The stocking or bag 95 is then stretched over the cylinder 70, and the sleeve 100 raised to its upper position. The knee pedal 50 is then actuated, operating the clutch 45, thus driving the wheel 39 and thereby forcing the shaft and chuck to the right, as shown in Figure 5, so that the cartridge is pressed into the sleeve 100 and at the same time is pressed within the bag 95. The bag or stocking is then fastened over the base of the cartridge by means of a shirr string.

The operation is then recommended. After complete operation, a cartridge is forced from the sleeve 100 by the succeeding cartridge.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible in view of the prior art.

I claim:

1. In a cartridge winding machine, a shaft, means for driving the shaft, a cylinder associated therewith and having an axis in alignment with the axis of the shaft, means for mounting a cartridge base upon the shaft and within the cylinder, said cylinder having a longitudinal slot in a side thereof through which a cartridge material in loose form may be supplied to be wound

on the cartridge base, and means for urging a wound cartridge from the cylinder.

2. In a cartridge winding machine, a shaft, means for rotating the shaft, a cylinder associated therewith and having an axis in alignment with the axis of the shaft, means for mounting a cartridge base upon the shaft and within the cylinder, said cylinder having a longitudinal slot in a side thereof through which cartridge material in loose elongated form may be supplied to be wound on the cartridge base, means for urging a wound cartridge from the cylinder, and a removably mounted closure member at the opposite end of the cylinder from the cartridge mounting means and shaped to center a cartridge base within the cylinder.

3. A cartridge winding machine as set forth in claim 2, in which the inner face of the closure member is dished to center the cartridge base.

4. In a cartridge winding machine, a cylinder, means for rotating a cartridge base within the cylinder, said cylinder having a longitudinal slot through which cartridge material in loose form may be supplied to be wound on the cartridge base, and a removable closure member for the cylinder having an inwardly sloping inner face and a central opening therein.

5. In a cartridge winding machine, a shaft, means for rotating the shaft, a cylinder associated therewith and having an axis in alignment with the axis of the shaft, means for mounting a cartridge base upon the shaft and within the cylinder, said cylinder having a longitudinal slot in a side thereof through which cartridge material may be supplied to be wound on the cartridge base, means for urging a wound cartridge from the cylinder, and a removable sleeve adapted to register with the cylinder, into which the wound cartridge may be urged.

6. In a cartridge winding machine, a shaft, means for rotating the shaft, a cylinder associated therewith, means for mounting a cartridge base upon the shaft and within the cylinder, means for feeding cartridge material into the cylinder and winding it upon the cartridge base through rotation of the shaft, and means operatively connected to the cartridge mounting for urging the cartridge from the cylinder and for returning the mounting within the cylinder, said means for removing the cartridge and returning the mounting being adapted to be actuated by a single operation.

7. In a cartridge winding machine, an open ended cylinder having a longitudinal slot through which cartridge material in loose form may be supplied to be wound on a cartridge base within the cylinder, a chuck within the cylinder adapted to receive the base of the cartridge to be wound, and means for rotating the chuck.

8. In a cartridge winding machine, an open ended cylinder having a longitudinal slot through which cartridge material in loose form may be supplied to be wound on a cartridge base within the cylinder, a chuck within the cylinder adapted to receive the base of the cartridge to be wound, means for rotating the chuck, and a movably mounted cylindrical body adapted to be moved into longitudinal alignment with and abutting the first cylinder, and having an axial opening therein.

9. In a cartridge winding machine, a receiving cylinder, a chuck within the cylinder adapted to receive the base of a cartridge, said cylinder being supplied with a longitudinal slot through which cartridge material in loose form may be supplied to be wound upon the cartridge base, means for rotating the chuck, a movably mounted discharge sleeve having substantially the inner diameter of said receiving cylinder, and means for forcing a wound cartridge from the receiving cylinder into the sleeve.

10. In a cartridge winding machine for winding fibrous material upon a cartridge base, a cylinder, means for rotatably mounting one end of the cartridge base within the cylinder, means for centering the other end of the cartridge base, said centering means being provided with a central opening, and said cylinder being supplied with a longitudinal slot through which cartridge material may be supplied to be wound on the cartridge base.

11. A cartridge winding machine as set forth in claim 1 in which the shaft is supported at one end and is free at the other and of sufficient length to extend into and substantially through the cartridge base when it is in position upon the shaft.

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