

W. G. JOPSON.

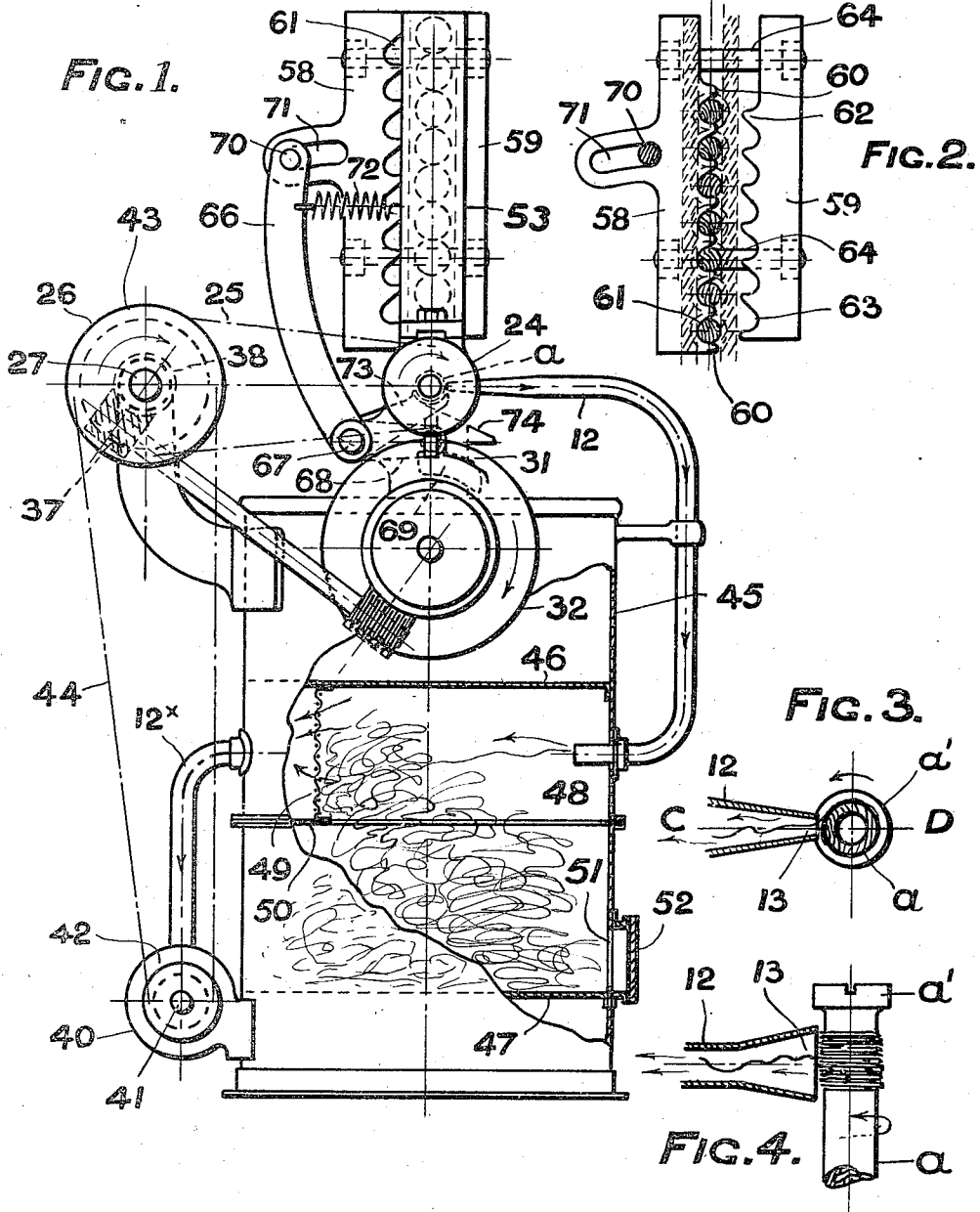
APPARATUS FOR REMOVING YARN FROM BOBBINS.

APPLICATION FILED JUNE 20, 1916.

Patented. Oct. 16, 1917.

1,243,071.

2 SHEETS—SHEET 1.



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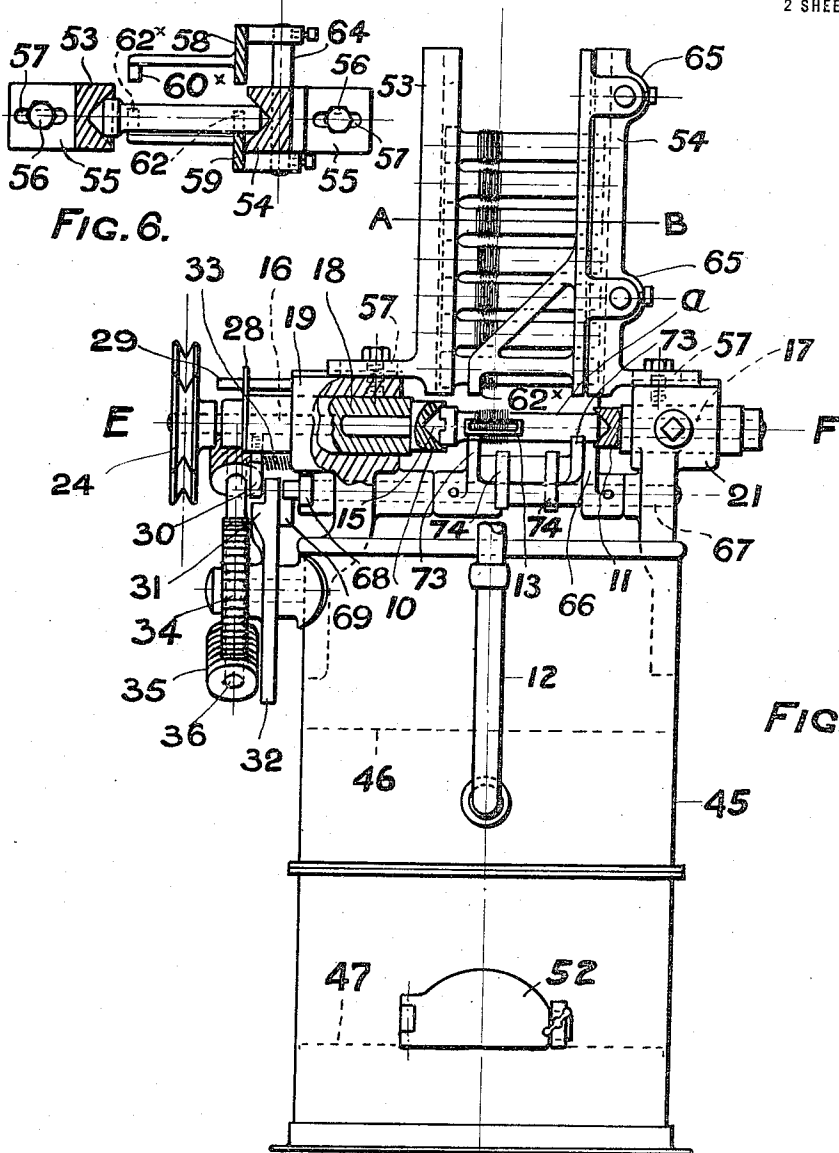
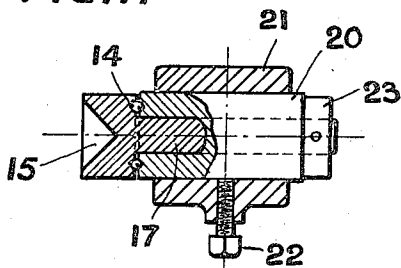


FIG. 6.

FIG. 5.

FIG. 7.



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APPARATUS FOR REMOVING YARN FROM BOBBINS.

1,243,071.

Specification of Letters Patent.

Patented Oct. 16, 1917.

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To all whom it may concern:

Be it known that I, WILLIAM G. JOPSON, a subject of the King of Great Britain, residing at Abington, in the county of Plymouth and State of Massachusetts, have invented new and useful Improvements in Apparatus for Removing Yarn from Bobbins, of which the following is a specification.

The object of the present invention is to provide an improved apparatus for removing yarn from bobbins. Hitherto there have been machines for this purpose, some of which slash the yarn while it is on the bobbins, and some of which have jaws that strip the yarn from the bobbin without slashing the yarn but which scrape the bobbin and incidentally injure the ribs or shoulders that are formed on the bobbin. The machines that slash the yarn also injure the bobbin, the cutting edge that is used to slash the yarn cutting into the wood of the bobbin and in some cases cleaving the bobbin in two.

My present improvement is embodied in an apparatus that has means for rotating a bobbin to unwind the yarn, and a pneumatic suction conduit arranged adjacent the bobbin and having an air inlet mouth into which the yarn, as it is unwound from the bobbin, is sucked by the inrushing air. The yarn is drawn through a section of the suction conduit and accumulates in a suitable receptacle, from which it may be removed in large quantities. The bobbin is not subjected to any harsh treatment in the course of having the yarn removed from it.

The invention contemplates the above-mentioned combination in its broadest aspect, regardless of the mechanical details necessary to accomplish the desired result in the most approved manner. There are, nevertheless, some mechanical details that are desirable in order to enable the fundamental combination to handle a large number of bobbins without requiring the services of an attendant other than to arrange the bobbins in a magazine from which they are fed automatically to the mechanism that removes the yarn.

Of the accompanying drawings that illustrate one form in which the present invention may be embodied:

Figure 1 represents an elevation, partly in section, of an apparatus including yarn-removing means, a magazine for bobbins, and automatic means arranged to feed the

bobbins one by one from the magazine to the yarn-removing means.

Fig. 2 represents an elevation of the feeding device by which the bobbins are fed from the magazine to the yarn-removing means, this device being shown in a different position from that shown in Fig. 1.

Fig. 3 represents a sectional view, in a vertical plane, including a bobbin and the receiving end of the pneumatic suction conduit in coöperative relation thereto.

Fig. 4 represents a horizontal section through the same structure as Fig. 3, in the plane indicated by line C—D of Fig. 3.

Fig. 5 represents an elevation, partly in section, of the assemblage shown by Fig. 1, the direction of view being from right to left with reference to Fig. 1.

Fig. 6 represents a horizontal section through the structure intersected by line A—B of Fig. 5.

Fig. 7 represents a horizontal section, on a larger scale, through the bobbin holder at the right of Fig. 5, the plane of the section being indicated by line E—F of Fig. 5, although the figure does not include all the structure within the length of said line.

The same reference characters indicate the same parts wherever they occur.

The bobbin *a* that is to have the yarn unwound from it is held by two coöperative holders 10, 11, and the pneumatic suction conduit through which the yarn is drawn is indicated at 12. The air-inlet opening into which the yarn is sucked is indicated at 13 (Figs. 3 and 4).

Both holders, 10 and 11, are adapted to rotate, and in the present instance holder 10 is driven and holder 11 is mounted in an anti-friction bearing 14 (Fig. 7) and is adapted to turn with the bobbin in consequence of its engagement with the bobbin. These holders are arranged upon a common axis, and their confronting ends are provided with conical cups 15 into which the ends respectively of the bobbins protrude. The conicity of the cups centers the bobbin relatively to the axis of the holders, and enables the holders to take bobbins of various diameters.

Holder 10 includes a shaft 16, and holder 11 includes a shaft 17. Shaft 16 is mounted in a sleeve 18, and this sleeve is mounted in a fixture 19. The sleeve is moved endwise by automatic mechanism hereinafter described, to take up and discharge the bobbins. Shaft

17 of the idle holder 11 is mounted in a sleeve 20, and this sleeve is mounted in a fixture 21 and is held by a set screw 22. By loosening the set-screw and adjusting sleeve 20 in or out the idle holder may be adjusted according to the length of the bobbins that are to be handled. A collar 23 is pinned or otherwise affixed to the outer end of shaft 17 to keep the idle holder and its anti-friction bearing intact. The diameter of both holders is less than the diameter of their respective sleeves, and consequently the holders and their sleeves are capable of being withdrawn intact from their respective fixtures, for cleaning, lubricating, or other purposes.

Shaft 16 of the driven holder is provided with a groove-pulley 24. This pulley is adapted to be driven by a belt indicated conventionally at 25 in Fig. 1. The driving pulley for such belt is indicated at 26 and is mounted upon a prime drive shaft 27. A plate 28 affixed to sleeve 18 has a hole bored in it to receive a pin 29, said pin being affixed to fixture 19 and arranged parallel to the axis of the shaft. The function of the plate and pin is to prevent the sleeve from turning, but the plate is adapted to slide back and forth along the pin to enable the holder 10 to be moved in and out.

A pin 30 projecting downwardly from sleeve 18 is arranged to be engaged by a cam portion 31 carried by a rotary disk 32. This cam portion is adapted to retract the sleeve and holder, and the return movement of the sleeve and holder is caused by a helical tension spring 33 connected to pin 30. Cam disk 32 is provided with a worm gear 34, and this gear is driven by a worm 35 carried by shaft 36. A spiral gear 37 affixed to this shaft is driven by a spiral gear 38 on shaft 27.

In order to show a complete self-contained apparatus I have included a fan blower 40, but it will be understood that since a great many mills are provided with pneumatic suction conduits for other purposes it would not be necessary to provide the yarn-removing apparatus with a special fan blower, provided the yarn-removing pipe were connected to the vacuum conduit already installed. As shown by Fig. 1 the shaft 41 of the fan blower is provided with a pulley 42, and this pulley is driven by pulley 43 on shaft 27 through the medium of a belt indicated conventionally at 44. The entire apparatus is mounted upon a base 45 that is in the form of a cylindrical shell. This shell is provided with horizontal partitions 46 and 47 that provide an air-tight waste-receiving chamber 48. The yarn-conducting pipe 12 extends into the shell 45, and its delivery end is arranged in the chamber 48. Communication between the blower 40 and chamber 48 is afforded by a suction

pipe 12*. A screen 49 of any suitable fabric is fastened to partition 46 and to a plate 50 to prevent the yarn and dust from leaving the shell through pipe 12*. All the yarn and dust that enters the chamber 48 from pipe 12 settles upon the bottom partition 47 and may be removed from time to time through a hand-hole 51 that has a detachable air-tight cover 52.

According to the mechanism shown, the bobbin would have a predetermined number of unwinding revolutions imparted to it before it is released by the action of cam 31. It is, of course, impossible to determine just how many convolutions of yarn will be left upon the bobbins, but the average number of convolutions can be determined and due allowance made therefor in determining the ratio of the gearing by which the bobbin is rotated and by which the discharging cam is driven. If a bobbin should have an excessive quantity of waste on it and should be discharged before all the waste is unwound, the yarn would be broken by the premature discharge and the bobbin could then be put back in the machine for another operation.

The magazine, in the present instance, comprises two coöperative grooved bars 53, 54 that form a chute. These bars are provided with feet 55 that are mounted upon the fixtures 19 and 21 respectively, and are secured by clamping bolts 56. In order to provide for adjustment of the bars toward and from each other the feet 55 are formed with slots 57 through which the shanks of the clamping bolts extend. When it is desired to adjust the bars 53, 54 according to the length of the bobbins, the bar 54 will be moved in or out; and when it is desired to make suitable adjustment according to the diameter of the large end of the bobbins, bar 53 will be adjusted in or out.

When the bobbins are in the magazine their large ends *a'* rest one upon another. It is not desirable to let the small ends of the bobbins rest one upon another because in that case it would be impossible to keep the axes of the bobbins parallel. I have provided an escapement that maintains the bobbins in parallel relation in the magazine and that discharges them one by one in keeping with the discharge of bobbins from the yarn-removing mechanism. The escapement device comprises two coöperative bars 58, 59. Bar 58 is provided with a series of teeth 60 that are spaced apart a distance equal to the diameter of the large end of the bobbins. The recesses 61 between the teeth are curved to conform to the small ends of the bobbins. Bar 59 is provided with teeth 62 and recesses 63 substantially like the teeth and recesses of bar 58, but the teeth and recesses of one bar are staggered with relation to those of the other

bar, as clearly shown by Fig. 2. The two escapement bars are moved horizontally in unison to enable the bobbins to drop step by step, the bobbins being thereby enabled to drop from the recesses of one bar into those of the other and vice versa as the bars are reciprocated. In the present instance the bars are rigidly connected to horizontal pins 64, and said pins are arranged to slide in bearings 65 formed in grooved bar 54. All the teeth 60 and 62 are arranged to contact with the small ends of the bobbins, but escapement bar 58 has one extra tooth 60* that is a companion to its lowest tooth 60, and bar 59 has one extra tooth 62* that is a companion to its lowest tooth 62. The teeth 60* and 62* are arranged to coact with the smaller portion of the bobbin near the large end, as shown by Figs. 5 and 6, to support the lowest bobbin in the magazine so that its axis will remain horizontal.

The escapement device is operated by a bell-crank lever that includes a long arm 66, a rockshaft 67, and a short arm 68. The latter is actuated by a cam 69. A stud 70 at the upper end of arm 66 occupies a slot 71 formed in escapement bar 58. The purpose of the slot is to enable rockshaft 67 to have a greater angular movement than that required to operate the escapement device, because the rockshaft carries a bobbin-registering device, hereinafter described, that requires the greater angular movement. Referring to Fig. 1, arm 66 is moved from right to left by cam 69, and is returned by a helical tension spring 72.

The bobbin-registering device above referred to comprises a pair of arms 73. These arms are affixed to rockshaft 67 and their free ends are formed with depressions, as shown by dotted lines in Fig. 1, and are arranged to catch the bobbin that is dropped from the escapement device, to register the bobbin in relation to the holders 10 and 11.

The operation of the automatic mechanisms is as follows. During the yarn-removing operation the escapement device remains in the position shown by Fig. 2, and the lowest bobbin in the magazine is supported by the lowest tooth 60 and its companion 60*. At this time the bobbin-registering arms 73 would not be in the position shown by Fig. 1, but would be in a lower position. The bobbin is rotated at a relatively high rate of speed, but cam disk 32 is rotated at a relatively slow speed, since the latter is intended to have only one complete revolution while all the yarn is being unwound from the bobbin. Assuming that all the yarn has been removed from the bobbin that is in the holders 10 and 11, cam portion 31 will in due course act upon pin 30 to retract holder 10. This will release the empty bobbin and the latter will drop upon a pair of inclined deflecting members 74 and will

be discharged to one side of the apparatus. While the holder 10 is held in its outer position by cam portion 31, cam portion 69 on the opposite side of the disk raises arm 68 and thus turns rockshaft 67 to place the bobbin-registering arms 73 in position to catch the next bobbin when the latter is dropped by the escapement device. Slot 71 in the escapement device enables the arms 73 to move upwardly a considerable distance before the next bobbin is dropped; but when stud 70 has traversed the full length of the slot, further movement causes the escapement device to move to the left from the position shown by Fig. 2 to that shown by Fig. 1. The lowest bobbin in the magazine is thus permitted to drop, and all the remaining bobbins drop from the notches 61 into notches 63 and are thereby fed downwardly a distance less than their greatest diameter. By the time the lowest bobbin in the magazine has been discharged, the registering arms 73 will have reached the position shown by Fig. 1, and thus the bobbin will be supported in register with the holders 10 and 11. While the arms 73 remain in registering position, cam portion 31 passes beyond pin 30 and spring 33 thereupon acts to return holder 10 to bobbin-engaging position as shown by Fig. 5. The bobbin is thus moved slightly to the left so that its smaller end will enter the cup 15 of the holder 11. As soon as the bobbin is clamped by holders 10 and 11, cam portion 69 passes beyond arm 68, whereupon spring 72 acts to lower registering arms 73 and to return the escapement device to its normal position as shown by Fig. 2. During the return movement of the escapement device all the bobbins that remain in the magazine drop from notches 63 into notches 61, all the bobbins having moved downward a distance equal to their greatest diameter, and the lowest bobbin being then in position to be discharged upon the next movement of the escapement device from right to left.

Although the magazine as shown has a capacity of only eight bobbins, it is to be understood that a magazine of larger capacity would be within the scope of the invention.

I claim:

1. An apparatus for removing yarn from bobbins, comprising a pneumatic suction conduit having an air inlet mouth, means arranged to sustain a bobbin outside and crosswise of said conduit, with the yarn in register with said mouth, and means arranged to rotate the bobbin to unwind the yarn.

2. An apparatus for removing yarn from bobbins, comprising two separated cooperative holders arranged to hold the ends, respectively, of a bobbin, a pneumatic suction conduit having an air inlet mouth adjacent the yarn that is on the bobbin, and means

arranged to rotate one of said holders to unwind the yarn.

3. An apparatus for removing yarn from bobbins, comprising two separated holders one of which is movable toward and from the other, said holders being arranged to hold the ends, respectively, of a bobbin, a pneumatic suction conduit having an air inlet mouth adjacent the yarn that is on the bobbin, and means arranged to rotate one of said holders to unwind the yarn.

4. An apparatus for removing yarn from bobbins, comprising two separate holders, one of which is rotatable, said holders being arranged to hold the ends, respectively, of a bobbin, a pneumatic suction conduit having an air inlet mouth adjacent the yarn that is on the bobbin, and means arranged to rotate said rotatable holder to unwind the yarn.

5. An apparatus for removing yarn from bobbins, comprising two holders arranged to hold the ends, respectively, of a bobbin, a pneumatic suction conduit having an air inlet mouth adjacent the yarn that is on the bobbin, means arranged to rotate the bobbin to unwind the yarn, and means arranged to retract one of said holders from the other to release the bobbin.

6. An apparatus for removing yarn from bobbins, comprising cooperative holders, one

of which is movable toward and from the other, means arranged to support a bobbin between said holders with its ends in register with said holders respectively, means arranged to move said movable holder toward the other to cause a conjoint clamping action of said holders upon the ends of the bobbin, whereby said holders are caused to sustain the bobbin, a pneumatic suction conduit having an air inlet mouth adjacent the yarn that is on the bobbin, means arranged to rotate the bobbin to unwind the yarn, and means arranged to retract said movable holder to release the bobbin.

7. An apparatus for removing yarn from bobbins, comprising a bobbin magazine, means arranged to discharge the bobbins, one by one, from said magazine, means arranged to register the discharged bobbin in a predetermined position, means arranged to clamp the registered bobbin by its ends, said clamping means including a rotatable bobbin-engaging element, means arranged to rotate said element to unwind the yarn, and a pneumatic suction conduit having an air inlet mouth arranged adjacent the yarn that is on the bobbin.

In testimony whereof I have affixed my signature.

WILLIAM G. JOPSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."