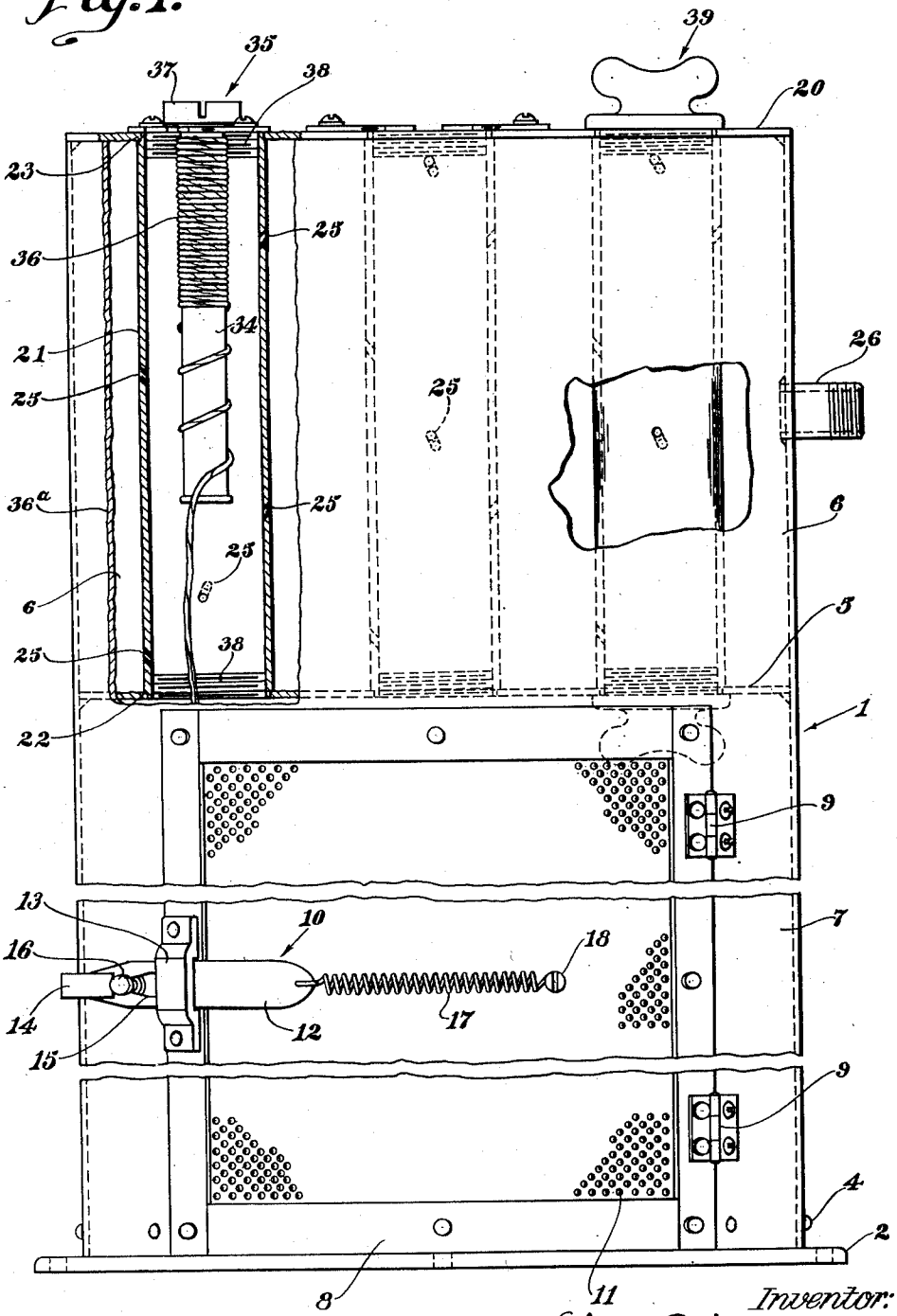
July 31, 1934. E. A. TERRELL 1,968,791

PNEUMATIC BOBBIN STRIPPING APPARATUS AND METHOD

Filed May 16, 1931 3 Sheets-Sheet 1

Fig. 1.



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PNEUMATIC BOBBIN STRIPPING APPARATUS AND METHOD

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Fig. 2.

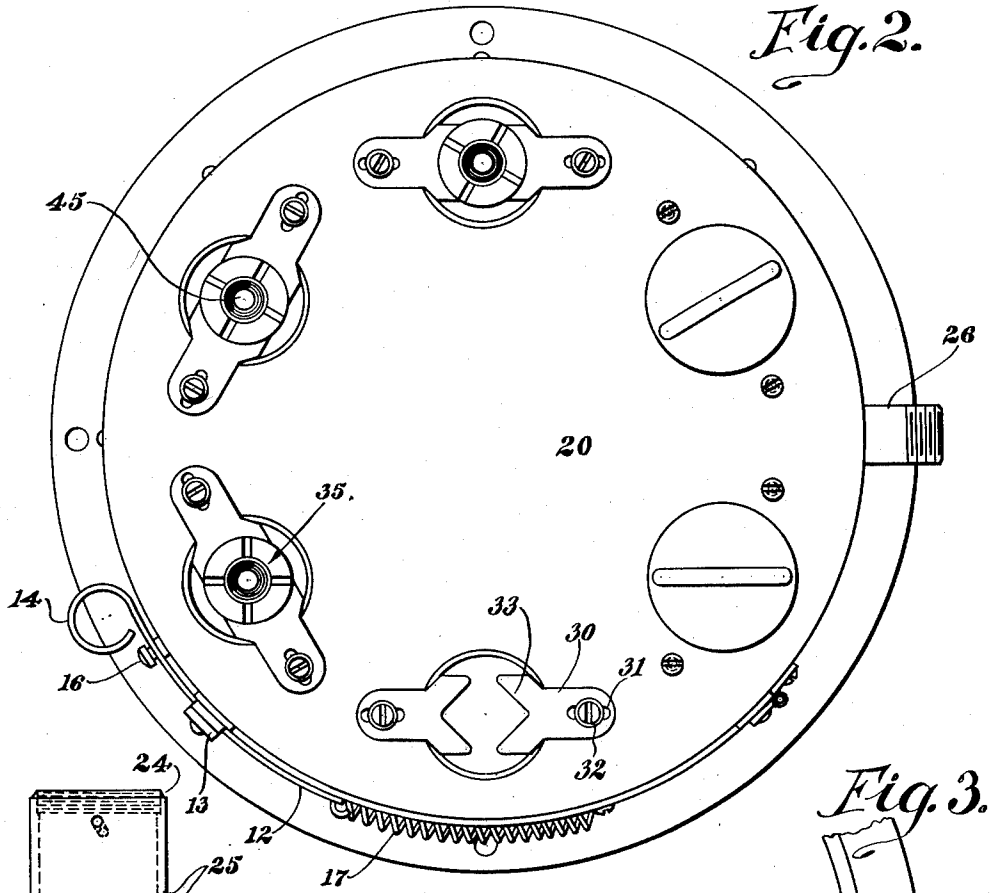
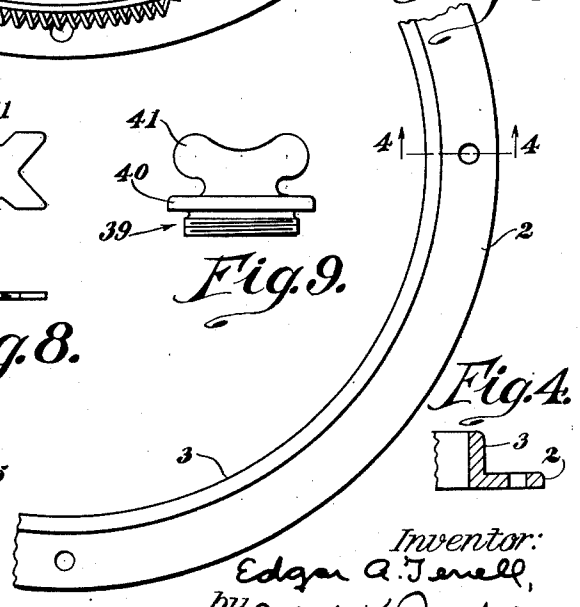


Fig. 3.



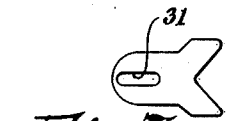


Fig. 7.

Fig. 9.

Fig. 8.

Fig. 4.

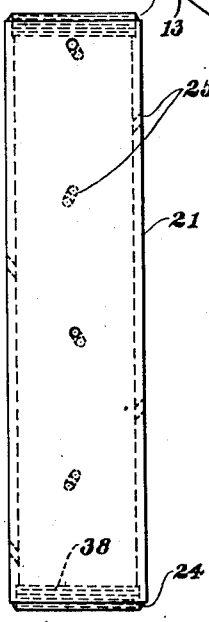


Fig. 5.

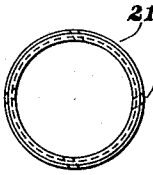


Fig. 6.

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PNEUMATIC BOBBIN STRIPPING APPARATUS AND METHOD

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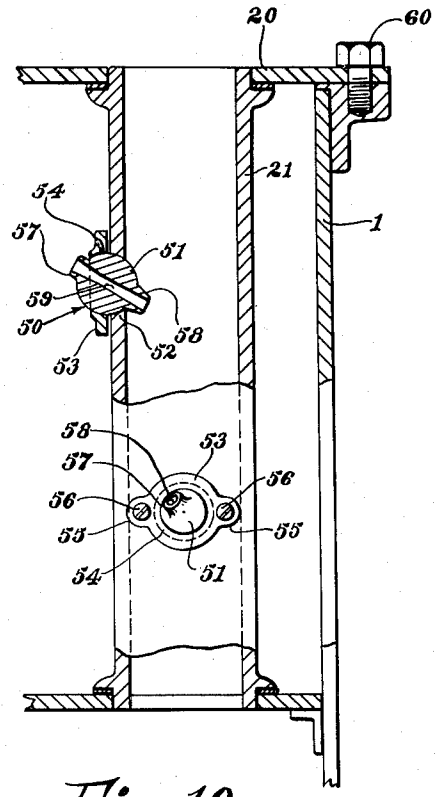


Fig. 10.

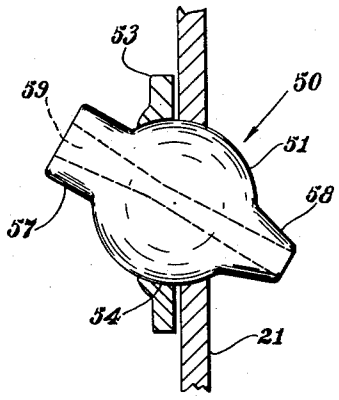


Fig. 11.

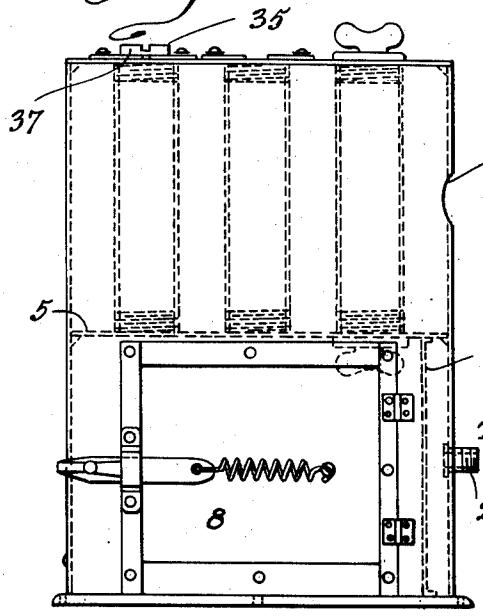


Fig. 12.

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UNITED STATES PATENT OFFICE

1,968,791

PNEUMATIC BOBBIN STRIPPING APPARATUS AND METHOD

Edgar A. Terrell, Charlotte, N. C., assignor to The Terrell Machine Company, Charlotte, N. C., a corporation of North Carolina

Application May 16, 1931, Serial No. 537,823

20 Claims. (Cl. 28—19)

The invention relates to methods and apparatus for pneumatically stripping waste yarn from bobbins.

A principal feature of novelty and advantage is the provision of means for directing a plurality of air jets under suitable pressure in directions generally toward and angularly along the axis of a waste-bearing bobbin supported or positioned for stripping, the inclination of the jets being toward the tip-end of the barrel, and the jets being preferably also directed substantially tangentially to the barrel, producing a flow of air spirally around the bobbin, resulting in rapid and complete unwinding and removal of the waste yarn. When the bobbin being stripped is supported for rotation, the described jet arrangement also has the effect of rapidly rotating the bobbin in a direction opposite to that of the tangential path of the jets, thus to unwind and pay-off the yarn, as well as carrying the end of yarn reversely around the axis of the bobbin, so that the stripping action is by this rotation additionally greatly augmented.

Briefly described, in accordance with the embodiment here disclosed, the general plan of construction and operation is such that the bobbin to be cleared of waste is placed in a sleeeve or flue provided with apertures constituting nozzles directed downward and tangentially inward in a direction opposite to the direction of winding of the yarn upon the bobbin. The tube or flue is located in the air jacket or casing to which air is supplied under suitable pressure. The air jets directed into the tube and toward the bobbin, in the manner stated, cause the free end, and following portions of the yarn, to unwind from the bobbin and to pass down through the tube and out of its lower end into a suitable chamber such as a lower compartment, to receive and retain the waste and permit escape of air.

Preferably the bobbin is mounted or suspended in the flue or tube in such manner that it is free to rotate, and when it is subjected to the action of air jets in the stated manner, properly arranged in the tube wall in relation to the bobbin and bobbin winding (as later more fully explained), the action or reaction of the air jets upon the bobbin and yarn, or the pull exerted on the yarn by the air suction, and acting upon the bobbin, causes the latter to rotate rapidly in a direction opposite to the direction of the air jets and also opposite to the direction of winding, thus greatly expediting the unwinding and cleaning action.

Preferably, a plurality of the tubes or flues are arranged in the air jacket, permitting simultaneous placing of and simultaneous cleaning action upon a plurality of bobbins, which are inserted and removed in sequence; and provision is also made for closing one or more of the tubes, when desired, to avoid waste of compressed air when it is unnecesssary to use the total number of tubes.

The air draft through the tube created by the air jets also acts on the injector principle to cause external air to be drawn downward through the bobbin bore, to remove therefrom accumulated dirt, lint, etc.

The invention also includes means for adjustably mounting the air nozzles upon their tubes or flues, so that the direction of the jets may be varied in accordance with the diameter of the bobbin-barrel, or for other reasons.

Preferably, each tube is provided at its upper end with bobbin supports in the nature of chucks or jaws, to engage under and support the bobbin head, desirably in such manner as to permit bobbin rotation, and preferably also the supports or jaws are adjustable to accommodate different dimensions of bobbin barrels adjacent the head.

The methods or processes included in the invention will sufficiently be understood from the preceding and following description of the modes of operation of the apparatus; but it is to be understood that the method is not limited to performance by the apparatus shown.

The characteristics and advantages of the invention are further sufficiently explained in connection with the following detailed description of the accompanying drawings, which show one representative embodiment. After considering this example, persons skilled in the art will understand that many variations may be made without departing from the principles disclosed, and I contemplate the employment of any structures or methods that are properly within the scope of the appended claims.

Fig. 1 is a side elevation of a stripping apparatus embodying the invention in one form, with some parts broken away and in section.

Fig. 2 is a top view.

Fig. 3 is a fragmentary plan detail of a base ring or plate.

Fig. 4 is a section at 4—4 in Fig. 3.

Fig. 5 is a side elevation of a single bobbin-receiving flue or tube.

Fig. 6 is a bottom plan of the same.

Fig. 7 is a plan view of one of the adjustable bobbin supports or chuck members.

Fig. 8 is an edge view of the same.

Fig. 9 is a side elevation of a tube-closing screw or plug.

Fig. 10 is a combined elevation and section of a flue with adjustably mounted air nozzles.

Fig. 11 is a detail view of one of the adjustable nozzles.

Fig. 12 shows the arrangement of the device when operated by exhausting the air, instead of by compressed air.

A sheet metal shell or casing 1, usually cylindrical, is supported on a base-ring 2. This has a vertical angular flange 3 telescoped within the lower end of the shell, which is secured by it as by rivets 4. The shell or casing is divided by a substantially central horizontal partition wall 5 into an upper portion 6 constituting an air jacket, and a lower portion 7 constituting a waste-receiving chamber. For convenient removal of waste this waste-chamber has a door 8 hinged at 9 and provided with a quickly operable latch mechanism 10. Discharge of air from the waste-chamber may be sufficiently provided for by perforations 11 of a screen constituting the center frame of the door, although of course the main jacket wall may also be perforated if desired.

The top of the air jacket 6 is closed by a top-plate 20.

One, or as here shown, a plurality of bobbin-receiving tubes or flues 21 are arranged to pass vertically through the air jacket. In a convenient arrangement the tubes are equally spaced in a circular series, as best understood from Fig. 2. Plates 5 and 20 have vertically aligned apertures 22 and 23, to receive the tube ends, which may be tapered or shouldered as at 24, Fig. 5, and the ends may be secured in the apertures either permanently as by swaging or pressing the tube ends outward, or brazing, soldering, etc., or the tubes may be made removable to permit substitution of other tubes having nozzles of different angularity to accommodate bobbins of different diameters. Each tube has a plurality of apertures 25 of moderate diameter, constituting nozzles, and these nozzle holes are bored through the tube in such manner that they are directed inward and downward at a substantial angle to both the vertical and horizontal planes, say substantially 45°, more or less, to the tube axis, and are also directed inward in a substantially tangential direction in relation to the surface of a bobbin barrel located in the tube. Thus, as best shown in Fig. 6 and by comparison with Figs. 1 and 5, the axis of each tube aperture or nozzle is not directed radially toward the tube axis, but has the direction of a tangent of an imaginary circle of approximately the same diameter as the bobbin barrel. The angle of the nozzle axes in transverse planes of the tube, in relation to radii intersecting the nozzles, may be substantially 30° (more or less) depending on the diameter of the bobbin and of the tube.

Desiredly, the series of nozzles or nozzle apertures follows the course or arrangement of a helix, the lead of which is preferably opposite to the direction of yarn-winding on the bobbin, and the nozzle axes are also so directed angularly or tangentially toward the bobbin barrel that the air jets from these nozzles move in the direction counter to that of the yarn-winding.

Air under suitable pressure from any desired source, such as an accumulator or blower, is supplied to the air jacket 6 through any convenient nipple or other air connection such as 26.

Means is provided at the top of each tube for the support of a bobbin therein, this means being in the nature of jaws or chuck members engaging under the bobbin head and embracing the barrel adjacent the head with substantial looseness. Thus, as shown in Figs. 1 and 2, for each tube, two chuck or jaw-plates 30 are provided, one of these being shown in detail in Figs. 7 and 8. Each chuck-piece has in its shank portion a lengthwise slot 31, and a screw 32 passes through the slot and engages in the top-plate 20, to secure the chuck-piece to the plate for adjustment toward and from the tube axis. Confronting such axis the chuck-plate is cut concave herein to provide jaws or jaw-faces 33, relatively angularly arranged. The chuck-pieces are adjusted to receive the barrel 34 of a bobbin 35, Fig. 1, with liberal clearance, and also to provide sufficient clearance for the waste 36 thereon; and when the bobbin is inserted its head 37 overlaps the jaws of the chuck-members, providing for support of the bobbin and also providing freedom for rotation, while the bobbin is centered with sufficient accuracy in relation to the tube axis by the jaw formations 33.

Provision is made for closing the upper and lower ends of any tubes which are not required for use. For this purpose, suitable plugs are removably inserted in the tube ends. As shown, each tube is provided with an internal screw thread 38 at each end, to receive the threaded end of a screw-plug 39 (shown in detail in Fig. 9). This plug has a flange 40 overlapping the tube end, and a flattened handle or finger-piece 41 for convenient manipulation. Fig. 1 shows one of the tubes, and Fig. 2 shows two of the tubes, closed by the inserted plugs, thus avoiding any wastage of air through these tubes when not in use, as for example, when the number of bobbins accumulating for stripping is not equal to the full capacity of the apparatus.

In stripping short bobbins, whose barrels terminate above the lower nozzle apertures, such apertures may be temporarily closed by removable plugs.

It is found in practice that an apparatus with fixed air jets, as so far described, efficiently strips bobbins having greatly varying barrel diameters. Provision may be made, however, as shown in Figs. 10 and 11, for adjusting the jet directions whenever necessary or desirable, as for cleaning bobbins of right-hand or left-hand wind. In this arrangement, each flue or tube 21 is provided with a plurality of movably mounted nozzle pieces 50, each of which has a spherical body 51 engaging in a part spherical socket 52, or aperture in the tube-wall, and is secured in angularly-adjusted position by a retainer 53, having a part spherical socket formation 54 and ears 55 through which screws 56 pass and engage in tapped holes in the tube-wall, to clamp the nozzle body in position. At its outward side the body preferably has a handle projection 57 affording means for convenient manipulation, and it may preferably but not necessarily also have at the inward side a projecting member 58. The jet hole 59 (preferably of Venturi form, as shown) is bored through the body and its extensions 57 and 58. Fig. 10 also shows that the top-plate 20 may be removably secured to the casing 1 as by screws 60, thus providing for easy access to and removal of the tubes 21, for adjustment of the nozzles, or in order to insert plugs in lower fixed nozzle apertures of the tubes shown in previous figures, as above referred to.

In accordance with the preferred procedure,

the operator places bobbins carrying waste in all of the tubes which are available for use (that is, all of the tubes of the apparatus, or all which are not rendered inactive by insertion of the plugs). The unwinding action then takes place simultaneously on all of the bobbins and the operator removes the stripped bobbins and replaces them with waste-carrying bobbins, in regular sequence.

A bobbin carrying waste being placed in a tube as shown in Fig. 1, air under pressure in the jacket surrounding the tube passes inward through all of the apertures 25, in the form of jets directed angularly downwardly and inward and also substantially tangentially in a direction counter to the direction of yarn-winding, producing strong air-currents whirling spirally around and along the bobbin. Any jet adjacent the free end of the waste will thus lift such end away from the bobbin and move it downward and in a rotary direction counter to its direction of winding, and all of the jets then act to rapidly unwind following portions of the waste and carry it downward through the tube and into the waste-chamber, thus rapidly stripping the waste from the bobbin regardless of any rotary movement thereof or if such rotary movement is definitely prevented.

By the described means or mode of bobbin support, in which the under face of the head rests lightly on the upper faces of the chuck-members 30, the bobbin readily rotates in response to any rotary force applied. The action of the air jets arranged and directed in the manner stated is such that the bobbin is rapidly rotated, in a direction opposite to the direction of the air jets and also opposite to the direction of winding of the yarn, so that the unwinding and cleaning action is very greatly expedited and made more positive and effective.

In addition to the more or less direct effect of the jets acting upon the waste thread or yarn to free and unwind it from the barrel, the combined jets of course produce a powerful down draft or current of air through the tube about the bobbin and out of the lower end of the tube into the waste-chamber to carry down the freed waste. This air issues through apertures in the chamber or its door (or door-screen, as shown), the waste being retained in the chamber.

The action of the air jets or the down draft in the tube also produces an induced draft of external air through the bobbin-bore 45. As otherwise described, the air flow produced by the jets has an injector action effective at the lower end of the bobbin bore whereby air is drawn in at the top of the bore and through it, to clean out lint, dust, etc., which may have accumulated therein, this lint or dirt being discharged into the waste-chamber along with the waste.

It will now be understood that in a broader aspect of the invention, the described construction, or arrangement including the air jacket, one or more tubes or flues, and air jet holes therein, is a representative embodiment of any suitable means or arrangement for effecting waste-removal from a bobbin or the like, by directing toward or against the bobbin barrel, air jets which move spirally around it preferably in a direction opposite to that of the yarn-winding; and also (when desired) for producing by the action or reaction of such air jets and the total air-flow, or by the reactive effect of pull on the waste yarn so produced, or a combination of such actions or effects, a rotation of the bobbin in a direction adapted to unwind the yarn therefrom, whereby the effectiveness and speed of the stripping operation are greatly enhanced.

It is to be understood that it is unnecessary for the bobbin to be rotated in order to be properly stripped and cleaned by the jets.

While I have described an arrangement in which air is supplied under pressure from a blower or accumulator to the air-jacket 6, it will be understood that instead, if desired, air may be exhausted from the discharge ends of the flues 21, by means of the arrangement shown in Fig. 12. Therein, the construction is as described, except that an aperture 29 permitting free entrance of atmospheric air replaces the compressed air inlet 26, and the door 8 as well as the rest of the casing is imprevious to air. A screen 28 extends across the chord of a portion of the waste chamber, to screen an exhaust port 27 in the side of this waste chamber which is connected to a vacuum pump to exhaust the air from the waste chamber and the tubes in free communication with the latter. Air jets will in this case be caused to flow through the nozzle apertures in the desired manner, by pressure of atmosphere surrounding the flues. In either case the air jets are caused to flow through the nozzles and tangentially or angularly toward the bobbin barrel in the manner and with results fully described above.

Since the maximum pressure available when the exhaust method is used, is approximately fifteen pounds per square inch, and there is no definite limit to the pressure at which air may be supplied to the air-jacket 6 by a compressor or the like, the latter mode of operation is preferred in some cases, and especially whenever the desired pressure-difference between the discharge ends of the flues and the outward ends of the nozzle apertures, is greater than fifteen pounds per square inch.

The door latch 10, as shown, consists of an arcuate latch strip 12 guided on the door by a guide-piece 13 secured thereto. At its end away from the door the latch has a finger-piece such as the loop-formation 14. Adjacent this finger-piece the latch strap has an opening 15 of key-hole form to cooperate with a headed stud 16 set in the casing wall. The latch is normally retracted by a spring 17 secured to a stud or screw 18 on the door. Figs. 1 and 2 show the latch in door-retaining position. To open the door the latch is moved arcuately by grasping the finger-piece, to bring the enlarged portion of the key-hole aperture 15 to a position adjacent the stud axis, whereupon the latch will clear the stud and the door may be opened and accumulation of waste removed from the waste-chamber.

What is claimed as the invention is:—

1. The method of removing waste yarn from a bobbin or the like, comprising supporting the bobbin for rotation, and causing it to rotate by directing an air jet substantially tangentially toward the bobbin.

2. The method of removing waste yarn from a bobbin or the like, comprising supporting the bobbin for rotation, and directing air jets substantially tangentially toward the bobbin barrel in a direction counter to the direction of waste-winding thereon, whereby the bobbin is rotated in a direction opposite to that of the air-flow and the waste is removed.

3. The method of removing waste from a bobbin or the like, comprising supporting the bobbin for stripping, and unwinding the waste therefrom by directing an air jet spirally around the bobbin.

4. The method of removing waste yarn from a bobbin characterized by directing an air jet spirally around the bobbin to unwind the waste yarn.

5. In a bobbin-stripper, the combination with means for locating a waste-carrying bobbin for stripping, of means for directing an air jet spirally around the bobbin barrel.

6. In a bobbin-stripper, the combination with means for locating a waste-carrying bobbin for stripping, of means for directing a plurality of air jets spirally around the bobbin barrel and in a direction opposite to that of the waste winding.

7. A pneumatic bobbin-stripper having in combination, means for rotatably supporting a waste-carrying bobbin, and means for directing air substantially tangentially toward the bobbin producing rotation of the bobbin and stripping the waste therefrom.

8. A pneumatic bobbin-stripper having in combination, a tubular enclosure, means supporting a waste-carrying bobbin therein with capacity for rotation, and means for directing air-flow substantially tangentially within the enclosure about the bobbin whereby it is rotated and the waste removed.

9. A pneumatic bobbin-stripper having in combination, a tubular enclosure, means supporting a waste-carrying bobbin therein with capacity for rotation, and means for directing a plurality of air jets angularly toward and along the bobbin in the direction of its tip whereby the bobbin is revolved and the waste removed.

10. In a bobbin-stripper, the combination with a waste-carrying bobbin revolubly supported for stripping, of means for directing a plurality of air jets generally convergently and tangentially in relation to the bobbin barrel, causing bobbin rotation and expedited stripping action.

11. Stripping apparatus for bobbins or the like comprising a bobbin support, and means for directing a plurality of air jets inwardly and angularly toward the barrel of a supported bobbin to produce a flow of air which whirls around the bobbin to unwind and remove waste therefrom.

12. Stripping apparatus for bobbins or the like comprising a tube and means for locating a waste-carrying bobbin therein, the tube having a plurality of air nozzles directed inwardly and angularly with respect to the axis in a direction away from the bobbin head, and means for supplying air under pressure to the nozzles, the inward and angular relation of the latter producing a whirling flow of air within the tube spirally around and along the bobbin.

13. In a bobbin-stripper, in combination, means for supporting a waste-bearing bobbin for stripping, and means for unwinding the waste yarn from the barrel and for simultaneously cleaning the bore of the bobbin, including air-jets directed spirally around and along the bobbin to unwind the yarn, such air-jets inducing a flow of air through the bore.

14. In a bobbin-stripper, in combination, means for supporting a waste-bearing bobbin with capacity for rotation about its own axis, and means for simultaneously unwinding the waste yarn by carrying the freed portion of the yarn around the axis of the bobbin, and rotating the bobbin counter to the unwinding movement of such freed portion.

15. In a bobbin-stripper, in combination, means for supporting a waste-bearing bobbin with capacity for rotation, and means for directing air-currents obliquely of the bobbin to carry the freed end of the waste yarn around the bobbin axis and to rotate the bobbin.

16. Bobbin stripping apparatus having in combination a support for a waste-bearing bobbin, and means for producing air currents directed spirally around the bobbin surface to unwind the waste and along the surface to carry off the waste as unwound.

17. Stripping apparatus for bobbins or the like comprising a tube adapted to enclose freely a bobbin barrel, air-supply means, means supporting a bobbin for rotation with its barrel within the tube, the tube having formations providing a plurality of air nozzles directed substantially inwardly and tangentially in relation to the barrel and producing rotation of the bobbin in a direction opposite to that of the air jets.

18. Bobbin-stripping apparatus comprising an air jacket adapted for containing air under pressure, a tube passing through the jacket, and means for supporting a waste-carrying bobbin in the tube, the tube having a plurality of nozzles directed substantially tangentially toward the bobbin barrel, the air jets supplied through the nozzles from the jacket acting to unwind the waste.

19. Bobbin-stripping mechanism, comprising a tube adapted to receive a bobbin for stripping, and a plurality of air jet nozzles adjustably mounted thereon for directing air-jets substantially tangentially of the bobbin when within the tube in either clockwise or counter-clockwise relation.

20. A pneumatic bobbin-stripper, comprising a casing adapted to contain air under pressure and having a bottom wall and a removable top wall, a plurality of stripping tubes removably mounted in apertures in said walls, each tube being adapted to receive a bobbin for stripping and having a plurality of air jet apertures directed angularly inward.

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