May 22, 1962 S. FÜRST 3,035,783

MULTI-STATION COIL-WINDING MACHINE HAVING AN AUTOMATIC SERVICING UNIT

Filed Oct. 22, 1957 3 Sheets-Sheet 1

FIG. 1

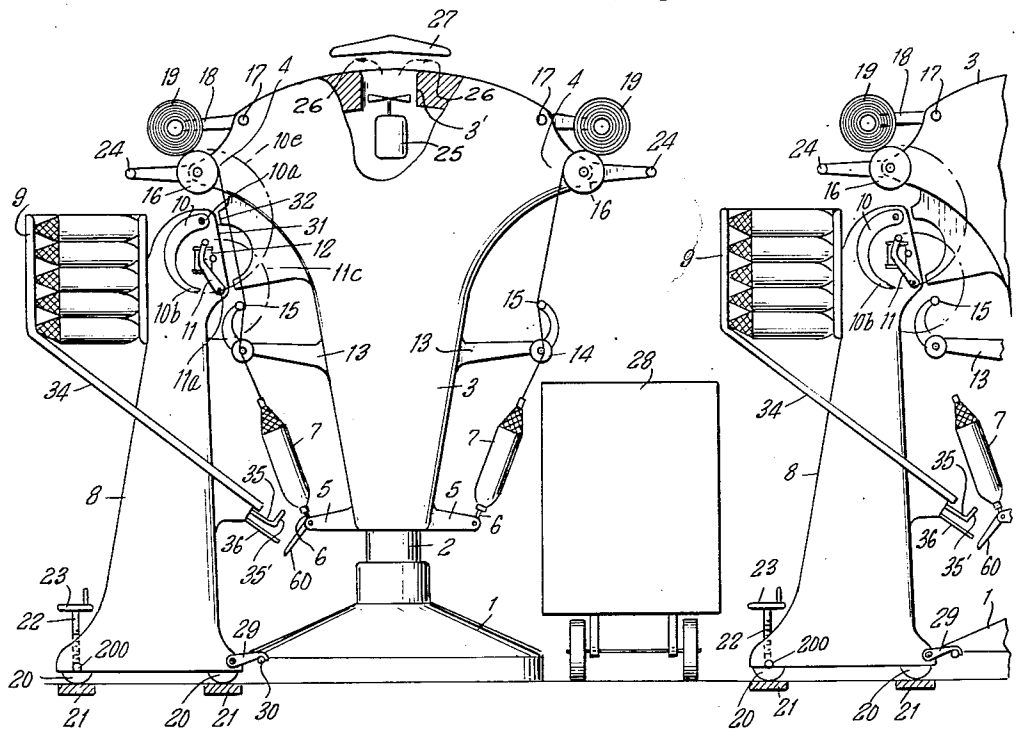
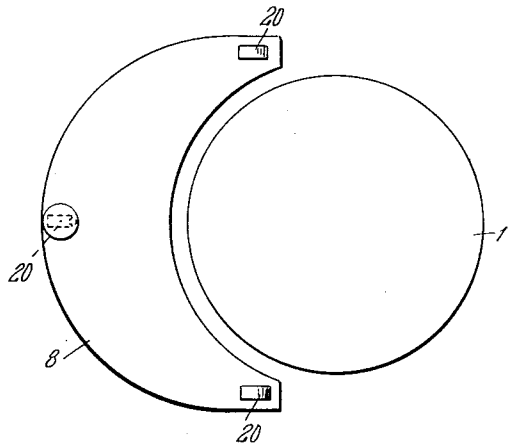


FIG. 2



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MULTI-STATION COIL-WINDING MACHINE HAVING AN AUTOMATIC SERVICING UNIT

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FIG. 3

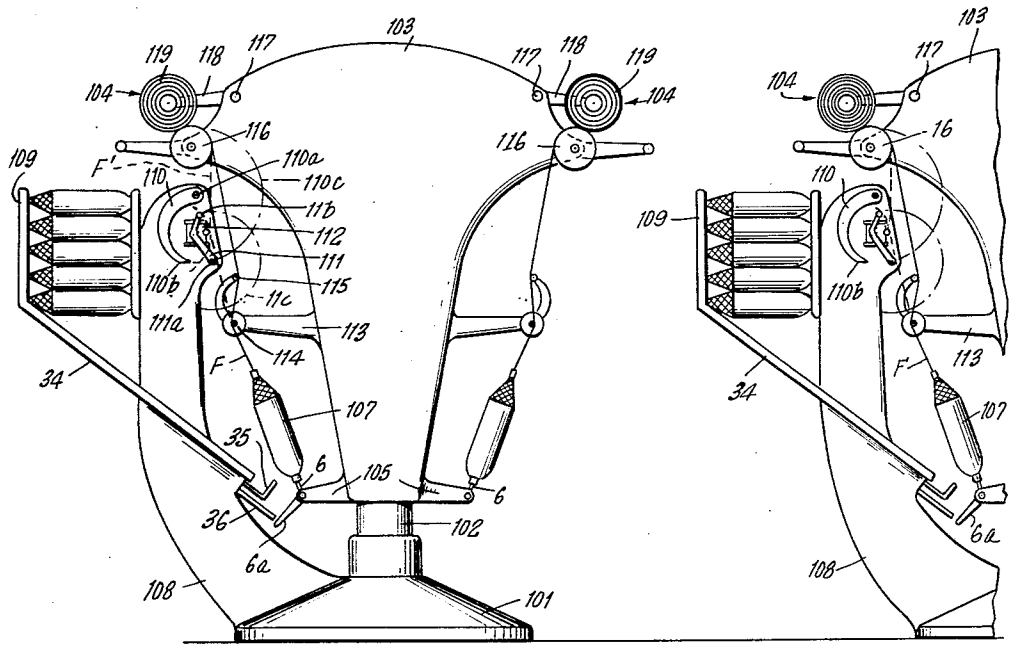
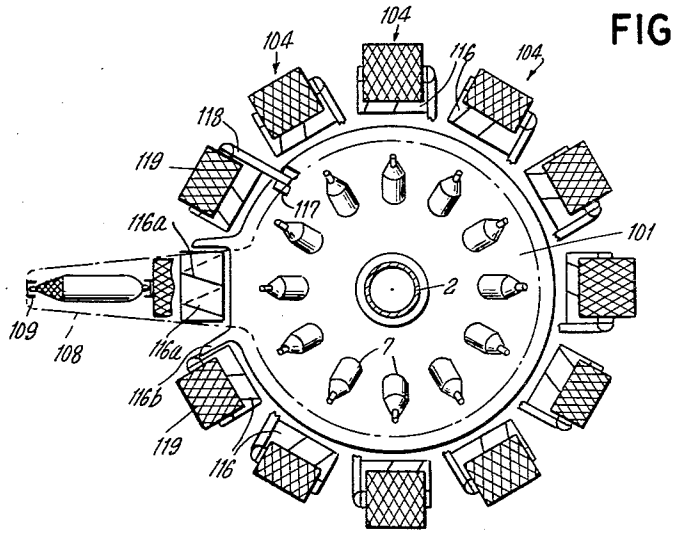


FIG. 4



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MULTI-STATION COIL-WINDING MACHINE HAVING AN AUTOMATIC SERVICING UNIT

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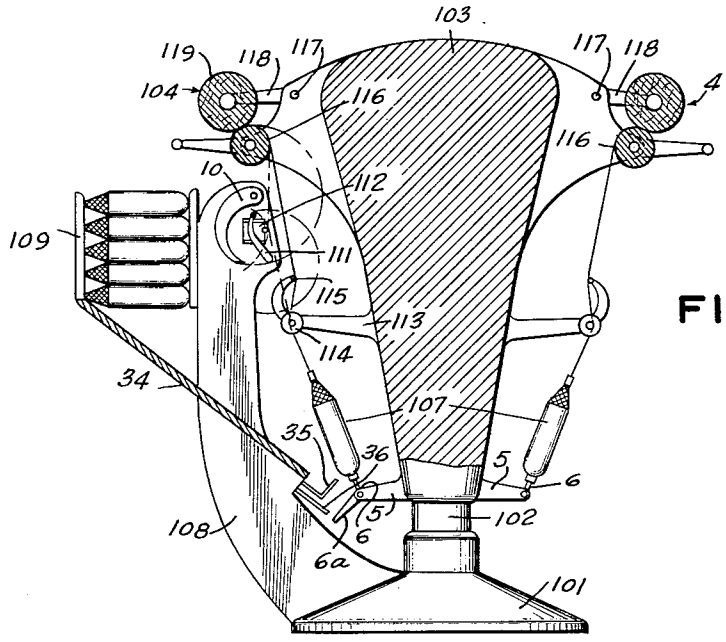


FIG. 3a

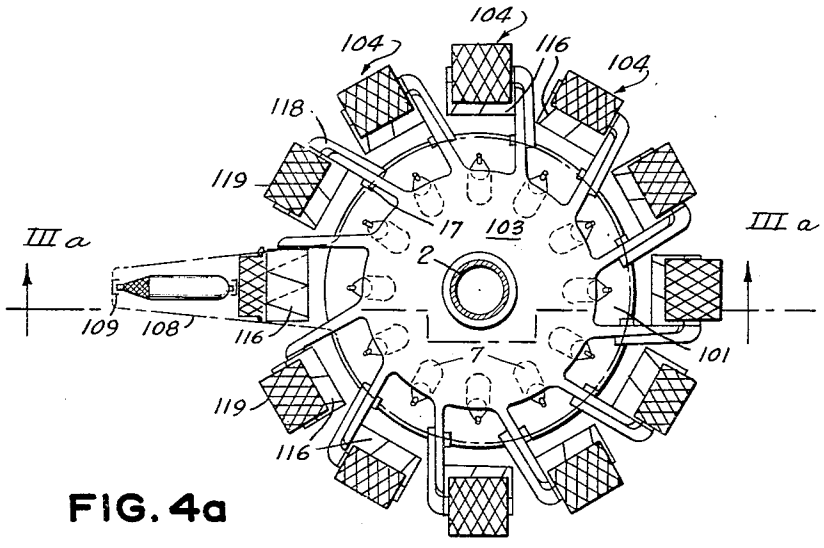


FIG. 4a

United States Patent Office 3,035,783 Patented May 22, 1962

3,035,783

MULTI-STATION COIL-WINDING MACHINE HAVING AN AUTOMATIC SERVICING UNIT

Stefan Fürst, Monchen-Gladbach, Germany, assignor to Walter Reiners, Monchen-Gladbach, Germany

Filed Oct. 22, 1957, Ser. No. 691,632
Claims priority, application Germany Oct. 27, 1956
11 Claims. (Cl. 242—35.6)

My invention relates to multi-station coil-winding machines for the re-winding of yarn as required in the fabrication of textile material. It particularly concerns yarn-winding machines of the type equipped with automatic devices for eliminating faults and thereafter continuing the winding operation. Such devices may comprise mechanisms which, in the event of yarn breakage, automatically tie the broken end of the take-up spool together with the yarn end of the supply coil, and mechanisms which, upon depletion of the supply coil, automatically substitute a full coil from a magazine.

While in non-automatic machines, requiring manual operation for elimination of the above-mentioned faults, the yarn path from the supply coil to the take-up coil is always so located as to be fully accessible to attendant personnel from the outside of the machine, such accessibility is not an absolute necessity for the above-mentioned automatic machines. Nevertheless, in the known automatic winding machines, the yarn passes from the supply coil over a yarn guide onto the take-up spool at a location facing the outside of the machine, this being so because the winding mechanisms are also positioned at the outer side of the machine.

My invention is in part based upon the recognition that with such conventional machine designs the over-all size of the machinery must be considerably greater than demanded by the structural requirement of the winding and automatic fault-removing devices proper. It is, therefore, an object of my invention to provide an automatic coil-winding machine which, without detriment to the desired performance, can be given considerably smaller size than heretofore needed.

According to one feature of my invention, therefore, the path of the yarn coming from the supply coil extends behind the yarn-guiding drum, seen from the servicing side of the machine, and thence onto the take-up spool. This has the effect of placing the yarn path farther into the interior of the machine so that the machine can be given a smaller over-all width. Furthermore, the yarn is better protected and hence less subject to accidental damage.

Moreover, such machines must accommodate a large number of individually operating winder units or winder stations in the smallest possible space. It is also important to provide for sufficient accessibility to the machine, so that conveying devices, particularly the manually steered carriages or "mules" usually employed, can be run close to the winding machine for supplying or receiving the yarn packages to be re-wound, or those completed by the machine. With the known winding machines, the over-all width of the machine, as a rule, determines the size of the remaining access space, or aisle, and hence of the conveying passages. Generally, the location of the largest machine widths has been, hitherto, in the vertical middle of the machine, at a height of approximately 40 centimeters, and the take-up spools of the machine, particularly in machines for the winding of cross-wound bobbins, generally recede from this greatest width of the machine.

An object of my invention is to improve the space utilization in multi-station winding machines, generally of the above-mentioned type, to permit the placing of the winding machines, in a plant, closer to each other, while

nevertheless providing sufficient space for servicing or for conveying devices to supply and remove the coils of yarn.

In accordance with a feature of my invention, I depart from the above-mentioned conventional design of the machine by mounting the take-up spools and the appertaining yarn-guiding and spool-driving components in the top portion of the machine at a location that protrudes farther than the lower portion of the machine toward or into the servicing space; and I mount the supply-coil holders and the other components that determine the yarn path, such as the yarn tensioner and the yarn cleaner, at locations that horizontally recede from the top portion of the machine and the take-up winder means mounted thereon.

For example, the vertical height of the components of the winder machine projecting farthest horizontally may amount to about 60 to 140 centimeters, and preferably 80 to 100 centimeters. With such a height, the winding machines can be placed close to each other and will then form an intermediate space below the take-up winder component which is ample for the passage of the conveying means such as the above-mentioned mules. The mules in this case may have a height above the floor of approximately 60 centimeters which is ample for the desired carrying capacity. It will be understood that the examples or numerical values are presented only for illustration and that the same advantages are obtained with proportionately different sizes.

According to another feature of the invention, a particularly advantageous embodiment of the machine according to the invention is obtained when the multi-station machine has a circular design. For this purpose, a generally upwardly expanding mushroom-shaped carrier structure is rotatably mounted on a vertical column supported by a circular base member; and the individual winding stations are mounted on the mushroom-shaped structure in peripheral distribution. Such machine has the further advantage that the two cooperating component devices, namely the take-up spool winder unit and the supply-coil holder unit, can readily be mounted with sufficient vertical spacing from each other. In such case, the yarn path between the two just-mentioned units, relative to all winding stations, generally defines a cone tapering downwardly. As a result, sufficient space for conveying devices is available up to a height of approximately 80 centimeters. Furthermore, in the middle range of the yarn path of the individual winding stations, at a height of, for example, between 60 and 120 centimeters, a range can be kept free in which an automatic servicing unit, moved from the outside against the machine, can act upon the yarn extending along the just-mentioned path. This is particularly important when the automatic servicing unit is provided with a device which, in the event of yarn breakage, ties the yarn end of the supply coil together with the yarn end coming from the take-up spool. The automatic servicing unit for the just-mentioned purpose, may be provided with a yarn-end seeking device which, by downward movement, seizes the broken yarn end of the supply coil; and with another seeking device which upon upward movement seizes the yarn end from the take-up spool, whereby both yarn ends are conveyed to the tying device to be knotted together. The tying device, thus located in middle height of the machine, occupies a location particularly favorable for such operation.

Detailed descriptions of a multi-station machine and an automatic servicing unit of the general types here employed are found in the following copending applications:

W. Reiners, Serial No. 675,758, filed Aug. 1, 1957, now abandoned

S. Fürst, Serial No. 675,677, filed Aug. 1, 1957, now abandoned

S. Fürst, Serial No. 676,580, filed Aug. 6, 1957, now abandoned

A more detailed description of the suction nozzle yarn finding and positioning mechanism is found in the following copending applications:

W. Reiners, Serial No. 640,166, filed Feb. 14, 1957, now Patent No. 2,936,130

S. Fürst, Serial No. 640,137, filed Feb. 14, 1957

A machine according to the invention also permits the extending of the range of action of the tying device downwardly, which is particularly desirable in the exchange of a depleted supply coil. This downwardly extended range of tying action is particularly advantageous for the proper operation of those devices which automatically remove a depleted coil core and supply a full supply coil from a magazine. During operation of such a coil-exchanging device, the exchanging mechanism is controlled by the same control means that also act upon the tying device. Now, by virtue of the mushroom-shaped design of the machine, the connecting paths and the operating components become relatively short, aside from the fact that in the lower range of the machine height sufficient space is provided for the convenient passage of servicing carriages, as already described. By virtue of the favorable utilization of the available space, the above-mentioned automatic servicing unit for coil exchange and tying operation can be run close to the winding machine proper. For this purpose, the base or foot portion of the auxiliary servicing device, according to another feature of the invention, is given a fork-shaped design which partially surrounds the foot of the winding machine proper. According to a more specific feature, the two ends of the forked-shaped foot portion of the servicing unit are respectively provided with two abutment members, for example rollers, whereas a third supporting point is provided approximately beneath the main inertia center of the unit. This third supporting point can simultaneously serve for adjusting the inclination of the servicing unit, or of the coil-exchanging device mounted thereon. For this purpose, the third supporting point may be formed or controlled by a manually operable adjusting device.

According to a further feature of the invention, the winding machine is provided with a centrally located blower which has an air-deflecting vane and, by virtue of the mushroom-shaped machine design, blows over the entire upper side thus keeping it free of lint or dust collection while simultaneously ventilating the interior as well as the winding-station components.

The invention is particularly advantageous when employed in conjunction with the method and means for seeking and tying the yarn ends described in German Patent No. 912,067.

In accordance with said German patent, the spacing of the yarn seeking suction nozzle from the periphery of the wind-up yarn coil, over the entire diameter range of the coil, is kept accurately or approximately uniform by guiding the coil axis, during the building-up of the yarn body, substantially along the bisector of a determined angle. The angle is formed by a point determined by the instantaneous position of the coil axis and by the point of the coil closest to the suction nozzle, on the one hand, and by a point determined by the coil axis and the location of the coil which rests against the part, namely the rotating yarn-guiding drum, that imparts a peripheral driving motion to the coil. That is, the coil axis is guided along a cam curve, and the displacements of the generatrix lines of the coil located in front of the suction tube, relative to the position of the suction opening, are compensated by varying the position of the suction nozzle in dependence upon the position of the coil holder. To accomplish this, the suction tube is rotated by means of a connecting member controlled by the coil holder. For details of this feature reference is also made to my co-pending U.S. application Serial No. 674,960, filed July 29, 1957, now Patent No. 2,954,178.

According to another feature of the invention, the pivot axis of the supporting frame for the take-up spool is located on the same side of the yarn-guiding drum as the incoming yarn; that is, this pivot is located behind the yarn-guiding drum seen from the servicing location. The just-mentioned feature, too, is of advantage in conjunction with the machine described in the above-mentioned Patent No. 912,067.

Another advantage of the invention is the fact that by placing the yarn path farther into the machine, a length of yarn available for operation by the auxiliary automatic device, for instance the yarn-tying device and the coil-exchanging device, lies open toward the servicing side of the machine. This is important if one of the components of the automatic devices requires checking, replacement or repair.

The foregoing and more specific objects, advantages and features of my invention will be apparent from the following description of the preferred embodiments, in conjunction with the accompanying drawings, in which:

FIG. 1 is a schematic front view; and

FIG. 2 is a bottom view of one embodiment;

FIGS. 3 and 3*a* are front views of another multi-station coil-winding machine; and

FIGS. 4 and 4*a* are top views of the machine of FIGS. 3 and 3*a*, respectively.

The machine illustrated in FIGS. 1 and 2 comprises a base plate **1** which supports a vertical column **2**. Rotatably mounted on column **2** is a carrier structure **3** generally of mushroom-shape, on which the individual winding stations **4** are mounted in peripheral distribution. The lower portion of the carrier structure **3** is provided with a star arrangement of holder members **5**. Each of these members carries a receiving device or thorn **6** for a supply coil **7**. Any conventional drive can be used to cause step-wise rotation of carrier **3**, such as the Geneva drive described in Serial No. 675,677.

Removably located adjacent the base plate **1** is a standard **8** which is provided with a magazine **9** for a reserve of full supply coils and also with a device for joining the yarn ends, comprising the seeker member **10**, a seeker member **11**, and a tying device **12**. These comprise parts of the automatic servicing unit.

The functions of the elements **35** and **36** are described in Serial No. 675,677. Ejector rod **35** and control **36** extend beneath the slide **34** in parallel relation thereto, and are displaceable, longitudinally, by means of automatic control equipment (not shown) housed within the standard **8**. When one of the winding stations is located opposite the standard, as shown in FIG. 1, the pusher rod **36** when lowered abuts against the arm **60** of the supply coil holder or thorn **6** and tilts the supply coil or its empty core to the left. Subsequent lifting of the ejector rod **35** then causes hook portion **35'** to pull the core off the spear **23**, thus discharging it into a collecting box (not shown).

The carrier structure **3** is further provided with an arm **13** for each winding station, located beneath the tying device **12** and carrying a yarn tensioner and a yarn cleaner **15**. Each winding station further comprises a yarn-guiding drum **16** which is located in the upper portion of the mushroom-shaped carrier structure. The spool of the yarn package being wound is rotatably mounted on a frame **18** which is pivoted upon the carrier structure **3** at **17**, which is located closer to the vertical shaft of the structure.

In each winding station the yarn coming from supply coil **7** passes through the tensioner **14** and the yarn cleaner **15** and then runs onto the rear side of the yarn-guiding drum **16** to the take-up spool **19**. The guiding drum **16** is driven by an electric motor (not illustrated) and, by

virtue of its frictional engagement with the periphery of the package of yarn being wound onto spool **19**, drives the spool at constant peripheral speed. At the same time, the guiding drum **16** causes the yarn to reciprocate axially along the yarn package on spool **19**. This is effected by means of the conventional helical guiding groove (not shown) of drum **16**. The yarn-seeking member **10** is a suction tube of arcuate shape which is pivotally mounted, at **10***a*, on the standard **8**, and the end of which forms a suction nozzle **10***b*. The suction tube **10** is connected through its hollow pivot shaft with a source of suction pressure in standard **8**. During rotation of suction tube **10** about the pivot **10***a*, the nozzle **10***b* travels along the dot-and-dash circle **10***c*. The suction tube **10** thus passes behind and around part of the yarn-guiding drum **16**. In this position, the suction nozzle **10** is located near and behind the lower portion of the take-up spool **19**. In the event of yarn breakage, the spool **19** is temporarily driven in the reverse direction so that the yarn end is unwound. The suction nozzle, in the location last described, then seeks the yarn end and pulls it somewhat into the interior of the suction tube **10**. Thereafter, the suction tube **10** returns clockwise into the illustrated position. It thus entrains the yarn end of the take-up spool, so that this yarn end is located in front of the tying device **12**. This method of seeking and entraining the yarn end is in accordance with German Patent No. 912,067 and is described in the copending applications referred to above.

The seeker member **11** comprises another suction tube, pivoted at **11***a* on the standard **8**, and likewise supplied through its hollow pivot axis with suction pressure, from the suction source located in the standard **8**. The opposite end of suction tube **11** forms a nozzle which, during clockwise rotation of tube **11**, travels along the dot-and-dash circle **11***c* to a position located close to the tensioner **14**. In the event of yarn breakage, the nozzle of suction tube **11** entrains the yarn end of supply coil **7** in the vicinity of tensioner **14** where it is kept in readiness; and during the subsequent return motion of suction tube **11** into the illustrated position, this yarn end is placed against the tying device **12**, where the two yarn ends are knotted together before the winding operation is continued.

The foot portion of the standard **8** is mounted and runs upon three wheels **20** which, in the illustrated position of the standard **8**, rest upon insert pieces **21** in the floor of the plant. The position of the standard **8** can be adjusted by means of a threaded spindle **22** and a hand wheel **23**. The adjustment of the latter causes vertical displacement of one of the wheels **20** relative to the standard and thus permits changing the inclination of the standard. Spindle **22** is screw-threaded into standard **8** and is connected to shaft **200**. When in the proper position, as shown, the standard **8** is firmly secured to the base plate **1** by means of a latch **29** engaging a latch pin **30** secured to the base plate **1**. An upper abutment surface **31** of standard **8** can be placed against two counter abutments **32** of the carrier structure **3**, preferably leaving a slight clearance when rolling the standard **8** toward the carrier **3**.

The mushroom-shaped carrier structure is thus provided with two indicating means for determining whether the proper adjustment or adaptation of the servicing unit to the machine is secured. One of these means, located in the lower range, is latch **29—30**, which provides for and indicates whether proper engagement of the servicing unit with the winding machine proper has been made. The other indicating means, preferably an upper one, constitutes the adjacent or abutting inclined surfaces **31—32**. The latter show the position or inclination of the automatic servicing unit with respect to the winding station, in order to permit correction.

In textile manufacture there is always the danger that dust and lint of the textile material may collect and may then adhere due to presence of oil or humidity. This may happen at those places that are frequently run over by the running wheels of the servicing unit. For that reason, it is of advantage to mount in the floor, or on the machine itself, a number of structures that can readily be cleaned and that secure a good fitting between the automatic servicing unit and the winding machine proper. For securing the desired temporary connection between the servicing unit and the machine, it is preferable, as shown, to provide a latching device which can be opened whenever desired.

Protective bars **24** are mounted at each winding station in front of the take-up winder devices for protection of these devices. Mounted in the upper portion of the carrier structure **3** is a blower **25** which blows the air out of the carrier structure in the directions indicated by arrows **26**. A hood **27** serving as a deflector vane guides the outflowing air over the top surface of the carrier structure **3** to prevent the accumulation of dust or lint. The blower also has the effect of cleaning and ventilating the take-up winding devices of the individual winding stations. To facilitate the cleaning and ventilating action, the upper part of the structure **3** may comprise a hollow duct, as indicated at **3'**, and this duct can extend or connect to passages located between, or at, each winding station. Shown next to the base plate **1** is a carriage **28** for conveying new supply coils and removing completed take-up spools from the machine.

It will be recognized that machines according to the invention can be placed close to each other, for instance so that the top portions of adjacent machines merely touch each other or leave just enough space for a single person to pass through. This is indicated in FIG. 1. Nevertheless, a comparatively large amount of space is available between such adjacent machines beneath the mushroom-head portions for the convenient passage of carriages or similar conveying devices. The fact that the automatic servicing unit including the standard **8** is readily removable from the rest of the machine is of considerable advantage because it simplifies the maintenance requirements. When one of the servicing units, which is mounted in entirety on the standard **8** and is preferably provided with its own electric drive, becomes defective, the entire servicing unit can be removed and be substituted by a stand-by unit, with the aid of few and simple manipulations, and within a minimum of time.

A plurality of adjacent winding machines and auxiliary units is indicated in FIGS. 1 and 3. The machines can also be positioned so that the servicing unit **8** is in between alternate pairs of the winding machines **3**; that is, the parts **14** of adjacent machines may be placed facing each other, across the gap between the two machines. Obviously, magazine **9** can extend transversely to the plane of FIG. 1, to conserve lateral space.

The machine illustrated in FIGS. 3 and 4 comprises a base plate **101** on which an upright column **102** is mounted. Rotatably journalled on column **102** is a machine structure **103** on which a number of individual winding stations **104** are mounted. Each of the winding stations is correlated to one of a corresponding number of holder brackets **105** firmly joined with the lower portion of the machine structure **103**. Each of holder brackets **105** accommodates a receiving device for a yarn-supply coil **107**. The base plate **101** also supports a lateral standard **108** which carries a magazine **109** for a reserve of supply coils as well as a device for the joining of yarn ends comprising a yarn-end seeking device **110**, a seeking device **111**, and a tying device **112**. The structure **103** also carries for each of the winding stations an arm **113** on which a yarn tensioner **114** and a yarn cleaner **115** are mounted. The arm **113** and the tensioner and cleaner mounted thereon are located beneath the yarn-tying device **112** when the individual winding station is located opposite the standard **108**. The upper portion of the machine structure **103** is provided for each winding station **104** with a yarn-guiding drum **116** from which the yarn coming from the supply coil **107** passes onto a take-up spool **119** journalled on a movable frame **118** whose

pivot **117** is mounted on machine structure **103** behind the yarn-guiding drum, seen from the servicing location or outside of the machine.

For simplicity, the complete journalling frame **118** for the take-up spool **119** is shown in FIG. 4 for only one of the winding stations.

The yarn, coming from the supply coil **107**, passes first through the yarn tensioner **114**, thence through the thread cleaner **115** and then passes over the rear side of the yarn-guiding drum **116** to the take-up spool **119**. During operation, the yarn-guiding drum **116** drives the wound-up body of yarn on spool **119** by frictional engagement with the spool periphery and thus at constant winding speed, while simultaneously a guiding groove **116***a* (FIG. 4) through which the yarn must pass, reciprocates the yarn back and forth along the body of the coil being wound.

The yarn-end seeking device **110** is an arcuate suction tube which is pivoted at **110***a* and has a suction nozzle at **110***b*. Suction pressure acts through tube **110** and nozzle **110***b* from the interior of the hollow standard **108**. The shape and length of suction tube **110** are such that when the tube **110** rotates counter-clockwise, the nozzle **110***b* will travel along the dot-and-dash circle **110***c* so that it passes from the rear around the yarn-guiding drum **116**. This takes place upon occurrence of yarn break or when the supply coil **107** is exhausted. The suction of nozzle **110***b* then seizes the yarn end of spool **119**. Thereafter, the arm **110** returns back to the illustrated position and entrains the yarn end now partially entering into the nozzle **110***b*. In this manner, the yarn end is passed over the knot-tying device and then occupies the position shown by a broken line F'. The design and operation of the suction tube **110** corresponds to those described in the German Patent No. 912,067.

The yarn-guiding drums **116** are preferably journalled on a pivoted frame structure **116***b* which is located on only one side of the take-up spool **119** as is illustrated in FIG. 4. Only one complete frame structure **116***b* is illustrated, to simplify the drawing. Such a unilateral journalling of the yarn-guiding drums has the advantage that, when an exchange of the take-up spool is to be made, this being usually done by hand, the yarn for the new take-up spool can be conveniently placed behind the yarn-guiding drum. For the purpose of exchanging the take-up spool upon completion of the previously wound spool, the above-described seeking and tying mechanisms need not enter into operation; but it is now necessary to first manually wind a few turns of the yarn onto the core body of the take-up spool, and this is facilitated by the unilateral mounting of the yarn-guiding drum.

During operation of the machine of FIG. 3, the machine structure **103** rotates stepwise in a given direction thus placing the winding stations individually in front of the standard **108** for a sufficient interval of time to permit the operation of the automatic devices **110**, **111**, **112**, if such operation, signalled by a yarn guard (not illustrated), is necessary at that time or if the supply coil **107** of that particular winding station is depleted and must be exchanged for a full coil from magazine **109**. In the event of coil depletion, an ejector member **35** lifts the depleted core of coil **107** off a spear or mandrel on which the supply coil is seated and thus throws the empty core from the spear. A pusher rod **36** acts against an arm **6***a* of device **6** and turns the spear counter-clockwise into the position required for the reception of a new supply coil dropping from magazine **109** along a slideway **34** onto the spear, whereafter the new supply coil is moved into the illustrated position, and the yarn-seeking and tying devices become effective to join the yarn end from the new supply coil with the yarn end coming from the take-up spool before the winding operation of that particular winding station continues.

It will be obvious to those skilled in the art that the above-described specific embodiments of the machines according to my invention may be modified in various respects, without departing from the essential features of my invention and within the scope of the claims annexed hereto.

I claim:

1. A coil-winding machine of the class wherein the machine is adapted to be serviced by a movable servicing unit having yarn seeking, seizing and tying devices, said machine comprising a rotatable carrier structure having a substantially vertical axis of rotation, a multiplicity of winding stations mounted on said carrier structure and peripherally distributed thereon, each of said stations having supply-coil holder means and take-up winder means, said take-up winder means comprising a take-up spool and a rotatable yarn-guiding drum adjacent to said spool for peripherally driving it, said carrier structure having a large diameter in its top portion and a smaller diameter in its bottom portion, said take-up winder means being located in said large diametered top portion and said supply-coil holder means being located in said smaller diametered bottom portion, said take-up winder means of said winding stations projecting horizontally away from said vertical axis toward the outside beyond the location of said supply-coil holder means, said winder means being spaced upwardly from the supply-coil holder means and defining together therewith a yarn path, the yarn path extending upwardly and outwardly of the carrier structure and inwardly around the yarn-guiding drum and being located on the side of the respective station away from said vertical axis and accessible from said side to said servicing unit, said top portion defining an open space therebeneath for receiving at least a major part of said servicing unit.

2. A coil-winding machine of the class wherein the machine is adapted to be serviced by a movable servicing unit having yarn seeking, seizing and tying devices, said machine comprising a rotatable carrier structure, a multiplicity of winding stations mounted on said carrier structure and peripherally distributed thereon about a common axis of rotation, each of said stations having supply-coil holder means and take-up winder means, said carrier structure having a large diameter in its upper top portion and a smaller diameter in its lower bottom portion, said take-up winder means being located in said large diametered top portion and said supply-coil holder means being located in said smaller diametered bottom portion, said take-up winder means of said winding stations projecting horizontally away from said common axis toward the outside beyond the location of said supply-coil holder means, said winder means being spaced upwardly from the supply-coil holder means, defining together therewith a yarn path, the yarn path being located at the side of the respective winding station facing away from said common axis and accessible from said side to said servicing unit, said top portion defining an open space therebeneath for receiving at least a major part of said servicing unit in a direction toward and away from a respective winding station.

3. A coil-winding machine of the class wherein the machine is adapted to be serviced by a movable servicing unit having yarn seeking, seizing and tying devices, said machine comprising a rotatable carrier structure, a multiplicity of winding stations mounted on said carrier structure and peripherally distributed thereon about a common axis of rotation, each of said stations having supply-coil holder means and take-up winder means, said carrier structure having a large diameter in its upper top portion and a smaller diameter in its lower bottom portion, said take-up winder means being located in said large diametered top portion and said supply-coil holder means being located in said smaller diametered bottom portion, said take-up winder means of said winding stations projecting horizontally away from said common axis toward the outside beyond the location of said sup-

ply-coil holder means, said winder means being spaced upwardly from the supply-coil holder means, defining together therewith a yarn path, the yarn path being located at the side of the respective winding station facing away from said common axis and accessible from said side to said servicing unit, said top portion defining an open space therebeneath for receiving at least a major part of said servicing unit in a direction toward and away from a respective winding station, said machine being provided with upper and lower members positioned to cooperate with said yarn-seeking, seizing and tying devices of said servicing unit to effect the proper cooperative positioning and connection between the machine and the auxiliary device for the servicing operation.

4. A coil-winding machine of the class wherein the machine is adapted to be serviced by a movable servicing unit having yarn seeking, seizing and tying devices, said machine comprising a rotatable carrier structure, a multiplicity of winding stations mounted on said carrier structure and peripherally distributed thereon about a common axis of rotation, each of said stations having supply-coil holder means and take-up winder means, said carrier structure having a large diameter in its upper top portion and a smaller diameter in its lower bottom portion, said take-up winder means being located in said large diametered top portion and said supply-coil holder means being located in said smaller diametered bottom portion, said take-up winder means of said winding stations projecting horizontally away from said common axis toward the outside beyond the location of said supply-coil holder means, said winder means being spaced upwardly from the supply-coil holder means, defining together therewith a yarn path, the yarn path being located at the side of the respective winding station facing away from said common axis and accessible from said side to said servicing unit, said top portion defining an open space therebeneath for receiving at least a major part of said servicing unit in a direction toward and away from a respective winding station, said machine being provided with upper and lower members positioned to cooperate with said yarn-seeking, seizing and tying devices of said servicing unit, and means for adjusting the cooperative positioning and connection between the machine and said servicing unit.

5. A coil-winding machine, comprising a rotatable carrier structure having a substantially vertical axis of rotation, a multiplicity of winding stations mounted on said carrier structure and peripherally distributed thereon, each of said stations having supply-coil holder means and take-up winder means, said carrier structure having a large diameter in its top portion and a smaller diameter in its bottom portion, said take-up winder means being located in said large diametered top portion and said supply-coil holder means being located in said smaller diametered bottom portion, said take-up winder means of said winding stations projecting horizontally toward the outside beyond the location of said supply-coil holder means, and an air venting device located concentrically with said vertical axis for simultaneously serving a plurality of winding stations of the machine, said large diametered top portion having a centrally located opening therein for passage of air therethrough, the venting device having a blower carried by said carrier structure beneath said centrally located opening, and deflecting means positioned above said opening to direct air from said blower over said top portion toward said winding stations, said top portion having a dome-shaped upper surface positioned to direct the flow of air from said deflecting means to said peripherally distributed winding stations, whereby an equal supply of air is provided from said blower to each of said winding stations.

6. A system comprising a plurality of adjacent coil-winding machines, each machine comprising a rotatable carrier structure having a substantially vertical axis of rotation, a multiplicity of winding stations mounted on each carrier structure and peripherally distributed thereon, each of said stations having supply-coil holder means and take-up winder means, said carrier structure having a large diameter in its top portion and a smaller diameter in its bottom portion, thus providing a comparatively wider space below the top portions of adjacent machines, said take-up winder means being located in said large diametered top portion and said supply-coil holder means being located in said smaller diametered bottom portion, said take-up winder means of said winding stations projecting horizontally away from said vertical axis toward the outside beyond the location of said supply-coil holder means, said winder means being spaced upwardly from the supply-coil holder means and defining together therewith an upwardly and outwardly directed yarn path, the yarn path being located projecting outwardly from said vertical axis a distance less than that of said take-up winder means, the system further comprising an auxiliary servicing unit which is movable into said space toward and away from the carrier structure of each machine and the supply-coil holder means and winder means mounted on that structure, the servicing unit having yarn-seeking, seizing and tying devices and a device for feeding supply-coils to the holder means, said carrier structure defining working clearance for access of said yarn-seeking, seizing, and tying devices to said yarn path.

7. A system comprising a plurality of adjacent coil-winding machines, each machine comprising a rotatable carrier structure having a substantially vertical axis of rotation, a multiplicity of winding stations mounted on each carrier structure and peripherally distributed thereon, each of said stations having supply-coil holder means and take-up winder means, the winder means including a take-up coil and a rotary yarn guide in contact therewith and inwardly thereof, said carrier structure having a large diameter in its top portion and a smaller diameter in its bottom portion, thus providing a comparatively wider space below the top portions of adjacent machines, said take-up winder means being located in said large diametered top portion and said supply-coil holder means being located in said smaller diametered bottom portion, said take-up winder means of said winding stations projecting horizontally away from said vertical axis toward the outside beyond the location of said supply-coil holder means, said winder means being spaced upwardly from the supply-coil holder means and defining together therewith a yarn path, the yarn path being upwardly and outwardly directed with respect to the carrier structure and extending behind the yarn guide in the inward direction toward said axis, the system further comprising an auxiliary automatic servicing unit movable into said space toward and away from the carrier structure of each machine and the supply-coil holder means and winder means mounted on that structure, the servicing unit having a yarn-seeking and tying device and a device for feeding supply coils to the holder means, said carrier structure defining working clearance for access of said yarn-seeking, seizing, and tying devices to said yarn path, the machine being provided with yarn tensioning means above the holder means, the tensioning means and yarn path being inwardly disposed and projecting horizontally outward from said vertical axis less than said take-up winder means to permit access of a servicing carriage between the carrier structures.

8. A coil-winding machine, comprising a rotatable carrier structure, a multiplicity of winding stations mounted on said carrier structure and peripherally distributed thereon, each of said stations having supply-coil holder means and take-up winder means, said carrier structure having a large diameter in its upper top portion and a smaller diameter in its lower bottom portion, said take-up winder means being located in said large diametered top portion and said supply-coil holder means being located in said smaller diametered bottom portion, said

take-up winder means of said winding stations projecting horizontally away from said vertical axis toward the outside beyond the location of said supply-coil holder means, said winder means being spaced upwardly from the supply-coil holder means, defining together therewith a yarn path, the yarn path being located closer to said vertical axis than is the outer portion of said take-up winder means, the machine further comprising an auxiliary servicing unit movable toward and away from the carrier structure of the machine and the supply-coil holder means and winder means mounted on that structure, said servicing unit having yarn-seeking, seizing, and tying devices, a supporting base for said carrier structure, said carrier structure defining working clearance for access of said yarn-seeking, seizing, and tying devices to said yarn path, the base portion of said auxiliary serving unit having a forked portion shaped to partially surround said supporting base, means for tilting the auxiliary servicing unit to obtain proper alignment of the yarn-seeking seizing, and tying devices thereof with respect to the yarn path in said carrier structure, and means for fastening the base portion to the supporting base.

9. A winding machine, particularly for the production of cross-wound spools, comprising holder means for rotatably accommodating a take-up spool, means for holding a supply coil, means defining a yarn path from the supply coil to the take-up spool, an apparatus movable to and from a predetermined servicing location in front of said take-up spool for the automatic elimination of yarn faults along said yarn path, a yarn-guiding drum rotatably mounted and peripherally engageable with the take-up spool for driving the latter, a servicing apparatus having means for delivering full supply coils to said means for holding a supply coil and for seizing and knotting together yarn ends from a supply coil and a take-up spool, said servicing apparatus being movable to and from a servicing location in front of said take-up spool and yarn guiding drum for the automatic elimination of yarn faults along said yarn path, said yarn path extending from the supply coil behind the yarn-guiding drum before passing onto the take-up spool.

10. The machine defined in claim 9, the take-up spool being mounted on a movable frame structure, the frame structure having a pivot axis located on the same side of the yarn-guiding drum as the oncoming yarn.

11. A system comprising a plurality of adjacent coil-winding machines, each machine comprising a rotatable carrier structure having a substantially vertical axis of rotation, a multiplicity of winding stations mounted on each carrier structure and peripherally distributed thereon, each of said stations having supply-coil holder means and take-up winder means, the winder means including a take-up coil and a rotary yarn guide in contact therewith and inwardly thereof, said carrier structure having a large diameter in its top portion and a smaller diameter in its bottom portion, thus providing a comparatively wider space below the top portions of adjacent machines, said take-up winder means being located in said large diametered top portion and said supply-coil holder means being located in said smaller diametered bottom portion, said take-up winder means of said winding stations projecting horizontally away from said vertical axis toward the outside beyond the location of said supply-coil holder means, said winder means being spaced upwardly from the supply-coil holder means and defining together therewith a yarn path, the yarn path being upwardly and outwardly directed with respect to the carrier structure and extending behind the yarn guide in the inward direction toward said axis, the system further comprising an auxiliary servicing device adjacent the carrier structure, the device having yarn-seeking and tying means, said carrier structure defining working clearance for access of said yarn-seeking and tying means of said servicing device from the side of the machine away from said vertical axis.

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