April 25, 1967 G. TIGGES 3,315,338

APPARATUS FOR INSERTING OF A LAP CARRIER INTO YARN SPOOLS OR THE LIKE

Filed Sept. 21, 1964

5 Sheets-Sheet 1

Fig. 1

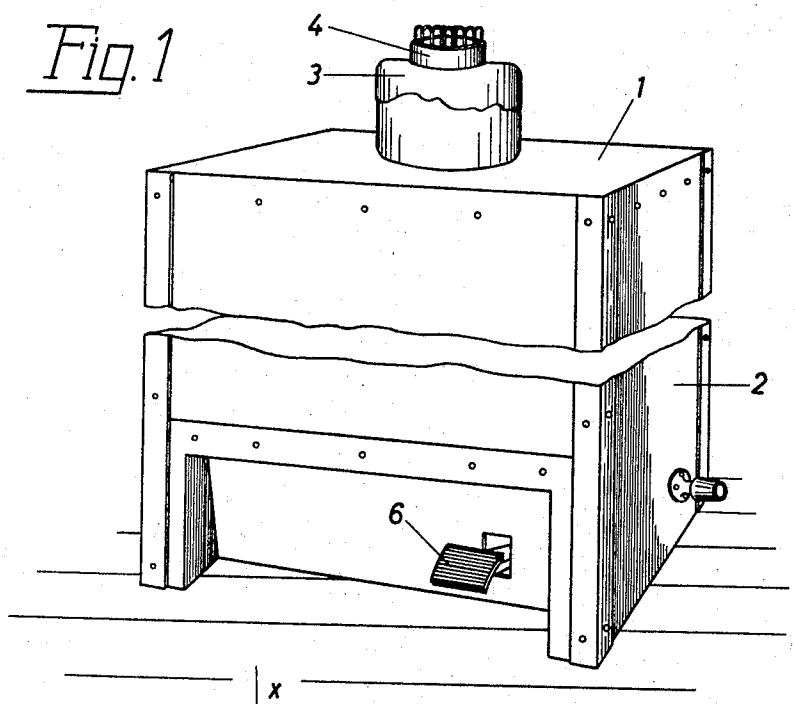


Fig. 2

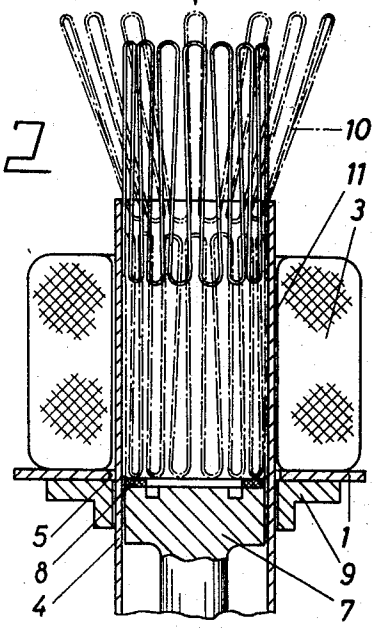
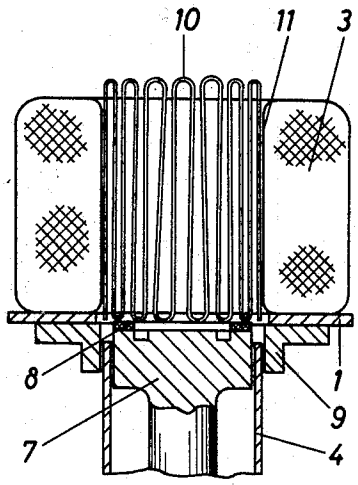


Fig. 3



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Fig. 4

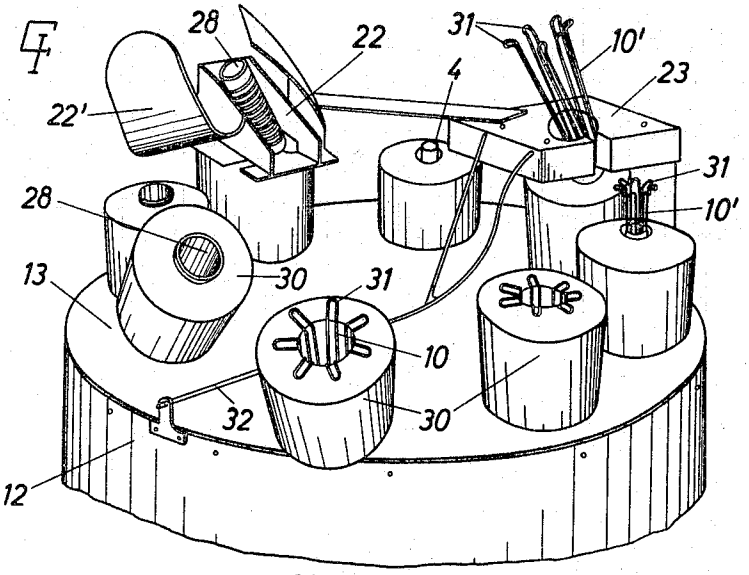
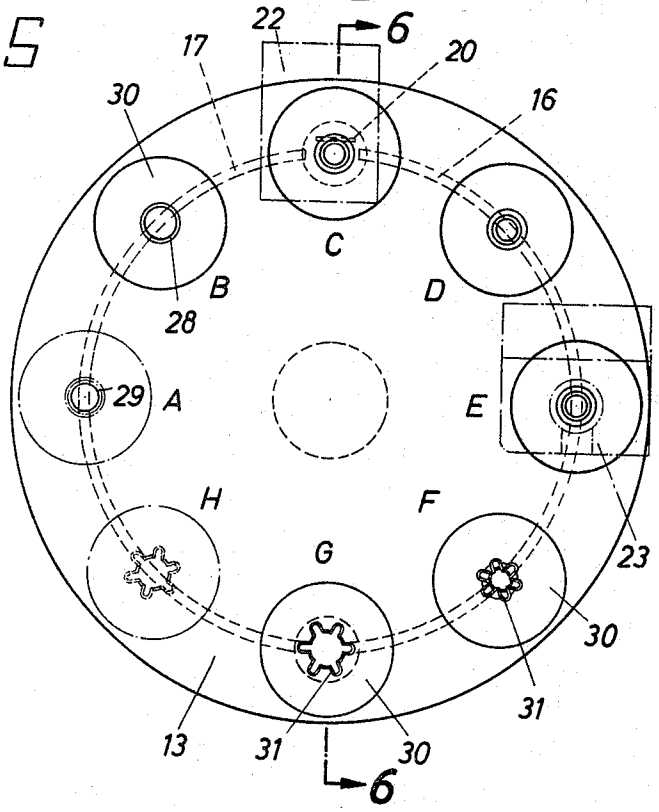


Fig. 5



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Fig. 6

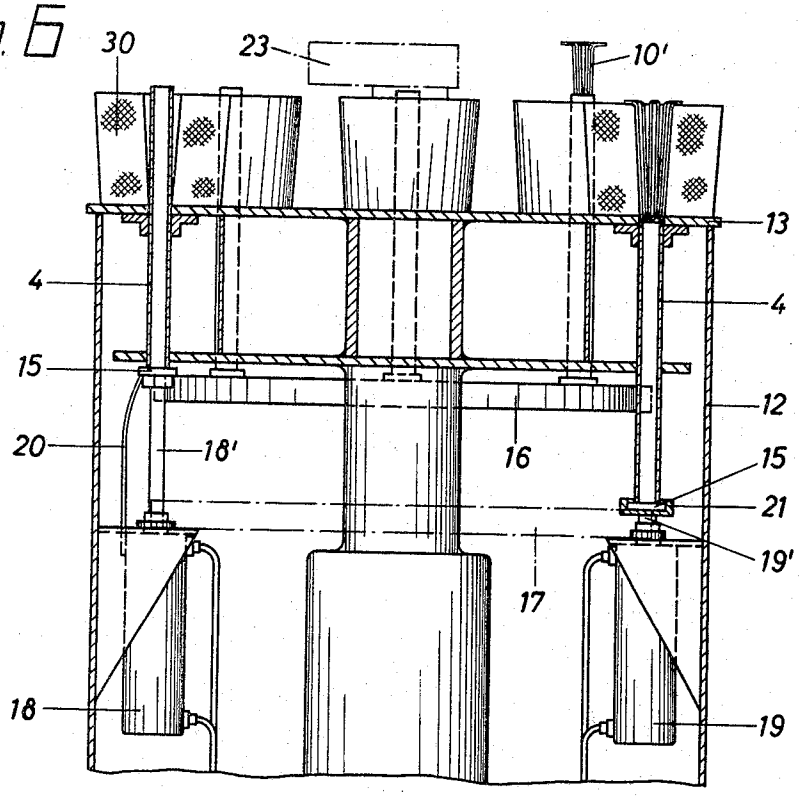


Fig. 7

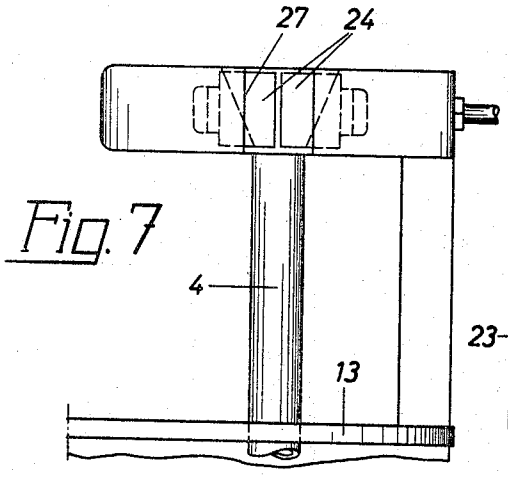
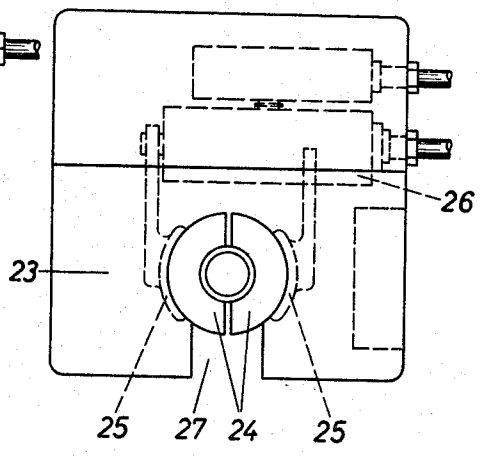


Fig. 8



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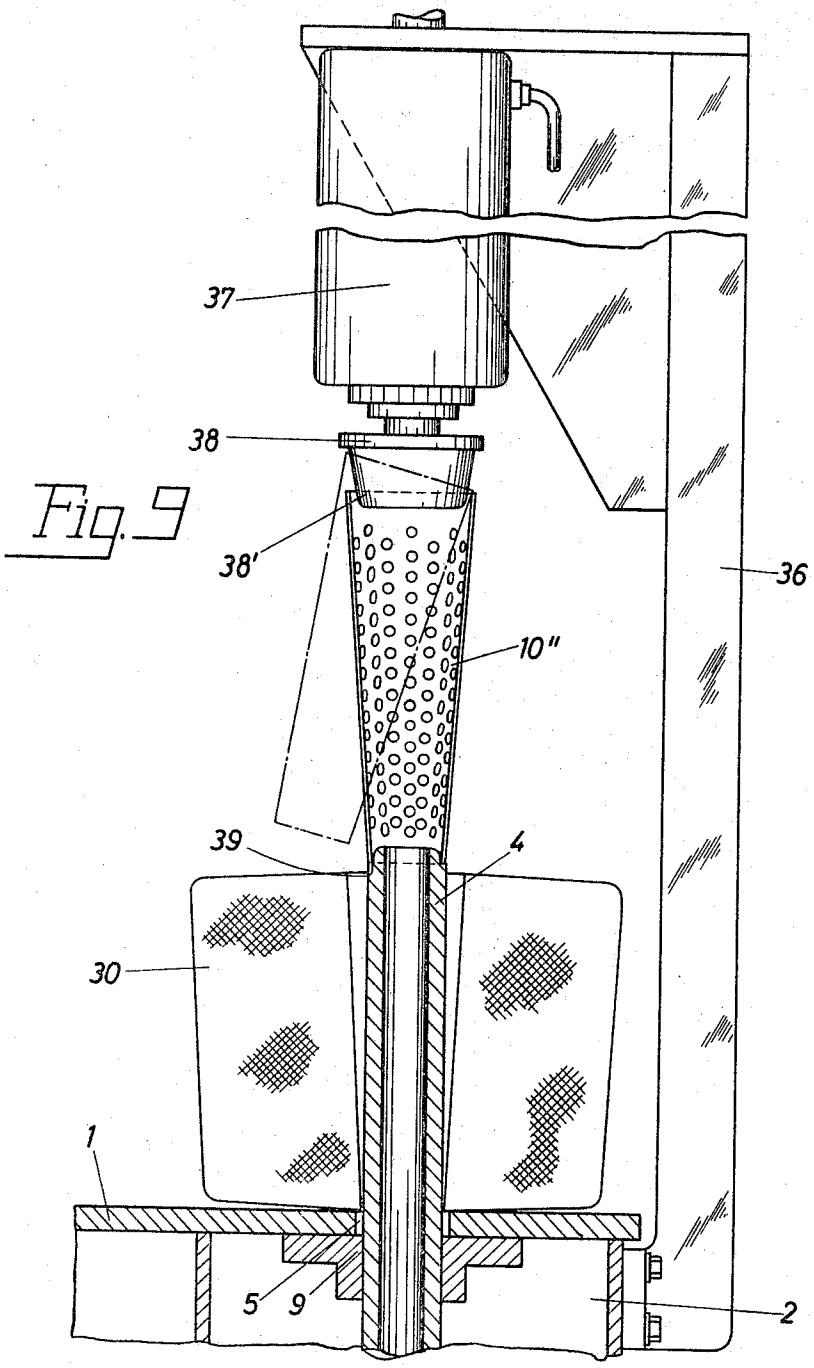
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APPARATUS FOR INSERTING OF A LAP CARRIER INTO YARN SPOOLS OR THE LIKE

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Fig. 9



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APPARATUS FOR INSERTING OF A LAP CARRIER INTO YARN SPOOLS OR THE LIKE

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Fig. 10

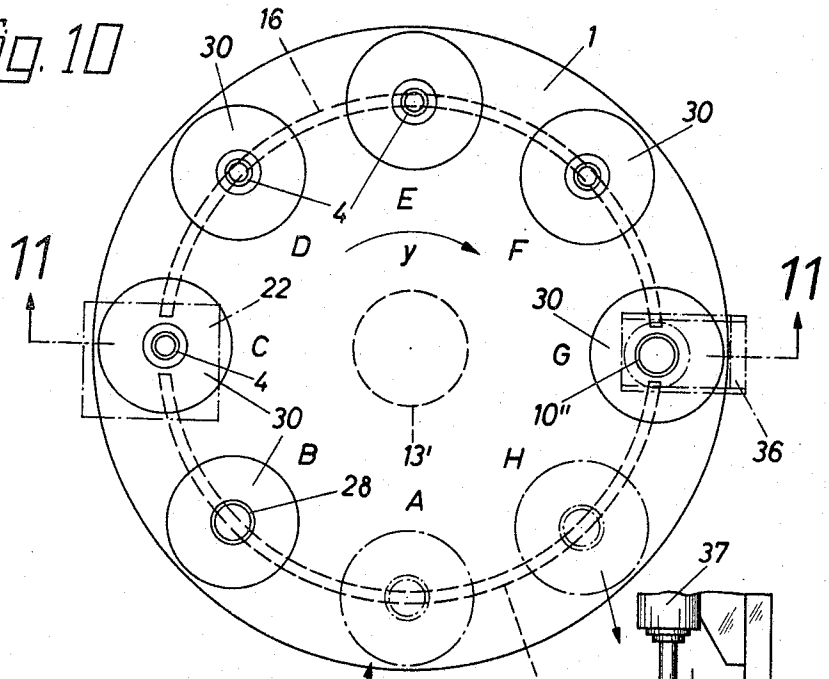
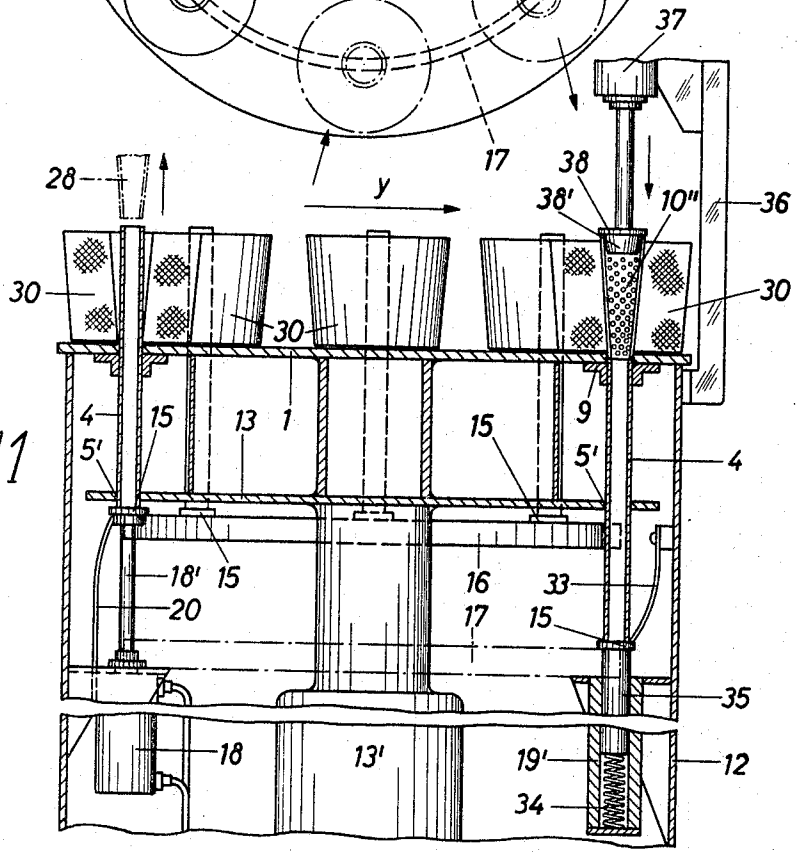


Fig. 11



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3,315,338
APPARATUS FOR INSERTING OF A LAP CARRIER INTO YARN SPOOLS OR THE LIKE

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Claims priority, application Germany, Sept. 19, 1963, T 24,740; Nov. 7, 1963, T 25,025
3 Claims. (Cl. 29—234)

The present invention relates to an apparatus for inserting of a lap carrier into yarn spools or the like, in general, and into the axial opening of yarn spools, spinning cakes or the like, in particular.

It is known to equip the laps with lap carriers made of wire or also perforated sleeves made of metal during the wet treatment of yarns.

It is one object of the present invention to provide an apparatus for inserting of a lap carrier into yarn spools or the like wherein an equalized, protecting and time-saving insertion of the lap carrier is possible.

It is another object of the present invention to provide an apparatus for inserting of a lap carrier into yarn spools or the like wherein a spindle projecting through an opening of a feeding table for the yarn lap and reciprocating upwardly and downwardly relative to the feeding table is provided, which spindle extends in its lifted position through the axial recess of the lap and moves downwardly jointly with the lap carrier centered by the spindle, during which downward movement the spindle emerges downwardly from the axial recess of the lap, while the lap carrier is stopped from further downward movement upon emergence of the spindle from the axial recess of the lap.

Due to such formation it is brought about, in an advantageous manner, that to transfer the lap carrier without appreciable exercise of force to the spindle, which causes thereafter an automatic insertion of the lap carrier into the lap. By raising the spindle, at first a holding of the lap itself takes place. The lap carrier then transferred to the spindle is subjected, likewise by means of the spindle, to centering, which is completely maintained also during the following lowering of the spindle into the axial recess of the lap. Due to the centering insertion of the lap carrier, at first also a displacement of the immediately adjacent yarn layers is avoided; rather a careful, protecting and even accelerated application of the laps with lap carriers is brought about. An appreciable increase of the output results. First of all, due to the fact, that upon emergence of the spindle from the axial recess of the lap, the simultaneously joined lap carrier is stopped against a further downward movement, an equalized coordination to the lap carrier is brought about for all laps. The spools do not require, therefore, a correcting after-treatment and are ready immediately for the next operational step.

It is still another object of the present invention to provide an apparatus for inserting of a lap carrier into yarn spools or the like, wherein a favorable abutment face is provided for the stopping of the lap carrier such that the spindle is formed as a tube, which has inside thereof at about the level of the feeding table an immovably disposed plate stopping the lap carrier against further downward movement. This is, first of all, favorable in the use of lap carriers made of spring wire, since the resilient spreading of these lap carriers in the recess of the lap takes place without scraping, rather a protecting radial engagement of the lap carrier-spokes takes place, which engagement is progressing in the removing direction of the spindle.

During the use of conical lap carriers of spring wire, in particular for cross-wound bobbins, in which case prior

to the insertion an ejection of the conventionally used paper tube takes place, it is advantageous, in order to obtain safely a rigid seat of the lap carrier, that in accordance with the present invention the spindle is designed as a tube for the centering reception of the radially resilient lap carrier equipped with laterally directed feet, whereby the feet stop the downward movement of the lap carrier by abutment with the upper wide side of the yarn lap, such that the further downward movement of the spindle leads to a removal of the lap carrier from the spindle.

For the purpose of simplification and acceleration of the insertion of the lap carrier into the tubularly shaped spindle, in addition two clamps having conical entrance openings are provided, in accordance with the present invention, above the spindle for the compression of the lap carrier against its radial resiliency.

An extensive automatisation is then easily possible due to this arrangement by providing, in accordance with present invention, a plurality of spindles on a joint rotary table controlled in a predetermined cycle, whereby the upward movement of the spindle for the ejection of the paper tube contained in the lap and the laps disposed on the rotary table, in case of the inwardly pulled spindle, run against a stripping device.

For the insertion of conventional, perforated conical sleeves serving as lap carriers and formed of sheet metal in the yarn lap, particularly in cross-wound bobbins, it is of advantage, in accordance with the present invention, to seat the conically and rigidly formed lap carrier between the upper edge of the axially displaceable spindle and a pressure punch disposed axially above the spindle and moving downwardly simultaneously with the spindle.

Due to this structure, it is made possible to insert mechanically, carefully, completely forcefully and without interference with the yarn positions also the conventional, conically shaped sheet metal sleeve-lap carrier into the axial opening of a cross-wound bobbin yarn lap, which opening is freed from the paper tubes used for the winding of the laps. The stopping of the lap carrier is brought about thereby by the conicity of the latter and/or the abutment of its lower end at the table.

A structurally advantageous formation is, furthermore, given by the fact, that, in accordance with the present invention, the spindle has on its upper end a flange penetrating into the sheet metal sleeve-lap carrier, and the pressure punch is formed at its end entering the lap carrier as a truncated cone. In addition to the centering easily obtained thereby, the insertion of the sleeves is simplified.

With these and other objects in view which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings in which:

FIGURE 1 is a perspective front view of the apparatus designed in accordance with the present invention for the insertion of a lap carrier into a lap;

FIG. 2 is an axial section of the insertion spindle during the insertion of the lap carrier;

FIG. 3 is an axial section similar to that of FIG. 2, the spindle being removed from the lap carrier;

FIG. 4 is a perspective view of a second embodiment of the apparatus including a rotary table and a plurality of spindles;

FIG. 5 is a schematic top plan view of the rotary table;

FIG. 6 is a section along the lines VI—VI of FIG. 5;

FIG. 7 is an end view of a bridge carrying feeding clamps;

FIG. 8 is a top plan view thereof;

FIG. 9 is an axial section of a third embodiment of the present apparatus showing the lap carrier in the apparatus, in a position ready for insertion between the

upper edge of the axially displaceable spindle and an axially arranged pressure punch disposed above the spindle, shown at an enlarged scale;

FIG. 10 is a schematic top plan view of the rotary table designed in accordance with the present invention; and

FIG. 11 is a section XI—XI of FIG. 10.

Referring now to the drawings and in particular to FIGS. 1–3, which disclose the first embodiment of the present invention, the apparatus comprises a table top **1**, forming part of a box-like machine frame **2**. A freely standing, tubular spindle **4**, axially displaceable relative to the table top **1** for a lap **3**, is provided on the table top **1**. A recess **5** is arranged in the table top **1** for the passing of the spindle **4** into the inner space of the machine frame **2**. The spindle **4** is connected with a lifting cylinder (not shown), operable by pressurized air, the operation of which takes place by means of a foot-operated lever **6**.

An immovably disposed plate **7** is arranged inside of the tubular spindle **4** at about the level of the table top **1** which plate **7** carries suitably a driving plate or ring **8**. A collar **9** is secured to the bottom side of the table top **1** for the guidance of the spindle **4**.

The carrier **10** is made of spring wire and has an appreciable radial resiliency. For the insertion of the lap carrier **10**, the latter is brought, as indicated in FIG. 2, into funnel shape by spreading apart the feet ends thereof, so that its head side permits easy insertion into the tubular spindle **4**. Then, by exerting pressure in the direction of the arrow *x*, the lap carrier **10** is inserted as much as possible into the inside of the spindle **4** (shown in pointed lines in FIG. 2). Now the loose lap **3**, the inner diameter of which is larger than the outer diameter of the spindle **4**, is set over the spindle **4**. Thereafter, the foot lever **6** is operated; pressurized air enters the lifting cylinder (not shown), whereby the spindle **4** is moved downwardly. During this downward movement, the spindle **4** emerges from the axial recess of the lap **3** in downward direction. The spindle **4** assumes then the position indicated in FIG. 3. On the other hand, the lap carrier **10** is stopped, during the emergence of the spindle **4** from the axial recess of the lap **3**, against further downward movement, since this lap carrier **10** abuts the plate **7** and its driving plate **8**, respectively. In this supported position, the lap carrier **10** has resiliently spread apart and in particular up to radial engagement of its spokes in the recess **11** of the lap **3**.

The lap **3** is now removed, and, by release of the foot lever **6**, the spindle **4** returns into its freely standing position, so that again a lap **3** can be mounted, and a lap carrier **10** can be inserted.

Referring now again to the drawings and in particular to FIGS. 4 to 8, disclosing a second embodiment of the present invention, the apparatus comprises a machine frame **12** supporting a rotary table **13**, and the latter is equipped with a plurality of tubular spindles **4**. The latter are equipped at their lower end with a presser plate **15**. Two half-circular guide rails **16** and **17** are secured to the machine frame **12** at different levels and serve the guidance of the spindles **4** in their respective positions, namely the upper position and the lower position, whereby the presser plates **15** engage the rails **16** and **17**.

Lifting cylinders **18** and **19** are arranged at the abutment points of the rails **16** and **17**. The lifting cylinder **18** carries a locking spring **20**. The latter enters in the space between the rails **16** and **17** below the presser plate **15**, so that the spindle **4** can step over to the rail **16** upon rotation of the table top **13**.

The lifting cylinder **19** includes a piston rod which has a fork into which the presser plate **15** can penetrate so that by means of this connection the spindle **4** can be pulled downwardly.

A discharging ramp **22** is disposed above the rotary table **13** in the axial position of the lifting cylinder **18**, and a bridge **23** is provided at the double-step distance therefrom. Two clamps **25** including conical entrance openings **24** are disposed in the bridge **23** above the spindle **4** which happens to be positioned therein for the clamping of the lap carrier **10'** against its radial resiliency. The clamps **25** can be opened and closed, respectively, by means of the pressure cylinder **26** (FIG. 8). An exit slot **27** is arranged in the bridge **23**.

The rotary table **13**, carrying jointly the spindles **4**, is controlled in accordance with a predetermined cycle. By this control, a step-wise rotation for a distance equal to the distance of the spindles **4** is brought about. The apparatus is arranged such that an ejection of the paper tubes **28**, in case of cross-wound bobbins **30** and the insertion of conical lap carriers **10'**, can be performed.

The operation of the apparatus according to this embodiment is as follows:

Referring to FIG. 5, the table positions A and B are loading stations. In these stations, a cross-wound bobbin **30** with the overlapping, thinner end of the paper tube **28** is centrally mounted in the recess **29** of the table **13**. During the step-wise movement, the spool reaches the station C. The lifting cylinder **18** is automatically controlled by any conventionally known means upon arriving in this station. Its piston pushes the spindle **4** upwardly by means of the piston rod **18'** and its end face drives the paper tube **28** out of the spool **30**. The paper tube **28** is turned by abutment on guide walls of the ejection ramp **22** and slides through the channel **22'** into a receiving basket (not shown).

The empty cross-wound bobbin **30** is now brought into the station E, while being retained by the projecting spindle **4**. In this position, a conical lap carrier **10'**, equipped with outwardly projecting feet **31** (FIGS. 4 and 5), is inserted, for instance manually, by pushing the latter into the funnel **24** of the clamps **25**, with its upper end spread apart, until the feet **31** engage the clamps **25**.

The clamps **25** are moved apart prior to the next step. The still projecting part of the lap carrier **10'** moves then out, upon rotation of the table **13**, through the slot **27**.

The presser plate **15** of the spindle **4** has penetrated the fork **21** upon reaching the station G of the table. During the operation of the pressure cylinder **19**, taking place in this station, the latter pulls the spindle **4** downwardly. The feet **31** engage thereby the upper side of the lap and of the corresponding cross-wound bobbin **30**, respectively. The downward movement of the lap carrier **10'** is thereby stopped. During the further displacement of the tubular spindle **4**, the lap carrier **10'** engages resiliently the wall of the axial recess of the lap. The still continued downward movement of the tubular spindle **4** leads finally to a separation between the lap carrier **10'** and the spindle **4**.

During the further rotation of the rotary table **13** to the station H, the stripper **32** moves now the finished spool **30** from the table top **13**.

Referring now again to the drawings and in particular to FIGS. 9 to 11, a third embodiment of the present apparatus is disclosed, which comprises again a machine frame **12** with a rotary table **13** carrying the table top **1** for the cross-wound bobbin-yarn laps **30**, which rotary table **13** is driven step-wise by the central carrying pillar **13'** in the direction of the arrow *y* (FIG. 10).

The spindles **4** are again disposed on the table top **1** at distances, which correspond with the station A–H, disclosed in the embodiment shown in FIGS. 4 to 8. The spindles **4** enter through guide openings **5** through the table top **1** into the inner space of the machine frame **12**. They are guided a second time in the rotary table **13** in corresponding holes **5'** and carry at their lower ends a pusher plate **15**. The spindles **4** can be also formed solid instead of tubular shaped.

In this embodiment again two half-circular guide rails **16** and **17** are secured in the machine frame **12** below the spindles **4** at different levels. They serve the purpose of guiding the spindles **4** in both positions, namely in the upper position or in the lower position, whereby the pusher plates **15** engage the rail **16** or **17**.

Any suitable means are provided at the engagement places of the rails **16** and **17** for the operation of the spindles **4**. The means for such operation comprises, on the one hand, a lifting cylinder **18** operated by pressurized air, and, on the other hand, a guide cylinder **19'** including a power accumulating spring **34** in addition to a piston rod **35**.

The lifting cylinder **18** carries a locking spring **20**. The latter enters below the pusher plate **15** into the space between the rails **16** and **17**, upon lifting the spindle **4** by means of the piston rod **18'** from the level of the rail **17** to the level of the rail **16**. The spindle **4** can then be transferred to the rail **16** during the continued rotation of the table **1** and of the rotary table **13**, respectively.

A projecting member **36** is provided vertically above the other space between the rails **16** and **17**, which member **36** carries a cylinder **37**, the pressure punch **38** of which, likewise operated by pressurized air, is disposed axially above the spindle **4** which happens to be in position.

Each spindle has at its upper end flange **39** entering a rigid lap carrier **10''**, which consists of a conical, perforated metal sheet sleeve. A central mounting of the sheet metal sleeve-lap carrier **10''** is assured by this fittingly measured flange **39**. The lap carrier **10''** is likewise formed conically corresponding with the conical axial recess of the lap **30**. Thus, during the centering insertion of the lap carrier **10''** into the axial recess of the lap, a parallel approaching of the walls engaging each other only in the end position or shortly prior to reaching such end position, respectively, results. In this embodiment a scraping is also avoided. The stopping of the lap carrier **10''** is caused by the conicity thereof and/or the abutment of its lower end on the table **1** and on the abutment face formed by the guide collar **9**, respectively.

The pressure stamp **38** is formed at its end **38'** entering the lap carrier **10''** as a truncated cone. As can be determined from FIG. 9, the cross-wound bobbin-yarn lap **30** is disposed on the table top **1**. The end of the spindle **4** projects slightly beyond the axial recess of the yarn lap. The distance of the pressure stamp **38** is slightly shorter than the length of the lap carrier-metal sleeve **10''**.

Accordingly, the metal sheet sleeve can be set easily into working position by subjecting the same to an angular position (shown in point dotted lines) and by central mounting on the flange **39**. Upon operation of the cylinder **37** and of the pressure stamp **38**, respectively, the conically and rigidly formed metal sheet sleeve **10''** is pushed into the yarn lap **30**, whereby the spindle **4** is moved downwardly against the yielding spring **34**.

During this operation, the pusher **15** urges the piston **35** into the guide cylinder **19'** and tensions the spring **34**. A locking spring **33** engages at the end of the working stroke the pusher **15** and retains the latter in position as long until it moves laterally onto the rail **17** by rotation of the table **13**. Thereafter, the piston **35** is moved upwardly again by means of the spring **35**, suitably with a braking effect, until its end face reaches the level of the rail **16**.

The next spindle **4** can then enter the receiving position.

An ejecting ramp **22** (shown schematically) is disposed above the table top **1** vertically to the lifting cylinder **18**. The spindle **4** lifted by the piston rod **18'** pushes out, at this point, the paper tube **28**, required for the winding of the yarn from the cross-wound bobbin **30**. The cross-wound bobbin **30** moves then with the rotary table **1**, which carries now merely the spindle **4**, to the receiving position. The described apparatus can also be equipped

with an automatic feeding of the spools and of the conical sleeves, so that a fully automatically working machine is obtained. With the machine disclosed in FIGS. 9 to 11, the metal sheet sleeves **10''** can also be ejected, and paper tubes can be inserted again therefor.

While I have disclosed several embodiments of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

I claim:

1. An apparatus for insertion of a lap carrier into the axial opening of yarn spools, spinning cakes, or the like, comprising

a supporting table for a yarn lap having an opening,

a spindle reciprocable upwardly, so as to receive a lap carrier inserted therein, and downwardly in the opening of said supporting table,

means for moving said spindle downwardly jointly with said lap carrier,

said spindle projecting in its lifted position into the axial recess of said yarn lap,

said lap carrier being centered by said spindle,

said spindle emerging downwardly during said downward movement of said spindle from the axial recess of said lap,

means for stopping a further downward movement of said lap carrier upon emerging of said spindle from the axial recess of said lap,

said lap carrier being radially resilient and including laterally directed feet members,

said spindle being of tubular shape and receiving said lap carrier, and

said feet members being adapted to abut the end face of said yarn lap to stop a further downward movement of said lap carrier, whereby the continued downward movement of said spindle serves to pull said lap carrier from said spindle.

2. The apparatus, as set forth in claim **1**, which includes

two clamping members having conical entrance openings and disposed above said spindle.

3. The apparatus, as set forth in claim **2**, wherein

said supporting table is a rotary table,

a plurality of said spindles mounted on said rotary table along an imaginary circular line equally spaced apart from each other,

said spindle being adapted to eject paper tubes contained in said laps during the upward movement of said spindles,

means for intermittent rotation of said rotary table for angular movements equal with the angular distance of each pair of adjacent spindles, and

stripper means removing said laps mounted on said rotary table during the lowered position of said spindle.

References Cited by the Examiner

UNITED STATES PATENTS

1,948,466	2/1934	Broecker	29—208
2,298,183	10/1942	Susen	29—225
2,615,606	10/1952	McDermott	29—235 XR
2,642,655	6/1953	Davis et al.	29—234

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