Jan. 9, 1962 S. FÜRST 3,016,166

MAGAZINE CONTROL APPARATUS FOR YARN WINDING MACHINES

Filed Feb. 20, 1959 2 Sheets-Sheet 1

FIG. 2

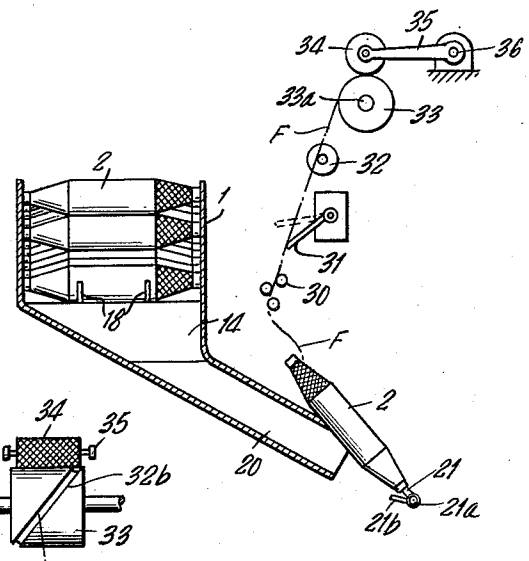
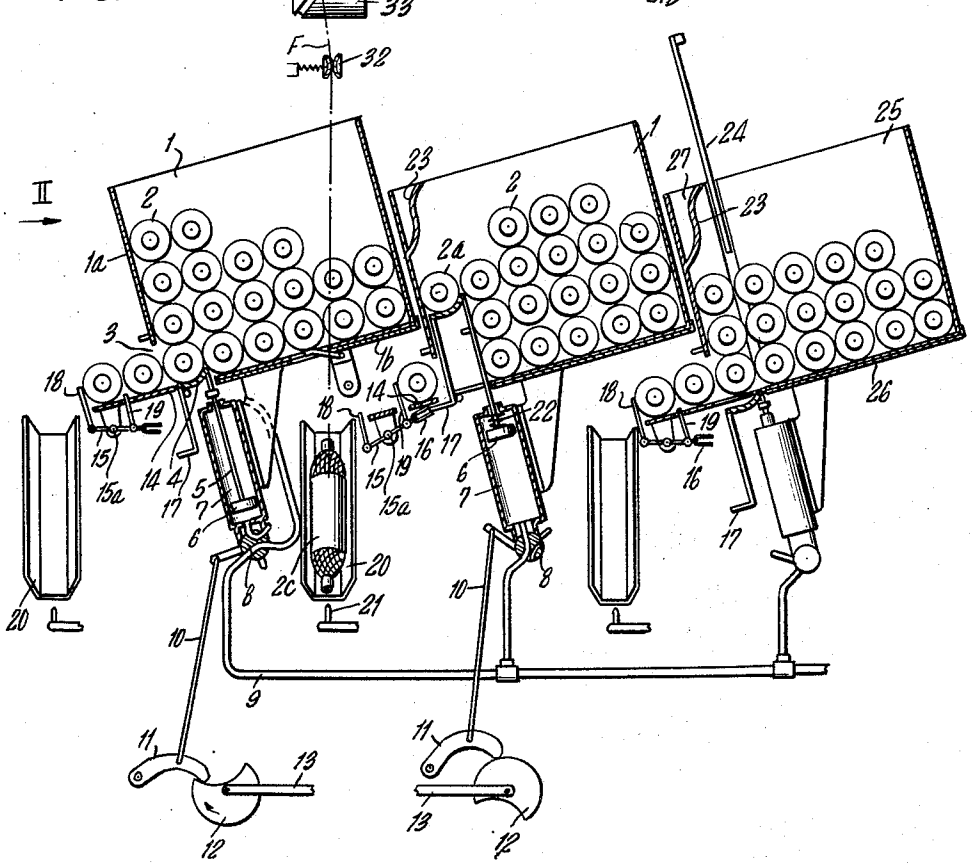


FIG. 1



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MAGAZINE CONTROL APPARATUS FOR YARN WINDING MACHINES

Filed Feb. 20, 1959 2 Sheets-Sheet 2

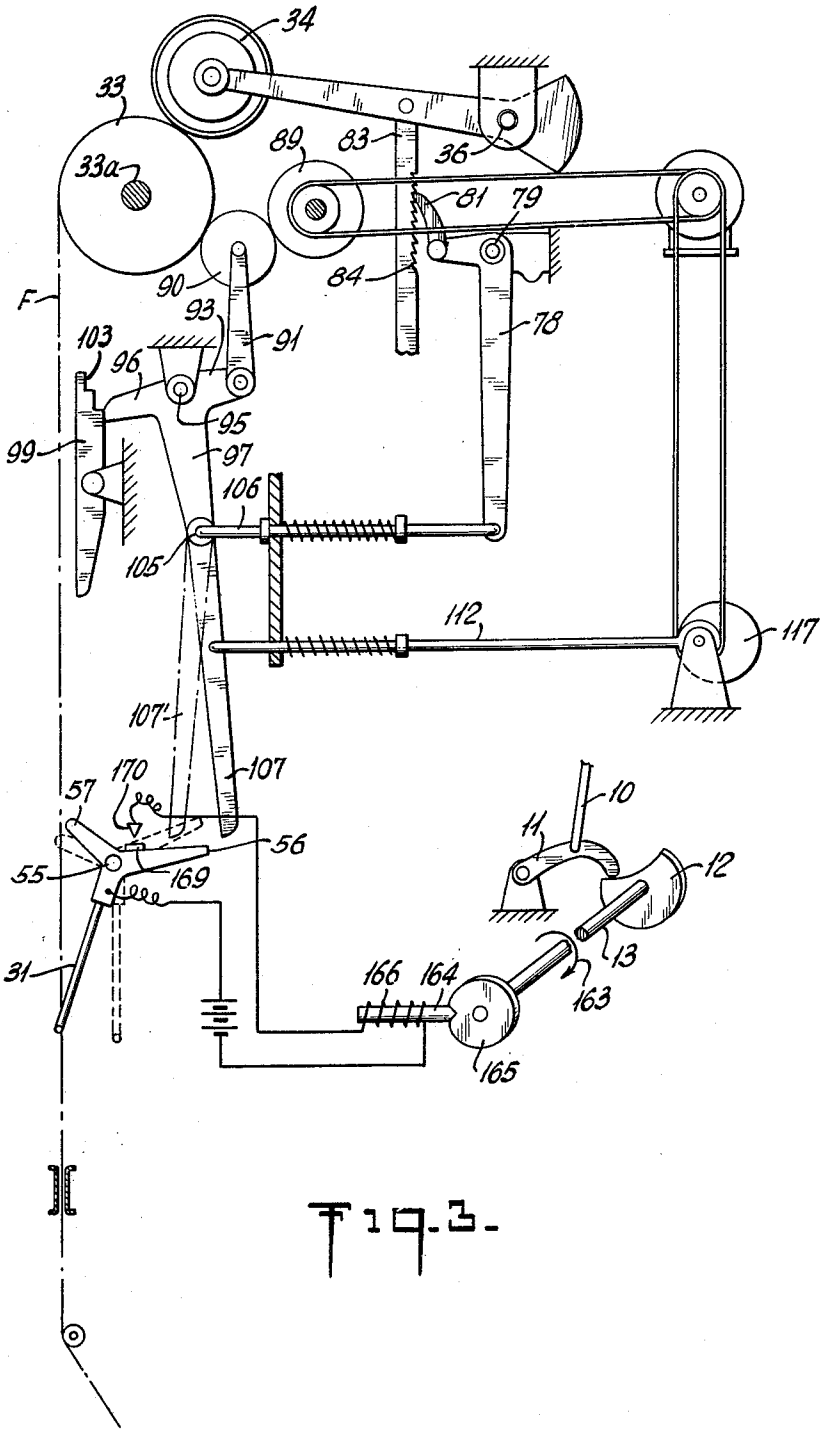


FIG. 3.

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3,016,166
MAGAZINE CONTROL APPARATUS FOR YARN WINDING MACHINES

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Filed Feb. 20, 1959, Ser. No. 794,771
10 Claims. (Cl. 221—200)

My invention relates to magazine devices for accommodating a number of yarn coils in a winding machine where the yarn from the coils is rewound into a larger yarn package of a desired shape and size. In a more particular aspect, the invention concerns a device for dispensing individual spinning cops from a magazine container previously filled with cops in such a manner that the respective axes of all cops are parallel to the container bottom and parallel to each other.

In accordance with the conventional practice in spinning plants, the cops coming from the spinning machine are stored in a collecting box which, when filled, is conveyed to a winding machine where the cops are rewound into a larger yarn package, such as a flange-type coil or a cross-wound package, also being called "cheese." The rewinding operation, particularly when performed in automatic winding machines, makes it necessary to provide for a regular supply of new spinning cops to the winding devices so that the yarn can be rewound without undue stoppages. It is known to provide each individual winding device with its own magazine into which the cops are placed by hand and from which a single cop at a time is dispensed into the winding device upon depletion of the cop previously unwound. If the cops in such a magazine form a single layer, the magazine is small and the supply of new coils must be replenished frequently. On the other hand, if larger magazine containers are used with the cops located in several layers on top of each other, the issuance of only one cop at the proper time becomes unreliable. This is because, even if only one cop is dispensed through an opening near the bottom of the magazine container, any cops located above the one being issued may brace themselves and edge against each other and thus form a bridge. As a result, the gripper, which enters into the container space for discharging a cop therefrom, will pass into the vacant space formed by the bridge and thus may thereafter leave the container in empty condition, so that no cop is furnished to the winding device.

It is an object of my invention to provide a coil magazine device that obviates the above-mentioned shortcomings and combines a large coil-holding capacity with a reliable dispensation of an individual cop each time the device is called upon to operate.

To achieve these objects, and in accordance with one of the features of my invention, I provide an essentially conventional magazine container through whose lateral outlet opening near the container bottom the coils are gravity-issued when released, and I combine such a magazine container with an entrainer device and with a lock mechanism which are designed and jointly controlled to cooperate in the following manner. The entrainer device is located in the container space immediately adjacent to the outlet opening and is movable upwardly and downwardly to respectively uncover and cover the outlet opening. The entrainer device forms on its top a cavity for entraining a single cop which, upon the next following arrival of the retainer device at the bottom of the container, is in position to issue from the outlet opening onto a guide surface outside the magazine container as soon as the lock mechanism at the remote end portion of the guide surface has acted to release the most forward cop. Since the retainer device, when moving upwardly for selecting and readying a single cop, penetrates into the stack of cops in the magazine, it prevents or destroys and bridge formation of the cops. A single upward and downward reciprocation of the entrainer device takes place only once for each coil-discharging operation.

The entrainer proper is preferably designed as a trough which is elongated transversely of the magazine container and which is open not only upwardly but also along its one longitudinal side that faces the outlet opening, the upward and downward movement of the entrainer being perpendicular to the axis of the trough space. The walls of the entrainer trough may have openings or recesses, or the trough may also be formed by wire members. The sidewall of the trough located toward the interior of the container space is given a height corresponding at least to one-half of the cop diameter but not larger than the full diameter of a cop. The downward return motion of the trough terminates at a point where the uppermost edge of the trough is flush with, or below, the bottom of the magazine container. The highest position reached by that edge at the end of the upward stroke may be at approximately one-half of the container height.

In order to prevent the upward movement of the entrainer device from pushing any coils upwardly out of the magazine container, a wavy or stepped baffle may be mounted in the upper range of the front wall of the container, namely above the outlet opening. Such a baffle pushes the uppermost cops in a direction toward the interior of the container space, so that only the one cop resting directly upon the retainer or in the above-mentioned trough will remain located in that trough. The same effect can be obtained by giving the front wall of the magazine container a correspondingly inclined position relative to the path of entrainer motion.

The above-mentioned reciprocating motion of the entrainer device is preferably controlled by compressed air which, acting upon a piston in a cylinder, operates to lift the entrainer device under control by a valve. The lifting motion may be accompanied by the tensioning of a return spring. Thereafter, the automatically actuated valve connects the interior of the cylinder with the ambient air so that the piston and the entrainer device are lowered back to the starting position where the entrainer single cop is ready to issue from the outlet opening of the magazine.

According to still another feature of my invention, a control device for actuating the lock mechanism is connected with the entrainer device in order to have the lock operate in the proper sequential relation to the entrainer device. The control of the lock is such that it releases a cop from the guiding surface when the entrainer device is in its uppermost position, and permits the next following coil to enter the lock area during the downward return movement of the entrainer device.

The foregoing and more specific objects and features of my invention will be apparent from, and will be mentioned in, the following with reference to the accompanying drawing in which:

FIG. 1 is a front view of three magazine devices according to the invention and also shows diagrammatically some of the components of a yarn-package winding station to be serviced by one of the magazine devices.

FIG. 2 is a lateral view of one of the magazine devices seen in the direction of the arrow II in FIG. 1; and FIG. 2 also shows diagrammatically the main component of the winding station of which the magazine forms part.

FIG. 3 is a schematic view showing how response of the yarn guide to absence of yarn causes a lifting of the takeup spool, the yarn guide being shown in the mirror image position relative to that in FIG. 2.

As illustrated, a magazine container **1** accommodates a large number of spinning cops **2** stacked in several layers one above the other. The container **1** is placed upon an

inclined supporting member 1*b* so that the bottom of the container space is likewise inclined. The front wall 1*a* of the container has an outlet opening 3 adjacent to the container bottom. The opening 3 extends transversely over the entire width of the container and is so dimensioned that only one cop 2 can pass through at a time.

Located immediately adjacent to the outlet opening 3 is an entrainer trough 4. The trough is open toward the outlet opening 3. The opposite side wall of the trough extends upwardly a distance approximately equal to one-half of the cop diameter. The trough 4 is mounted on a rod 5 connected with a hydraulic piston 6 movable in a cylinder 7 which is connected to a control valve 8. In the one magazine device shown in the left-hand portion of FIG. 1, the lower chamber and the upper chamber of the cylinder can be selectively connected by means of valve 8 with a compressed-air line 9. Valve 8 is actuated by a linking rod 10 cooperating with a lever 11 and a control cam 12. Cam 12 is mounted on a control shaft 13 which performs a single full revolution each time a depleted coil in the winding station is to be replaced by a full cop from the magazine device. In my U.S. Patent No. 2,769,599, issued November 6, 1956, and assigned to the assignee of the present invention a mechanism is disclosed for causing a single cam shaft revolution to take place upon response to a yarn feeler to absence of yarn. As shown in the lower portion of FIG. 3, shaft 13 is rotated in a similar manner, as follows: The feeler member 31 is rotatably mounted and carries a contact 169 located opposite a stationary contact 170 so that when the thread F breaks or is otherwise absent, the feeler member 31 turns about its pivot 55 in a clockwise direction, as viewed in FIG. 3, to bring contact 169 into engagement with the contact 170 for closing the illustrated circuit connected to the coil 166. Rotatable cam shaft 13 is adapted to be rotated in the direction of arrow 163 when the pin 164 is removed from a matching notch in the disc 165 which is fixed to the cam shaft 13, this pin being pressed by a spring (not shown) toward the periphery of this disc 165 so as to enter the notch therein and limit the rotation of cam shaft 13 to a single revolution after the pin 164 is removed from disc 165 by energizing of the coil 166 located about this pin 164.

In the illustrated operating condition of FIG. 1, the air line 9 is connected through valve 8 with the upper cylinder chamber, thus holding the entrainer trough 4 in lowermost position where the cop seated in the trough is ready to issue from the outlet opening 3.

The above-mentioned surface member 1*b* forms a guide surface 14 outside of the magazine container 1 and adjacent to the outlet opening 3. Mounted at the lower end of surface member 14 is a lock mechanism 15 which is pivoted at 15*a* and provided with a fork 16 for cooperation with a lug 17 firmly secured to the entrainer device and movable together with the trough 4. During the above-described upward motion imparted to the entrainer device by the hydraulic piston 6, the lug 17 enters into the fork 16 only shortly before the upward travel is terminated. During the last portion of the upward movement, the fork 16 and the pivoted lock mechanism 15 are turned counterclockwise. This causes the lock mechanism to withdraw its latchpins 18 from the lowermost cop and to simultaneously place corresponding latchpins 19 in front of the next following cop. The released cop then rolls onto an incline 20 and, passing through the intermediate position shown at 2*c*, is speared upon a thorn 21 which forms part of the supply-coil holding means in the winding station. At the moment when the cop 2 reaches the thorn 21, the thorn is in the broken-line position shown at 21*b* in FIG. 2. Thereafter, the thorn is turned about its pivot 21*a* into the full-line position, and the cop is then ready for its yarn to be tied together with the yarn end coming from the package being wound.

The devices for thus controlling the coil holder and other components of the winding station are not part of the present invention proper and may correspond to those illustrated and described in my co-pending applications Serial No. 795,151; Serial No. 728,139; Serial No. 675,677, now abandoned; and in the application of S. Furst and W. Reiners, Serial No. 750,381, all said applications being assigned to the assignee of the present invention. However, a brief description of some of the winding-station components will be given presently in conjunction with the schematic illustrations in FIGS. 1 and 2.

As shown in FIG. 2, the yarn F passes from the cop 2 through yarn guiding means 30 and along a spring-biased yarn guide 31 through a tensioner 32 and thence through a guiding groove 32*b* of a guiding drum 33 onto the take-up spool of the yarn package 34 to be wound. The guiding drum 33 is mounted on a shaft 33*a* continuously driven at constant speed. The guiding groove 32*b* of drum 33 extends about the drum periphery and forms a loop closed upon itself so that during rotation of the drum the traveling yarn is reciprocated along the take-up spool 34 in order to produce the desired cross-wound yarn package. The take-up spool is rotatably mounted on a holder 35 which is pivoted at 36 to the stationary machine frame structure. As a result, the take-up spool rests with its periphery against the guiding drum 33 and is entrained thereby to rotate at constant peripheral speed.

The yarn guard 31 is essentially a lever which is spring-biased against the taut portion of the yarn between the guide means 30 and the tensioner 32. Considering only the operating condition here of particular interest, namely the event that the cop 2 becomes depleted, it will be recognized that such depletion causes the yarn to vanish between the guide 30 and the tensioner 32. As a result, the guard 31 deflects to the broken-line position and thereby causes the winding operation to be stopped by lifting the take-up spool 34 off the rotating drum 33 as is more fully described in the above-mentioned co-pending application Serial No. 675,677, for example.

This lifting of the take-up spool off drum 33 by the action of yarn guide 31 is described in greater detail in my copending application Serial No. 704,983, filed December 24, 1957, and is summarized herein as follows: Immediately upon the breaking of the thread F or depletion of the supply coil 2, the thread guard 31 turns about its pivot to the dotted line position shown in FIG. 2, for example under the pressure of a spring (not shown). An extension lever 107, shown in FIG. 3, driven from cam 117 through control rod 112, continuously performs a swinging motion between the full-line position and the dot-and-dash position 107′. During this swinging motion, the lever 107 enters into the range of motion of lever 56. Consequently, when the lever 56 moves upward, due to the deflection of thread guard 31, it prevents or blocks the extension lever 107 from performing its normal swinging motion about pivot 105. As a result, the lever 107, now abutting against the tip of arm 56 while being driven by the control rod 112, moves the link 105 toward the left (FIG. 3). This causes the three-armed lever 93, 96, 97 to turn clockwise about its pivot 95. The lever arm 96 now enters into the latch step 103 of latch lever 99 where it finds a rigid or firm abutment. The intermediate friction gear 90, connected by link 91 with the pivot of lever arm 93, is simultaneously pulled downward thus interrupting the driving connection between the driving gear or drum 89 and the thread-guiding drum 33. At the same time, the pull member 106 fastened to the link 105 turns the lever 78 clockwise (relative to FIG. 3) about its pivot 79. Consequently, lever 78 now lifts the pawl 81, and the pawl, cooperating with the ratchet teeth 84, lifts the piston rod 83 and thus also the journalling frame 35 with the take-up spool 34.

At the same time, the deflection of yarn guard 31 controls the shaft 13 to perform a single start-stop revolution which first effects doffing of the depleted cop and then replacing it by a full cop from the magazine of the winding

station in the manner and by the means already described above.

More specifically, when a cop becomes depleted and an exchange is initiated by actuation of the yarn guard, the control shaft **13** and the cam **12** mounted thereon cause the cam-follower lever **11** to move counterclockwise, thus displacing the linking rod **10** and the movable member of valve **8**. This has the effect of connecting the lower cylinder chamber with the air line **9** while simultaneously connecting the upper cylinder chamber with the ambient air. The piston **6** now moves upwardly, thus shifting the entrainer trough **4** upward. The trough entrains not only the one cop located in the trough space, but may also push upwardly a number of the other cops on top of the one to be entrained. In order to prevent such cops from being inadvertently pushed out of the container space, the front wall **1***a* of the container is preferably provided with a baffle member as shown at **23**. This member extends transversely through the magazine space and has a stepped or wavy shape. The uppermost cops hit against the baffle and are directed toward the interior of the magazine space so that only the one cop denoted by **2***a* will ultimately remain in the entrainer trough.

When the trough reaches the uppermost position shown in the middle magazine of FIG. 1, the lock mechanism **15** opens so that the most forward cop is released and passes through the inclined glideway **20** onto the thorn **21**. At this time, the latch members **19** of the lock mechanism prevent all other cops from being likewise discharged. During the next following downward motion of piston **6** and entrainer trough **4**, the lock mechanism **15** returns to its original locking position. Now the next following cop can advance into the active range of the lock mechanism, and the entrainer trough **4**, returning to its lowermost position, can now issue the one entrained cop **2***a* through the outlet opening **3** onto the guide surface **14**.

In the meantime, another can enter into the entrainer trough **4**. However, if the cops have formed a bridge in the magazine space, the next following upward movement of entrainer trough **14** will dissolve such bridge formation. In any event, the entrainer trough can always receive one of the cops and keep it ready for issuance as soon as, during the coil-exchanging operation of the winding station, the above-described operating cycle is again initiated.

As described above, the hydraulic control cylinder in the magazine device shown in the left-hand portion of FIG. 1 has the upper cylinder space and the lower cylinder space selectively connected with the air line **9** under control by valve **8**. The magazine device shown in the middle portion of FIG. 1 is somewhat modified with respect to the hydraulic actuation. According to this modification, only the lower cylinder space is connected with the air line **9** through valve **8**, whereas a spring **22** is provided in the upper cylinder space which is freely connected with the ambient air. When the valve **8** is automatically placed in position to apply air pressure in the lower cylinder chamber so that the piston **6** lifts the entrainer device, the spring **22** is stressed. When thereafter the valve **8** is actuated to connect the lower cylinder space with the ambient air, the spring **22** supplies the force necessary for reliably returning the piston **6** and the entrainer trough **4** to lowermost position.

The magazine device shown in the right-hand portion of FIG. 1 is provided with a container **25** that can be closed by means of a slidable cover **24**. The container can be filled with cops at the spinning machine and can then be closed by means of cover **24** before transporting it to the winding machine. In the winding machine, the container **25**, in closed condition, is placed upon the supporting structure **26**. The front portion **27** of the magazine device forms part of the winding machine and is permanently connected with the supporting structure **26**. When the container **25** is placed in proper position, the magazine portion **27** covers the open side of the container so that the cops cannot fall out of the container when the cover **24** is opened. In all other respects, the device is designed and operative as described above. By using the same container **25** at the spinning machine and the winding machine, the filling of cops from one container into another is eliminated and any danger of damage to the cops due to such re-filling is avoided.

It will be apparent to those skilled in the art, upon a study of this disclosure, that my invention permits of various modifications and may be embodied in devices other than particularly illustrated and described herein, without departing from the essence of my invention and within the scope of the claims annexed hereto.

I claim:

1. With a magazine container adapted for storing a number of spinning cops parallel to each other and having a front wall with a cop outlet opening adjacent to the container bottom, the combination of a magazine control device comprising an entrainer structure slidably movable in said container near said opening and having a top position in which said entrainer device covers said opening and a bottom position in which said entrainer device uncovers said opening, said entrainer device having a portion receivingly engageable with only the one supply coil closest to said opening when said entrainer device moves from said bottom position to said top position whereby said one coil is caused to issue through said outlet opening when said entrainer device returns to said bottom position, a surface structure located outside said container and adjacent said opening and forming a passageway for the coils issuing from said opening, a lock disposed on said structure for individually releasing the most forward coil therefrom, and control means connected with said retainer device and said lock for actuating them in a given relation to each other.

2. With a magazine container adapted for storing a number of spinning caps parallel to each other and having a front wall with a cop outlet opening adjacent to the container bottom, the combination of a magazine control device comprising an entrainer device having a trough structure extending transversely through said container near said opening, said trough structure being slidably movable upwardly and downwardly along said wall and having a top position in which said entrainer device covers said opening and a bottom position in which said entrainer device uncovers said opening, said trough structure being open at its longitudinal side facing said opening when said entrainer device is in bottom position, said trough structure being receivingly engageable with only the one supply coil colsest to said opening whereby said one coil is caused to issue through said opening when said entrainer device returns to said bottom position, a surface structure disposed outside said container adjacent said opening and forming a passageway for coils issuing from said opening, a lock disposed on said structure for individually releasing the most forward coil therefrom, and control means, connected with said entrainer device and said lock for actuating them in a given relation to each other.

3. In a magazine control device according to claim 2, said trough structure having its other longitudinal side extend upwardly to a height greater than one-half of the cop diameter but smaller than the whole cop diameter when said entrainer device is in said bottom position.

4. In a magazine control device according to claim 1, said front wall having an upper portion located above said entrainer structure and inclined relative to the path of entrainer motion and in an upward direction toward the interior of said container so as to form a baffle for deflecting the cops, except the entrained one, away from said entrainer structure.

5. A magazine control device according to claim 2, comprising a baffle member of wavy shape mounted in said container above said trough structure and extending transversely through said container near said front wall, said baffle member being upwardly inclined from said

wall toward the interior of said container for deflecting the cops, except the entrained one, away from said trough structure.

6. A magazine control device according to claim 1, comprising a pneumatic actuator having a cylinder and a piston displaceable in said cylinder and connected with said entrainer structure for moving the latter, and valve means for controlling the supply of compressed air to said cylinder.

7. A magazine control device according to claim 1, comprising a spring connected with said entrainer structure and tending to hold said entrainer structure in said bottom position, and a fluid-pressure responsive actuator having a cylinder and a piston displaceable in said cylinder, said piston being connected with said entrainer structure for moving it to said top position against the force of said spring when said cylinder is under fluid pressure.

8. A magazine control device according to claim 1, comprising a reciprocating drive connected with said entrainer device for moving it once from said bottom position to said top position and back to said bottom position during each reciprocation of said drive, said control means having coupling means active to join said entrainer device with said lock so as to actuate said lock and resetting it to starting condition during the motion of said entrainer structure.

9. With a magazine container adapted for storing a number of spinning cops parallel to each other and having a front wall with a cop outlet opening adjacent to the container bottom, the combination of a magazine control device comprising an entrainer structure slidably movable in said container near said opening and having a top position in which said entrainer device covers said opening and a bottom position in which said entrainer device uncovers said opening, said entrainer device being engageable with only one supply coil at a time when moving from said bottom position to said top position whereby said one coil is caused to issue through said outlet opening when said entrainer device returns to said bottom position, a surface structure located outside said container and adjacent said opening and forming a passageway for the coils issuing from said opening, a lock disposed on said structure for individually releasing the most forward coil therefrom, and control means connected with said retainer device and said lock for actuating them in a given relation to each other, a reciprocating drive connected with said entrainer device for moving it once from said bottom position to said top position and back to said bottom position during each reciprocation of said drive, said control means having coupling means active to join said entrainer device with said lock so as to actuate said lock and resetting it to starting

condition during the motion of said entrainer structure, said lock having a pivoted control member movable forward and back for actuating and resetting said lock, said coupling means comprising a fork on said control member and a nose on said entrainer device, said fork being engageable with said nose to be entrained thereby when said entrainer device is in a given upper range of its reciprocating travel.

10. A magazine device for storing a number of cops parallel to each other and dispensing them one at a time, comprising a supporting structure having an inclined supporting surface, a removable magazine box for storing said cops, said box resting upon said surface and having a movable front cover to be closed when said box is removed from said surface and to be opened when said box is on said surface, a container portion fixed to said supporting structure and located adjacent to said box when said box is on said surface so that said portion forms part of the magazine space when said cover is open, said container portion having a front wall with a cop outlet opening adjacent to the container bottom, and an entrainer device slidably movable in said container portion near said opening and having a top position in which said entrainer device covers said opening and a bottom position in which said entrainer device uncovers said opening, said entrainer device having a portion receivingly engageable with only the one supply coil closest to said opening when said entrainer device moves from said bottom position to said top position whereby said one coil is caused to issue through said opening when said entrainer device returns to said bottom position, said supporting surface extending outside said container portion at the side adjacent to said opening to form a passageway for the coils issuing from said opening, a lock disposed on said structure for individually releasing the most forward coil therefrom, and control means connected with said retainer device and said lock for actuating them in a given relation to each other.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,016,166 January 9, 1962

Stefan Fürst

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, between lines 6 and 7, insert the following:

Claims priority, application Germany Feb. 22, 1958

Signed and sealed this 8th day of May 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents