

[54] **METHOD AND APPARATUS FOR PLACING A COP WITH ITS THREAD DRAWN OUT IN A MOVABLE STORAGE POINT**

[75] Inventor: **Luciano Savio**, Pordenone, Italy

[73] Assignee: **Officine Savio S.p.A.**, Pordenone, Italy

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[51] Int. Cl. .... **B65h 54/22**

[58] Field of Search ..... **242/35.5 R, 35.5 A, 35.6 R, 242/35.6 E**

[56] **References Cited**

**UNITED STATES PATENTS**

|           |         |             |            |
|-----------|---------|-------------|------------|
| 2,675,971 | 4/1954  | Abbott..... | 242/35.6 R |
| 3,224,694 | 12/1965 | Oishi.....  | 242/35.5 R |
| 3,279,710 | 10/1966 | Raasch..... | 242/35.5 R |

|           |         |                     |            |
|-----------|---------|---------------------|------------|
| 3,381,908 | 5/1968  | Igushi et al.....   | 242/35.5 R |
| 3,471,101 | 10/1969 | Moyer et al.....    | 242/35.6 R |
| 3,480,215 | 11/1969 | Matsui et al.....   | 242/35.5 R |
| 3,480,216 | 11/1969 | Iannucci et al..... | 242/35.6 R |
| 3,506,209 | 4/1970  | Matsui et al.....   | 242/35.5 R |

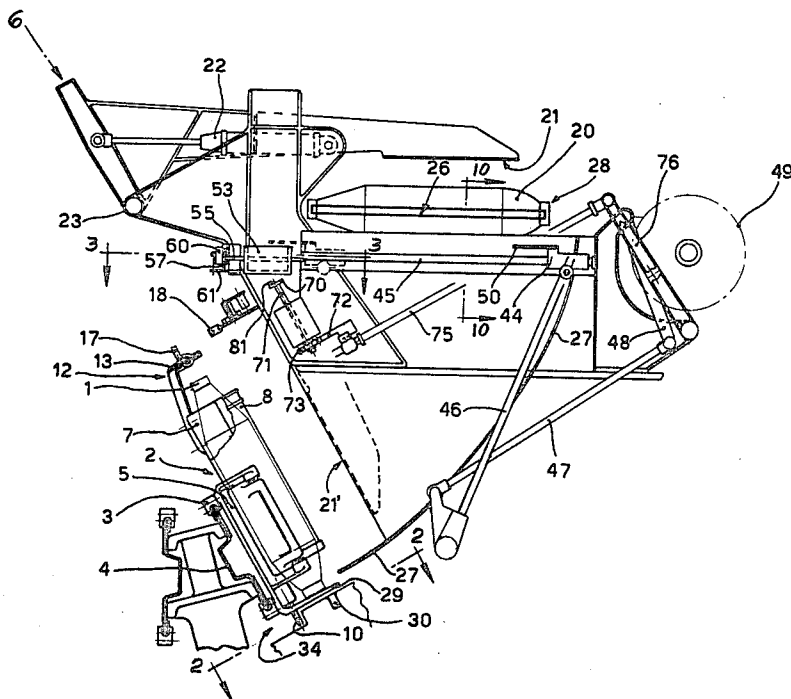
*Primary Examiner*—Stanley N. Gilreath  
*Attorney, Agent, or Firm*—Stevens, Davis, Miller & Mosher

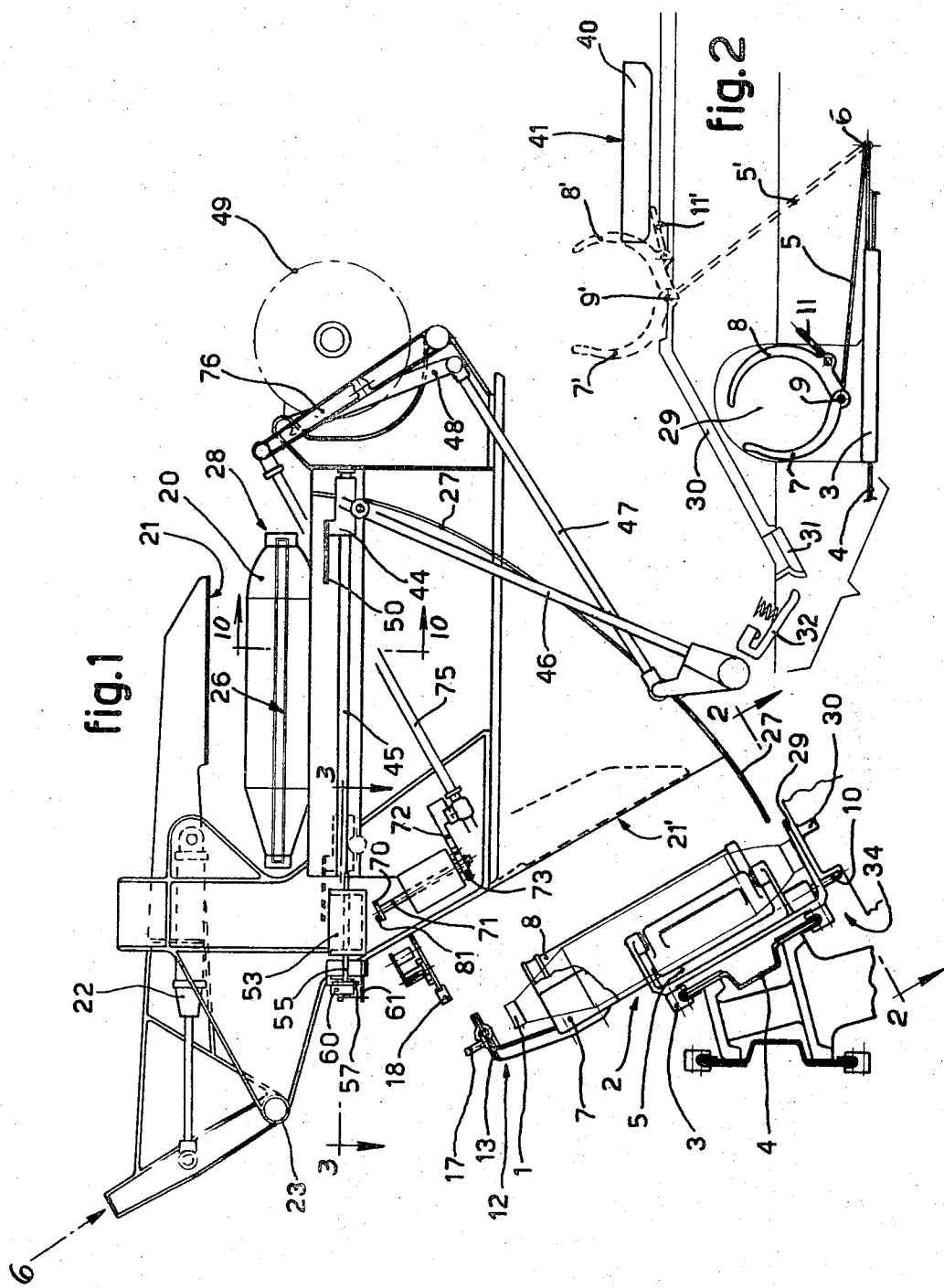
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**ABSTRACT**

A method and apparatus for loading cops of thread wound on spindles into movable containers including means for detecting the presence of an empty container and shunting the empty container toward a loading station; means for separating a thread-end of a cop loaded between opposed vibrating mandrels in response to the detected presence of an empty container; means to detect the failure of a thread-end to be separated from the cop waiting to be loaded; and means to expel a cop loaded into a container from that container when the presence of a separated thread-end has not been detected.

**21 Claims, 12 Drawing Figures**





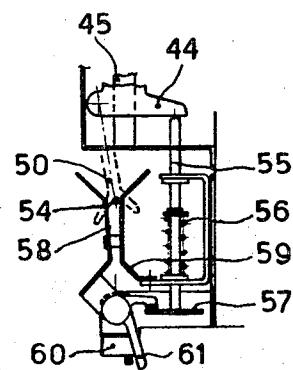


fig. 3

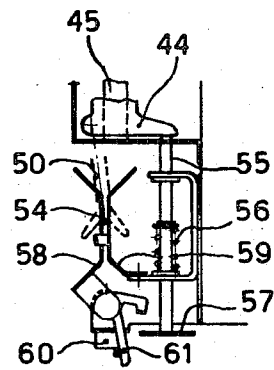


fig. 4

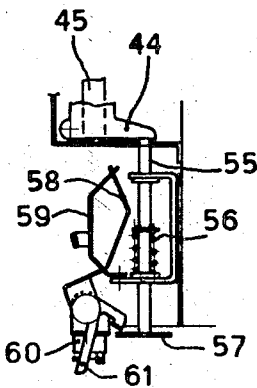


fig. 5

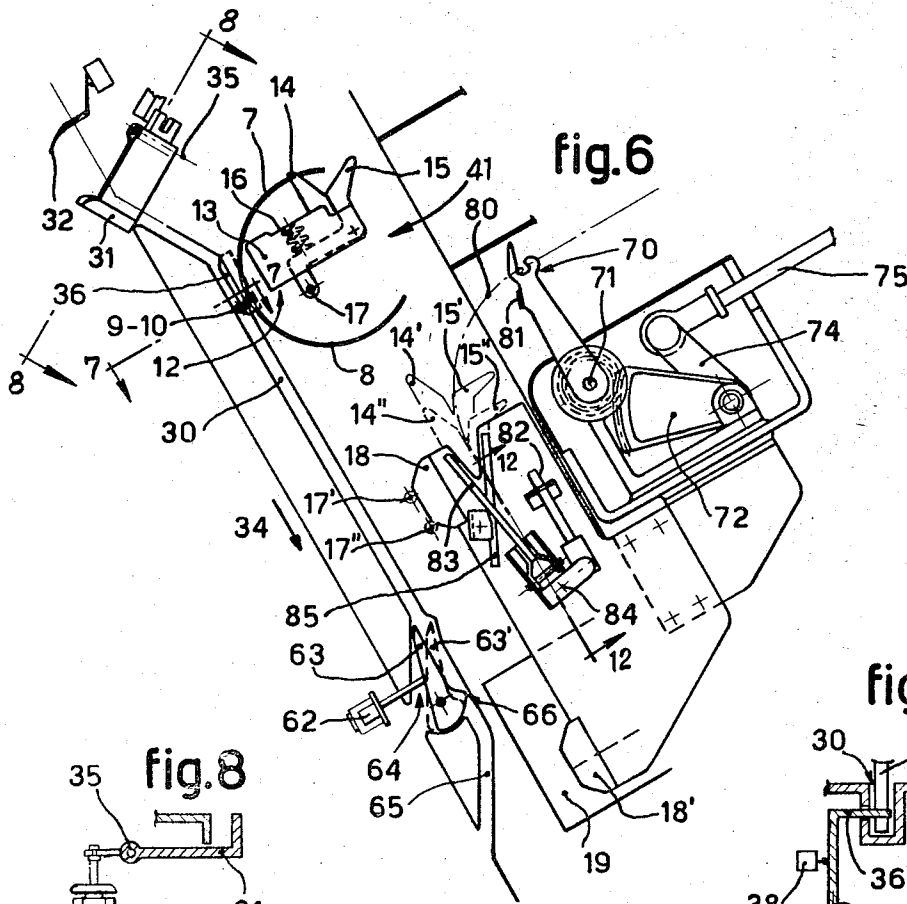


fig. 6

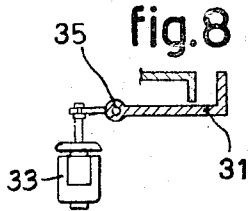


fig. 8

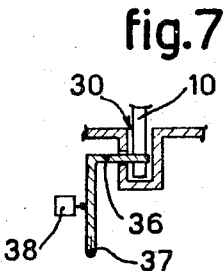
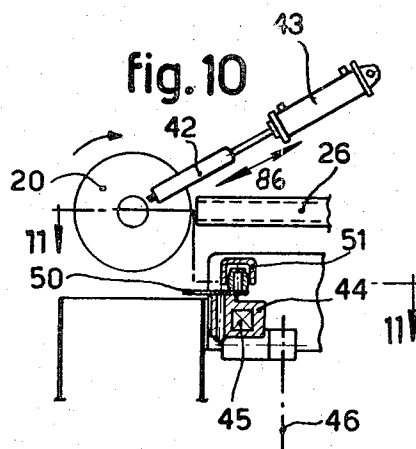
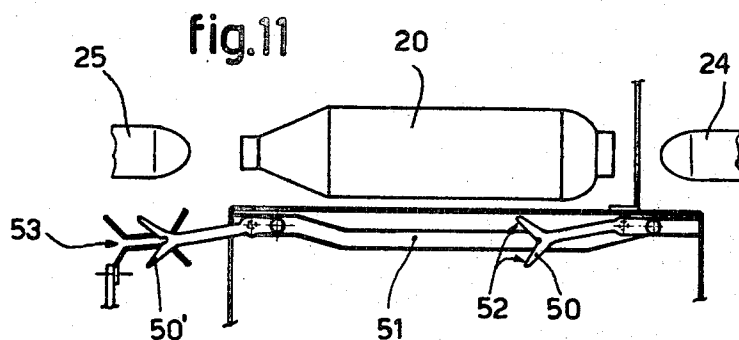
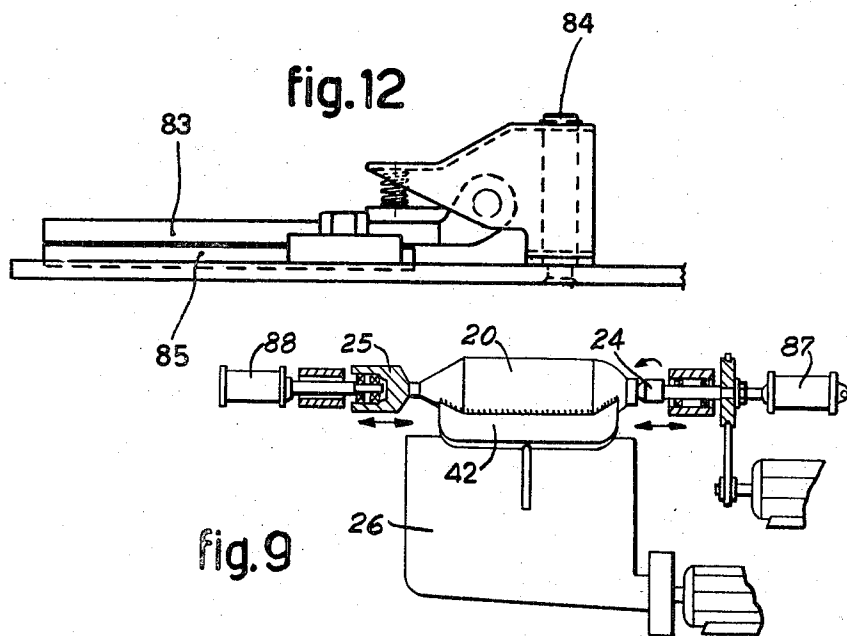


fig. 7



# METHOD AND APPARATUS FOR PLACING A COP WITH ITS THREAD DRAWN OUT IN A MOVABLE STORAGE POINT

This invention relates to a method for placing a cop with its thread drawn out in a movable storage point, and to a device suitable for taking cops from a means for their preparation and for picking up their thread-ends so as to dispatch them into a movable storage point when a compartment of said storage point happens to have no cop inside it; the device also includes the relative station for loading cops into the container of the movable storage point.

Movable storage points are used for various purposes, one of which is to supply the automatic loaders of machines with a self-controlled cycle.

The invention is suitable for carrying out loading of movable storage points whether these latter are linear, almost linear, circular or almost circular and whether they move continuously or in stages.

The method of this invention starts from the presumption that it is to use a cop which is ready in a horizontal, almost horizontal or vertical position and has already been orientated with its thread-end picked up.

A feature of the invention is that it dispatches the cop into the container of the movable storage point by means of a pusher.

Another feature is that it delivers the cop to the container whether the latter is moving forward continuously or in stages.

A further feature is that it delivers the cop to the container and at the same time passes the thread-end to suitable prearranged pincers, which are present in the container itself, and cuts off the excess part of the thread, which part is automatically taken away. Yet another additional feature is that it checks the presence of the thread-end and obtains therefrom permission for the cop to remain in the container or else permission for a cop present in the container to be expelled therefrom whenever the thread-end has not been found.

The invention envisages the use of containers positioned one after another and composing the movable storage point; such containers are already known as regards their general structure but have been conveniently altered and improved so as to be made suitable for the subject of this invention. The movable storage point is composed of a closed ring made of a coordinated series of containers, linked together, the axis of which is vertical or sub-vertical. The ring can have a variety of forms, i.e., oval, round, ovoid, rectangular, etc., and this according to the needs of distribution downstream of the present invention. The movable storage point, as has been said can move continuously or in stages.

In accordance with the invention, the cop is placed and set in rotation between two mandrels and is subjected to a vibrating superficial brushing action carried out by a mechanical means. This brushing action facilitates the suction action which is applied longitudinally to the whole of the cop; in this way the thread-end can be recovered and sucked up by the inlet provided for the purpose even if the thread-end is inverted or wound up in a marginal position of the winding.

When the cycle for picking up the thread-end has been completed by the suction system, if the control of the moving container reports that it has no cop in it, the

mandrels between which the cop is placed open and a pusher-device pushes the said cop into the container which in the meantime has opened its doors in readiness.

As soon as the cop begins to descend or else when it is in the container or when it is in an intermediate position therebetween, a fork to pick up and deliver the thread-end moves and passes in front of the suction inlet and between the inlet and the cop.

By doing this, the fork picks up the thread-end, if available, and delivers it to a device consisting of crossed combs for checking the presence of the thread-end.

Therefore while the cop is being pushed into the moving container, a check on the presence of the thread-end is also being carried out.

This check is necessary because, when the cop is consigned to the usage point downstream of the invention apparatus, it must be consigned with its thread-end ready, since otherwise the usage point is not able to use the cop.

A device checks on the presence of the thread-end picked up and consigned in position to the container of the movable storage point. Where it is ascertained that the cop has been consigned to the container without the end being positioned, the emission of a signal has been envisaged which causes the expulsion of the cop as consigned to the containers.

After being put in the checking device, the thread-end is then moved until it is positioned in some clamping pincers; present in the container of the movable storage point; at the same time the excess part of the thread-end thereof is cut off and taken away by the aforesaid suction inlet.

At this point the container or compartment of the movable storage point is ready with the cop and the thread-end in position.

More specifically, the invention can be set out as follows. The movable storage point is produced by the use of containers with doors which are supported on a hinged, folding arm or on another means suitable for the purpose, such as supports which are axially free to move forwards, a pantograph etc. At the beginning of the loading station, when the presence of a container has been established, an arm applied to the entire lower part of the container also ascertains its contents. If it follows from this inspection that the container has no cop in it, the checking device activates a switch, which moves the doors forwards and thus moves them out of their normal course into a more frontal course in a direction perpendicular to that of the canal for the containers. In this course, the container doors are opened and kept open for a certain distance.

In accordance with a variation, the doors could be kept in their normal course and be opened only for the length of the station where loading takes place and possibly also in the area where possible discharge of the cop is carried out if the thread-end is not found to be in position. A further way of resolving the problem is that of planning a container without a lower support of its own to hold up the cop or with a lower support that turns over during the loading phase; in these cases, when the cop has been put in, the doors could close again, and extraction would take place below by the opening of a trap-door.

In accordance with the first described alternative, which, as will be seen, presents different advantages

both in security and also in simplicity of construction, the container is moved by the switch into another course. The action of the switch is carried out by the effect of a pin which follows the course in which it has been placed, transmitting the movements to the container.

During the movement the pin activates a stylus which reveals the presence of a container to be loaded with a cop. This stylus starts up the cycle of loading the cop and positioning the thread-end. In the meantime or soon afterwards, the doors are opened by a tube. When the loading cycle starts, the cop which is positioned between the mandrels is set in rotation by them and at the same time its outer surface undergoes, longitudinally an action of suction from an inlet which thereby seeks to find and pick up the thread-end.

During this phase, a brush, which may affect longitudinally all or part of the cop, carries out a vibrating action on the cop surface in coordination with the suction action.

The existence of the auxiliary action of the brush which could be substituted by a spatula is necessary to improve the action of the longitudinal suction tube either in a case where the end of the thread is folded back in the opposite direction on the cop or where it has not been wound up on the cop in a long spiral but in a short spiral and therefore has to be found in among the normal turns of the yarn.

In accordance with a variation, the brush may affect only the end portion where the action of forming the winding was finished.

After a precalculated time or else after a definite number of rotations, the mandrels withdraw axially and the cop is left free. At the same time a pusher device begins to act longitudinally on the cop, pushing it between the doors of the container and then returning it automatically to a stalled position.

As soon as the pusher device begins to act on the cop, a fork starts to pass in front of the suction inlet and between it and the cop, picks up the thread-end and goes on to place it in a feeler-device to check the presence of the thread-end.

The action of the fork does not carry the thread-end away by the suction tube but leaves its end therein.

A variation from the preferred embodiment here described is to start up the movement of the fork when the cop is between or almost between the doors; yet another variation is to arrange that the fork should start its movement when the cop is in an intermediate position between the two positions previously described.

The fork, itself when consigning the thread-end to the feeler-device frees it from a control, which normally makes it stay open, and thus allows it to close so as to establish that the thread-end is present. The feeler device is in the form of crossed combs.

If the thread-end is present, the feeler-device is not able to close completely. If, however, the thread were not there, the feeler-device is able to close and thus to activate a signal to give warning that the thread-end is missing.

When this check has been completed, the thread-end is taken and delivered to some pincers present on the container and solidly fixed thereto above it.

Before receiving the thread, the pincers are opened and are closed again soon after the thread is positioned therein.

Delivery of the thread-end can take place with the container at a standstill or by following the container in cases where the movable storage point moves continuously. Simultaneously with delivery of the thread-end to the pincers on the container, the device which carries out delivery activates some shears which cut off the excess part of the thread-end, this part of the thread-end then being sucked away by the suction tube.

If the crossed comb feeler device has not emitted any signal, the container or compartment which has received the cop is turned back again into its normal path; if, however, the feeler-device has established that the thread-end in the cop consigned to the container is missing and has consequently emitted the signal showing the absence of the positioned thread-end, the container is forced to continue to move in an auxiliary path by a deviation means which prevents it from returning to its normal circuit.

The container moves in its auxiliary circuit and comes upon a device which causes the expulsion or evacuation of the cop consigned to the container.

It is better to evacuate the cop from underneath which is effected owing to the absence of a floor below to hold up the cop.

Thus the container without the presence of a cop, whose thread-end cannot be found, is again set back on its normal path.

The attached drawing figures show a non-limiting layout of the invention. In the disclosed embodiment, the movable storage point is linear and moves forwards continuously and the containers, hinged to fold back like a book, are moved towards their front out of their normal course.

In the preferred arrangement to move the containers out of their normal course, whenever either the device to feel the presence of the cop or the first deviation means does not function, the containers, with or without cops, continue on their course without creating obstructions or errors in movement and this constitutes a material advantage.

In the drawings:

FIG. 1 shows a side elevation schematically illustrating the device of the present invention with the cop in a horizontal or almost horizontal position at the start of the operation;

FIG. 2 illustrates a partial plan view taken along line 2—2 of FIG. 1 of the under-carriage of the device of the present invention in the position of the normal run and in the position for receiving the cop as shown in dotted lines;

FIG. 3 illustrates a partial plan view of the feeler device of FIG. 1 in a position where the thread-end has just arrived;

FIG. 4 illustrates a partial plan view of the feeler device of FIG. 1 in a position where the presence of the thread-end is being checked;

FIG. 5 illustrates a partial plan view of the feeler device of FIG. 1 in a position where the thread-end is absent;

FIG. 6 illustrates a partial plan view of the device of FIG. 1 positioned to deliver the thread-end to the pincers and activate the shears;

FIG. 7 illustrates a vertical section of the inspection device of FIG. 1 for checking the presence of the container for cop loading taken along line 7—7 of FIG. 6;

FIG. 8 illustrates a partial vertical section of the initial deviation device of FIG. 1 taken along line 8—8 of FIG. 6;

FIG. 9 illustrates a partial plan view of the cop and suction tube for removal of the thread-end device of FIG. 1;

FIG. 10 illustrates a vertical section of the device of FIG. 1 taken along line 10—10 of FIG. 1;

FIG. 11 illustrates a partial plan view of the segment of FIG. 10 taken along line 11—11 of FIG. 10 when positioned to pick up the thread-end and when delivered to the feeler device of FIGS. 3-5; and

FIG. 12 illustrates a partial vertical section of the shears of FIG. 6 taken along line 12—12.

Referring to the figures, FIG. 1 shows a cop 1 present in the container 2 consisting of the container indicated generally by 2 and the sliding carriage 3 on the guide 4.

The cop 1 is contained in the container 2 comprising a carriage part 3, which slides on a guide 4, and a folding arm 5, which is hinged at 6 onto the part 3 and supports the doors 7 and 8 forming the compartment of the cop container hinged together at 9 by a pivot pin 10 which passes therethrough projecting into the lower part. The doors 8 have the fixed arm 11 which serves to open the door when 11 presses against cam 40. Pincers 12, generally fixed in container 2 and more specifically in door 7, for clamping the thread-end, are illustrated in FIG. 6, wherein a support 13 contains in its upper part a fixed jaw 14 and a movable jaw 15 which is held in its closed position by a spring 16 and can be opened by means of a pin 17 when this latter passes (see positions 17' and 17'') in front of a cam 18 and in front of a cam 18'. The cam 18 is an auxiliary cam corresponding to the space 19, serving to ensure that even in the case of a wrong signal of expulsion, the cop is equally expelled and the thread-end is freed from the pincers 12.

A cop 20 is shown in FIG. 1 in a stalled position at the beginning of the cycle. A pusher-device 21 is activated by the piston 22 and hinged at 23; the pusher 21 causes movement of the cop 20 about a semi-circular course effected by the action of piston 22. The piston 22 operation is initiated when the rotating mandrels 24 and 25 draw back at the end of a cycle for picking up a thread-end by the suction tube 26. The terminal part 28 of the cop tube slip on slide 27. The slide 27 serves, therefore, as a support during the transference of the cop. A lower support 29 of the cop is fixed onto the carriage 3. Reference numeral 30 designates the auxiliary course which serves to prepare doors 7 and 8 for the loading operation. In course 30 the pivot pin 10 is deviated by an interceptor device 31 if a feeler-device 32 passing a compartment without a cop is not activated and thus blocks the signal that there is no cop 1 in the compartment of container 2. The interceptor device 31 is hinged at 35 and is activated by a suction means 33 but could also be a piston, which is linked to feeler signal 32, so that, according to this solution if a breakdown takes place, the interceptor device 31 does not function and thus avoids the state in which those containers 2 which contain cops travel along auxiliary course 30 instead of along normal course 34. A control device 36 checks the presence of a container 2 in the course 30. The device 36 is hinged at 37 and controls a device 38 to emit impulses when checker 36 is pushed backwards by the pivot pin 10 going past it into course

30. This device 38 gives the all clear to activate the loading cycle of the cop. A fixed cam 40 is positioned above 36 and moves forward beyond the position 41 of the insertion of the cop, the cam 40 presses against the fixed arm 11 of door 8, thus moving door 8 away from 7 and opening them so as to allow them to receive cops 20 pushed toward container 2 by pusher device 21.

Owing to the signal emitted by device 38 for emitting signals, the cop 20 (see FIGS. 9, 10 and 11) is set into rotation by the rotating mandrels 24 and 25 (25 being idle) and undergoes both the longitudinal action of a suction tube 26 and the vibrating action of a brush 42. The vibrating action 86 of the brush 42 is obtained with the piston 43. At the end of the phase of the pick-up of the thread-end by the suction tube 26, the mandrels 24 and 25 draw back and through the action of the respective pistons 87 and 88 at the same time the mandrels 24 and 25 draw back axially, the pusher device 21 operates.

When the pusher 21 has passed in front of the suction tube 26, a fork-carrier support 44 begins to move along the guide 45 owing to the effect of a linked transmission 46-47-48, the lever 48 obtaining the movement from the double cam 49. A fork 50 is steered by a guide-arm 51 which makes it follow an appropriate course both to take the thread-end 54 in the fork 52 and also to deliver the thread-end to a feeler and checking device 53.

When the thread-end 54 has been delivered to the checking device 53, the fork carrier 44 acts on a shaft 55 with a return spring 56, which through the small plate 57 controls a finger 58 of the feeler device, which finger tends to press against a fixed finger 59 owing to the effect of a spring. The fingers 58 and 59 are comb shaped and designed to fit into each other, but the presence of the thread is enough to prevent them from fitting together.

When the finger 58 is freed by the action of the small plate 57 (see FIG. 4) of carrier 44 pushing against shaft 55 to release plate 57 from engagement with a catch of finger 58, it checks the presence of the thread-end 54 (FIG. 4); where the absence of the thread-end has been established (FIG. 5), the finger 58 activates a signalling device 60 acting on it with an auxiliary lever 61. This signalling device emits an impulse which controls the electric suction device 62 (such as a relay device) and moves a deviation control device 63 into a position of closure of the outlet 64 in course 30 and thus causes the pin 10 to move along a supplementary course 65 to engage cam 18'. During this supplementary course, the compartment container 2 passes over the space 19 and, as support 27 in which the lower part of the cop tube ran is not present there is, discharged the cop present there in for which no thread-end was detected.

So as to prevent possible breakdowns in the suction device 62 from causing all cops to be discharged into space 19, the deviation device 63 has a tooth 66 which is engaged by the pin 10 to bring the deviation device back to initial position 63'.

When the thread-end has been delivered to the feeler device 53, it is also at the same time positioned in a hook 70, which is pivoted at 71 and is activated by a toothed segment 72 that meshes into a toothed wheel 73 integral with the hook 70, pivoted at 71. The toothed segment 72 is in its turn activated by levers 74-75-76; lever 76 being operated by the cam 49. The hook 70 rotates along the course 80 and places the

thread-end between the open jaws 14 and 15; when these latter jaws 14 and 15 reclose, as the pivot reaches 17", a beating face 81 of the hook 70 acts upon a pivot 82, moving it backwards. This backward movement makes a lever 83 rotate with a fulcrum 84, thus forcing it to pass over the fixed blade 85 and cutting off the excess part of the thread-end, which is sucked away by the suction tubes 26.

A preferred but non-limitative embodiment of the present invention has been described above. Other modifications can be carried out without going outside the scope of the novel aspects of the invention.

What is claimed is:

1. A method for placing a cop with its thread drawn out into a container comprising movable storage point, comprising the steps of: detecting the presence or absence of a cop in a container; moving the container detected as being empty through a first travel path to bring it to a cop loading station; moving the container detected as containing a cop through a second travel path, said first travel path being different from said second travel path of a container detected as containing a cop; opening said container in said loading station; detecting the thread end of a wound cop; loading said cop and thread-end into said empty container separately; and discharging a cop from a container into which it has been loaded when its thread-end has not been detected.

2. A method according to claim 1, comprising the further steps of separating said thread-end from said cop by applying suction to said cop to draw said thread-end away from the thread coiled on said cop.

3. A method according to claim 2, wherein said separating step further includes vibrating said cop to shake said thread-end loose from the thread coil on said cop.

4. A method according to claim 2, wherein the step of detecting said thread-end includes: engaging said thread-end between a first pair of relatively movable jaws; moving said first jaws into engagement with a second pair of relatively movable jaws; and activating a signal emitting means when said first and second pairs of jaws engage each other and no thread-end is detected by said second pair of jaws.

5. A method according to claim 4, including the step of changing the travel path of a loaded container by a signal emitted from said signal emitting means when a thread-end of the cop loaded therein has not been detected to discharge said cop from said loaded container.

6. A method according to claim 1, wherein said loading step includes: engaging said thread-end between a first pair of relatively movable jaws; transferring said thread-end from engagement with said first pair of jaws to a movable lever; moving said lever to bring said thread-end into engagement with a second pair of relatively movable jaws; and shearing off an excess portion of said thread-end upon engagement of said thread-end with said second pair of jaws.

7. An apparatus for placing a cop with its thread drawn out into a movable storage point, comprising:  
a pair of axially opposed mandrels;  
a cop, comprising thread wound on a bobbin, mounted between said opposed mandrels;  
a movable container;  
detecting means for detecting the presence or absence of a cop in said container;

switch means controlled by said detecting means to direct containers in which no cop is detected along a first path to a loading station and to direct containers in which a cop is detected along a second path by-passing said loading station;

first cam means for opening said container when said container is in the area of said loading station;

separating means for separating a thread-end from said cop mounted between said mandrels;

movable fork means for engaging said separated thread-end;

a pair of relatively movable finger means mounted for engagement with said fork means for detecting the failure of a thread-end to be separated from said copy by said separating means;

pusher means for pushing said cop from between said pair of mandrels to said loading station and into said container;

pulse generating means connected to said movable finger means for generating a pulse signal when said finger means detects the absence of a separated thread-end of said cop;

relatively movable jaw means engaged with said container;

second cam means for opening said jaw means;

transfer means for transferring said thread-end from said separating means to said jaw means;

shearing means engaged with said container for shearing the excess from said thread-end after said thread-end is engaged with said jaw means; and

expelling means controlled by said pulse generating means for expelling said cop from said container when no separated thread-end has been detected by said finger means.

8. The apparatus according to claim 7, wherein said container comprises a base portion mounted for substantially linear movement and a cop-carrying portion mounted for both linear movement and for substantially translational movement with respect to said first portion when said detecting means detects the absence of a cop in said container.

9. The apparatus according to claim 7, wherein said separating means comprises suction means and vibrating means cooperating with said cop mounted between said mandrels to shake loose and separate said thread-end from said cop.

10. The apparatus according to claim 9, wherein said suction means is disposed axially adjacent the periphery of said cop.

11. The apparatus according to claim 9, wherein said vibrating means comprises brushing means axially disposed in engagement with the surface of said cop.

12. The apparatus according to claim 7, wherein said detecting means comprises a resiliently yieldable arm mounted for contact with a cop contained in said container.

13. The apparatus according to claim 7, wherein said switch means comprises an adjustable member mounted adjacent the branch point of said first and second paths and movable to interdict a selected one of said first and second paths.

14. The apparatus according to claim 7, wherein said container comprises hinged support means including door means opening to receive a cop and closing to contain said cop.

15. The apparatus according to claim 7, further comprising means for moving said mandrels axially and rotationally.

16. The apparatus according to claim 7, wherein said pusher means comprises a blade member hinged at one end for arcuate movement.

17. The apparatus according to claim 7, further comprising means for moving said fork means axially along said cop between said cop and said separating means.

18. The apparatus according to claim 7, wherein said transfer means comprises a lever having a seizing hook and a pressure surface, the latter for activating said shearing means, said lever being mounted for arcuate movement between said separating means and said jaw means.

19. The apparatus according to claim 7, wherein said

movable jaw means includes pin means acted on by said cam means in a direction to open said jaw means.

20. The apparatus according to claim 7, wherein said expelling means comprises: a third path branching off said first path, means disposed along said third path and acting to open said container to discharge said cop, and further switching means for switching said container out of said first path and along said third path in response to a signal generated by said pulse generating means.

21. The apparatus according to claim 20, wherein said further switching means comprises an adjustable member mounted adjacent the branch point of said first and third paths and movable to inderdict a selected one of said first and third paths.

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