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DEVICE FOR SEPARATING ONE SPECIMEN FROM A PLURALITY OF ELONGATED ELECTRICALLY CONDUCTIVE FLEXIBLE BODIES

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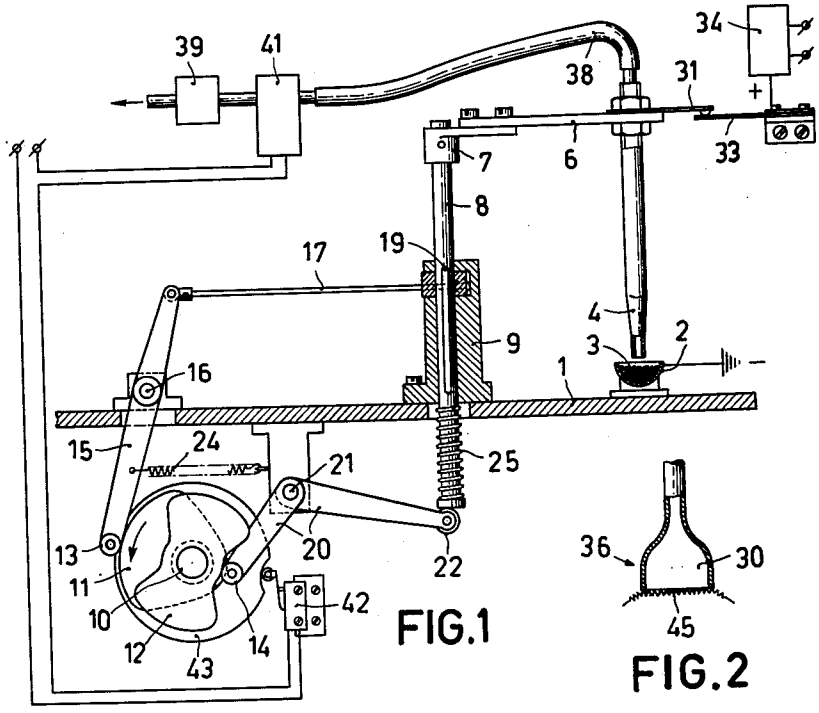


FIG.1

FIG.2

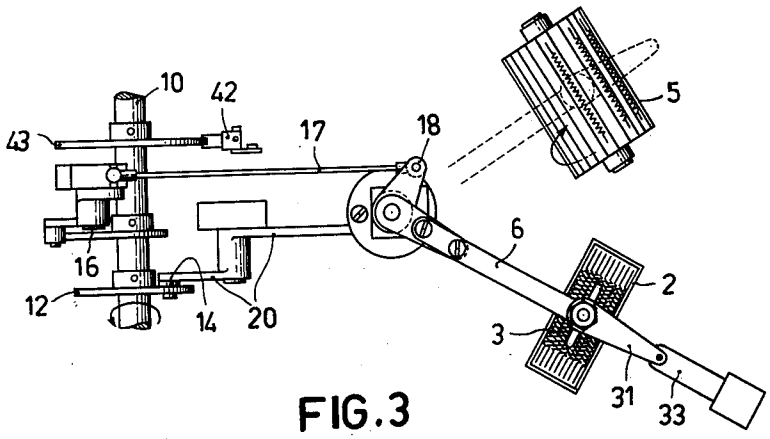


FIG.3

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DEVICE FOR SEPARATING ONE SPECIMEN FROM A PLURALITY OF ELONGATED ELECTRICALLY CONDUCTIVE FLEXIBLE BODIES

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5 Claims. (Cl. 294—1)

The invention relates to a device for separating one specimen from a plurality of light, elongated, electrically conductive, flexible bodies such as helically wound, incandescent bodies for use in electrical incandescent lamps, which bodies are arranged in a container.

In a known device a filament body is separated from the others by electro-static agency with the aid of a lifting member. The filament is then partly lifted, then grasped by a pick-up member and completely removed from the container. One of the disadvantages of this known device resides in that an additional pick-up member is always required, so that there is a greater risk of damage to the body already singled out. With the known device it will therefore be preferred to lift the filament concerned always at one end, where any damage is hardly harmful.

The device according to the invention is characterized in that it is provided with a lifting member having an electro-static potential difference with respect to the bodies in the container and being adapted to approach the bodies closely and to move away therefrom and having an opening communicating with a suction duct and constituting a locating area for a body lifted at least partly. Over the known device this arrangement with the suction opening has the advantage that the lifting force exerted by the electro-static potential difference on the filament body to be lifted is materially increased. The use of a suction opening in the lifting member has a further advantage in that the filament body will occupy an accurately predetermined position on the lifting member since a filament lifted by electro-static force will automatically find its way to the location area formed by the suction opening. This is not the case with devices not provided with a suction opening, where the filament body will occupy a fairly arbitrary position on the lifting member. A further advantage of the use of a device according to the invention resides in that the height of lifting can be considerably enlarged, so that the separated filament body can be removed completely out of the container and be conveyed to its place of destination by the lifting member itself without the intermediary of a pick-up member since as soon as a singled body closes the suction opening it is no longer necessary and even undesirable to maintain an electric difference.

It is known per se to use only reduced pressure to hold objects, however, if the objects are elongated and helically wound, for example if the objects are filaments for use in electrical incandescent lamps, it is not always certain that only one specimen will be lifted from a plurality of bodies lying in a container.

With one embodiment of the device according to the invention the container is arranged with respect to the lifting member so that, when the lifting member is in its position nearest the container, the centre of each of the bodies in the container lies approximately opposite the location area of the lifting member. Lifting the filament body approximately by the centre instead of lifting it by the end by means of the lifting member of known devices has the advantage that the friction of the body to be lifted with the other bodies in the container plays a considerably less important part so that a body already slightly lifted can be removed more easily. In

a further embodiment the opening of the lifting member is shaped in the form of a slot. Thus a lifted filament body can engage the slot over a suitable part of its length; it closes the slot and then occupies a defined preferred position relative to the lifting member. A slot-shaped opening may be obtained in a simple manner by flattening one end of a tube.

In a further embodiment the lifting member constitutes at the same time a conveying member for transporting and placing a single body at a remote station, so that an additional conveying member is dispensed with.

In a final embodiment the location area of the lifting member occupies an at least substantially horizontal position at the instant when the lifting member releases a lifted body, whilst the longitudinal direction of the slot-shaped opening is parallel at this instant to the prescribed longitudinal direction of the object at the station. The elongated opening in this embodiment has the particular advantage that a separated body can be delivered each time in a reproduceable manner at a station remote from the container.

FIG. 1 of the diagrammatical drawing shows a side view of the essential elements of one embodiment of the device according to the invention. FIG. 2 is a side view of part of the lifting member of FIG. 1. FIG. 3 is a plan view, without baseplate. In these figures the FIG. 1 is a view according to line I—I from FIG. 3.

A baseplate 1 carries a container 2 in which a plurality of helically wound filament bodies 3 for use in electrical incandescent lamps are orientated as a bundle. With the aid of a lifting member 4, which at the same time serves as a transporting member these filament bodies can be removed individually from the container 2 and be conveyed to a dosing station, in this case a dosing drum 5, remote from the container 1 (FIG. 3). This dosing drum forms part of a machine for manufacturing lamps, and is adapted to be turned stepwise and has at its circumference a plurality of axial grooves to accommodate each only one filament body; the structure is otherwise the same as used in such a machine.

The hollow, tubular lifting member 4 is secured to an arm 6 of insulating material. This arm 6 is secured to a sleeve 7, which in turn is attached to a shaft 8, being slidable and pivotable in its housing 9 mounted on the baseplate 1. The movements of this shaft 8 are such that the arm 6 can be lowered just above and not in contact with the filament bodies 3 in the container 2, then raised, turned to the dosing drum 5 and lowered again in order to drop the transported filament body on the drum 5. In the lowermost position the centres of the filament bodies are located approximately opposite the opening 30 of the lifting member 4. This is effected by a cam mechanism, consisting of a continuously rotatable shaft 10 having cams 11 and 12, cooperating with camrollers 13 and 14. The camroller 13 forms part of a lever 15 being pivotable at an axis 16. This lever 15 is coupled to a crank 18 by means of another lever 17. The crank 18 is slidably attached to the shaft 8 showing a slit 19. The shape of the cam 11 is such that on rotating the shaft 10 the arm is intermittently swung between the container 2 and the dosing drum 5 and held in these extreme positions a short time. The camroller 14 forms part of a lever 20, which is pivotable at 21 and is further provided with another roller 22. This roller 22 cooperates with the lower part of the shaft 8. The camrollers 13 and 14 are held against the cams 11 and 12 by means of springs 24 and 25.

The arm 6 is furthermore provided with a flexible strip 31, which is adapted to move downwards or upwards with the shaft 8. At the termination of the downward movement of this shaft 8 it can establish a contact with the tag 33. Between the tag 33 and the container 2 prevails a

potential difference of for example 5000 v. direct voltage, derived from a high voltage apparatus, indicated by 34. The container 2 and the bodies lying therein are at earth potential in this embodiment.

The lifting member 4 has a slot-shaped opening 30 obtained by flattening the lower end 36 of a tube; at the top end it communicates via a rubber hose 38 with a suction pump 39. The suction-action in the connection-line can be interrupted by means of a valve 41. This valve 41 is actuated by a switch 42, which once per revolution cooperates with a further cam 43.

The filament bodies are individually removed and transported as follows.

On rotating the shaft 10, the arm 6 arrives at the situation indicated by dotted lines in FIG. 3. Out of its top position the lifting member 4, communicating with the suction duct, is then moved downwards. As soon as the flexible strip 31 is in contact with the tag 33 and then bends slightly over, the strip and the lifting member 4 are charged to a high positive potential. Thus an electrostatic field is introduced into the filament bodies 3 in the container 2 and under the action thereof the filament bodies exert a repelling force on each other. The part of the filament body nearest the lower end of the lifting member 4 jumps up against this member 4 and will thus close the suction opening 30. Immediately thereupon the lifting member 4 is moved upwards, the electric contact is interrupted and the filament body partly lifted by electro-static force is drawn further out of the container solely with the aid of suction. The suction opening 30 thus constitutes a location for the removed filament body 45.

Owing to the suction opening 30 the separated filament body arrives always at an accurately predetermined place of the lifting member. If this opening was not provided, the filament body would arrive at a fairly arbitrary place of the lifting member.

It should furthermore be noted that a filament body cannot be suspended on the lifting member 4 completely free of the further filament bodies, if only electro-static force of attraction was concerned. In this case the filament body 45, when set free of the further bodies would assume immediately the same potential as the lifting member 4, so that the latter would repel it.

Rotating the shaft 10 causes the lifting member 4, arranged above the container 2 in its topmost position, to transport the separated filament body 45 towards a station of delivery, in this case a dosing drum 5 (FIG. 3). At this place the lifting member, which thus fulfills the function of a conveyor, is lowered above one of the axial grooves in the drum 5. By then obviating the reduced pressure in the lifting member by means of the cam actuated switch 42 the filament body 45 is detached and it arrives in the groove concerned. The slot-shaped opening 30 plays an important part in this process, since it holds a separated filament body always in the same, prescribed manner at the location area of the lifting member. The location area for the separated filament body will be preferably horizontal at least at the instant when the member disengages the body; moreover the direction of length of the slot-shaped opening is chosen to be parallel to the grooves of the dosing drum 5.

In the embodiment described above the filament bodies are located uniformly side by side and one on the other in the container 2. However, it has been found to be permissible of arranging the filament bodies in a more or less disordered position in the container.

In this embodiment the lifting member 4 has a positive potential and the bodies 3 are at a negative potential. As a matter of course, the parts may have the reverse potentials.

What is claimed is:

1. Apparatus for separating and removing a single electrically conductive body from a plurality of said bodies comprising a movable vacuum pick-up member having a nozzle at one end closed by said body in engagement therewith, means supporting said body for movement, means connecting said pickup member with a vacuum source and means adjacent the path of movement of said pickup member and proximate said plurality of bodies for creating an electric potential between said pick-up and said plurality of bodies, whereby one of said bodies is electro-statically attracted to said pick-up when said pick-up is moved into proximity with said plurality of bodies and held on said pick-up by differential pressure when said potential is removed by movement of said pick-up away from said plurality of bodies.

2. Apparatus according to claim 1 with the addition of means for orienting said bodies to close said pick-up nozzle when attracted thereto.

3. Apparatus for separating and removing a light bulb filament from an open container having plurality of said filament aligned therein, comprising a movable vacuum pick-up member having an elongated nozzle at one end aligned with said filaments, means for connecting said pickup with a vacuum source and means for movably supporting said pick-up, means engageable by said pick-up creating an electrostatic potential between said pick-up in engagement therewith and said plurality of filaments for attracting one of said plurality of filaments to close said nozzle whereby said filament is secured to said pick-up when said potential is removed.

4. Apparatus for separating and removing a single electrically conductive body from a plurality of said bodies comprising a vacuum pick-up member having a nozzle means supporting said pick-up for movement proximate said plurality of bodies, electrostatic means proximate said plurality of bodies for electrostatically separating one of said bodies and attaching it to said nozzle whereby said separated body is removably secured to said pick-up member.

5. Apparatus according to claim 4 wherein said electrostatic means includes said pick-up member.

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