INKING DEVICE FOR INKING RIBBONS, FELT ROLLERS, RUBBER COATINGS AND THE LIKE

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Our invention relates to an inking device for inking ribbons, felt rollers, rubber coatings or the like devices in cash registers, postage metering apparatus and other business machines.

One known type of inking device for postage marking machines is provided with an ink or dye container rotatably mounted in a separate housing and engageable with the appertaining printing drum by actuation of a control member. The rotatable drum-shaped ink container has its peripheral surface covered with felt or other material and possesses perforations in its metal shell through which the dye or ink passes from the interior in order to wet the covering.

This known device has the disadvantage that after prolonged use the ink in the relatively narrow openings or at the adjacent portions of the felt covering becomes hardened and may form a crust which could clog the openings so that intricate and time-consuming cleaning work is necessary for restoring proper operation of the inking device.

In another known type of machine, operating with a printing cylinder, an attempt has been made to eliminate this disadvantage by making the shell of the ink container, journaled in a particular frame structure, of highly porous sintered metal by virtue of whose capillary action the felt covering can be omitted. However, in this device, too, ink residues may become deposited in the capillaries of the porous metal shell after prolonged use and particularly after long periods of inactivity. This difficulty occurs especially when using viscous dye substances which, in contrast to the first-mentioned design, make it still more difficult to clean the equipment.

It is an object of our invention to eliminate the above-mentioned deficiencies of known inking devices and to provide improved inking devices which can be operated, preferably, in machines with endless inking ribbons or with inking ribbons of any desired length.

According to the invention we employ a cylindrical, rotatably mounted ink container whose wall has passages for the ink and is covered with felt or other covering material; and we provide the peripheral surface of the cylindrical container with grooves which communicate through bores with the hollow interior space of the ink container in which the ink or liquid dye is stored.

Due to the hollow spaces thus provided between the exit openings for the inking liquid and the textile covering, the bores always remain free of deposits or incrustations of the inking material because these hollow spaces are always traversed or scavenged by the inking liquid from the interior side of the container as well as from the exterior side, and because the portions of the covering directly impregnated by the inking liquid have relatively large areas and therefore hardly tend to become hardened.

According to another, preferred feature of the invention, a covering diaphragm is provided which is adapted to the shape and size of the ink container and which, in the operating condition, covers the inactive partial areas of the inking roller, thus protecting it from rapid evaporation of the inking liquid. According to still another feature, the just-mentioned diaphragm simultaneously serves as a stopping or lift-off device which, whenever necessary, removes the inking ribbon from the inking roller with which the ribbon is otherwise in contact, thus discontinuing the supply of ink to the ribbon.

The above-mentioned and further objects, advantages and features of our invention, said features being set forth with particularity in the claims annexed hereto, will be apparent from, and will be described in, the following with reference to the embodiments of devices according to our invention, illustrated by way of example upon the accompanying drawings in which:

FIG. 1 is a side view of a printing device according to the invention.

FIG. 2 shows the front view of the same printing device, partly in section.

FIG. 3 illustrates the inking roller of the device in longitudinal section.

FIG. 4 illustrates another embodiment, showing a multiple inking roller in longitudinal section.

FIG. 5 is a side view, partly in section, of a printing device provided with another embodiment of the inking roller with a diaphragm.

FIG. 6 illustrates the device of FIG. 5, showing the inking roller with diaphragm in cross section, but with the inking ribbon removed.

FIG. 7 illustrates another embodiment of the inking roller, designed as driving member, in longitudinal section.

FIG. 8 illustrates the inking roller of FIG. 7 in cross section.

FIG. 9 is a lateral view, showing the inking roller as a built-in component of the inking-ribbon control device.

FIG. 10 is a part-sectional front view of the device according to FIG. 9.

The printing device 1 (FIG. 1) is designed as an independently operable unit. It comprises printing type wheels 2, 3 and 4 which are adjusted in conventional manner by data-posting members 5, 6, 7 with the aid of a system of concentric tubes 10 (FIG. 2) journaled in lateral walls 8, 9 of a frame structure, with the aid of spur gears 11, the adjustment being controlled by the keyboard of the machine or the computing mechanisms of the machine with which the printing device cooperates.

The printing device is further provided with an engraved-plate carrier or cliché carrier 12, a feed roller 13 for an inking ribbon, a displaceably mounted tensioning roller 14, and an inking roller 15. The lateral walls 8 and 9 are kept in proper position and spaced from each other by means of spacer bolts 16, 17. The inking roller 15 (FIGS. 2, 3) is journaled in the side walls 8, 9 and comprises a cylindrical shell 18 of metallic material or synthetic plastic. The peripheral surface of the inking cylinder is provided with grooves 19 which may have any desired shape, for example triangular shape as shown in FIG. 3. The grooves 19 may also be given a rectangular or square shape and may extend radially or in the form of curves along the cylindrical surface of the inking container 15. The continuity of grooves 19 is interrupted by bores 20 through shell 18. These bores are mutually arranged in a plane passing through the longitudinal axis of the cylindrical shell 18. The inking container 15 merges with a head portion 21. Machined into the periphery of the head portion 21 are two radial, rectangularly shaped guiding or bearing grooves 22, 23. Provided at the front side of the head portion 21 is another transverse groove 24 for inserting a tool, and also a threaded bore 25 (FIG. 3) arranged in the same plane as the bores 20 and serving for introducing the inking dye 26 by means of the threaded end of a collapsible filler tube 108 (FIG. 3).
4. The bore 25 also serves for receiving a stopper screw 27 (FIG. 3). At its opposite end, the front side of the cylindrical ink container 45 has an undercut opening at 28 which forms a shoulder upon which a cover 29 is seated. The cover 29 is joined with the container 15 by welding and has an integral pivot pin 30 journaled in the bore 31 (FIG. 2) of the side wall 9. If desired, the cover 29 may also be fastened to the container 15 by a threaded connection or by shrinking. The peripheral portion 18 of the ink container 15 is covered with a layer 32 of felt or porous rubber which becomes impregnated by the inking dye 26 entering through the bores 20 into the grooves 19.

Through the grooves 19, the inking dye 26 emerging from the bores 20 becomes distributed uniformly over the entire periphery of the ink container 15 and thus causes wetting of the porous cover 32 at all localities. By virtue of this simple arrangement and limitation to a few bores 20, such bores can be given relatively large size so that a clogging of the bores 20 by thickened or viscid dye-stuff 26 is not possible, because the bores are continuously traversed and scavenged by inking liquid which emerges from the container 15 and which is contained in the grooves 19, without any more liquid being issued than is required by the suction effect of the porous cover 32. Since the bore 20 and the thread of the air contained in the ink container 15 can escape through the bores 20 when inking dye 26 is being charged into the container.

For printing with more than one color, the inking roller 15 may also be designed as a two-color or multi-color roller 33, as is shown in FIG. 4. The plural-color roller 33, whose exterior dimensions are identical with those of the single-color roller 15 already described, is subdivided by a partition 36 into two or more separate color chambers 34, 35, each chamber having its own ink inlet opening 37 or 38, its own group of outlet bores 39 or 40 and appertaining grooves 41. The cylindrical body 43 of the plural-color roller 33 is enclosed within two or more separate covers 45 and 46 of felt or porous rubber which are separated from each other by a labyrinth or grooved seal 44 to prevent the different colors from flowing into each other.

For securing a good and uniform distribution of the dye 26 issuing from the bores 20 or 39 and 40 into the grooves 19 or 41, 42, the radial grooves 19 or 41 and 42 may also be cut by short longitudinal grooves 47 in the holder 58 (FIG. 4), which extend parallel to each other in the axial direction and which may be produced by knurling. This secures a particularly good adhesion of the felt or rubber cover 32 or 45, 46 on the peripheral surface 18 or 43.

Mounted on the side wall 9 (FIG. 2) in coaxial relation to the bore 31 is a short tube 45 which serves for guiding a pressure spring 49. The spring 49 acts against the side wall 9 at one spring end and against the bottom piece 50 of the axially displaceable and rotatable diaphragm 51 at the other spring end. The diaphragm 51 separates the inking roller 15 from the inking ribbon 79 (FIG. 3) when the inking ribbon 52 is saturated, as will be more fully described below. The diaphragm 51 (FIG. 2) is made of thin sheet metal and consists of a cylindrical hollow body 54 which has a rectangular opening 53 (FIG. 1) formed in the cylindrical face thereof, and carries attached thereto the bottom piece 50 and a handle 55. The diaphragm 51 also serves as an additional bearing member for journaling and supporting the inking roller 15. The bottom piece 50 has a bore 56 by means of which the diaphragm 51 is guided on the tube 48. The diaphragm 51 is rotatable and longitudinally displaceable in the bore 57 of the side wall 8. For preventing axial displacement of the diaphragm 51 as well as of the inking roller 15 guided in the diaphragm 51, in opposition to the force of spring 49, a holder 58 (FIG. 1.2) engages the groove 22 (FIG. 3) of the inking roller 15. The holder 58 is fastened to the side wall 8 by means of a screw 59 and also acts as a arresting means by engaging one of the grooves 60 or 61 (FIG. 2) milled into the front side of the diaphragm 51. For temporarily separating the inking ribbon 52 when saturated, from the inking roller 15, the handle 55, as apparent from FIGS. 2.5 and 6, is placed against the side wall 8 in opposition to the force of spring 49 to such an extent that the holder 58 passes over the threads 54 by a rotating motion in the counter-clockwise direction from the position of FIG. 5 to that of FIG. 6. The part-cylindrical portion 54 (FIG. 5) of the diaphragm 51 lifts the inking ribbon 52 off the inking roller 15; and during the return motion of the handle 55 in the axial direction by the force of spring 49, the groove 61 catches the holder 58 and thus arrests the diaphragm 51 in this adjusted position.

The inking roller 15 is preferably completely enclosed in the operating position of the diaphragm 51 in order to prevent evaporation of the inking liquid in the inactive condition of the inking roller 15. For this purpose, a cover sheet 62 (FIG. 6) is preferably fastened between the side walls 8 and 9 and covers the rectangular opening 53 of the diaphragm 51 in the position illustrated in FIG. 6.

In the embodiments so far described the inking roller 15 is driven by the inking ribbon 52. However, according to another embodiment the inking roller 15 may also be used as a bore 25 not all longitudinal, not desirable, for example, in small cash registers where only limited space is available. For this purpose, the modification illustrated in FIGS. 7 and 8 is applicable to advantage.

The inking roller in this embodiment is designed as the driving roller and is provided with a driving spur gear 63 (FIG. 7) to be driven from the driving mechanism of the cash register in a conventional manner. The inking roller is further provided with a device 64 for controlling the dye quantity, this device comprising a cylindrical pin 66 provided with a needle 67 engaging an attached screw thread 67 and a screw head 68. The cylindrical pin 66 is rotatably seated in a bore 69 of the roller body 70. The bore 69 is traversed by radially directed bores 71. Bore 71 terminate in outlet openings on the peripheral surface of the body 70, and these openings are positioned along the grooves 72 machined into the body surface as explained above with reference to grooves 19. For controlling the supply of inking liquid, the pin 66 is longitudinally displaceable by means of the screw head 68 and, by such longitudinal displacement, can be set to partially or fully close off the bores 71 as may be required.

For checking or determining the ink content, a filling or checking rod 73 with spaced notches is attached to the fill-in screw 74. The inking roller 15 as described above is applicable not only for endless inking ribbons 52 but also for inking ribbons of any desirable length or for supplying ink to printing rollers or clichés.

The embodiment illustrated in FIG. 9 is a printing device for business machines equipped with an inking roller according to the invention. The illustrated transporting mechanism for the inking ribbon is known as such. This device, denoted as a whole by 75, comprises two ribbon take-up spools 76 and 77 between which the inking roller 78 is rotatably mounted. For securing a largest possible area of contact between the inking roller 78 and the inking ribbon 79, a double lever 80 is provided for pivoting motion about a fixed pivot pin 81. Mounted on the lower end of the lever 80, relative to FIG. 9, is a roller 82, rotatable about a pivot pin 83 for action upon the inking ribbon 79. A pin 84 is mounted on the upper end of lever 80 so that it can catch into recesses 85 and 86 of an adjusting lever 87, which is biased clockwise by a pull spring 88 against the lever 80 in either of the two positions determined by recesses 85 and 86. For removing the inking ribbon 79 from the inking roller 78, the adjusting lever 87 is turned manually at the pin 89 in the counter-clockwise direction until the lever 80, being acted upon by the tensioned ribbon 79, turns
counter-clockwise relative to FIG. 9 and snaps with its pin 84 into the recess 86 of the adjusting lever 87. This causes the ink forking roller 79 to automatically lift itself off the ink roller 79 due to the tension of the ribbon.

When the ink roller 78 is inactive, this embodiment of FIG. 9 also permits controlling the lever 88, when counter-clockwise relative to FIG. 9 and snaps with its pin 84 into the recess 86 of the adjusting lever 87. The counter-clockwise pin 84 carries the ink roller 89 which carries the check (v) or tape transporting counter roller 90. The lifting device 91 comprises a lever 92 biased by a spring (not illustrated). The lever 92 is pivotally mounted on a stationary pivot pin 93 and merges with a laterally bent lever arm 94. The outer end 95 of lever arm 94 carries the counter roller 90 rotatable on a pin 97 and cooperating with the check transport roller 96. By turning the control lever 92 counter-clockwise relative to the pin 93 to the dot-and-dash position according to FIG. 9, this being done when a new roll 98 of check or registering tape is being inserted, the angular portions 99 of lever arm 94 presses upon the double lever 89 and causes it to turn clockwise about the pivot 91 until the pin 84 snaps into the other recess 85 of the adjusting lever 87. In this manner, when a new roll 98 of check tape is being pulled through and the ink roller 78 is switched off, the ink roller 78 is automatically controlled to become switched on for replenishing the ink in ink roller 78; and when no action is required the ink roller is again made inactive by operation of the adjusting lever 87.

To permit conveniently filling the ink roller with inking liquid, particularly in machines where the available space is limited, a particular closure is required, as illustrated in FIG. 10. The ink roller 109 carries on its fill-in side a ball-type snap closure valve 101 of conventional type, comprising a ball 102 and a spring 103. The ball 102 places itself in front of the filling opening 104 which is provided outside with a threaded bore 105. The threaded neck 106 of an ink-containing collapsible tube 107 is screwed into the threaded bore 105, after removing a stopper screw (not illustrated). This design has the advantage that it permits filling of the ink roller 109 without disassembling anything, under conditions where the available space is extremely limited.

It will be obvious to those skilled in the art, upon a study of this disclosure, that inking devices according to our invention can be given a variety of modifications and may be embodied in designs other than particularly illustrated and described herein, without departing from the essential features of the invention and within the scope of the claims annexed hereto.

We claim:
1. In a business machine, a device comprising a drum-shaped ink container defining a hollow interior space for storing inking liquid, said container being rotatably mounted in said device and having a cylindrical shell rotatable therewith and provided with openings for the passage of inking liquid from said interior space to the outside of said shell, said shell being provided on the external side thereof with grooves communicating through said openings with said internal hollow space, said container being provided in one wall thereof with a bore disposed eccentrically at an acute angle to the rotation axis of said shell for filling the container through said bore with inking liquid, said bore and said openings being arranged in a common plane radially directed with respect to the said container, so that when said ink container is being filled said openings are located above the liquid ink level in said interior space, and whereby the air contained within said space can escape through said openings, removable closure means for sealing said filler bore, said bore being sealingly engageable and disengageable with the closure portion of a separate ink supply means for introduction of ink through said bore when said filler bore closure means is removed, removable measuring rod means, the same filler bore also being shaped to serve for receiving said measuring rod means for indicating the ink level in said space.
2. In a business machine, a device comprising a drum-shaped ink container defining a hollow interior space for storing inking liquid, said container being rotatably mounted in said device and having a cylindrical shell rotatable therewith and provided with openings for the passage of inking liquid from said interior space to the outside of said shell, said shell being provided on the external side thereof with grooves communicating through said openings with said internal hollow space, means forming a cylindrical porous inking roller around said drum-shaped ink container, an inking ribbon normally engageable with said roller for receiving ink therefrom, a cover diaphragm shaped to substantially conform to the external periphery of said inking roller and movably mounted for being selectively shifted into operating and inactive conditions, said diaphragm in its operating condition covering inactive peripheral surfaces of said inking roller to prevent a too rapid evaporation of the inking liquid therefrom, said diaphragm constituting a shut-off device, operable when said diaphragm is shifted to its inactive condition, for simultaneously lifting said inking ribbon from its normal position contacting the inking roller off the inking roller for the purpose of thereby interrupting the ink supply to said ribbon.
3. A device according to claim 2, said diaphragm being of cylindrical shape and mounted on said device for axial and rotational movement therein to said operating and inactive conditions, said diaphragm having an opening in the peripheral cylindrical surface thereof for permitting engagement of said ribbon with said inking roller when said diaphragm is in said operating condition, holding means engageable with said diaphragm for arresting said diaphragm in a predetermined position, spring means urging said diaphragm into arrested position, and means for releasing said holding means to permit displacement and adjustment of said diaphragm in a plurality of positions, said diaphragm when rotated into said inactive condition lifting said ribbon from said inking roller.
4. A device according to claim 3, said holding means comprising means defining transverse grooves in said inking roller and in said diaphragm, and a projection guidingly engageable with said roller and said diaphragm for permitting rotation of said roller, said projection engaging also said diaphragm groove for preventing rotation of said diaphragm.
5. A device according to claim 3, including a cover sheet firmly mounted for covering at least a portion of said opening in the peripheral surface of said diaphragm so as to seal off said inking roller to retard evaporation of ink from said roller.
6. In a business machine, a device comprising a drum-shaped ink container defining a hollow interior space for storing inking liquid, said container being rotatably mounted in said device and having a cylindrical shell rotatable therewith and provided with openings for the passage of inking liquid from said interior space to the outside of said shell, said shell being provided on the external side thereof with grooves communicating through said openings with said internal hollow space, means forming a cylindrical porous inking roller around said drum-shaped ink container, means forming a filling inlet located at a lateral end of said drum-shaped container for introducing ink into said container without disassembly of said container from said device, an inking ribbon normally engageable with said roller for receiving ink therefrom, said inking container having a bore dividing same into a plurality of ink chambers, said roller having separate porous covers, grooved seal means sealing off said separate covers from each other, said openings and grooves in said shell being operative to transfer ink from respective ones of said chambers to respective porous covers.
7. In a business machine, a device comprising a drum-shaped ink container defining a hollow interior space for storing inking liquid, said container being rotatably
mounted in said device and having a cylindrical shell rotatable therewith and provided with openings for the passage of inking liquid from said interior space to the outside of said shell, said shell being provided on the external side thereof with grooves communicating through said openings with said internal hollow space, means forming a cylindrical porous inking roller around said drum-shaped ink container, an endless inking ribbon normally engageable with said roller for receiving ink therefrom, a cover diaphragm having a partially cylindrical portion shaped to substantially conform to the external periphery of said inking roller and movably mounted for being selectively shifted into operating and inactive conditions, said diaphragm in its operating condition covering inactive peripheral surfaces of said inking roller to prevent a too rapid evaporation of the inking liquid therefrom, said diaphragm constituting a shut-off device, operable when said diaphragm is shifted to its inactive condition, for simultaneously lifting said inking ribbon from its normal position contacting the inking roller off the inking roller for the purpose of thereby interrupting the ink supply to said ribbon drive means operably connected to said inking roller for driving the latter and for driving therethrough said endless inking ribbon when said inking roller is engaged with the surface of said inking roller, and means carried by said inking roller for controlling the quantity of inking liquid fed from said interior space to said porous inking roller.

8. In a business machine, a device comprising a drum-shaped ink container defining a hollow interior space for storing inking liquid, said container being rotatably mounted in said device and having a cylindrical shell rotatable therewith and provided with radial openings for the passage of inking liquid from said container being provided in one end wall thereof with a bore offset from the rotation axis of said shell for filling the container through said bore with inking liquid and for measurement therethrough of the liquid level in said container, said interior space to the outside of said shell, said shell being provided on the external side thereof with grooves communicating through said radial openings with said internal hollow space, means forming a cylindrical porous inking roller around said drum-shaped ink container, an endless inking ribbon normally engageable with said roller for receiving ink therefrom, a cover diaphragm having a partially cylindrical portion shaped to substantially conform to the external periphery of said inking roller and movably mounted for being selectively shifted into operating and inactive conditions, said diaphragm in its operating condition covering inactive peripheral surfaces of said inking roller to prevent a too rapid evaporation of the inking liquid therefrom, said diaphragm constituting a shut-off device, operable when said diaphragm is shifted to its inactive condition, for simultaneously lifting said inking ribbon from its normal position contacting the inking roller off the inking roller for the purpose of thereby interrupting the ink supply to said ribbon drive means operably connected to said inking roller for driving the latter and for driving therethrough said endless inking ribbon when said inking roller is engaged with the surface of said inking roller, and means carried by said inking roller for controlling the quantity of inking liquid fed from said interior space to said porous inking roller.

11. In a business machine, a device comprising a drum-shaped ink container defining a hollow interior space for storing inking liquid, said container being rotatably mounted in said device and having a cylindrical shell rotatable therewith and provided with openings for the passage of inking liquid from said interior space to the outside of said shell, said shell being provided on the external side thereof with grooves communicating through said openings with said internal hollow space, means forming a cylindrical porous inking roller around said drum-shaped ink container, an inking ribbon normally engageable with an arcuate portion of the periphery of said roller for receiving ink therefrom, means including a counter roller for guiding a recording tape through said machine, means for shifting said counter roller between inactive and active positions, and a tensioning member under control by said shifting means for placing said inking ribbon in contact with a portion of the peripheral surface of said inking roller.

12. In a business machine, a device comprising a drum-shaped ink container defining a hollow interior space for storing inking liquid, said container being rotatably mounted in said device and having a cylindrical shell rotatable therewith and provided with openings for the passage of inking liquid from said interior space to the outside of said shell, said shell being provided on the external side thereof with grooves communicating through said openings with said internal hollow space, means forming a cylindrical porous inking roller around said drum-shaped ink container, an inking ribbon normally engageable with an arcuate portion of the periphery of said roller for receiving ink therefrom, means including a counter roller for guiding a recording tape through said machine, means for shifting said counter roller between inactive and active positions, and a tensioning member under control by said shifting means for placing said inking ribbon in contact with a portion of the peripheral surface of said inking roller.
9 closure valve having a removable cap for additionally closing off said valve.

14. In a business machine having a machine drive, a device comprising a drum-shaped ink container defining a hollow interior space for storing inking liquid, said container being rotatably mounted in said device and having a cylindrical shell rotatable therewith and provided with openings for the passage of inking liquid from said interior space to the outside of said shell, means forming a cylindrical porous inking roller around said drum-shaped ink container, an endless inking ribbon normally engageable with said roller for receiving ink therefrom, a cover diaphragm having a partially cylindrical portion shaped to substantially conform to the external periphery of said inking roller and movably mounted for being selectively shifted into operating and inactive conditions, said diaphragm in its operating condition covering inactive peripheral surfaces of said inking roller to prevent a too rapid evaporation of the inking liquid therefrom, said diaphragm constituting a shut-off device, operable when said diaphragm is shifted to its inactive condition, for simultaneously lifting said inking ribbon from its normal position contacting the inking roller off the inking roller for the purpose of thereby interrupting the ink supply to said ribbon drive means fixedly attached to said inking roller and connectable to said machine drive for driving said roller and for advancing thereby said endless inking ribbon when said ribbon is engaged with the surface of said inking roller, and means carried by said inking roller for controlling the quantity of inking liquid fed from said interior space to said porous inking roller.

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