June 13, 1950 R. G. CHOLLAR ET AL 2,511,148

RIBBON INKING AND CONTROL THEREOF

Filed Aug. 3, 1945

FIG. 1

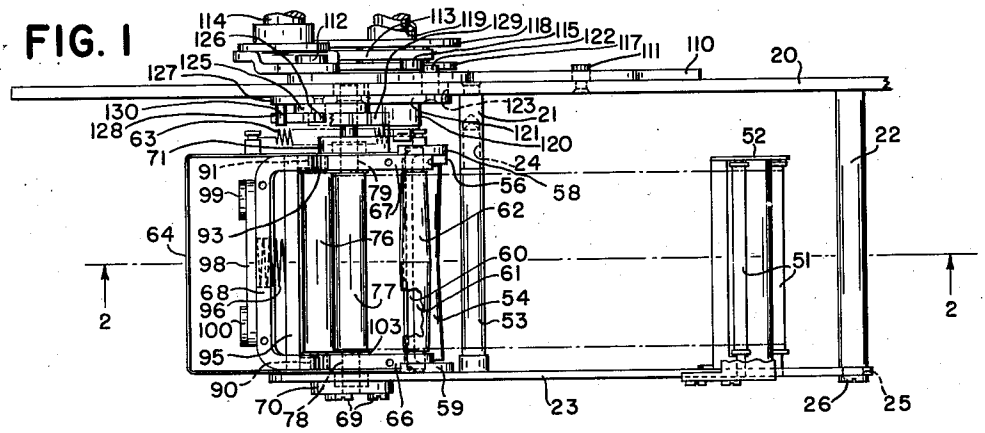


FIG. 2

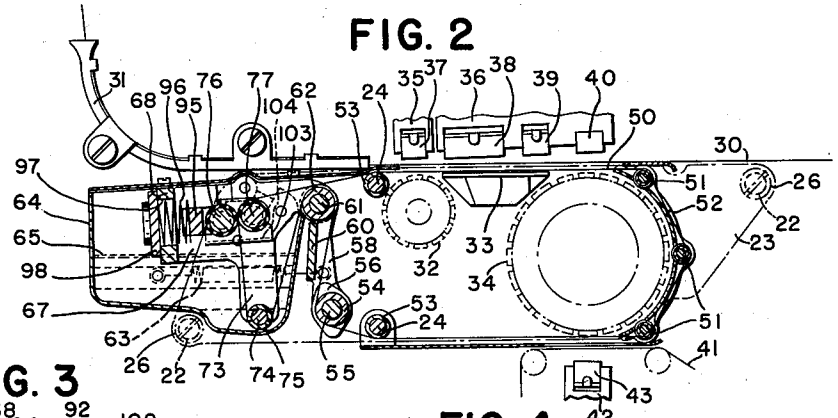


FIG. 3

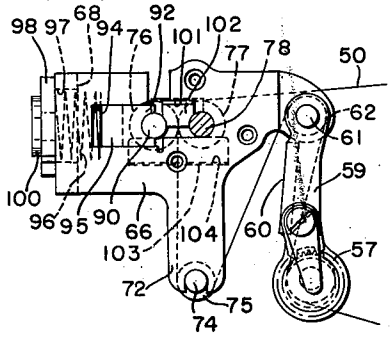


FIG. 4

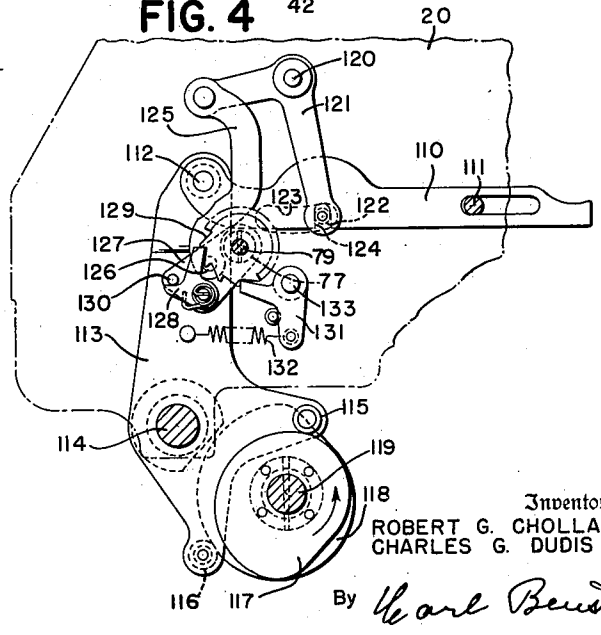
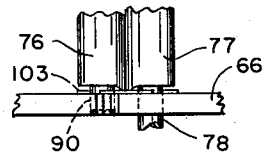


FIG. 5



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Patented June 13, 1950 2,511,148

UNITED STATES PATENT OFFICE

2,511,148

RIBBON INKING AND CONTROL THEREOF

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Application August 3, 1945, Serial No. 608,660

1 Claim. (Cl. 101—336)

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This invention relates to ink ribbons and the control of the wetness thereof, particularly for ribbons used in cash registers, accounting machines, and other types of business machines where it is necessary to obtain certain results of additions, subtractions, itemizing of data, the balance and/or totals thereof, and other calculation results in the form of printed records.

In producing such printed records it is highly desirable that the records be legible at all times, and to produce legible records ink ribbons of various kinds are used, such as long endless ribbons and straight ribbons on spools. The use of the latter type, of course, necessitates the use of ribbon reversing mechanism.

The invention is illustrated and described as applied to cash registers and accounting machines of the type disclosed in Letters Patent of the United States Nos. 1,817,883 and 1,865,147, granted to B. M. Shipley on August 4, 1931, and June 28, 1932, respectively; and also Numbers 1,812,194 and 1,963,733, granted to Samuel Brand on June 30, 1931, and June 19, 1934, respectively.

It is known that ribbons now on the market have to be changed frequently due to the exhaustion of ink through usage, whereby the printed records soon become very dim and often illegible. And furthermore, the drier the ribbon, the more subject it is to wear from impact with the printing type, and such conditions also necessitate frequent changes of ribbons.

Felt ink rolls charged with dye ink have been used in the past to re-ink ribbons, but the felt rolls dry out as well as the ribbons, and practically each time a felt ink roll is re-inked to supply the ribbon with ink, the ribbon becomes very much over-inked, and the result of such over-inking is an over-inked print, which many times is not legible due to the feathering of the ink to such extents as to create smears.

Felt ink rolls charged with pigmented ink have been tried but proved to be wholly unsuccessful because the pigmented inks, having solids therein, soon clog up the felt to such a degree that it will not re-ink a ribbon and the result of such a condition is an under-inked print which is not legible.

Therefore, in order to be able to produce properly inked printed records from cash registers and accounting machines the condition of the ink ribbon must be controlled so that the desired wetness of the ribbon can be maintained at all times.

To find ways and means to overcome these undesirable conditions relative to ink ribbons used in cash registers and accounting machines created a problem of no mean importance and particularly so when considered from the standpoint of practical manufacturing and the maintenance of a fresh or newly inked ribbon at all times to obviate the necessity of frequent replacements while the machines are in use.

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There are many advantages gained by providing a wet ink ribbon. A wet ink ribbon will stand up under the impacts of hammer blows longer than a dry ribbon, thus giving longer life to the ribbon and consequently permitting the use of a comparatively short endless ribbon, and the use of endless ribbons eliminates the use of ribbon reversing mechanism.

Moreover the inking and the control of the ribbon by means of the present invention permits the use of pigmented inks, thus eliminating feathering and bleeding of the printed characters or numbers.

The use of pigmented ink gives a wide variation of color range, which cannot be gotten by the use of dye inks.

By using pigmented inks highly desirable characteristics of the printed numbers and the symbols can be produced, that is the intensity and solidness of the printed numbers and symbols can be properly controlled. Therefore, due to frequent re-inking of short endless ribbons by means of a reservoir of pigmented ink through which the ribbon passes, good solid prints always having the same intensity are produced during the entire life of the ribbon.

The ribbon is given a feeding movement each time a print is made so as to always present to the type a freshly inked portion of the ribbon. As the ribbon leaves or is fed out of the reservoir of ink, that portion of the ribbon naturally is very much over-inked and to de-ink or remove the surplus ink from the said portion of the ribbon it is passed between a pair of doctor rolls, one of which rolls is rotated each time a print is made, thereby feeding the ribbon and at the same time controlling the wetness of the ribbon by de-inking the same, by squeezing the ribbon as it is fed by and between said doctor rolls. The surfaces of said rolls are made of non-ink absorbing material which has sufficient pliability to feed the ribbon when one of the rolls is positively rotated.

The control of the wetness of the ribbon by doctor rolls makes for even distribution or equalization of the ink to all parts of the ribbon, whereby all characters and/or numbers of the printed records are always the same, that is, there are no records produced which have some

dim characters and some heavily inked characters or numbers.

Under the above conditions the ribbon has time to fully recover, that is, the ink flows back into the spaces from which a portion thereof has been removed by the act of printing.

Moreover the operator of the machine does not have to turn the ink supply on and off, as is the case with some types of re-inkers. In the instant case all that is necessary is to maintain a supply of ink in the reservoir and then the mechanism automatically controls the wetness of the ribbon at all times.

Also, due to the control of the wetness of the ribbon, there is no smearing or smudging of the characters or numbers making up a record.

Therefore, the principal object of this invention is to provide a machine, such as cash registers and/or accounting machines with wet ink ribbons, and control the wetness of such ribbons to control the intensity and legibility of the printing of records from said machine.

Another object of the present invention is to provide means for frequent re-inking of the ribbon to cause the printed records to have substantially the same intensity at all times.

A further object is to provide means to control the wetness of an endless ribbon by passing the ribbon between a pair of doctor rolls having non-ink absorbing pliable surfaces and providing the proper amount of pressure to the rolls to cause them to de-ink the ribbon and equalize the distribution of the ink to all parts of the ribbon, and at the same time feed the ribbon step by step toward the printing line or lines.

A still further object of this invention is the provision of the method of inking an endless ribbon with a pigmented ink and controlling the wetness of the ribbon to produce records having good solid prints of constant intensity.

A more specific object is the provision of a reservoir of pigmented ink through which the ribbon is run, after which said ribbon is passed between a pair of rolls located within the reservoir just above the ink line, whereby the surplus ink is removed from the ribbon.

With these and incidental objects in view, the invention includes certain novel features of construction and combinations of parts, the essential elements of which are set forth in appended claims, and a preferred form or embodiment of which is hereinafter described with reference to the drawings which accompany and form a part of this specification.

In said drawings:

Fig. 1 is a top plan view of the ribbon re-inking means, the means for feeding the ribbon step by step, and also shows the ribbon guiding means.

Fig. 2 is a section on line 2—2 of Fig. 1 looking in the direction of the arrows, and also shows a portion of the printing means.

Fig. 3 is a detail side view of the supporting frame for the doctor rolls and shows how they are mounted, and also illustrates the ribbon tension frame.

Fig. 4 is a detail of the ribbon feeding means and its actuating means.

Fig. 5 is an enlarged plan view of a portion of the doctor rolls showing how their ends flare out at the point of tangency.

Description

As has been hereinbefore stated, this invention is particularly adapted for use in cash registers and accounting machines of the type

illustrated and described in the Shipley and Brand patents, the numbers of which have been previously given.

In such machines the printing mechanism is usually on the left side of the machine, by means of which a receipt or check is printed and issued, and a record is also printed on a detail or audit strip. Only a part of such printing mechanism has been shown herein, and for a more detailed illustration and description thereof reference may be had to said Shipley and Brand patents.

In Fig. 1 is shown the usual printer plate or frame **20** which carries two hollow guide studs **21** (only one being shown) and two ribbon frame supporting studs **22**. A ribbon frame **23** has two guide studs **24** adapted to enter the hollow studs **21** to locate the frame **23** and facilitate the insertion of the frame into position in the machine. When the studs **24** of the ribbon frame **23** have been fully inserted in the hollow studs **22**, tenons **25** of the studs **22** enter holes in the ribbon frame **23**, and the latter is firmly secured in the machine by means of screw **26**. This frame **23** is shown in dot and dash lines of Fig. 2.

Fed from the usual supply roll (not shown) is a receipt or check strip **30**, guided by a guide **31** above type wheels **32**, an electroplate **33**, and type wheels **34**. Cooperating with the type wheels and electroplate are the usual hammers **35** and **36** having printing platens **37**, **38**, **39**, and **40**. The hammer platen **37** makes impressions on the check from the wheels **32** to show the type of transaction and the clerk or cashier's number. The platens **38** and **39** print any desired data which the merchant may wish to have printed on his check from the electroplate **33**, and the platen **40** prints from the type wheels **34** the amount and any other data, such as the date and consecutive number, depending upon the arrangement of the type wheels according to the system desired by the owner of the machine.

Below the type wheels **34** is shown a portion of the usual detail or audit strip **41**, a hammer **42**, carrying a platen **43** for making impressions from the type wheels **34** on the audit strip **41**. An endless ribbon **50** carried by the ribbon frame **23** is supported at its right end as viewed in Fig. 2 by three rolls **51**, which in turn are supported by the ribbon frame **23** and a formed ribbon guard **52**, which in turn is secured to the ribbon frame **23**. Rollers **53**, carried by the studs **24** also help to support the ribbon **50** in horizontal position beneath the platens **37**, **38**, **39**, and **40**, and above the platen **43**, so that legible prints may be made on the check or receipt strip **30** and on the audit strip **41**. The ribbon **50** also passes over a concaved roller **54**, supported by a shaft **55** which in turn is supported at its ends in a block **56** and the hub of an eccentric disk **57**, which hub and disk are carried by arms **58** and **59** connected by a bail **60** to form a ribbon tension frame. The arms **58** and **59** of the frame are pivoted on a rod **61**, which supports a convex roller **62** over which the endless ribbon **50** also passes. These two rollers **54** and **62** keep the ribbon running straight, the eccentric being used to adjust the roller **54** for such purpose. A spring **63** connected to the arm **58** tends at all times to rock the ribbon tension frame clockwise, as shown in Figs. 2 and 3, to keep the ribbon **50** taut.

From the roller **62** the ribbon **50** enters a reservoir **64** which carries pigmented ink **65** represented by the dotted lines. This reservoir **64** is supported by a frame consisting of side plates **66** and **67** connected by a bail **68**.

As shown in Fig. 1, the sides of the reservoir 64 are on the outside of the plates 66 and 67. The plate 66 is secured to the ribbon frame 23 by screws 69, which also secure a bearing collar 70 to the ribbon frame 23. The purpose of this bearing collar will be hereinafter explained. A bearing collar 71 (Fig. 1) is also fastened to the plate 67 by screws (not shown), and since the sides of the reservoir 64 are between the bearing 71 and plate 67 on one side and between the plate 66 and ribbon frame 23 on the other side, consequently this reservoir 64 is securely fastened in operating position for the ribbon 50 to be run through the pigmented ink 65 contained in said reservoir. The plates 66 and 67 each has an arm 72 and 73, respectively, which is forked at its lower end to receive a rod 74 carrying a roller 75 around which the ribbon 50 passes after it leaves the roller 62.

From the roller 75 the endless ribbon 50 is fed upwardly out of the pigmented ink 65 between doctor rolls 76 and 77 and thence over the doctor roll 77 toward the previously described roller 53 to the printing lines above the type wheels 32 and 34 and the electro printing plate 33.

These doctor rolls 76 and 77 have surfaces made of pliable non-ink absorbing material, such as a pliable plastic or a synthetic rubber, so that when one of the rollers is positively driven by means to be hereinafter described, the pliable surfaces of these doctor rolls 76 and 77 will feed the ribbon 50 toward the right on its top side as viewed in Fig. 2, or in other words toward the type wheels 32.

The roll 77 has reduced ends 78 and 79, which ride in the bearing blocks 70 and 71, previously described. The plates 66 and 67 are both formed as shown in Fig. 3 to receive the reduced ends 78 and 79 of the doctor roll 77. The doctor roll 76 also has reduced ends 90 and 91, which have half-bearings in blocks 92 and 93 in slots 94, formed in the plates 66 and 67. These blocks 92 and 93 are connected by a bail 95. Pressing against the center of the bail 95 is a strong compression spring 96, seated in a hole 97 in the bail 68 and backed up by a retaining plate 98 pivotally mounted on a stud 99 and arranged to latch over a stud 100, both studs being secured to the bail 69. This heavy compression spring 96, by pressing against the bail 95, causes the bearing blocks 92 and 93 to press firmly against the ends 90 and 91 of the doctor roll 76 and consequently press the doctor roll 76 tightly against the ribbon 50 and press the latter tightly against the doctor roll 77 to squeeze out the surplus pigmented ink 65 on the ribbon 50 as it passes upwardly and out of the reservoir of ink 65 when the doctor roll 77 is turned by means to be hereinafter described, in a step by step movement. The plates 66 and 67 are formed with the half bearings for the ends 78 and 79 to facilitate assembly and permit removal of the roll 77 if necessary. Inserted in slots 101 in the plates 66 and 67 above the ends 78 and 90 on the one hand and 79 and 93 on the other hand, of the doctor rolls 76 and 77, is a block 102.

Between each block 102 and the ends of the pliable portions of the rolls 76 and 77 is a shim or thin plate 103 shaped to fit partly around the reduced ends of the rolls 76 and 77 (Figs. 1, 2, 3, and 5). This plate 103 is made of a springy metal and has a very slight flange 104 along its bottom edge which with the springiness of the plate 103 causes the latter to bear against that portion of the area of the pliable ends adjacent their tangential contact points, which area is slightly extended beyond the normal lengths of the pliable parts of the rolls 76 and 77 due to the pressure applied to the rolls to wring out or deink and feed the ribbon 50. Such contact of the plates 103 with the rolls 76 and 77 wipes off any ink from the ends of the rolls during the wringing and feeding of the ribbon. Therefore, these plates 103 prevent any ink from being carried upwardly along the ends of the rolls so that the ink cannot reach the ribbon 50 above the rolls 76 and 77. If ink were permitted to crawl or work its way up over the ends of the rolls 76 and 77, such ink would contact the edges of the ribbon on top of the rolls and would "bleed" across the entire width of the ribbon and overink that part of the ribbon which had been controlled as to its wetness.

Feeding means for doctor rolls

The means for positively driving the doctor roll 77 to cause the two rolls 76 and 77 to feed the endless ribbon 50, and at the same time control the wetness of the ribbon so as to always present to the printing lines a properly inked ribbon, will now be described.

This feeding is step by step and takes place when the check or receipt strip 30 is fed by mechanism which is fully illustrated and described in the above mentioned Brand Patents Nos. 1,812,194 and 1,963,733, and also the Shipley Patent No. 1,865,147. This feeding mechanism in the present case is shown in Figs. 1 and 4.

As is fully illustrated and described in the last mentioned Shipley and Brand patents, a slide 110 mounted to slide on the stud 111, carried by the frame 20, and pivoted on a stud 112 of a lever 113 is moved first to the left as viewed in Fig. 4 and then restored to the right to the position shown at the proper time during the operation, after the printing has taken place. This lever 113 is pivoted on a stud 114 carried by the regular side frame of the machine (not shown). This lever 113 carries rollers 115 and 116 cooperating with a pair of plate cams 117 and 118, respectively secured to a printer drive shaft 119. As the shaft 119 and cams 117 and 118 make one complete counter-clockwise rotation the lever 113 is rocked first counter-clockwise and then clockwise to its normal position, which moves the slide 110 first to the left and then back to the right, to the position shown, as above mentioned.

Pivoted on a stud 120 carried by the printer frame 20 is a bell crank 121 having a stud 122 which projects through a slot 123 in the frame 20 and into a slot 124 in the slide 110. Pivoted to the bell crank 121 is a link 125 which is also pivoted on a stud 126 carried by a ribbon feed arm 127 which is pivotally mounted on the small end 79 of the doctor roll 77. Pivoted on the ribbon feeding arm 127 is a spring-pressed feeding pawl 128, which cooperates with a ratchet 129, which is secured to the small end 79 of the doctor roll 77. A limiting pin 130 on the arm 127 cooperates with the pawl 128 to facilitate in assembling by maintaining the pawl 128 in proper position on the arm 127 for assembling.

When the slide 110 is moved to the left in the manner previously described, the bell crank 121 is rocked clockwise, which raises the link 125 and rocks the ribbon feed arm 127 in a clockwise direction, whereupon the pawl 128, through its cooperation with the ratchet 129, rotates the ratchet 129 and consequently the end 79 of the doctor roll 77 and the doctor roll 77 itself in a clockwise direction one step of movement equiva-

lent to one ratchet tooth space. This step of movement of the doctor roll 77, because of the pressure exerted by the doctor roll 76 against the ribbon 50, feeds the ribbon 50 upwardly between the rolls 76 and 77, as has been previously mentioned.

When the slide 110 is moved back to the right, to the position shown in Fig. 4, the bell crank 121 is restored in a counter-clockwise direction, thus lowering the link 125 and rocking the arm 127 counter-clockwise to the position shown, whereupon the pawl 128 is clicked over the ratchet 129 to engage the tooth next below that from which it has just been disengaged.

To pervent any retrograde or counter-clockwise movement of the ratchet 129, and consequently the roll 77 during this restoring movement of the arm 127 and pawl 128, a retaining pawl 131 is held in contact with the ratchet 129 by a spring 132. This retaining pawl is pivotally mounted on a stud 133 carried by the printer frame 20.

From the above description it will be clear that whenever the check strip 30 is fed by the slide 110, the ratchet 129 is driven by the pawl 128 to turn the doctor roll 77 positively in a clockwise direction to cause the endless ribbon 50 to be fed upwardly between the pair of doctor rolls 76 and 77 to remove the surplus pigmented ink from the ribbon 50 to control the wetness of the ribbin by such removing of the surplus ink through the pressure to which the ribbon 50 is subjected as it is being fed. This wringing out of the ribbon causes the ink which remains in the ribbon to be equally distributed over the ribbon so that when the ribbon reaches the printing line or lines it will always be of the same wetness, neither too wet nor too dry, so that there is always produced a record, the characters and numbers of which are always of the same intensity and solidness.

While the form of mechanism herein shown and described is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to

the one form or embodiment herein disclosed, for it is susceptible of embodiment in various forms, all coming within the scope of the claim which follows.

What is claimed is:

In a device of the class described, the combination of a frame for supporting an endless ribbon in cooperative relation with printing means; an ink reservoir carried by said frame to carry a supply of pigmented ink; a pair of rolls having non-ink absorbing pliable surfaces; a pair of members for supporting said rolls above the ink line in said reservoir; a bail connecting said members; an arm on each of said members and projecting into the ink in the reservoir; means supported by arms to guide the ribbon through the pigmented ink; a combined bearing and pressure means slidably mounted in said members to support one of said rolls and press it against the ribbon and the other roll; means supported by said bail for applying pressure to said combined bearing and pressure means; a feed ratchet secured to the last mentioned roll; and means to actuate the ratchet to cause the rolls to feed the ribbon out of the ink and remove surplus ink therefrom to control the wetness of that portion which has just been fed between said rolls to present said controlled portion to the printing means to cause the printed records to always be of the same intensity and solidness.

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