Aug. 1, 1967 O. W. SWENSON 3,333,569

METERING RIBBON INKER

Filed Aug. 11, 1966

FIG. 1

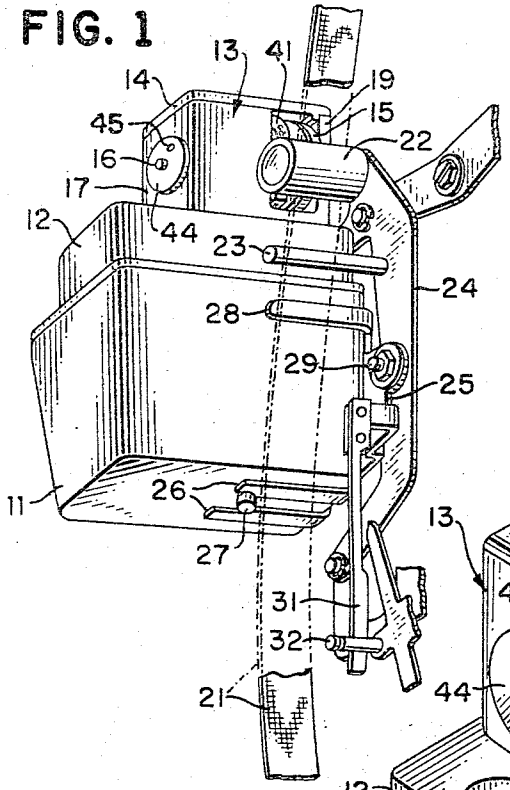


FIG. 2

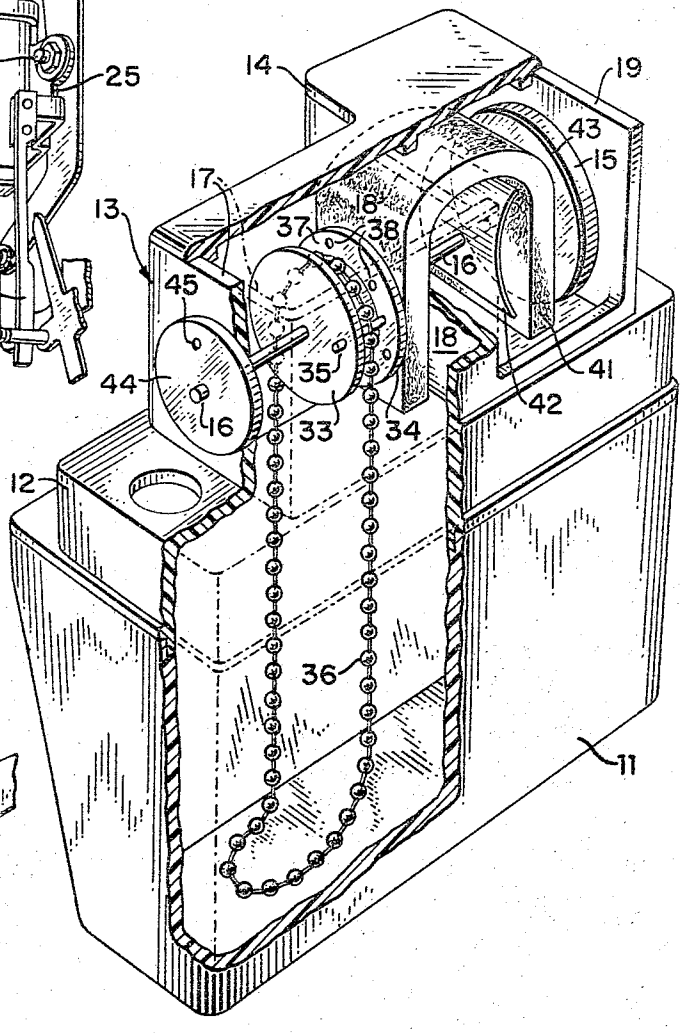
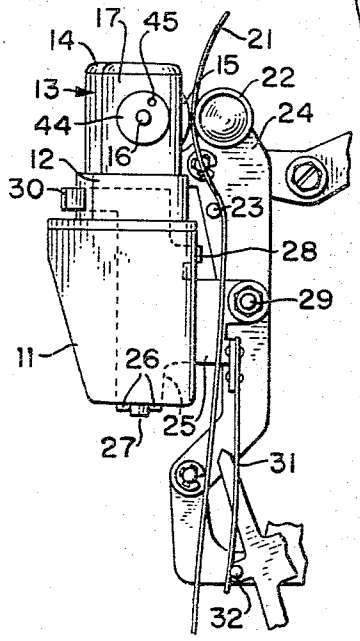


FIG. 3



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METERING RIBBON INKER

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5 Claims. (Cl. 118—260)

This invention relates to typewriting devices generally, and in particular to a device useful for continuously re-inking the ribbons of printing or typing machines such as a stock market ticker, during use of the machine.

When printing devices in the nature of a stock market ticker are operating continuously at high speeds for long periods of time, a substantial amount of ink is used and the ink absorbing capacity of a typewriter ribbon of normal dimensions is rapidly exhausted. This is especially observed in modern high speed tickers which print at a very rapid rate, and the problem is further aggravated by the fact that such printing frequently is done on a transparent strip for projection of the opaque printed characters onto a screen, in greatly enlarged form.

Such enlargement requires that the ink used must be very dense and quite uniform in regard to the amount of ink applied to each character marking, at all times during the operation of the printer.

Such demanding performance cannot be obtained for more than a relatively short period of time from a pre-inked ribbon, and a re-inking device must be used in order to obtain satisfactory results over a period of days or weeks of unattended service by the printing machine. The introduction of ribbons fabricated of woven plastic materials has extended the life of the ribbon itself sufficiently to enable a machine equipped with such a ribbon to operate without need for changing the ribbon during an extended period. It has been found, further, that by continuously re-inking the ribbon with an ink of appropriate composition, a lubricating and preservative effect is achieved, even on ribbons of silk or cotton. Re-inking of such ribbons in a ticker machine has heretofore been accomplished by means of wick-type re-inking devices fastened to the machine such for example, as that shown in Patent No. 3,101,283 for "Inking Devices" issued to E. G. Brown, Aug. 20, 1963, and a similar device patented to J. P. Knight, Patent No. 2,559,561, issued June 10, 1952, for "Apparatus for Inking Ribbons," and a great variety of other similar devices.

Such wick type devices depend for their operation upon the capillarity of a wick, usually made of wool felt material. Such a wick thus is relied upon to draw the ink out of an ink storage reservoir and to apply the ink by rubbing it onto a passing ribbon or onto a roller which is in contact with such a ribbon. The present need for an opaque ink to be used in relatively large quantities at a very uniform rate, as needed for a high speed ticker printer, has not been successfully met by such wick-type re-inking devices however. This is because the need for opacity in the ink as above explained, has led to the use of pigmented inks, rather than the former true solutions of aniline dye. The solid portion of such pigmented inks is found to cause difficulty in feeding of the ink through a capillary lifting wick because of the tendency of the solid portion of the ink to clog the wick, especially in cases where the equipment is shut down for a period of several days, such as would be the case for example, over a long weekend. Another feature of the capillary wick re-inkers which is found to be undesirable for present purposes is the fact that ink is delivered through the wick at a rate which varies in accordance with the level of the ink in the ink storage reservoir. This results in a variation in the density of the typed copy according to the level of the ink, which is undesirable.

It is therefore an object of the present invention to provide a ribbon re-inker which is capable of providing a constant supply of pigmented ink to the ribbon of a printer.

It is another object of the invention to provide such a ribbon re-inker which is not subject to drying out or clogging of the wick during extended periods of shut down.

It is still another object of the invention to provide a ribbon re-inker which applies a constant uniform quantity of ink to the ribbon for each character typed.

It is still another object of the invention to provide a re-inker having a metered ink feed mechanism such that an enlarged ink storage reservoir may be used without danger of the ink feed mechanism becoming plugged by ink solids.

These and other objects which will later become apparent I accomplish by means of an ink lifting or pumping mechanism which is located for lifting a copious flow of ink to a position above an ink reservoir, which then may be constructed of enlarged size. A loop of chain, such as ordinary bead chain, which dips into the ink reservoir, and which is rotated by its engagement with a small gear from which it depends, is found to make an excellent ink pump. The ink adhering to the bead chain bathes the gear in an oversupply of ink, and the excess ink drains back into the reservoir. Such portion of the pumped ink as may be required for ribbon re-inking is metered by means of a capillary ink bridge, which provides an ink carrying conduit between the aforesaid gear and a ribbon-contacting roller mounted on the same shaft.

By novel modifications later to be described, this capillary ink bridge is caused to perform a new metering function and to avoid all of the disadvantages formerly associated with capillary ink feed in devices of the prior art.

A clearer understanding of the invention may be had by reference to the following detailed description of a specific illustrative example of the invention taken in conjunction with the drawings wherein:

FIG. 1 is a perspective view of a ribbon re-inker of the present invention:

FIG. 2 is a cut-away view of the device of FIG. 1; and

FIG. 3 is a side view of the device of FIG. 1.

Referring now to the drawings, there is seen at **11**, a reservoir made of a suitable ink-resistant material, and which conveniently may be transparent in order to permit the level of the contained ink to be easily determined at all times. Methyl methacrylate plastic has been found to be quite satisfactory for the purpose, and the reservoir cap **12**, feed wheel housing **13** and cover plate **14** may all be constructed of the same material for convenience of fabrication, if desired. The parts mentioned are conveniently injection molded, and may be fastened together by means of solvent bonding or by cement, as desired.

A plastic feed wheel **15** is mounted by means of a shaft **16** journalled in holes drilled in alignment through the vertical walls **17**, **18** and **19** of the feed wheel housing **13**.

Feed wheel **15** is seen in FIG. 3 to protrude from housing **13** so as to contact and roll along the ribbon **21** in its passage over the roller **22** and the stud **23** which are located on a bracket **24** fastened to the machine.

It is, however, the only internal part of the re-inking device which is in any degree exposed to the air and the evaporation of ink solvents which otherwise leads to loss and solidification of the ink during extended periods of shutdown is thereby entirely prevented.

A carriage **25** for the inker has a split retaining member **26** for securely engaging a protuberance **27** on the underside of reservoir **11**, and two positioning arms, one

of which, **28** is formed from the relatively stiff metal of the carriage, and the other of which, **30**, is made of spring material such as Phosphor bronze, and has an end provided with a terminal hook so shaped as to snap into engagement with a lateral wall of the cap **12**.

The plastic inker assembly thus is held securely in place on the carriage **25** although it is readily removable by hand without the use of tools for purposes of replacement or refilling, when necessary.

The carriage **25** is hinged to the bracket **24** on a shoulder screw **29**, and thus can be rocked into contact with ribbon **21** by pressure applied on the leaf spring **31** riveted to it, said pressure being applied by motion of the pin **32** during automatically selected portions of machine operation.

The organization of the assembled invention into the relevant operating structure of the typewriting machine having thus been described, attention is now directed to the particular structure and manner of operation of the improved removable re-inker device shown in FIG. 2.

When the feed wheel **15** is pressed into contact with the moving ribbon **21** by pressure of the pin **32** on the spring **31**, rotating carriage **25** around the shoulder screw **29**, the shaft **16** to which it is affixed revolves.

Trundle heads **33** and **34** of a lantern pinion also affixed thereto, retain a single cylindrical bar or trundle **35** between them, corresponding to a single leaf on a shrouded pinion gear. Over this bar and downward into reservoir **11** depends an endless loop **36** of chain.

It is found that a very convenient and effective form of chain for this purpose is the so called "bead" chain which was in extremely wide use for operating switches within electric light sockets by a former generation, and is still in popular use for key chains and the like. It has the marked advantage of symmetrical construction with an unlimited swiveling capability at every joint, so that it is quite limp and non-directional even when piled in excess length on the bottom of reservoir **11**. As a result, it displays no tendency to tangle or bind under these circumstances, and a certain amount of excess chain length is desirable in providing a stirring and churning effect useful to more advantageously accommodate the ink solids whose tendency to separate and settle might otherwise be troublesome in view of the greatly enlarged volume of the reservoir **11** over that of such containers heretofore used on machines of this kind.

The single bar **35** joining the trundle heads **33** and **34** of the lantern pinion causes an intermittent motion of chain loop **36** as it rotates, which lifts a more than sufficient supply of ink to bathe the inner face **37** of the trundle head **34** with a copious flow of ink. The excess drains back into reservoir **11**, but holes such as **38** through the trundle head **34** permit an appropriate amount of ink to flow outward from the lantern pinion, according to their size and number. Under the particular conditions of a pigmented ink composed of aniline violet dye and having a substantial inclusion of oleic acid, it has been found that three holes of 0.040 inch diameter in the trundle head **34** provide a sufficient passage of ink to give good results in printing for projection, on a transparent plastic tape.

Inks of other characteristics, especially if used for other purposes, will require appropriate adjustment of the size or the number, or both, of such holes **38**. This factor, together with the number of trundles **35** employed in the lantern pinion, comprise the only variables necessary to be considered in accommodating the widest range of types of ink and methods and purposes of writing, in order to bring about satisfactory operation of the re-inker. It represents a desirable simplification of the empirical determination of wick-type inker geometry which has heretofore been required.

An ink bridge **41** is composed of a rectangular strip of heavy wool felt, bent into an inverted U-shape as shown, and pierced by the shaft **16**. It is held in contact with the

trundle head **34** by proximity of the wall **18** and the resilience due to bending as above mentioned, and in contact with feed wheel **15** by the spring **42** formed of flat material such as beryllium copper, and pressing against the said wall **18**.

Ink bridge **41** acts as a local reservoir of limited capacity, which is able, however, to retain enough ink for a shutdown period of several days so that re-inking can commence immediately upon rotation of the feed wheel **15**. It also serves a valuable purpose in providing relatively constant high resistance to the flow of ink, so that the amount of ink provided by the bead chain pump, which may vary greatly according to the level of ink in the reservoir, has no visible adverse effect in influencing the amount of ink applied to the ribbon.

A bevel **43** is formed only on the inner corner of the feed wheel **15**. This enables ink to flow from the inner disc face to the cylindrical surface of the feed wheel. It also causes the formation of a small puddle of ink in the crevice thus formed between the edge of the feed wheel and the ink bridge **41**, which appears to be essential to the successful operation of the device, at least insofar as its operation with feed wheels of impermeable materials is concerned.

Suitable bevels are from five to fifteen thousandths of an inch in width, and may be formed at an angle of forty-five degrees. No modification of the bevel is required, however, to accommodate different inks.

Obviously, the required bevel could be replaced by a compound bevel, or even a radius, but the principle of breaking the corner of any solid feed wheel such as **15** in order to induce a flow of ink across its rolling surface is essential to the successful operation of the device.

Inasmuch as the interior of the housing **13** is generally obscured by a film of opaque ink during use, it is desirable to provide some means for observing the operation of the device in order to determine whether it is functioning properly. Accordingly, a wheel **44** is affixed to the shaft **16** externally of the housing **13**, and is provided with a mark, hole or protuberance **45**, whereby its rotation may be observed.

Although this invention has been described in terms of a specific illustrative example of the preferred embodiment thereof, it will be understood that various modifications or substitutions may be made in its elements by those who are skilled in the art, without, however, departing from the essential inventive concept disclosed. It is therefore intended that the invention shall be limited only by the appended claims.

What is claimed is:

1. A ribbon inker comprising an ink tank, an endless loop of flexible material dipping therein, a shaft mounted for rotation above the tank, a lantern pinion affixed to said shaft, having an end plate perforated, and having a single leaf for engaging and intermittently moving said endless loop, a traction wheel affixed to said shaft, comprising a disc having an edge with a chamfer on one of its corners, and ink bridge means comprising a body of absorptive material extending between the perforations of said end plate and the face of said traction wheel adjacent said chamber.

2. Ribbon inking means for a percussive printer which comprises:

a storage vessel of ink,

endless chain ink lifting means in the vessel,

a shaft journalled in bearings for rotation above the vessel,

a lantern pinion on the shaft having end plates one of said end-plates being perforated, engaging the said chain for rolling it through the ink,

a traction wheel affixed to the said shaft and disposed for frictional contact with a ribbon, having an outer edge chamfered, and

capillary ink bridge means comprising a body of readily ink-saturable material disposed in sliding contact

with the said one end plate and with the said traction wheel adjacent said chamfered edge thereof.

3. In a machine for printing with dark ink on a transparent tape for enlargement by rear projection onto a translucent screen, and wherein a ribbon containing the said ink is to be renewed from the ink reservoir of an attached ribbon re-inker during machine operation, the improvement in said re-inker which comprises: an ink reservoir, a shaft journalled for rotation over said ink reservoir in fixed relationship thereto, a chamfered cornered ink feed disc affixed on the said shaft for the rotation thereof, and having a portion of its circumference exposed for friction drive by ribbon motion, a lantern pinion affixed to said shaft, having at least a single trundle and having one of its trundle heads perforated, ink bridge means comprising a syphon of absorptive material fixedly located between said ink feed disc and said perforated trundle head in resilient sliding frictional engagement with said disc and said trundle head for metered ink transfer therebetween and ink pump means comprising a flexible loop engaging and dependent from said pinion and dipping into the ink in said reservoir.

4. The invention of claim 3 wherein said flexible loop consists of a loop of stranded beads.

5. Inking mechanism for the ribbon of a typing printer which comprises an ink tank, mechanically actuated ink

lifting, metering pump means in the tank for lifting a surplus of ink from the tank, an ink delivery wheel wettable by the ink having a ribbon engagement surface and rotatable by the ribbon and adapted by having ink feeding flow surfaces which intersect in obtuse angles in order to cause ink to flow onto the said ribbon engagement surface, conduit means of absorptive material for regulating ink flow having one end located adjacent said pump means for ink reception therefrom and having another end located in rubbing contact with at least one of said ink feeding flow surfaces of said ink delivery wheel for delivery of a metered flow of ink thereto.

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