Nov. 23, 1954 G. E. PELTON 2,695,092

INK FOUNTAIN TYPING MACHINE

Filed Oct. 5, 1950 2 Sheets-Sheet 1

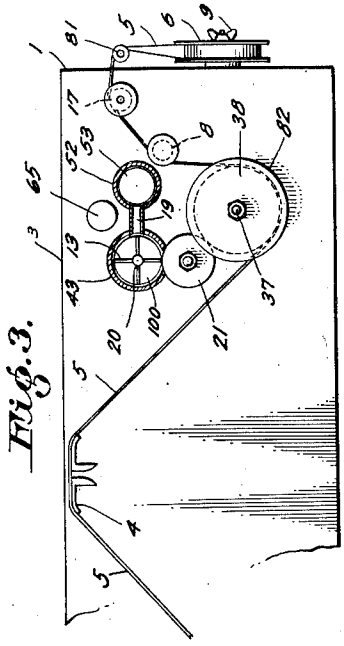


Fig. 3.

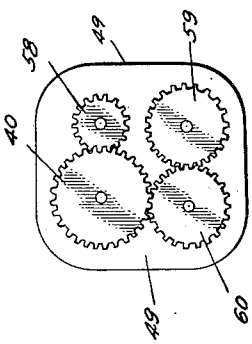


Fig. 5.

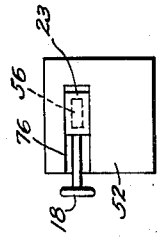


Fig. 7.

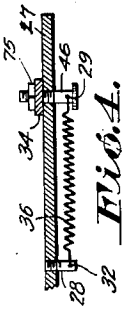


Fig. 4.

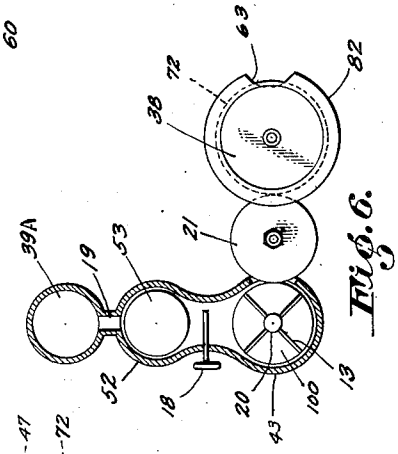


Fig. 6.

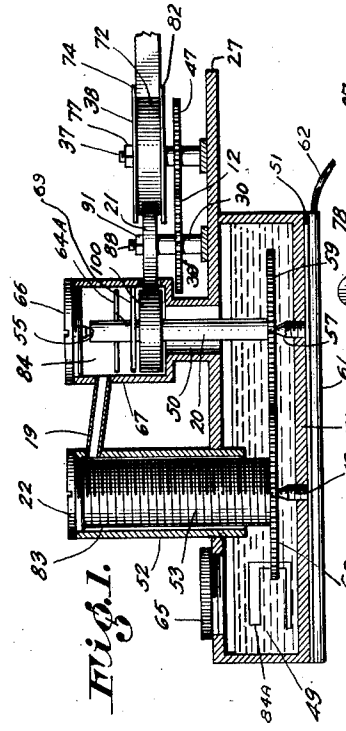


Fig. 1.

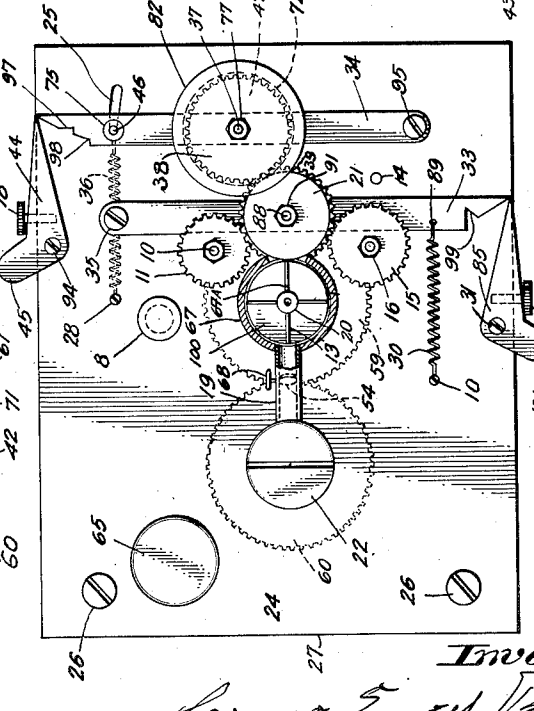


Fig. 2.

Inventor

George Ernest Pelton

Nov. 23, 1954 G. E. PELTON 2,695,092

INK FOUNTAIN TYPING MACHINE

Filed Oct. 5, 1950 2 Sheets-Sheet 2

Fig. 8.

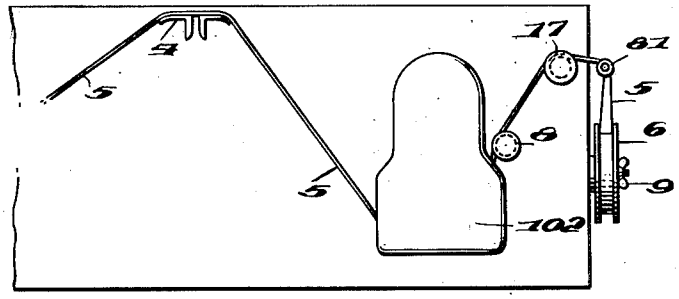
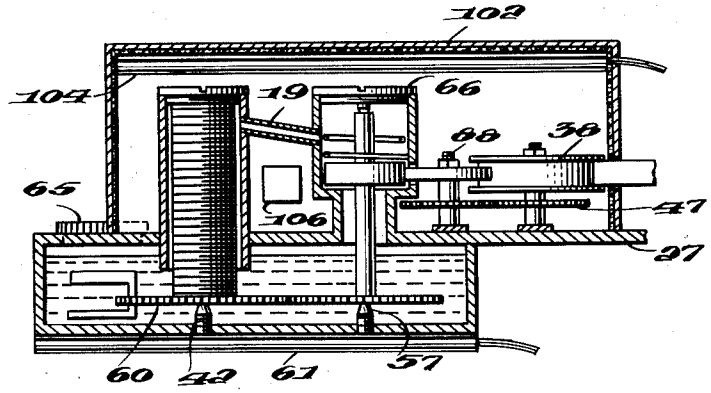


Fig. 9.



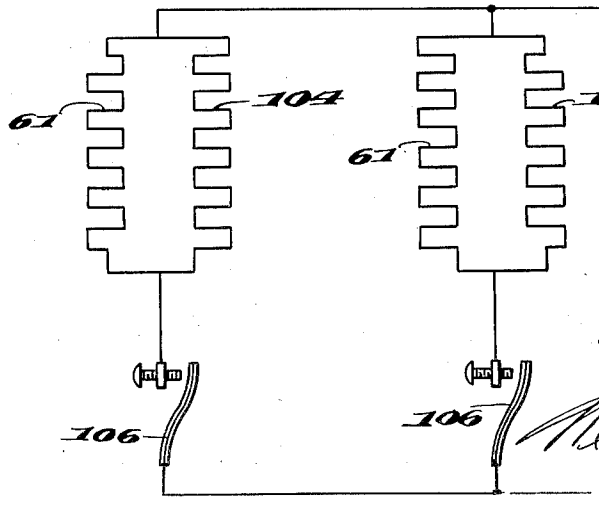


Fig. 10.

INVENTOR
GEORGE ERNEST PELTON,

ATTORNEY

United States Patent Office

2,695,092

Patented Nov. 23, 1954

2,695,092

INK FOUNTAIN TYPING MACHINE

George Ernest Pelton, Bluemont, Va., assignor, by direct and mesne assignments, of three-fourths to Ida S. Pelton, Bluemont, Va., and one-fourth to Miles D. Pillars, Washington, D. C.

Application October 5, 1950, Serial No. 188,592

6 Claims. (Cl. 197—171)

This invention relates to improvements in typing machines and particularly to improvements in the writing results from typewriters, bookkeeping machines, invoicing machines, teletype machines, posting and auditing machines.

The principal object of the invention is to provide improved inking means and heating means for the ink for typing and new methods of using wax ink for writing of richer color, like printing, and having much finer appearance.

Another object of the invention is to provide an improved non-woven ribbon of high tensile strength which is extremely thin and wear-resistant and has one face that is suitable for receiving hot ink without injury to said ribbon.

Another object is to provide a tough, very thin, writing ribbon, having a non-absorbent face for receiving heated Carnauba wax ink, of very rich color.

Another object is to provide heating means (which may be insulated) connected with a typing machine, for liquefying wax ink to feed to a ribbon.

Another object of my invention is to provide an ink fountain typewriter which writes two sheets simultaneously, with wax ink, the first sheet being thinner and next to the ribbon, which has a face which is tough and smooth.

Another object of the invention is to provide means for liquefying a non-fluid ink until it is a thin liquid, and means for feeding said ink through a pipe to rotary members and also means for maintaining a circulation of said ink through said pipe and through a second pipe and means for discharging surplus ink.

Other objects and advantages of the invention will become apparent from the following detailed description of the accompanying drawings, in which:

Fig. 1 is a cross sectional view, partly in elevation, of the improved ink applying mechanism;

Fig. 2 is a plan view of the mechanism shown in Figure 1;

Fig. 3 is a plan view showing an alternative form of ink applying mechanism mounted upon a typing machine;

Fig. 4 is an enlarged view showing details of the biasing means for the inking wheel supporting bar;

Fig. 5 is a plan view of the gear train positioned within the ink reservoir;

Fig. 8 is a plan view of a modified form of ink transferring mechanism located between the ink reservoir and the ribbon spool;

Fig. 7 is a detail view of control means for the ink feed mechanism of Fig. 6;

Fig. 8 is a plan view of the mechanism shown in Fig. 1 mounted upon a typing machine with a cover in position over the ink applying mechanism;

Fig. 9 is an enlarged cross sectional view, partly in elevation, of the mechanism shown in Fig. 1 with a cover member applied thereto; and

Fig. 10 is a schematic wiring diagram showing the circuitry for energizing the heating elements shown in Figs. 1 and 9.

As the ink is used from the new ribbon on a letterhead of expensive paper that has an engraved heading (or other expensive heading) the oily ink cannot give writing of richness of color and finish of outline and keep it up day after day, that is at all harmonious with the quality paper or the engraved heading.

Carbon paper ribbons have long been available but due

to their many defects they have not come into wide use. Efforts have been made to press viscose into the body portion of a white, woven ribbon, dry it, and ink one face with a dry, carbon paper ink. Such a method is described in U. S. Patent No. 1,445,469. This method did not secure as neat writing as is secured from an ordinary, cheap, lightly inked, cotton ribbon. Another inventor tried coating a ribbon with shellac in an effort to secure more printlike writing. I made the discovery that if the user of engraved paper is to have writing that harmonizes with the quality of his letter-head and is to have the ink in the writing match the heading at all times, and not have the impressions cut deep into the paper, and not put the burden on the typist of frequently changing a carbon paper ribbon, it is necessary to quit using knife-edged, cutting type and to use the ink from an extremely thin, tough ribbon, which offers very slight obstruction between the type and the paper; and better results may be secured if a wax ink is used, which must be liquefied and fed as a liquid ink to a smooth face of the thin ribbon; and perfectly the first sheet of paper is not the main sheet of expensive paper and is not the letter-head, since the best results are secured if the first sheet of paper is thinner than the letter-head (or main sheet) and wax ink of extremely rich color may write the first sheet directly from the wax ink of the ribbon; and the second sheet, or the main sheet of paper, may be written simultaneously with wax ink from an extremely thin, ink transfer sheet.

By using a tough, synthetic, writing ribbon equal to nylon, approximately two thousandths of an inch thick and having at least one smooth face suitable for receiving the heated wax ink, and by using a thinner first sheet of paper next to said ribbon's ink and also by using a very thin sheet of ink transfer paper following the first sheet, with the wax ink of the transfer sheet next to the main sheet, or letter-head, it is easily possible to secure beautiful wax ink writing for the thinner sheet of paper and for the main sheet, or letterhead. The wax ink writing has a finish of outline and of edges like actual printing and it has extremely rich color. The ribbon never has to absorb the ink or to act as an ink reservoir. The face of the ribbon towards the type may be a clean, uninked film surface or plastic surface, or it may be a calendered surface of a fifteen denier, or twenty denier, woven, ribbon which has a suitable, smooth, substantially impervious surface towards the paper for receiving hot wax ink; such aribbon may be of nylon or other synthetic fibers.

As a common thing today, the thick letter paper is used next to the ribbon and the thinner paper is next to the platen. The ribbon in common use is about .004 to .005 of an inch thick and is filled with ink. The first writing is too heavy on the letter-head, or main sheet, and the thinner paper is so far from the metal type that the impressions on the thinner paper are often ugly and dim. As the thick ribbon rapidly gives off its ink, the appearance of the writing on the main sheet, or letter-head, changes and before long it is dim and ugly. I have made the discovery that wax ink may be heated and fed to a much thinner ribbon and to the thinner sheet of paper and then feed ink to the letter-head from the thin ink transfer sheet, and have all writing of rich color and very neat.

As explained in my co-pending application, Serial No. 94,872, filed May 23, 1949 and now abandoned, it is possible to use ink of one color on the ribbon and ink of any color desired, or any thickness of the wax ink on the ink transfer sheet. In other words, the typist may write with black ink that is fed from the reservoir 49 of Fig. 1 to ribbon 5 of Fig. 3, and blue ink (or ink of any color desired) may be fed from the ink transfer sheet. And the typist may at any time put a sheet in the machine which feeds purple ink to the main sheet, or letter-head, while the ribbon continues to feed black ink to the thinner sheet of paper which lies next to the ribbon. Of course if the typist wishes, the writing may be done with the main sheet next to the ribbon.

Ink in reservoir 49 (of Fig 1—attached to base plate 27 by welding or in any suitable manner) is heated by

the electric heating plate **61**, and electric current is received through the cord **62**. I may heat Carnauba wax ink to a temperature of about 170 degrees Fahr. This wax ink may be the usual carbon paper ink used for typewriter carbon paper, made up of Carnauba wax, petroleum jelly, carbon, coloring matter, or any other suitable ink of rich color. I do not limit the ink used to any particular type. The heated ink is mixed by metal arm member **84**–A and gears **59** and **60** of Fig. 1, and the ink is then pumped by threaded roller **53** up to and through pipe **19** into the space **84**. The ink then passes by gravity past mixer **64**–A, through the narrow space between housing **67** and a stationary, fixed, circular plate **69**, and, as the rotary disk **100** is rotated, ink is applied to said disk continuously. The space between housing **67** and the disk **100** may be less than the space shown so that a very thin film of ink may be applied to disk **100** for transfer by contact with disk **21**. The surplus ink which moves down from disk **100** through space **50** (between housing **67** and the shaft **20**) returns to the ink reservoir as a liquid ink and may be pumped up again by the threaded roller **53**. During operation of the machine, the ink in the reservoir is slowly mixed also by gears **40** and **58** (Fig. 5). Disk **21** transfers the ink, as a thin film, to the face **72** of inking wheel **38** of Fig. 1. Control of the thickness of the ink film picked up by disk **21** and control of the thickness of the ink film picked up by inking wheel **38** is maintained in the following manner: Bar **34** extends transversely of the outer end portion of plate **27** and, at its rear end, is pivotally mounted by a screw **95** so that it may be urged inwardly by spring **36** (Fig. 4; also see threaded stud **46** and threaded stud **28** and nut **75** of stud **46** of Fig. 1—spring secured underneath base plate **27**) and spring **36** is anchored to threaded stud **46** and the other end is attached to threaded stud **28**; and bar **34** carries an upstanding shaft **37** (Figs. 1, 2 and 3) about which a flanged inking wheel is rotatably mounted; and inking wheel **38** has frictional contact with inked ribbon **5** (Fig. 3) so the same amount of ink may be maintained by said ribbon during its use; threaded screw **78** controls the position of lever **44** (Fig. 2) and this controls the contact of inking wheel **38** with rotary disk **21** and controls the amount of ink received by face **72** of inking wheel **38** from contact with disk **21**. Bar **34** may move outwardly since the threaded stud **46** (Figs. 1 and 4) may move through a slot **25** in base plate **27**; and when lever **44** is moved by handle **45** to force bar **34** far out so that one end of lever **44** contacts bar **34** at point **98** of bar **34**, then, by reason of the cut-out portion of lower flange **82** (see cut-out **63** of Fig. 6), the flanged wheel **38** may be more readily removed from shaft **37** (see Figs. 1 and 2) for cleaning and servicing. Lever **85** has handle **101** and the control of the movement of transverse bar **33** is obvious; stop **14** is a stud in plate **27** which controls outward movement of bar **33** regardless of the position of lever **85**; in other words, bar **33** cannot move past stud **14**; when lever **85** is moved by handle **101** to force bar **33** towards stud **14**, and held in said position by screw **80** (Fig. 2) then disk **21** will have less contact with the ink on the face of disk **100** and will pick up less ink from disk **100**; therefore disk **21** will feed less ink to face **72** of inking wheel **38**. (Please see my patent 2,471,238 for a more detailed description of the control of ink films of disk **21** and wheel **38**.)

Drive shaft **16** (Fig. 2) or any suitable drive shaft may be used to rotate the rotary members. In Fig. 2 gear **15** is mounted upon the upper end of drive shaft **16**; and gear **15** drives gear **39** (Figs. 1 and 2) and gear **39** drives gears **11** and **47** of Fig. 2; gear **11** being at the upper end of shaft **10** of Fig. 2 and gear **11**, when rotating, drives shaft **10**, which has gear **58** mounted on its lower end, and gear **58** drives gears **40**, **60**, **59**; and said gears **58**, **40**, **60**, **59**, are in ink reservoir **49** (Figs. 1 and 5) and gear **60** rotates threaded roller **53** of Fig. 1.

The inking members of Figs. 1, 2, may be used with any suitable driving means and any suitable ribbon and ribbon spools. Ribbon **5** may wind around pulley **8** of Figs. 2, 3, and may pass to pulley **17** of Fig. 3, and over roller **81** and into vertical spool **6** of Fig. 3.

The mechanism of Figs. 1, 2, may be used on each side of a typing machine and may be enclosed by insulated cover **102** as shown in Figs. 8 and 9 to prevent loss of heat, or there may be insulation for any desired portion of the ink reservoir and inking mechanism. The ink may be any thickness desired before heating and heating may be done by any kind of heating means such as resistance elements **104**. I do not limit myself to electrical heating units.

The spools may be located as shown in my U. S. Patent 2,471,238 or in any desired position associated with the typing machine, or connected therewith.

The entire cover **102** over the heating means **104** and reservoir and inking means, may be wired for electricity and suitable means may be used for delivering heat to all parts of the inking mechanism at the same instant that the heat is applied to the ink in the ink reservoir by energizing heating units **61**, so that ink about the rotary members will be quickly liquefied without waiting for heated ink to be delivered from the ink reservoir to the disks and then to the ribbon. In other words, the ink within the housings and about the rotary members will be sufficient for starting the inking operation without waiting for heated ink to be pumped up from below and transferred to the inking disks **100**, **21** and **38** and then to a face of ribbon **5**. Suitable electrical heating means may apply a higher degree of heat to the ink in the ink reservoir so that said ink may be liquefied very quickly and some of it fed to the pump means for use imediately after the ink already within the housings for inking said disks **100**, **21** and **38** and for maintaining a steady feed of liquefied ink to a face of the ribbon **5**, so the typist may not be held up by lack of ink.

In Fig. 6, **39**A represents an overflow pipe for receiving surplus ink through small pipe **19** from the threaded roller **53**. In Fig. 6, **39**A also represents the pipe through which ink is fed to the reservoir which lies beneath base plate **27** (see **49**, Fig. 1); **52** represents the housing; **100** is an inking disk having four thin spokes; ink is fed to disk **21** from disk **100** and from disk **21** ink is fed to face **72** of inking wheel **38**. **18** is a shutter for stopping the feed of ink to disk **100**, or shutter **18** may be used simply to reduce the amount of ink passing to the periphery of disk **100**. For elite type machines, I prefer the mechanism of Fig. 1. If very exact and extremely slight feed of ink is not necessary and if a temperature of 170 Fahr. is maintained during operation of the typing machine, then plate **69** and mixing arm **64**A are not essential. This mechanism of Fig. 6 is suitable for use in machines having large Gothic type such as used for writing telegrapms.

In Fig. 7 shutter **18** is closed and the feed of ink is stopped. In Fig. 7, **56** is an opening for passage of ink. By pulling the shutter outwardly the wider part of the shutter shown at **23** moves outward leaving **56** free for the passage of ink to disk **100**. **76** represents a metal plate attached to housing **52** and this plate **76** holds shutter **18** in position whether the shutter is open or closed or is partly open, for the passage of a reduced amount of ink.

Referring to the mixer shown at **54** in the connecting pipe of Fig. 2, there is an extremely narrow slot that extends the length of the connecting pipe **19** and handle **68** moves a thin but rigid or stiff metal arm which acts to mix the ink. The handle must be moved manually in order to mix said ink. If heavy pigment ink should remain in the connecting pipe for weeks during which time the mechanism remained idle, then it might be necessary to mix the ink in the connecting pipe, as well as heat the ink.

With reference to the space **84** of Fig. 1, by careful tests it has been proved that the ink roller **53**, when the threads are fairly deep and the space between the housing **52** and the roller **53** is as much as .002 of an inch, will pump up much more ink thin is used and ink will accumulate about the upper end of shaft **20** and will fill said space which serves as an ink storage receptacle. This is very desirable because it means that after the mechanism has been idle for some hours or longer, there is a reserve supply of ink in said receptacle about the upper end of shaft **20**, ready to feed down promptly to the periphery of the rotary disk **100**; and it is not too much to say that this means a great deal to the typist because otherwise the ribbon is being used and time elapses until ink may be fed to the roller **53** from reservoir **49**.

Referring to threaded stud **46** of Fig. 4, this moves in a slot **25** (Fig. 2) and said stud **46** is screwed into the transverse bar **34** (Figs. 2 and 4) and is held securely to said bar by means of nut **75** (Figs. 2 and 4) and

spring 36 is attached to the lower end of stud 46 down underneath base plate 27.

Of course the various parts of the mechanism shown in Fig. 2 may be arranged in different positions and somewhat different designs of the mechanism may be seen in Figs. 3 and 6.

I prefer to use a ribbon which is so thin as to be diaphanous and which is extremely tough and wear-resistant and is inked in the wide with Carnauba wax ink by the usual standard carbon paper inking machine. The market does not now have available a nylon, non-woven ribbon as thin as .002 of an inch. The same thing is true of Orlon non-woven material. I have successfully drawn out non-woven nylon ribbons of approximately twice the thickness desired, when I began my work. At the conclusion of my work, simply by drawing the ribbon forcefully I brought down its thickness to approximately .002 of an inch. In doing this operation I had to start with ribbons much wider than I wanted to use because the drawing operation reduced the width. The manufacturers of nylon non-woven ribbons and webs will soon produce the .002 material desired in quantities.

I may use an equally tough synthetic ribbon that is made of 15 denier threads or 20 denier threads of nylon or Orlon.

If a file copy and a main thicker sheet of better quality paper are to be used, much better results are secured by having the thin sheet next to the ribbon and having an ink transfer sheet, coated on one face with wax ink, between the thin file sheet and the main, thicker sheet. The wax ink of the ink transfer sheet, should be firm and clean to the touch and yet of extremely rich color. The writing secured will be sharper and of richer color and more printlike than usual writing and the file copy as well as the main quality sheet of paper, will have beautiful printlike writing. As a common thing today the thick letter paper is used next to the ribbon and the thin file copy paper is next to the platen, and due to the thickness of the ribbon and its oily ink the writing on the thick paper has poor appearance and due to the thickness of both ribbon and thick sheet of letter paper, as now used, the writing on the file copy sheet has no chance to be sharp and neat and beautiful. It is a new discovery that one may feed to a ribbon a wax ink which has been heated to a temperature of 170° F. It is extremely economical to use such an ink because just a little of it goes a long way and the ribbon may be tough and wear-resistant, good for many millions of impressions. An examination of the work done by the usual ribbon, which must carry a reserve supply of ink, shows writing that is too heavy when the ribbon is new and soon wearing down to ugly, dim writing.

I may use an ink transfer sheet coated on one face with an aluminum coating and on the opposite face with a tough, plastic coating which is very thin; and I may apply the Carnauba wax ink to the face of said transfer sheet which has the alumium coating. Such a sheet may be very thin and much stronger and more durable and wear-resistant than ordinary tissue paper such as is used for ink transfer sheets or carbon paper.

The very thin ribbon used may be any of the ribbons described in my copending application Serial No. 94,872 or I may use a synthetic ribbon or a paper ribbon (treated with resin) which has been friction calendered on one face and then coated with a very strong synthetic or plastic coating material and then coated with wax ink. This may be done in wide webs or in narrow ribbons. If in wide webs, the webs will, of course, be slit to the narrow width suitable for typing machine ribbons. I prefer to use ribbons about ¼ inch or 5/16 inch in width depending on the kind of machine used. Of course this does not apply to machines using two color ribbons as they have to be at least ½ inch wide.

The thin, tough plastic coating on the non-inked face of the ribbon makes it particularly suitable for use in noiseless typing machines. Such a ribbon may be coated before inking with aluminum material and dried and then inked over the aluminum coating. Or the wide web may be friction calendered on both surfaces and then coated on both faces and inked with wax ink over a coated face.

I may use a plastic coated synthetic ribbon or long fiber silk ribbon, which has warp threads securely fastened together side by side with suitable adhesive material and carrying wax ink on one face. Such ribbons are extremely thin and since they are free from any cross threads they have high value in noiseless typewriters particularly. Such ribbons are now produced as a standard article without any plastic coating. The ribbons are used for tying boxes.

I prefer to use the heating units and wax ink in electrical correspondence typewriters, Teletype machines, electric bookkeeping and invoicing machines, etc. When power is used in the non-electric typewriter to rotate the spools, and rotary members of the present invention, it means less work for the typist and a lighter action for the type-bars and lighter movement for the carriage, also for the key levers. The electric current will furnish the necessary heat by energizing heating units **61** and **104** to liquefy the wax ink described herein (or other non-liquid ink) and maintain it by virtue of the setting of heat responsive control units **106** at the desired temperature as a thin, quickly flowing ink, during the entire use of the machine. The Carnauba wax ink will take a much higher temperature than 170° F.

There are electrical, Teletype machines in wide use which rotate the spool shafts by electric power. There are numerous devices on the market with thermostat controlled electrical heating units. But it is a new invention and discovery to secure writing of finer appearance and richer color for many weeks, from one ribbon of such thin, new type by using heating units to heat non-liquid ink which contains wax and feeds same while hot to a ribbon which is in a typing machine. It is also new to maintain such ink as a thin liquid in the reservoir and in the housings and about the rotary members until it is fed to a face of the ribbon. The wax ink quickly becomes a non-liquid ink and is clean to the touch before the ribbon is wound up.

For a complete description of how the unwinding spool is set free so it moves without tension or pull, please see my U. S. Patent 2,471,238 issued May 24, 1949.

The inking mechanisms described herein may be built extremely small and compact for any typing machine, including the smallest portable machines made.

Variations may be made in sizes and styles of parts without departing from the scope of the present invention.

What I claim is:

1. In a typing machine for printing characters on a writing surface, the combination of a reservoir adapted to contain ink which normally is congealed and becomes liquefied upon heating, heating means for said reservoir, a writing ribbon, ink feeding means for transferring ink from said reservoir to a face of said ribbon, and heating means for said ink feeding means to maintain the ink on said ink feeding means in liquid condition during operation of the typing machine, and, upon resumption of operation of said typing machine following a period of idleness thereof, to substantially immediately liquefy the ink which has congealed on said feeding means during said period of idleness.

2. In a typing machine for printing characters on a writing surface, the combination of a reservoir adapted to receive wax-containing ink which normally is congealed and becomes liquefied upon heating, heating means for said reservoir, a writing ribbon having a non-absorbent ink receiving face, ink feeding means for transferring said wax-containing ink from said reservoir to said face of the ribbon, and heating means for said ink feeding means to maintain the wax-containing ink on said ink feeding means in liquid condition during operation of the typing machine, and, upon resumption of operation of said typing machine following a period of idleness thereof, to substantially immediately liquefy the wax-containing ink which has congealed on said feeding means during said period of idleness.

3. In a typing machine for printing characters on a writing surface, the combination of a reservoir adapted to contain ink which normally is congealed and becomes liquefied upon heating, means for heating the ink in said reservoir, a writing ribbon, an inking wheel in contact with a face of said writing ribbon, a plurality of rotary members for feeding liquefied ink from said reservoir to said inking wheel for transfer to a face of said ribbon, means for driving said inking wheel and said ink feeding members, and heating means to maintain the ink on said inking wheel and rotary members in liquid condition during operation of said typing machine, and, upon resumption of operation of said typing machine following a period of idleness thereof, to substantially immediately

liquefy the ink which has congealed on said inking wheel and rotary members during said period of idleness.

4. In a typing machine for printing characters on a writing surface, the combination of a reservoir adapted to contain ink which normally is congealed and becomes liquefied upon heating, means for heating the ink in said reservoir, a writing ribbon, an ink storage receptacle, ink feeding means for transferring ink from said reservoir to said ink storage receptacle and for transferring ink from ink storage receptacle to a face of said ribbon, and heating means to maintain the ink on said ink feeding means and in said ink storage receptacle in liquid condition during operation of the typing machine, and, upon resumption of operation of said typing machine following a period of idleness thereof, to substantially immediately liquefy the ink which has congealed on said feeding means and in said ink storage receptacle during said period of idleness.

5. In a typing machine for printing characters on a writing surface, the combination of a reservoir adapted to contain ink which normally is congealed and becomes liquefied upon heating, heating means for said reservoir, a writing ribbon, ink feeding means for transferring ink from said reservoir to a face of said ribbon, an enclosure for said ink feeding means, and means for heating the space within said enclosure, whereby ink congealed on said feeding means during a period of idleness of said typing machine will, upon resumption of operation of said typing machine, be substantially immediately liquefied for transfer to said face of the writing ribbon.

6. In a typing machine for printing characters on a writing surface, the combination of a reservoir adapted to contain ink which normally is congealed and becomes liquefied upon heating, heating means for said reservoir, a writing ribbon, an ink storage receptacle, ink feeding means for transferring ink from said reservoir to said ink storage receptacle and for transferring ink from said ink storage receptacle to a face of said ribbon, an enclosure for said ink feeding means and said ink storage receptacle, and means for heating the space within said enclosure, whereby ink congealed on said feeding means and in said ink storage receptacle during a period of idleness of said typing machine will, upon resumption of operation of said typing machine, be substantially immediately liquefied for transfer to said face of the writing ribbon.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
933,593	Snell	Sept. 7, 1909
1,122,473	Butler	Dec. 29, 1914
1,179,946	Lewis	Apr. 18, 1916
1,476,988	Latta	Dec. 11, 1923
1,962,309	Jewell	June 12, 1934
2,127,812	Gabrielson	Aug. 23, 1938
2,475,336	Petz	July 5, 1949
2,565,319	Newman	Aug. 21, 1951