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[54] MEANS AND METHODS FOR CLEANING TYPE FACES OF IMPACT PRINTING MACHINES

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[73] Assignee: International Business Supplies, Oaklyn, N.J.

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[52] U.S. Cl..... 197/184, 15/210 R, 252/DIG. 1, 197/172, 197/171

[51] Int. Cl..... B41j 29/00

[58] Field of Search ..... 197/171, 172, 181, 184, 197/185; 101/424; 15/104 R, 104 E, 210 R; 252/DIG. 1

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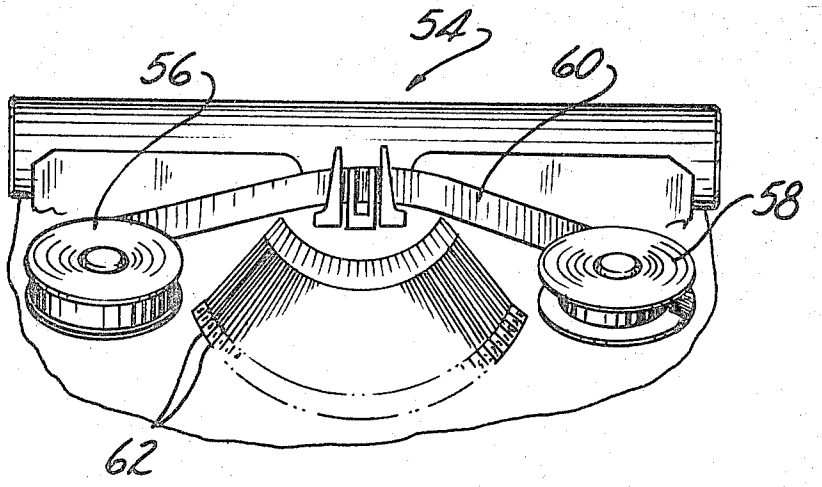
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Primary Examiner—Ernest T. Wright, Jr.

[57] ABSTRACT

A fabric cleaning ribbon capable of dissolving or removing ink and dirt particles is dimensioned to be substituted for the inked ribbon normally used for printing in an impact printing machine of the type used in high speed computer printers, typewriters and the like.

4 Claims, 5 Drawing Figures



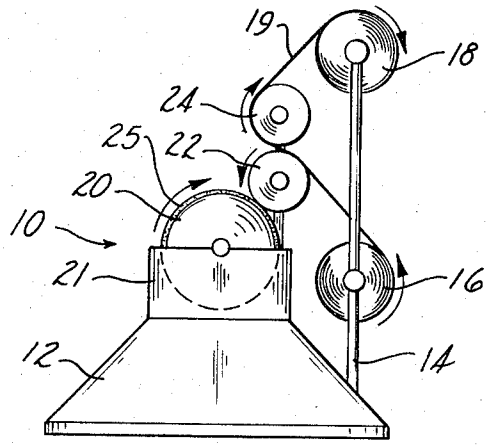


Fig - 1

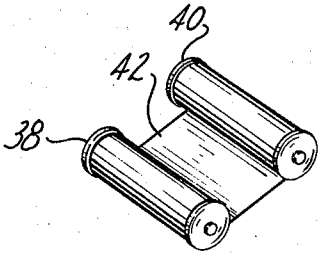


Fig - 3

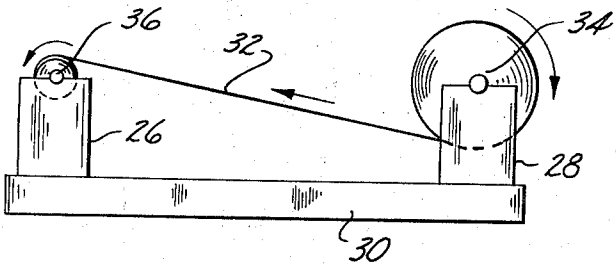


Fig - 2

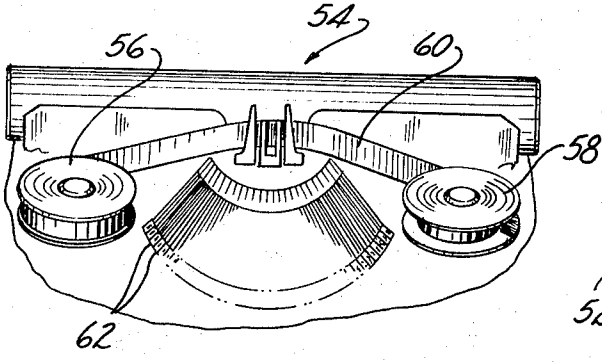


Fig - 5

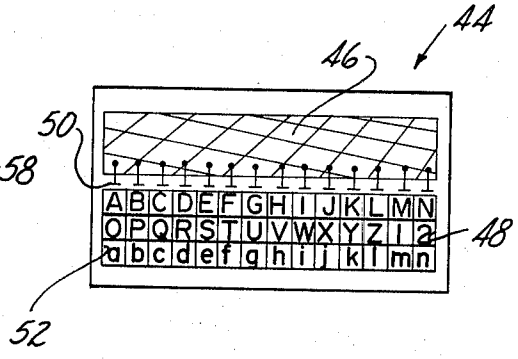


Fig - 4

MEANS AND METHODS FOR CLEANING TYPE FACES OF IMPACT PRINTING MACHINES

Impact printing devices using inked ribbons for printing operations are well known. Such devices have included computer printers, typewriters and other types of machines. Such impact printing devices generally must have their type face (FONT) cleaned periodically. Periodic cleaning is necessary to remove particles of paper, ink, ribbons, dust and other forms of dirt which build up on the type face and clog the type faces to a point where the printed characters are not legible. Clogged type faces can not produce clean, sharp, clear print characters. At the present time, much money and many man hours are used in the tedious manual and messy job of cleaning the type face.

Numerous methods and means have been used in the past for cleaning type faces in typewriters and other types of impact printing devices.

A patent to Brown, U.S. Pat. No. 2,796,367, for example, discloses a cleaning sheet having a coating containing an ink adhesive material on the side facing the type. The sheet is inserted into the machine in the manner of a conventional paper. A patent to Balaban, U.S. Pat. No. 3,177,512, shows a rotatable type cleaning device having a tacky layer thereon for cleaning type of a typewriter. A patent to Wolowitz U.S. Pat. No. 3,141,539 discloses a complete type typewriter ribbon using one portion for printing and another portion for obliterating. A patent to Ploeger, U.S. Pat. No. 3,010,559, discloses an absorbent ribbon for receiving ink with an impervious strip to prevent the type from contacting the ribbon during operation. A patent to Stirrup, U.S. Pat. No. 3,000,031, discloses a cleaning element for manually cleaning type in a typewriter. A patent to Converse, U.S. Pat. No. 2,800,215, discloses another type of cleaner which may be inserted into a typewriter in the same manner as a sheet of paper. A patent to Aaron, U.S. Pat. No. 2,324,662 discloses means for protecting the type face from contamination by stencil material.

While some of the devices described in the aforementioned patents are capable of accomplishing cleaning of type faces, in the main, they require tedious manual operations, are time consuming, are inconvenient for a person to use or otherwise inefficient. Very often, they are not adaptable for efficient use in automatic printers of the types used in computers.

Many types of chemical agents including an alcoholic base are generally unsuitable because they tend to corrode the metal of the type faces. Also, such agents are unsafe because they are flammable. In any case, such agents are generally not strong enough to penetrate and dissolve ink.

It is an object of this invention to provide improved means and methods for cleaning type faces of impact printing devices.

It is a further object of this invention to provide improved means and methods for cleaning type faces of impact printing devices in which the time required for cleaning such devices is minimized.

It is still a further object of this invention to provide improved means and methods for cleaning type faces of impact printing machines without corroding the type faces or using flammable materials.

It is still a further object of this invention to provide improved means and methods for cleaning type faces of impact printing machines of the types which are automatically operated.

It is still a further object of this invention to provide improved means and methods for cleaning type faces of impact printing machines wherein persons performing the cleaning operations have a minimum physical contact with the cleaning agents involved in the cleaning operations.

In accordance with the present invention, a cleaning ribbon is dimensioned to be substituted for the inked ribbon used to perform printing in an impact printing machine. The cleaning ribbon comprises a porous material which includes a solvent or is otherwise treated to make it capable of removing or dissolving dirt particles accumulated on the type faces of the printing machine. The type faces of the machine are actuated to contact the cleaning ribbon or the cleaning ribbon is brought into contact with the type faces dependent upon the type of impact printer involved, with the cleaning ribbon being moved in the same manner as the inked ribbon to expose different portions of the cleaning ribbon to the type faces during a cleaning operation.

Other objects and advantages of the present invention will be apparent and sugggest themselves to those skilled in the art from a reading of the following specification and claims, in conjunction with the accompanying drawing, in which:

FIG. 1 illustrates apparatus for making a cleaning ribbon, in accordance with the present invention;

FIG. 2 illustrates apparatus for spooling cleaning ribbons into predetermined lengths from a main supply roll;

FIG. 3 illustrates one type of a cleaning ribbon ready for substitution into a printing machine in accordance with the present invention;

FIG. 4 illustrates a high speed printer device of the type adapted to use a cleaning ribbon made in accordance with the present invention, and

FIG. 5 illustrates a conventional typewriter including a cleaning ribbon made in accordance with the present invention.

Referring particularly to FIG. 1, apparatus **10** is mounted on a base **12** and includes a roller support member **14** for holding a pair of rollers **16** and **18.** The roller **16** holds and dispenses a strip material **19** when it is in an uncoated raw fabric condition. The roller **18** receives the strip material **19** after it has been suitably coated with a cleaning solvent from the container **21.**

A solvent transfer roller **20** is mounted on the container **21** with its lower portion within the solvent. A pair of coating rollers **22** and **24** are suitably mounted to receive the strip material **19.**

The lower roller **22** frictionally engages the solvent transfer roller **20.** The roller **20** includes an absorbent material **25** capable of receiving and holding the liquid solvent. The roller **20** frictionally engages and drives the roller **22** to transfer the liquid solvent from the material **25** to the surface of the roller **22.**

The strip material **19** is directed between the rollers **22** and **24** from the feed roller **16** to the take up roller **18.** As the uncoated or dry portion of the strip material **19** engages the roller **22,** it receives and absorbs the liquid solvent which the roller **22** has received from the material **25.** The roller **24** directs the solvent coated strip material **19** to the roller **18.**

Means for driving the various rollers **16** and **18** of the apparatus **10** may take a wide variety of different forms well known to those skilled in the art. One such driving means may be a motor to drive the take up roller **18.** The strip material **19** from the roller **16** then frictionally drives the roller **22,** which in turn drives the roller **20.** The roller **24** acts as an idler roller as it is moved by the strip material **19.** The rollers **22** and **24** also control the amount of solvent applied to the strip material **19.**

The uncoated raw fabric making up the strip material **19** may be made of Nylon, cotton, silk or any other suitable fabric material. In general, the fabric must be porous and capable of absorbing a liquid solvent when a solvent is used as the cleaning agent. Nylon is the preferred fabric because of its long wear and relatively low expense. Silk is capable of performing a good job but is relatively expensive. Cotton tends to have a limited life due to wear.

Referring particularly to FIG. **2,** one means and method for transferring large rolls of coated fabric material to mandrels for use in a variety of different types of machines is illustrated. Frame members **26** and **28** are mounted on a base **30,** with the frame member **28** holding a roller **34** including wound solvent coated fabric **32** and the frame member **26** including a roller or mandrel **36** to receive the solvent coated fabric **32.**

After the fabric **32** is wound on to the mandrel **36** it is cut into predetermined lengths, a typical length being ten yards. After the fabric **32** has been cut into predetermined lengths, the mandrel **36** is removed from the frame member **26** and a second mandrel attached to the free end of the coated fabric **32.** The mandrel **36** and the second mandrel to which the free end of the fabric **32** is attached may be specially designed to fit into a particular type of impact printing machine which may be a conventional typewriter, adding machine, printer used in computer systems or other types of printers.

FIG. **3** illustrates an arrangement wherein solvent coated fabric **42** is wound on a pair of mandrels **38** and **40,** and ready for use in a printer of a computer system, for example. The arrangement illustrated may be packaged into a polyfilm bag, for example, to prevent the fabric **42** from drying out. The mandrels **38** and **40** are designed to fit into and replace the feed and take up members which hold the inked ribbon of the impact printing machine. In a conventional typewriter, the mandrels **38** and **40** may take the forms of conventional spools which hold the inked ribbon.

Referring particularly to FIG. **4,** a drum printer **44** includes a key strike unit head **46** and a printing drum **48.** Print hammers **50** are disposed to strike the type faces or font **52.** In normal printing operation, a standard inked ribbon and paper are disposed between the key strike unit head **46** and the printing drum **48.** When the print hammers **50** are struck, a print is formed. In computer systems, a whole line is generally formed for each strike.

In utilizing the present invention, the inked ribbon used for the printing operation, including the members which hold it, are removed. An assembly, such as illustrated in FIG. **3,** may then be inserted into the drum printer **44.** When the assembly of FIG. **3** is inserted into the drum printer **44,** the solvent coated fabric **42** comprising the cleaning ribbon is disposed between the strike hammers **50** and the type faces **52.**

As previously mentioned, when inked ribbons are used with impact printing machines, particles of ink are left on the type faces **52.** These ink particles pick up paper dust, ribbon lint and other forms of unwanted dirt particles which clog the type faces **52** and prevent the printing device from printing clear, sharp or well defined characters. This results in print characters which can not be easily read. When the cleaning ribbon **42** of the present invention is substituted for the regular inked ribbon, the strike hammers **50** are activated to strike the cleaning ribbon to bring it into contact with the type faces **52** resulting in the dirt and ink particles being removed or dissolved from the types faces **52** by the cleaning agent on the cleaning ribbon.

Referring particularly to FIG. **5,** a typewriter **54** of the conventional type is illustrated. A pair of spools **56** and **58** are disposed to be driven by conventional means to dispense and receive a cleaning ribbon **60** when the keys of the typewriter are depressed to cause the type faces **62** to engage the ribbon **60.**

The cleaning ribbon **60** is wound onto standard spools **56, 58** which are then placed onto the typewriter **54** in place of the usual inked ribbon used for printing. After the cleaning ribbon **60** is in place an operator may activate all of the individual keys to move each type face **62** to engage the cleaning ribbon **60.**

When various type faces **62** come in contact with a cleaning ribbon **60,** a solvent from the ribbon **60** wets the type faces **62.** The solvent on the type faces **62** then breaks down and dissolves unwanted dirt particles from the type faces **62.** These dirt particles, for example, may include ink, paper dust and lint which usually accumulate from normal typewriter use.

Several operations of all the keys on the typewriter **54,** or other printing machine involved, may sometimes be necessary to adequately clean the type faces **62.** After the cleaning operation is completed, a regular inked ribbon may be substituted for the cleaning ribbon **60,** with the typewriter **54** being again ready for printing.

The solvent used in the present invention should contain very little or no alcohol or other solvents containing acids. The reasons for this are that such solvents tend to corrode metal type faces and may be hazardous because of their flammability. Also, many such solvents with alcoholic bases are incapable of penetrating and breaking down the permanent inks of the types used in computer printers, for example. In addition, alcoholic base solvents tend to dry out quickly.

Permanent inks of the types used in computers take a wide variety of forms. In general, the inks are already included in the ribbons when the ribbons are sold. Each manufacturer may have his own formula including dye, oleate, resins and oil, with the particular formula being determined by the characteristics desired by the user. Some of the manufacturers of ribbons including inks with which the present invention has been successfully associated with respect to cleaning include inked ribbons sold by Olivetti Co., Kee Lox, Leeda 11 Products, Curtis Young Corp., Allied Carbon and Ribbon Co. and others.

The solvents used in the present invention are preferably oil base solvents. Among the reasons for this are that such solvents break down permanent ink particles effectively. In addition, the danger of burning is less than with alcohol base solvents. Oil base solvents will not dry out quickly thereby enabling the "clean type"

ribbon of the present inventiono to be stored over relatively long periods of time. Rather than tending to corrode metal on type faces, the solvent used in the present invention actually builds up a protective coating on the type faces, such as type faces **52** or **62** illustrated in FIGS. **4** and **5**, respectively, which minimizes the tendency of ink from the inked ribbon to accumulate on the type faces **52** or **62** (FIGS. **4** and **5**).

The clean type ribbon, such as ribbon **42** and **60** illustrated in FIGS. **3** and **5**, respectively, of the present invention may be used over and over, as many as 300 times, and still retain much of its cleaning properties.

One embodiment of the present invention involves the use of an oil base solvent formula coated on or embedded into the cleaning ribbon **42** or **60** (FIGS. **3** and **5**). The solvent is capable of dissolving, breaking down and cleaning unwanted dirt particles from type faces **52.** In testing one particular formula, it was demonstrated that after the type faces **52** were cleaned with the cleaning ribbon **60** with the solvent thereon, an invisible layer of surfactant prohibits and retards further dirt build up. Thus after using a cleaning solvent of the present invention, an initial cleaning of the type faces **52** resulted with the added advantage that less cleaning of the type faces **52** are required.

One formula used was a mixture of Alky Phenoxy Polyethoxy Ethanol mixed with water in the ratio of 2 percent Alky Phenoxy Polyethoxy Ethanol and 98 percent water by volume. This mixture, it was found, dissolved all ink and other unwanted dirt particles completely. This mixture is a neutral surfactant organic compound. Mixed in the proportions mentioned, the formula has a number of physical properties with a number of advantages. For example, the mixture is not harmful to human skin, is not flammable or explosive, does not corrode the metal on the type faces **52, 62,** is not oderous, does not evaporate and is most effective in dissolving and breaking down ink. The formula may be used most effectively with Nylon, cotton or silk.

The chemical Alky Phenoxy Polythoxy Ethanol is sold by Rohm and Haas of Philadelphia, Pa. under the brand name TRITON-X-100.

The percentage of water is not critical. For example more or less water may be used. The more water added the more economical the mixture. On the other hand, adding less water does not increase the cleaning efficiency. When long shelf life is involved, it is desirable to increase the chemical to 20%, with the water being 80 percent by volume.

Various experiments were conducted in which flat pieces of metal, of the type used for type faces **52** or **62** (FIGS. **4** and **5**) in computer printers, had permanent ink coated on their surfaces for several months. When the solvent used in the present invention was applied to the surfaces and allowed to remain for less than a minute without agitation of any kind, ink particles were dissolved from the metal surfaces. A simple rubbing with a paper towel resulted in clean metal surfaces free of ink stains.

It was also observed that on pieces of metal which were treated with the solvent used in the present invention there was little tendency of the ink to stick to the coated metal surfaces, which acted as protective barriers.

It is noted that when cleaning ribbons **46** or **60,** of the types used in the present invention, are used in impact printing machines the type faces **52** or **62** hit the cleaning ribbon **42, 60** at relatively high speeds. Consequently, the ink particles accumulated on the type faces **52, 62** will tend to dislodge from the type faces **52, 62** easier than when no movement or agitation is involved as in the cases of the experiments mentioned above with flat metal pieces. Other experiments involved the use of solvents in ribbons dimensioned to be substituted for the inked ribbons of impact printing machines.

In practicing the present invention, a number of cleaning ribbons were developed and satisfactorily tested. Nylon, silk and cotton ribbons of fabric thickness of 0.0055 inches, 10 yards long and from ½ inch to 17½ inches wide were made and tested. The widths were variable to accommodate different printing devices. All ribbons tested satisfactorily with Nylon giving the best results from the overall point of view of long wear and efficiency.

Four different cleaning methods were tried with varying results. The first involved a cleaning ribbon including a solvent for cleaning type faces in a manner described above followed by a second operation. Following the initial cleaning, a dry ribbon which had been expanded slightly by heating was substituted for the ribbon with the solvent. The dry ribbon dried the type faces and produced some advantage than with a single operation with a solvent ribbon.

The second method involved the use of the solvent ribbon alone which produced satisfactory results with the advantage that the cleaning was done in a minimum of time and effort. This is the method emphasized throughout the above specification.

The use of a dry ribbon, such as Nylon, which was heated produced some cleaning action but did not compare with the cleaning achieved with the solvent coated ribbon.

Finally, a dry heated ribbon which was prepared with a friction action to produce an electrostatic or magnetic field thereon produced some cleaning action.

What is claimed is:

1. A cleaning ribbon for cleaning type faces of an impact printing machine using an inked ribbon to perform a printing operation comprising a pair of spools, a fabric strip material disposed to be moved from one spool to the other and dimensioned to substitute for said inked ribbon, and a neutral surfactant organic chemical compound capable of dissolving ink and removing paper dust and other unwanted dirt particles from said type faces on said strip material to dissolve ink and remove paper dust and other unwanted dirt particles from said type faces when said printing machine is operated with said strip material to cause said strip material with said neutral surfactant organic chemical compound to physically engage said type faces.

2. A cleaning ribbon as set forth in claim **1,** wherein said neutral surfactant organic chemical compound comprises Alky Phenoxy Polythoxy Ethanol.

3. A cleaning ribbon as set forth in claim **2,** wherein said Alky Phenoxy Polythoxy Ethanol is mixed with water, with the water being in a ratio of over 19 to 1 to the amount of said Alky Phenoxy Polythoxy Ethanol.

4. A method of cleaning type faces of an impact printing machine of the type using an inked ribbon movable from a feed member to a take up member by drive means during a printing operation comprising the steps of providing a cleaning ribbon having a neutral surfactant organic chemical compound thereon capa-

ble of dissolving ink and removing paper dust and other unwanted dirt particles from said type faces, substituting said cleaning ribbon in place of said inked ribbon, operating said printing machine to cause said type faces to engage said cleaning ribbon, and moving said cleaning ribbon by said drive means in increments as said printing machine is operated to expose different surfaces of said cleaning ribbon to said type faces to dissolve ink and remove paper dust and other unwanted dirt particles from said type faces.

* * * * *