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Boyles

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[54] **PRESS WASH**

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[51] **Int. Cl.**..... **C11d 7/52**

[58] **Field of Search**..... 252/172, 170, 171, 252/364; 106/301; 101/424; 134/40

[56] **References Cited**

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[57] **ABSTRACT**

A solvent composition for cleaning ink and other soil material from printing presses is formulated by blending together in a critical ratio higher boiling non-flammable chlorinated or brominated hydrocarbon liquid, low boiling chlorinated or brominated hydrocarbon liquid, petroleum solvent such as mineral spirits, and a compatible surfactant, such as nonylphenoxy polyethoxy ethanol. When blended together in proper ratio the blend is non-flammable, possesses desirable characteristics so as not to dry so quickly that the printer or pressman does not have sufficient time to wipe the equipment clean but completely evaporates within a few minutes after application, and is highly efficacious as a solvent for the soil materials.

19 Claims, No Drawings

PRESS WASH

BRIEF SUMMARY OF THE INVENTION

Printing presses must be cleaned completely free of ink between changes of ink color and prior to any lengthy shutdown of the press. The cleaning job is commonly done by a highly paid printer or pressman and is to the advantage of the owner or operator to expedite the cleaning operation.

It is common practice when cleaning presses to accomplish the cleaning in two steps. In the first step the press is cleaned of ink and ink residue while in the second step the press is rinsed to remove soil material from the rollers and cylinders. During the first step all traces of ink whether wet or dry must be carefully removed without attacking the rollers or cylinders. In the second step a rapid drying solvent is used. The drying time of the solvent will depend on the size of the press, more rapid drying solvents being used on the smaller presses than on the larger ones. The solvents that are commonly used are highly flammable fast drying types such as naphtha, isopropanol, methyl ethyl ketone, hexane, gasoline, mineral spirits and kerosene. They constitute a safety and health hazard to the workers in the printing establishment.

It is an object of this invention to provide solvents for cleaning printing presses in a one step operation.

It is a further object of the invention to provide non-flammable solvents for cleaning printing presses.

It is still another object of the invention to provide non-flammable solvents which dry rapidly so as to avoid long down times between printing operations.

It is still another object of the invention to provide a cleaning solvent for printing equipment which remains wet for a long enough period of time to enable a workman to effectively clean the printing equipment, but which dries within a reasonably short time.

Other objects and advantages of the invention will become apparent from the following detailed description.

DETAILED DESCRIPTION OF THE INVENTION

In accordance with my invention there is blended together non-flammable higher boiling brominated and/or chlorinated hydrocarbons boiling within the range of about 60°–175°C, non-flammable lower boiling chlorinated or brominated hydrocarbons, liquids boiling no higher than about 40°C, a hydrocarbon solvent of petroleum origins such as mineral spirits and a compatible detergent such as nonylphenoxy polyethoxy ethanol or other nonionic polyglycol ether group-containing detergent such as described in U.S. Pat. No. 2,931,777. The solvent blend is non-flammable while at the same time possessing the necessary drying characteristics and soil removing efficacy. The constituents of the solvent blend must be mixed in a critical ratio so that the higher boiling halogenated hydrocarbon is present in an amount of 40 to 55 percent, the mineral spirits or equivalent hydrocarbon solvent is present in the amount of 30 to 40 percent, the lower boiling halogenated hydrocarbon is present in amount of 10 to 25 percent and the surfactant is present in an amount of 0.5 to 1.5 percent. When blended within the ranges specified the resulting solvent will have a drying time of approximately 3 to 15 minutes depending on the quantities of each constituent present within the limits specified. Where faster drying times are desired the higher boiling halogenated hydrocarbon is used in amounts approaching the lower limit and the lower boiling halogenated hydrocarbon is used in amounts approaching the upper limit. As the quantity of mineral spirits approaches the upper limit and the higher halogenated hydrocarbon approaches the lower limit, the drying time of the solvent is shortened. Although surfactants of the nonionic, alkyl polyethoxy ethanol type are preferred, anonic surfactants may be used if they are compatible.

As previously set forth one of the important characteristics of the solvent blend is its non-flammability, as determined by ASTM Test Method D–92–57.

Within the scope of the invention are compositions effective for removing printing inks in the dry, tacky, or wet state. These inks are generally composed of petroleum based ink oils of a drying oil type, resins, solvents and pigments to impart color. They dry either by internal curing or by solvent evaporation. It is important that the solvent be capable of removing all traces of the printing ink while not attacking working parts such as ink rollers or cylinders.

A typical solvent cleaning composition in accordance with the invention is: 1, 1, 1 Trichlorethane 40 to 55 percent, mineral spirits 30 to 40 percent, Methylene Chloride 10 to 25 percent and Nonylphenoxy polyethoxy ethanol 0.5 to 1.5 percent. In a preferred composition the 1, 1, 1 Trichlorethane is present in the amount of 45 to 50 percent, mineral spirits 35 to 40 percent, methylene chloride 10 to 25 percent and nonylphenoxy polyethoxy ethanol 0.5 to 1 percent.

As examples of other higher boiling chlorinated and/or brominated hydrocarbons which may be used in place of 1, 1, 1 trichlorethane or mixed together therewith may be mentioned chloroform, trichlorethylene, perchlorethylene, bromochloromethane, trichlorpropane bromoform, ethylene dibromide and methylene bromide. Among the lower boiling halogenated hydrocarbons that may be used may be mentioned methylene chloride and ethyl bromide. While I prefer to use mineral spirits as the hydrocarbon portion of the solvent other petroleum fractions boiling within the range of approximately 40°C to 200°C may be used. Mineral spirits is a well known commercial product and is composed principally of saturated aliphatic hydrocarbons boiling within the range of apporoximatley 38°C to 210°C. For further information as to the nature of mineral spirits attention is directed to "Petroleum Products Handbook" by Guthrie, published by McGraw-Hill 1960, pps. 11–14 to 11–15.

Although the mineral spirits used in formulating the blends disclosed herein had a flash point of 38°C as determined by the Cleveland Cup method in general mineral spirits which fall under the ASTM designation D235 may be used. In general, saturated aliphatic petroleum solvents having a flash point not less than 100°F may be used.

As previously pointed out other chlorinated and/or brominated hydrocarbons may be used instead of the 1, 1, 1 trichlorethane and methylene chloride in the preferred blend. However, care should be used in selecting other halogenated hydrocarbons so as to avoid health and ecological problems. For example, while chloroform is effective as a component of the solvent, it presents health hazards. Trichlorethylene is also effective but presents an ecological problem.

Following are a number of examples of blends which have been prepared and found to be highly effective. Percentages are by weight.

EXAMPLE I

1, 1, 1 Trichlorethane	55%
Mineral Spirits	34%
Methylene Chloride	10%
Nonylphenoxy polyethoxy ethanol	1%

This composition is not flammable when tested according to ASTM Test Method D–92–57. It will dry completely and removes either wet or dried ink. As measured by ASTM Test Method D–1901–67, the drying time of this composition is about six minutes. This is an acceptable rate for use on medium sized presses.

EXAMPLE II

1, 1, 1 Trichlorethane	40%
Mineral Spirits	40%
Methylene Chloride	19%
Nonylphenoxy polyethoxy ethanol	1%

This blend was found not to be flammable when tested according to ASTM Test Method D–92–57. When tested according to ASTM D–1901–67, the drying time was about 10 to 11 minutes.

EXAMPLE III

1, 1, 1 Trichlorethane	44%
Mineral Spirits	40%
Methylene Chloride	15%
Nonylphenoxy polyethoxy ethanol	1%

When tested according to the test methods of Examples I and II, the drying characteristics were acceptable and the composition was non-flammable.

EXAMPLE IV

1, 1, 1 Trichlorethane	46%
Mineral Spirits	30%
Methylene Chloride	23%
Nonylphenoxy polyethoxy ethanol	1%

When tested according to the ASTM Methods applied in Examples I and II, the blend was non-flammable and it dried in less than six minutes. This blend is useful in cleaning smaller type presses.

EXAMPLE V

1, 1, 1 Trichlorethane	52%
Mineral Spirits	35%
Methylene Chloride	12%
Nonylphenoxy polyethoxy ethanol	1%

When tested according to the ASTM Methods applied in Examples I and II the blend was non-flammable and had an acceptable drying time.

EXAMPLE VI

1, 1, 1 Trichlorethane	45.5%
Mineral Spirits	38.0%
Methylene Chloride	15.0%
Nonylphenoxy polyethoxy ethanol	1.5%

This composition when tested according to the aforesaid ASTM Test Methods was non-flammable and had acceptable drying characteristics for use in a press wash. It cleans without leaving a residue on the press rollers or cylinders.

EXAMPLE VII

1, 1, 1 Trichlorethane	22%
Perchlorethylene	24%
Mineral Spirits	38%
Methylene Chloride	15%
Nonylphenoxy polyethoxy ethanol	1%

When tested according to ASTM Test Method D–9-2–57 the composition was non-flammable. It had an acceptable drying time when tested according to ASTM Test Method D–1901–67 and is useful as a one-step wash for presses.

EXAMPLE VIII

Methylene Bromide	47%
Mineral Spirits	37%
Ethyl Bromide	15%
Nonylphenoxy polyethoxy ethanol	1%

This blend had the desired non-flammable and drying characteristics.

It will be seen therefore that I have succeeded in formulating a cleaning solvent for printing presses and other printing equipment which is capable of removing ink and other soil materials in a one-step operation. The solvent formulation has the additional advantages in that it is non-flammable and dries within a relatively short period of approximately 3 to 13 minutes. By judicious selection of the components of the blend and blending within the ratios above set forth, a blend can be formulated which dries slower or faster so that if the equipment to be cleaned is small a faster drying blend can be formulated whereas if the equipment is large it may be desirable to blend together constituents which dry in a little longer period of time.

When used in the specification and claims, the term non-flammable means non-flammable when tested according to ASTM Test Method D–92–57. Drying time means drying time is determined by ASTM Test Method D–1901–67.

What I claim is:

1. A solvent composition consisting essentially of the following constituents and volume percents: non-flammable halogenated hydrocarbon boiling within the range of about 60° to 170°C and selected from the group consisting of chlorinated hydrocarbons, brominated hydrocarbons and hydrocarbons which are chlorinated and brominated in the amount of 40–50 percent, a low boiling petroleum solvent in the amount of 30–40 percent, non-flammable halogenated hydrocarbon liquid boiling no higher than about 40°C and selected from the group of chlorinated and brominated hydrocarbons in the amount of 10–25 percent, and 0.5 to 1.5 percent of a compatible detergent.

2. The solvent in accordance with claim **1** in which the halogenated hydrocarbon boiling within the range of 60° to 170°C is 1,1,1 trichlorethane, the solvent is mineral spirits, and the halogenated hydrocarbon boiling no higher than about 40°C is methylene chloride.

3. The solvent in accordance with claim **2** in which the 1,1,1 trichlorethane is present in the amount of about 45–50 percent, the mineral spirits present in the amount of about 35–40 percent, the methylene chloride is present in the amount of about 10–25 percent and the detergent is nonylphenoxy polyethoxy ethanol present in the amount of about 0.5 to 1 percent.

4. The solvent in accordance with claim **2** in which the 1,1,1 trichlorethane is present in the amount of 55 percent, the mineral spirits is present in the amount of 34 percent, the methylene chloride is present in the amount of 10 percent and the detergent is nonyl-

phenoxy polyethoxy ethanol present in the amount of 1 percent.

5. The solvent in accordance with claim 2 in which the 1,1,1 trichlorethane is present in the amount of 40 percent, the mineral spirits is present in the amount of 40 percent, the methylene chloride is present in the amount of 19 percent, the detergent is nonylphenoxy polyethoxy ethanol present in the amount of 1 percent.

6. The solvent in accordance with claim 2 in which the 1,1,1, trichlorethane is present in the amount of 44 percent, the mineral spirits is present in the amount of 40 percent, the methylene chloride is present in the amount of 15 percent and the detergent is nonylphenoxy polyethoxy ethanol present in the amount of 1 percent.

7. The solvent in accordance with claim 2 in which the 1,1,1 trichlorethane is present in the amount of 46 percent the mineral spirits is present in the amount of 30 percent, the methylene chloride is present in the amount of 23 percent and the detergent in nonylphenoxy polyethoxy ethanol present in the amount of 1 percent.

8. The solvent in accordance with claim 2 in which the 1,1,1 trichlorethane is present in the amount of 52 percent, the mineral spirits is present in the amount of 35 percent, the methylene chloride is present in the amount of 12 percent and the detergent is nonylphenoxy polyethoxy ethanol present in the amount of 1 percent.

9. The solvent in accordance with claim 2 in which the 1,1,1 trichlorethane is present in the amount of 45.5 percent, the mineral spirits is present in the amount of 38 percent, the methylene chloride is present in the amount of 15 percent and the detergent is nonylphenoxy polyethoxy ethanol present in the amount of 1.5 percent.

10. The solvent in accordance with claim 1 in which the halogenated hydrocarbon boiling within the range of about 60°–175°C is a mixture of 1,1,1, trichlorethane and perchlorethylene.

11. The solvent in accordance with claim 10 in which the halogenated hydrocarbon boiling no higher than about 40°C is methylene chloride.

12. The solvent in accordance with claim 10 in which the 1,1,1 trichlorethane is present in the amount of 22 percent, the perchlorethylene is present in the amount of 24 percent, the mineral spirits is present in the amount of 38 percent, the methylene chloride is present in the amount of 15 percent and the surfactant is nonylphenoxy polyethoxy ethanol present in the amount of 1 percent.

13. The solvent in accordance with claim 1 in which the halogenated hydrocarbon boiling within the range of about 60° to 175° C is methylene bromide and the halogenated hydrocarbon boiling no higher than about 40°C is ethyl bromide.

14. The solvent in accordance with claim 13 in which the methylene bromide is present in the amount of 47 percent, mineral spirits is present in the amount of 37 percent, ethyl bromide is present in the amount of 15 percent and nonylphenoxy polyethoxy ethanol is present as the surfactant in the amount of 1 percent.

15. A solvent in accordance with claim 1 in which the halogenated hydrocarbon boiling in the range of about 60° to 175°C is from the group consisting of 1,1,1 trichlorethane, chloroform, trichorethylene, perchlorethylene, trichlorpropane, bromoform, ethylene dibromide, methylene bromide and bromochloromethane.

16. A solvent in accordance with claim 1 in which the halogenated hydrocarbon having a boiling point no higher than 40°C is from the group consisting of methylene chloride and ethyl bromide.

17. A solvent in accordance with claim 15 in which the halogenated hydrocarbon having a boiling point no higher than 40°C is from the group consistng of methylene chloride and ethyl bromide.

18. The method of removing ink, oil, grease and other soiling substances from printing equipment comprising applying thereto the solvent of claim 1 and wiping the equipment with a clean cloth before the solvent evaporates.

19. The method of removing ink, oil, grease and other soiling substances from printing equipment comprising applying thereto the solvent of claim 3 and wiping the equipment with a clean cloth before the solvent evaporates.

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