

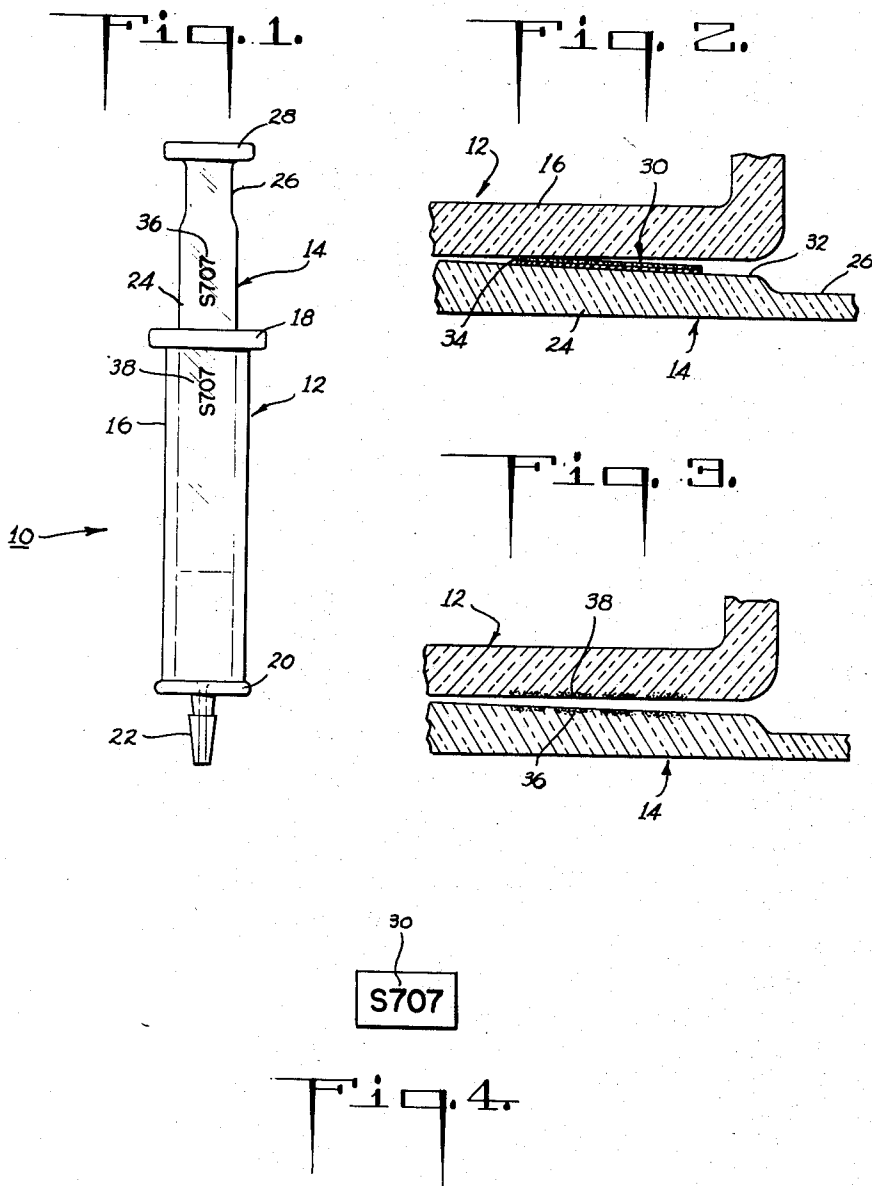
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METHOD OF MARKING HYPODERMIC SYRINGES

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METHOD OF MARKING HYPODERMIC
SYRINGES

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This invention relates to methods of marking hypodermic syringes. More particularly my invention pertains to methods of marking hypodermic syringes of the type constituting a glass barrel with a matingly fitted glass plunger.

The barrel of a hypodermic syringe must fit its plunger very closely in order to maintain a certain required pressure within the barrel as the plunger is pressed down. In order to obtain this close fit it is the present-day practice to individually match each plunger and barrel, for example, by grinding. As a result, plungers and barrels are not interchangeable, and to make certain that each plunger is used with its matched mating barrel, a distinctive marking such as a number is imprinted on each plunger and the same marking is imprinted on the mating barrel. These printing operations now are carried out separately. Where decalcomanias are used to aid in the printing operation it is necessary to employ two decalcomanias, one for each printing operation.

It is an object of the present invention to provide a novel method of printing mating hypodermic plungers and barrels in such fashion that both printing operations are carried out simultaneously, i. e. in a single step.

It is another object of the present invention to provide a method of the character described which can be carried out with the use of but a single decalcomania for each plunger and mating barrel.

It is another object of the present invention to provide a method of the character described which is simple and inexpensive to practice.

Other objects of the invention will in part be obvious and in part will be pointed out hereinafter.

The invention accordingly consists in the series of steps which will be exemplified in the method hereinafter described and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings in which is shown one of the various possible embodiments of the invention,

Fig. 1 is an elevational view of a hypodermic syringe, the barrel and plunger of which have been printed in accordance with the present invention, said plunger having been partially withdrawn from the barrel after printing;

Fig. 2 is a highly enlarged fragmentary sectional view through the plunger and barrel immediately prior to printing;

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Fig. 3 is a view similar to Fig. 2 but after printing; and

Fig. 4 is a plan view of a typical decalcomania used in the printing process.

In Fig. 1 I have shown a typical conventional hypodermic syringe 10 which has been imprinted in accordance with my invention. Said syringe includes a glass barrel 12 and a glass plunger 14. Both the plunger and barrel are of conventional configuration, the barrel including, by way of example, a long glass tube 16 having an outwardly extending flange 18 at its upper end and at its lower end an apertured bottom 20 from which an apertured tip 22 extends. The plunger comprises a shaft 24 which is necked as at 26 at its upper end just below a head 28.

As is customary, the shaft 24 and tube 16 are matched by grinding so as to fit very closely, the tolerance of the grinding being quite small, for example, in the order of one-forty thousandth of an inch.

It is not necessary for the entire length of the plunger to be ground to this great accuracy. A portion of the lower end of the shaft may be relieved as by providing a slight taper thereon so as to reduce the diameter of the plunger in a direction towards the base thereof.

Similarly at the upper end of the shaft adjacent the necked portion 26 the plunger is likewise relieved by the provision of a slight taper running upwardly toward the neck. This latter taper is employed in the practice of the present invention. Said taper is of a very slight order being so small that it is not observable to the naked eye and is difficult to sense tactilely. For example, the taper is so small that at the end of the shaft adjacent the necked portion the reduction in radius of the shaft over the maximum radius of the shaft is about one and one-half to two and one-half thousandths of an inch. The length of said taper ranges from about one-quarter to one-third of the length of the shaft, this distance not being critical except to the extent that a sufficient length of the shaft must be left of full diameter in order to obtain the requisite pressure beneath the plunger and to prevent rocking of the plunger in the barrel.

In practicing my invention I place a marking 30 such as a numeral, or combination of a numeral and letter, on either the plunger or the barrel in the region which during printing coincides with a tapered portion of the plunger, preferably the taper adjacent the necked portion 26.

Referring to Fig. 2, in which the shaft 24 and the tube 16 have been shown on a highly en-

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larged scale, the marking 30 has been placed on the upper tapered portion 32 of the shaft adjacent the necked portion 26. In this figure the thickness of the marking and the taper have been exaggerated.

Said marking consists of a heat-decomposable metallic compound, e. g. a heat-decomposable metallic salt. It will be understood that "heat-decomposable" as used herein denotes decomposable at a temperature below the temperature at which the glass of the barrel or plunger loses its dimensional stability. An example of such a salt is a metallic halide, for instance, silver chloride. When such a compound is heated in the vicinity of glass, as the compound decomposes and the metal is liberated, the nascent metal is characterized by its ability to penetrate a touching or adjacent glass surface in its immediate vicinity and to form a stain therein corresponding in pattern to the pattern of the marking.

The marking, while still in the form of a metallic compound is of slight height, said height being less than the clearance between the tapered portion 32 of the shaft and the adjacent portion of the tube. More specifically, as has been noted hereinabove, there is a clearance of about one and one-half to two and one-half thousandths of an inch between the shaft and tube adjacent the necked portion. This taper extends for an inch or an appreciable fraction thereof before it merges into the maximum diameter of the shaft. Hence, the height of the metallic compound constituting the marking 30 is made less than one and one-half thousandths of an inch, e. g. one-thousandth of an inch, and is placed near the point of maximum clearance between the shaft and tube, e. g. adjacent the necked portion 26.

The plunger is so located with respect to the barrel immediately prior to heat-printing (decomposing the metallic compound) that the number is not beneath any part of the barrel which might tend to obscure the vision thereof, e. g. not beneath the flange 18.

The hypodermic syringe then is placed in an oven or heat otherwise is suitably applied to an extent and in a manner sufficient to decompose the heat-decomposable metallic compound without affecting the dimensional stability of the barrel or plunger. Where the heat-decomposable metallic compound is silver halide, the temperature to which the hypodermic syringe is raised is about 1020° F., which suffices to break down the metallic compound, but is not sufficient to affect the dimensional stability of the glass of the hypodermic syringe.

The marking 30 can be placed on the shaft 24 in any suitable fashion, for example, by printing, as through a silk screen. The metallic compound can be printed through the screen simply as a powder. However, it is desirable to have the same incorporated in powder form in a suitable carrier such for instance as a synthetic plastic and a solvent for the same. The solvent will evaporate after the first printing and before the heat-printing which decomposes the metallic compound. The synthetic plastic selected is one which will decompose at or prior to the time that the metallic composition decomposes during the heating thereof. A typical synthetic plastic is cellulose acetate.

Another manner of placing the marking 30 on a barrel consists in having said metallic compound incorporated as a powder in a carrier such for example as an oil paste and printing the combined oil paste and metallic compound on a plas-

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tic pellicle 34. This plastic pellicle in turn can be carried by a sheet, the pellicle being adhered to the sheet by a water-soluble cement thereby forming a decalcomania. When it is desired to remove the pellicle 34 from the sheet, the sheet is immersed in water to free the pellicle whereupon it is transferred to the barrel in its proper position. Either the pellicle or the printed marking may be placed in face-to-face contact with the barrel.

Desirably, in order to obtain good dispersion of particles of the metallic compound and a high concentration of said particles, said compound is carried by a matrix such for example as ferrous oxide particles.

The metallic compound is affixed to the matrix in any suitable manner, for instance, a water soluble salt of the metal involved such as silver nitrate, is dissolved in water and the matrix, ferrous oxide, in powder form, added to the solution. The solution is mechanically agitated to uniformly disperse the ferrous oxide particles and then silver chloride is precipitated on to said particles by adding hydrochloric acid to the solution. The composite matrix and metallic compound may be incorporated in a carrier such as a pasty oil base and printed either directly on the plunger as by means of a stencil or printed on a decalcomania pellicle such as the pellicle 34.

I have discovered that when a numeral or other identifying mark constituting particles of a heat-decomposable metallic compound is decomposed under heat at or near a glass surface, the nascent metal particles are capable not only of staining a surface on which the heat-decomposable compound is in contact but also an immediately adjacent surface out of contact therewith. Therefore the identifying mark will be stained not only on the plunger but also on the interior surface of the barrel which is extremely close to the heat-decomposable marking. The resulting stain on the plunger is indicated by the reference numeral 36 in Fig. 3 and the resulting stain on the barrel by the reference numeral 38 in said figure. It will be noted that the nascent metal travels across a tiny gap to produce the stain 38. As mentioned earlier the marking 30 can be placed on the internal surface of the barrel and in this position will create stains on both the barrel and plunger.

It thus will be seen that there is provided a method which achieves all the objects of the invention and is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all steps herein described, or shown in the accompanying drawings, are to be interpreted as illustrative and not in a limiting sense.

Having thus described the invention, there is claimed as new and desired to be secured by Letters Patent:

1. A method of marking glass members having closely spaced surfaces, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of a metallic compound which in a temperature range that will not affect the dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, placing said surfaces in closely spaced superimposed position, and heat-decomposing said compound so as to release nascent

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metal onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

2. A method of marking glass members having closely spaced surfaces, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of an inorganic metallic salt which in a temperature range that will not affect the dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, placing said surfaces in closely spaced superimposed position, and heat-decomposing said salt so as to release nascent metal onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

3. A method of marking glass members having closely spaced surfaces, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of a metallic halide which in a temperature range that will not affect the dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, placing said surfaces in closely spaced superimposed position, and heat-decomposing said halide so as to release nascent metal onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

4. A method of marking glass members having closely spaced surfaces, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of a metallic chloride which in a temperature range that will not affect the dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, placing said surfaces in closely spaced superimposed position, and heat-decomposing said chloride so as to release nascent metal onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

5. A method of marking glass members having closely spaced surfaces, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of a silver chloride, placing said surfaces in closely spaced superimposed position, and heat-decomposing said chloride so as to release nascent metal onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

6. A method of marking glass members having closely spaced surfaces, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of a metallic compound which in a temperature range that will not affect the dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere affixed to a solid particulate matrix, placing said surfaces in closely spaced superimposed position, and heat-decomposing said compound so as to release nascent metal onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

7. A method of marking glass members having closely spaced surfaces, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of silver chloride and ferrous oxide, placing said surfaces in closely spaced superimposed position, and heat-decom-

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posing said chloride so as to release nascent silver onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

8. A method of marking glass members having closely spaced surfaces, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of a metallic compound which in a temperature range that will not affect the dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, placing said surfaces in closely spaced superimposed position with a slight clearance therebetween, and heat-decomposing said mark so as to release nascent metal onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

9. A method of marking the barrel and plunger of a hypodermic syringe wherein there is a slight clearance between portions of juxtaposed surfaces of said barrel and plunger when the barrel is in the plunger, said method comprising the steps of placing on one of said portions a distinguishing mark composed of a metallic compound which in a temperature range that will not affect the dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, placing said portions in juxtaposition, and heat decomposing said compound so as to release nascent metal on to both said juxtaposed portions simultaneously to enter said portions and form stains therein.

10. A method of marking the plunger and barrel of a hypodermic syringe wherein the plunger has a tapered portion to provide a slight clearance, said method comprising the steps of placing on said tapered portion a distinguishing mark composed of metallic compound which in a temperature range that will not affect the dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, inserting the plunger in the barrel so that the tapered portion of the plunger is within the barrel, and heat-decomposing said compound so as to release nascent metal onto the surfaces of the barrel and plunger simultaneously in the region of said mark to enter said surfaces and form stains therein.

11. A method of marking the plunger and barrel of a hypodermic syringe wherein the plunger has a tapered portion to provide a slight clearance, said method comprising the steps of placing on said tapered portion a distinguishing mark constituting a pellicle carrying a pattern composed of a metallic compound which in a temperature range that will not affect the dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, inserting the plunger in the barrel so that the tapered portion of the plunger is within the barrel, and heat-decomposing said compound so as to release nascent metal onto the surfaces of the barrel and plunger simultaneously in the region of said mark to enter said surfaces and form stains therein.

12. A method of identically marking two glass members simultaneously, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of a metallic compound which in a temperature range that will not affect the dimensional stability of the

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glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, placing said surfaces in juxtaposition and spaced apart not more than about two and one-half thousandths of an inch, and heat-decomposing said compound so as to release nascent metal onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

13. A method of identically marking two glass members simultaneously, said method comprising the steps of placing on one of said surfaces a distinguishing mark composed of a silver chloride, placing said surfaces in juxtaposition and spaced apart not more than about two and one-half thousandths of an inch, and heat-decomposing said chloride so as to release nascent metal onto both said juxtaposed surfaces simultaneously to enter said surfaces and form stains therein.

14. A method of marking the barrel and plunger of a hypodermic syringe wherein there is a slight clearance of not more than about two and one-half thousandths of an inch between portions of juxtaposed surfaces of said barrel and plunger when the plunger is in the barrel, said method comprising the steps of placing on one of said portions a distinguishing mark composed of a metallic compound which in a temperature range that will not affect the

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dimensional stability of the glass members is heat-decomposable to form nascent metal that is non-reactive with the ambient atmosphere, placing said portions in juxtaposition, and heat decomposing said compound so as to release nascent metal onto both said juxtaposed portions simultaneously to enter said portions and form stains therein.

15. A method of marking the barrel and plunger of a hypodermic syringe wherein there is a slight clearance of not more than about two and one-half thousandths of an inch between portions of juxtaposed surfaces of said barrel and plunger when the plunger is in the barrel, the steps of placing on one of said portions a distinguishing mark composed of silver chloride, placing said portions in juxtaposition, and heat-decomposing said chloride so as to release nascent metal onto both said juxtaposed portions simultaneously to enter said portions and form stains therein.

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