Nov. 6, 1956 A. I. ROSHKIND 2,769,391

METHOD OF MANUFACTURING IMAGED HECTOGRAPH SPIRIT MASTER

Filed Nov. 14, 1951

Fig. 1

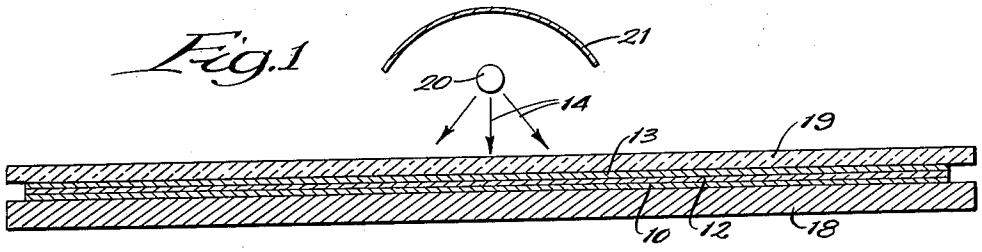


Fig. 2

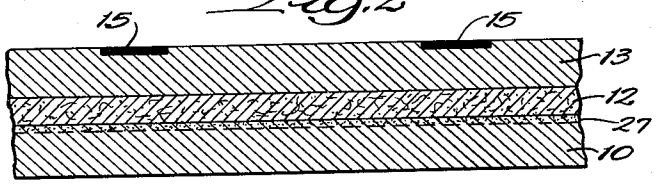


Fig. 3

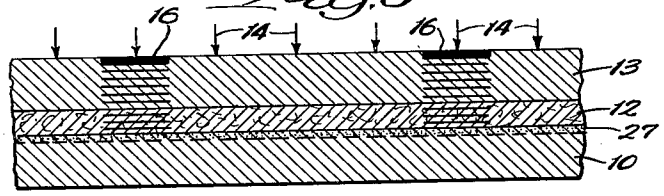


Fig. 4

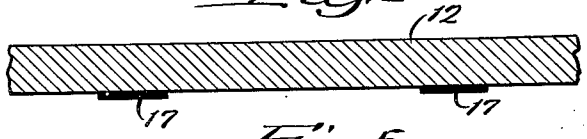
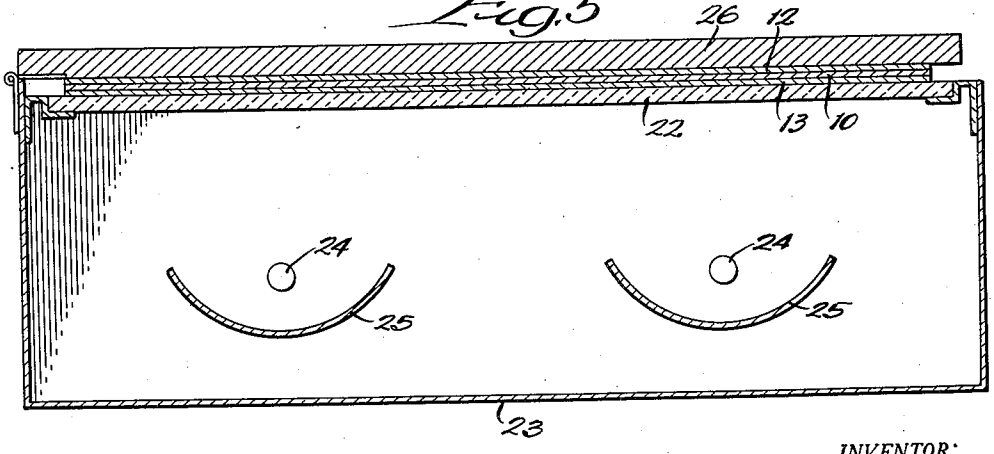


Fig. 5



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METHOD OF MANUFACTURING IMAGED HECTOGRAPH SPIRIT MASTER

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2 Claims. (Cl. 101—149.4)

This invention relates to duplication by the hectograph technique and it relates more particularly to a new method for producing an imaged hectograph spirit master.

In the usual spirit duplicating process a design formed of a water or alcohol soluble dye is applied as by inscribing, drawing, typing, die-impressing or the like onto an ordinary paper sheet such as bond paper, on the reverse side of this paper sheet by arranging a carbon sheet containing this dye with the coated side in contact with the reverse face of the master sheet while the design is being formed. The design or letter outline on the master copy is then contacted in a duplicating machine with impression paper which has been moistened with alcohol or mixture of alcohol and water. The portion of the dye forming the design or letter outline is dissolved in this medium and consequently transfers from the master copy to the impression paper to form the copy. A substantial number of copies can be made before the dye is consumed.

It will be apparent from this description that an intermediate step is required first to form the design or letter outline on paper to form the master copy as by inscribing in some manner or other with a water or alcohol soluble dye composition.

It is an object of this invention to provide a new and improved method for producing an imaged hectograph master. Another object is to provide a new and improved method for producing an imaged hectograph master directly from an original in an economical and efficient manner.

A further object is to produce an imaged hectograph master directly from an original without being encumbered with the time and expense of photographic systems used in related arts.

A still further object is to produce for immediate use an imaged hectograph master and to provide elements for use in the manufacture of same.

These and other objects and advantages of this invention will hereinafter appear and for purposes of illustration, but not of limitation, embodiments are shown in the accompanying drawing in which—

Figure 1 is a schematic sectional elevational view showing an arrangement of parts for use in the practice of this invention;

Figure 2 is an enlarged sectional elevational view showing the elements in their position of use for the practice of this invention;

Figure 3 is a sectional elevational view similar to that of Figure 2 illustrating the conditions which exist during a subsequent stage of the process;

Figure 4 is a sectional elevational view of the hectograph master produced in accordance with this invention; and

Figure 5 is a modification of Figure 1 showing the arrangement of elements used in the practice of this invention.

This invention is a continuation-in-part of my copending application Serial No. 165,490, filed on June 1, 1950, now abandoned.

In accordance with the practice of this invention, the design or image may be formed directly from an original for subsequent transfer to the hectograph spirit master. For this purpose, a transfer or carbon sheet is provided having a composition capable of being reduced to flowable condition at elevated temperature and containing the water or alcohol soluble dye. The transfer sheet may be formed of a substantially continuous layer of such heat meltable composition preferably strengthened with fibers randomly arranged therein. It is preferred, however, to make use of a thin fibrous tissue such as a highly porous stencil base tissue, paper, textile fabric, thin film of plastic material or the like coated or impregnated with the composition capable of being reduced to flowable condition at elevated temperature and containing the glycerine and water soluble dye. When incorporated as a coating or as an impregnating composition coating weights of about 2–20 pounds per 3,000 square feet of sheet surface is sufficient.

As the heat meltable composition use preferably is made of waxes, such as paraffin wax, montan wax, esparte wax, candelilla wax, beeswax, petrolatum and the like, alone or in admixture with each other. Use may also be made of fats and oils if of sufficient hardness at ordinary temperature to militate against inadvertent transfer upon contact with the surface of the hectograph master. In order to prevent transfer merely upon contact with the hectograph master, it is desirable to select waxes and combinations thereof, with or without plasticizers or softeners, such as mineral oil, castor oil, petroleum oils, polyethylene glycols, triethylene glycol and the like to formulate for a softening point which is above 150° F. and preferably within the range of 150–1200° F. It is also preferred to formulate the composition for as sharp a melting point range as possible in order to secure sharp copy as will hereinafter be pointed out.

In manufacture of the imaged hectograph master directly from an original the transfer sheet **10** is placed substantially in surface contact with the surface of the hectograph master **12**. The original **13** is placed in surface contact with the transfer sheet **12** and radiations **14** rich in infra-red are directed onto the original. The radiations are absorbed by the design or letter outlines **15** of the original and converted into heat **16** to form a corresponding heat pattern, the temperature of which depends upon the intensity of the infra-red rays and the time of exposure. It is desirable to provide radiations at an intensity which will almost instantaneously raise the temperature of the heat pattern above 150° F. and preferably within the range of 150°–1200° F. Higher temperatures may be reached and might possibly be obtained by the described process. Some radiations are absorbed by the lighter areas of the original but most are reflected or otherwise dissipated and the amount absorbed is incapable of generating sufficient heat to reduce the composition of the adjacent transfer sheet to molten condition. The heat pattern developed upon radiation reduces the corresponding areas of the composition of the transfer sheet to flowable condition whereby it transfers to form the image **17** on the surface of the hectograph master capable of use immediately for the preperation of copy.

Although infra-red radiations exist in daylight, they do not exist in sufficient quantity to develop a heat pattern of a temperature high enough to reduce the material to flowable condition unless the rays of the sun are concentrated by suitable lenses of reflectors. Radiations capable of providing infra-red rays of suitable intensity may be supplied by various well known and readily available means. They have been developed in fractions of a second by a photo flash lamp whereby the image in exact duplication of the original can be formed on the hectograph mass almost instantaneously. Instead use may be

made of radiations generated by a carbon arc or tungsten filament lamp, or standard infra-red ray lamp.

It has been found that the definition of the image is markedly improved when sufficient heat for reducing the composition to molten condition is developed by absorbed radiations in minimum time. If prolonged exposure is employed for the purpose of developing adequate heat to accomplish the desired reduction of the composition in the transfer sheet to flowable condition, there is a tendency for the heat to dissipate laterally into adjacent areas and consequently produce ragged and indistinct letter outlines. In order to accomplish the desired instantaneous or concentrated exposure, devices of the type heretofore described, such as photographers' flash lamps, are preferred. Instead, use may be made of devices in which the source of infra-red ray bearing light is energized at high wattage by a capacitor device similar to that used for industrial spot welding. Another device which may be used for accomplishing the desired short exposure to intense rays consists of a relatively long but thin source of infra-red radiation, such as a tungsten filament lamp, radiations from which are focused onto the original through the use of suitable lenses and reflectors and which may be adapted to traverse the original at constant speed so that the exposure of each line element in the original is of substantially equal intensity throughout. A still further device for accomplishing the desired results may consist of a point source of infra-red ray radiation, such as an incandescent lamp, in which the radiations are focused to a relatively fine point through a reflector system and are directed upon the surface of the original for the purpose of heat generation.

It will be apparent that a dye suitable for use as the coloring component of the composition that is conveyed to the surface of the hectographic master upon the development of a suitable heat pattern should not only be a water and alcohol soluble dye as has heretofore been used, but it should also be characterized by being non-infrared absorbing, otherwise radiations will be absorbed thereby to develop an overall competing heat pattern. Suitable non-infra red absorbing dyes may be selected of the rhodamine dyes, saframine dyes, Victoria green or the like. Where the original is so constructed as to militate against substantial penetration of the infra-red rays, as when the image is on the outer surface and the sheet is too thick for penetration, the water and glycerine soluble dye in the composition need not be so limited to those which are non-infra red ray absorbing.

By way of illustration, but not by way of limitation, the following is an example for carrying out this invention.

A transfer sheet may be formed of a tissue coated with a composition containing 40 percent paraffin wax, 50 percent Victoria green dye, and 10 percent plasticizer of the type petroleum oil. The coating is applied in amounts ranging from 2–20 pounds per 3,000 square feet and preferably in amounts of about 15 pounds per 3,000 square feet.

The transfer sheet **10** is then positioned beneath the hectograph master **12** with the coating **27** in surface contact with the underside of the master. The original **13** is positioned on top of the master with the letter outlines uppermost. This sheet assembly is preferably positioned on top of a supporting table or glass plate **18** and is covered by another glass plate **19** in order to hold the sheets in substantial contact with each other and in a manner to militate against relative movement.

Infra-red rays **14** generated by a tungsten filament lamp **20** are directed downwardly upon the surface of the original **13** with the aid of a reflector **21**. The rays are absorbed substantially completely and converted into heat by the dark letters **15** of the original while the lighter colored areas of the original substantially reflect or otherwise dissipate the rays directed thereon. By concentrating the rays generated by the tungsten filament lamp and then moving the tungsten lamp at a constant rate across the plate, rays of sufficient intensity are directed onto the original to form a heat pattern conforming to the letter outlines of the original and of sufficiently high temperature to reduce the corresponding areas of the transfer sheet composition to flowable condition whereby the wax base material transfers to the hectograph master **12** to form the transfer image **17** thereon. Upon separation of the sheets, the imaged master may be mounted in a commercial hectograph spirit machine for the preparation of a number of copies each of which will conform almost exactly with the original.

By way of further illustration, the original transfer sheet and hectograph plate may be positioned upon a glass plate **22** which forms the cover for a box-like member **23** having two or more infra-red ray generating lamps **24** mounted therein with reflectors **25** for directing the generated infra-red rays upwardly through the plate **22** onto the original. The device described embodies a cover plate **26** which is adapted to be positioned over the sheet assembly when in position of use for holding same in substantial contact with each other during exposure.

The assembly described above comprises a small and compact unit which may be used as an ordinary piece of office equipment or may be carried about from place to place and from which masters may be produced immediately from originals for subsequent use in the preparation of a number of exact copies thereof. By reason of the fact that the hectograph dye is colored and clearly readable, the prepared master can be inspected immediately upon preparation to determine whether or not errors exist therein.

By way of a still further example, a suitable transfer sheet may be prepared of a thin film of plastic material such as a film of polyvinyl chloride or polyvinylidene chloride having a wax coat applied thereon and containing substantially equal amounts of a hectograph dye. The wax composition may be selected of carnauba wax, beeswax, petrolatum, paraffin wax and combinations thereof, with or without plasticizer, to provide a surface which is substantially solid at room conditions and at temperatures up to 150° F. but which is reduced to flowable condition at temperatures above 150° or 200° F. Application of the composition may be made at the rate of about 5–25 pounds per 3,000 square feet.

Instead of using a plastic film as the base upon which the coating is applied, thin and porous paper or the like may be used.

It will be apparent from the description that I have provided a completely new and improved means for producing an imaged hectograph master and that I have provided a technique whereby the imaged master may be produced directly from an original without being subject to the expense and labor which have heretofore militated against the adoption of indirect means for preparing an imaged hectograph master.

It will be understood that numerous changes may be made in the details of construction, arrangement and operation without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. In the method of producing an imaged hectograph spirit master directly from an original having the reproducible portion in the form of a black letter outline containing infra red absorbing-heat generating material, the steps of positioning the original, the hectograph master sheet and a transfer sheet having a non-infra-red absorbing composition which is solid at room temperature and which is reducible to flowable condition at elevated temperatures and containing a hectograph dye in surface contact with each other with the transfer sheet adjacent the hectograph master at about ambient temperature without preheating, directing a sufficient quantity of radiations rich in infra-red onto the original substantially instantaneously to generate a temperature rise above 150° F. in the black letter outlines which reduces the composition in corresponding areas of the transfer sheet to flow-

able condition whereby the flowable material transfers to the hectograph master to provide an image thereon corresponding to the original.

2. In the method of producing an imaged hectograph spirit master directly from an original having the reproducible portion in the form of a black letter outline containing infra red absorbing-heat generating material, the steps of positioning the original, a hectograph master sheet and a transfer sheet containing a non-infra-red absorbing heat sensitive wax base composition which is solid at room temperature and which is reducible to flowable condition at temperatures in excess of 150° F. and containing a non-infra-red absorbing, water and alcohol soluble dye composition substantially in surface contact with each other with the transfer sheet lying adjacent the master at about ambient temperature without preheating, directing a sufficient quantity of radiations of

infra-red onto the original substantially instantaneously to generate heat for a temperature rise above 150° F. in the black letter outlines and which reduces the composition in corresponding areas of the transfer sheet to flowable condition whereby it transfers to the hectograph surface of the plate and provides a reproducible image thereon corresponding to the original.

References Cited in the file of this patent

UNITED STATES PATENTS

2,057,696	Sherman	Oct. 20, 1936
2,299,014	Foster	Oct. 13, 1942
2,501,495	Carroll et al.	Mar. 21, 1950
2,503,758	Murray	Apr. 11, 1950
2,554,909	Holik	May 29, 1951
2,616,961	Groak	Nov. 4, 1952