July 9, 1935. W. B. WESCOTT 2,007,588

DAMPENING METHOD AND MEANS FOR PLANOGRAPHIC PRINTING

Filed Sept. 2, 1932

Fig. 2

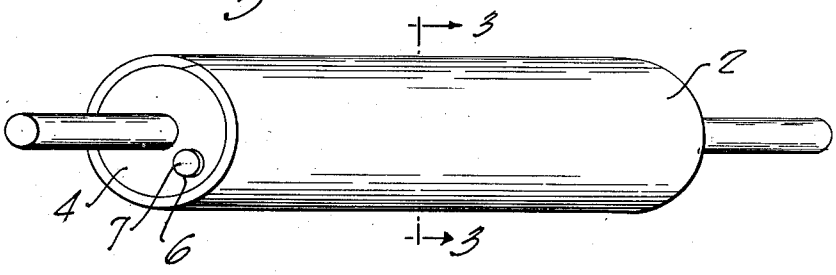


Fig. 1

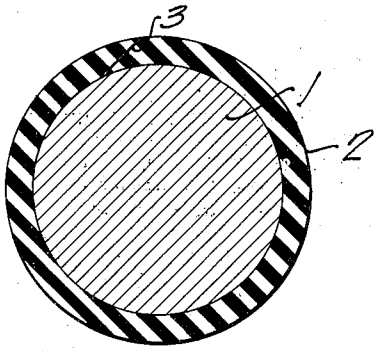


Fig. 3

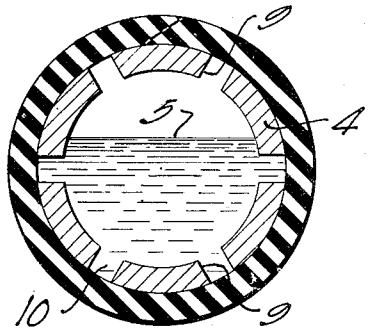
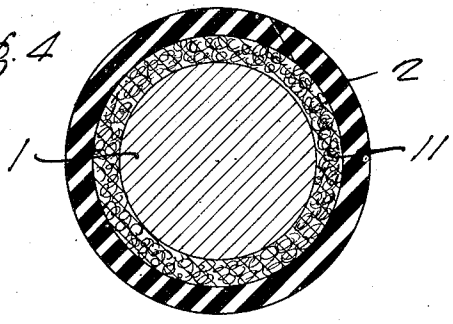


Fig. 4



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DAMPENING METHOD AND MEANS FOR PLANOGRAPHIC PRINTING

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Application September 2, 1932, Serial No. 631,516

7 Claims. (Cl. 101—148)

This invention relates to a method and means for dampening surfaces, such as planographic printing plates, and it comprises providing a covering of microforaminous material such as microporous rubber charged with a viscous dampening fluid and sometimes, but not always, with an internal source of supply, as, for example, a reservoir, wherefrom dampening fluid may be continuously fed through the micropores of said covering material to the outer surface thereof, all as more fully hereinafter described and claimed.

Lithography, or planographic printing depends upon the immiscibility of oil and water. Simply stated, the process consists of applying a greasy image to the surface of a dry printing plate and thereafter, during printing, maintaining the non-printing areas of the plate in a damp and consequently ink-repellent condition.

The use of water as a dampening fluid has several serious objections, among which may be mentioned the fact that it is volatile, that its viscosity is very low and that a high degree of skill is required to feed to and to maintain on the printing surface such a nicely adjusted amount of water as will protect the non-printing areas from contamination by ink and prevent the dampening fluid from encroaching on the printing areas with consequent degradation of the tinctorial value of the printed image. These difficulties have been long recognized in the art and many attempts have been made to eliminate or mitigate them. Thus it has been proposed to substitute glycerin or other viscous non-volatile polyhydric alcohols of the saturated series for the usual dampening water. However, the viscosity of glycerin, which makes it much more effective than water, presents at the same time a serious difficulty in that it has been found extremely difficult heretofore to apply to the non-printing areas a film which was both sufficiently thin and uniform to avoid the detrimental effect produced by the aforementioned encroachment by the dampening fluid on the printing image. If the amount of glycerin on the non-printing areas be such that the ink roller passing thereover is capable of imparting substantial motion to the glycerin, a minute wave or glycerin is moved forward by the ink roll and is forced over the printing image. Because of its viscosity the glycerin produces markedly greater degradation of the printed image than that produced by water under similar circumstances. In order to take advantage of the desirable characteristics of glycerin, i. e. its viscosity and hygroscopicity, and avoid the heretofore insurmountable difficulties of obtaining from a glycerin-charged dampening roll a sufficiently tenuous filmiform layer of glycerin over the non-printing areas without degradation of the printing image, it has been suggested to incorporate the glycerin as minute, dispersed emulsoid particles in the printing ink itself, it having been discovered that such emulsoid ink, when the ratio of dispersed glycerin to pigmented oily vehicle was properly adjusted, would deliver a just adequate amount of glycerin to the non-printing areas. So far as the maintenance of the non-printing areas in an ink-repellent condition by an extremely thin filmiform layer of glycerin replenished from the ink carried by the ink roller, the process left nothing to be desired. The advantages derived from the use of glycerin and its just adequate supply to the plate were, however, more than offset by the facts that such emulsoid inks are unstable and tend to "break", with separation of the glycerin from the pigmented vehicle, in the ink fountain; that such emulsoid inks by reason of the contained hygroscopic glycerin remain tacky for weeks and sometimes for months and after printing; and further that containing as they must a substantial proportion of non-pigmented fluid, i. e. glycerin, their covering power is greatly reduced and in consequence to obtain good tinctorial values such emulsoid inks must be so heavily loaded with pigment as to adversely affect their physical characteristics, as is well recognized by those skilled in the art.

It is an object of this invention to provide means whereby an extremely thin filmiform layer of glycerin, neither motile nor mobile, may be deposited on the non-printing areas of planographic printing plates without the necessity for human intervention or control. It is a further object of this invention to provide means whereby such a film of glycerin may be so replenished between successive inkings as to effectively protect the non-printing areas of the plate from contamination by ink throughout long editions, without the necessity for adjustment of the glycerin supply. Other objects and advantages of the invention will become apparent from its more detailed description.

I have discovered that if the micropores of microforaminous material, such as microporous rubber, be permeated with glycerin and such so permeated microporous rubber be contacted with the non-printing areas of a planographic printing plate, an extremely thin but continuous and

unbroken filmiform layer of glycerin will remain adherent to the plate upon removal of the glycerin-permeated microporous rubber. I have further discovered that a roller covered with glycerin-permeated, though not completely saturated, microporous rubber, while capable of yielding an ideally thin and continuous filmiform layer of glycerin to a dry or substantially dry plate, when rolled over a surface carrying an excessively thick layer of glycerin, is capable of absorbing the excess of glycerin and reducing the film of glycerin to the desired thinness. As a theory useful in visualizing the action of the microporous rubber, though not relied upon as a statement of fact, it may be considered that the amount of glycerin retained on the plate surface, after contact with the glycerin-permeated microporous rubber, is a measure of the balance of the capillary attraction of the micropores for the glycerin and its viscosity. I have observed that for relatively thin films the thickness of the film of glycerin deposited on the surface of a glycerin-receptive material is roughly proportional to the size of the foramens of the pervious body and to the viscosity of the glycerin from which it was derived. Thus the greater the viscosity, the smaller the size of micropores required to yield the same thinness of film. Any foraminous body, such as a dense felt or fine sponge rubber having foramens of such size as to be visible to the naked eye, when permeated with glycerin yields to a glycerin-receptive surface an amount of glycerin greater than that desirable for the present purpose. It is true, however, that dense felts or very fine sponge rubbers may be permeated with glycerine and then deprived of all but a trace of the permeating glycerin by rolling pressure until they are barely dampened therewith and that under these conditions these materials will yield a satisfactorily thin film, but it is obvious that as the supply of available glycerin in such a body is limited, such a so-treated foraminous body could function but for a sharply limited time and would need to be replenished at a rate substantially comparable to that at which the glycerin was desired to be fed to the plate.

Because of the viscosity of the glycerin such nice adjustment of feed involves the personal equation to a greater extent than does the old water-dampening means and therefore is objectionable.

I have discovered, however, that if the foramens or pores of a material capable of resilient deformability such as rubber be of such minute bore as to be invisible to the naked eye, the pores of the material may be glycerin permeated to a point closely approximating saturation and still yield a film of the desired thinness. It is a characteristic of such material that, when permeated with glycerin to a point just short of saturation, i. e. just short of maximum retention by capillary forces, repeated rolling contacts with a glycerin-receptive surface will leave a film not substantially thicker than that produced by the fourth or fifth passage thereover. The volume of available glycerin may be determined by the thickness of the microporous material applied to a roll as a covering, i. e. the reservoir capacity of the micropores, or the microporous roll covering may be continuously fed from a reservoir of glycerin held interiorly of the roll. Micropores, while readily permeable to glycerin, exert such a high capillary attraction as to withstand, without exhibiting detrimentally superfluous glycerin at the lower surface of a horizontally disposed roll, a static head depending in part on the viscosity of the glycerin and for a glycerin-water mixture having a coefficient of viscosity of 2 will withstand a static head of more than an inch. It is frequently desirable to add to the glycerin a concentrated or nearly concentrated solution of ammonium nitrate and ammonium phosphate for the purpose of maintaining the surface of the plate in a glycerin-receptive condition. While a small addition of a salt solution to the glycerin somewhat decreases its viscosity, such a mixture may be satisfactorily used as a dampening fluid by means of the microporous distributing roll of this invention charged therewith. As the ink-repellancy of a wet surface depends upon the maintenance of an unbroken film of moisture thereover, the resistance of such a film to grease under pressure rises rapidly with the viscosity of the fluid of the film and hence it is usually desirable to use a dampening fluid of as high a viscosity as possible. Glycerin compounds having higher coefficients of viscosity than glycerin, as a boroglyceride for instance, may be used successfully when distributed by the microporous roll of this invention.

Referring to the drawing,

Fig. 1 is a cross section of a roll covered with a sheet of microporous rubber suitable for the purposes of this invention;

Fig. 2 is an isomeric view of a dampening roll, exemplifying a combined interior reservoir and connecting microporous surface;

Fig. 3 is a cross section of Fig. 1 taken on the line 3—3; and

Fig. 4 is a view similar to Fig. 3 illustrating another form of dampening roll with an internal source of supply which may be employed.

In Fig. 1 a cylindrical core 1 made of any suitable material is surfaced with a cemented layer of microporous rubber 2, the ends of which are carefully joined by a butt or skived joint 3. Such a roll may be permeated or charged with glycerin or other suitably viscuous material by imbibition from any suitable supply of the same, as by rolling contact with a saturated microporous roller. After the microporous layer 2 is approximately saturated, the surface excess and preferably slightly more glycerin may and should be removed by appropriate wiping. The roll is then mounted on the press in the usual manner to contact the printing plate across the entire extent of its printing surface between successive inkings thereof as needed, or each successive inking as may be desired. A microporous layer 2, one-eighth of an inch thick, will, when charged with glycerin having a coefficient of viscosity of between 12 and 14, maintain a letter-size plate in ink-repellent condition without necessity for recharging the roll for upwards of a thousand copies depending of course on the ratio of the surface of the printing image to that of the non-printing area.

The core 4 of the roll illustrated in Figs. 2 and 3 is a hollow cylinder which provides a central reservoir 5, Fig. 3. Access to the reservoir 5 may be had through a port 6, capable of being closed by a suitable closure device such as the threaded means 7. The microporous covering 2 may be mounted on the hollow cylinder 4 provided with perforations 9, thus permitting a charge of glycerin 10 introduced through the port 6, Fig. 2, to have access through said perforations to the surrounding microporous cover. In cementing the microporous covering to the perforated hollow cylinder 4, care should be taken not to permit occlusion of the micropores opposite the perforation by the cement. This may readily be accomplished by coating the cylinder 4 with a rub-

ber cement and merely softening the inner surface of the microporous sheet with benzol or like rubber solvent, as will be apparent to anyone skilled in the art of manipulating rubber.

If desired the microporous covering may be cast and vulcanized in place by procedures well recognized in the art. A soft vulcanized microporous layer, as shown, is sufficiently resiliently deformable to satisfactorily contact plate surfaces such as are usually used for planographic printing. However, I have found it sometimes expedient, particularly when applying glycerin to very coarse-grained printing plates, to increase the resilient deformability by interposing between the core 1, Fig. 1, and the microporous outer layer 2, a layer of resilient rubber (not shown) which, when similarly interposed between the core 4, Fig. 2, and the outer microporous layer 2, should be of permeable sponge rubber.

As shown in Fig. 4, the layer 11 interposed between the core 1 and the microporous outer layer 2 may be of felt sponge rubber or other porous material which will increase the resilient deformability. The interposed layer may also be saturated with the glycerin or similar material so that it will serve, similar to the reservoir 5 shown in Fig. 3, as a source of supply of the dampening liquid to the outer layer.

While, as stated, I prefer to use microporous rubber, any resiliently deformable material not disintegrated by water or glycerin and having micropores may be substituted for microporous rubber, provided that the capillary attraction of said pores for glycerin is such that the film of glycerin deposited by such material is so thin as to exhibit substantially no mobility under the rolling pressure of the ink roll.

I claim:

1. Method of dampening planographic printing plates and like surfaces, which comprises charging a microforaminous material with an aqueous solution of glycerin and passing the substantially saturated material over the surface of the plate.

2. Method of dampening planographic printing plates and like surfaces, which comprises charging a microforaminous material with an aqueous solution of glycerin, ammonium nitrate and ammonium phosphate, and passing the substantially saturated material over the surface of the plate.

3. Means for dampening planographic plates and like surfaces, comprising a resilient surface of microporous rubber permeated with a dampening liquid.

4. Means for dampening planographic plates and like surfaces, comprising a resilient roller having a surface of microporous rubber permeated with a dampening liquid.

5. Means for dampening planographic plates and like surfaces, comprising a core, an outer layer of microforaminous material permeated with a dampening liquid and a layer of resilient material interposed between the core and the outer layer to increase the deformability thereof.

6. Means for dampening planographic plates and like surfaces, comprising a core, an outer layer of microforaminous material permeated with a dampening liquid and a layer of resilient material interposed between the core and the outer layer and saturated with such liquid whereby the interposed layer supplies liquid to the outer layer.

7. A roller for dampening planographic plates and like surfaces, comprising a cylindrical core, an outer layer of microforaminous material and a layer of resilient material interposed between the core and the outer layer and saturated with dampening liquid, which liquid is supplied to the outer layer and is transferred, when the roller is passed over the surface, in the form of a film thereto.

WILLIAM B. WESCOTT.