May 14, 1940. J. D. KREIS 2,200,363

PRINTING PLATE AND METHOD OF MAKING THE SAME

Filed July 3, 1937

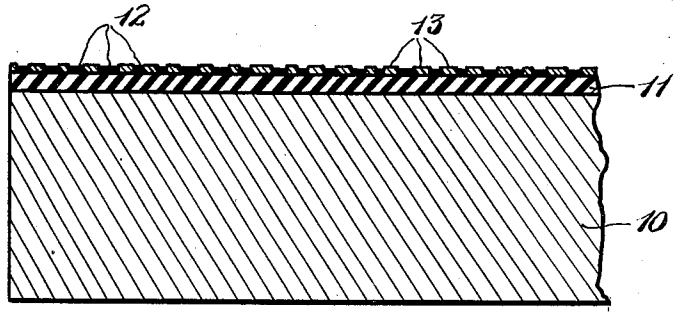

FIG. 1

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Patented May 14, 1940 2,200,363

UNITED STATES PATENT OFFICE

2,200,363

PRINTING PLATE AND METHOD OF MAKING SAME

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Application July 3, 1937, Serial No. 151,852

2 Claims. (Cl. 41—41.5)

This invention relates to improvements in printing plates and a method of making the same. It has reference to lithographic printing where the ink rejecting material is an amalgam of silver or other metal but where the metal combining with mercury to form the amalgam is present on the plate in a thin film or skin only, this film or skin being formed upon a resilient sheet of soft rubber or other similar material.

One of the objects of the invention is the provision of a low cost printing plate which shall be capable of making a great number of impressions and be useful in a machine intended for letter press work.

Another object of the invention is the provision of a lithographic plate using amalgam as the ink rejecting substance but employing only a thin film of metal for the formation of the amalgam.

Still another object is the provision of novel means for applying a thin film of metal to a rubber sheet in the manufacture of a printing plate.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have herein disclosed.

Fig. 1 of the drawing is a fragmental cross-sectional view of a printing plate constructed in accordance with the invention, the printing surface with its image and amalgam portions being shown on an exaggerated scale.

In the drawing, a suitable backing of rigid material is shown at 10. This backing may be of wood, iron, steel or other rigid material, machined to an accurate smooth surface. On this backing there is a sheet of soft rubber 11 which is cemented to the backing or caused to adhere thereto by some other suitable means. The sheet 11 may be made of natural rubber or synthetic rubber or of some other material having physical characteristics of soft rubber. The sheet 11 is covered with a film or skin of silver, tin, or other metal capable of combining with mercury to form an amalgam. Upon this skin I then form, either photographically or by ink transfer, the image which is to be printed. This image is so constituted as to have the greasy characteristics necessary to reject mercury. Thereafter, mercury is applied to the surface of the plate. It adheres to all portions of the metal film not covered and protected by the image, and unites with the metal to form an amalgam. The mercury is worked well into the plate throughout its extent by means of a roller or the like so that amalgam is formed everywhere except over the image. The plate is then complete and ready for use. It is mounted in a press and printing may begin without any make-ready or other intermediate procedure.

There are various methods of applying a metallic coating to the sheet rubber. The method which I prefer at the present time is to mill into raw rubber a metal powder, such as silver powder or thin powder, preferably in proportions of about 75% metal to 25% rubber, causing the metal powder and the rubber particles to be thoroughly and intimately commingled, and then to spread a thin layer of this mixture over a sheet of rubber and vulcanize the two together. The particles of metal powder will thereby be anchored firmly to the rubber sheet.

Another method of applying a metal coating is to distribute a layer of metal in powder form over the surface of a rubber sheet and then cause the powder particles to be embedded directly into the face of the rubber sheet by curing the latter under heat and moderate pressure. The curing temperature may be in the neighborhood of 280° F.

A further method of applying the silver or other metal coating to the rubber sheet is to surround the sheet with a wall or dam, cover the sheet with a metal compound in liquid form, as, for instance, silver nitrate solution, and then precipitate the metal from this compound. In the case of silver nitrate, a high concentrate of the nitrate is subjected to a heat of 250° F. and the free silver deposited on the surface of the plate.

Still another method of applying the metal coating to the rubber is to spray molten metal onto the rubber sheet, causing the metal particles to strike the sheet when their temperature is correct for vulcanization of rubber. The desired result may be effected by properly regulating the distance between the spray nozzle and the sheet to be coated. This distance may be determined by experiment. By this means the particles of metal are firmly gripped by the rubber and a thin even coating is obtained.

When the desired image is one which may be set up in type, I prefer to impose it on the surface of the plate by a method which is in effect the decalcomania process, that is to say, the type are set up as in letter press work except that the arrangement of letters is not reversed, and an ink image made therefrom upon paper coated with glycerin, the ink used being special transfer ink. The ink is allowed to dry. The printed sheet is then placed printed side down upon the metal-coated rubber plate, and heavy pressure is ap-

plied to force the image into close contact with the plate. This pressure may be of the order of 5000 lbs. Next the back of the paper is moistened with water, pressure again applied, the sheet again moistened, etc. Alternate pressure and moisture may be used repeatedly until the moisture has passed through the paper and dissolved the glycerin. Now the paper sheet may be peeled off the plate, leaving the image on the plate to which it has been caused to adhere by the heavy pressure exerted. We then have a rubber sheet covered with a metal film or skin upon which is imposed a greasy ink image. Now, mercury is applied and rubbed in to form an amalgam on all portions of the plate not covered by the image.

It is not essential that the amalgamation of the silver or other metal take place after the image is formed. When the entire plate is covered with amalgam as a step preliminary to making the image it is necessary, however, to include in the transfer ink something to neutralize the ink rejecting characteristic of mercury. Dilute hydrochloric acid is one such material. When it is made a constituent part of the special transfer ink the image will attach itself firmly to the amalgamated metal coating.

When the image is an illustration or other image which cannot be set up in type, I apply it to the plate photographically. In this case, the plate, previously covered with a metal skin, is coated with albumen or some other light-sensitive chemical. When this coating is dry, it may be exposed to light through a negative. Those portions of the albumen coating which are not protected by the opaque or dense parts of the negative are hardened by the light and become insoluble in water. The other parts remain soluble. After exposure, but before development, the plate is inked up. Then it is developed in distilled water which dissolves the soluble parts of the albumen coating. These parts, with the ink carried thereby, come away and rise to the surface of the water, leaving the hardened and insoluble portions, together with the ink film thereon, intact on the face of the plate. When the plate is thoroughly dehydrated, the amalgamation may be proceeded with as in the case of the ink transfer image.

As an alternative procedure for obtaining a photographic image, I may first coat a rubber sheet with nitro-cellulose. Then I coat the thus treated sheet with albumen, expose through a negative, apply the ink and develop, obtaining thereby an image covered with greasy ink as described in the previous paragraph. Thereafter I make a mixture of cellulose acetate with metallic silver or other metal in powder form and apply this to the plate. The acetate mixture, rich in metallic powder, is rejected by the ink of the image but adheres firmly to the nitro-cellulose coating of the sheet. There is then a silver or other metal backing everywhere except over the image. Thereafter mercury is applied to the plate and is rubbed in to form an amalgam as in the other procedures previously described.

As a modification of the last described procedure, I may coat the rubber sheet with nitro-cellulose, and then on the thus treated rubber sheet I may make an image photographically with light-sensitive photo engravers fish glue, mixed with sufficient ink to make the image visible. Then when the image is dry I apply to the surface of the sheet a coating of cellulose acetate mixed with a plentiful supply of metal powder, silver powder for example. The cellulose acetate film readily unites with and adheres to the nitro-cellulose coating, but the image repels this film and the metal powder carried thereby. Mercury then is added to it to form an amalgam coating everywhere on the plate except where the latter is protected by the glue image. The plate may then be inked and used as in the other previously described procedures.

Another method of producing a plate of this kind comprises the following steps: First, I coat a rubber sheet with metal, silver for example. Then over that coating I superimpose a coating of light-sensitive fish glue or other similar material. Next the plate is exposed to light through a positive image, thereby causing the background to harden while the image portions remain unaffected. Then I brush onto the plate a solution of nitric acid which etches through the previously protected and unhardened image portions of the glue coating and dissolves the metal coating therebeneath down to the bare rubber. The light hardened portions of the glue coating, corresponding to the background protect the metal coating from the action of the dilute acid. This remaining glue coating is then washed off with a suitable solvent, benzine for example, leaving the silver exposed, after which mercury may be applied to form an amalgam throughout the background portions of the plate. In the printing operation greasy ink will adhere to the bare rubber but will be rejected by the amalgam surface.

While I have described the invention as applied to a flat plate, it should be understood that it is adaptable also to use upon a cylinder. In printing with such a flat or cylindrical plate I prefer to use an ink containing a small proportion of mercury, 2% or 3% for example. The mercury does not adversely affect the quality of the work done, and it serves to maintain and build up gradually the body of amalgam on the plate. The amalgam adds height to the plate, leaving the image inset to a slight extent, so that the printing has the appearance and feel of gravure or intaglio printing. In the drawing I have illustrated the image and the amalgam on an exaggerated scale, the image being indicated by the solid black areas 12 and the amalgam, elevated slightly above the image, by the cross-hatched areas 13. In printing, the plate is inked in the normal manner used in letter press printing. The ink adheres readily to the ink image, but is rejected completely by the amalgam.

After a run of printing is completed the plate may be cleaned off and the new image applied. In fact the plates may be reused an indefinite number of times. In some cases it is necessary or desirable to clean the plate down to the rubber sheet. In such cases I first apply dilute nitric acid which dissolves and cleans off the silver or tin amalgam. Then, if there is hardened fish glue on the plate I clean that off with benzine. If there is a nitro-cellulose coating I clean that off with cellulose acetate. Finally when all coatings have been removed, I clean the bare plate with benzol, after which it is ready to be used again.

Plates made in accordance with my invention may be used in conjunction with type, as for instance in the making of illustrations to be used with text printed from type. The small amount of mercury which it is advisable to employ in the

ink when printing from my plates does no harm in ordinary letter press work, and hence may be employed when the plates are used in conjunction with type.

Variations from the described structure and method may be employed. Accordingly I desire it to be understood that the scope of the invention is to be regarded as defined exclusively by the appended claims rather than by the foregoing description or the accompanying illustration.

Having thus described my invention, I claim:

1. The method of making printing plates which comprises intimately commingling rubber and a metal powder, placing a thin layer of such mixture over a sheet of rubber, causing the mixture to adhere to the rubber sheet by curing them together, forming on the surface of the plate an image adapted to receive and retain ink, and producing an amalgam on all portions of the plate not covered by said image.

2. The method of making printing plates which comprises intimately commingling rubber and a metal powder, placing a layer of such mixture over a backing sheet, causing the mixture to adhere to the backing sheet by vulcanization of the mixture, forming on the surface of the plate an image adapted to receive and retain ink, and producing an amalgam on all portions of the plate not covered by said image.

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