Sept. 8, 1959 W. RITZERFELD ET AL 2,902,926

METHOD AND APPARATUS FOR DUPLICATING

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Fig. 1

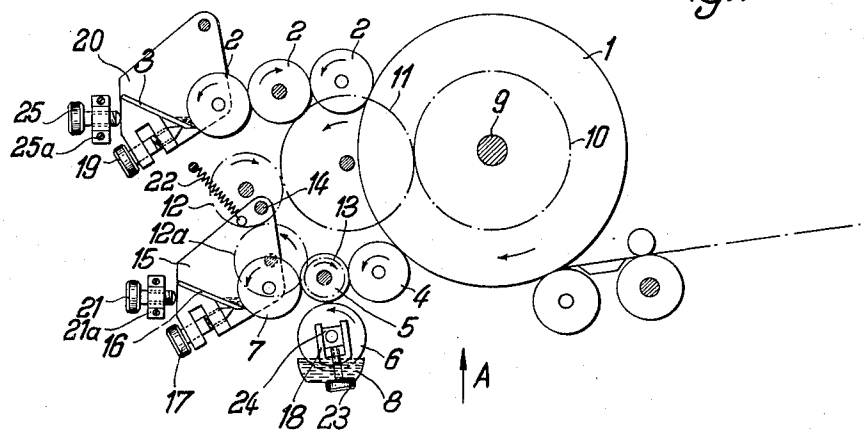
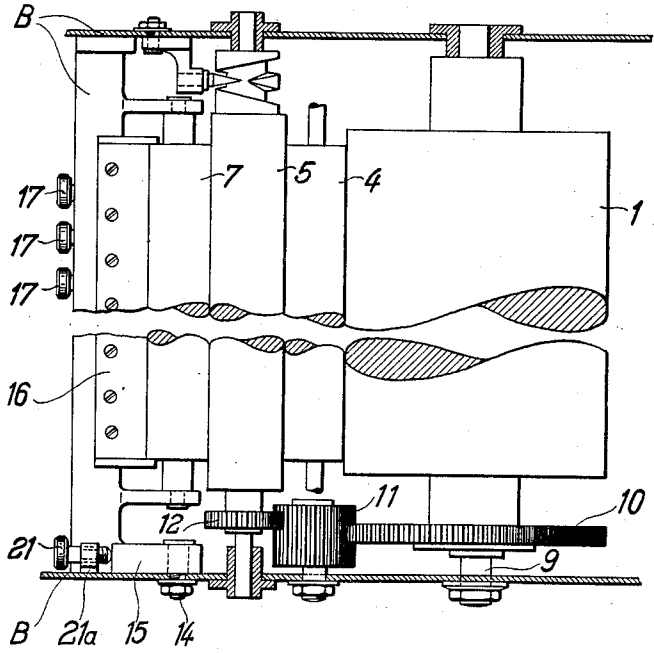


Fig. 2



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METHOD AND APPARATUS FOR DUPLICATING

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9 Claims. (Cl. 101—141)

The present invention refers to a method and an apparatus for duplicating, and more particularly to arrangements in which the duplicating is carried out using printing forms prepared in accordance with offset printing and operating in accordance with the lithographic process, including the use of devices for applying ink and for applying moisture to said forms.

In offset printing machines it is known to apply ink to the printing form by means of an ink applicator and to apply moisture by means of a separate moisture applicator. Machines of this type have the drawback that it is necessary to adjust very carefully the ratio between the amount of ink and the amount of moisture that are applied to the form. In operation it creates substantial difficulties, to apply to the printing form with the conventional moistening devices so small an amount of moisture that the form is just about prevented from obtaining a haze of ink in the open spaces, while at the same time the strength of the ink is not affected by the application of the water so that impressions of satisfactorily deep dark black or intense color are obtained.

It is an object of the present invention to provide a method and apparatus free of the disadvantages of the known methods.

It is another object of the invention to provide a method and apparatus for applying the necessary moisture to the printing form in an accurately controllable manner.

It is a further object of the present invention to provide for a method and apparatus for the above purpose comprising steps and means that permit to adjust the moisture application to the exact requirements of the particular duplicating job.

It is still another object of the present invention to provide for the above purpose a method and apparatus which is extremely simple and reliable in operation.

With the above objects in view, the duplicating method according to the invention mainly consists in mixing a moistening liquid with a fatty substance such as vaseline and in applying the resulting mixture to the printing form in order to moisten the latter to a predetermined degree depending upon the composition of the mixture.

In a preferred embodiment of the duplicating method according to the invention, fatty substances are applied simultaneously with a moistening liquid by separate supply means to a mixing device which transfers to the printing form the resulting mixture in thoroughly blended condition.

Again with the above objects in view, the apparatus according to the invention comprises means for mixing a moistening liquid with a fatty substance in a controllable manner and means for transferring the resulting mixture to the printing form.

In a preferred embodiment of the apparatus according to the invention, a device is provided, consisting of a supply roller and a doctor blade or scraper, for applying the fatty substance to a supply roller. Preferably the fatty substance is then applied to a reciprocating mixing roller to which a moistening liquid is applied by another

supply roller. The doctor blade is provided with means for exactly controlling the dosage of the fatty substance.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments which read in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic elevation illustrating one embodiment of the method and apparatus according to this invention; and

Fig. 2 is a diagrammatic bottom view in direction of arrow A in Fig. 1, showing only certain important elements of the apparatus.

Referring now to the drawing, an ink applicator, consisting mainly of a set of mutually engaging rollers **2**, cooperates with the printing drum **1**. The supply of ink is controlled by means **3**.

A moisture applicator is provided and arranged independently of the inking device described above. The moisture applicator comprises the rollers **4**, **5**, **6** and **7** which serve to apply the required moisture to the printing form carried by the printing drum **1**. For this purpose the supply roller **6** picks up the moistening liquid from a reservoir **8** into which it projects being partly immersed in the liquid, and transfers the liquid to a mixing roller **5**. This mixing roller **5** is in engagement with a supply roller **7** which serves to supply the fatty substance to the mixing roller **5** where the fatty substance is thoroughly mixed with the moistening liquid supply to it by supply roller **6**. The mixing roller **5** carries out a rubbing action with respect to the cooperating rollers **4**, **6** and **7**. The rubbing action is effected by an axially reciprocating movement imparted to the mixing roller **5**. The film consisting of the mixture of moistening liquid and fatty substance is then transferred by transfer roller **4** to the printing form on the printing drum **1**.

In this embodiment both the supply roller **7** and the mixing roller **5** are driven through a gear **10** mounted on the shaft **9** of the printing drum and by a gear train **11**, **12**, **12***a* and **13**.

The supply roller **7** for the fatty substance rotates and cooperates with a doctor blade or scraper **16** in such a manner that the rollers **4** and **5** of the moisture applicator receive a film of fatty substance the thickness of which is maintained uniform. The thickness of this film may be adjusted for all the rollers of the moisture applicator simultaneously by adjusting the doctor blade **16**. In order to control also the moisture content of the mixture referred to above, at least two of the rollers of the moisture applicator may be provided with means for adjusting their relative position.

For this purpose and in order to control and to adjust the thickness of the film of fatty substances, the supply roller **7** for the fatty substance is rotatably supported in brackets **15** which in turn are pivoted at **14**. A spring **22** tends to move the bracket **15** and the roller **7** away from the mixing roller **5**. The adjusting screws **21** mounted on the general frame B of the machine bear against an edge of bracket **15** and thereby serve to move bracket **15** and supply roller **7** towards mixing roller **5** against the action of the spring **22**.

An adjustable doctor blade or scraper means **16** is also mounted on the tiltable brackets **15** and its position with respect to the supply roller **7** can be adjusted by means of screws **17** bearing against the blade **16**. Also the pressure of the liquid supplying roller **6**, arranged in the tank **8**, against the mixing roller **5** may be adjusted by means of a screw **23** which acts upon a bearing block **24** slidably arranged in guiding means **18**.

A similar means for adjusting the position of the doctor blade 3 in the ink applicator is provided in conventional manner and comprises adjustment screws 19 arranged in the support 20 for the blade 3.

Whenever the doctor blade 3 of the inking device and the doctor blade 16 for the fatty substance are adjusted by means of the screws 19 and 17, respectively, an adjustment of the thickness of the substance to be applied to the rollers may be effected by the main control screws 21 which are supported at 21*a* on the frame B and act on the supports 15 and 20 of the rollers 7 and 2, respectively.

In order to predetermine the moisture content and the relative amount of fatty substance, an amount of pressure, in the present embodiment between the mixing roller 5 and the supply roller 7 for the fatty substance, may be set up and controlled by adjustment of the relative position of the said rollers 5 and 7 by the means described above.

It is advisable to make the transfer roller 4 for the moisture film of non-absorbent, elastic material such as rubber or any other suitable material. This material may constitute only a cover of roller 4. The mixing roller 5 should be made of non-absorbent hard material, such as metal or any other suitable material. Moreover, the roller 7 for supplying the fatty substance to the mixing roller may be provided with a cover of a grease-resistant rubber, as for instance synthetic rubber (Buna).

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of duplicating methods and machines differing from the types described above.

While the invention has been illustrated and described as embodied in a duplicating method using a mixture of a moistening liquid with a fatty substance for moistening a printing form, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a duplicating method, in combination, the steps of mixing a moistening liquid with a fatty substance to regulate the amount of moistening liquid in the mixture and of applying the mixture to a printing form for moistening said form; and then applying printing ink to said printing form independent from the application of said moistening liquid and said fatty substance.

2. In a duplicating method, in combination, the steps of applying moistening liquid to rotary transfer means in engagement with a printing form; and simultaneously applying a fatty substantially colorless substance to said transfer means to regulate the amount of moistening liquid applied by said rotary transfer means to the printing form; and then applying printing ink to said printing form independent from the application of said moistening liquid and said fatty substance.

3. In a duplicating method, in combination, the steps of applying moistening liquid to rotary means; applying a fatty substance as a layer of predetermined thickness to second rotary means; transferring said moistening liquid and said fatty substance from said two rotary means to a common rotary transfer means in engagement with said two rotary means for mixing said moistening liquid and said fatty substance to a predetermined degree on said transfer means; transferring the mixture from said transfer means to a printing form; and applying printing ink to said printing form independent from the application of said moistening liquid and said fatty substance.

4. In a duplicating method, in combination, the steps of applying moistening liquid to rotary means; applying a fatty substantially colorless substance as a layer of predetermined thickness to second rotary means; transferring said moistening liquid and said fatty substance from said two rotary means to a common rotary transfer means in engagement with said two rotary means for mixing said moistening liquid and said fatty substance on said transfer means; applying controllable pressure to the engagement between said second rotary means and said transfer means for adjusting the ratio between said moistening liquid and said fatty substance in the mixture produced on said transfer means; transferring the mixture from said transfer means to a printing form; and applying printing ink to said printing form independent from the application of said moistening liquid and said fatty substance.

5. In a duplicating machine, in combination, a printing drum; a printing form carried by said printing drum; first supply roller means; means for applying a moistening liquid to said first supply roller means; second supply roller means; adjustable means for applying a controllably variable amount of a fatty substance to said second supply roller means; transfer roller means in engagement with said first and second supply roller means and with said printing form and adapted to apply to said printing form said moistening liquid and said fatty substance; and means spaced from and independent of said transfer roller means for applying ink to said printing form.

6. In a duplicating machine, in combination, a printing drum; a printing form carried by said printing drum; first supply roller means; means for applying a moistening liquid to said first supply roller means; second supply roller means; adjustable means for applying a controllably variable amount of a fatty substance to said second supply roller means; a transfer roller positioned parallel with the axis of said printing drum and in engagement with said printing form; a mixing roller in engagement with said transfer roller and with said first and second supply roller means and adapted to produce a mixture of said moistening liquid and said fatty substance and to apply said mixture to said transfer roller; and means spaced from and out of contact with said rollers and roller means for applying ink to said printing form.

7. In a duplicating machine, in combination, a printing drum; a printing form carried by said printing drum; moistening means for applying a moistening liquid to said printing form, said moistening means including a non-absorbent, elastic moistening roller in engagement with said printing form, an unelastic mixing roller cooperating with said moistening roller for applying a mixture of fatty substance and moistening fluid to said moistening roller, a first reservoir for holding a fatty substance, a second reservoir for holding a moistening fluid, and a pair of supply means cooperating with said mixing roller and said first and second reservoirs, respectively, for supplying fatty substance and moistening fluid to said mixing roller; and inking means independent from and out of contact with said moistening means for applying ink to said printing form.

8. In a duplicating machine, in combination, a printing drum; a printing form carried by said printing drum; and moistening means for applying a moistening liquid to said printing form, said moistening means including a non-absorbent, elastic moistening roller in engagement with said printing form, an unelastic mixing roller in engagement with said moistening roller, a first supply roller engaging said mixing roller, means for applying a

moistening liquid to said first supply roller, a second supply roller engaging said mixing roller, means for applying a fatty substance to said second supply roller, and means for adjusting the position of said first and said second supply rollers with respect to said mixing roller for controlling the ratio between fatty substance and moistening liquid applied by said mixing roller to said transfer roller.

9. In a duplicating machine, in combination, a printing drum; a printing form carried by said printing drum; moistening means for applying a moistening liquid to said printing form, said moistening means including a non-absorbent, elastic moistening roller in engagement with said printing form, an unelastic mixing roller in engagement with said moistening roller, a first supply roller engaging said mixing roller, means for applying a moistening liquid to said first supply roller, a second supply roller engaging said mixing roller, means for applying a fatty substance to said second supply roller,

and means for adjusting the position of said first and said second supply rollers with respect to said mixing roller for controlling the ratio between fatty substance and moistening liquid applied by said mixing roller to said transfer roller; and inking means independent from and out of contact with said moistening means for applying ink to said printing form.

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