June 27, 1939. F. GEORGE 2,164,270

GRAVURE PRINTING

Filed Dec. 28, 1937 2 Sheets-Sheet 1

Fig. 2.

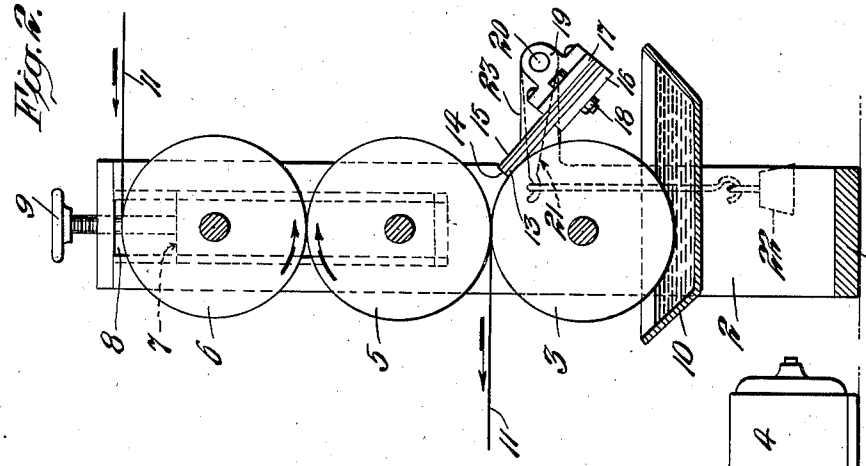
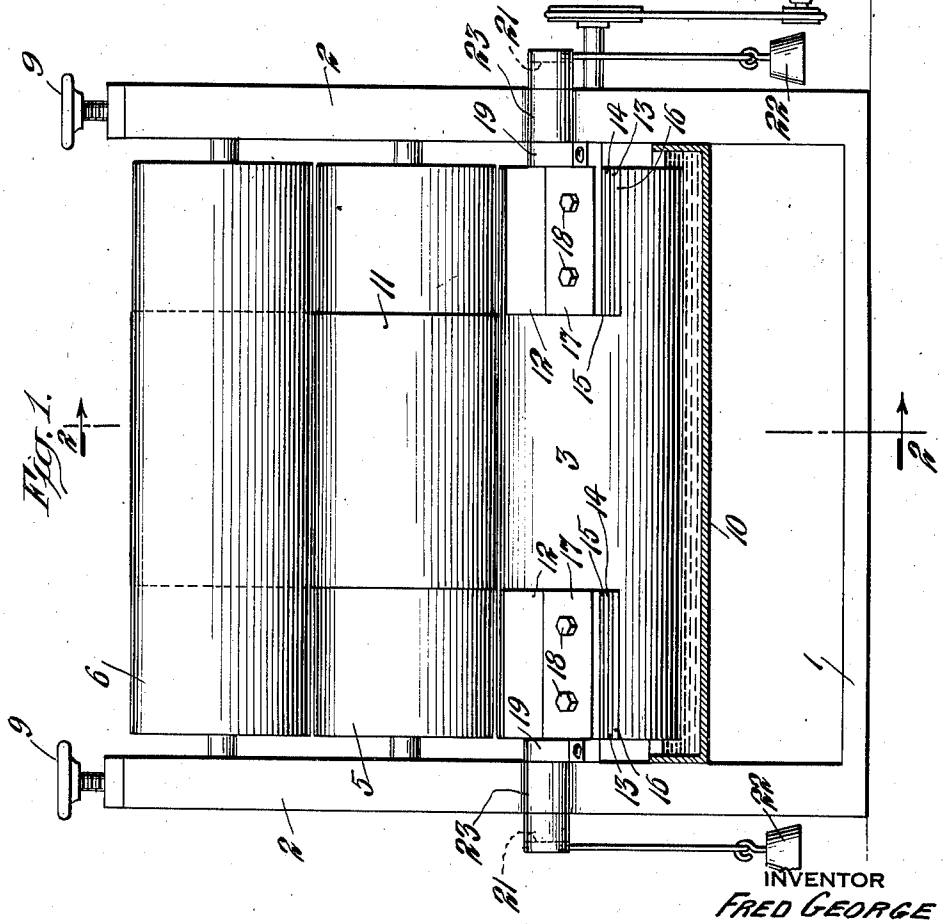


Fig. 1.



INVENTOR
FRED GEORGE
BY Milton Zucker
ATTORNEY

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Fig. 3.

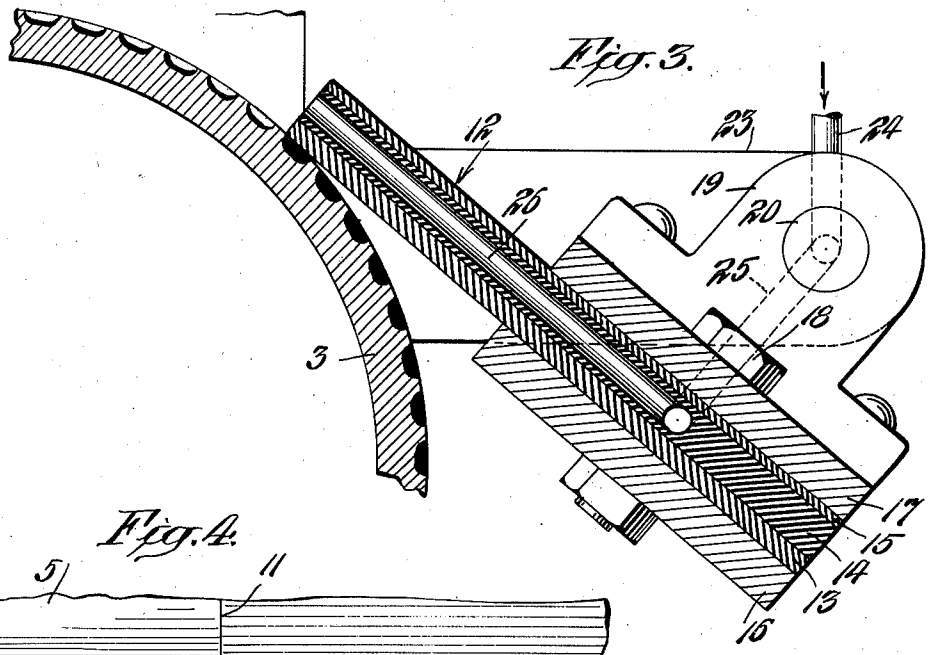


Fig. 4.

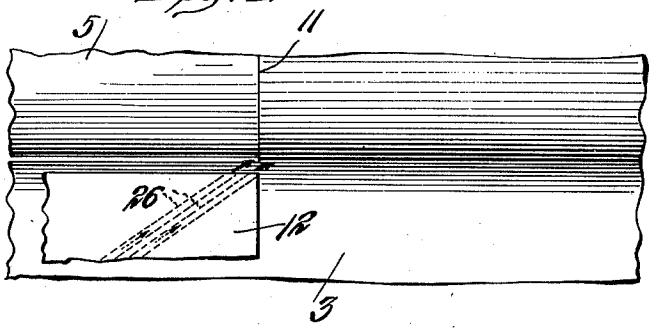
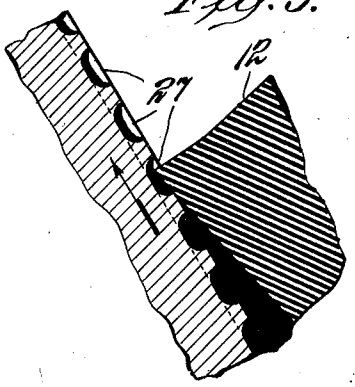


Fig. 5.



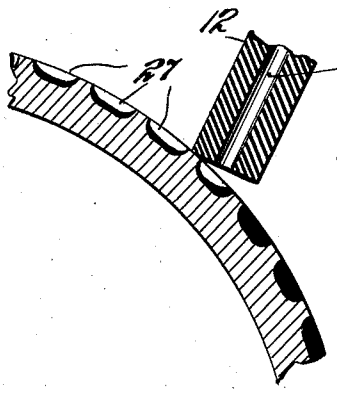


Fig. 6.

INVENTOR
FRED GEORGE
BY Milton Zucker
ATTORNEY

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UNITED STATES PATENT OFFICE

2,164,270

GRAVURE PRINTING

Fred George, Lakewood, Ohio, assignor to Interchemical Corporation, New York, N. Y., a corporation of Ohio

Application December 28, 1937, Serial No. 182,125

10 Claims. (Cl. 101—153)

This invention relates to the coating and printing of paper and the like, where the paper is fed in webs of varying widths between a marking cylinder and an impression cylinder; and it is particularly directed to means for preventing offset onto the back of the web from the exposed portions of the impression cylinder.

In conventional coating and printing practice, paper and the like is fed, in web form, between a coating or printing cylinder and an impression cylinder. In most work, the paper is of uniform width and the cylinders are designed to fit the paper, so that there is no contact between the cylinder carrying the marking composition and the impression cylinder. In certain types of printing and coating work, however, it is necessary to mark webs of varying widths with standard size marking cylinders; and in such cases the marking composition transfers to the exposed portions of the impression cylinder. This presents no problem in typographic and lithographic printing, where relatively stiff plastic inks are used; but in intaglio printing and ordinary coating practice, where thin compositions are used, there is a pronounced tendency for the marking compositions to spread on the impression cylinder to the portion over which the web operates, resulting in smearing of the material on the back of the web. This tendency increases, of course, with increased concentration of marking fluid, and becomes serious when over-all coating or mass intaglio printing is attempted, particularly when no doctor blade is employed on the intaglio cylinder.

I have discovered that on coating machines with smooth rollers, doctor blades placed on the portions of the marking cylinder which contact the exposed portions of the impression cylinder clean the cylinders sufficiently well to prevent offset; but when an intaglio engraved cylinder is used, the doctor blade leaves ink in the cells of the cylinder and ink is transferred to the impression cylinder.

I have also discovered that such transfer of marking composition can be substantially prevented by removing a substantial portion thereof from the cells in the portions of the intaglio cylinder which face the exposed portions of the impression cylinder. Preferably, I use a doctor blade of deformable resilient material (having approximately the characteristics of soft rubber) to effect the removal, applying sufficient pressure to force the doctor blade into the cells, thereby removing sufficient of the composition to eliminate transfer to the impression cylinder. In another form of my invention, I blow the composition out of the cells by the use of compressed air, applied through pipes inserted in a doctor blade.

When conventional intaglio printing is desired, I remove the bulk of the marking composition by a conventional doctor blade before removing the excess from the cells facing the exposed portions. When over-all printing is to be carried out, the machine is run without a doctor blade on the printing portion, and the paper is printed with the nip between the printing cylinder and the impression cylinder flooded. To prevent transfer of ink at the nip where flooding is heavy, I have found that air jets in the doctor blade, directed inwardly toward the paper, are extremely effective.

The accompanying drawings illustrate preferred embodiments of my invention.

Figure 1 is a front elevation of a novel machine, on which my processes may be practiced.

Figure 2 is a section through the line 2—2 in Figure 1.

Figure 3 is a detail sectional view, showing the wiping action of the flexible doctor blade and the manner in which the air ducts are placed therein.

Figure 4 is a detailed section showing the horizontal inclination of the air ducts.

Figure 5 is a sectional view on a greatly magnified scale, showing the wiping action of the doctor blade.

Figure 6 is a detail of a doctor blade embodying a second form of my invention.

A typical intaglio printing press is illustrated in the drawings, comprising a base 1 and standards 2. Journaled in the standards is an intaglio cylinder 3, driven as by a motor 4, by means of conventional gearing or belting. An impression cylinder 5 and a pressure cylinder 6 are journaled in blocks 7 set in openings 8 in the standards and frictionally held in the standards. Set screws 9 passing through the tops of the standards and bearing against the blocks 7 maintain any desired pressure between the printing cylinder and the impression cylinder. To improve the pressure relationships, the printing cylinder and pressure cylinder are preferably made of metal, while the impression cylinder is preferably a flexible composition such as rubber, glue-glycerine, or "Thiokol" (a rubber-like synthetic product made by the polymerization of ethyelene sulfide). The printing cylinder runs in a fountain 10 in which the marking composition is placed. A web of paper 11 passes between the pressure cylinder and

the impression cylinder, around the impression cylinder, and finaly out between the impression cylinder and the printing cylinder, picking up its markings in the bite between the impression cylinder and the printing cylinder. When such a device is operating with a web which is of lesser width than the printing and impression cylinder, ink normally is conveyed to the impression cylinder, and set-off occurs during the travel of the paper about the impression roll due to spreading of the ink inwardly.

One form of a device for preventing transfer of ink is shown in Figures 1 to 4. It comprises a pair of doctor blades 12, made of deformable material. The doctor blade is preferably a composite structure of several layers of varying resiliency, such as is described and claimed in my co-pending application, Serial Number 119,104, filed January 5, 1937. As shown particularly in Figures 2 and 3, each blade 12 consists of three parts, a thin soft strip 13 of resilient material such as soft rubber, the end of the strip being cut square, a thicker strip 14, also resilient and somewhat soft or yielding, although less resilient and less soft than strip 13, and a hard backing strip 15, which is preferably metallic. All three of these strips are clamped firmly together by means of bars 16 and 17 and bolts 18, the bars running the full length of the doctor blade. To the bar 17 are fastened brackets 19, one at each end, which are secured to a shaft 20 that is journaled in brackets 23 extending from the side frames of the press. To each end of shaft 20 outside of the frame of the press, there is attached an arm 21, and upon these arms weights 22 of selected size may be hung in order to exert forces of different strength producing varying pressures of the doctor blade against the surface of the printing cylinder 6.

The form of device above described may be used to prevent offsetting in normal operation of the press, but I prefer to modify it as shown on the drawings, so that over-all printing may be accomplished with a heavily flooded nip. To accomplish this end, the shafts 20 are made hollow, and flexible tubing 24 connected with a compressed air line is attached. Passages 25 in the brackets 19 connect the hollow shaft with passages 26 in the center strip of the doctor blade. As can be best seen in Figure 4, these passages are adapted to direct air inwardly against the flooded nip and thus prevent the ink in the flooded nip from spreading outwardly into contact with the exposed portions of the impression cylinder.

Figure 5 illustrates the action of the doctor blade in wiping ink out of the cells. The blade is preferably held against the cylinder at an angle of 30° or less to the tangent at the point of contact. The pressure exerted on the deformable doctor blade deforms it sufficiently so that it is forced into the cells 27 of the plate, and removes so much ink that no offset occurs.

A modified method of removing ink from the cells 27 is shown in Figure 6. Here a deformable doctor blade need not be used, although I preferably employ one. Each doctor blade 12 is provided with a plurality of air passages 28 throughout its length, and is held against the cylinder, as illustrated, to form a tight seal to force the air downwardly, so that it blows the ink out of the cells as they approach the blade.

Other variations in structure can obviously be made, the scope of the invention being defined by the claims.

What I claim is:

1. In a machine for marking paper and the like of varying width, an engraved marking cylinder carrying marking composition, an impression cylinder, and means for preventing transfer of marking composition from the marking cylinder to such portions of the impression cylinder as are exposed to contact with the marking cylinder, said means comprising doctor blades of deformable resilient material impinging on the portions of the marking cylinder which contact the exposed portions of the impression cylinder, and air ducts in the inner ends of said doctor blades directed inwardly against the undoctored portion of the marking cylinder.

2. In a machine for marking paper and the like of varying width, an engraved marking cylinder carrying marking composition, an impression cylinder, and means for preventing transfer of marking composition from the marking cylinder to such portions of the impression cylinder as are exposed to contact with the marking cylinder, said means comprising doctor blades impinging on the portions of the marking cylinder which contact the exposed portions of the impression cylinder and making a tight seal with said marking cylinder, and air ducts in said doctor blades so directed that air issuing therefrom blows marking composition out of the cells of the engraved marking cylinder.

3. The method of marking paper with an engraved cylinder of greater width than the paper, which comprises applying marking composition to the entire cylinder, and thereafter removing marking composition from the surface and the cells of such portions of the cylinder as do not contact the paper.

4. The method of marking paper with an engraved cylinder of greater width than the paper, which comprises applying marking composition to the entire cylinder, and thereafter removing marking composition from the surface and the cells of such portions of the cylinder as do not contact the paper by means of deformable resilient doctor blades.

5. The method of marking paper with an engraved cylinder of greater width than the paper, which comprises applying marking composition to the entire cylinder, and thereafter removing marking composition from the surface and the cells of such portions of the cylinder as do not contact the paper by means of compressed air.

6. In a machine for marking paper and the like of varying width, a marking cylinder wider than the paper to be marked and carrying marking composition beyond the edges of the paper, an impression cylinder coacting with said marking cylinder and extending beyond the edges of the paper, and means for removing marking composition from the portions of the marking cylinder contacting the exposed portions of the impression cylinder.

7. In a machine for marking paper and the like of varying width, a marking cylinder wider than the paper to be marked and carrying marking composition beyond the edges of the paper, an impression cylinder coacting with said marking cylinder and extending beyond the edges of the paper, and means for removing marking composition from the portions of the marking cylinder contacting the exposed portions of the impression cylinder, said means comprising doctor blades impinging on the portions of the marking cylinder which contact the exposed portions of the impression cylinder.

8. In a machine for marking paper and the like of varying width, an engraved marking cylinder wider than the paper to be marked and carrying marking composition beyond the edges of the paper, an impression cylinder coacting with said marking cylinder and extending beyond the edges of the paper, and means for removing marking composition from the portions of the marking cylinder contacting the exposed portions of the impression cylinder.

9. In a machine for marking paper and the like of varying width, an engraved marking cylinder wider than the paper to be marked and carrying marking composition beyond the edges of the paper, an impression cylinder coacting with said marking cylinder and extending beyond the edges of the paper, and means for removing marking composition from the portions of the marking cylinder contacting the exposed portions of the impression cylinder, said means comprising doctor blades impinging on the portions of the marking cylinder which contact the exposed portions of the impression cylinder.

10. The method of marking paper with an engraved cylinder of greater width than the paper, which comprises applying marking composition to the cylinder to a width greater than the width of the paper, and thereafter removing marking composition from the surface of such portions of the cylinder as do not contact the paper.

FRED GEORGE.