Dec. 22, 1936. W. C. HUEBNER 2,065,136

PROCESS AND MEANS OF PRINTING

Filed March 14, 1934 2 Sheets-Sheet 1

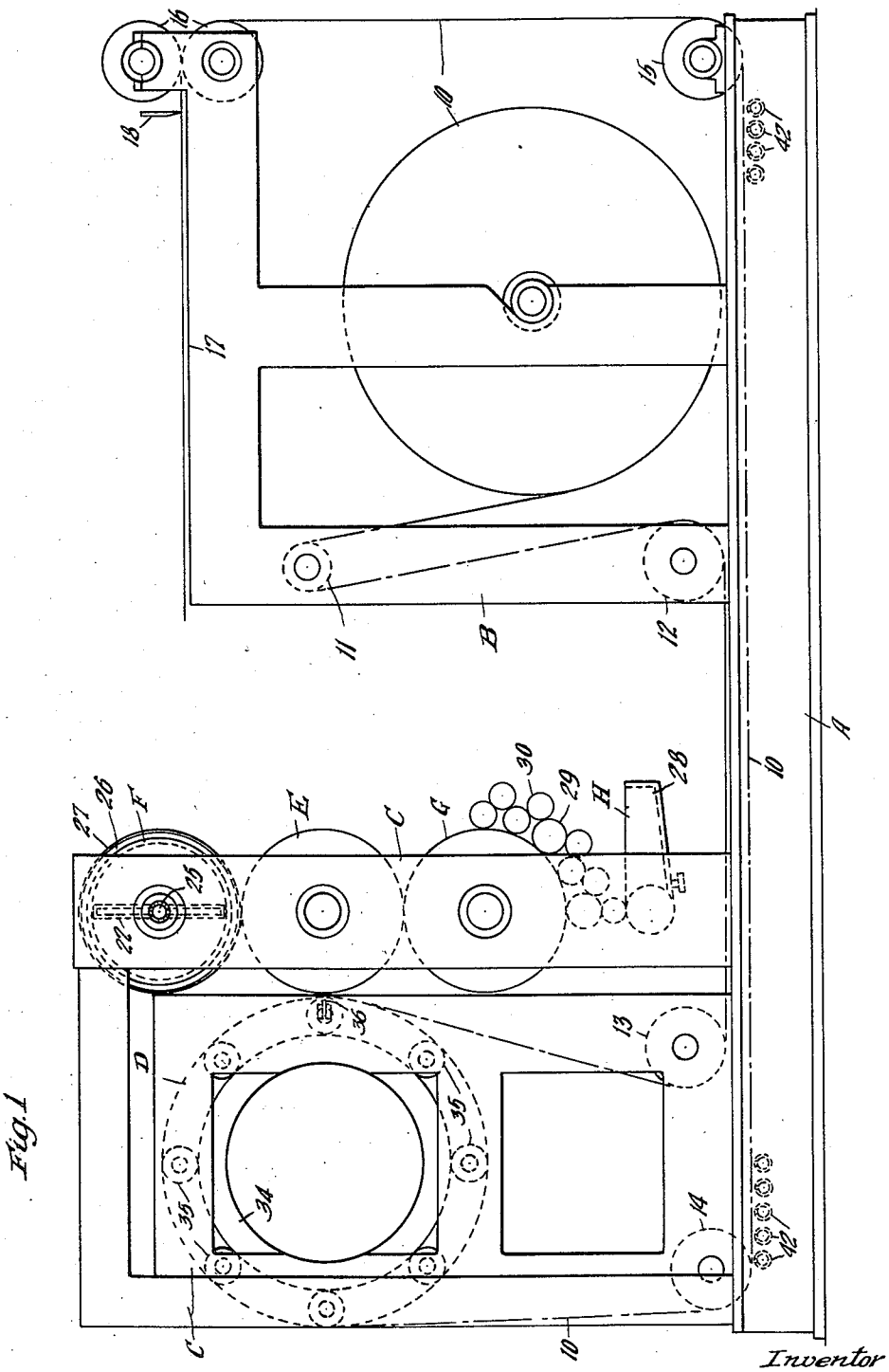


Fig. 1

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Fig. 2

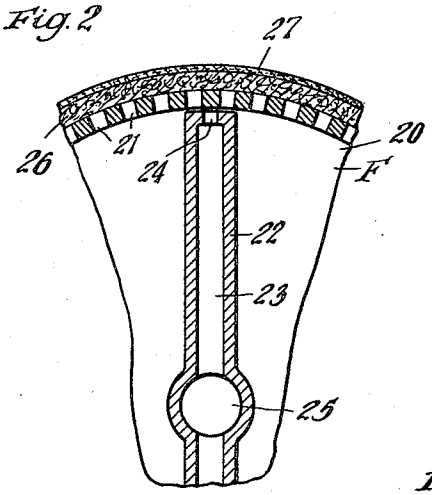


Fig. 3

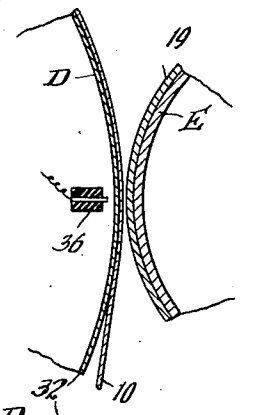


Fig. 4

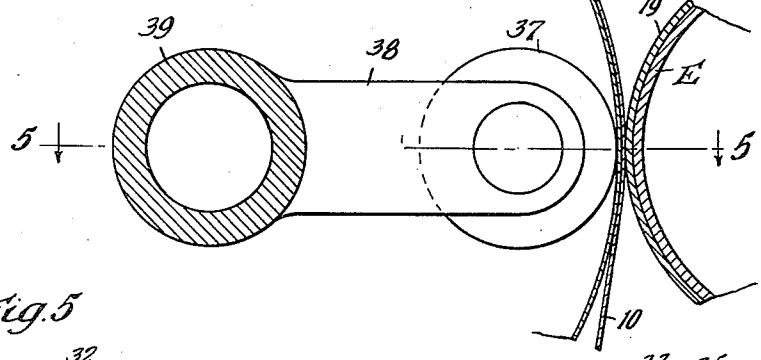
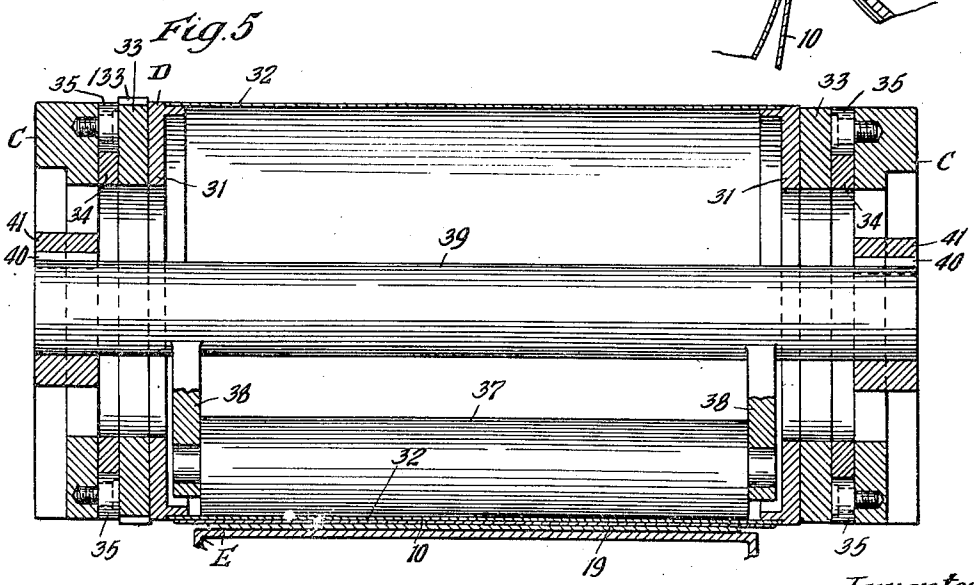


Fig. 5



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Patented Dec. 22, 1936 2,065,136

UNITED STATES PATENT OFFICE

2,065,136

PROCESS AND MEANS OF PRINTING

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Application March 14, 1934, Serial No. 715,391

8 Claims. (Cl. 101—149)

This invention relates to improvements in process and means of printing and more especially to improved process and means of printing from planographic, lithographic, deep etch or intaglio, direct or offset printing elements.

Heretofore, in all lithographic, planographic and offset printing, it has been the universal practice to dampen the entire surface of the primary, prepared printing element, for convenience hereinafter referred to as a press plate. Restated, it has been the universal practice to dampen or moisten those areas of the press plate corresponding to the matter to be reproduced or printed and which for convenience are hereinafter referred to as the image areas, as well as those portions of the press plate which are clear and not intended to have any of the ink applied to or lifted from during the printing process. In the large majority of cases, the dampening has been accomplished by the use of a multiple of rollers of small diameter as compared to the diameter of the press plate cylinder, although in some instances such complete dampening has been accomplished by spraying or by condensing moisture in a thin film over the entire plate surface.

Experience has shown that the application of an excess of moisture over the work or image areas of such press plates, prevents such image areas from either receiving or retaining the proper quantity of ink because the presence of moisture thereon tends to repel the inks, which are generally greasy, thus resulting in the impressions made from the image areas, looking gray where the impression should be solid and in lack of contrast and strength between various portions of the printed images. The difficulty referred to also results in changes in values as printed on the paper or other print-receiving element, since the impressions do not correspond in quality or range of values with those actually existing on the press plate. On the contrary, if the amount of moisture on the dampening rollers is reduced, the rollers will partially lift off a considerable quantity of the ink left on the image areas from previous inkings and the ink thus picked up by the dampening rollers is thereafter deposited in the form of scum on the near dry clear or non-image areas of the plate. The gradual accumulation of this scum in turn results in the picking up of a deposit from the ink rollers, which roll over the clear areas of the plate as well as the image areas and finally results in what is known as a "caught up plate". To overcome the latter difficulty, pressmen frequently add compounds to the dampening water in the effort to cut or dissolve the greasy scum receptive conditions of the plate, such compounds generally consisting of more or less acid or gum compounds. This in turn generally results in the ink or its ingredients tending to receive or blend with the water or fountain compound or etch with a gradual digestion of the greasy image areas on the plate until the latter become weak and finally blind with resultant inability to take or accept ink from the ink rollers. This, of course, then necessitates removing the press plate and replacing with a make over, all of which involves heavy loss of time and money and frequently eats up not only the possible profit but more.

One object of this invention, therefore, is to provide an improved method and means for restricting the dampening of a prepared press plate to the clear or non-image areas and maintaining the greasy or ink-receptive image areas free from all moisture so that the image areas are at all times completely receptive to the full quality, quantity and strength of the ink with all the gradations of values represented by the plate with correspondingly improved impressions obtained from the plate.

Also, in the prior known methods and means of applying the ink to the press plate, it has been the usual practice to use ink rollers of relatively small diameter as compared to the diameter of the press plate cylinder. Experience has shown that, when such rollers roll in contact over the surface of the press plate, each revolution of an inking roller thins or lessens the amount of ink carried by the roller with the result that the amount of ink delivered to or deposited upon the portions of the press plate at the rear or back end of the latter, considered in its direction of movement in the press, is materially less than the amount of ink that is deposited on those portions of the plate adjacent the front or gripper edge, the last named portions receiving the full charge of which the inking system is capable of delivering for any particular design of machine. Another disadvantage resulting from the inking processes and means heretofore generally used, is because of the continual contacting of the inking rollers with the various moisture or clear non-image areas of the press plate and by reason of which the water or moisture is picked up by the inking rollers and carried or transferred by the latter into the entire inking system, thus preventing the ink from working properly and from being

deposited in proper quantity and values on the press plate on account of the chemical reactions previously referred to. So pronounced does this last described action become at times that a color as printed on the paper or other print-receiving element, appears radically changed when compared to proofs printed with the identical ink, because the dampened condition of the proof plate was different from the dampened condition of the press plate employed in printing the edition.

Another object of this invention, therefore, is to provide an improved method and means for applying the ink to the press plate in such manner as to eliminate or minimize the pollution of the inking system while at the same time insuring a uniform deposit of the ink on the press plate at all points thereon where called for.

A more specific object of the invention is to provide an improved method and means of applying the ink to the press plate in such manner that the ink applying means is co-ordinated in both area and surface speed with the area and surface speed of the press plate so that the respective clear non-image areas and the image areas of the press plate will always register with corresponding areas of the inking means during each act of depositing the ink.

Other objects of the invention will more clearly appear from the description and claims hereinafter following.

In the drawings forming a part of this specification, Figure 1 is a more or less diagrammatic or schematic elevational view of a press embodying the improved means and adapted for carrying out the improved process. Figure 2 is an enlarged broken transverse or radial sectional view of a portion of the dampening cylinder employed in carrying out the invention. Figure 3 is an enlarged, broken, transverse or radial sectional view of portions of the plate and impression cylinders illustrated in Figure 1 and incorporating one embodiment of the invention. Figure 4 is a view similar to Figure 3 illustrating a modification of the means for carrying out the invention. And Figure 5 is a horizontal sectional view corresponding substantially to the line 5—5 of Figure 4.

In said drawings, the bed of the press is indicated at A and on the latter are supported two frameworks B and C. The framework B carries the supply roll 10 of paper or other material to be printed upon, the paper being run up over a roller 11, down and around another roller 12 and thence over to the other framework around and up over another roller 13, the web then being passed over and around the impression cylinder D, thence down and around a roller 14, back to the extreme righthand end of the apparatus, whence it is passed up and around roller 15 and thence between feed rollers 16 onto the top bed 17. As will be understood, the web is cut into sheets by suitable cutting mechanism, as indicated conventionally at 18, preferably operated from one of the feed rollers 16 which in turn are synchronized with the rest of the apparatus.

In addition to the impression cylinder D, the framework C carries the plate cylinder E; dampening cylinder F; inking cylinder G; and ink supply means designated generally by the reference character H. As will be understood, all the cylinders D, E, F and G will be suitably geared so as to operate in synchronized relation, it being observed that the three cylinders E, F and G are of the same surface diameter, whereas the impression cylinder D is of twice the diameter of the plate cylinder E. As will be obvious, therefore, the surface speeds of the three cylinders E, F and G will all be alike and, for each revolution of the impression cylinder D, two impressions will be made on the web.

In carrying out the invention, a press plate 19 of cushioned and insulated type will preferably be employed, such as described in co-pending application 622,051 for printing element and method of making same, filed July 12, 1932, and to which reference may be had for a more detailed description.

For the dampening cylinder F, the following described construction is preferred for the type of press illustrated in the drawings. Referring more particularly to Figure 2, the dampening cylinder comprises a suitable metal drum 20, the periphery of which is formed with a series of closely spaced holes, vents or slits 21 which pass successively over and in close proximity to an interior spray device. The latter preferably consists of a vertically extending, diametrically disposed, plate-like member 22 having a central chamber 23 and provided along its edges adjacent the interior surface of the periphery of the drum 20 with a plurality of fine jet openings or slits 24, adapted to successively register with the vents or perforations 21 of the drum, as will be apparent. Water or water vapor is preferably supplied under an air pressure blast to the central hub 25 of the member 22 at one end thereof through a suitable air and water spray mixing valve, not shown. The dampening cylinder F has applied to the surface thereof a layer or sheet of felt or other suitable equivalent material 26 and on the outer surface of the latter, the dampening blanket proper 27.

The inking cylinder G will be provided with any suitable type of inking blanket and the ink is supplied thereto from the ink fountain 28 of any suitable or usual type and the series of inking and form rollers 29—30 extending around approximately one fourth of the circumference of the inking cylinder G.

The impression cylinder D may be, and preferably is, made of relatively light construction with a hollow interior accessible through the large open ends thereof and of the framework. Preferably, said cylinder D, as best illustrated in Figure 5, comprises two annular flanged rings 31 on which is secured the impression shell or drum proper 32; two annular rings 33, one of which is formed with a peripheral gear 133 to constitute the drive for the drum; and two annular end bearing rings 34. As will be understood, each set of rings 31, 33 and 34 is rigidly united. Each bearing ring 34 cooperates with an annular series of spaced bearing rollers 35—35, carried by the framework C to thus maintain the alinement and position of the impression cylinder, as will be understood.

The transfer of ink from the press plate to the paper on the impression cylinder preferably will be made under electrostatic lines of force, as disclosed in prior Patent 1,820,194 of August 25, 1931, for Improvement in process of and apparatus for printing, the discharge comb of such apparatus being indicated conventionally at 36 in Figure 3 within the impression cylinder and in which case actual contact of the press plate 19 and the paper web 10 will not take place but instead there will be a minute spacing therebetween as indicated. In lieu of the electric discharge

method of making the impressions or transferring the ink, the usual pressure method may be employed, in which event a pressure roller 37 will be employed within the impression cylinder D, as shown in Figures 4 and 5, said roller 37 providing rolling supporting contact on the interior of the shell 32 of the impression cylinder and in which case the plate 19 of the plate cylinder E will be in direct contact with the paper, as shown. The pressure roller 37 will preferably be mounted in radial arms 38 integral with a center heavy member 39 fixedly held in position by suitable keys 40 or equivalent in supports 41—41, detachably but rigidly secured to the framework C.

Below the lower reach of the paper web 10 at each end thereof, two series of vented pipes 42—42 are preferably employed, said pipes being vented on their upper surfaces so that cold air may be blown therethrough and onto the impression side of the web as it passes thereover to congeal and set the ink.

In carrying out the invention, and more particularly the process, the following procedure is preferably adopted, it being understood that suitable provision is made in the mounting of the several cylinders E, F and G to allow for temporary separation thereof, as well as removal from the framework C. To begin the printing operation, the press plate, assuming it to have been prepared in the usual or any suitable manner, is first dampened and inked up by hand, that is, the greasy image areas are inked and the clear non-image areas dampened. The press plate on the plate cylinder E, dampened and inked as stated, is then brought into rolling and synchronized contact with the dampening blanket on the dampening cylinder F, the dampening blanket at this time being still dry. The two cylinders E and F are then rotated in contact, thus transferring an ink impression corresponding to the image areas from the press plate to the surface of the blanket, and providing on the dampening blanket areas corresponding exactly to the image areas of the press plate, which are rendered moisture proof or resistant during subsequent running of the edition. Thereafter, as will be apparent, as the moisture is sprayed from the interior of the dampening cylinder through the perforated surface and felt layer thereon to the dampening blanket proper, only those portions of the latter which correspond to the clear or non-image areas of the press plate, will be moistened. Inasmuch as the blanket and press plate cylinders have the same diameter and are maintained in geared relation with the same surface speed, it is evident that the moistened areas of the dampening blanket will always register or coincide with the clear or non-image areas of the press plate and, correspondingly, the non-moistened areas of the dampening blanket will always register with the ink-receptive image areas of the press plate. This in turn insures that the ink-receptive image areas of the press plate will always be water or moisture free and always readily receptive of the full charge of ink and will yield the latter freely during an impression or transfer to the paper web passing over the impression cylinder. In this manner, the disadvantages hereinbefore referred to resulting from the prior universal practice of moistening the entire surface of the press plate are eliminated.

With reference to the inking of the press plate from the inking cylinder G, the entire surface of the latter may be kept inked. In any event, as will be apparent, the same areas of the inking cylinder G will always register with like areas of the press plate, since the two cylinders E and G are of the same diameter and are rotated in geared relation at the same surface speed. At the same time, uniform application of the ink from the inking cylinder G over the entire length of the press plate will be assured, thus eliminating the disadvantages of prior practice where relatively small inking rollers are brought in contact with the press plate direct and which results in greater deposits of ink on the forward or gripper edge of the press plate than on the rear edge.

In some instances, a more refined and efficient method of applying the ink to the press plate may be employed as follows. In starting up, the inking blanket may first be inked all over in the usual manner. The press plate having been rolled up and mounted on the plate cylinder E and the clear or non-image areas of the latter dampened by hand, the press plate and ink blanket are then rolled in contact with each other. Ink is then deposited on the image areas only of the press plate and the ink so deposited is then transferred to the, as yet, dry dampening blanket, as previously described. The press plate is then again inked up from the inking blanket, thus depositing the ink once again on the ink-receptive or image areas only of the press plate. The inking blanket is then washed off clear and entirely free of ink, while out of contact with any of the inking rollers. While still out of contact with the inking rollers, the clean, clear inking blanket is then rolled in pressure contact with the press plate having the deposits of ink on the image areas only thereof. This results in a transfer of the ink back onto the clean inking blanket and on those areas only which correspond to and will always register with the image areas of the press plate during the running of the edition. The inking blanket with its deposits of ink on image areas only thereof then has applied thereto a solution of gum arabic and bichromate, which is suitably rubbed down and fanned dry. This results in a gum coating on the inking blanket in all areas thereof corresponding to the clear or non-image areas of the press plate, that is, on all areas other than the inked areas of the blanket, which correspond to the image areas of the press plate. The coating on the inking cylinder is then subjected to light exposure after which the coating is washed free of the bichromate, thus leaving those areas of the inking blanket corresponding to the clear or non-image areas of the press plate moisture-receptive and the remaining areas of the inking blanket corresponding to the image areas of the press plate ink-receptive. The inking blanket is now in condition for operation in conjunction with the press plate so that, after the inking rollers are brought in contact with the inking cylinder, moisture from the dampening blanket transferred through the medium of the press plate, will be applied to the moisture-receptive areas of the inking blanket and the remaining areas, only, of the latter corresponding to the image areas of the press plate will accept the ink from the inking rollers. As will be apparent, only those areas of the inking blanket which accept ink from the supply system will always register with the ink-receptive or image areas of the press plate and the latter, in turn, will always register with the dry corresponding areas of the damp-

ening blanket, thus preventing the accumulation of scum, digesting of the plate and pollution of the ink supply.

The invention has been described with reference to one type of press adapted for making impressions of one color only. As will be apparent to those skilled in the art, the essential features of the invention may obviously be incorporated in presses of various other types than the one shown and also, by suitable duplication of the plate, dampening and inking cylinder group around the impression cylinder, multi-color impressions may be made without departing from the spirit of the invention. All changes and modifications are contemplated that come within the scope of the claims appended hereto.

What is claimed is:

1. A printing press including, in combination: a printing element having the image areas thereof ink-receptive and the remaining clear areas ink-repellent and moisture-receptive; and means for dampening the printing element, said means having the areas thereof corresponding to said image areas non-dampened and its remaining areas dampened, said means and printing element being synchronized in movable contact with the image areas of the printing element always registered with the corresponding non-dampened areas of the dampening means.

2. The improvement in the process of printing, utilizing a printing plate having a planographic printing surface comprised of ink-receptive image areas and ink-repellent, moisture-receptive areas, which includes: mounting the plate on a plate cylinder; mounting a dampening blanket on a blanket cylinder in juxtaposition for synchronized rolling contact with the plate; rendering non-moisture receptive those areas of the blanket corresponding to and adapted always to register when in contact with the image areas of the plate; maintaining the remaining areas of the blanket moist; and rotating the plate and blanket cylinders with the moistened areas of the blanket in register and contact with the moisture-receptive areas of the plate.

3. A printing press including in combination: a plate cylinder having a planographic printing plate thereon, the printing surface of which is comprised of ink-receptive image areas and ink-repellent, moisture-receptive areas; a blanket cylinder having a dampening blanket thereon; non-moisture-receptive means on those areas of the blanket surface corresponding to and adapted to register in contact with the ink-receptive image areas of the plate; means for moistening the remaining areas of the blanket surface; and means for rotating the blanket and plate in contact with each other at the same surface speeds and in register.

4. The improvement in the process of printing which, when carried out in a press having synchronously operated planographic plate and dampening blanket cylinders of the same diameter, and plate inking means, includes: initially dampening and inking the respective clear non-image areas and image areas of the plate; then rolling the plate in contact with the blanket while the latter is still dry and transferring ink to the blanket on areas thereof corresponding to and always registerable with the image areas of the plate to thereby render said areas of the blanket moisture-proof; and thereafter moistening the remaining non-inked areas of the blanket for repeated moistening of the clear non-image areas of the plate during a run.

5. The improvement in the process of printing which, when carried out in a press having synchronously operated planographic press plate, and dampening blanket cylinders of the same diameter, includes: dampening and inking the respective clear non-image areas and image areas of the press plate while out of contact with the dampening blanket; then rolling the plate thus prepared in contact with the dampening blanket while the latter is still dry and transferring ink to the dampening blanket on areas corresponding to and always registerable in contact with the image areas of the plate, and thereby rendering said areas of the dampening blanket moisture-proof; and, during a run, continuing to moisten the remaining non-inked areas of the work surface of the dampening blanket.

6. The improvement in the process of printing, utilizing a printing element having a metal base and a prepared work surface whereon the image-areas thereof are ink-receptive and the remaining clear areas ink-repellent and moisture-receptive which includes: repeatedly dampening the clear areas only of the work surface of the printing element by application of moisture directly onto the exposed said clear areas of the work surface, the image-areas of the work surface thereby remaining free from moisture.

7. The improvement in the process of printing, utilizing a printing element having the image-areas thereof ink-receptive and the remaining clear areas ink-repellent and moisture-receptive, and a dampening element cooperable with the printing element, which includes: supplying moisture to only those areas of the exposed work surface of the dampening element which correspond to and contact with the clear areas of the work surface of the printing element; and then dampening the printing element by said restricted dampened areas of the dampening element with said restricted dampened areas always in register with the corresponding clear areas of the printing element.

8. A printing press including in combination: a printing element having the image-areas of the work surface thereof ink-receptive and the remaining clear areas ink-repellent and moisture-receptive; a dampening element having the work surface thereof engageable and cooperable with the printing element; means for supplying moisture to only those exposed areas of said work surface of the dampening element which engage and correspond to and always register with said clear areas of the work surface of the printing element; and means for periodically effecting engagement between said moistened areas of the work surface of the dampening element and the corresponding clear areas of the work surface of the printing element.

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