Feb. 9, 1943. W. HÜMMELCHEN 2,310,788

MEANS FOR INKING PRINTING FORMS

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Fig. 1

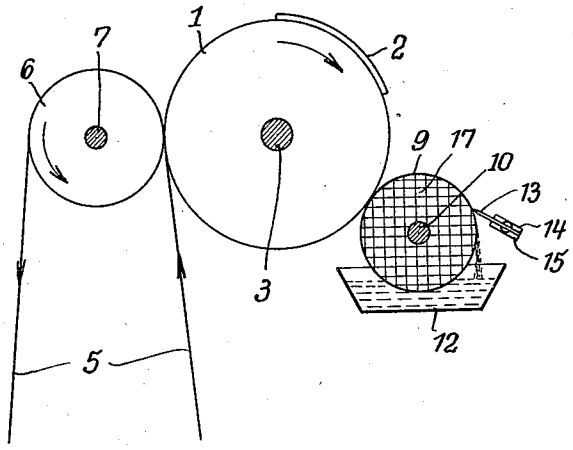
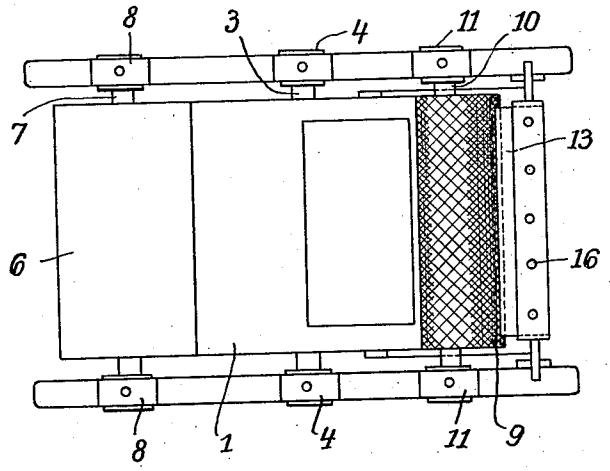


Fig. 2



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Fig. 3

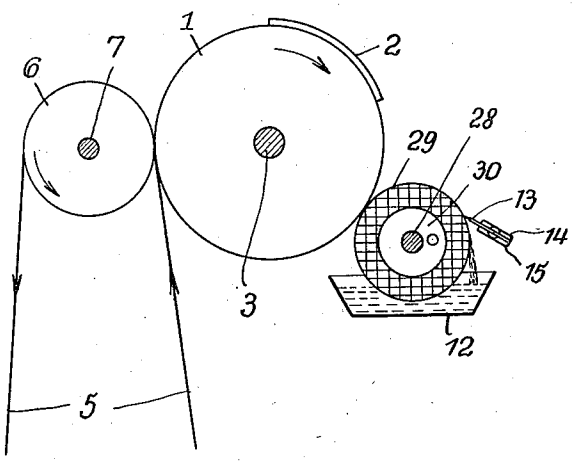
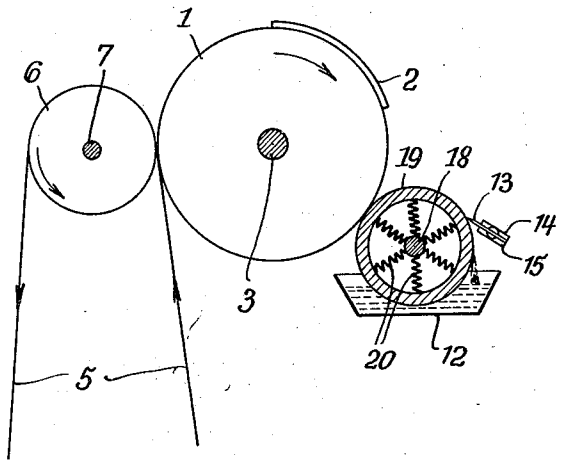


Fig. 4



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UNITED STATES PATENT OFFICE

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MEANS FOR INKING PRINTING FORMS

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Application January 9, 1939, Serial No. 250,010
In Germany January 18, 1938

3 Claims. (Cl. 101—350)

This invention relates to an improved method and means for inking printing forms and its principal object is to provide for the more advantageous inking of forms in relief.

In printing by means of blocks, the application of the ink to the parts of the printing form in relief is generally effected by applying the printing ink by means of plain cylindrical rollers made of various materials.

The strength of the ink application is regulated by precisely controllable adjustment devices for the ink-applying roller, so that the result of the printing is substantially influenced by this adjustment. In addition, in all printing processes with metal blocks, the printing inks generally have a comparatively strongly viscous or "pliant" nature. In other cases, for example with the so-called aniline-rubber printing process, the inks are very fluid and, as a rule, are clear solutions of dyestuffs for which the fluidity is a favourable condition for good results in the finished printed product. The reason for this lies in the fact that with an elastic rubber block a rapidly drying ink of thick consistency necessarily leads to unclear and blurred printing. The same thing occurs, particularly in the case of the use of rubber blocks, if the printing ink employed is filled with solid substances (pigment dyestuffs) which in themselves would offer many advantages if they could be employed without restriction in rubber-block printing. Heretofore this has not been the case because the previously indicated condition was produced in the rubber-printed work by the application of the ink, and the applied ink containing pigment tended to squeeze out due to the comparatively thick application to the elevated surface of the rubber block, causing not only blurred edges resulted in the print itself but also causing the ink to penetrate into the recesses located laterally beside the elevated parts of the block so as to smear and clog the block.

This invention avoids the defects caused by inking the printing form with a smooth surfaced roller by providing a cylindrical inking roller in the surface of which a screen-like formation, preferably a fine screen, is inset in a countersunk fashion. This inking roller having a surface of screen-like formation may be inked up in any desired fashion, and the ink not located in the depths of the screen formation is scraped off clean by means of a scraper, as in intaglio printing. Thus, the ink which comes to the printing form does not, as heretofore, lie on the surface of the inking roller, but below its cylindrical surface. The roller thus inked and scraped is pressed against the elevated parts of the form under appropriate but generally slight pressure, the form being thereby inked up in the usual fashion.

If the printing is to be effected by a metal block, it is preferable to use an inking roller made of an appropriate material which is somewhat elastic in place of the metal roller. The printing ink applied to the surface of this roller having the screen-like formation is scraped off from the cylindrical surface parts which do not take part in the inking operation.

Further features of the invention will appear from the following description made with reference to the annexed drawings wherein:

Figure 1 is a diagrammatic elevation view of the assembly and

Figure 2 is a plan of one ink-applying arrangement in accordance with the invention.

Figure 3 is a diagrammatic elevation of a modification in which a pneumatically mounted inking roller is used, and

Figure 4 is a similar view of a further modification in which a spring-mounted inking roller is used.

Referring to Figures 1 and 2, the printing roller 1 with the printing form 2 has its shaft 3 mounted in bearings 4 and prints upon the paper web 5 which is carried over the counter-pressure roller 6 the latter having its shaft 7 mounted in bearings 8. Arranged in front of the printing roller 1 is an inking roller 9 the shaft 10 of which runs in bearings 11. The surface of the roller 9 is scored, grooved or otherwise provided with the aforesaid screen-like formation. The ink which is taken up by the inking roller 9 by dipping into the ink trough 12 is scraped off clean by the scraper or doctor-plate 13 which is secured, for example, by means of screws 16 between upper and lower beams 14 and 15. Thus, the ink for printing does not, as heretofore, lie upon but lies below the cylindrical surface of the roller 9. By this means the elevated parts of the form 2 become properly inked but there is a definite avoidance of filling with ink the recesses located beside the elevated parts. Therefore, the defects and troubles which otherwise arise in this type of printing (i. e. off-set of the print) are avoided and uniformly clean and sharp printed products can always be obtained in continuous operation.

If printing is to be effected by metal blocks, then in place of a metal roller there is preferably selected an inking roller 9 of an appropriate

material which is elastic to a certain extent and from which the ink is scraped off from the cylindrical surface parts which are not to partake in the inking up, the ink being carried by the screen-like formation as aforesaid.

Experiments have shown that the invention has made it possible, particularly when using relief forms of elastic materials (rubber blocks), to employ inks highly filled with pigments, which heretofore only led to difficulties and troubles for the reasons mentioned above. In the same fashion, it is possible according to the invention to ink up metal blocks with thinly fluid ink by the use of a simple inking arrangement and nevertheless to obtain sharp and trouble-free printing.

The invention also offers the possibility of high speed printing from metal blocks when using viscous printing inks which have been prepared with readily volatile solvents, particularly in cases in which the inks are to be superimposed in large-surface printing (multi-colour printing).

Heretofore, difficulties have arisen in the inking up of relief forms of rigid material, for example metal, due to the fact that all the elevated parts are not engaged uniformly by the inking roller. This may occur if individual parts of the printing surface do not lie in geometrically precise fashion in one cylindrical surface with the other parts. In this case the lower-lying parts receive little or no ink. With a soft rubber roller, this defect could in some circumstances be simply obviated by increasing the bearing pressure. Since an elastic roller according to the invention must have a screen-like formation, its surface must be made of a material which is sufficiently hard for the purpose and cannot be made merely of soft rubber. In any case, the hardness must be so selected that a screen-like formation suitable for the purpose of the invention is possible. Even then, however, the desired elasticity of the inking roller might in some circumstances still be open to question. Therefore, according to a further feature of the invention, an inking roller is provided comprising a shell forming an outer hard layer, or, in any case, a layer sufficiently hard for the production of the screen-like formation whilst the remaining part located within the shell is an elastic body pressing uniformly against the interior of the shell.

Thus, a rigid shaft of metal or other material may have mounted upon it a cylinder of soft rubber which is enclosed by the harder layer or shell in the surface of which the screen-like formation is produced. Such a construction is illustrated in Figure 1 where the shaft **10** of the inking roller **9** is embedded in a cylinder **17** of soft rubber, the latter having an outer jacket or shell of a harder layer which bears the screen-like formation.

According to a modification, illustrated in Figure 4, a rigid cylindrical shell **19** may be supported from the shaft **18** by resilient members **20** giving, in the position of rest, a force distribution which is uniform in all directions. This support may be effected, inter alia, not only by means of spiral springs, as shown, but also by means of leaf and other springs. An ink-receiving layer having a screen-like formation is then applied to the rigid cylindrical shell **19** or the shell itself may receive such formation.

If it is not desired to employ springs or like mechanical elements, an elastic mounting may be achieved by means of a pneumatic cushion **30**, as shown in Figure 3, disposed between the inking surface **29** and the shaft **28**, as is the case of pneumatic wheels of motor vehicles. This construction has the advantage that the elasticity of the inking roller can be modified within wide limits for varying the bearing pressure to suit the requirements of the block from which the printing is to be done. It is immaterial whether an inking roller of this nature includes only a single cushion or several cushions, provided only that a uniform distribution of the bearing pressure for the ink transfer takes place.

The screen-like formation hereinbefore described may, according to this invention, be replaced by pressing a fine metal screen, for example, made of bronze upon a cylindrical surface of suitable material, for example, rubber of appropriate hardness or an artificial material. An inking roller thus provided with a fine screen surface is scraped after inking, as described above, after which it contacts the relief printing form. Naturally the mesh number of the screen must be selected so that it corresponds wholly or substantially to the usual intaglio printing screens. Such a metal screen can be used for each of the described embodiments of the invention, but self-evidently it must always lie upon the cylinder in such manner that no recesses running continuously from one end of the roller to the other come to lie in the generatrices of the cylinder. This applies to all screen-like formations of the invention, since, in this case, the scraper would scrape not only the elevated but also the recessed parts of the screen.

I claim:

1. An apparatus for inking a rubber printing form comprising a resiliently mounted inking roller having an inflexible meshed surface, an ink supply, scraping means for cleaning the surface after it has been inked, and means for supporting the roller and printing form relatively so that the cleaned surface of the roller bears against the printing form with uniform pressure.

2. An apparatus for inking a rubber printing form comprising a pneumatically supported inking roller having an inflexible meshed surface, an ink supply, scraping means for cleaning the surface after it has been inked, and means for supporting the roller and printing form relatively so that the cleaned surface of the roller bears against the printing form with uniform pressure.

3. Printing mechanism including cooperating printing and inking surfaces adapted to have rolling contact, at least one of said surfaces being resiliently supported, the inking surface being characterized by a network of grooves having capacity to receive an amount of ink sufficient to ink the printing surface, means for applying ink to said inking surface, and means for scraping from said surface, prior to contact of such surface with the printing surface, all of the ink so applied except that within the said grooves.

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