Dec. 15, 1964 W. S. VOGEL 3,161,130

PRINTING APPARATUS

Filed May 27, 1963

Fig. 1.

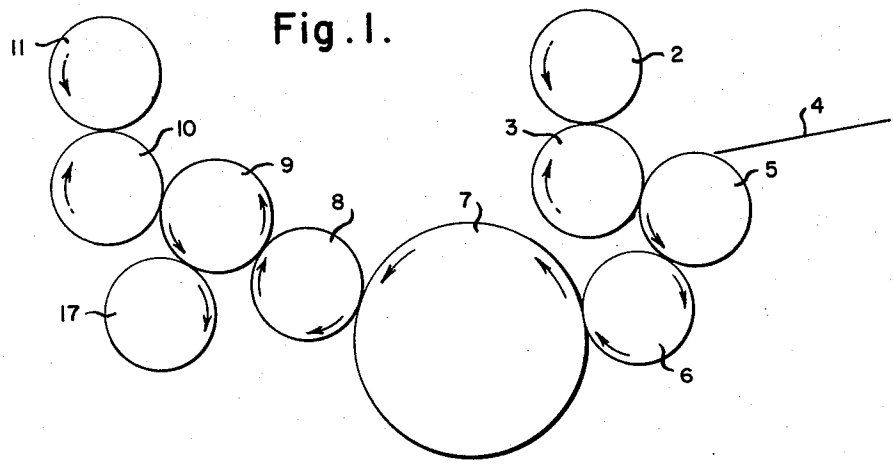


Fig. 2.

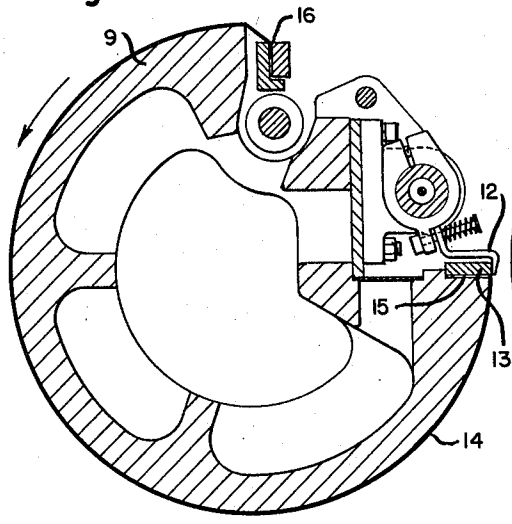


Fig. 3.

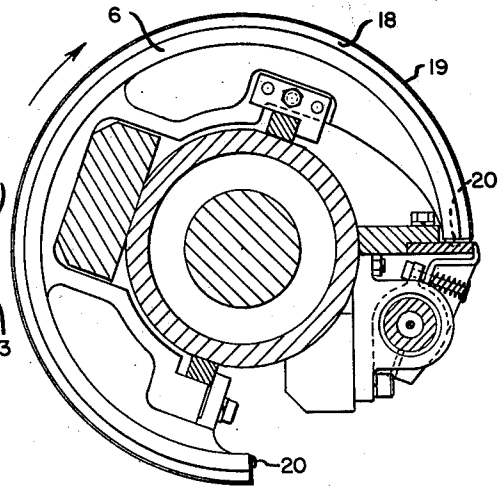
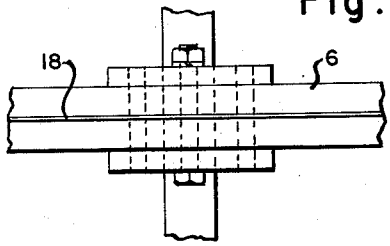


Fig. 4.



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3,161,130

PRINTING APPARATUS

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20 Claims. (Cl. 101—422)

This invention relates to printing apparatus and has to do with means for obviating smearing and transfer of ink when in the passage of sheets through a printing press the printing on the sheets is contacted by a surface of an element of the press before the ink is completely dry.

An example of printing apparatus to which my invention is applicable is a perfecting press in which sheets are printed on opposite sides in separating printing couples, the sheets being advanced through the press from the first printing couple to the second printing couple. The time which elapses between the printing on one side of a sheet in the first printing couple and the printing on the opposite side of the sheet in the second printing couple is very short so that even with the use of quick drying ink the ink constituting the printing of the first printing couple is not completely dry when the sheet reaches the second printing couple. But in the second printing couple the side of the sheet which was printed in the first printing couple lies against the impression cylinder of the second printing couple during printing of the opposite side of the sheet in the second printing couple and danger of smearing the still somewhat wet ink or transfer of ink to succeeding sheets by the impression cylinder exists.

In an attempt to solve this problem various proposals have been made for treatment of the surface of the impression cylinder of the second printing couple to make that surface resistant to ink so that the ink constituting the printing of the first printing couple will no be smeared upon contact with the impression cylinder of the second printing couple and so that ink will not be transferred by such impression cylinder to succeeding sheets. The impression cylinder has been covered with an aluminum sheet which has been grained or anodized or sand-blasted or otherwise treated but that did not obviate smearing and ink transfer. The impression cylinder has been covered with a sheet consisting of a paper backing covering with an adhesive in which minute glass beads or spheres are embedded but completely satisfactory results have not been obtained. Smearing and ink transfer have not been eliminated, and the glass beads become disassociated from the paper backing and impair the printing and necessitate shutting down and cleaning of the press. Those most highly skilled in the art have been attempting to discover a solution to the problem for many years but no satisfactory solution has been discovered prior to my invention.

I have discovered that the problem above referred to can be satisfactorily solved by providing a chromium-surfaced element for contact with the not completely dry ink constituting the printing of the first printing couple as the sheet is advanced to and through the second printing couple. The impression cylinder of the second printing couple may have a chromium surface; also, a transfer cylinder between the printing couples may be provided with a chromium surface. In certain types of presses transfer cylinders have been employed consisting of parallel partial disc-like elements positioned to engage the side of sheets which has been printed on but on which the ink is not completely dry, such elements contacting the sheets at spaces or gaps in the printing, as, for example, page borders in a sheet on which several pages are printed at the same time. I have found that a chromium-surfaced sheet can be disposed at the periphery of the partial disc-like elements of such a transfer cylinder so as to span the spaces between such elements with the chromium surface of the sheet disposed outwardly.

For optimum results the chromium surface should have a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.). I find that an ideal chromium surface is produced by chromium plating. A very thin plating of chromium serves the purpose, although so far as resistance to ink is concerned the plating may be of any thickness. Excellent results are obtained with a chromium plating having a thickness in the range .0003"–.0005".

It is desirable to produce the desired chromium surface on an impression cylinder or transfer cylinder or other element of a printing press adapted to contact ink which is not yet completely dry on sheets moving through the press by application thereto of a chromium-plated sheet. I prefer to employ a chromium-plated aluminum sheet since aluminum has the desired flexibility and can be fabricated and plated in the desired thickness. I prefer to utilize an alumium sheet having a thickness in the range .006"–.011". Thinness of the applied sheet is highly important in certain cases, as, for example, when the sheet is applied to an impression cylinder of a press which may be used selectively for two-color printing on the same side of the sheet and for perfecting. Such a press is disclosed in United States Patent No. 2,757,610. When such a press is used for straight two-color printing the impression cylinder of the second printing couple may not have the chromium-plated sheet applied to it but such sheet may be applied when the press is used for perfecting. Application of the sheet increases the effective diameter of the impression cylinder which in turn affects the printing. Consequently it is desirable that the sheet be of minimum thickness consistent with obtaining of the results sought. It is possible to leave the sheet in place on the impression cylinder for two-color printing or to replace it with a plain sheet of equal thickness so that the effective diameter of the impression cylinder of the second printing couple will be the same in straight two-color printing as in perfecting.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention in which

FIGURE 1 is a diagram of an offset printing press which may be used selectively for straight two-color printing or for perfecting, such press being of the type disclosed in said Patent No. 2,757,610;

FIGURE 2 is a cross-sectional view through the impression cylinder of the second printing couple;

FIGURE 3 is a cross-sectional view through the first transfer cylinder; and

FIGURE 4 is a fragmentary view taken at right angles to the axis of the transfer cylinder of FIGURE 3 showing one of the parallel partial disc-like elements of the transfer cylinder before the chromium-surfaced sheet is applied to the transfer cylinder.

Referring now more particularly to the drawings, the press shown in FIGURE 1 has a first plate cylinder 2 to which the first printing plate is applied and to which ink and water are applied by means not shown well known to those skilled in the art. The first blanket cylinder is designated 3. It offsets the ink from the first plate cylinder 2 onto the first side of sheets fed to the press on a feed board 4. The sheets are taken by grippers of the first impression cylinder 5 and are printed upon by the first blanket cylinder 3 as they pass between the first blanket cylinder 3 and the first impression cylinder 5 constituting the first printing couple.

The sheets are taken from the first impression cylinder 5 by grippers on the first transfer cylinder 6 and are delivered to grippers on the second transfer cylinder 7. From the second transfer cylinder 7 the sheets are delivered to grippers of the third transfer cylinder 8 whence they are delivered to grippers of the second impression cylinder 9 coacting with the second blanket cylinder 10 to form the second printing couple. The second blanket cylinder 10 offsets ink from the second plate cylinder 11 which carries the second printing plate to which ink and water are applied by means not shown well known to those skilled in the art.

The grippers of the various cylinders are not shown in FIGURE 1 as their structure and function are well known to those skilled in the art; moreover, the grippers are shown in Patent No. 2,757,610. The third transfer cylinder 8 may take the sheets from the second transfer cylinder 7 by either their leading edges or their trailing edges depending upon whether the press is being used for straight two-color printing or for perfecting. When the press is being used for straight two-color printing the grippers of the third transfer cylinder 8 take the sheets from the second transfer cylinder 7 by their leading edges with the result that the second printing couple prints upon the same side of the sheets as the first printing couple. When the press is used for perfecting the grippers of the third transfer cylinder 8 take the sheets from the second transfer cylinder 7 by their trailing edges resulting in reversal of the sheets in relation to the position which they would occupy on the third transfer cylinder 8 had they been taken from the second transfer cylinder 7 by their leading edges. This is in accordance with the full disclosure of Patent No. 2,757,610.

The direction of rotation of the cylinder is indicated in FIGURE 1 by arrows. When the press is being used for perfecting the side of each sheet which is printed upon in the first printing couple is disposed inwardly or against the first transfer cylinder 6 and the second impression cylinder 9.

The second impression cylinder 9 is shown in FIGURE 2. It includes grippers 12 coacting with a gripper pad 13 and operated in well known manner. Since the operation of the grippers is not involved in the present invention such operation will not be described but will be understood by those skilled in the art. A sheet 14 is applied to the surface of the cylinder 9, the ends 15 and 16 of the sheet being held by suitable clamping means. The sheet 14 is a chromium-plated aluminum sheet with the chromium-plated surface disposed outwardly. The aluminum sheet per se is .009" thick and the chromium plating has a flash thickness of .0004" making the total thickness of the chromium-plated sheet .0094". The outer or chromium-plated surface of the sheet 14 has a roughness of 190 microinches (R.M.S.).

As sheets which have been printed in the first printing couple are delivered to the second printing couple they are taken by the grippers 12 of the second impression cylinder 9 with the side of the sheet which was printed in the first printing couple disposed against the outer chromium-plated face of the sheet 14 which is resistant to the not completely dry ink and obviates smearing of the ink and transfer of ink to succeeding sheets. In the second printing couple the sheets are printed on the side opposite the side on which they were printed in the first printing couple and are taken from the second impression cylinder 9 by grippers of a delivery cylinder 17 whence they pass to a delivery mechanism as well known to those skilled in the art.

When the press is used for straight two-color printing the sheet 14 may be left in place on the second impression cylinder 9 or it may be removed. By reason of its extreme thinness the sheet 14 does not materially alter the diameter of the cylinder 9, although of course it does alter such diameter to a slight extent. If desired the sheet 14 may be replaced by a plain sheet of the same thickness as the sheet 14 when the press is used for straight two-color printing whereby the effective diameter of the cylinder 9 is precisely the same for straight two-color printing and for perfecting.

FIGURES 3 and 4 show the first transfer cylinder 6. That cylinder consists of parallel partial disc-like elements one of which is shown at 18 in FIGURE 4. When no sheet as presently to be described is applied to the first transfer cylinder the sheets passing thereabout are engaged by the elements 18 in unprinted areas. I apply to the cylinder 6 a sheet 19 which may be identical with the sheet 14 above described and applied to the cylinder 6 so that it is disposed at the periphery of the elements 18 and spanning the spaces therebetween. The sheet 19 may be fastened in place by any suitable fastening or clamping means indicated diagrammatically at 20. The application of the sheet 19 transforms the first transfer cylinder 6 from a cylinder consisting of parallel partial disc-like elements adapted to engage the paper in unprinted areas into a cylinder having a continuous surface engaging the side of the sheet printed in the first printing couple. The advantage is a more positive handling of the sheet while at the same time obviating smearing of the ink and transfer of ink to succeeding sheets.

I find that a chromium-plated aluminum sheet used for the purpose above described receives a slight imprint of the printing but the imprint is negligible and the ink constituting the imprint dries in a single revolution so that it is not transferred to succeeding sheets. If desired, the sheet can be washed at intervals.

Thus I have for the first time successfully solved a problem which those most highly skilled in the art have been endeavoring to solve for many years. The solution once it is appreciated is simple and relatively inexpensive and highly effective. It increases the efficiency of perfecting presses and results in increase in the quality of printing.

While I have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including a surface against which the side of the sheet printed in said printing couple is adapted to lie before the ink is completely dry, said surface consisting of a thin layer of chromium having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.) which is resistant to the ink whereby smearing of the ink and transfer of ink to succeeding sheets are obviated.

2. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including an element against which the side of the sheet printed in said printing couple is adapted to lie before the ink is completely dry, said element comprising a chromium-plated base with the chromium plating at the surface of the element against which the sheet lies, said surface having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.) and being resistant to the ink whereby smearing of the ink and transfer of ink to succeeding sheets are obviated.

3. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including a rotatable cylinder with gripper means on the cylinder for taking the advancing sheet as the cylinder rotates with the side of the sheet printed in said printing couple lying against the cylinder before the ink is completely dry, the surface of the cylin-

der against which said side of the sheet lies consisting of a thin layer of chromium having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.) which is resistant to the ink whereby smearing of the ink and transfer of ink to succeeding sheets are obviated.

4. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including a rotatable cylinder with gripper means on the cylinder for taking the advancing sheet as the cylinder rotates with the side of the sheet printed in said printing couple lying against the cylinder before the ink is completely dry, the surface of the cylinder against which said side of the sheet lies being chromium-plated and having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

5. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including a chromium-plated sheet against the chromium-plated surface of which the side of the sheet printed in said printing couple is adapted to lie before the ink is completely dry, said chromium-plated surface having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

6. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including a rotatable cylinder with gripper means on the cylinder for taking the advancing sheet as the cylinder rotates with the side of the sheet printed in said printing couple lying against the cylinder before the ink is completely dry, the surface of the cylinder against which said side of the sheet lies being constituted by a chromium-plated sheet with the chromium plating disposed outwardly, the chromium-plated surface of the sheet having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

7. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including a rotatable cylinder with gripper means on the cylinder for taking the advancing sheet as the cylinder rotates with the side of the sheet printed in said printing couple lying against the cylinder before the ink is completely dry, the surface of the cylinder against which said side of the sheet lies being constituted by a chromium-plated aluminum sheet with the chromium plating disposed outwardly, the chromium-plated surface of the aluminum sheet having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

8. A cylinder for a printing press having gripper means for taking an advancing sheet as the cylinder rotates, the surface of the cylinder against which the sheet lies consisting of chromium having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

9. A cylinder for a printing press having gripper means for taking an advancing sheet as the cylinder rotates, the surface of the cylinder against which the sheet lies being chromium-plated and having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

10. A cylinder for a printing press having gripper means for taking an advancing sheet as the cylinder rotates, the surface of the cylinder against which the sheet lies consisting of a chromium-plated sheet with the chromium plating disposed outwardly, the chromium-plated surface of the sheet having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

11. A cylinder for a printing press having gripper means for taking an advancing sheet as the cylinder rotates, the surface of the cylinder against which the sheet lies consisting of a chromium-plated aluminum sheet with the chromium plating disposed outwardly, the chromium-plated surface of the aluminum sheet having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

12. A perfecting printing press comprising two printing couples respectively for printing on opposite sides of a sheet and means for advancing the sheet after the sheet passes through the first printing couple and delivering the sheet to an impression cylinder constituting an element of the second printing couple with the side of the sheet printed in the first printing couple lying against said impression cylinder before the ink applied in the first printing couple is completely dry, the surface of said impression cylinder being of chromium, having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

13. A perfecting printing press comprising two printing couples respectively for printing on opposite sides of a sheet and means for advancing the sheet after the sheet passes through the first printing couple and delivering the sheet to an impression cylinder constituting an element of the second printing couple with the side of the sheet printed in the first printing couple lying against said impression cylinder before the ink applied in the first printing couple is completely dry, the surface of said impression cylinder being chromium-plated and having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

14. A perfecting printing press comprising two printing couples respectively for printing on opposite sides of a sheet and means for advancing the sheet after the sheet passes through the first printing couple and delivering the sheet to an impression cylinder constituting an element of the second printing couple with the side of the sheet printed in the first printing couple lying against said impression cylinder before the ink applied in the first printing couple is completely dry, the surface of said impression cylinder being constituted by a chromium-plated sheet with the chromium plating disposed outwardly, the chromium-plated surface of the sheet having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

15. A perfecting printing press comprising two printing couples respectively for printing on opposite sides of a sheet and means for advancing the sheet after the sheet passes through the first printing couple and delivering the sheet to an impression cylinder constituting an element of the second printing couple with the side of the sheet printed in the first printing couple lying against said impression cylinder before the ink applied in the first printing couple is completely dry, the surface of said impression cylinder being constituted by a chromium-plated aluminum sheet with the chromium plating disposed outwardly, the chromium-plated surface of the aluminum sheet having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

16. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including a transfer cylinder comprising parallel partial disc-like elements with a sheet disposed at the periphery of said elements and spanning the spaces therebetween, said sheet having an outer surface of chromium having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

17. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including a transfer cylinder comprising parallel partial disc-like elements with a sheet disposed at the periphery of said elements and spanning the spaces therebetween, said sheet being chromium-plated with the chromium plating facing outwardly, the chromium-plated

surface of the sheet having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

18. A printing press comprising a printing couple for printing on one side of a sheet and means for advancing the sheet after the sheet passes through said printing couple, said means including a transfer cylinder comprising parallel partial disc-like elements with a sheet disposed at the periphery of said elements and spanning the spaces therebetween, said sheet being of chromium-plated aluminum with the chromium plating facing outwardly, the chromium-plated surface of the aluminum sheet having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

19. A transfer cylinder for a printing press having parallel partial disc-like elements with a sheet disposed at the periphery of said elements and spanning the spaces therebetween, said sheet having an outer surface of chromium having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

20. A transfer cylinder for a printing press having parallel partial disc-like elements with a sheet disposed at the periphery of said elements and spanning the spaces therebetween, said sheet being of chromium-plated aluminum with the chromium plating facing outwardly, the chromium-plated surface of the aluminum sheet having a roughness of at least 80 microinches (R.M.S.) but not to exceed 300 microinches (R.M.S.).

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EUGENE R. CAPOZIO, *Primary Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,161,130

December 15, 1964

William S. Vogel

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 16, for "separating" read -- separate --; line 37, for "no" read -- not --; column 6, line 16, strike out the comma.

Signed and sealed this 4th day of May 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents