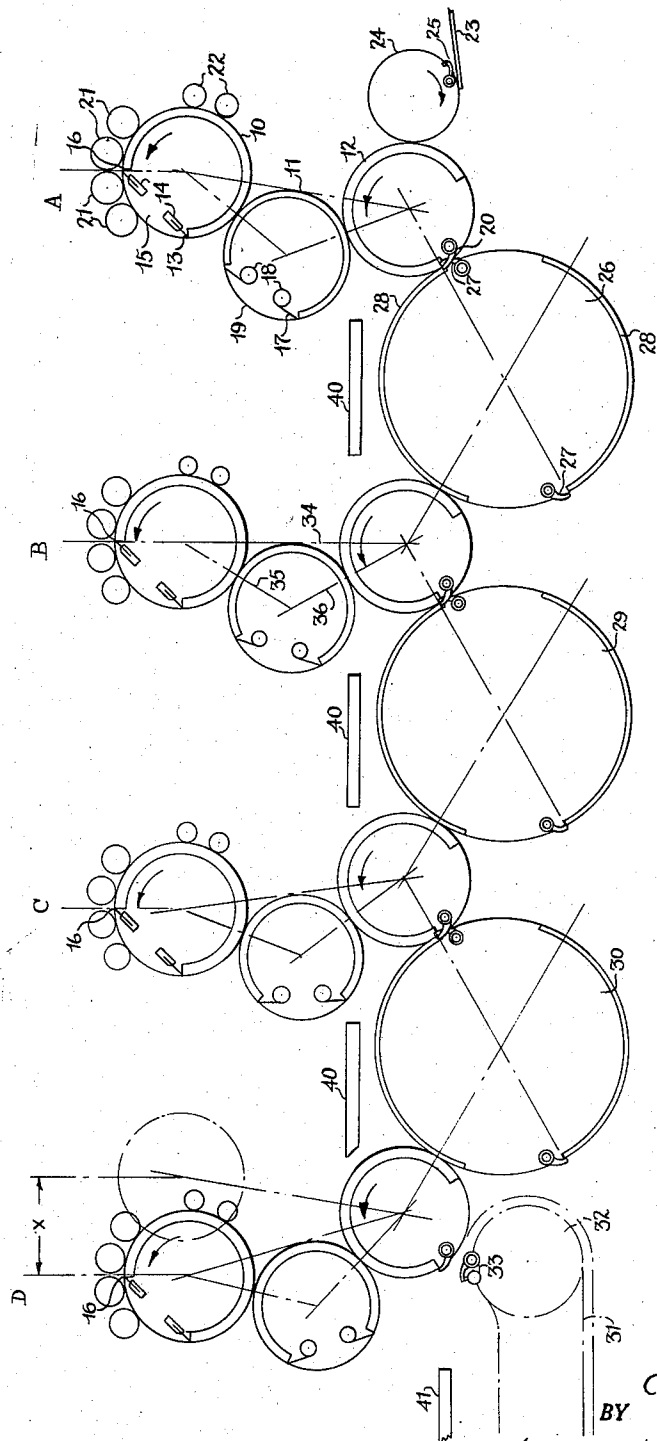


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C. W. HARROLD
MULTICOLOR PRINTING PRESS

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MULTICOLOR PRINTING PRESS

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This invention relates to improvements in multicolor printing presses, particularly rotary offset presses, and has to do with an improved arrangement of the cylinders of the different units resulting in increased working space between the units.

In the type of multicolor offset printing press in which the sheets to be printed are passed successively through a plurality of printing units, each of which comprises a plate cylinder, a blanket cylinder and an impression cylinder, it is necessary to provide sufficient space between adjacent printing units to accommodate the press operator so that he may work upon the plate and blanket cylinders and upon the inking and dampening mechanism.

In such presses it is important, from the standpoint of efficiency of operation, that the printing cylinders be arranged in such a way that the angular positions of the cylinders at any point in their rotation be the same in all units. Such an arrangement makes it possible to perform the same operation on all units at the same time. For example the operations of applying or removing a plate from the plate cylinder, washing or gumming up the plate, washing or otherwise treating the blanket, etc., may be performed by different operators working simultaneously on the several units, thereby saving considerable time over that required if each unit were to be operated upon separately, it being important of course that an expensive machine be productively employed during as much as possible of each working day.

It is also desirable that in such presses the sheet, in passing through the press, be handled by as few sets of sheet grippers as possible in order to minimize the danger of mis-register of the sheets.

It has been found in practice that the above desirable ends may be satisfactorily achieved by arranging the cylinders of the press in such manner that all of its printing units are substantially identical and are disposed in the same relation to the base line of the press, and by providing between the impression cylinders of adjacent printing units a single transfer cylinder having twice the diameter of the impression cylinders and so located that the lines joining the centers of each of the impression cylinders and the center of the transfer cylinder lie at an angle of 120° to each other. By means of such an arrangement all the impression cylinders occupy the same rotational position at all times, and since the printing units are all similar the other cylinders of the units also occupy the same rotational position at any given time.

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It is apparent that the amount of working space between adjacent units in such a press will depend at least partly upon the diameters of the cylinders, there being more working space in a press having large cylinders than in a press having small cylinders. Thus, a press having small cylinders designed for printing on relatively small sheets may not provide sufficient space between units for the operator to conveniently and efficiently perform his necessary duties.

I have found that additional working space between units, as compared to the space provided by the known construction described above, can be provided by a new arrangement of the printing units while still substantially retaining the desirable features above referred to.

Accordingly, it is an object of the present invention to provide a sheet fed multicolor printing press having increased working space between units.

Another object of the invention is the provision in a multicolor offset printing press of increased space between units, wherein the plate cylinders of the various units all occupy the same angular position at any given time.

Another object is the provision of such a press in which the cylinders of each unit are disposed at the points of a triangle, and in which the triangles are similar but are disposed in different angular positions relative to the base line of the press.

Still another object is the provision of a press of the type described in which sheets are conveyed from one impression cylinder to the next by a transfer cylinder having twice the diameter of the impression cylinders and in which greater space is provided between units than in presses heretofore employing such transfer cylinders.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the single figure of the accompanying drawing.

In carrying out the invention I provide a press having a plurality of printing units, each comprising a plate cylinder, a blanket cylinder, and an impression cylinder all of the same diameter, and I employ between the impression cylinders of adjacent units a transfer cylinder whose diameter is twice that of the impression cylinders, and which is so located that the impression cylinders all occupy the same angular position at any given time. The three cylinders of each printing unit are arranged with their axes at the points of an isosceles triangle, and the triangles of all units are identical. The blanket and plate cylinders of

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each unit however are so arranged that the triangles of the different units take different angular positions with respect to the base line of the press. In other words each printing unit is tilted to a different extent about the axis of its impression cylinder. As illustrated the first printing unit is given a certain angular position and each succeeding unit is tilted to a greater extent toward the delivery end of the press. Thus the press of this invention may be said to have its printing units fanned out. As will later appear, this is accomplished while retaining all the plate cylinders in the same rotational position and with very little change in the rotational position of the blanket cylinders.

In the drawing a four color press is illustrated, the printing units thereof being designated A, B, C and D. Each unit comprises a plate cylinder 10, a blanket cylinder 11 and an impression cylinder 12. Plate cylinder 10 is provided with a plate 13 held in clamps 14 within a gap 15, all in the usual manner. The leading edge of the plate cylinder printing surface is indicated at 16. The blanket cylinder 11 is provided with a blanket 17 held by reel rods 18 within the gap 19 of that cylinder. The impression cylinder 12 is equipped with the usual sheet grippers 20 which receive the sheet, carry it past the blanket cylinder 11 where it is printed and release it at the proper time. The usual form inking rollers are indicated at 21, and the dampening rollers at 22.

Sheets are fed in any desired manner to the grippers 20 of the first impression cylinder 12, for example, by means of a feed board 23 and an intermittently rotating feeding cylinder 24 having grippers 25.

Between the impression cylinders 12 of units A and B there is a transfer cylinder 26 the diameter of which is substantially twice that of the impression cylinders 12. This transfer cylinder is provided with two sets of grippers 27 and two sheet supporting surfaces 28. It is so arranged with respect to the associated impression cylinders 12 that the lines joining the centers of the impression cylinders with the center of the transfer cylinder lie at an angle of 120° with each other, thereby causing the impression cylinders to occupy the same rotational position with respect to the base line of the press.

Between the impression cylinders of units B and C is a transfer cylinder 29 similar to cylinder 26, and between the impression cylinders of units C and D there is a further transfer cylinder 30 of similar construction.

Above each of the transfer cylinders is a platform 40 upon which the operator stands while working on the plate and blanket cylinders. At the left of unit D is a platform 41 on which the operator stands while working on the cylinders of that unit.

Adjacent the impression cylinder 12 of the last unit D there is a sheet conveyor 31 comprising chains which run around sprockets 32 and carry a series of gripper bars 33 which take the sheets from the impression cylinder and convey them to a pile in a manner well known in the art.

All of the printing cylinders 10, 11 and 12 and the transfer cylinders 26, 29 and 30 are geared together in the usual manner, not shown, so as to rotate in unison and in the proper timed relation.

As will be apparent the sheets are fed by feeding cylinder 24 to the impression cylinder 12 of unit A, are transferred by a transfer cylinder 26

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to impression cylinder 12 of unit B and so on through the succeeding units, and are delivered from the last unit by conveyor 31. The impression cylinders of all units occupy the same rotational position, as indicated in the drawing.

The three cylinders of each printing unit are arranged with their axes at the points of a triangle and the sides of this triangle are indicated for clearness by numerals 34, 35 and 36. The triangles of all units are similar, but it will be noted that the long side or base 34 of each triangle which connects the axes of the impression and plate cylinders, stands at a different angle to the base line of the press from the base of every other triangle, side 34 of unit A being tilted somewhat toward the feeder end of the press, side 34 of unit B being approximately vertical, side 34 of unit C being tilted somewhat toward the delivery end of the press and side 34 of unit D being still further tilted toward the delivery end of the press. The accumulated difference between the positions of the plate cylinders of units A and D is indicated by the letter X, this difference being divided substantially equally between the three working spaces between adjacent units, so that all of these spaces are substantially equal.

It is to be noted that the printing surfaces of the three cylinders of any given printing unit must register with each other during rotation of the cylinders, that is the leading edges and trailing edges of these printing surfaces must come together at the proper time in the cycle, and this condition must be satisfied regardless of the angular position of the printing unit with respect to the center of its impression cylinder. Thus it is evident that if the impression cylinder of a unit is held fixed and the plate and blanket cylinders are bodily swung about the axis of the impression cylinder, the blanket cylinder 11 must in effect roll upon the impression cylinder 12, and the plate cylinder 10 must roll in the opposite direction upon the blanket cylinder 11. Thus, regardless of how much or how little the plate and blanket cylinder are swung about the axis of the impression cylinder, the leading edge of plate cylinder 10 will always remain in the same position. This fact is shown in the drawing wherein the leading edge 16 of each of the plate cylinders 10 is shown as coinciding with a vertical line through the center of the plate cylinder even though the units are arranged in different angular positions.

The blanket cylinders 11 of the different units will of course occupy slightly different rotational positions as shown in the drawing, but the difference is not great. Thus it is seen that the printing units are arranged in different positions so as to provide increased working space between units while at the same time all the plate cylinders are kept in the same rotational position and the blanket cylinders are only slightly disturbed so that similar operations may be performed on all the units at the same time.

Having thus described my invention, I claim:

1. In a multicolor printing press, a series of three printing units each comprising an impression cylinder and a printing cylinder, the axis of each printing cylinder being at a higher elevation than that of the corresponding impression cylinder and the axes of the impression cylinders lying in a common horizontal plane, means in the lower part of the press for transferring sheets from one impression cylinder to the next, and platforms above said transfer means, the planes

through the axes of the impression and printing cylinders of each pair of adjacent units diverging upwardly to provide a fanned-out arrangement of units.

2. In a multicolor printing press, a series of three printing units each comprising an impression cylinder and a printing cylinder, the axis of each printing cylinder being at a higher elevation than that of the corresponding impression cylinder and the axes of the impression cylinders lying in a common horizontal plane, means in the lower part of the press for transferring sheets from one impression cylinder to the next, and platforms above said transfer means, the plane through the axes of the impression and printing cylinders of the middle unit being substantially vertical, and the corresponding planes for the first and third units inclining upwardly away from said first named plane.

3. In a multicolor printing press, a series of three printing units each comprising a printing cylinder and an impression cylinder, the axis of each printing cylinder being at a higher elevation than that of the corresponding impression cylinder and the axes of the impression cylinders lying in a common horizontal plane, said impression cylinders being of uniform diameter, double size transfer cylinders between adjacent impression cylinders, and platforms above said double size cylinders, said printing cylinders being so disposed that the plane through the axis of a given printing cylinder and that of the corresponding impression cylinder and the corresponding plane of an adjacent unit diverge upwardly.

4. In a multicolor offset printing press, a series of three printing units each comprising an impression cylinder, a blanket cylinder and a plate cylinder one above another in that order, the axes of the impression cylinders lying in a common horizontal plane, the axes of the cylinders of each unit intersecting the points of an isosceles triangle the base of which extends upwardly from the axis of the impression cylinder, means in the lower part of the press for transferring sheets from one impression cylinder to the next, and platforms above said transfer means, said triangles being so disposed that the bases of adjacent triangles diverge upwardly.

5. In a multicolor offset printing press, a series of three printing units each comprising an impression cylinder, a blanket cylinder and a plate cylinder one above another in that order, the axes of the impression cylinders lying in a common horizontal plane, said impression cylinders being of uniform diameter, the axes of the cylinders of each unit intersecting the points of an isosceles triangle the base of which extends upwardly from the axis of the impression cylinder, a double size transfer cylinder interposed between the impression cylinders of adjacent units, and platforms above said transfer cylinders, said triangles being so disposed that the bases of adjacent triangles diverge upwardly.

6. In a multicolor offset printing press, a series of three printing units each comprising an impression cylinder, a blanket cylinder and a plate cylinder one above another in that order, the axes of the impression cylinders lying in a com-

mon horizontal plane, the axes of the cylinders of each unit intersecting the points of an isosceles triangle the base of which extends upwardly from the axis of the impression cylinder, means in the lower part of the press for transferring sheets from one impression cylinder to the next, and platforms above said transfer means, the base of the middle triangle being substantially vertical and the bases of the first and third triangle diverging upwardly away from the base of the middle triangle.

7. In a multicolor offset printing press, a series of three printing units each comprising an impression cylinder, a blanket cylinder and a plate cylinder one above another in that order, all of said cylinders being of uniform diameter and the axes of the impression cylinders lying in a common horizontal plane and the different cylinders of each unit being disposed in the same relation, the planes through the axes of the impression and plate cylinders of adjacent units diverging upwardly, the rotational position of all impression cylinders and the rotational position of all plate cylinders being the same in the different units, the rotational position of each successive blanket cylinder being advanced with respect to that of its cooperating impression cylinder and with respect to the preceding blanket cylinder to compensate for the divergence of the said planes, sheet transfer means in the lower part of the press interposed between consecutive impression cylinders, and platforms above said transfer means.

8. In a multicolor offset printing press, a series of three printing units each comprising an impression cylinder, a blanket cylinder and a plate cylinder one above another in that order, all of said cylinders being of uniform diameter, the axes of the impression cylinders lying in a common horizontal plane and the different cylinders of each unit being disposed in the same relation, the planes through the axes of the impression and plate cylinders of adjacent units diverging upwardly, the axes of the blanket cylinders being progressively lower in the direction of sheet travel, the rotational position of all impression cylinders and the rotational position of all plate cylinders being the same in the different units, the rotational position of each successive blanket cylinder being advanced with respect to that of its cooperating impression cylinder and with respect to the preceding blanket cylinder to compensate for the divergence of the said planes, sheet transfer means in the lower part of the press interposed between consecutive impression cylinders, and platforms above said transfer means.

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