Jan. 28, 1958 G. R. BRODIE 2,821,134

OFFSET PRINTING PRESS

Filed Nov. 24, 1954

FIG. 1

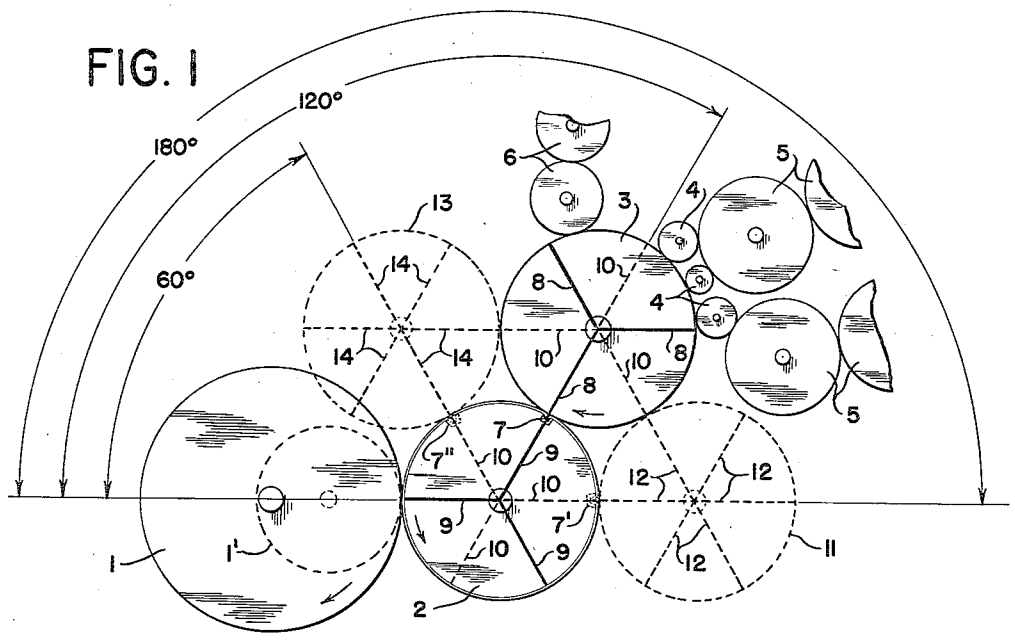
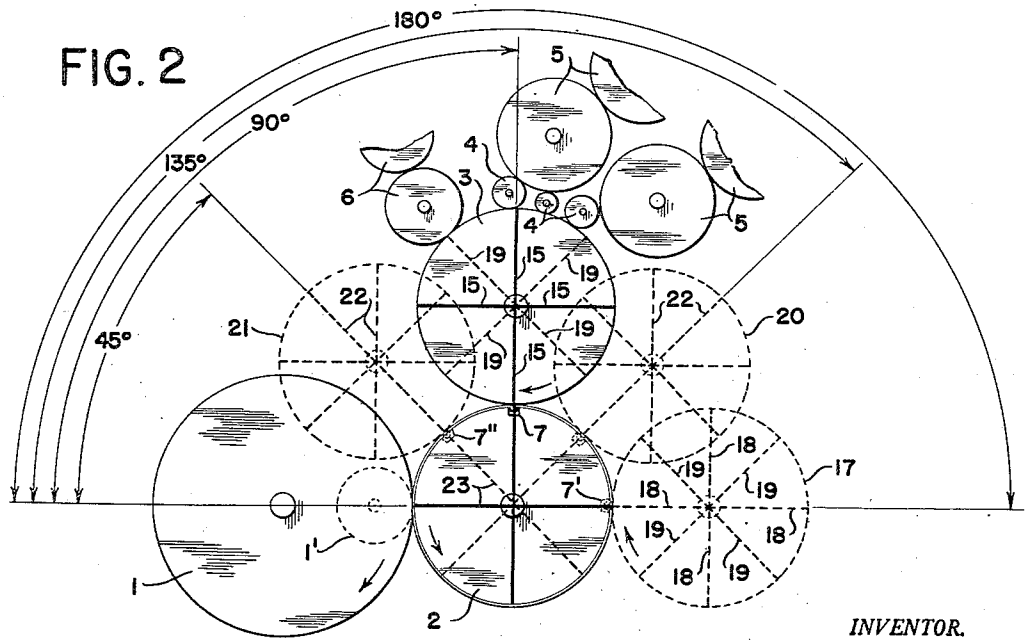


FIG. 2



INVENTOR.

George R. Brodie

BY

Pennie, Edmonds, Morton, Barrows & Taylor.

ATTORNEYS

United States Patent Office

2,821,134

Patented Jan. 28, 1958

2,821,134

OFFSET PRINTING PRESS

George R. Brodie, Lower Merion Township, Montgomery County, Pa., assignor to Fred'k H. Levey Company, Inc., New York, N. Y., a corporation of New York

Application November 24, 1954, Serial No. 470,962

6 Claims. (Cl. 101—217)

This invention relates to printing, and more particularly, to improvements in web-fed offset printing presses.

As is well understood in the art of offset printing, the ink is not applied directly by the printing plate to the paper web, but is applied by the plate to a blanket, usually of rubber, which, in turn, passes in rolling contact with the web of paper passing over the impression cylinder and applies the ink thereto.

The blanket is wrapped around the circumference of what is known as the blanket cylinder which is rotatably mounted on an axis parallel to the axis of both the plate cylinder and the impression cylinder and is so positioned that the circular blanket is rotated in simultaneous contact with the peripheries of each of the other two cylinders.

The blanket is applied to the blanket cylinder by passing it tightly around the periphery of the cylinder and securing its edges along a line in the periphery of the cylinder parallel to its axis. Clamping means are customarily provided along this line in the periphery of the blanket cylinder for that purpose.

Due to the discontinuity and irregularities of the blanket at the seam, it is necessary that the seam fall within a margin between the printed pages so as to avoid imperfections in the printed matter. To accomplish this, the blanket seam must be so positioned with respect to the printing plate on the plate cylinder as to fall, on each revolution of the blanket, in a margin between the printing surfaces of adjacent pages on the plate cylinder.

In spite of precautions to minimize irregularities in the periphery of the blanket cylinder at the blanket seam, there is always a noticeable vibration or periodic bumping of the press, and particularly the blanket cylinder, at the instant the blanket seam passes the plate cylinder.

In fine printing, and especially in high grade multicolor work where precise register is required, the bumping or vibration of the blanket cylinder is particularly objectionable as the resulting quivering of the blanket in contact with the web causes a perceptible blurring of the ink being applied at the point of contact between the blanket and impression cylinder.

My present invention provides improvements in printing presses of the type described whereby the objectionable blurring or imperfections in the printed matter due to this bumping of the blanket seam can be entirely avoided.

In accordance with my present invention, this is accomplished by so designing and constructing the press that the inevitable bumping, caused by the passing of the blanket seam against the plate cylinder, will occur at an instant when no printing is taking place, i. e., at an instant when a margin between pages is passing between the blanket cylinder and the impression cylinder.

The invention is applicable to embodiment in any rotary printing press for offset printing where there are two or more pages around the printing cylinder, i. e., margins around the plate cylinder, and the plate cylinder and blanket cylinder are of equal circumference. It will be understood that reference herein and in the accompanying claims to circumferences of the plate cylinder and blanket cylinder is intended to mean the circumference of these cylinders when ready for operation, i. e., with the plate and the blanket, respectively, in position.

I have found that the condition just described can be brought about regardless of the number of pages around the plate cylinder, providing there are at least two margins, by appropriate positioning of the plate cylinder axis with respect to the axis of the blanket cylinder and the impression cylinder, respectively, and particularly with respect to the angle between the plane passing through the axes of the plate cylinder and the blanket cylinder and the plane passing through the axes of the blanket cylinder and the impression cylinder.

This angle will vary with the number of pages around the plate cylinder but can, in each instance, be calculated by dividing 360° by the number of margins around the cylinder and multiplying the quotient by any whole number not greater than one less than the number of pages.

The invention will be further described and illustrated by reference to the following drawings which represent conventionally and diagrammatically that portion of a web-fed offset printing press to which my present invention is applicable and of which

Figure 1 represents a press design adapted to the use of three pages, about the plate cylinder showing in dotted lines the appropriate arrangement for presses having six pages about the plate cylinder, and

Figure 2 represents the design of that portion of the press adapted to the use of four pages about the plate cylinder, showing in dotted lines the appropriate arrangement in presses having two or eight pages around the plate cylinder.

It will be understood that the cylinders and rollers shown in the drawing are rotatably mounted on shafts which are supported by press side-frames and driven in the manner customary in rotary web-fed printing presses and, therefore, need not here be described in detail.

In Figure 1 of the drawings, the impression cylinder is indicated at 1, the blanket cylinder at 2 and the plate cylinder at 3. Ink is supplied to the plate cylinder by form rollers 4 to which ink is, in turn, supplied by the distributing rollers 5 from a customary source. If printing is from planographic plates, water is supplied to the plate surface in the customary manner by rollers 6. In letter presses, the rollers 6 may be omitted.

The blanket is held tightly about the circumference of the blanket roller 2 by means of clamping jaws indicated at 7. The printing plate is secured in the customary manner about the circumference of the plate cylinder 3 and the margins between the pages are positioned at the intersections of the circumference of the cylinder and the three solid radial lines 8.

As the plate cylinder 3 rotates in contact with the blanket cylinder 2, the ink images of the respective pages are transferred to the blanket along corresponding segments of the circular blanket, the corresponding margins betwen the pages falling at the intersections of the circumference of cylinder 2 and the three solid radial lines 9.

As previously noted, the blanket clamp on roller 2 must fall at one of the margins between pages on the plate cylinder 3. Since the plate cylinder and the blanket cylinder are of equal circumference and are rotated at equal rates, the blanket clamp when once placed at a margin between the pages will continue to fall on the same margin.

It will be seen from the drawing that the position of the margins of blanket cylinder 2, with respect to impression cylinder 1, at the instance the blanket clamp 7 passes cylinder 3 will depend upon the position of the axis of cylinder 3 and that by so positioning that axis that it lies in a plane passing through the axis of cylinder 2 at an angle of 120° from a plane passing through the axis of an impression cylinder 1 and the blanket cylinder 2, one of the margins 9 of the blanket cylinder will pass in contact with the web on impression cylinder 1 at the in-

stant the vibration occurs due to the passing of the blanket clamp 7 in contact with the plate cylinder 3. Under no other coincidence can this condition occur, where there are but three margins around the plate cylinder.

Where there are six pages around the plate cylinder, instead of three, making three additional margins about the cylinders 3 and 2, respectively, as indicated by the dotted radial lines 10, the axis of the plate cylinder may be positioned identically with that just described for three pages. However, when using six pages, there are two other possible positions of the plate cylinder axis. One of these positions is shown in dotted lines at 11 with its axis in a plane 180° from the plane passing through the axis of cylinders 1 and 2, the margins between the pages being indicated in dotted radial lines 12 and the blanket seam at the instant of contact with cylinder 11 being indicated in dotted lines at 7'.

A further possible position using six pages around is that indicated in dotted lines at 13 lying in a plane forming an angle of 60° with the plane through the axis of cylinders 1 and 2, the six margins being indicated by the dotted radial lines 14, and the blanket seam at the instant of contact with cylinder 13 be indicated in dotted lines at 7''.

In the construction represented in the drawing, the periphery of plate cylinder 13 would interfere with the periphery of the impression cylinder 1. However, this condition can be avoided by using an impression cylinder of a smaller diameter, as indicated at the drawing at 1'.

In the foregoing and elsewhere herein, the angles specified are measured clockwise from the plane extending to the left through the axes of the blanket cylinder and the impression cylinder. Like angles measured in the opposite direction may, of course, be used in the case of angles other than 180° C.

Figure 2, in which like elements are indicated by the reference numerals used in Figure 1, represents in solid lines an arrangement adapted to presses having four margins about the plate cylinder 3 indicated by the solid radial lines 15, the cylinder 3 being placed with its axis in the plane forming an angle of 90° with the plane passing through the axes of the blanket cylinder and impression cylinder. An alternative position for plate cylinder having four margins is indicated in dotted lines at 17, the margins being indicated by the dotted radial lines 18. In either instance, when the blanket clamp 7 or 7' passes in contact with the plate cylinder, one of the other margins of the blanket cylinder will be in contact with the impression cylinder.

The position of the plate cylinder at 17 is also applicable to plate cylinders having two margins. The position of cylinders 3 and 17 are also applicable where eight pages around are used, resulting in four additional margins, as shown by the dotted radial lines 19.

Alternative positions of plate cylinders having eight margins are shown in dotted lines at 20, where the axis lies on a plane forming an angle of 135° with the plane passing through the axis of cylinders 1 and 2, and at 21 where the axis lies within a plane 45° from the plane through the axis of cylinders 1 and 2. In cylinders 20 and 21, the margins are indicated by the dotted radial lines 22, corresponding margins on the blanket roll being indicated by the dotted radial lines 23.

As in Figure 1, the circumference of cylinder 21 when its axis is placed in the 45° plane would interfere with the periphery of cylinder 1. But this condition can be avoided by reducing the diameter of cylinder 1, as indicated at 1'.

As will readily appear from the drawings, in each of the indicated positions of the axis of the plate cylinder, the bumping due to the blanket seam striking the plate cylinder will occur at an instant when a marginal area of the blanket is in contact with the web passing over the impression cylinder.

Though I have illustrated my invention with respect

to printing presses employing 2, 3, 4, 6, or 8 margins around the plate cylinder, it will be understood that the invention is not so restricted but is applicable to presses employing any number of pages of equal circumferential dimensions about the plate cylinder. Subject only to exceptions where there may be mechanical interference between the peripheries of the plate cylinder and the impression cylinder, the plane passing through the axes of the plate cylinder and the blanket cylinder should form an angle with the plane passing through the axis of the impression cylinder and the blanket cylinder, depending on the number of pages around the plate cylinder as set forth in the following tabulation:

No. of Pages	2	3	4	6	8	12
Angle, degrees	180	120	90	60	45	30
			180	120	90	60
				180	135	90
					180	120
						150
						180

In the foregoing, I have, for simplicity, considered the blanket seam and the page margins as lines running longitudinally along the periphery of the respective cylinders. It will, of course, be recognized that this is not strictly in accordance with the facts. The lines considered are those passing through the center of the margins and of the blanket seam. The irregularity of the surface of the blanket cylinder, caused by the blanket seam, and which is responsible for the bumping heretofore referred to, may be an inch or more in width. The margins between pages will usually be at least as wide as said irregularity and frequently are somewhat in excess of the width of the blanket irregularity.

Consequently, depending upon the width of the respective margins, relative to the width of the irregularity of the blanket surface due to the blanket seam, minor deviations from the precise angles defined above, and in the appended claims, will be permissible without loss of the benefits of the invention. Translation of such periphal dimensions into degrees will, of course, depend on the radii of the plate and blanket cylinders. Usually a deviation, in either direction, of about 2° from the precise angles mentioned will be permissible, so long as no printing on the web occurs while the blanket seam is passing the plate cylinder.

I claim:

1. In a web-fed, offset printing press comprising an impression cylinder, a blanket cylinder, and a plate cylinder rotatably mounted on parallel axes, each having a substantial continuous, smooth peripheral surface, means for passing a continuous web between the impression and blanket cylinders, the blanket cylinder comprising means for securing a blanket about the periphery thereof forming a blanket seam running parallel to the axis of said cylinder, the plate cylinder comprising means for securing to the peripheral surface thereof a printing plate bearing images of pages of equal length, equally spaced circumferentially of the plate cylinder so as to provide equal intervening page margins, the blanket cylinder being adapted to operate in rolling contact simultaneously with the impression cylinder and the plate cylinder, the circumference of the blanket cylinder, with the blanket attached, being equal to the circumference of the plate cylinder, with the plate attached, so that the blanket seam will invariably fall within a page margin on the plate, the improvement which comprises so positioning the axis of the plate cylinder with respect to the axes of the blanket cylinder and the impression cylinder that it will lie in a plane passing through the axis of the blanket cylinder forming with the plane passing through the axis of the blanket cylinder and the axis of the im-

pression cylinder an angle determined by dividing 360° by the number of page margins about the plate cylinder and multiplying the quotient thereof by an integer not greater than 1 less than the number of said page margins, and thereby causing the blanket seam to pass in contact with the plate cylinder at an instant when no page image on the blanket is in contact with the web passing about the impression cylinder.

2. In a web-fed offset printing press comprising an impression cylinder, a blanket cylinder, and a plate cylinder rotatably mounted on parallel axes, each having a substantially continuous, smooth peripheral surface, means for passing a continuous web between the impression and blanket cylinders, the blanket cylinder comprising means for securing a blanket about the periphery thereof forming a blanket seam running parallel to the axis of said cylinder, the plate cylinder comprising means for securing to the peripheral surface thereof a printing plate bearing images of two pages of equal length, equally spaced circumferentially of the plate cylinder so as to provide two equal intervening page margins, the blanket cylinder being adapted to operate in rolling contact simultaneously with the impression and the plate cylinders, the circumference of the blanket cylinder, with the blanket attached, being equal to the circumference of the plate cylinder, with the plate attached, so that the blanket seam will invariably fall within a page margin on the plate, the improvement which comprises so positioning the axis of the plate cylinder with respect to the axes of the blanket cylinder and the impression cylinder that it will lie in a plane passing through the axis of the blanket cylinder forming with the plane passing through the axis of the blanket cylinder and the axis of the impression cylinder an angle of 180°.

3. In a web-fed offset printing press comprising an impression cylinder, a blanket cylinder, and a plate cylinder rotatably mounted on parallel axes, each having a substantially continuous, smooth peripheral surface, means for passing a continuous web between the impression and blanket cylinders, the blanket cylinder comprising means for securing a blanket about the periphery thereof forming a blanket seam running parallel to the axis of said cylinder, the plate cylinder comprising means for securing to the peripheral surface thereof a printing plate bearing images of three pages of equal length equally spaced circumferentially of the plate cylinder so as to provide three equal intervening page margins, the blanket cylinder being adapted to operate in rolling contact simultaneously with the impression and the plate cylinders, the circumference of the blanket cylinder, with the blanket attached, being equal to the circumference of the plate cylinder, with the plate attached, so that the blanket seam will invariably fall within a page margin on the plate, the improvement which comprises so positioning the axis of the plate cylinder with respect to the axes of the blanket cylinder and the impression cylinder that it will lie in a plane passing through the axis of the blanket cylinder forming with the plane passing through the axis of the blanket cylinder and the axis of the impression cylinder an angle of 120°.

4. In a web-fed offset printing press comprising an impression cylinder, a blanket cylinder, and a plate cylinder rotatably mounted on parallel axes, each having a substantially continuous, smooth peripheral surface, means for passing a continuous web between the impression and blanket cylinders, the blanket cylinder comprising means for securing a blanket about the periphery thereof forming a blanket seam running parallel to the axis of said cylinder, the plate cylinder comprising means for securing to the peripheral surface thereof a printing plate bearing images of four pages of equal length equally spaced circumferentially of the plate cylinder so as to provide four equal intervening page margins, the blanket cylinder being adapted to operate in rolling contact simultaneously with the impression and the plate cylinders, the circumference of the blanket cylinder, with the blanket attached, being equal to the circumference of the plate cylinder, with the plate attached, so that the blanket seam will invariably fall within a page margin on the plate, the improvement which comprises so positioning the axis of the plate cylinder with respect to the axes of the blanket cylinder and the impression cylinder that it will lie in a plane passing through the axis of the blanket cylinder forming with the plane passing through the axis of the blanket cylinder and the axis of the impression cylinder an angle equal to 90° multiplied by a whole number not in excess of 3.

5. In a web-fed offset printing press comprising an impression cylinder, a blanket cylinder, and a plate cylinder rotatably mounted on parallel axes, each having a substantially continuous, smooth peripheral surface, means for passing a continuous web between the impression and blanket cylinders, the blanket cylinder comprising means for securing a blanket about the periphery thereof forming a blanket seam running parallel to the axis of said cylinder, the plate cylinder comprising means for securing to the peripheral surface thereof a printing plate bearing images of six pages of equal length equally spaced circumferentially of the plate cylinder so as to provide six equal intervening page margins, the blanket cylinder being adapted to operate in rolling contact simultaneously with the impression and the plate cylinders, the circumference of the blanket cylinder, with the blanket attached, being equal to the circumference of the plate cylinder, with the plate attached, so that the blanket seam will invariably fall within a page margin on the plate, the improvement which comprises so positioning the axis of the plate cylinder with respect to the axes of the blanket cylinder and the impression cylinder that it will lie in a plane pasing though the axis of the blanket cylinder forming with the plane passing through the axis of the blanket cylinder and the axis of the impression cylinder an angle equal to 60° multiplied by a whole number not in excess of 5.

6. In a web-fed offset printing press comprising an impression cylinder, a blanket cylinder, and a plate cylinder rotatably mounted on parallel axes, each having a substantially continuous, smooth peripheral surface, means for passing a continuous web between the impression and blanket cylinders, the blanket cylinder comprising means for securing a blanket about the periphery thereof forming a blanket seam running parallel to the axis of said cylinder, the plate cylinder comprising means for securing to the peripheral surface thereof a printing plate bearing the images of eight pages of equal length equally spaced circumferentially of the plate cylinder so as to provide eight equal intervening page margins, the blanket cylinder being adapted to operate in rolling contact simultaneously with the impression and the plate cylinders, the circumference of the blanket cylinder, with the blanket attached, being equal to the circumference of the plate cylinder, with the plate attached, so that the blanket seam will invariably fall within a page margin on the plate, the improvement which comprises so positioning the axis of the plate cylinder with respect to the axes of the blanket cylinder and the impression cylinder that it will lie in a plane passing through the axis of the blanket cylinder forming with the plane passing through the axis of the blanket cylinder and the axis of the impression cylinder an angle equal to 45° multiplied by a whole number not in excess of 7.

References Cited in the file of this patent

UNITED STATES PATENTS

939,553 Scheuerer ..... Nov. 9, 1909

FOREIGN PATENTS

111,078 Great Britain ..... Jan. 9, 1918
252,698 Italy ..... Apr. 4, 1927