Feb. 23, 1926. 1,574,708

R. J. SMOTHERS

MULTICOLOR PRINTING PRESS

Filed April 2, 1924 4 Sheets-Sheet 1

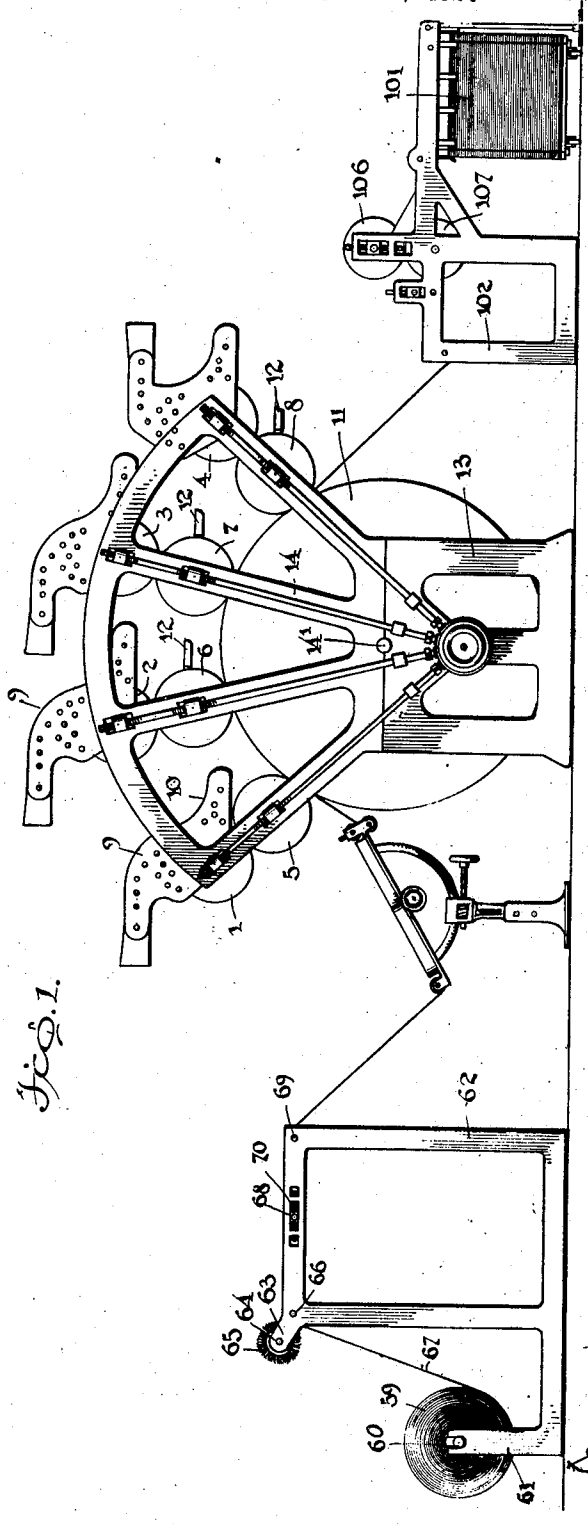


Fig. 1.

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Filed April 2, 1924 4 Sheets-Sheet 2

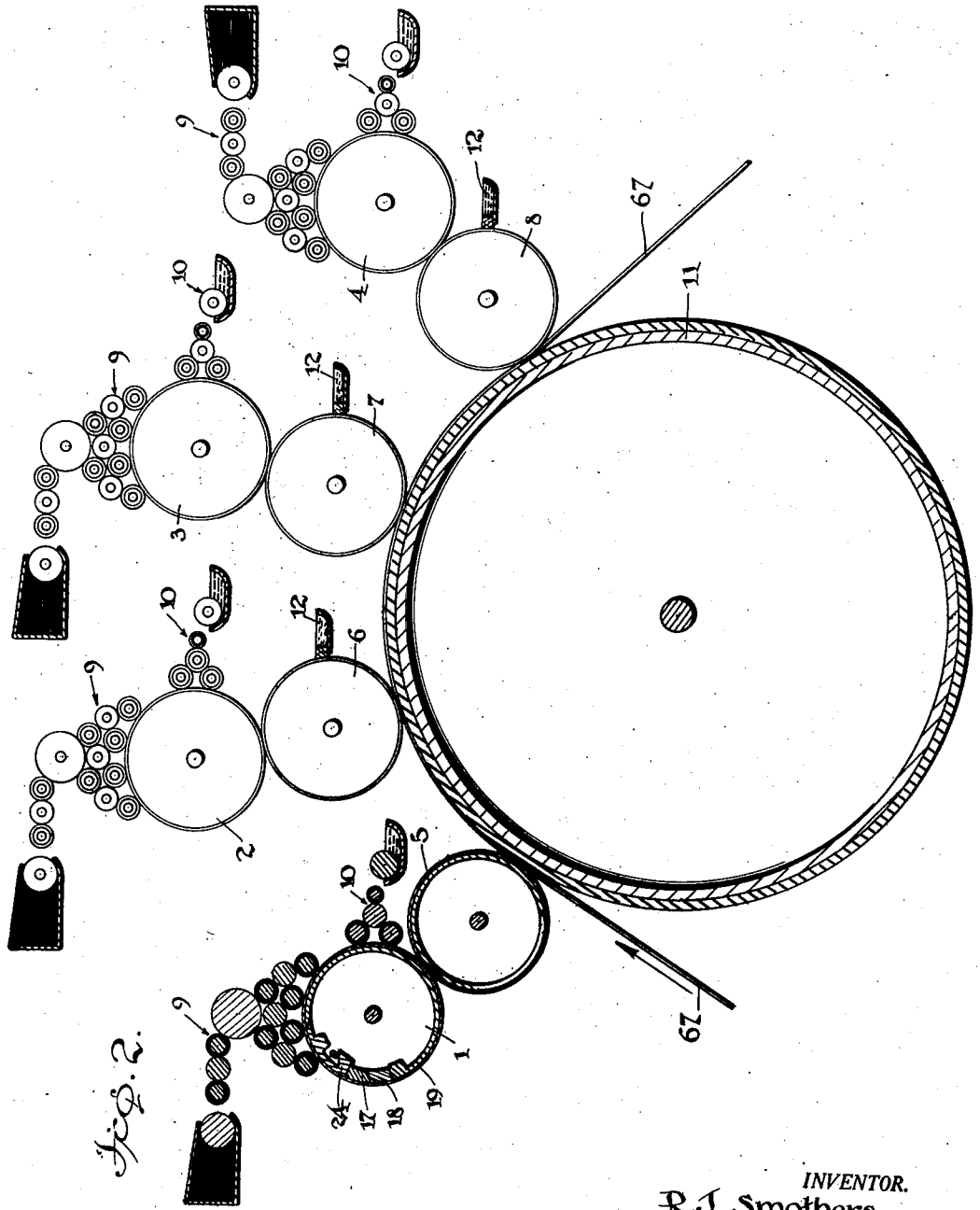


Fig. 2.

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1,574,708

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MULTICOLOR PRINTING PRESS

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4 Sheets-Sheet 3

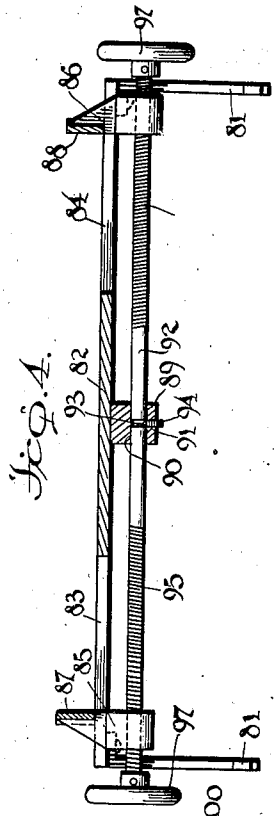


Fig. 4.

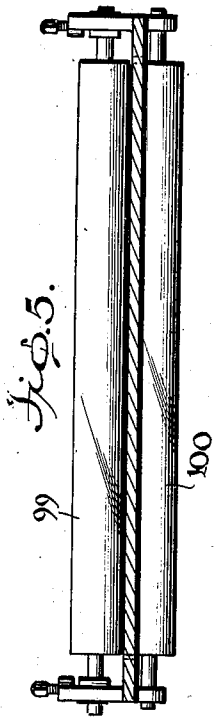


Fig. 5.

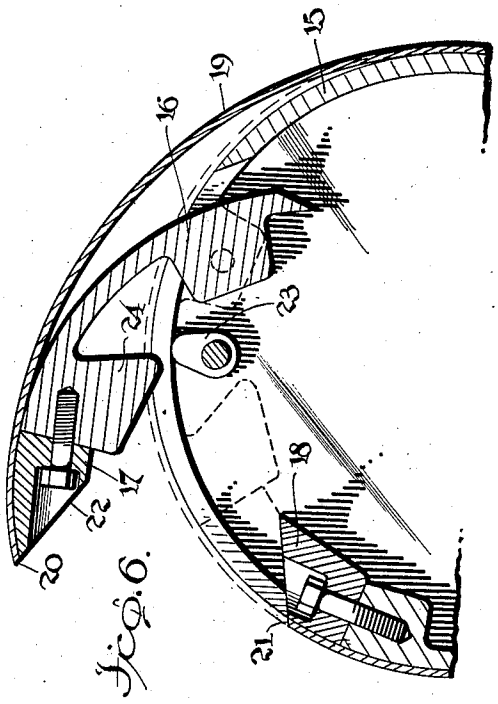


Fig. 6.

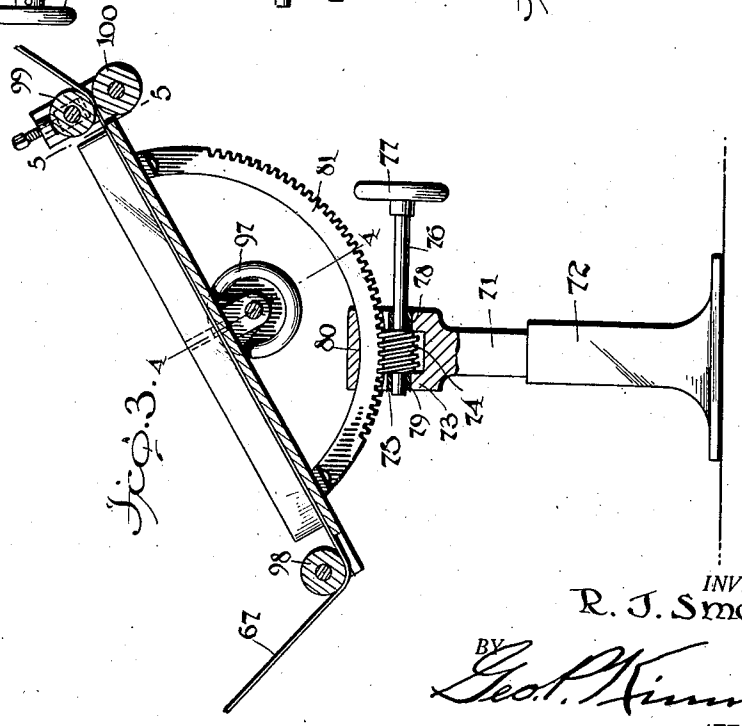


Fig. 3.

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MULTICOLOR PRINTING PRESS

Filed April 2, 1924 4 Sheets-Sheet 4

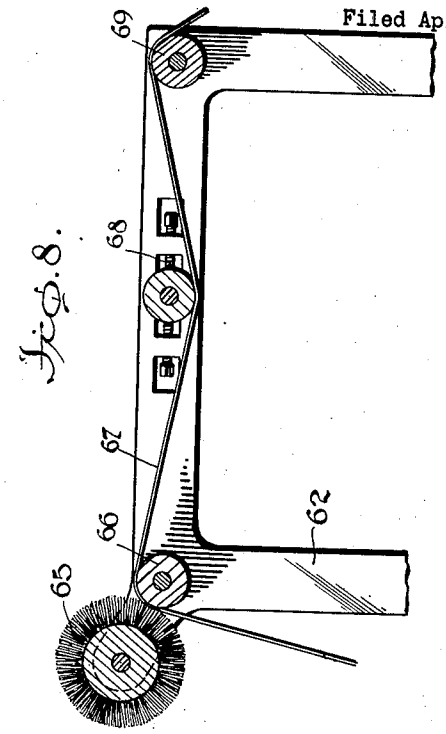


Fig. 8.

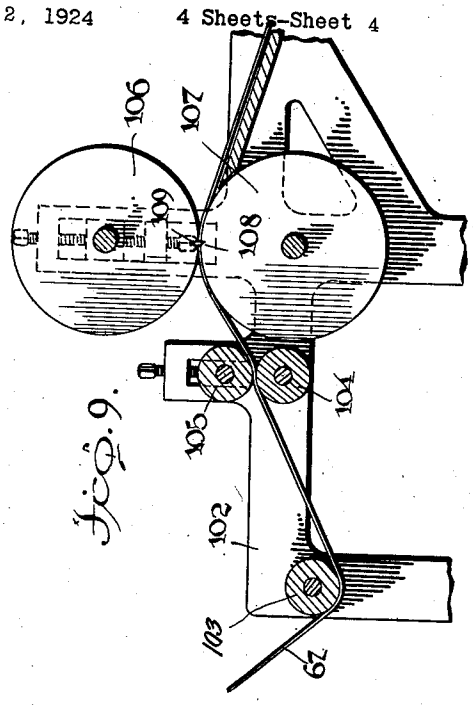


Fig. 9.

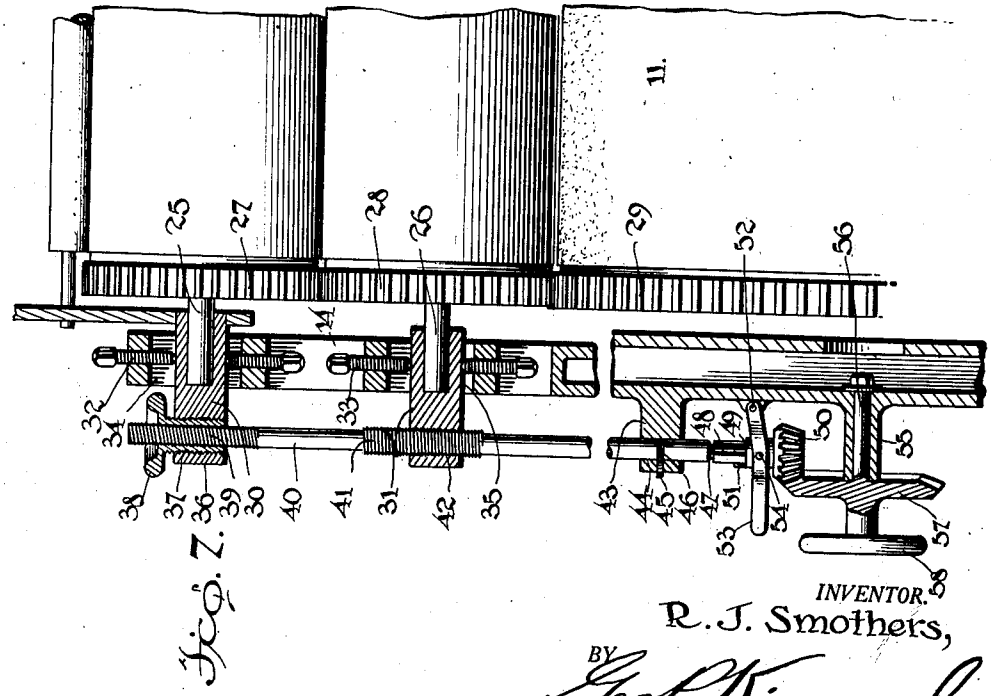


Fig. 7.

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Patented Feb. 23, 1926. 1,574,708

UNITED STATES PATENT OFFICE.

ROBERT JARVIS SMOTHERS, OF HOLYOKE, MASSACHUSETTS, ASSIGNOR TO JAMES T. ROBINSON, OF HOLYOKE, MASSACHUSETTS.

MULTICOLOR PRINTING PRESS.

Application filed April 2, 1924. Serial No. 703,776.

To all whom it may concern:

Be it known that I, ROBERT JARVIS SMOTHERS, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Multicolor Printing Presses, of which the following is a specification.

This invention relates to a multi-color printing press and has for its object to provide, in a manner as hereinafter set forth, a press of such class, with means for printing successively, in color, portions of a design to complete the latter on a continuously travelling web, or for printing a plurality of continuous designs in color on a continuously travelling web, or for printing successively different designs, in color, on a continuously travelling web, under such conditions overcoming the necessity of passing the web through the press more than once, whereby printing in color is vastly expedited and the cost of the same materially reduced.

A further object of the invention is to provide, in a manner as hereinafter set forth, a press of the class referred to, including means whereby the web will be positioned to be acted upon by a transfer roll to insure satisfactory printing on and during the travel of the web.

A further object of the invention is to provide, in a manner as hereinafter set forth, a press of the class referred to, with new and novel means for adjusting a plate or blanket roll with respect to its associated transfer roll and for throwing out from operative position a plate or blanket roll and its associated transfer roll with respect to each other and the transfer roll with respect to the impression cylinder, and further whereby a plurality of plate or blanket rolls with their associated transfer rolls can be thrown out or adjusted synchronously.

Further objects of the invention are to provide, in a manner as hereinafter set forth, a multi-color printing press, which is comparatively simple in its construction and arrangement, strong, durable, thoroughly efficient and convenient in its use, readily assembled, and comparatively inexpensive to set up.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts, as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:—

Figure 1 is a side elevation of a multi-color printing press, in accordance with this invention.

Figure 2 is a diagrammatic view, partly in section, illustrating the arrangement of the plate or blanket roll, transfer roll and impression cylinder.

Figure 3 is a sectional elevation of the guide.

Figure 4 is a section on line 4—4, Figure 3.

Figure 5 is a section on line 5—5, Figure 3.

Figure 6 is a fragmentary view in transverse section, of a plate or blanket roll, and with the latter in open position.

Figure 7 is a sectional elevation of the adjusting mechanism for the plate or blanket rolls and their associated transfer rolls.

Figure 8 is a longitudinal sectional view of the web shifting and cleaning device.

Figure 9 is a longitudinal sectional view of the web cutter.

A multi-color printing press, in accordance with this invention, is illustrated by way of example with four plate or blanket rolls and a transfer roll associated with each plate roll, but it is obvious that the number of plate or blanket rolls can be increased or diminished, depending upon the number of colors to be applied to the continuously travelling web, and as illustrated the press includes not only the blanket and transfer rolls, but a web brushing and shifting device, and a web guide, as well as other co-operating elements to be hereinafter referred to.

The blanket rolls are set up one in advance of the other and the same arrangement is had with respect to the transfer rolls, and each blanket roll would have a portion of a design thereon to receive a

color which is transferred through the medium of a transfer roll to the web. The portions of the design on the plate rolls when combined, set up the complete design, and the plate rolls in connection with the transfer rolls and impression cylinder provide for successively printing, in color, portions of the design on the continuously travelling web, so that when the web leaves the impression cylinder the complete design will be printed thereon, and by this arrangement it only requires the passage of the web once through the press. The color is applied to the plate in a known manner, and in lithography the plate is also dampened in a known manner.

The plate rolls are indicated at 1, 2, 3 and 4. The transfer rolls are indicated at 5, 6, 7 and 8 and which associate respectively with the rolls 1, 2, 3 and 4. The inking mechanism for each of the plate rolls is indicated at 9. The dampening means for each of the plate rolls is indicated at 10. The inking mechanism and dampening means are of known construction. The impression cylinder is indicated at 11. Means for applying lycopodium to the transfer rolls 6, 7 and 8 is indicated at 12, and the object of which is to prevent said transfer rolls from taking up color from the web as it travels through the machine. The housing for the foregoing referred to elements, is indicated at 13.

Each plate roll has an operative drive gear connection with its associated transfer roll, and the transfer rolls have operative drive gear connections with the impression cylinder 11. The housing 13 is formed with a series of radially extending arms 14 at each side thereof, and the arms on one side align with the arms on the other side and each pair of aligning arms supports a plate roll and its associated transfer roll. The operating shaft of the impression cylinder is indicated at 14′ and is driven from any suitable source. Each of the plate or blanket rolls is constructed in a manner set forth in my co-pending application, Serial Number 703,775, filed April 2, 1924, and said roll includes a fixed section 15, a pivoted section 16, a pair of removable sections 17, 18, a plate 19 having beveled end edges 20, 21 and with the removable sections 17 and 18 fixedly secured to the inner face of the plate 19 at each end thereof. The removable sections 17 and 18 are beveled, as at 22, and which form a continuation of the beveled ends 20, 21 of the plate 19, and the roll further includes a clamping element 23 which abuts against the enlargement 24 on the section 16 for maintaining the latter in position, forming a continuation of the section 15 and the sections 17 and 18. The beveling of the ends of the plates 19 provides feathered edges, and the said bevelled ends abut throughout when the plate 19 is secured in position to the body of the roll, as shown in Figure 2, whereby the plate will be maintained in true cylinder form with no gap between the opposed end edges thereof and this insures satisfactory printing.

The shaft of each blanket roll as indicated at 25, see Figure 7, and the shafts of the transfer rolls at 26. The gear drive connections between a blanket roll and its associated transfer roll is indicated at 27, 28, Figure 7. The gear drive connection between the transfer roll and the impression cylinder 11 is indicated at 28 and 29 in Figure 7. The shaft 25 is journalled at each end in a bearing element 30, mounted in an arm 14. This arrangement is illustrated in Figure 7, at one end of a plate roll and its associated transfer roll and as the arrangement at the other end is the same, the description of one end will apply to the other. See Figure 7. One end of the shaft 26 of a transfer roll is mounted in a bearing 31 extended through an arm 14. The bearings 30 and 31 project outwardly from the arm 14, and the latter carries a pair of micrometer screws 32, for adjustably supporting the bearing 30. The arm 14 also carries a pair of micrometer screws 33 for adjustably supporting the bearing 31. The arm 14 has an enlarged opening 34 to provide for the adjustment of a bearing 30, and is further provided with an enlarged opening 35 to enable the adjustment of the bearing 31.

The outer end of the bearing 31 is formed with an opening 36, having a threaded wall with which threadedly engages a peripherally threaded sleeve 37, having its top formed with a hand wheel 38. The sleeve 37 is interiorly threaded for engagement with the threaded portion 39 of an adjusting rod 40, provided intermediate its ends with a threaded portion 41 which threadedly engages with the threaded wall of an opening 42 formed in the outer end of the bearing 31. The threaded portion 39 is of a greater pitch than the threaded portion 41, so that when the rod 40 is revolved in a clockwise direction the plate roll will be shifted a greater distance from the transfer roll than the distance the transfer roll is shifted from the impression cylinder. The screws 32 and 33 permit of the micrometer adjustment between the plate and transfer rolls and between the transfer rolls and the impression cylinder.

The housing 13 is formed with a lateral lug 43, having an opening 44 through which extends the rod 40. Carried by the lug 43 is a retaining screw 45 engaging in a peripheral groove 46, formed in the rod

40 to prevent the lengthwise shifting of the rod 40 relative to the lug 43.

Below the lug 43 the rod 40 is formed with an annular groove 47, and with a lengthwise groove 48 for the purpose of keying the hub 49 of a bevelled pinion 50 upon the rod 40. The hub 49 carries a latch 51 engageable in the groove 47 for maintaining the pinion 50 in position when it has been shifted upwardly on the rod 40.

The housing 13 has pivotally connected therewith, as at 52, a shifting element 53, which is connected to the hub 49 to provide for the shifting thereof on the rod 40. The hub 49 has a peripheral groove in which extends a lug 54, carried by the member 53, and by this arrangement, although the member 53 can shift the pinion lengthwise with respect to the shaft 40, yet the connection between the member 53 and the hub will not interfere with the revolving of the pinion 50 when desired, to drive the shaft 40.

The sleeve 37 provides for the adjusting of the bearing 30 independently of the adjusting of said bearing by the rod 40.

The number of adjusting rods 40, at each side of the housing, corresponds to the number of plate rolls and their associated transfer rolls, and as four plate rolls are shown, the set of rods at each side of the housing would be four in number.

Each side of the housing 13, below the shaft 14', as well as below the bevelled pinions 50, is provided with a laterally extending bearing 55, in which is mounted a shaft 56, provided at its outer end and exteriorly of the bearing 55 with a bevelled gear 57, with which is formed integral a hand wheel 58. The gear 57 meshes with the pinions 50 carried by the rods of the set, at the lower ends thereof and by this arrangement when the gear 57 is operated from the hand wheel 58, the rods 50 are actuated for the purpose of simultaneously throwing out the blanket rolls relative to the transfer rolls, and the transfer rolls releative to the impression cylinder 11.

The adjusting mechanism provides means whereby a plate roll with its associated transfer roll can be thrown out independently with respect to the other plate rolls and their associated transfer rolls. This provision is had, due to the fact that the pinions 50 can be shifted out of mesh with the gear 57, and if certain of the pinions 50 are shifted clear of the gear 57, the latter will only operate those rods 40, having their pinions 50 in mesh with the gear 57.

The roll of web, which is indicated at 59, is carried by a spindle 60 removably supported in a standard 61, and inwardly with respect to the standard 61 a support 62 is arranged which carries the combined brushing and web shifting device, and the latter includes a brush roll support formed by lateral arms 63, which are disposed at an inclination and project from the support 62, at the top thereof. The brush roll shaft is indicated at 64 and is operatively driven in any suitable manner from the shaft 14' or the driving means for the shaft 14'. The brush roll is indicated at 65, and arranged in proximity thereto and journalled in the top of the support 62 is an idler roll 66, between which and the brush roll 65 the web 67 travels. Adjustably mounted in the top of the support 62, centrally thereof, is a web shifting roll 68, against the lower face of which travels the web 67, and journalled in the top of the support 62 is an idler roll 69 upon which the web 67 travels. The adjusting means for the roll 68 is indicated at 70 and comprises a pair of bearing blocks slidably mounted in the sides of the support 62 and which are connected to adjusting screws, and by this arrangement the roll 68 can be shifted to extend at a rearward or forward inclination transversely of the support for the purpose of shifting the web 67 if the web is traveling at an inclination through and with respect to the top of the support 62.

Arranged between the support 62 and the impression cylinder 11, as well as in close proximity to said impression cylinder 11, is a web guide, which is employed for directing the web upon the impression cylinder at the proper point so that the web will not contact with a transfer roll before it is directed onto the impression cylinder to prevent any possibility of the web being blurred or damaged from the color on the impression cylinder so as to insure satisfactory printing. The guide consists of a vertical adjustable telescopic standard formed of an adjustable upper section 71 and a fixed lower section 72. The upper end of the section 71 is enlarged, as as 73, and formed centrally with a chamber 74 in which is arranged a worm 75, carried by a shaft 76, provided with a hand wheel 77. The enlarged upper end of the section 71 is formed with a pair of horizontal openings 78, which communicate with the chamber 74, and each of which has arranged therein a bearing 79 for the shaft 76.

The enlarged upper end 73 of the section 71, above the chamber 74, is formed with a segment-shaped slot 80, through which extends a semi-circular rack bar 81, meshing with the worm 75, and by this arrangement when the shaft 76 is actuated, the engagement of the worm 75 with the teeth of the bar 81 will shift the latter for the purpose of adjustably positioning the web guiding member at the desired inclination.

The guiding member consists of a rectan-

gular plate 82, formed with a pair of aligning oppositely extending slots 83, 84, through which depend a pair of shifting members 85, 86, each having its lower portion formed with an opening having a threaded wall The threads within the shifting member 85 are oppositely disposed with respect to the threads in the shifting member 86. Carried by the member 85, at the upper end thereof, is a retaining bar 87, which is disposed upon the upper face of the plate 84 and extends lengthwise with respect thereto, and secured to the upper end of the member 86 is a retaining bar 88, arranged over the plate 84 and extending lengthwise with respect thereto.

Formed integral with the lower face of the plate 82, centrally thereof, is a hanger 89, provided with a passage 90 and an opening 91, which communicates with the passage 90.

Extending through the passage 90 is a toothed operating shaft 92 for the members 85 and 86, and said shaft 92, centrally thereof, is provided with a peripheral groove 93, into which extends a retaining pin 94 mounted in the opening 91, and by this arrangement the lengthwise shifting of the shaft 92 relative to the hanger 89 is prevented. The shaft 92 is formed with threaded portions 95, 96, and with the threads of the portion 95 oppositely disposed with respect to the threads of the portion 96, and the threaded portions 95 and 96 engage with the threads of the members 85 and 86, so that when the shaft 92 is revolved in a clockwise direction the members 85 and 86 will be shifted towards each other, and when revolved in an anti-clockwise direction the members 85 and 86 will be moved away from each other, whereby the retaining bars can be set at the desired position, and such position would be that the distance between the bars would equal the width of the web 67, so that the travel of the web 67 over the plate 82 will be such that its side edges will be engaged by the bars 87, 88, whereby the web will be guided properly to be positioned upon the impression cylinder.

The shaft 92 projects outwardly from each side of the support 62 and has each end provided with a hand wheel 97 to provide for the convenient operation of the shaft 92.

The lower end of the plate 82 is provided with an idler roll 98 against the lower face of which travels the web 67, and supported from the plate 82, at the forward end thereof, is a pair of web tensioning rolls 99, 100.

The web 67 after being printed can be arranged in a roll-like form or if desired can be cut and the severed lengths of the web piled in a known manner by a conventional form of jogger device, as indicated at 101. When the web is cut, the cutting mechanism is employed and consists of a support 102, provided with an idler roll 103, against the lower face of which the web 67 travels and said support 102 is furthermore provided with tensioning rolls 104, 105, for the web 67. Carried by the support 102 is a cutting device comprising a roll 106 and a roll 107 having a groove 108. The roll 106 is provided with a knife 109, which severs the web and operates in the groove 108. The rolls 106, 107, are driven by any suitable means, and the speed thereof can be regulated so that the web can be severed in the desired lengths, or the rolls 106 and 107 may be of the same diameter as the blanket roll, operate at the same speed, whereby the web will be severed between each design printed thereon, or if the blanket roll is of less diameter than the rolls 106, 107, these latter may be provided with spaced knives and grooves so that the web will be cut at the desired points.

The arrangement shown will permit of the web being printed with different designs, that is to say one-half of the web has one design printed thereon and the other half the other design, and when this method is carried out, each plate roll would be provided with a pair of designs, or alternate plate rolls be provided with designs.

The guide member can be adjusted at the desired inclination so that the web will be fed upon the impression cylinder at the desired point, and by this arrangement, as the web has been shifted from any angular position, while travelling, by the roll 68 prior to its reaching the guide, this will always insure satisfactory printing without damage to any portion of the web.

The construction of press as referred to provides for printing or lithographing successively the color portions of a design to complete the latter on a continuously travelling web, or for printing or lithographing a plurality of continuous designs in color on a continuously travelling web, or for printing or lithographing different designs in color on a continuously travelling web, and which is accomplished by the manner in which the plate rolls and their associated transfer rolls are arranged with respect to the impression cylinder, as the plate roll 1 will receive one color, plate roll 2 a different color, plate roll 3 still a different color, and plate roll 4 a remaining color, so that the colors of the design will be successively applied upon the passage of the web but once through the press, and it is obvious that this manner of printing or lithographing in color will vastly expedite color work, as well as materially reduce the cost thereof, and although the preferred embodiment of

the invention is as illustrated and described, yet it is to be understood that changes in the details of construction can be had which will fall within the scope of the invention as claimed.

What I claim is:—

1. A multi-color printing press comprising an impression cylinder, a plurality of synchronously operated transfer rolls opposing said cylinder for successively printing in connection with said cylinder, upon a web travelling in one direction, differently colored portions of a design to complete the latter on the web on one pass thereof between said rolls and cylinder, a plurality of plate rolls operated from and synchronously with said transfer rolls and each associated with a transfer roll and each provided with means for applying on its associated transfer roll a differently colored portion of the design to be printed on the web, an angularly adjustable web directing mechanism positioned in advance of and in proximity to said impression cylinder, and an adjustable combined web brushing and shifting mechanism positioned in advance of and spaced from said directing mechanism.

2. In a multi-color printing press a bearing for each end of the shaft of a plate roll, a bearing for each end of the shaft of a transfer roll, a revolvable adjusting rod extending through and common to the bearings at one end of said shafts, each rod and the bearings through which it extends and to which it is common having associated means for shifting the transfer roll away from an impression cylinder and the plate roll away from the transfer roll when said rod is revolved in one direction.

3. In a multi-color printing press, a bearing for each end of the shaft of a plate roll, a bearing for each end of the shaft of a transfer roll, a revolvable adjusting rod extending through and common to the bearings at one end of said shafts, each rod and the bearings through which it extends and to which it is common having associated means for shifting the transfer roll away from an impression cylinder and the plate roll away from the transfer roll when said rod is revolved in one direction, the said associated means between the rod and the bearing for the shaft of the blanket roll shifting the plate roll a greater distance from the transfer roll than the transfer roll is shifted from the impression cylinder.

4. In a multi-color printing press, a bearing for each end of the shaft of a plate roll, a bearing for each end of the shaft of a transfer roll, a revolvable adjusting rod common to the bearings at one end of said shafts, each rod and the bearings to which it is common having associated means for shifting the transfer roll away from an impression cylinder and the plate roll away from the transfer roll when said rod is revolved in one direction, and means engaging with each of the bearings to provide for the micrometer adjustment thereof.

5. In a multi-color printing press, a bearing for each end of the shaft of a plate roll, a bearing for each end of the shaft of a transfer roll, a revolvable adjusting rod extending through and common to the bearings at one end of said shafts, each rod and the bearings through which it extends and to which it is common having associated means for shifting the transfer roll away from an impression cylinder and the plate roll away from the transfer roll when said rod is revolved in one direction, and means whereby the bearings of the shaft of the plate roll can be adjusted independently of the bearings for the shaft of the transfer roll.

6. In a multi-color printing press a plurality of plate rolls, a transfer roll associated with each of the plate rolls, a bearing for each end of the shaft of each of said plate rolls, a bearing for each end of the shaft of each of said transfer rolls, a revolvable adjusting rod extending through and common to the bearings at one end of the shafts of a plate roll and its associated transfer roll, each rod and the bearings through which it extends and to which it is common having associated means for shifting the transfer roll away from an impression cylinder and the plate roll away from the transfer roll, and means for simultaneously shifting the said plate and transfer rolls and for selectively shifting a plate roll and its associated transfer roll.

7. In a multi-color printing press a plurality of plate rolls, a transfer roll associated with each of the plate rolls, a bearing for each end of the shaft of each of said plate rolls, a bearing for each end of the shaft of each of said transfer rolls, a revolvable adjusting rod extending through and common to the bearings at one end of the shafts of a plate roll and its associated transfer roll, each rod and the bearings through which it extends and to which it is common having associated means for shifting the transfer roll away from an impression cylinder and the plate roll away from the transfer roll, means for simultaneously shifting the said plate and transfer rolls and for selectively shifting a plate roll and its associated transfer roll, the associated means between said rods and the bearings of the plate rolls providing for the shifting of the plate rolls a greater distance from the transfer rolls than the distance the transfer rolls are shifted from the impression cylinder.

8. In a multi-color printing press the combination with means for printing a design of different colors on a traveling web and including an impression cylinder, of an angularly adjustable web directing mechanism positioned in advance of and in proximity to said impression cylinder, and an adjustable combined web brushing and shifting mechanism positioned in advance of, spaced from and of greater height than said web directing mechanism.

In testimony whereof, I affix my signature hereto.

ROBERT JARVIS SMOTHERS.