

July 17, 1928.

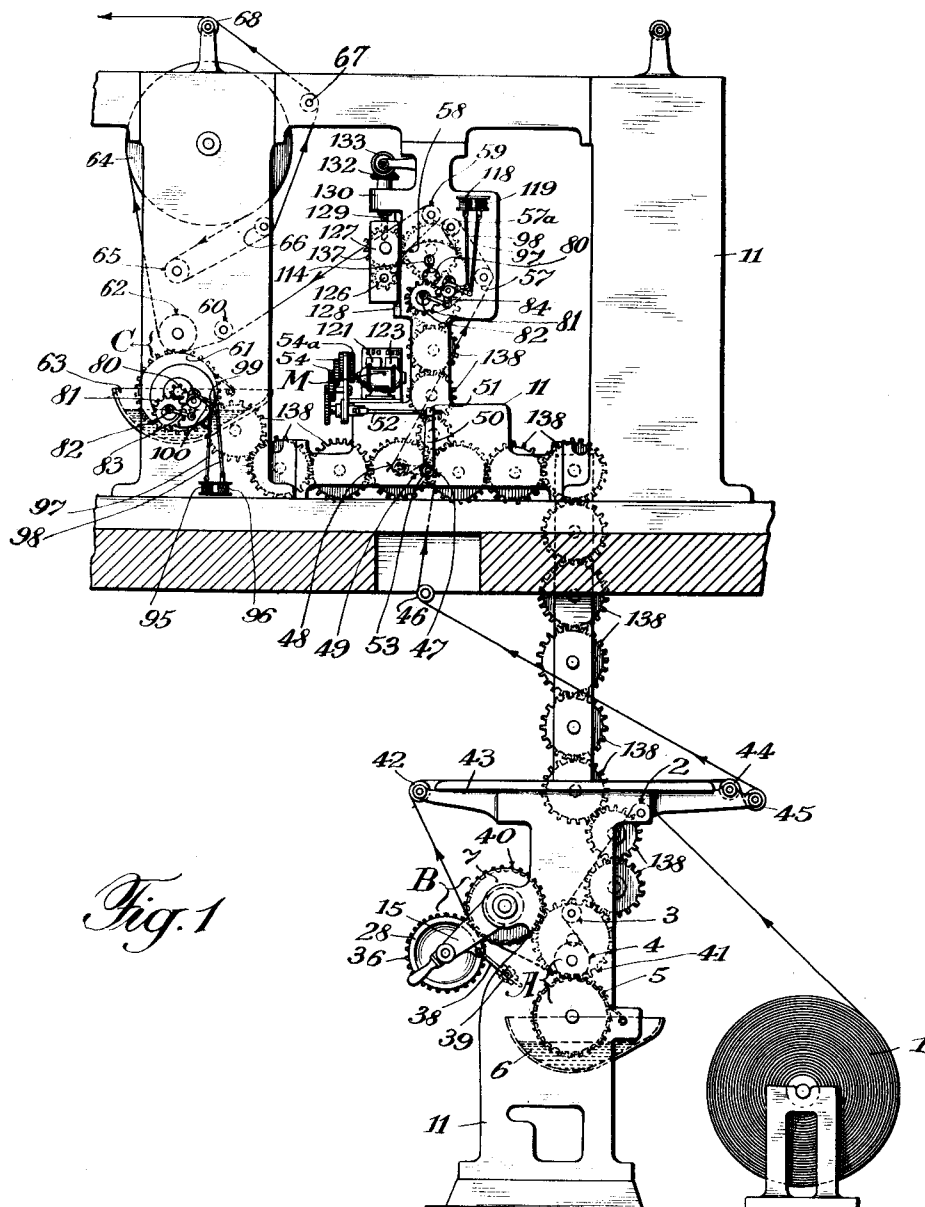
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MULTICOLOR ROTARY PRINTING PRESS

Filed Nov. 11, 1926

5 Sheets-Sheet 1



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MULTICOLOR ROTARY PRINTING PRESS

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5 Sheets-Sheet 2

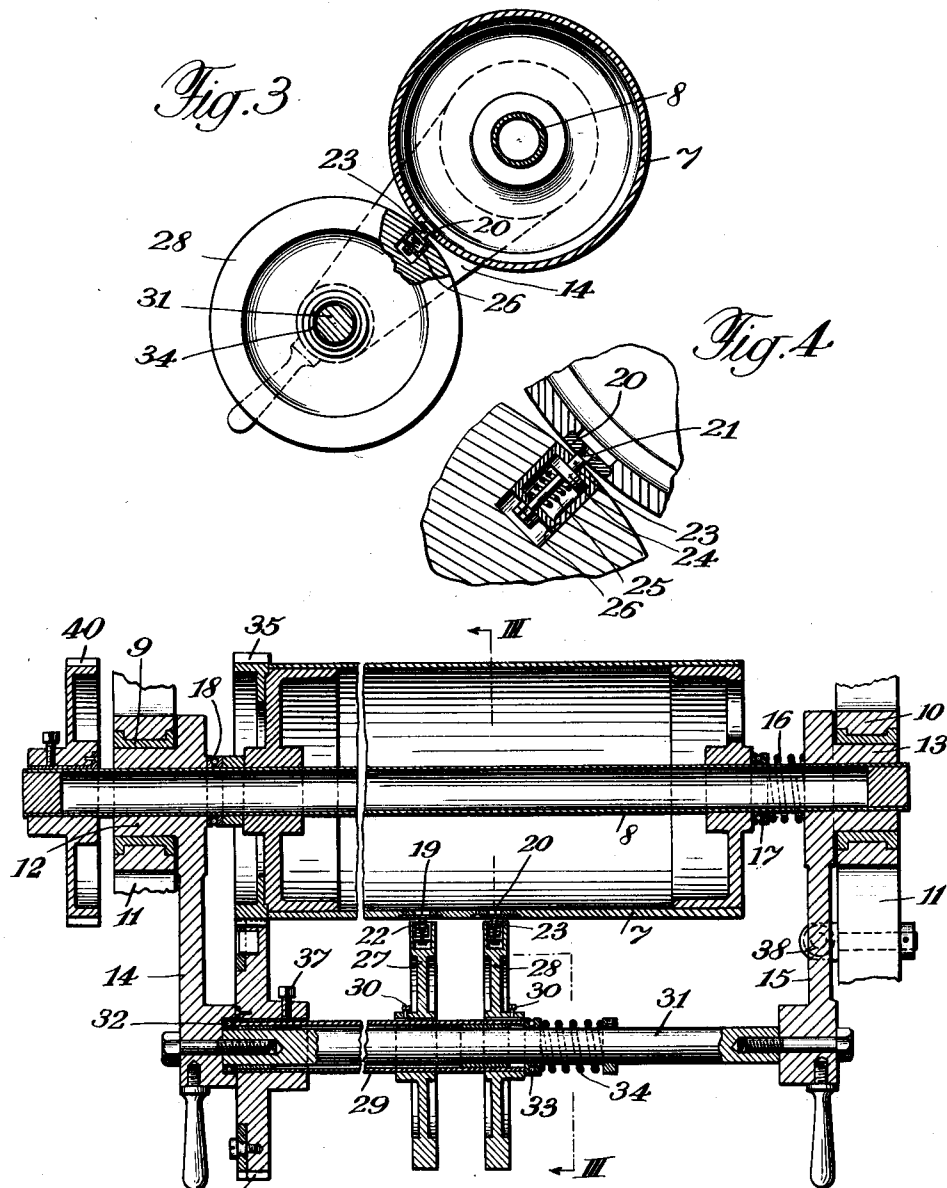


Fig. 2

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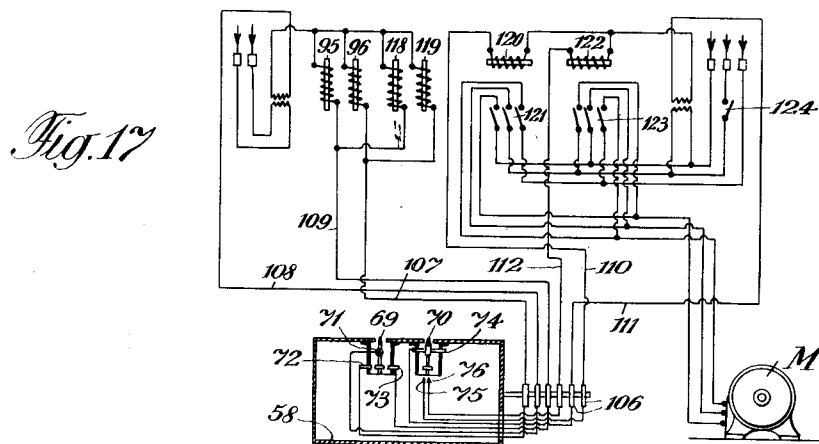
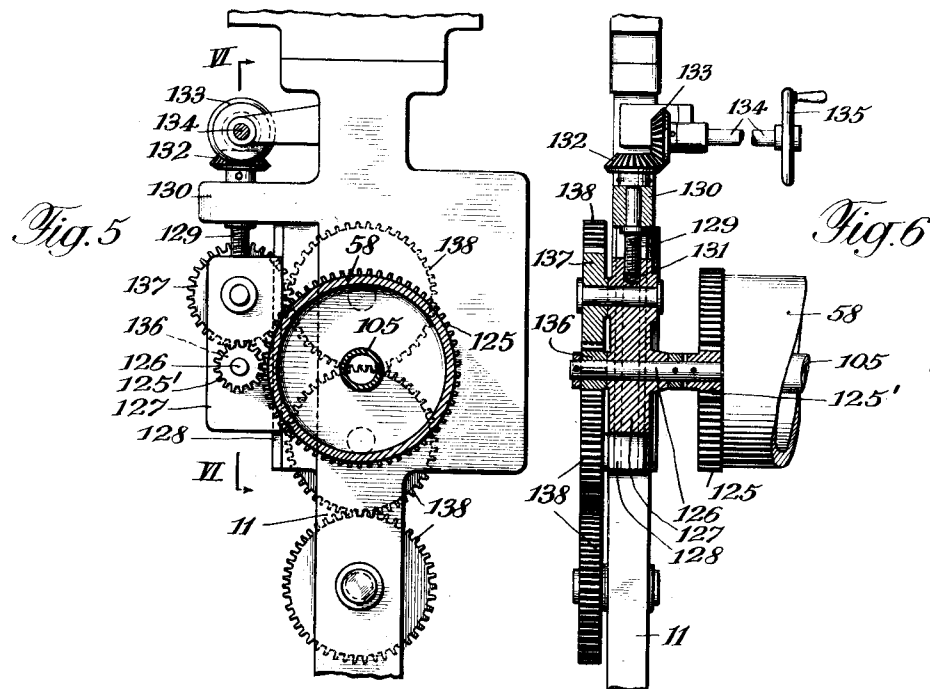
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MULTICOLOR ROTARY PRINTING PRESS

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5 Sheets-Sheet 3



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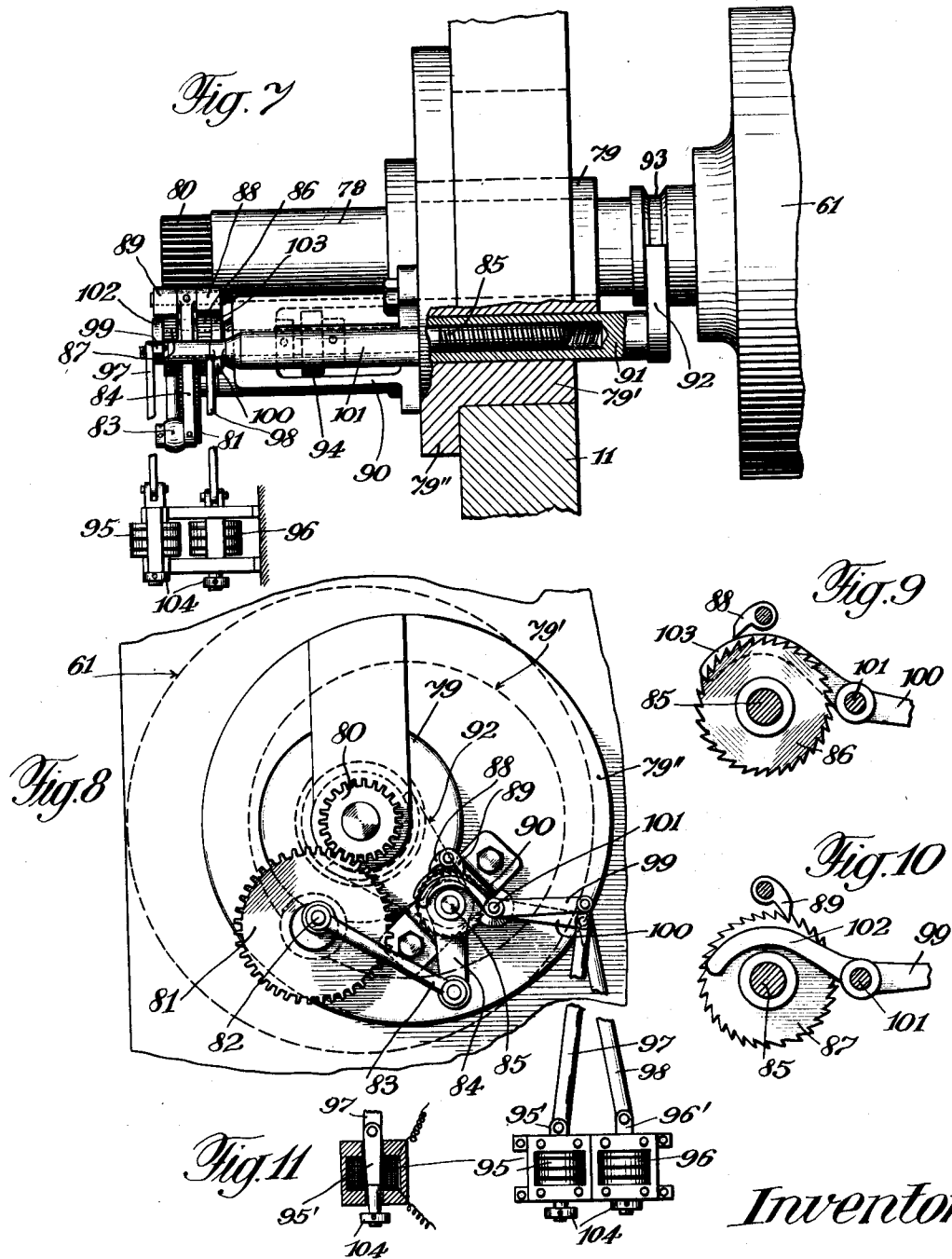
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MULTICOLOR ROTARY PRINTING PRESS

Filed Nov. 11, 1926

5 Sheets-Sheet 4



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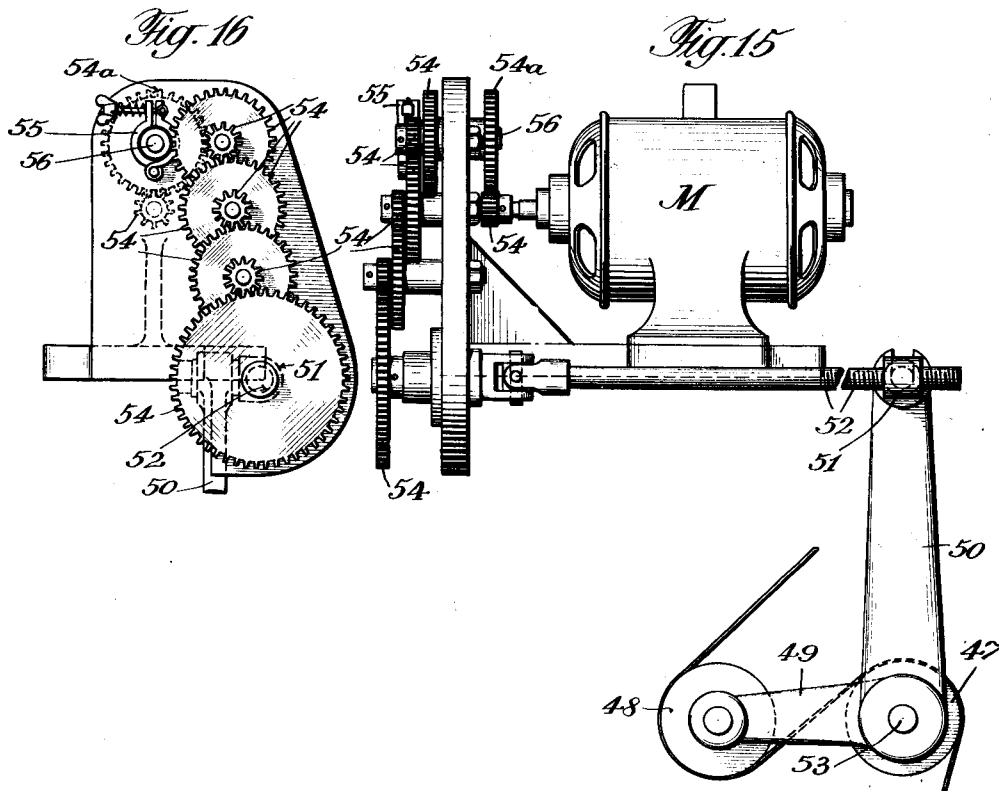
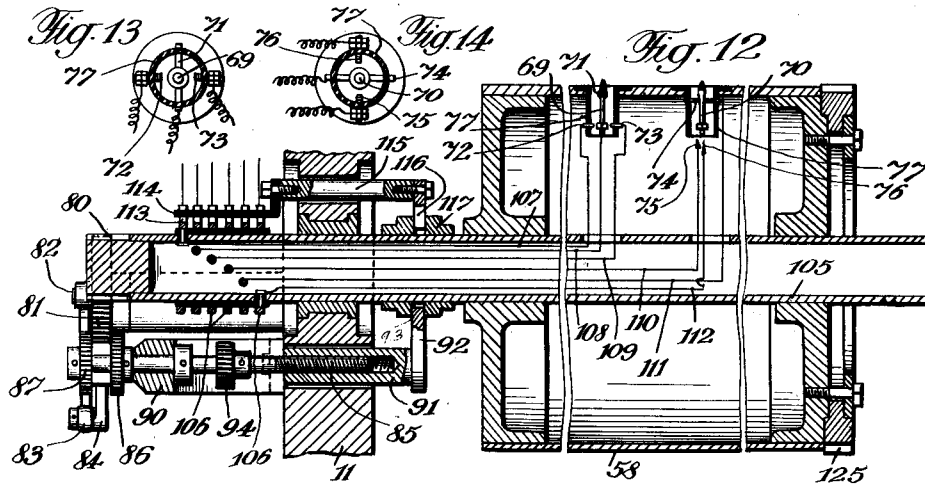
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MULTICOLOR ROTARY PRINTING PRESS

Filed Nov. 11, 1926

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE.

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MULTICOLOR ROTARY PRINTING PRESS.

Application filed November 11, 1926, Serial No. 147,725, and in Switzerland October 8, 1926.

The present invention relates to a method and an arrangement for automatically regulating the register with rotary printing presses.

Multi-color printing by means of rotary printing presses presents many difficulties as the endless web gets distorted in the longitudinal and in the transversal direction between the single printing mechanisms, which are arranged at a considerable distance from each other, so that no good register of the various colors printed one upon the other is obtained. It has therefore been proposed to cut the endless web into sheets previous to the printing and to move the single sheets past the printing mechanisms. Printing presses of this type are complicated and their output is naturally smaller than that of rotary printing presses with which an endless web is printed.

The object of the present invention is to provide a method for automatically regulating the register and which permits the production of perfect multicolor prints with rotary printing presses.

The method according to the present invention consists in ascertaining by the aid of holes provided in regular distances in the endless web and by contact organs, provided in front of every printing mechanism and adapted to cooperate with said holes, every variation in the position of the web, i. e. in the transverse direction and in the longitudinal direction of the latter and caused by irregularities in the structure of the paper or by differences in temperature, and in adjusting in the axial direction the impression cylinders of every further printing mechanism in correspondence with the variations of the web in the widthwise direction of the latter, and in compensating variations in the longitudinal direction of the web by influencing the register lever.

With the arrangement for carrying into effect the method according to the present invention in front of every further printing mechanism two movably mounted contact pins are provided, which are intended for cooperation with pairs of holes in the endless web and which are displaced when variations in the position of the web occur, in which case the holes do no longer exactly register with the contact pins, one of the contact pins being swingably mounted about an axis

arranged in the widthwise direction of the web in order to respond to alterations of positions in the longitudinal direction of the web, whilst the other contact pin is swingably mounted about an axis arranged in the longitudinal direction of the web in order to respond to alterations in the position of the web in the widthwise direction of the latter.

A constructional example of an arrangement for carrying into effect the method according to the present invention is illustrated on the accompanying drawings, in which:

Fig. 1 shows diagrammatically in elevation a part of a rotary printing press comprising two printing mechanisms and indicating the general disposition of the parts forming the arrangement according to the present invention;

Fig. 2 is an axial section through a device for punching holes in regular distances into the endless web;

Fig. 3 is a section along line III—III in Fig. 2;

Fig. 4 is a section through a detail of the punching device;

Fig. 5 shows in an elevation and partly in section means for causing a displacement of a regulating cylinder;

Fig. 6 is a section along line VI—VI in Fig. 5;

Fig. 7 shows in an elevation and partly in section a part of the device serving to adjust an impression cylinder of the printing mechanism;

Fig. 8 is an end view of the adjusting device seen from the left hand side in Fig. 7;

Figs. 9–11 show details of this adjusting device in end views and section respectively;

Fig. 12 is an axial section through the regulating cylinder;

Figs. 13 and 14 show details of the regulating cylinder;

Fig. 15 shows part of the device for adjusting a register lever;

Fig. 16 is a side view of Fig. 15 and

Fig. 17 shows the diagram of the electric connections.

Referring now to the drawings 1 in Fig. 1 denotes the roll of paper from which the web is led over guide rollers 2 and 3 between the pressure cylinder 4 and the impression cylinder 5 of a first printing mechanism A. 6

designates a trough for the color into which the impression cylinder 5 dips as diagrammatic means for applying the color to the impression cylinder.

5 After leaving the printing mechanism A the web passes the punching device B illustrated in detail in Figs. 2-4. 7 is the punching drum mounted on a hollow shaft 8 which is rotatably mounted in bearings 9 and 10
10 of the machine frame through the intermediary of bosses 12 and 13 of levers 14 and 15. The drum 7 is pressed by means of a helical spring 16 acting on an axial ball thrust bearing 17 against a further ball thrust bearing
15 18 in order to prevent an axial displacement of the drum 7. In the latter dies 19 and 20 having a cylindrical bore 21, to which a conical enlargement joins, are inserted at a distance from each other. Punches 22 and
20 23 which fit exactly into the holes of the dies 19 and 20 cooperate with the latter. Each punch is pivoted with a disk 24 acted upon by a spring 25 which presses this disk against a casing 26; the casing 26 for the
25 punch 22 is mounted in the rim of a disk 27 and the casing for the punch 23 is mounted in the rim of a disk 28 in such a manner that the punches project by approximately 0.2 m/m. beyond the outer surface of the disks
30 27 and 28 respectively. The two disks 27 and 28 are fixed to a hollow shaft 29 by means of set screws 30. The hollow shaft 29 is rotatable on an axle 31, rigidly connected to the levers 14 and 15, and is mounted
35 between axial ball thrust bearings 32 and 33 in a similar manner as the drum 7, a coil spring 34 acts upon the bearing 33 in order to prevent an axial displacement of the disks 27 and 28. A toothed rim 35 is
40 rigidly fixed to the drum 7 and cooperates with a gear wheel 36 adapted to be clamped to the hollow shaft 29 by means of a set screw 37.

The diameter of the drum 7 and that of
45 the circle described by the ends of the punches 22 and 23 upon the rotation of the disks 27 and 28 and the ratio of the gear wheels 35 and 36 are so chosen that with every revolution of the drum the punches
50 22 and 23 fit exactly into the bores of the dies 19 and 20 whereby at every revolution of the drum 7 two holes are punched into the web passing between the drum 7 and the disks 27 and 28; the distance between a pair
55 of holes from the next is always the same and equal to the circumference of the drum 7 which is exactly equal to the circumference of the impression cylinders of the printing mechanisms. The exact coincidence
60 between the punches and the holes of the dies is obtained by adjusting these elements relatively to each other, which may be effected by loosening the different clamping screws and adjusting the hand levers 14 and 15. A
65 screw threaded bolt 38 is linked to the hand

lever 15 and a nut 39, non-displaceably mounted in the axial direction in the machine frame 11, cooperates with said bolt for securing the hand lever in the adjusted position. On the hollow shaft 8 of the drum 7
70 a driving gear wheel 40 is fixed which is in mesh with a gear wheel 41 of the press.

If, for instance, the punches are say $\frac{1}{4}$ " off the holes in the circumferential direction the set screw 37 is loosened and the hand
75 levers are so far turned that the punches are moved by that $\frac{1}{4}$ " and project into the holes. During this movement of the hand levers the gear wheel 36 runs idle on the bush 29 and is clamped to the latter again by the
80 clamping screw 37 when the punches are in their proper position, whereby the proper driving connection is maintained. The manner of adjusting the punches and holes
85 permits the compensation of any clearance in the meshing of the gear wheels caused by wear, as during the movement of the hand levers the flanks of the teeth of the gear wheels are pressed against each other into
90 their operative position.

The web to which one color has been printed and which is provided with pairs of holes at equal distances passes over a
95 guide roller 42, a drying table 43, guide rollers 44, 45, 46 and 47 to a guide roller 48 which is rotatably mounted in an arm 49 of a bell crank lever, at the other arm 50 of which a nut 51 is carried, which cooperates
100 with a screw threaded spindle 52. The bell crank lever, which corresponds to the register adjusting lever commonly used with rotary printing presses, is turnably mounted
105 about a pivot 53 and a turning motion in the anti-clockwise direction in Fig. 1 causes a tensioning and momentary holding back of the web whilst a turning in the opposite
110 i. e. clockwise, direction causes a slackening and a momentary acceleration of the moving web. The actuation of the spindle 52 for adjusting the bell crank lever is caused by
115 an electromotor M through the intermediary of a train of transmission wheels 54, of which the wheel 54^a is clamped to a shaft 56 by means of a clamping device 55, as is shown in detail in Figs. 15 and 16.

From the guide roller 48 of the bell crank lever 49, 50 the web runs over further guide rollers 57, 57^a, around the regulating cylinder 58, then over guide rollers 59 and 60 and passes through the next rotary printing mechanism which comprises an impression cylinder 61, a pressure cylinder 62 and a trough 63 for the color. After leaving the printing mechanism C the web runs over a
drying drum 64 and from there over guide rollers 65, 66, 67 and 68 to one or more further stages of the rotary printing press in case one more color or several further colors have to be printed, whereby every stage is again provided with an adjusting

lever for altering the tension of the web and with a regulating cylinder.

The regulating cylinder is shown in detail in Figs. 12-14 and comprises two contact-pins 69 and 70 which are arranged at the same distance from each other as the holes of each pair of holes punched into the web; further the diameter of the pins having rounded ends at the circumference of the cylinder beyond which the pins project corresponds exactly to the diameter of the holes punched in the web and the diameter of the regulating cylinder is exactly the same as the diameter of the punching drum and of the impression cylinders of the printing mechanism. The contact pin 69 is swingable about an axle 71 arranged in the circumferential direction of the cylinder 58 and its inner end cooperates with the contacts 72 and 73, whilst the contact pin 70 is swingable about an axis 74 arranged parallel to the axis of the cylinder and its inner end cooperates with the contacts 75 and 76. The contacts and the axes of the contact pins 69 and 70 respectively are fixed in bushes 77 made of an insulating material, which are recessed in the regulating cylinder 58.

The pairs of holes have a determined position to the position of the print in the first color on the web as they have been punched immediately after the first printing took place and as the paper has not been subjected to any heat treatment on its way between the first printing mechanism and the punching device. By means of the contact pins 69 and 70 on the regulating cylinder care is taken that the cliché on the impression cylinder 61 of the printing mechanism C also occupies the same definite position with reference to the pairs of holes; if this is the case the prints of the different colors are exactly in register. During the passing of the web from one printing mechanism to the next a more or less pronounced deviation of the web towards the left or towards the right occurs caused by the nonuniform structure of the paper. Further the heat to which the web is subjected for drying the printed color and the subsequent cooling cause continuously changing tensions in the web whereby differences in the register in the longitudinal direction of the web occur. The impression cylinder of the printing mechanism for the next color and the impression cylinder of all the other printing mechanisms for the other colors in multicolor printing have to follow exactly these deviations of the web and these regulating movements are initiated and controlled by the contact pins 69 and 70 of the regulating cylinder 58 and of the other regulating cylinders respectively appertaining to the other printing mechanisms.

When the web has displaced itself widthwise the pairs of holes do not exactly fit on

the contact pins and cause the contact pin 69 which is movable in the axial direction to bear against one or the other of the contacts 72 and 73. The arrangement is now such that as soon as this happens devices are rendered operative, which are provided on the regulating cylinder and on the impression cylinder of that printing mechanism to which the regulating cylinder belongs, and which cause a displacement of both these cylinders in the axial direction. This device is shown in detail in Figs. 7-11.

The axle 78 of the impression cylinder 61 is mounted in a bush 79 carried in a further bush 79', which is mounted with a cylindrical facing that is eccentric to its bore in the frame 11 of the press. At one end of the axle 78 a toothed wheel 80 is provided that is in mesh with a toothed wheel 81. On the latter a crank pin 82 is arranged which imparts oscillating movement to an arm 84, loosely mounted on a spindle 85, by a connecting rod 83. To both sides of the arm 84 ratchet wheels 86 and 87 respectively are arranged and fixed on the spindle 85, the ratchet wheel 86 is provided with teeth for movement in the anti-clockwise direction whilst the ratchet wheel 87 has teeth for movement in the clockwise direction (Figs. 9 and 10). Pawls 88 and 89 respectively mounted on the oscillating arm 84 are adapted to cooperate with the ratchet wheels 86 and 87 respectively. The spindle 85 is mounted in a support 90 which is fixed to the flange 79'' of the bush 79'. The end of the spindle 85 is provided with screw thread and cooperates with a nut 91 which carries a segment 92 that projects into a groove 93 of the axle 78. Further a wheel 94 is fixed on the spindle 85 and serves for turning the latter by hand. Depending on whether one or the other of the pawls 86 and 87 respectively is operative the spindle 85 is turned in the one or in the other direction and thereby the impression cylinder 61 and simultaneously the regulating cylinder 58, which, as is shown in Fig. 12, is provided with the same device, are axially displaced in one or the other direction.

The operation of the pawls 86 and 87 for displacing the impression cylinder 61 is controlled by the contact pin 69, two relay electromagnets 95 and 96 being provided to this end, the cores 95' and 96' respectively being connected to rods 97 and 98 respectively which are linked to arms 99 and 100 respectively of two-armed levers. The latter are turnable about a pin 101 and the other arms 102 and 103 of these two-armed levers act as releasing members to the pawls. If no ratchet movement has to occur the releasing members 102 and 103 are under the influence of the weight of the rods 97 and 98 respectively and the pawls 88 and 89 respectively are lifted out of engagement

with the ratchet wheels 86 and 87 respectively. If the web has somewhat deviated in the widthwise direction so that one of the holes in the paper does not fit exactly on the contact pin 69 the latter is caused to bear on one of the contacts 72 and 73 respectively. Thereby a current circuit is closed which energizes one of the electromagnets 95 or 96 respectively, the core is attracted until its stroke limiting nut 104 bears against the casing of the electromagnet (as is shown with the right hand magnet in Fig. 8) and the releasing member is moved out of its locking position in the downward direction and permits an engagement of the pawl with the ratchet wheel, whereupon the ratchet movement and thereby the axial displacement of the impression cylinder 61 is caused. Simultaneously one of the electromagnets 118, 119 of the device for effecting the axial displacement of the regulating cylinder 58 is energized and the displacement is continued until after the regulating cylinder has been displaced so far that the hole in the web fits exactly on the contact pin.

The supply of current to the contacts of the regulating cylinder is shown in Fig. 12. On the hollow shaft 105 on which the regulating cylinder 58 is mounted, six slip rings 106 insulated from each other are illustrated, of which one is connected by a wire 107 to the contact 72, the second by wire 108 to the contact pin 69, the third by wire 109 to the contact 73, the fourth by wire 110 to the contact 75, the fifth by wire 111 to the contact pin 70 and the sixth by wire 112 to the contact 76. Contact brushes 113 cooperate with the slip rings 106 and are mounted in a piece 114 of insulating material. The latter is rigidly connected to a pin 115 which is axially displaceable in the frame 11 of the press and which carries a segment 116 projecting into the groove 93 of a sleeve 117 fixed to the shaft with which the segment 92 of the nut 91 cooperates for causing the axial displacement of the regulating cylinder 58. This arrangement causes the contact brushes 113 to be axially displaced to the same extent as the regulating cylinder together with the slip rings 106 so that a good contact is always ensured. The electromagnets which cause the engagement of the pawls for the axial displacement of the regulating cylinder 58 are designated with 117 and 119 in Fig. 1. In contradistinction to the electromagnets 95 and 96 they are arranged above the releasing levers 99, 100 and their action is similar to that of the electromagnets 95 and 96, however, the stroke limits for the cores have to act in the opposite manner.

Fig. 17 illustrates the diagram of electric connections showing the electric circuits, in which the electromagnets 95, 96 and 118, 119 are inserted and which are opened and closed

by the contact pin 69, the pairs of magnets being connected in parallel. Further the circuits controlled by the contact pin 70 are shown which lead to the three phase motor M which turns the register lever 48, 49 if an alteration of the endless web in its longitudinal direction has occurred, and one hole of the pair of holes does not fit exactly on the contact pin 70 and causes the latter to bear on the contacts 75 or 76. The connections are so arranged that when the contact pin 70 is caused to bear on the contact 75 the relay electromagnet 120 closes the switch 121, whereupon the motor M rotates in one direction, whilst when the contact pin 70 bears on the contact 76 the relay magnet 122 closes the switch 123 and the motor M rotates in the other direction as two phases of the circuit connected to the switch 123 are transposed as compared with the circuit connected to switch 121. 124 is a single pole switch which serves to break the circuit to the motor M until after the start the rotary printing press has reached its normal speed. Thereby it is avoided that the motor M regulates too much when the speed of the press is still below the normal speed.

In order to adjust the regulating cylinder 58 by hand so that the contact pins 69 and 70 fit exactly into a pair of holes and that the preceding color fits exactly on the subsequent color the arrangement illustrated in Figs. 5 and 6 is provided. The regulating cylinder 58 is driven by means of a toothed rim 125 fixed to it from a pinion 125' fixed to a shaft 126. The latter is mounted in a glidable member 127 displaceable along a guide 128 of the machine frame 11. The displacement is caused by a screw threaded spindle 129, which is axially non-displaceably mounted in a lateral extension 130 of the frame 11 and the lower end of which cooperates with a threaded bore 131 of the glidable member. On the upper end of the spindle 129 a bevel wheel 132 is fixed which cooperates with a bevel wheel 133 on a horizontal shaft 134. The latter is turned by means of a hand wheel 135. On the shaft 126 a pinion 136 is further fixed which is in mesh with a gear wheel 137 also mounted on the glidable member 127, the wheel 137 cooperating with the uppermost of the driving wheels 138 mounted in the frame 11; the train of gear wheels 138 forms the driving connection between the printing mechanisms A and C, the punching device B and the regulating cylinder 58. By turning the hand wheel 135 the glidable member 127 may be displaced in the upward or downward direction along the guide 128 whereby the wheel 137 rolls on the uppermost of the toothed wheels 138 and causes through the intermediary of the gear wheels 136, 125' an angular displacement of the

regulating cylinder 58 and permits thus an adjustment of the latter.

The manner of operation of the above described arrangement is as follows:

First of all the punching device is so adjusted that the produced holes are in a part of the web in which the latter is cut after the finished printing. This adjustment is caused by turning the hand lever 15 and loosening the clamping screw of the driving wheel 40 (Fig. 2). Thereupon the regulating cylinder 58 is so adjusted that the holes in the web fit exactly on the contact pins 69 and 70, so that the contact pins remain in their mid-position and do not bear against any contact when they enter into the holes of the web. The adjustment of the regulating cylinder 58 in the axial direction is caused by turning the wheel 94 (Fig. 12), the adjustment in the circumferential direction is caused by turning the hand wheel 135 (Fig. 6). In a similar manner the impression cylinder 61 of the second printing mechanism C is adjusted by means of the milled wheel 94 (Fig. 7) and by loosening a clamping connection by which the gear wheel driving the impression cylinder is fixed to the axle of the latter so that the second color exactly fits on the first color when the holes fit exactly on the contact pins.

If now after the above adjustment has been made no lateral deviation of the web would occur nor variations in the length of the parts of the web all the further pairs of holes would exactly fit on the contact pins and no differences in the register of the different colors would show themselves. As soon as the web deviates slightly in the widthwise direction the next pair of holes does not fit exactly on the contact pins and the contact pin 69, which is movable in the axial direction of the regulating cylinder 58 is turned and closes the circuit over one of the contacts 72 or 73. Thereby one of the relay magnets 118 or 119 and simultaneously one of the relay magnets 95 or 96 is energized, the respective releasing means of the ratchet mechanisms drop and the regulating cylinder 58 and the impression cylinder 61 are simultaneously and by the same amount displaced in the axial direction until the contact pin 69 has returned into its mid-position and is no more acted upon by the following pair of holes. It is easily possible to construct the contact device so that it responds to a displacement of the holes of $\frac{1}{10}$ of a millimetre and the ratio of the means effecting the axial displacement of the cylinders may be so chosen that upon a single closing of the circuit a displacement of both cylinders in the axial direction by $\frac{1}{10}$ of a millimetre occurs.

If a variation in the length of the part of the web has occurred the pairs of holes do

also not exactly fit on the contact pins and the contact pin 70 which is movable in the circumferential direction of the regulating cylinder is displaced by one of said holes and pressed against one of the contacts 75 and 76, whereby the circuit to the relay magnets 120 or 122 (Fig. 17) is closed and the switch 121 or 123 closes one of the circuits to the electromotor M, which turns the register lever 49 in one or the other direction so that the web is slackened or tensioned and the alteration in the length compensated.

Also in this case an extremely fine regulation of the register in the longitudinal direction of the web may be obtained by choosing the ratio of the transmission means accordingly.

Obviously the regulations causing the axial displacement of the cylinders and the adjustment of the register lever which have been described one after the other may also occur simultaneously.

I claim:

1. A method of automatically regulating the register with multicolor rotary printing presses, which consists in causing the printing means to follow the variations of the web in the transverse direction of the latter, and in compensating the variations of the web in the longitudinal direction of the latter by varying the tension of the web.

2. A mechanism for automatically regulating the register with multicolor rotary printing presses, comprising in combination a number of printing mechanisms for different colors each provided with an impression cylinder, two feelers provided in front of every printing mechanism except the first and adapted to cooperate with holes in the web, one of said feelers being swingably mounted about an axis arranged in the transverse direction of the web, and the other feeler being swingably mounted about an axis arranged in the longitudinal direction of the web, means adapted to vary the tension of the web, means adapted to cause an axial displacement of an impression cylinder and a displacement of said feelers in the transverse direction of the web, and relay means controlled by said feelers and controlling the operation of said means.

3. A mechanism for automatically regulating the register with multicolor rotary printing presses, comprising in combination a number of printing mechanisms for different colors provided with impression cylinders, an axially displaceable cylinder around which the web passes, provided in front of every printing mechanism except the first and having the same diameter as the impression cylinders, two feelers slightly projecting beyond the circumference of said cylinder and adapted to cooperate with holes in the web, one of said feelers

being swingably mounted about an axis arranged in the transverse direction of the web, and the other feeler being swingably mounted about an axis arranged in the longitudinal direction of the web, means adapted to vary the tension of the web, means adapted to cause an axial displacement of an impression cylinder and of said cylinder carrying the feelers, and relay means controlled by said feelers and controlling the operation of said means.

4. A mechanism for automatically regulating the register with multicolor rotary printing presses, comprising in combination a number of printing mechanisms for different colors provided with impression cylinders, an axially displaceable cylinder around which the web passes provided in front of every printing mechanism except the first and having the same diameter as the impression cylinders, two contact pins slightly projecting beyond the circumference of said cylinder and adapted to exactly fit into pairs of holes provided at equal distances in the web, one of said contact pins being swingably mounted about an axis extending parallel to the axis of said cylinder and the other contact pin being swingably mounted about an axis extending in the circumferential direction of said cylinder, means adapted to cause an axial displacement of an impression cylinder and of said cylinder carrying the contact pins, means adapted to regulate the tension of the web, and relay means controlled by said contact pins and controlling the operation of said means.

5. A mechanism for automatically regulating the register with multicolor rotary printing presses, comprising in combination a number of printing mechanisms for different colors provided with impression cylinders, an axially displaceable contact cylinder around which the web passes, provided in front of every printing mechanism except the first and having the same diameter as the impression cylinders, two contact pins slightly projecting beyond the circumference of said contact cylinder and adapted to exactly fit into pairs of holes provided at equal distances in the web, one of said contact pins being swingably mounted about an axis extending parallel to the axis of said cylinder and the other contact pin being swingably mounted about an axis extending in the circumferential direction of said cylinder, a ratchet mechanism provided for said impression cylinder and said cylinder carrying the contact pins, having pawls for causing ratchet movements in both directions of rotation and acting upon a screw threaded spindle arranged parallel to the axis of a cylinder and coupled to the latter, means adapted to regulate the tension of the web, and relay means

controlled by said contact pins and controlling the operation of said ratchet mechanisms and of said means.

6. A mechanism for automatically regulating the register with multicolor rotary printing presses, comprising in combination a number of printing mechanisms for different colors provided with impression cylinders, an axially displaceable contact cylinder around which the web passes, provided in front of every printing mechanism except the first and having the same diameter as the impression cylinders, two contact pins slightly projecting beyond the circumference of said contact cylinder and adapted to exactly fit into pairs of holes provided at equal distances in the web, one of said contact pins being swingably mounted about an axis extending parallel to the axis of said cylinder and the other contact pin being swingably mounted about an axis extending in the circumferential direction of said cylinder, a ratchet mechanism provided for said impression cylinder and for said cylinder carrying the contact pins and comprising pawls for causing ratchet movements in both directions of rotation and means adapted to render said pawls inoperative, screw threaded spindles arranged parallel to the axes of said cylinders and coupled to the latter for effecting the axial displacement of said cylinders, relay means comprising electromagnets having cores connected to said means adapted to render said pawls inoperative, said relay means being controlled by said contact pin swingable about an axis arranged in the circumferential direction of said cylinder, means adapted to regulate the tension of the web, and further relay means controlled by said contact pin swingable about an axis arranged parallel to the axis of said cylinder and controlling the operation of said means for regulating the tension of the web.

7. A mechanism for automatically regulating the register with multicolor rotary printing presses, comprising in combination a number of printing mechanisms for different colors provided with impression cylinders, an axially displaceable contact cylinder around which the web passes provided in front of every printing mechanism except the first and having the same diameter as the impression cylinders, two contact pins slightly projecting beyond the circumference of said contact cylinder and adapted to exactly fit into pairs of holes provided at equal distances in the web, one of said contact pins being swingably mounted about an axis extending parallel to the axis of said cylinder and the other contact pin being swingably mounted about an axis extending in the circumferential direction of said cylinder, each of said contact pins cooperating with two electric contacts, a ratchet mech-

anism provided for said impression cylinder and for said cylinder carrying the contact pins and comprising pawls for causing ratchet movements in both directions of rotation and means adapted to render said pawls inoperative, screw threaded spindles arranged parallel to the axis of an impression cylinder and coupled to the latter for effecting the axial displacement thereof, relay means comprising electromagnets having cores connected to said means adapted to render said pawls inoperative, and arranged in electric circuits with some of said contacts, whereby said relay means are controlled by said contact pin swingable about an axis arranged in the circumferential direction of the contact pin carrying cylinder, and further relay means arranged in electric circuits with the other of said contacts and controlled by said contact pin swingable about an axis arranged parallel to the axis of said cylinder carrying the contact pins and controlling the operation of said means for varying the tension of the web.

8. A mechanism for automatically regulating the register with multicolor rotary printing presses, comprising in combination a number of printing mechanisms for different colors provided with impression cylinders, an axially displaceable cylinder around which the web passes provided in front of every printing mechanism except the first and having the same diameter as the impression cylinders, two contact pins slightly projecting beyond the circumference of said axially displaceable cylinder and adapted to exactly fit into pairs of holes provided at equal distances in the web, one of said contact pins being swingably mounted about an axis extending parallel to the axis of said cylinder and the other contact pin being swingably mounted about an axis extending in the circumferential direction of said cylinder, each of said contact pins cooperating with two electric contacts, a ratchet mechanism provided for the impression cylinder and for said cylinder carrying the contact pins and comprising pawls for causing ratchet movements in both directions of rotation and means adapted to render said pawls inoperative, screw threaded spindles arranged parallel to the axes of said cylinders and coupled to the latter for effecting the axial displacement of said cylinders, relay means comprising electromagnets

having cores connected to said means adapted to render said pawls inoperative, and arranged in electric circuits with some of said contacts whereby said relay means are controlled by said contact pin swingable about an axis arranged in the circumferential direction of the contact pin carrying cylinder, a register lever adapted to regulate the tension of the web, a screw-threaded spindle operatively connected to said lever, an electric motor and transmission means interposed between the latter and the screw threaded spindle, and further relay means arranged in electric circuits with said other contacts and controlled by said contact pin swingable about an axis arranged parallel to the axis of said cylinder carrying the contact pins and controlling the operation of said electric motor.

9. A mechanism for automatically regulating the register with multicolor rotary printing presses, comprising in combination a number of printing mechanisms for different colors provided with impression cylinders, a punching device arranged immediately after the first printing mechanism and comprising a cylinder having the same diameter as said impression cylinders, dies inserted in said cylinder, disks in driving connection with said cylinder and carrying punches adapted to cooperate with said dies, and means adapted to prevent an axial displacement of said cylinder and of said dies, an axially displaceable cylinder around which the web passes provided in front of every printing mechanism except the first and having the same diameter as the impression cylinders, two feelers slightly projecting beyond the circumference of said displaceable cylinder and adapted to cooperate with holes in the web, one of said feelers being swingably mounted about an axis arranged in the transverse direction of the web, and the other feeler being swingably mounted about an axis arranged in the longitudinal direction of the web, means adapted to vary the tension of the web, means adapted to cause an axial displacement of the impression cylinder and of said cylinder carrying the feelers, and relay means controlled by said feelers and controlling the operation of said means.

In testimony whereof, I have signed my name to this specification.

FRIEDRICH FUCHS.