March 28, 1939. E. ERICKSSON 2,151,960

PRINTING METHOD AND APPARATUS

Filed April 27, 1936 3 Sheets-Sheet 1

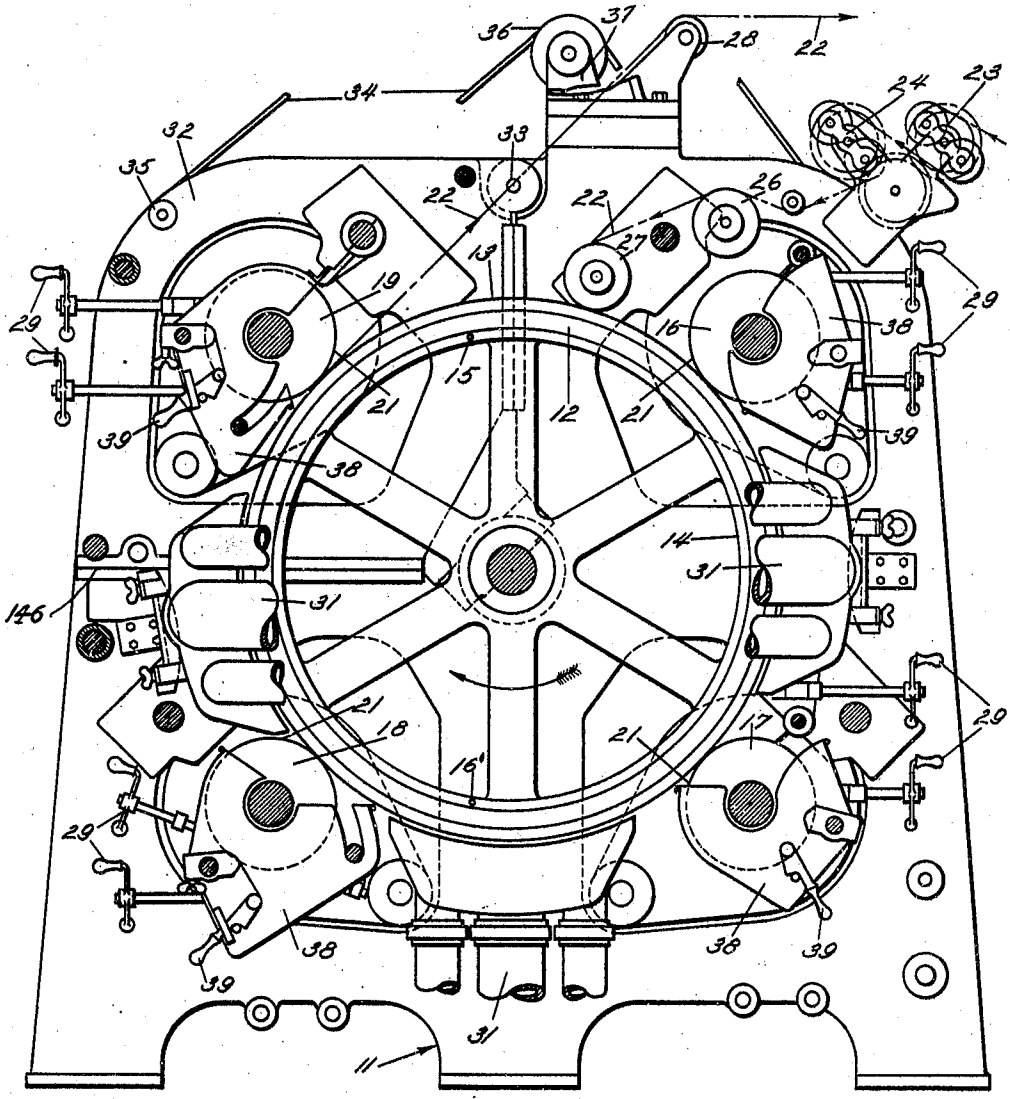


Fig. 1

Inventor
Emil Ericksson

By Strauch & Hoffman
Attorneys

March 28, 1939. E. ERICKSSON 2,151,960

PRINTING METHOD AND APPARATUS

Filed April 27, 1936 3 Sheets-Sheet 2

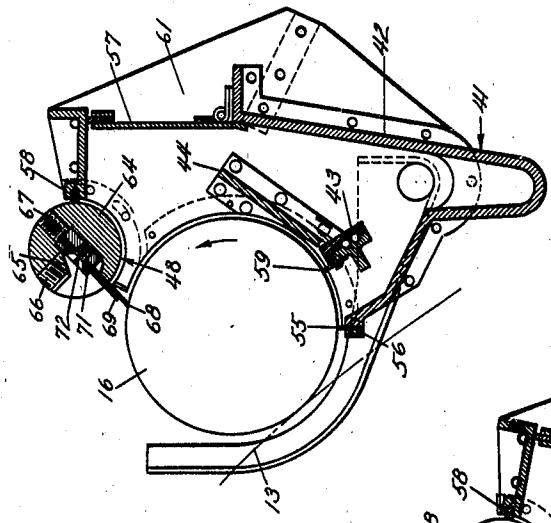


Fig. 2

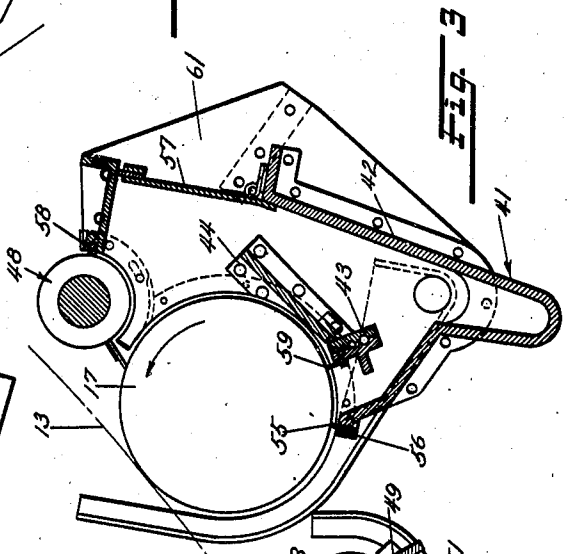


Fig. 3

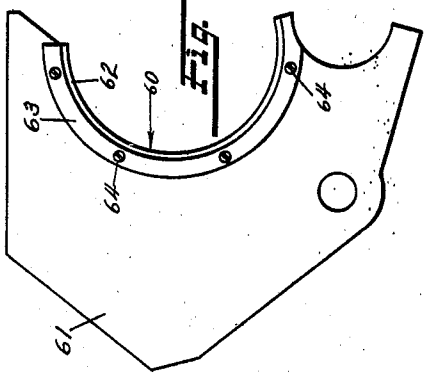


Fig. 6

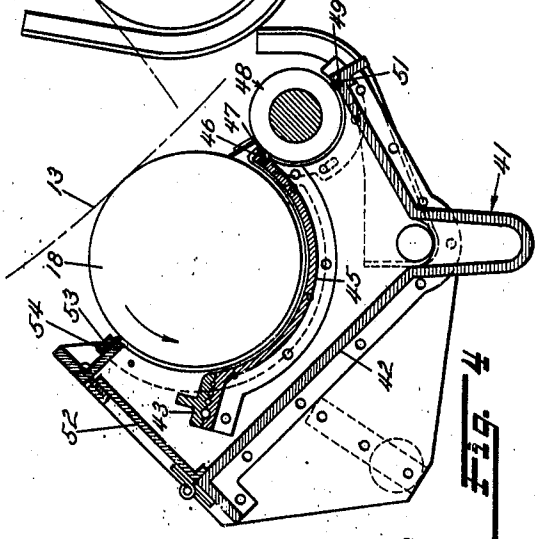


Fig. 4

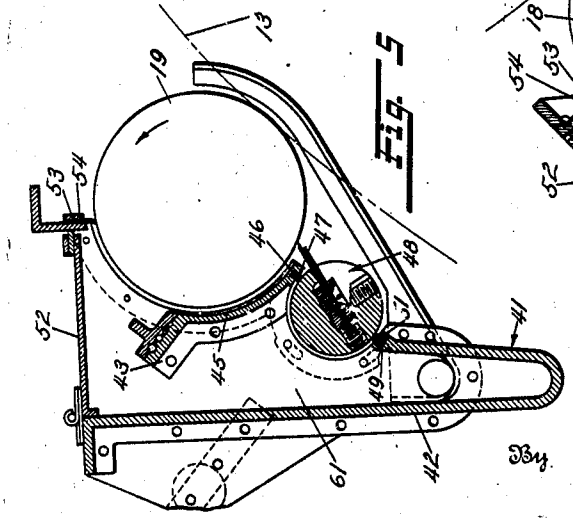


Fig. 5

Inventor
Emil Ericksson

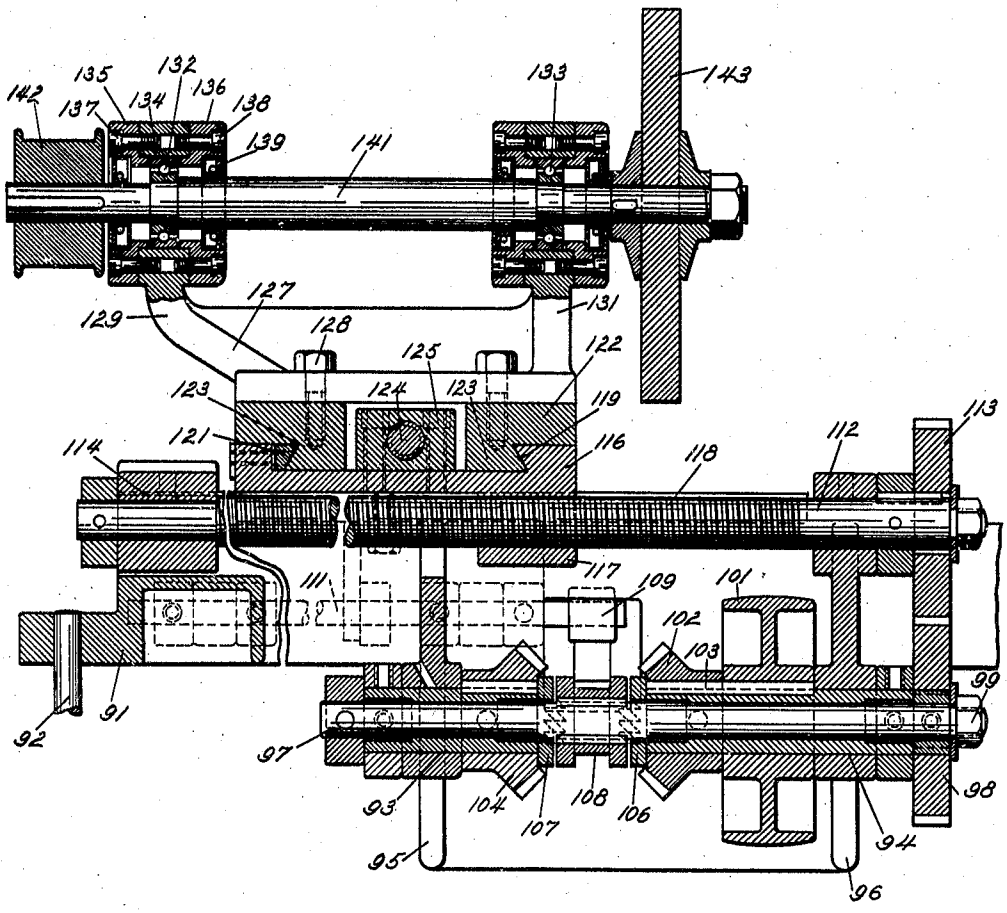
By Strauch & Hoffman
Attorneys

March 28, 1939. E. ERICKSSON 2,151,960

PRINTING METHOD AND APPARATUS

Filed April 27, 1936 3 Sheets-Sheet 3

Fig. 7



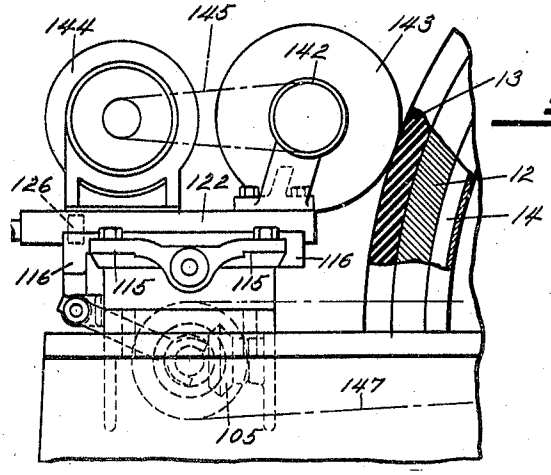


Fig. 8

Inventor
Emil Ericksson

Strauch & Hoffman
Attorneys

Patented Mar. 28, 1939 2,151,960

UNITED STATES PATENT OFFICE

2,151,960

PRINTING METHOD AND APPARATUS

Emil Ericksson, Chicago, Ill., assignor to Standard Process Corporation, Chicago, Ill., a corporation of Delaware

Application April 27, 1936, Serial No. 76,686

12 Claims. (Cl. 101—152)

This invention relates to printing methods and apparatus, and more particularly to novel means for printing intricate color designs upon relatively thin or flimsy materials such as paper, transparencies, webs formed from regenerated cellulose, and the like. The present application constitutes a continuation in part of my application Serial No. 634,406, filed on September 22, 1932, and entitled Multiple impression printing apparatus.

In the printing of multiple colors upon textiles, wallpaper and the like, it has been the practice in the past to employ two or more color cylinders in combination with a common impression cylinder, an endless belt of hard felt or fabric being provided to travel around the common impression cylinder and around pulleys spaced therefrom. While such arrangements may be suitable for relatively coarse work as encountered in the printing of textiles and wallpapers, they have not been found satisfactory for quality commercial intaglio or Rotogravure color printing such as in the printing of magazines, catalogues and the like, and they have not been found suitable for use in connection with relatively finely made printing rolls such as those engraved by photo-etching methods, the reason for this being that it is impossible to manufacture a belt of rubber-covered fabric of the required width and thickness or to secure any comparatively hard rubber surface that would be sufficiently uniform in thickness and free of seams, defects and blemishes when the belt has been joined.

With the endless belt as used on textile or wallpaper printing machines, the printing cylinders cannot be placed or spaced around a common impression cylinder as placed on a multi-color Rotogravure printing press according to the present invention. On all such textile and wallpaper machines, the printing impression is disengaged by raising the impression cylinder away from the printing cylinder which makes it necessary to have all the printing cylinders arranged below the center of the common impression cylinder. No attempt is made on such printing machines to dry the ink between impressions. Therefore the space between impressions has not been considered important whereas in commercial Rotogravure color printing, it is absolutely necessary to dry between each impression. The printing cylinders are therefore arranged around the common impression cylinder so as to get all possible space between impressions. As in the present invention, impression is released by disengaging the printing cylinders from the common impression cylinder, it has been found possible to place the printing cylinder above as well as below the center of the impression cylinder. This permits of the use of a common impression cylinder of a diameter that is practical in a printing press room.

Further disadvantages of the endless belt arise from slippage on the impression drum or the pulley which is out of the question for close register Rotogravure color work and the natural tendency for dirt to accumulate on the under side of the belt which accumulations make the impression uneven.

In the typographical field, it has also been proposed to arrange a number of printing cylinders around a common impression cylinder. As no drying is necessary between impressions for color process printing in relief, no space is required for this purpose between printing impressions. Therefore, in typographical presses, a comparatively small impression form or cylinder is used to take the multi-color impressions.

However, the impression cylinders as employed in such presses are not suitable for the purposes of the present invention since the impression surfaces thereof are of either tympan paper or a fairly hard rubber "blanket". Furthermore, the impression cylinders cannot have a continuous circumferential surface in that they must be slotted at one or more places to provide means to fasten or tighten the tympan or blanket around the cylindrical form, since the tympan or blanket must be frequently changed. Such a slot or gap invariably comes at a margin where there is no printing, and consequently such an impression cylinder may be used only for typographical or relief printing.

In commercial Rotogravure printing, the essential and criterion of a quality standard product is absolute precision of printing impression. Both the common impression cylinder and the printing cylinders must be in perfect alignment and the accuracy in diameters of the printing and impression cylinders must be in the order of 0.001 inch to insure absolute uniformity in impression. Such accuracy and the maintenance thereof has not been found possible in the prior art devices.

In overcoming the aforesaid disadvantages of the prior art and other disadvantages not mentioned, it is a major object of the present invention to provide novel printing methods and apparatus wherein the required accuracy of impression can be secured and maintained in order that multi-color printing of paper, transparencies and

the like may be accomplished in a commercially practical manner.

A further object of the present invention is to provide a novel common impression cylinder for a multi-color press whereby the material being printed is maintained thereon in perfect register throughout the contact with the various color cylinders, despite any inherent fragility or tendency of the material to warp, shrink or stretch.

Still a further object of the present invention is to provide a novel surface for a common impression cylinder employed in combination with a series of printing cylinders as employed, for instance, in commercial intaglio or Rotogravure color printing, whereby relatively thin material such as transparencies and regenerated cellulose may be maintained in perfect register during separate printing operations.

Prior Rotogravure web or rotary color presses have been of the unit type, i. e., a number of printing units are set up in line, a unit for each of the colors to be printed on one side of the web, and one or more additional units for printing on the opposite side of the web. Dependent upon the drying method employed between the surface impressions, there is a length of all the way from a minimum of 21 feet to a maximum of 32 feet of partially uncontrolled web between each impression. For this reason it has always been impossible to secure and maintain perfect register on this type of Rotogravure color system, since the web is bound to weave or move sidewise or may shrink or stretch or otherwise change in dimension or possibly warp not only by reason of the application of ink thereto and the drying thereof but also due to the weight of the length of the material.

To overcome this disadvantage of the prior art, it is a further object of the present invention to provide a multi-color press wtih a novel impression surface wherein the web is maintained in close contact with the impression surface throughout all its contacts with the printing cylinders whereby no opportunity is afforded for the web to move sidewise or change in dimension and thus vary the registry of the various colors, despite the flimsy or fragile character thereof.

A further object of the present invention is to provide a novel arrangement of impression and printing rollers whereby the natural static set up in the web is employed to cause the web to cling closely to the impression cylinder and thus maintain the web in perfect register.

Still a further object of the present invention is to provide a novel impression roller in combination with a printing roller for the multi-color printing of material such as Cellophane, Glassine and the like wherein the inherent characteristics of the material itself causes it to cling tenaciously to the impression cylinder and so insure perfect registry of printing, whereas this same inherent characteristic in such material is a serious handicap and makes it almost impossible to maintain register on the unit type of Rotogravure color press.

A further object of the present invention resides in the provision of a novel common impression cylinder and a method of making it whereby the cylinder surface may be applied and thereafter processed without removing the cylinder from the press.

A further object of the present invention is to provide novel means for use on a press of the type described whereby reconditioning of the surface of the common impression cylinder may be readily accomplished without disturbing the position of the cylinder in the press.

Still a further object of the present invention is to provide novel means in connection with a printing cylinder whereby there will be no splashing of ink when the roller is operated at relatively high speeds and the vaporization of solvents in the ink will be held to a minimum.

A further object of the present invention is the provision of novel sealing means for an ink fountain containing a printing cylinder having a doctor associated therewith wherein the sealing means substantially prevents evaporation of the volatile ingredients of the ink with no interference with the action of the doctor.

Still a further object of the present invention is to provide novel inking means in association with a printing cylinder wherein sustained contact of the cylinder with a continuous supply of fresh ink is assured.

A further object of the present invention is to provide novel stripping means and methods whereby the material being printed is subjected to a stripping action from a printing couple substantially coincident with the printing.

With the foregoing and other objects in view, reference is made to the following description and accompanying drawings wherein:

Figure 1 is an end view of a printing press illustrating a preferred embodiment of the present invention, a portion of the drying means and the cylinder operating mechanism being removed.

Figure 2 is an end view taken partially in section of a further preferred embodiment of the present invention in the form of a printing cylinder and the fountain associated therewith as may be employed for the first color in the press of Figure 1.

Figures 3, 4 and 5 respectively are views similar to Figure 2 of the cylinders constituting the second, third and fourth colors as may be employed in the press of Figure 1.

Figure 6 is a side view of an end plate of the fountain shown in Figure 4 showing a preferred manner of sealing the ends of the printing cylinders.

Figure 7 is a rear elevation taken partly in section of a grinder preferably employed in conditioning the common impression cylinder of the press of Figure 1.

Figure 8 is a side view of a portion of the press of Figure 1 with the grinder of Figure 7 shown in operating position.

Referring to the drawings and particularly to Figure 1, a printing press illustrating a preferred embodiment of the present invention is there indicated generally by reference character 11.

Press 11 is provided with a normally idling common impression cylinder 12 having a suitable impression surface 13 formed of a yielding substance such as rubber or the like permanently bonded thereto. While it is to be understood that rubber is preferred, any other resilient or elastic material having equivalent characteristics may be used as a surface for the impression roller. In applying the material to the cylinder, it is not necessary to remove the cylinder from the press, this being a marked advantage inasmuch as said cylinders are of considerable weight and the removal thereof from the press would necessitate the removal of much of the mechanism associated therewith.

In applying an elastic or resilient material such as rubber to the cylinder, the rubber in the form of sheets is wound around the cylinder to approx-

imately the desired thickness, and substantially sealed from contact with the atmosphere by heat insulating and heat-resistant material such as asbestos sheets and cloth. The cylinder is preferably constructed with a steam chamber 14 either confined to the periphery thereof as shown or occupying the entire interior of the cylinder. Steam of the proper temperature is admitted to steam chamber 14 through an inlet 15, the water of condensation being discharged at 16' whereby the rubber sheeting is vulcanized to the cylinder. After vulcanizing, the heat insulating cover may be removed and the rubber surface ground to the proper size by methods and apparatus to be later described.

Spaced about the entire periphery of common impression cylinder 12 are mandrels or printing cylinder holders 16, 17, 18 and 19 which are arranged to receive readily removable, thin printing cylinders or shells 21, held firmly on the mandrel by means described in my application Serial No. 634,406, previously referred to. The shells 21 and the method of forming and utilizing them are fully disclosed and claimed in my copending applications Serial Nos. 418,916 and 525,267. If desired, cylinders 16, 17, 18, and 19 may themselves be provided with engraved or relief printing surfaces or may receive removable type, if so desired, and this arrangement may be varied at will to produce successive superimposed impressions on the same area of printing surface from each of the cylinders 16, 17, 18, and 19, by any known printing or transfer means. Different colors or the same color may be printed by each of the cylinders if desired.

As shown in Figure 1, the printing cylinders are preferably positioned both above and below the horizontal axis of the impression cylinder 12 and are spaced about the entire periphery of the impression cylinder in such a manner that the distance between the lines of printing contact of the first and last printing cylinders measured along the peripheral surface of the impression cylinder in the direction of travel of the web 22 is more than one-half the circumferential distance around the impression cylinder, thus the impression cylinder cannot be moved radially, as for replacement purposes, unless one printing cylinder such as the upper printing cylinder 16 is displaced.

Web 22, which may be of any substance upon the surface of which it is desired to print, either paper or textile material or a transparency such as regenerated cellulose or the like, is passed from material rolls, not shown, through suitable guide rollers and tensioning means as described in my application Serial No. 634,406. Web 22 prior to its entry between the printing couples formed by the impression surface 13 and the printing cylinders is guided by pairs of adjustable tensioning rollers 23 and 24 and guide rolls 26 and 27, all of which are provided with suitable adjusting means as described in my applications above identified. The web 22 after passing between the printing couple constituted by impression surface 13 and printing cylinder 19 is guided over a stripping roller 28 after which it may be subjected to drying and treating and wound or otherwise conveniently taken care of by any desired means not shown. Particularly in the handling of transparencies such as regenerated cellulose and like relatively flimsy material, it is desired to have the roller 28 located on a tangent to the point of contact between the printing couple formed by impression surface 13 and the cylinder 19. This arrangement has been found most suitable for stripping the web from the impression cylinder against the static action which tends to hold the web to the cylinder. This action is believed due to the timing of the stripping action substantially with the application of pressure to the web by cylinder 19 whereby the stripping takes place substantially coincident with a minute displacement of the web relative to the impression cylinder because of the pressure of the printing roller 19.

As described in my application Serial No. 634,406, adjustment means are provided for the various printing cylinders whereby their positions may be adjusted with reference to the impression surface 13 and the cylinders may be either singly or simultaneously thrown out of or into contact with the impression surface. Means for operating several of the adjustment means for the cylinders, inking fountains and doctor blades are shown at 29, such operating means being described in detail in my application hitherto referred to.

Drying means generally indicated at 31 is disclosed in detail in my application above referred to and no detailed description thereof is considered necessary in the present case, since such does not form part of the present invention.

As will be noted from Figure 1, the upper left quadrant 32 of the press frame 11 is preferably made separate from the remaining portion of the frame and is hinged thereto by suitable pins 33. Cables 34 have ends secured to the quadrant 32 as shown at 35, cables 34 passing over guide pulleys 36 mounted upon an extended upper portion of the frame as shown at 37 and passing to suitable means either located within or without the press for retraction purposes. Thus, if it is desired to gain access to the interior of the press to treat or process the impression surface 13, it is only necessary to retract the cables 34 whereupon the quadrant 32 will be rotated about pins 33 to a position whereby access may be had to the surface 13 of the common impression cylinder 12.

Ink is supplied to the printing cylinders 16, 17, 18 and 19 through suitable means as described in my application Serial No. 634,406, the excess of ink being collected in a housing positioned around each of the cylinders. As shown in Figure 1, each ink housing 38 comprises generally a trough-like section closed at the ends by suitable plates and having means as shown at 39 whereby the housings may be swung to and away from the printing cylinders. These housings are fully described in my application above referred to and no detailed description thereof is deemed necessary in the present case.

Referring to Figures 2 to 5 inclusive, a further preferred embodiment of my invention is there illustrated as embodied in the individual color printing cylinders and the apparatus associated therewith as shown in Figure 1. As will be noted upon inspection, the ink fountains 41 of each of the individual colors are of generally like design, necessary changes being made in the individual colors as required by the positions of the individual color cylinders with reference to the impression surface 13. Each ink fountain preferably comprises a trough-like section 42 extending from a point adjacent one end of the cylinder to a point adjacent the opposite end of the cylinder. Each trough 42 is designed in a manner to collect the excess ink and to afford means whereby the ink may be returned to a re-

circulating system such as is described in my applications Serial Nos. 623,421 and 634,406 and is mounted on the press frame 11 in a manner described in my application Serial No. 634,406 so that ready access may be had to the interior thereof.

From the recirculating system, the ink is supplied to ink distributors generally indicated at 43 which discharge ink onto the surface of the individual printing cylinders. The internal construction of these distributors is described in detail in the applications above referred to and as they form no part of the present invention, a detailed description thereof at the present time is not considered necessary except to state that the ink distributors are modified as the ink fountains to care for the different positions of the printing cylinders 16, 17, 18 and 19 with reference to the impression surface 13.

As will be noted printing cylinders 16 and 17 are provided with substantially straight distributing plates 44 immediately adjacent the ink distributors while cylinders 18 and 19 are provided with curved plates 45 for a like purpose. Plates 44 and 45 serve to maintain a supply of ink in contact with the surface of the cylinders at all times despite the continual discharge of ink from the distributors, thus insuring a sustained period of contact between the cylinders and fresh ink at all times.

Plates 45 at their forward ends are formed with grooves 46 arranged to receive a suitable packing material such as a strip of felt 47 in contact with a portion of the surface of a doctor blade holder 48. The portions of the ink fountains 41 associated with cylinders 18 and 19 adjacent the doctor blade holders 48 are also grooved in like manner as shown at 49 and supplied with a similar sealing or packing strip 51. Each of the fountain sections with cylinders 18 and 19 is formed with a hinged section 52 at the upper side thereof to afford ready access to the cylinder and the fountain interior, the hinged sections 52 at their forward ends having sealing strips 53 suitably secured thereto by flat strips 54.

In like manner with reference to cylinders 16 and 17, the lower ends of fountain sections 41 are provided with sealing strips 55 suitably secured to fountain sections 41 as by screws and fastening strips 56. Each fountain section 41 associated with cylinders 16 and 17 has a hinged section 57 secured thereto at the forward end of which is secured a sealing strip 58 adapted to contact portions of the surface of the doctor blade holders 48. It will also be noted that in printing cylinders 16 and 17 adjacent ink distributors 43, sealing strips 59 are provided which contact the printing cylinders and aid in the distribution of ink thereon.

In addition to the trough-like sections 42, the ink fountains 41 comprise end plates 61, one of which is shown in Figure 6. The various end plates are shaped to fit the various fountains employed in connection with the different printing cylinders. By way of example, an end plate for the fountain of Figure 4 is here illustrated. As shown in Figure 6, each end plate is provided with felt pads or like sealing strips 62 adjacent the cut out portions 60 thereof adapted to receive the cylinder which strips contact the surface of the printing cylinders adjacent the ends thereof. The ink fountains 41 do not extend the entire width of the cylinders 16, 17, 18 and 19, and immediately outside the ends of the fountain the cylinders are sealed with relation to the fountains by sealing strips 62. If desired, strips 62 may be arranged on the inside of the fountain ends if the design upon the cylinders is such that the printing thereof will not be interfered with. Each strip 62 is secured to its end plate by a curved strip 63 and suitable fastening means 64 passing therethrough.

It will be noted that by reason of the various sealing means and the doctor, the interiors of the ink fountains are substantially sealed against the atmosphere. This not only prevents the access of dust and dirt to the ink but also insures against undue evaporation of the solvents contained in the ink.

With reference to Figures 2 and 5, a detailed view is there shown of the doctor of the present invention. As shown the doctor comprises a metal rod 64 preferably slotted as shown at 65 and provided with a series of apertures 66 and 67 arranged at right angles to one another. A doctor blade 68 is provided in conjunction with a pressure blade 69 which extends to a point approximately one-quarter inch from the edge of the doctor blade 68, the two blades being maintained in superposed relation by being clamped between two elongated plates 71 by suitable screws 72. The plates 71 in turn are held in place by set screws passing through the aperture 66 and are subject to adjustment by set screws operating in apertures 67.

Grinding mechanism

Referring back to Figure 1, when the impression surface 13 is first applied or is to be reconditioned, it is necessary after the application and vulcanizing of the elastic or resilient material to grind the surface to a relatively smooth and uniform contour. This is preferably accomplished by a mechanism about to be described.

Referring to Figures 7 and 8, a grinding mechanism is there shown which comprises an undercarriage 91 fitted with dowel pins or the like 92 which engage corresponding apertures in the press frame, the undercarriage being preferably bolted to the press frame to hold it in the desired position. The carriage 91 is arranged to extend from one side of the frame to the opposite side and in a position parallel to the axis of common impression cylinder 12. The carriage 91 is formed with two aligned apertures 93 and 94 formed in projecting ribs 95 and 96 of the carriage. A shaft 97 is mounted in the apertures in suitable bearings which shaft is suitably connected in driving relation at its right end to a gear 98 through a suitable nut and washer connection 99. Shaft 97 mounts a pulley 101 which is preferably arranged to receive power from the axis of the shaft of the impression cylinder 12 although it is to be understood that it may be driven from an outside source.

A bevel gear 102 is suitably keyed to operate with pulley 101 by a key 103, a corresponding bevel gear 104 being provided on the shaft 97 adjacent the member 95. A differential gear 105 is mounted in the carriage 91 (Figure 8) to transmit power from gear 102 to gear 104. Both gears 102 and 104 are mounted to rotate freely on shaft 97.

Secured to gears 102 and 104 and arranged to rotate therewith are clutch elements 106 and 107 respectively, these elements being arranged to engage a clutch element 108 slidably mounted on shaft 97 and splined thereto so as to rotate with the shaft. Fork 109 with a suitable operating bar 111 is connected with clutch element 108 to slide the same on the shaft 97.

A threaded shaft 112 is mounted on suitable bearings in elements 95 and 96 and mounts a gear 113 on the end thereof which is arranged to mesh with gear 98. Shaft 112 is supported at the end removed from the gear 113 by a suitable bearing 114 in the undercarriage 91. The undercarriage 91 is provided on its upper surface with a series of guides 115 arranged to support a traveling carriage or table 116 in sliding relation thereto, the table 116 being moved through a suitable collar 117 thereon having threads engaging with a threaded portion 118 of shaft 112.

From the structure thus far described, it will be noted that upon rotation of pulley 101 in clockwise direction, gear 102 will be revolved in the same direction. If the clutch element 108 is moved to the right so that it engages clutch element 106 secured to gear 102, shaft 97 will likewise be driven in a clockwise direction and gears 98 and 113 will drive shaft 112 to move the table or carriage 116 to the left.

If the clutch element 108 be moved to the left to engage clutch element 107, the shaft 97 will be driven through bevel gear 104 in counterclockwise direction thus causing rotation of shaft 112 in a clockwise direction moving the table 116 to the right. It is thus seen that means is provided for quickly and easily reversing the direction of travel of the table 116 by relatively simple mechanism.

Table 116 is suitably grooved as shown at 119, the left side of the groove being provided with adjustable member 121 to permit locking of the table in the groove.

A second table 122 is formed with guide members 123 arranged to fit within groove 119 and slide therein. To effect sliding movement of table 122 relative to table 116, a threaded shaft 124 is provided which engages threaded member 125 secured to table 116 and is held in relatively fixed relation to table 122 by a collar 126 as shown in Figure 8. A supporting frame 127 is secured to table 122 as by bolts 128, frame 127 having upstanding portions 129 and 131 which support bearings 132 and 133 respectively. Bearings 132 and 133 are identical, each being provided with a roller element 134 secured in place by collars 135 and 136 and bolts 137 and 138, suitable lubricant seals 139 being provided.

A shaft 141 is mounted to rotate in bearings 132 and 133, the shaft having a pulley 142 keyed to the left end thereof and a suitable grinding wheel 143 secured to the right end thereof. An electric motor 144 is mounted on the rear of table 122 as shown in Figure 9, and is arranged to drive pulley 142 through a suitable connection as by belt 145.

By raising the sector 32 of press 11 as shown in Figure 1 through the use of cables 34, approximately a quadrant of the impression surface 13 is open to access. The grinding mechanism of Figures 7 and 8 is mounted upon the surface 146 of the press as shown in Figure 1 and suitable connection made to the shaft of the impression cylinder as by a belt 147. By reason of the travel of the grinding wheel 143 in a direction parallel to the axis of the impression cylinder through threaded shaft 118, and the ability to adjust table 122 with reference to the carriage 116, grinding of the impression surface 13 to a relatively smooth and accurate surface is easily accomplished. It will be noted that this grinding is possible without dismantling the press.

While the grinding attachment as disclosed herein has been described in connection with a press having a pivotal section, it is to be understood that the use of the grinding attachment is not so limited. On presses that are built without the pivotal section, the grinding attachment substantially as described herein may be bolted or similarly secured to either a planed pad on the frame of the press or to a bracket that can be bolted or otherwise fastened to the frame.

The press of the present invention has been found to be particularly valuable in the printing of relatively fragile and flimsy transparent material such as transparent regenerated cellulose and like materials. This is believed to be due in part to the condenser action on the layer 13 of elastic or resilient material and the metal common impression cylinder 12, the material as soon as it contacts the impression cylinder becoming statically charged and clinging to the impression cylinder as if glued thereon. It is thus possible to print very accurately thereon and obtain a registration of different colors to a degree not hitherto considered possible. No matter how delicate or fragile the web may be, it is impossible for the material to be torn or the registration of color thereon to become inaccurate once the printing rolls have been properly adjusted. The characteristic of the material adhering tightly to the impression cylinder prevents any change in dimension thereof as might be occasioned by shrinkage due to contact with the ink or heat from the driers.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A printing press for Rotogravure or intaglio multi-color printing comprising a common impression cylinder provided with a web contacting surface permanently bonded thereto and a plurality of printing cylinders spaced about said impression cylinder, said contacting surface being formed as a continuous surface of elastic or resilient material ground to precision.

2. A printing press for Rotogravure or intaglio multi-color printing comprising a common impression cylinder provided with a web contacting surface and a plurality of printing cylinders spaced about said impression cylinder, said contacting surface comprising a metal base and a continuous precision ground layer of elastic or resilient material permanently bonded thereto.

3. A printing press for Rotogravure or intaglio multi-color printing comprising a common impression cylinder provided with a web contacting surface, and a plurality of printing cylinders spaced about said impression cylinder, said contacting surface comprising a metal base with a continuous precision-ground layer of rubber vulcanized thereto.

4. An impression cylinder for use as a common impression cylinder for a plurality of printing cylinders in Rotogravure or intaglio printing comprising a cylinder having a metal surface thereon and a layer of resilient or elastic material permanently bonded thereto, said material being ground to precision to form a smooth continuous cylindrical surface.

5. An impression cylinder for use as a common impression cylinder for a plurality of printing cylinders in Rotogravure or intaglio printing comprising a cylinder having a metal face and a layer of rubber vulcanized thereto, said rubber being precision-ground to form a continuously smooth cylindrical surface.

6. In a multicolor printing press of the type defined in claim 1, a stripping roller disposed adjacent the region at which the final printing operation takes place, said roller being so located as to cause the web to leave the surface of said impression roller upon a line which is substantially tangential to the surface of said impression cylinder at that printing region.

7. A printing press for Rotogravure or multicolor intaglio printing comprising a common impression cylinder, a continuous layer of resilient material permanently bonded to the periphery of said cylinder to provide a web-contacting surface, and a plurality of printing cylinders spaced about the entire periphery of said impression cylinder.

8. A printing press for Rotogravure or multicolor intaglio printing comprising a normally idling common impression cylinder having a continuous, resilient precision-formed peripheral surface permanently bonded thereto about the major portion of which a web to be printed is wrapped in close contact, and a plurality of spaced driven printing cylinders adapted to firmly contact spaced portions of said web about the periphery of said impression cylinder, said impression cylinder being frictionally driven by said printing cylinders.

9. A printing press for Rotogravure or multicolor intaglio printing comprising a normally idling common impression cylinder, a continuous, resilient precision-formed web-contacting surface permanently bonded to the periphery of said cylinder, and a plurality of driven printing cylinders spaced about the entire periphery of said impression cylinder, said impression cylinder being frictionally driven by one or more of said printing cylinders.

10. A printing press for Rotogravure or intaglio printing comprising a common impression cylinder having a continuous, resilient, precision ground peripheral surface permanently bonded thereto about which a web to be printed is wrapped in close contact for more than half the circumferential distance around said impression cylinder, and at least three printing cylinders adapted to firmly contact spaced portions of the web about the periphery of said impression cylinder, said printing cylinders being spaced about the entire periphery of said cylinder in such a manner that the impression cylinder cannot be displaced radially without shifting at least one of said printing cylinders.

11. A printing press for Rotogravure or intaglio printing comprising a common impression cylinder having a continuous, resilient, precision ground peripheral surface permanently bonded thereto about which a web to be printed is wrapped in close contact for more than half the circumferential distance around said impression cylinder, the surface of contact between said web and impression cylinder including the bottom half of the peripheral surface of said impression cylinder, a plurality of printing cylinders adapted to firmly contact spaced portions of said web along said bottom half of the impression cylinder surface and at least one printing cylinder adapted to engage said web along the upper half of the peripheral surface of said impression cylinder, said points of contact and engagement being such that said impression cylinder cannot be displaced radially without shifting at least one of said printing cylinders.

12. A printing press for Rotogravure or intaglio printing comprising a common impression cylinder having a smooth, resilient, continuous web contacting peripheral surface permanently bonded thereto, a plurality of spaced printing cylinders having parallel axes disposed about the peripheral surface of said impression cylinder below the horizontal axis thereof and a plurality of printing cylinders whose axes are parallel to each other and to the axes of the above mentioned cylinders disposed about the peripheral surface of said impression cylinder above the horizontal axis thereof, said printing cylinders being adapted to print in succession upon a web wrapped about the peripheral surface of said impression cylinder for more than half the circumference thereof, said printing cylinders being arranged so that said impression cylinder cannot be displaced radially without shifting at least one of said printing cylinders.

EMIL ERICKSSON.