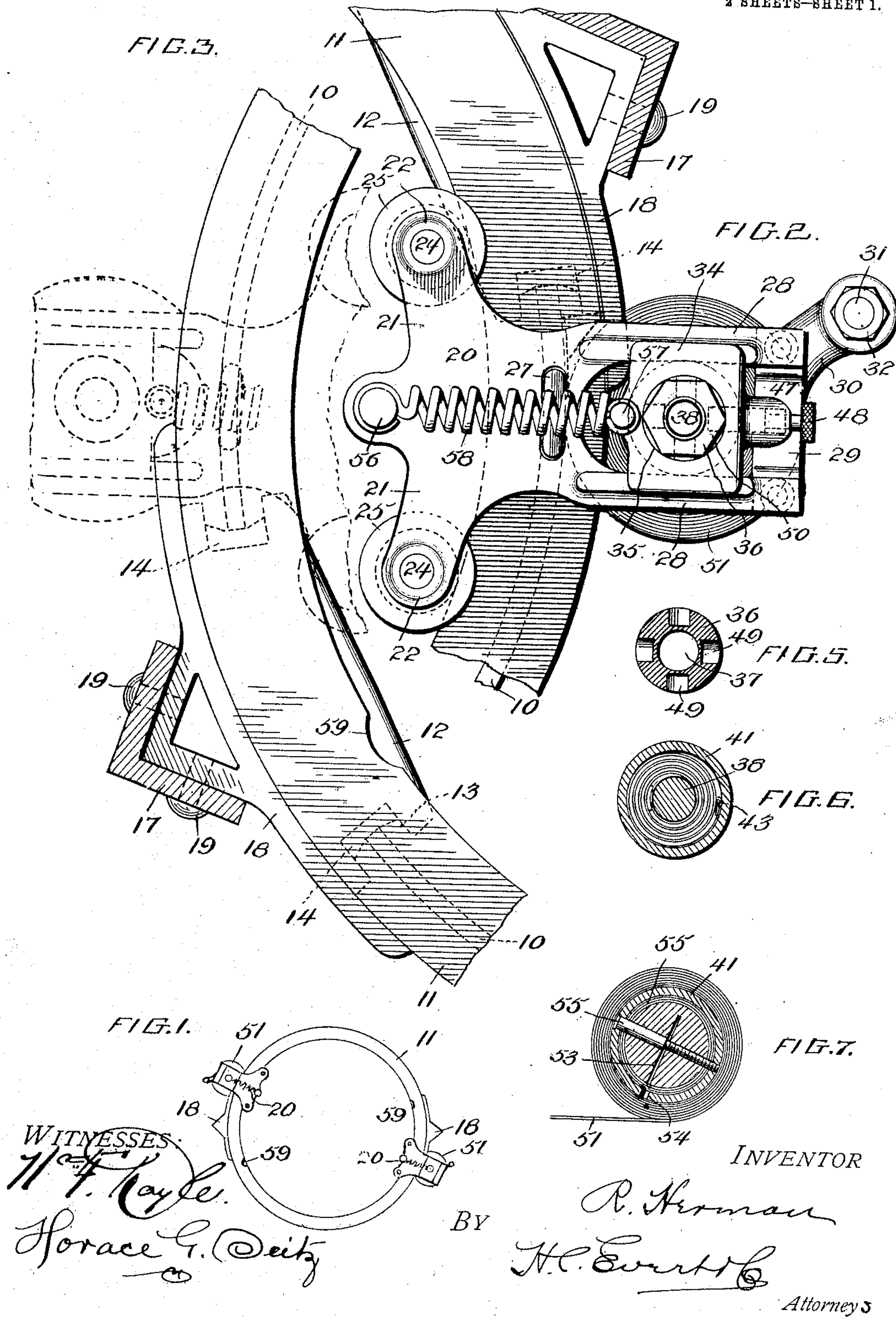


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CURTAIN SUPPORT FOR BLUE PRINTING APPARATUS.
APPLICATION FILED JAN. 18, 1903.

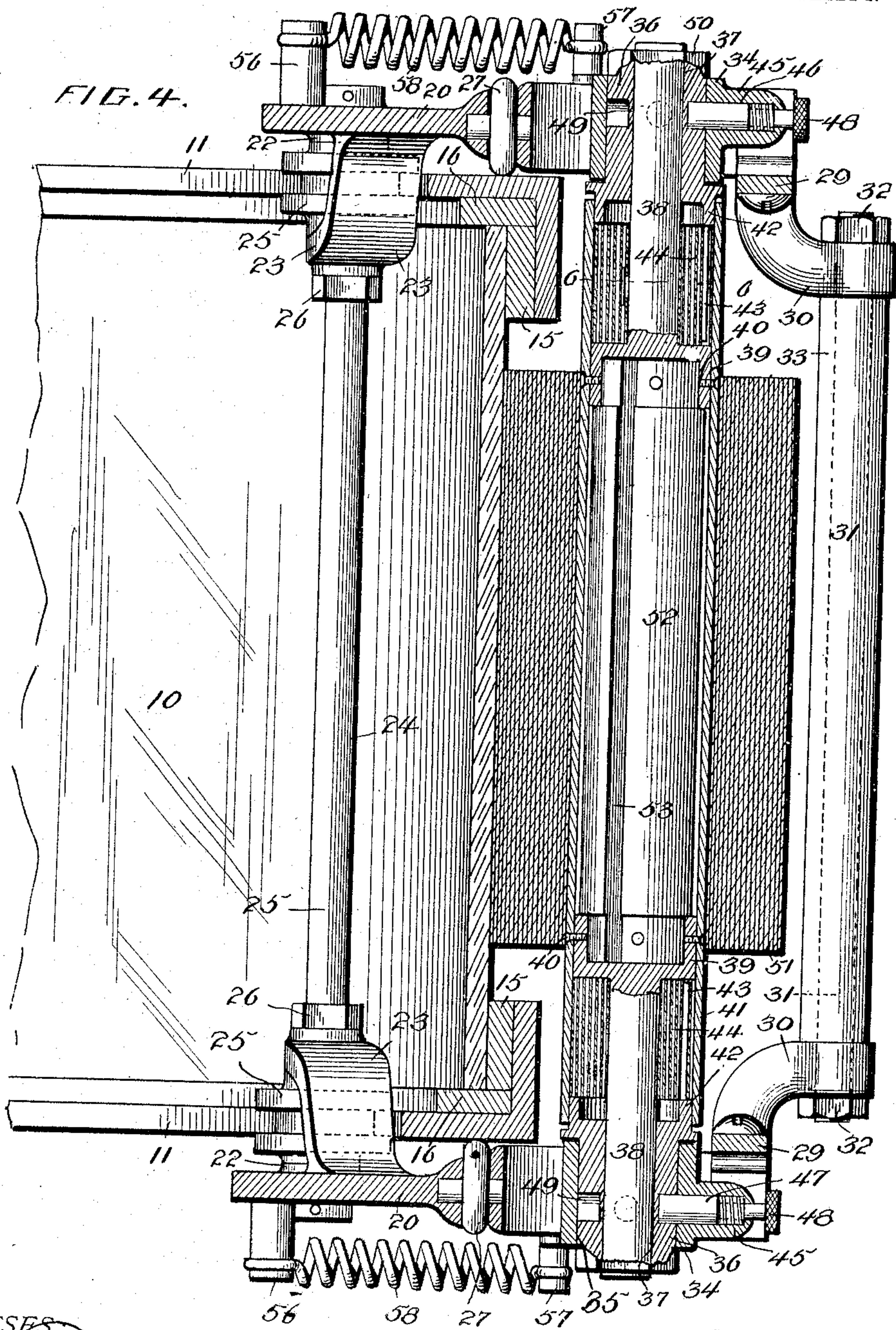
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2 SHEETS—SHEET 1.



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WITNESSES:

W. F. Kayle

Horace E. Deitz

INVENTOR

R. Herman

BY

J. C. Ewart & Co.

Attorneys

UNITED STATES PATENT OFFICE.

REINHOLD HERMAN, OF CRAFTON, PENNSYLVANIA.

CURTAIN-SUPPORT FOR BLUE-PRINTING APPARATUS.

974,965.

Specification of Letters Patent.

Patented Nov. 8, 1910.

Application filed January 18, 1909. Serial No. 472,845.

To all whom it may concern:

Be it known that I, REINHOLD HERMAN, a citizen of the United States of America, residing at Crafton, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Curtain-Supports for Blue-Printing Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in blue printing apparatus, and has particular relation to the construction of the printing frame and the mechanism for supporting the curtain for the frame.

Among the objects of my invention are the following: To provide a printing frame having transparent portions, the ends of which are positively held spaced apart, compensation for expansion and contraction being provided along the edges of the transparent portions. To provide a printing frame having a cylindrical transparent portion provided at its ends with spacing rings formed angular in cross section, said transparent portions having vertically extending spacing members for positioning and retaining the transparent portions in predetermined position relative to the rings. To provide a printing frame having a cylinder, the ends of which provide a positioning device for the cylinder and a track and support for the curtain carrier. To provide a printing frame having a movable curtain with a guiding and supporting-structure located and operating on the opposite side of the wall of the cylinder of the frame from that on which the curtain is located. To provide a printing frame having a transparent cylinder with a curtain support having a fixed path of travel about said cylinder, said support being under a tension extending radially of the cylinder for positively retaining the curtain against the face of the cylinder. To provide a curtain-supporting structure having a fixed path of travel about the cylinder and having tension mechanism adapted to place an increasing tension on the structure during its movement in a direction to place the curtain around the cylinder. To provide a curtain-supporting structure having a fixed path of movement about the cylinder, and also having tension applying mechanism operative during the movement of the structure, provision being made to retain the structure in a

fixed position under the maximum tension provided during its movement. To provide a curtain-supporting structure having a fixed path of movement about the printing-cylinder, the movements of the structure being under tension, the movement in one direction applying a gradually increasing tension, the tension placed on the structure during a predetermined portion of its path of travel being insufficient to cause an automatic return of the structure when the latter is placed in adjusted position within the limits of such predetermined portion. To provide a curtain-supporting structure having a fixed path of movement about the printing-cylinder, said structure being under tension extending radially of the cylinder, and also having a tension mechanism actuated by the movements of the structure, said radial tension forming a controlling means for preventing automatic return of the structure under its tension mechanism when the structure is moved within the limits of a predetermined portion of its path of travel. To provide a curtain-supporting structure in which the curtain-supporting roller is supported and positioned within the structure by the tension controlling mechanism.

Minor objects are the provision of novel and improved structures of specific elements included in the structures for producing the objects above mentioned.

To these, and other ends, the nature of which will be understood as the invention is hereinafter disclosed, my invention consists in the improved construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views, Figure 1 is a diagrammatic top plan view of the printing frame of a blue-printing apparatus. Fig. 2 is a top plan view of a portion of the printing frame and showing the curtain-supporting structure in position thereon. Fig. 3 is a similar view of the printing frame. Fig. 4 is a vertical sectional view taken through a portion of the printing frame and showing, in section, the curtain-supporting structure mounted in position thereon. Fig. 5 is a horizontal sectional view of the roller shaft bearing, the line of section being taken through the several radial recesses of the

bearing. Fig. 6 is a sectional view taken on line 6—6, Fig. 4. Fig. 7 is a horizontal sectional view taken through the curtain roller, showing the manner in which the curtain is

5 secured to the roller.

The printing frame consists preferably of two semi-cylindrical transparent glass sections 10 of proper length, the end rings 11, and the structures presently described for

10 fixedly securing the sections of glass in position in the end rings.

Owing to the excessive cost of a glass cylinder of sufficient size to form a printing cylinder, it is the general practice to provide

15 such cylinders in semi-cylindrical form, the opposing edges of the sections extending in juxtaposition to each other. In the present case, these sections are of a size to provide a space between the opposing edges of the

20 glass in which space is located a spacing member 12 formed in cross section substantially as shown in dotted lines in Fig. 3, said member being preferably formed of wood or similar material. The spacing members,

25 which are located on diametrically opposite sides of the printing frame, each have, on their vertical edges, longitudinally extending recesses 13 within which a strip of felt 14 or similar material is placed, said strip

30 being provided to form a cushioning element for the sections of glass when the latter are in position and to provide the necessary compensation for expansion or contraction of the glass sections when the latter are in posi-

35 tion, the glass sections and the spacing members when properly positioned relative to each other forming a complete cylindrical printing cylinder with relatively small "blind" spaces on diametrically opposite

40 sides of the cylinder.

The printing cylinder is completed by the end rings 11, each of which is preferably formed of angle-iron, as shown in Fig. 4, the diameter of the inner edge of the verti-

45 cally extending portion of the ring being slightly larger than that of the outer face of the cylinder formed by the glass sections and the spacing members, the horizontally extending portion of the ring, in cross section, being of a length to extend inward and over-

50 hanging the inner face of the glass portion of the cylinder. To cushion the glass sections from contact with the rings 11, I provide felt strips 15 and 16, the strip 15 being

55 interposed between the face of the glass and the vertically extending portion of the ring 11, while the strip or ring 16 is interposed between the horizontally extending portion of the ring and the ends of the glass sections.

60 For the purpose of retaining the printing frame in position in a blue-printing apparatus, I preferably provide a supporting frame having vertically extending bars 17, preferably formed angular in cross section,

65 within which a bracket 18 secured to dia-

metrically opposite sides of each ring is secured, the securing means being of any desired type, such for instance, as by bolts 19 passing through the bar 17 into the bracket 18 as shown in Fig. 3. The brackets

70 18 are preferably secured on the rings 11 in such position that the "blind" portions formed by the spacing members will be in alinement with the bars 17.

The particular construction of the sup-

75 porting frame, herein designated as 17, is not set forth herein, since that forms the subject matter of a separate application for Letters Patent. It will be understood from the above, however, that

80 when the sections of glass and spacing members are properly positioned between the rings 11, and the latter, through the brackets 18, secured rigidly to the bars 17, all liability of movements of the cylinder

85 bodily or of the integral parts thereof relative to the supporting frame, will be eliminated with the exception of the expansion and contraction of the glass sections and that any deleterious effect of such expansion

90 and contraction will be overcome or compensated for by the particular manner of supporting the edges of the sections.

The curtain-supporting structure or carrier is mounted to have a path of travel

95 around the outer face of the cylinder to place a curtain of the desired material on such outer face over the drawing and printing paper placed thereon. In the present invention the printing frame is provided

100 with two curtain-supporting structures having their normal inactive positions on diametrically opposite sides of the frame, as shown in Fig. 1, this position being adjacent to the vertical bars 17. This structure will

105 now be described.

In view of the fact that the construction of the supporting structure above a median line through the curtain and its supporting

110 roller is the same as that below such line, the description of parts will be confined to the upper portion of said structure, it being understood of course, that the construction, adjustments, movements and operations are

115 substantially co-incident at each end of the structure.

20 designates an end frame, shown in plan view in Fig. 2, having its inner end provided with laterally extending wings 21 within

120 which, and bearings 22 formed at the outer ends of downwardly extending brackets 23 carried by the under face of the frame 20 (see Fig. 4), is mounted a shaft 24 carrying a grooved pulley 25, the position of the

125 pulley being such as to permit the inner edge of the horizontal portion of the end ring 11 to enter into the groove of said pulley, it being understood of course, that each frame is provided with two pulleys 25 spaced sub-

130 stantially equi-distant of the longitudinal

center of the frame. In Fig. 4 I have shown a shaft 24 as extending from the frame at one end of the cylinder to the frame at the other end of the cylinder for the purpose of positioning the frames relative to each other, suitable set nuts 26 being provided for this purpose. If desired, the shafts of both pulleys 25 may be of equal length and therefore forming more than a single connection between the opposing frames 20, but such construction is not necessary, the shaft for one of the pulleys, being, if desired, a stub shaft. In order that the frame may be additionally supported against an end-wise movement of the cylinder, and to permit a freer movement of the structure thereon, I preferably mount within the frame 20 at a point above the horizontal portion of the ring 11 a suitable roller 27 which rides on the upper face of said ring. The outwardly extending portion of the frame 20 is in the form of two spaced projecting portions 28, having their inner faces extending in parallelism and formed as guide ways, the upper and lower faces of said portions also being formed to provide guides having the plane of their faces extending in directions at right angles to the planes of the inner faces of said portions. The outer ends of the portions 28 are connected together by a suitable cross-tying member 29, from which depends a bracket 30 adapted to receive one end of a rod 31, said rod passing through the opposing bracket 30 and being secured therein by suitable nuts 32 screw-threaded on to the ends of the rod.

33 designates a sleeve mounted on the rod 31 for the purpose of providing a handle for moving the entire structure.

Mounted within the space formed between the inner faces of the portions 28 is a cross-head 34 having movement in directions extending radially of the cylinder. The cross-head 34 is provided with a vertical opening 35 within which is mounted a journal 36 formed to be rotatable within the opening 35. The journal 36 is provided with an axial opening 37 through which extends one end of a shaft 38, the opposite end of said shaft being in the form of a cup-shaped flange 39 secured, as by screws 40, to the interior of a tube 41 at a point spaced from the end of said roller. While I have designated the roller 41 as a "curtain roller", it is to be understood that this element is not the complete "curtain roller", the latter being a composite structure (as hereinafter set forth) of which the element 41 provides the surface on which the curtain is rolled in use, and which is of tubular form. The journal 36 has its lower end formed to be received within and loosely fit the interior of the end of the roller 41, and having an annular flange 42, which serves to prevent axial movement of the roller in

use, the space between the flanges 42 of the upper and lower members, being slightly greater than the length of the roller 41 in order that binding of the roller on the flange will be prevented under ordinary circumstances.

The journal 36 is provided on its lower edge with a pin 43 of a length slightly less than the distance between the lower edge of said member and the cup-shaped flange of the shaft 38, said pin being adapted to receive one end of a spring 44, the convolutions of which encircle the shaft 38, the opposite end of the spring being secured to said shaft in any preferred manner. This construction provides a spring connection between the journal 36 and shaft 38 and serves as a tension device when the journal 36 is rotated in a direction to "wind" the spring. For the purpose of controlling the tension of the spring 44, I provide the journal 36 with a plurality of recesses 49 extending from the outer edge of the journal in a radial direction, these recesses being preferably four in number as shown in Fig. 5. And to cooperate with said member and its recesses, I provide, within a projection 45 formed on the cross-head 34, an opening 46 within which is located a spring-pressed plunger 47 having an exposed head 48, said plunger being positioned to enter either one of the recesses 49 when the recess is placed in alinement with the plunger. If, therefore, the journal 36 be rotated in a direction to wind the spring 44, and the plunger 47 is seated in one of the recesses, the roller 41, through the shaft 38 will be placed under tension, the amount of which is controlled by the movement of the journal 36. To permit ready manipulation of the journal 36, said journal is preferably formed at its outer end with an angular portion 50 as shown in Figs. 2 and 4, to enable a suitable tool, such as a wrench, to rotate said journal.

51 designates the curtain which may be of any desired material, preferably canvas, and which is of a length sufficient to substantially cover the peripheral face of one of the sections of the glass but which may or may not extend in close proximity to the edges of the vertical portions of the rings 11. The curtain is secured to the roller in the following manner, reference being had more particularly to Fig. 7 of the drawings.

52 designates a roller having a length substantially equal to the distance between the cup-shaped flanges 39 of the shafts 38, said roller having reduced ends adapted to fit within said flanges and be secured therein in any suitable manner, such as by the screws 40. The portion of the roller intermediate the planes of the edges of the flanges 39 is of increased diameter, but of less diameter than that of the interior of the tube or curtain roller 41 to provide an annu-

lar space between the face of the roller 52 and the inner edge of the roller 41. The roller 52 is provided with a radially extending kerf 53 which normally aligns with a slot 54 extending longitudinally of the roller 41; the slot 54 may extend the entire length of the roller 41, if desired, or have its ends located intermediate the ends of the roller.

To secure the curtain 51 to its roller, one end of the curtain is first passed through the slot 54 and into the kerf 53 of the roller 52, (this taking place prior to securing the shafts 38 to the roller 41). The roller 52 is now rotated causing the curtain to be wound around said roller 52 until the annular space between the roller 52 and roller 41 is substantially filled by the convolutions of the curtain. A screw 55 of proper form, is then passed diametrically through the rollers 41 and 52, said screw passing through the convolutions of the curtain located within the annular space as well as the end of the curtain located within the kerf 53, and serves to closely bind the parts together to prevent all liability of a withdrawal of the curtain from the roller. Where the curtain is of a length sufficient to extend over the screws 40, the shaft 38 is secured in position before winding the curtain on the exterior of the roller 41. The opposite end of the curtain is secured to one of the spacing members in any suitable manner, for instance, it may be inserted within the recess 13 of the member 12 prior to the final assemblage of the printing cylinder, as shown by dotted lines in Fig. 2 of the drawings, the end of the curtain in this case passing around the glass and being secured to the spacing member on the inner side of the glass, this construction insuring that the curtain will have its ends lying in close contact with the glass.

To retain the curtain in contact with the glass during the movements of the curtain-supporting structure, I provide the frame 20 and the cross-head 34 with vertically extending pins 56 and 57 respectively and connect said pins by means of a spring 58 thereby placing a tension on the cross-head in a direction extending radially of the cylinder due to the particular location of the rollers 25 relative to the longitudinal center of the frame 20, which position maintains the frame in true radial alignment regardless of the position of the frame on the cylinder.

The operation of placing the curtain around the glass section consists simply in grasping the handle formed by the sleeve 33 and moving the structure around the printing frame, the structure having a fixed path of movement due to the fact that the rollers 25 are located on the inner edge of the rings 11 while the curtain itself, in the form of a roll, travels on the outer surface of the cylinder, the two opposing riding surfaces being

held under relative tension by the spring 58 which insures positive contact of the rollers and rings and the curtain and cylinder. This movement of the structure, by reason of the rotation of the roller 41 as the curtain is unwound, winds the spring 44 without changing the position of the journal 36, and thereby gradually increases the tension of the spring until the structure reaches the opposite side of the cylinder, at which time, the maximum tension of the spring is reached. In order that the structure may be maintained with the curtain extending from one side to the other of the glass section, I provide the rings 11 with a recess 59 adapted to receive one of the rollers 25, when said roller is brought into proper position relative thereto, the spring 58 serving to retain the structure in a manner to normally prevent the said roller from leaving the recess or notch 59. Upon release of this engagement of roller 25 and recess 59, upon the completion of the printing operation, by a drawing of the handle 33, the tension of the spring 44 will cause the entire structure to pass to its normal inoperative position with the curtain wound upon its roller, the power of the spring 44 being sufficient to impart the necessary momentum to the structure to permit its movement unaided by the operator. When, however, it is desired to move the structure but partially around the cylinder, as when making prints from small drawings, the frame is carried to the necessary point and retained there by the pressure exerted by spring 58 and the friction of the parts, the tension of the spring 44 being insufficient to move the structure from such position. When so positioned, the return movement of the structure must be performed by the operator.

Among the advantages of the particular construction of the curtain-supporting structure or carrier and the manner of its mounting, are the following: The curtain will be held in close contact with the cylinder regardless of the position of the carrier within its path of travel, the fixedly-positioned end being in contact with the cylinder and the carrier being under radial tension; the carrier has a fixed path of travel which is not affected by any position assumed by the carrier within the travel-path; the carrier, having its ends positively held against tilting movement (by reason of the mounting of the rollers 25 with respect to the ring 11), cannot be tilted to affect the true vertical axis of the roller, so that liability of the curtain being improperly rolled, or a differentiation in pressure on the cylinder at opposite edges be provided, is entirely eliminated; the provision of a tension mechanism serving to maintain a constant tension on the curtain and at the same time form a means for moving the carrier rapidly from one end to the

other of its path of travel, without providing a similar result in the portion of the travel path in which the operator can manually return the carrier without changing his position; the ability to remove the prints quickly after the print-exposure has been made; the provision of a gradually increasing tension on the roller as the curtain is unwound, which, in connection with the radial tension provides increased power to resist tendency of the curtain to become slack intermediate the carrier and the point of connection of curtain and printing frame; the formation of a curtain roller in which a disconnection of curtain from the roller or a relative movement of one to the other, is prevented; the provision of a novel, durable and efficient tension device. And owing to the fact that the radial tension on the roller is constant, and the fact that the roller tension retains the unwound portion of the curtain taut on the face of the cylinder, it will be understood that the unwinding movement of the curtain roller will effect a positive flattening out of creases, etc., in the print or drawings without any tendency of the curtain-covered portion of the latter to creep on the face of the cylinder, any movement of the drawing or print under this flattening operation being in the direction in which the roller is being drawn.

As will be seen, the carrier frame, formed by the end frames, the rod 24 and the rod 31, forms an extremely rigid structure, supported on the rings 11 against endwise movement by the rollers 27, the flanges of the rollers 25 serving to aid in preventing such movement. In view of this substantially integral structure of the parts and the particular form of mounting on the rings 11, it will be readily understood that the path of travel of the roller is absolutely fixed except for such variations as might result from the yielding movement thereof.

While I have herein shown and described a preferred embodiment of my invention, it will be understood that the same may be changed and modified to meet conditions arising in manufacture and use, and I desire it to be understood that I reserve the right to use any and all such changes and modifications as may be required, so far as the same may fall within the spirit and scope of the invention as expressed in the claims.

Having thus described my invention, what I claim as new is:

1. In a blue-printing apparatus, the combination with a supporting frame, of a printing frame carried by said supporting frame, and having a printing cylinder formed of glass sections, spacing members between the sections, and end rings for the sections, the side edges of the glass being cushioned in a manner to provide compensation for expansion and contraction of the sections.

2. In a blue-printing apparatus, the combination with a supporting frame, of a printing frame carried by said supporting frame, and having a printing cylinder formed of glass sections, spacing members between the sections, said members having recesses to receive the side edges of the sections, said recesses being of greater width than the thickness of the sections, end rings for the sections, and cushions interposed between the edges of the sections and the opposing portions of the frame and spacing members, said cushions being out of contact with the sides of the sections adjacent the side edges.

3. In a printing frame, glass sections, spacing members between the sections, each member having a section-receiving groove of greater width than the thickness of the section, and end rings, said rings being L-shaped in cross-section, the sides of the section within the groove being unsupported.

4. In a printing cylinder, glass sections, spacing members between the sections, end rings, said rings being L-shaped in cross section, and cushioning means interposed between the end edges and the outer face of the sections and the rings.

5. In a printing cylinder, glass sections, spacing members between said sections, said members each having longitudinally-extending recesses of greater width than the thickness of the sections, cushioning strips within said recesses for the side edges of the sections, end rings for the sections, said rings being L-shaped in cross-section to provide vertical and horizontally-extending portions in overlapping relation to the top and bottom edges of the sections, said rings being in cushioned contact with the sections.

6. In a blue printing apparatus, a printing-frame including a printing-cylinder, and a curtain support carried by said frame, said support extending within the cylinder and overhanging both sides of the wall of the cylinder.

7. In a blue-printing apparatus, a printing-frame including a printing cylinder, and two independently-movable curtain supports carried by the frame, said supports being normally positioned on diametrically-opposite sides of the printing-cylinder.

8. In a blue-printing apparatus, a printing-frame including a printing cylinder, and two independently-movable curtain supports carried by the frame, said supports being normally positioned on diametrically-opposite sides of the printing-cylinder, said carriers having independent paths of travel combinedly substantially completing the circumferential length of the printing surfaces of the cylinder.

9. In a blue-printing apparatus, a printing-frame including a printing cylinder, and a curtain support carried by said frame, said support extending within the cylinder and

being of greater length than the length of the printing-frame.

10. In a blue-printing apparatus, a printing-frame including a printing-cylinder, and a curtain-support carried by and movable on said frame, the support being in overhanging relation to the printing cylinder to provide movements of the support in a fixed path of travel extending on both sides of the wall of the printing-cylinder.

11. In a blue-printing apparatus, a printing-frame including a printing-cylinder, a curtain-carrier comprising two spaced members connected together on opposite sides of the cylinder wall, a curtain-roller, and tension-applying mechanism for supporting and positioning the roller within the carrier.

12. In a blue-printing apparatus, a printing-frame including a printing-cylinder, said frame having a face concentric with and extending in parallelism with a face of said cylinder, and a curtain-support carried by the frame and movable along and in contact with said frame face.

13. In a blue printing apparatus, a printing cylinder, a printing frame having end-rings extending in planes at right angles to the axis of the frame and overhanging the opposite sides of the wall of the printing cylinder, each of said rings having its inner face in parallelism with a side of said cylinder, and a curtain carrier having its ends carried by said end rings, each end of the carrier being movable along and in contact with the face of an end ring.

14. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain support movable on said frame and extending within the cylinder, and a curtain roller carried by the support, said support and roller being under tension exerted in opposite directions to retain the support and roller in contact with the frame and cylinder.

15. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain support movable on said frame and extending within the cylinder, and a curtain roller carried by the support, said support and roller being under tension exerted in opposite directions to retain the support and roller in contact with the frame and cylinder, the tension strain being permanently in a direction radial to the cylinder.

16. In a blue-printing apparatus, a printing-frame including a printing-cylinder, a curtain-support carried by the frame and extending within the cylinder, a curtain-roller movable relatively to the support in a direction radial of the cylinder, and tension means for controlling said radial movements.

17. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain support carried by and extending

within said frame, said support overhanging both sides of the wall of the cylinder, a reciprocating instrumentality on said support, and a curtain roller carried by the instrumentality.

18. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain support carried by and extending within said frame, said support overhanging both sides of the wall of the cylinder, a reciprocating instrumentality on said support, and a curtain roller carried by the instrumentality, the reciprocating movement of the instrumentality being in a direction radial to the cylinder.

19. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain support carried by and extending within said frame, said support overhanging both sides of the wall of the cylinder, a reciprocating instrumentality on said support, and a curtain roller carried by the instrumentality, the reciprocating movement of the instrumentality being in a direction radial to the cylinder, the radial movement of the instrumentality being under tension.

20. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain support carried by and extending within said frame, said support overhanging both sides of the wall of the cylinder, a reciprocating instrumentality on said support, and a curtain roller carried by the instrumentality, the reciprocating movement of the instrumentality being in a direction radial to the cylinder, the radial movement of the instrumentality being under tension, exerted in a direction corresponding with the direction of radial movement.

21. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain support carried by and extending within said frame, said support overhanging both sides of the wall of the cylinder, a reciprocating instrumentality on said support, a curtain roller carried by the instrumentality, the reciprocating movement of the instrumentality being in a direction radial of the cylinder, and a tension member for placing the radial movements of the instrumentality under tension exerted in a direction corresponding with the direction of radial movement, the tension member being of a length to also overhang both sides of the wall of the cylinder.

22. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain support extending within said frame and overhanging both sides of the cylinder wall, and a curtain carried by said support, said support and curtain having a surface contact with and being movable on the frame and cylinder, the contact on the cylinder being on a side opposite that of the contact with the frame.

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23. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain support carried by and extending within said frame and having its ends overhanging opposite sides of the wall of the printing cylinder in a direction radial of the cylinder, said support being movable on said frame, said support having a radial length less than the length of a radius of the printing cylinder, and means for retaining the radial positioning regardless of the movement of the carrier about the cylinder.

24. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain carrier in movable contact with the frame, said curtain carrier including a reciprocating instrumentality, a curtain roller supported by the instrumentality, and means carried by the instrumentality and cooperating with the roller mechanism for providing a torsional tension to the roller.

25. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain carrier in movable contact with the frame, said curtain carrier including a reciprocating instrumentality, a curtain roller supported by the instrumentality, and means carried by the instrumentality and cooperating with the roller mechanism for providing a torsional tension to the roller, said support overhanging both sides of the cylinder wall, the carrier and instrumentality having a radial tensional connection.

26. In a blue printing apparatus, a printing frame including a printing cylinder, a curtain carrier in movable contact with the frame, said curtain carrier including a reciprocating instrumentality, a curtain roller supported by the instrumentality, and means carried by the instrumentality and cooperating with the roller mechanism for providing a torsional tension to the roller, said torsional tension being adjustably controlled, the element for retaining the adjustable tension being carried by the instrumentality.

27. In a blue printing apparatus, a printing frame including a printing cylinder, and a curtain carrier extending within and supported by the frame and overhanging the opposite sides of the wall of the printing cylinder.

28. In a blue printing apparatus, a printing frame including a printing cylinder, and a curtain carrier extending within and supported by the frame and overhanging the opposite sides of the wall of the printing cylinder, and having a supporting contact with the ends of the frame to prevent longitudinal movement.

29. In a blue printing apparatus, a printing frame including a printing cylinder, and a curtain carrier extending within and supported by the frame and overhanging the opposite sides of the wall of the printing

cylinder, and having a roller support in contact with the ends of the frame to prevent longitudinal movement.

30. In a blue printing apparatus, a printing frame including a printing cylinder, a carrier mounted on the frame and extending within the cylinder, said carrier overhanging opposite sides of the wall of the cylinder and having a radial length less than the length of the radius of the outer face of the cylinder, and a curtain roller supporting structure carried by and movable with the carrier, the said structure having movements in directions at right angles to the path of movement of the carrier.

31. In a blue-printing apparatus, a printing-frame, including a printing cylinder a curtain carrier carried by the frame and extending within the cylinder, said carrier having a fixed path of travel on said frame, and a curtain-roller mounted in said carrier and having a tension mechanism operative to gradually increase the tension as the curtain is unwinding from the roller, and means on the frame and carrier for locking the carrier against movement when the maximum tension has been reached.

32. In a blue-printing apparatus, a printing-frame having a circumferential track, said frame including a printing cylinder a curtain-carrier having a rolling contact with said track, and a curtain roller mounted in said carrier in a manner to provide a constant pressure engagement of the curtain and printing-cylinder.

33. In a blue-printing apparatus, a printing-frame having a circumferential track, said frame including a printing cylinder a curtain-carrier having spaced rollers in contact with said track, and a curtain roller mounted in said carrier in a manner to provide a constant pressure engagement of the curtain and printing-cylinder.

34. In a blue-printing apparatus, a cylindrical printing-frame having circumferential tracks located at its opposite ends, and a curtain carrier comprising two opposing members secured together, and mounted to provide a rolling contact with the inner faces of the tracks, said members combinedly carrying the curtain.

35. In a blue printing apparatus, a cylindrical printing-frame including a printing-cylinder having circumferential tracks located at its opposite ends, and a curtain carrier comprising two opposing members adjustably secured together and mounted to provide a rolling contact with the tracks, each of said members having a radial length less than the length of the radius of the cylinder wall, said members combinedly carrying the curtain.

36. In a blue-printing apparatus, a printing-frame including a printing cylinder and

having circumferential tracks located at its opposite ends, and a curtain carrier comprising two opposing members secured together, and mounted to provide a rolling contact with the tracks, said members combinedly carrying the curtain, said tracks and said curtain being located on opposite sides of the wall of the printing-cylinder.

37. In a blue-printing apparatus, a printing-frame including a printing cylinder a curtain carrier comprising two opposing spaced-apart members each having a rolling contact with the printing-frame, and each having a guide-way extending in a direction radially of the printing-cylinder, and a curtain roller mounted to move longitudinally of said guide-ways.

38. In a blue-printing apparatus, a printing frame including a printing cylinder a curtain carrier comprising two opposing spaced-apart members each having a rolling contact with the printing-frame, and each having a guide-way extending in a direction radially of the printing-cylinder, and a curtain roller mounted yieldingly within said guide-ways.

39. In a blue-printing apparatus, a printing-frame including a printing cylinder a curtain carrier comprising two opposing spaced-apart members each having a rolling contact with the printing-frame, and each having a guide-way extending in a direction radially of the printing-cylinder, and a curtain roller mounted to move longitudinally of said guide-ways, means being provided for placing the movements of the roller within the guide-ways under tension.

40. In a curtain carrier, two opposing end-supports secured together at their opposite ends and each having guide-ways, a journal mounted in each guide-way and movable longitudinally thereof, a curtain-roller pivotally mounted within said journals, and tension mechanism for the roller located within the roller and the journals.

41. In a curtain carrier, an end-support, a guide-way formed therein, a cross-head movable longitudinally of the guide-way, a journal pivotally-mounted within the cross-head, means for positioning said journal in the cross-head, and a curtain-roller pivotally mounted within said journal, said journal and roller having a spring connection.

42. In a curtain carrier, an end-support, a guide-way formed therein, a cross-head movable longitudinally of the guide-way, a journal pivotally-mounted within the cross-head, means carried by the cross-head for positioning said journal in the cross-head, and a curtain-roller pivotally mounted with-

in said journal, said journal and roller having a spring connection.

43. In a blue-printing apparatus, a printing-frame, including a printing cylinder a curtain-carrier carried by the frame and extending within the cylinder, said carrier having a fixed path of travel on said frame, a curtain roller mounted in said carrier and having a tension-mechanism operative to gradually increase the tension as the curtain is unwinding from the roller, and radially extending tension mechanism for the roller on the carrier.

44. In a blue-printing apparatus, a printing-frame, including a printing cylinder and a curtain support carried by said frame, said support comprising two end members secured together at points on opposite sides of the wall of the printing-cylinder.

45. In a blue-printing apparatus, a printing-frame, including a printing cylinder a curtain-carrier movable on said frame, a curtain-roller mounted within the carrier, tension mechanism for supporting the roller in movements radially of the printing-cylinder, and independent tension mechanism carried by and movable with the carrier for applying a gradually-increasing torsional tension to the roller during the unwinding of the curtain, said tension mechanisms determining the automatic or manual return of the curtain to its wound position.

46. In a blue-printing apparatus, a printing-frame, including a printing cylinder, a curtain-carrier movable on said frame, a curtain-roller mounted within the carrier, tension mechanism for supporting the roller in movements radially of the printing-cylinder, and independent adjustable tension mechanism for applying a gradually-increasing tension to the roller during the unwinding of the curtain, said tension mechanisms determining the automatic or manual return of the curtain to its wound position.

47. In a blue-printing apparatus, a printing-frame, a curtain-carrier carried by and movable on said frame in a fixed path of travel, and a curtain-roller having a radial-tension and a torsional-tension support in said carrier, the radial tension forming a controlling means for preventing the automatic return of the carrier under the torsional tension when the carrier is moved within the limits of a predetermined portion of its path of travel.

In testimony whereof I have affixed my signature in the presence of two witnesses.

REINHOLD HERMAN.

Witnesses:

CARL R. HERMAN,
ERNEST PAYNE.