July 3, 1962 H. W. MOSER ETAL 3,041,968

INK FOUNTAINS FOR ROTARY PRINTING PRESSES

Filed Oct. 1, 1957 7 Sheets-Sheet 1

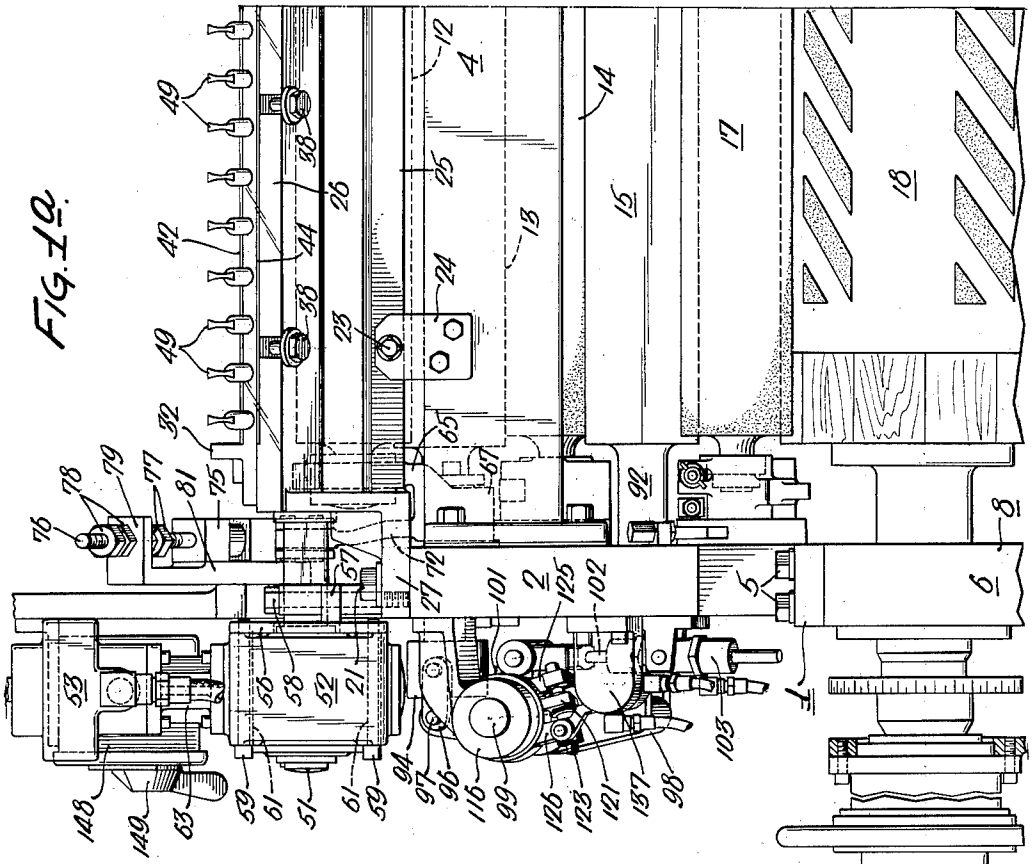


FIG. 1.

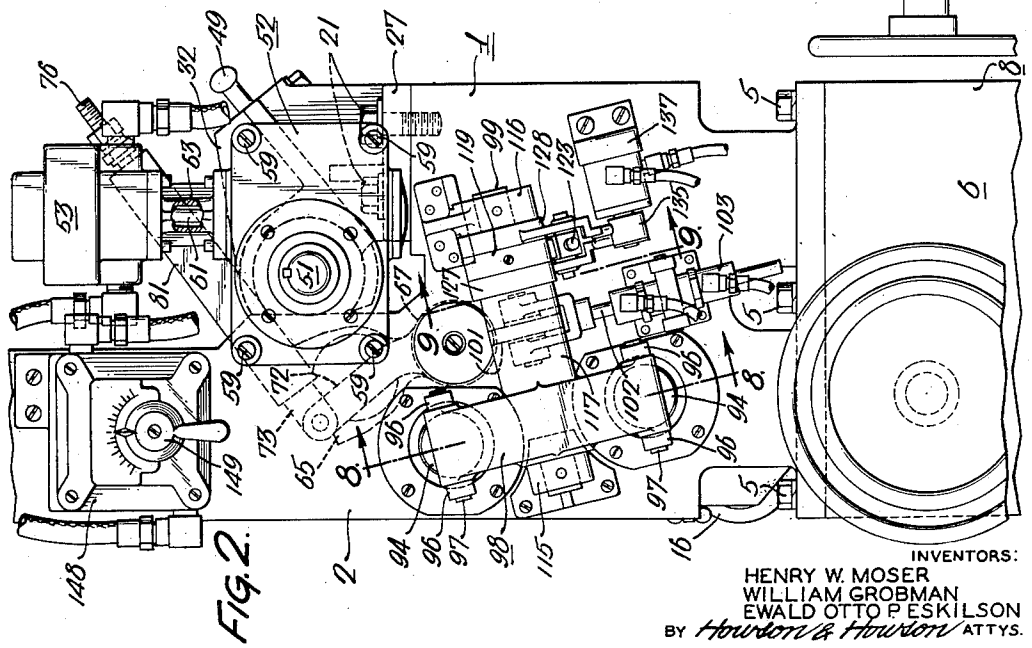


FIG. 2.

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INK FOUNTAINS FOR ROTARY PRINTING PRESSES

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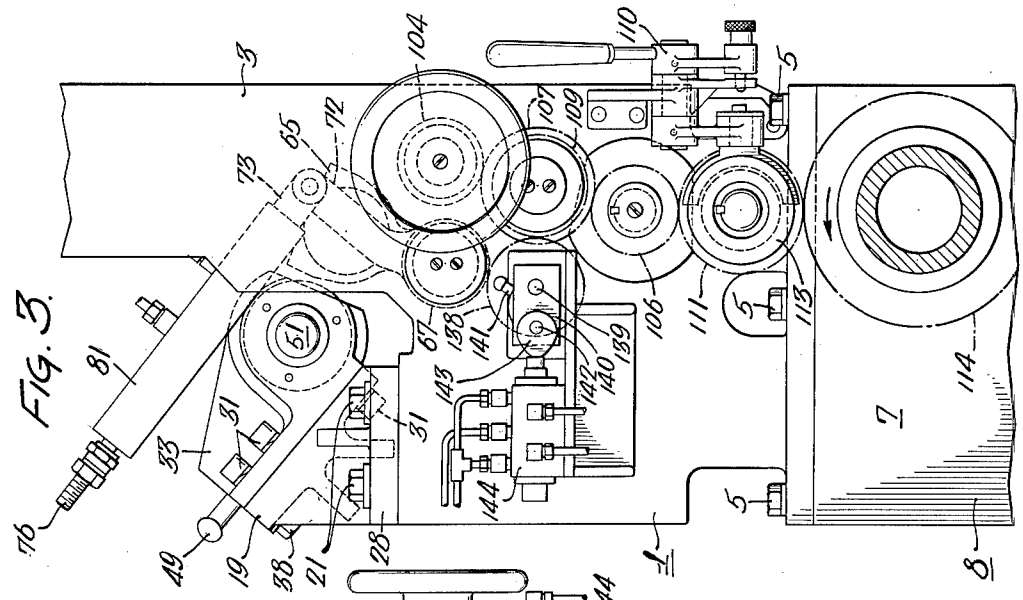


FIG. 5.

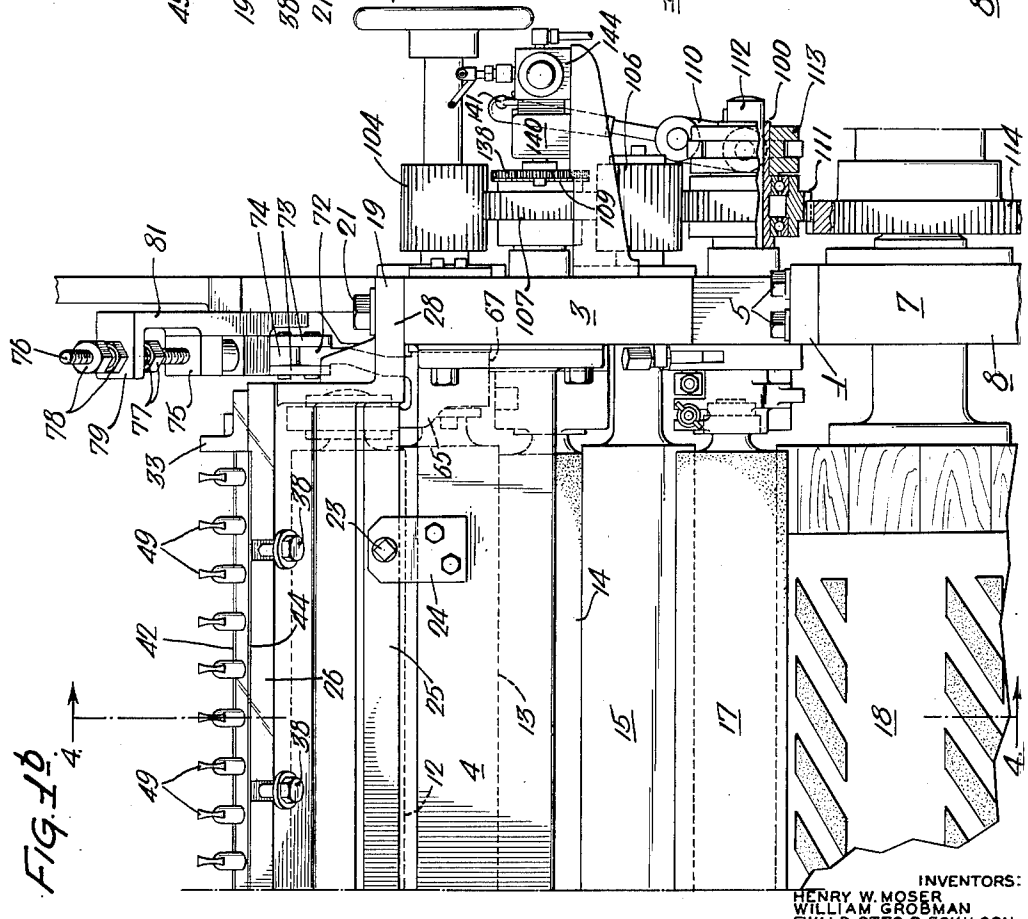


FIG. 1b

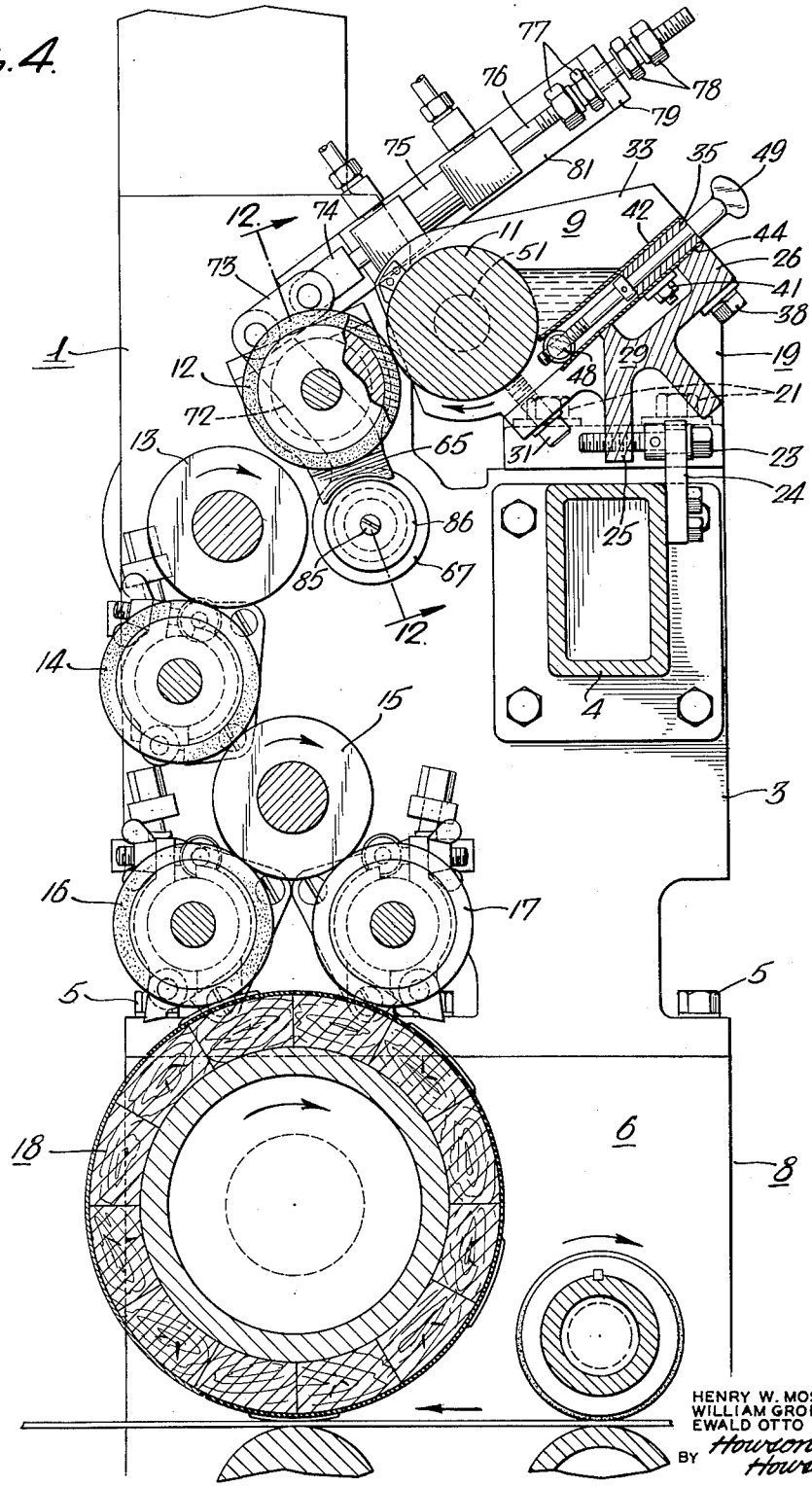
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INK FOUNTAINS FOR ROTARY PRINTING PRESSES

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FIG. 4.



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INK FOUNTAINS FOR ROTARY PRINTING PRESSES

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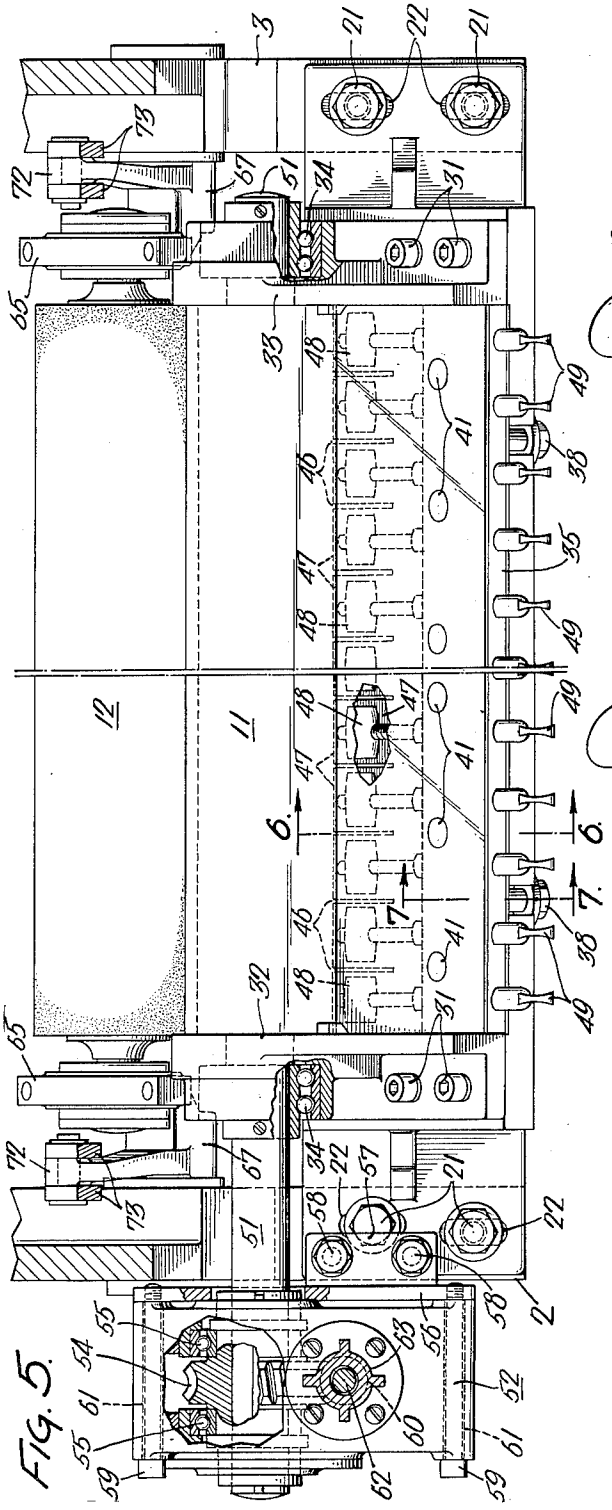


FIG. 5.

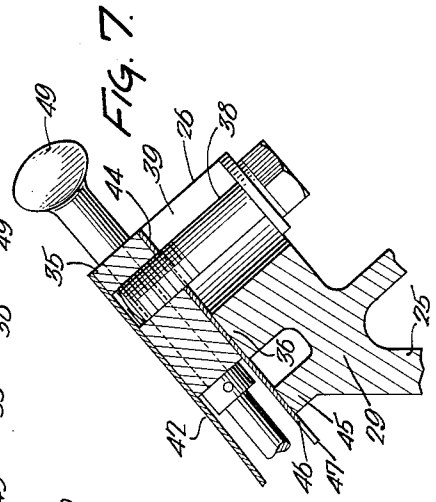


FIG. 7.

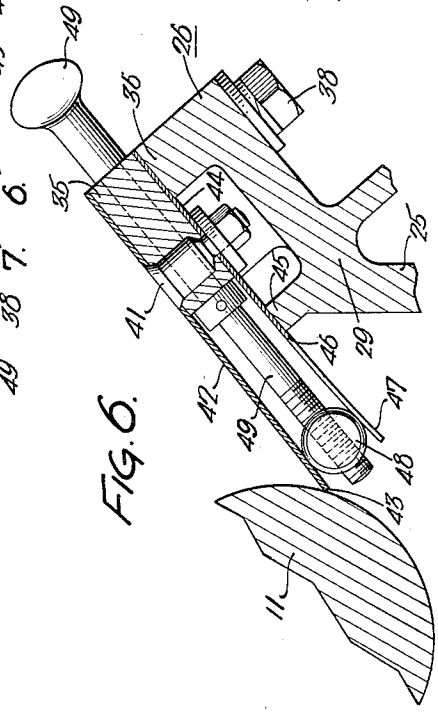


FIG. 6.

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INK FOUNTAINS FOR ROTARY PRINTING PRESSES

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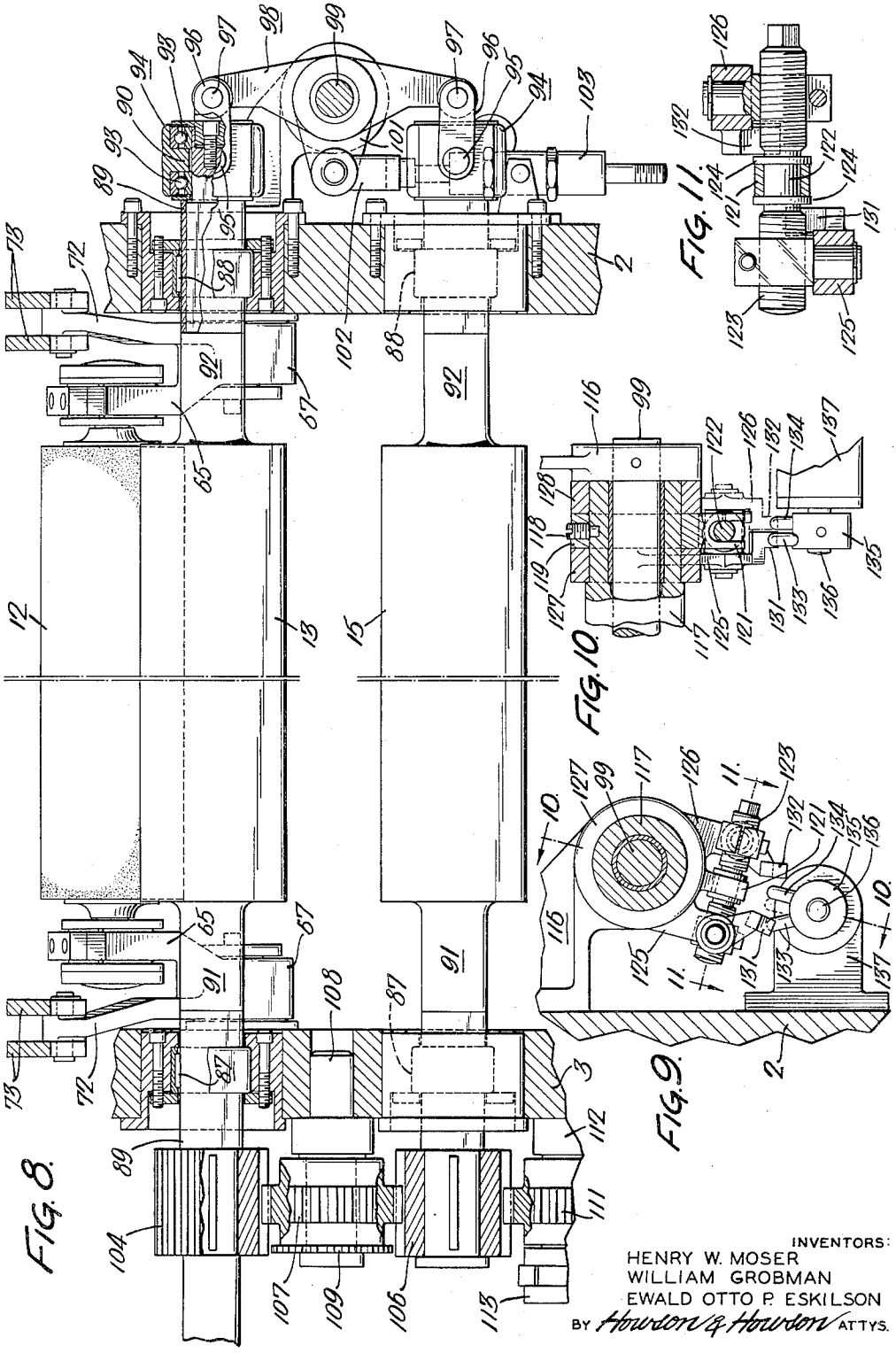


FIG. 8.

FIG. 11.

FIG. 10.

FIG. 9.

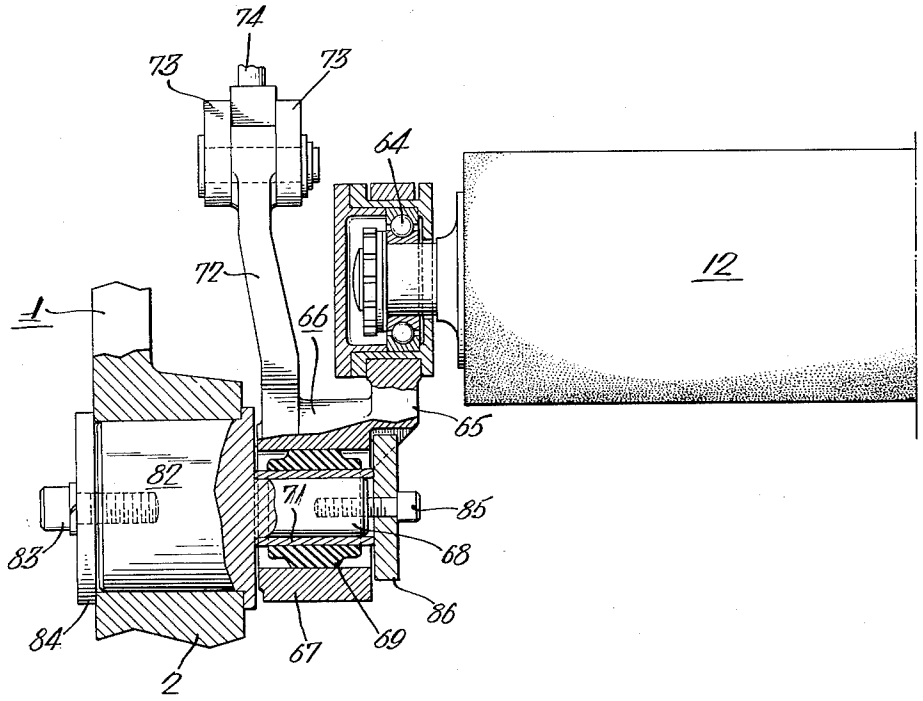
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INK FOUNTAINS FOR ROTARY PRINTING PRESSES

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FIG. 12.



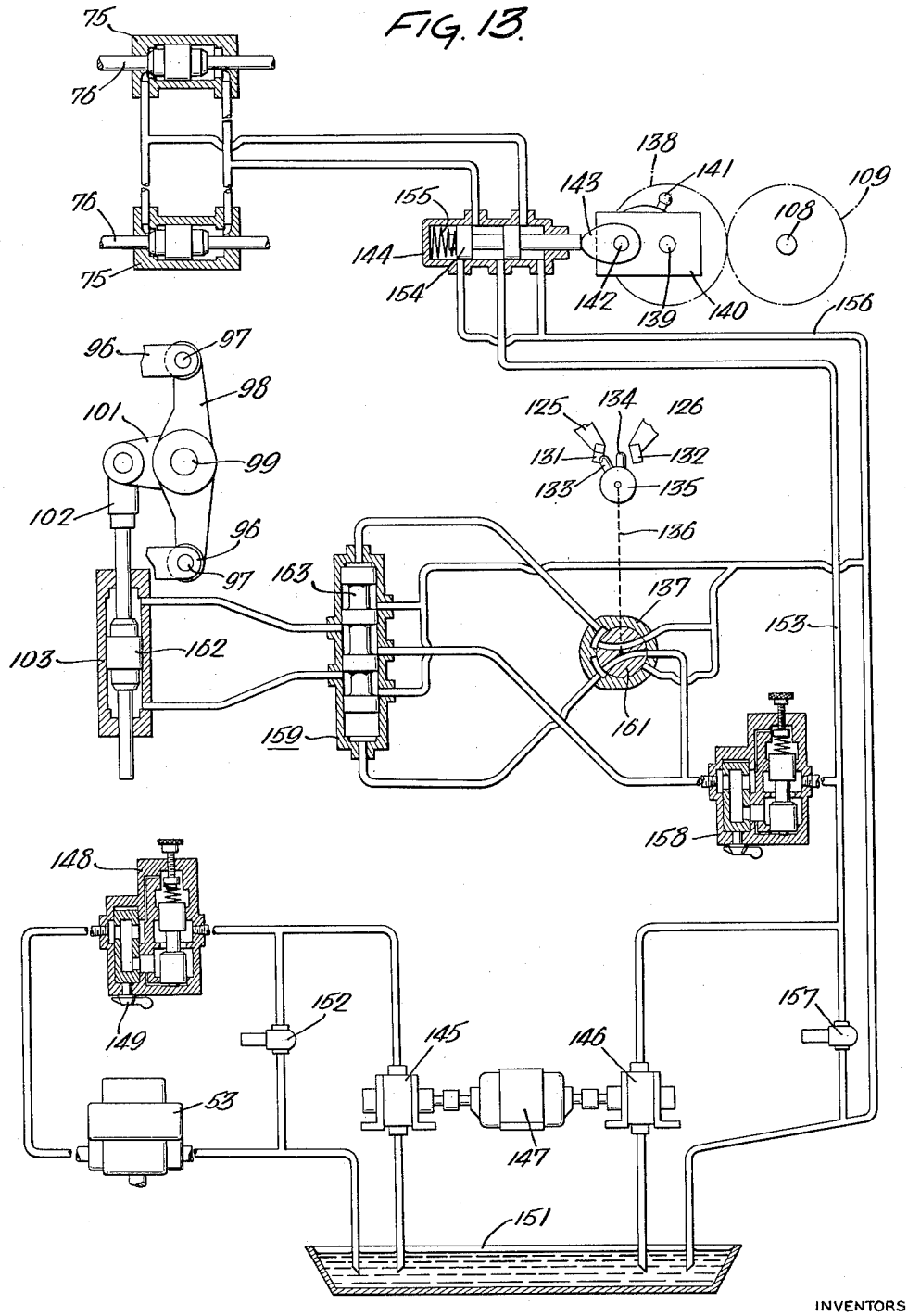
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INK FOUNTAINS FOR ROTARY PRINTING PRESSES

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FIG. 13.



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United States Patent Office 3,041,968 Patented July 3, 1962

3,041,968

INK FOUNTAINS FOR ROTARY PRINTING PRESSES

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Filed Oct. 1, 1957, Ser. No. 687,568
4 Claims. (Cl. 101—365)

The present invention relates generally to rotary printing presses and more specifically to ink fountains and associated mechanisms for rotary printing presses.

It is the object of the present invention to provide improved means for effective adjustment of an ink wiper blade in respect to a fountain roll in an ink fountain system, to permit finer and more sensitive adjustment of the thickness of the ink film delivered to the ink fountain roll at any particular location longitudinally of the blade and roll.

In the attached drawings FIGURES 1*a* and 1*b* are a front elevational view of an ink fountain made in accordance with the invention including the printing cylinder of the machine of which the fountain constitutes an element.

FIGURE 2 is an end elevational view from the adjoining end of the fountain.

FIGURE 3 is an end elevational view from the opposite end of the fountain.

FIGURE 4 is a vertical sectional view on the line 4—4 FIGURE 1*b*.

FIGURE 5 is a top plan view of the fountain.

FIGURES 6 and 7 are respectively sectional views on the lines 6—6 and 7—7 of FIGURE 5.

FIGURE 8 is a sectional view on the line 8—8, FIGURE 2.

FIGURE 9 is a sectional view on the line 9—9, FIGURE 2.

FIGURE 10 is a sectional view on the line 10—10, FIGURE 9.

FIGURE 11 is a sectional view on the line 11—11, FIGURE 9.

FIGURE 12 is a fragmentary sectional view on the line 12—12, FIGURE 4 and

FIGURE 13 is a diagrammatic view showing the hydraulic operative system for the several rolls of the fountain.

The fountain comprises a unitary frame **1** consisting of side members **2** and **3** joined rigidly by a tubular cross beam **4** and secured by bolts **5** to the corresponding side members **6** and **7** of the main frame **8** of the machine. The fountain consists essentially of an ink reservoir **9**, which includes a fountain roll **11**, a ductor roll **12**, and a series of rolls **13**, **14**, **15**, **16** and **17** which with the ductor roll and fountain rolls, transfer ink from the reservoir to a printing cylinder **18** journaled in the main frame **8**.

The reservoir **9** is in the present instance a unitary substructure comprising a bracket frame **19** secured by bolts **21** to the top of the frame **1**, the said bolts passing through slots **22** in the bracket to provide for adjustment of the bracket on the frame. Adjustment of the bracket may be effected by turning screws **23** which are rotatably mounted in straps **24** bolted on the cross beam **4**, the screws **23** being threaded into a depending flange **25** of bracket **19**.

The bracket **19** comprises a base member **26** which is attached to the frame **1** by the bolts **21**, as described, and which comprises flanged end members **27** and **28** and a transverse connecting member **29** the cross sectional shape of which is shown in FIGURE 4, the depending flange **25** being a part of this member. Secured to the members

27 and **28** respectively, by screws **31**, are side plates **32** and **33** which form the end walls of the reservoir **9** and in which the fountain roll **11** is journaled on anti-friction bearings **34**, **34**, see FIGURE 5. The ends of the roll **11** lie flatly against the inner faces of the plates **32** and **33**.

Also fitted snugly between the confronting faces of the plates **32** and **33** is a transverse bar **35** which seats upon an upstanding longitudinal rib **36** of the member **29** of the bracket and is secured to the latter by screws **38** as best shown in FIGURES 4 and 7. The screws **38** occupy recesses **39** in the upper edge of the member **29**, so that by release of the screw the bar **35** with the screws may be adjusaed on the bracket or may be removed from the bracket as a unit. Attached to the upper face of the bar **35** by means of countersunk bolts **41** is a thin flexible blade **42** the lower longitudinal edge **43** of which an assembly contacts or lies in close proximity to the surface of the roll **11**, the edge **43** being axially coextensive with said surface. In effect the surface of the roll and the blade **42** form the opposite longitudinal side walls, and the plates **32** and **33** the end walls, of the reservoir **9**.

A second resilient blade **44** is attached to the underside of the bar **35** by the bolts **41**. This blade rests intermediate its upper and lower edges on a rib **45** of bracket member **29** which rib is spaced apart from and parallels the rib **36**. The blade **44** differs from blade **42** in having its lower edge portion divided by slits **46** into a series of tongues **47** which underlie the corresponding edge portion of blade **42** and constitute in effect independently flexible elements of the blade **44**. Confined between each of the tongues **47** and the underside of the blade **42** is a cylindrical wedge member **48** which is held in place by a screw **49** freely rotatably mounted in the bar **35** and in threaded engagement with and extending through the said wedge member, as best shown in FIGURES 6 and 7. When the screw is turned the wedge member will be raised or lowered on the screw between the blade **42** and tongue **47** depending on the direction of rotation. Inward movement tends progressively to wedge the blade **42** and tongue **47** apart and thereby to deflect the edge **43** of the blade toward the roll **11** or to press it more firmly into contact with the surface of the roll; and an outward movement of the wedge member has the opposite effect. By relative adjustment of the individual screws **49** in the longitudinal series, the blade **42** may be adjusted with respect to the roll to form on the surface of the roll as it moves downwardly from the reservoir in clockwise rotation, as viewed in FIGURE 6, a film of ink of uniform desired thickness extending over the full length of the roll or over any selected part or parts of the length.

At one end of the roll **11**, see FIGURE 5, the roll shaft **51** is extended beyond the bearing **34**, and this shaft carries at its extremity a casing **52** containing transmission elements for driving the roll **11** from a hydraulic motor **53** mounted on the said casing. The aforesaid transmission elements include a worm wheel **54** which is keyed to the shaft **51**; and the casing **52** has mounted therein antifriction bearings **55**, **55** the inner race rings of which receive the hub of the worm wheel **54** and which in effect support the casing on the wheel. In order to preclude rotation of the casing **52** about the axis of the shaft **51**, the casing is loosely attached to a plate **56** which is secured through the medium of a flange **57** and screws **58** to the proximate frame member **27**. The connection between the plate **56** and casing **52** is by way of screws **59** which pass loosely through oversized openings **61** in the casing and which are not drawn solidly against the casing so as to afford freedom for limited movement of the casing both axially and radially of the bolts. The motor **53** constitutes an individual drive means for the fountain roll **11** through which the latter roll may be rotated in-

dependently of the other rolls of the ink transfer system, although if desired the roll may be operatively connected with the other driven parts of the machine for in-step operation with the latter.

The shaft **2** extends downwardly from the motor **53** through a flanged sleeve **63** which mounts the motor casing **53** rigidly on the casing **52**. A worm **60** carried by the shaft meshes with the worm wheel **54**. The entire reservoir structure, including the motor **53** and transmission casing **52**, can be adjusted laterally on the main frame **1**, and may be removed from that frame as a unit.

As best shown in FIGURE 12 the ductor roll **12** is mounted at each end in an anti-friction bearing **64** in one arm **65** of a compound lever **66**. This lever comprises a hub **67** which is supported on a pin **68** through the medium of an interposed rubber or other resilient cylindrical sleeve **69**. The sleeve **69** is under radial compression between a sleeve **71** fitted to the pin **68** and the bore wall of the hub **67** and is frictionally or otherwise bound to the confining surfaces so that angular movement of the lever on the pin **68** will be effected by displacement in shear of the resilient material of the sleeve **69**.

The lever **66** comprises a second arm **72** to which is secured by links **73** the piston rod **74** of a hydraulic cylinder **75**. This cylinder constitutes a means for rocking the lever **66** about the axis of the pin **68** to bring the ductor roll into operative contact alternately with the fountain roll **11** and with the distributor roll **13**. The surface of the ductor roll **12** is preferably of resilient composition; and means is provided for limiting the angular movement of the roll-supporting lever in both directions to thereby regulate the functional relationship between the ductor roll and the rolls **11** and **13**. This means consists of an extension **76** of the piston rod **74** from the opposite end of the cylinder **75**, and nuts **77** and **78** on the threaded end of this extension and at opposite sides respectively of a fixed flange **79** on the support bracket **81** of the cylinder **75**, the rod **76** extending through an opening in the flange as illustrated in FIG. 4.

The pin **68** constitutes in the present instance a reduced extension of a cylindrical member **82** which is mounted in the frame **1** for angular adjustment about its own axis. This pin is normally clamped in an adjusted position in the frame by a screw **83**, threaded into the end of the member **82**, and a clamping plate **84** which is confined between the head of the screw **83** and the adjoining face of the frame, as best shown in FIG. 12. The lever **66** is confined to the pin by a similar screw **85** and clamping plate **86**, the screw **85** in this case being threaded into the end of the pin **68** and drawing the plate **86** against the outer end of the sleeve **71** to clamp the latter between the plate **86** and the confronting face of the cylindrical member **82**. By adjustment of the member **82** about its axis the normal position of the ductor roll **12** with respect to the rolls **11** and **13** may be regulated as required. This ductor roll mount is described and claimed in a co-pending U.S. application Serial No. 671,918, filed July 15, 1957, now Patent No. 3,003,416.

The rolls **13** and **15** are in continuous operative contact with the roll **14**; the roll **15** also being in continuous contact with the roll **14** and with the rolls **16** and **17** which transfer the ink to the printing cylinder **18**. In their ink transfer function the rolls **13** and **15** are reciprocated axially in operative contact with the surfaces of the rolls **14**, **16** and **17** thereby spreading the ink in a uniform film on the latter rolls. The manner in which the rolls **13** and **15** are mounted and given the axial reciprocatory motion is illustrated in FIGS. 2 and 8. These rolls are journaled in the side members **2** and **3** of the frame **1** in needle bearings **87** and **88**, sleeves **89** being interposed between the bearings and the roller shafts **91** and **92**. Each of the shafts **92** has confined on the outer end thereof two anti-friction thrust bearings **93** which journal a sleeve **94**. This sleeve has an internal radial flange **90** which fits between the bearings **93** and has a trunnion **95** at each outer side thereof, the trunnions being connected through links **96** and pins **97** to the opposite ends of a rack lever **98** which is pivotally mounted on a shaft **99**. The lever **98** has an arm **101** to which is attached the upper end of a piston rod **102** of a piston (not shown) in a hydraulic cylinder **103**. Reciprocation of the piston and rod **102** oscillates lever **98** and axially reciprocates the rolls **13** and **15** simultaneously and in opposite directions.

The shaft **91** of the roll **13** carries an elongated spur gear **104**, and the corresponding shaft of the roll **15** similarly identified carries a like spur gear **106**. These two gears are connected by a relatively narrow gear **107** journaled on a stub shaft **108** supported in the frame, and the gear **107** comprises also a narrow faced gear **109**, the function of which will be hereinafter described. The gear **106** meshes in turn with a relatively narrow gear **111** journaled on a stub shaft **112** mounted in the frame and the gear **111** meshes with a gear **114** on the shaft of printing cylinder **18**, said shaft and gear being connected to the input or power source of the machine. The gear **111** is adjustable axially of its shaft **112** to a position of disengagement from the gear **114** to thereby disconnect the rolls **13** and **15** from the said power source, and to this end the gear is journaled on a sleeve **100** which is keyed to and slidable axially on the shaft **112** and which may be shifted through the medium of a grooved collar **113** fixed to the sleeve and a lever **110** which is operatively connected to the collar as shown in FIG. 1*b* and FIG. 3. The shafts of the rolls **14**, **16** and **17** are mounted in suitable anti-friction bearings in the side frames and derive their rotary motion solely from their contact with the driven rolls **13** and **15**.

The shaft **99** is mounted in brackets **115**, **116** on frame member **2**, as shown in FIG. 2, and the hub portion of lever **98** is extended axially as indicated at **117** in FIGS. 2 and 10. The end of this extended hub has attached thereto by a set screw **118**, see FIG. 10, a collar **119** having a radially projecting fork **121** at the underside thereof. As shown in FIGS. 10 and 11, this fork embraces the unthreaded midsection **122** of a double ended right and left hand screw **123** and is fitted between radial flanges **124**, **124** on said mid section. Oscillations of the lever **98** and its hub **117** is transmitted through collar **119**, its fork **121**, and flanges **124**, to the screw **123** which is reciprocated longitudinally. The opposite ends of screw **123** are threaded respectively into arms **125** and **126** which extend from sleeves **127** and **128** individually mounted on the hub **117**, one at each side of collar **119** as shown in FIG. 10. The sleeves are thus operatively connected to the said collar and to each other, and their relative angularity with respect to the axis of shaft **99** may be adjusted by rotation of screw **123**, rotation in one direction drawing the arms toward each other and rotation in the other direction increasing the included angle.

Each of the arms carries at its extremity a finger, **131** and **132**, which are aligned respectively with a pair of pins **133** and **134**, see FIG. 10, projecting radially from a collar **135** secured to the shaft **136** of a four way valve **137** mounted on the frame member **2**. This valve controls the flow of pressure fluid to cylinder **103** which as previously described oscillates the lever **98** and thereby axially reciprocates rolls **13** and **15**. The actuation of the lever is thus automatic as hereinafter more fully set forth.

As previously described, the gear **107** has connected thereto a narrow gear **109**. As shown in FIG. 3 the gear **109** meshes with a gear **138** on the input shaft **139** of an infinitely variable speed transmission unit **140** which may be adjusted through medium of lever **141** to vary the speed ratio between the shaft **139** and the output shaft **142** of the unit. The shaft **142** carries a cam **143** which is operatively connected to a valve **144** which controls the operations of the hydraulic cylinders **75**, **75** of the ductor roll assembly previously described. Rotation of the cam **143** operates the valve to actuate the cylinders synchronously to oscillate the levers **72** which carry the ductor roll and to thereby traverse the ductor roll between and alternately into contact with the rolls **11** and

13, the frequency of the oscillations and the dwell of the ductor roll in contact with the rolls **11** and **13** being determined by the adjustment of the variable speed unit **140** and the shape of the cam **143**.

The operation of the mechanism may be better understood by reference to the diagrammatic view of FIGURE 13 which shows the hydraulic system in its association with the various rolls. The system comprises the hydraulic motor **53** which constitutes the independent drive means for the fountain roll **11**; the cylinder **103** which axially reciprocates the spreader rolls **13** and **15** and the hydraulic cylinders **75** which oscillate the ductor roll. The system is energized by two pumps **145** and **146** which are operated in the present instance by a common electric motor **147**. The pump **145**, which is of relatively high pressure type, is connected to the motor **53** of the fountain roll through the medium of an adjustable flow control pressure compensated valve **148**, the valve operating to maintain a constant volume flow of pressure fluid from the pump to the motor, and this pressure can be calculated as required through the medium of a calibrated knob **149** on the valve, see FIGURES 1*a* and 2. By this means the operating rotational speed of the fountain roll may be regulated as required. The hydraulic medium is drawn by the pumps from the sump or reservoir **151**, and the medium discharged from the motor **53** is returned to the sump as illustrated. A conventional pressure relief valve **152** is provided in a by-pass short-circuiting both the valve **148** and the motor **53**. The pressure line of the pump **146**, indicated by the reference numeral **153**, is connected both to the cylinder **103**, which reciprocates the cylinder rolls **13** and **15**, and to the cylinders **75**, **75** to oscillate or traverse the ductor roll.

The connections between the pressure line **153** and the cylinders **75** are controlled by the valve **144** which, as previously described, is actuated by the cam **143**. In one of its terminal positions, as shown in FIGURE 13, the movable element **154** of valve **144** connects the line **153** with the corresponding ends of both of the cylinders **75**; and in the opposite terminal position, which it assumes under pressure of a spring **155** when the cam **143** has moved through an angle of 180° from the position in which it is shown in FIGURE 13, the element **154** connects the opposite ends of the cylinders **75** simultaneously to the line **153**. The ends of the cylinders not connected to the pressure line are connected to the sump line **156** which returns the hydraulic medium to the sump **151**. Pressure in the lines **153** is limited by a conventional pressure relief valve **157**.

The pressure line **153** is connected through an adjustable flow control pressure compensated valve **158**, corresponding to the valve **148** previously described, directly with a piston valve **159** which controls the operations of the cylinder **103**. The pressure line is also connected through the flow control valve **158** with the valve **137**. As previously described the rotary element **161** of the valve **137** is oscillated by the piston **162** of the cylinder **103** which also acts to reciprocate the rolls **13** and **15**. In one position of the valve element **161** the pressure line **153** is connected to one end of the cylinder **159** while the other end of the cylinder is connected as illustrated in FIGURE 13 to the sump line **156**. In the other or alternative position of the valve element **161**, the opposite end of the cylinder **159** is connected to the pressure line while the first named end is connected to the sump. The oscillations of the valve element **161** thereby act to force the movable element **163** of the valve **159** from one end of the valve casing to the other. This movement of the element **163** connects the respective opposite ends of the cylinder **103** alternately with the pressure line **153** and the opposite end of the cylinder to the sump line **156**. The action of this portion of the system is continuous and automatic, the effect being to longitudinally reciprocate rolls **13** and **15** simultaneously in opposite phase.

We claim:

1. In an ink fountain for priniting machines, a fountain roll, a flexible blade converging downwardly towards the side of the roll and forming therewith a trough for the ink from which the ink is withdrawn as a film on the roll surface as the roll rotates, means for closing the ends of the trough, and means for adjusting the lower edge of the blade with respect to the roll surface to regulate the thickness of said film and the linear extent thereof axially of the roll, said blade adjusting means including a plurality of individually flexible tongue elements underlying and spaced from the lower edge portion of the blade in longitudinal series substantially aligned with said blade, wedge elements corresponding in number to said tongue elements movably interposed between the blade and each of said flexible tongue elements and of greater thickness than the distance between the blade and said flexible tongue elements for transmitting pressure from the said elements to the blade in localized areas tending to resiliently displace the blade toward the roll surface, and means for individually adjusting the positions of the wedge elements between the blade and the flexible tongue elements away from or toward the lower edge of the blade to vary said pressure by wedging coaction between said elements and said blade.

2. An ink fountain according to claim 1 wherein the flexible tongue elements diverge from the plane of the under surface of the blade toward the lower edge of the latter.

3. An ink fountain according to claim 2 wherein the means for adjusting the wedge elements comprises freely rotatably mounted screws extending approximately parallel to the blade between the lower and upper edges thereof and interposed between said blade and said flexible tongue elements and in screw threaded engagement with said wedge elements, and accessible at their upper ends for manipulation in the wedge adjusting function.

4. An ink fountain according to claim 3 wherein said wedge elements are barrel shaped having at least the largest circumference thereof in engagement with said blade and a said flexible tongue element.

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