

Dec. 19, 1961

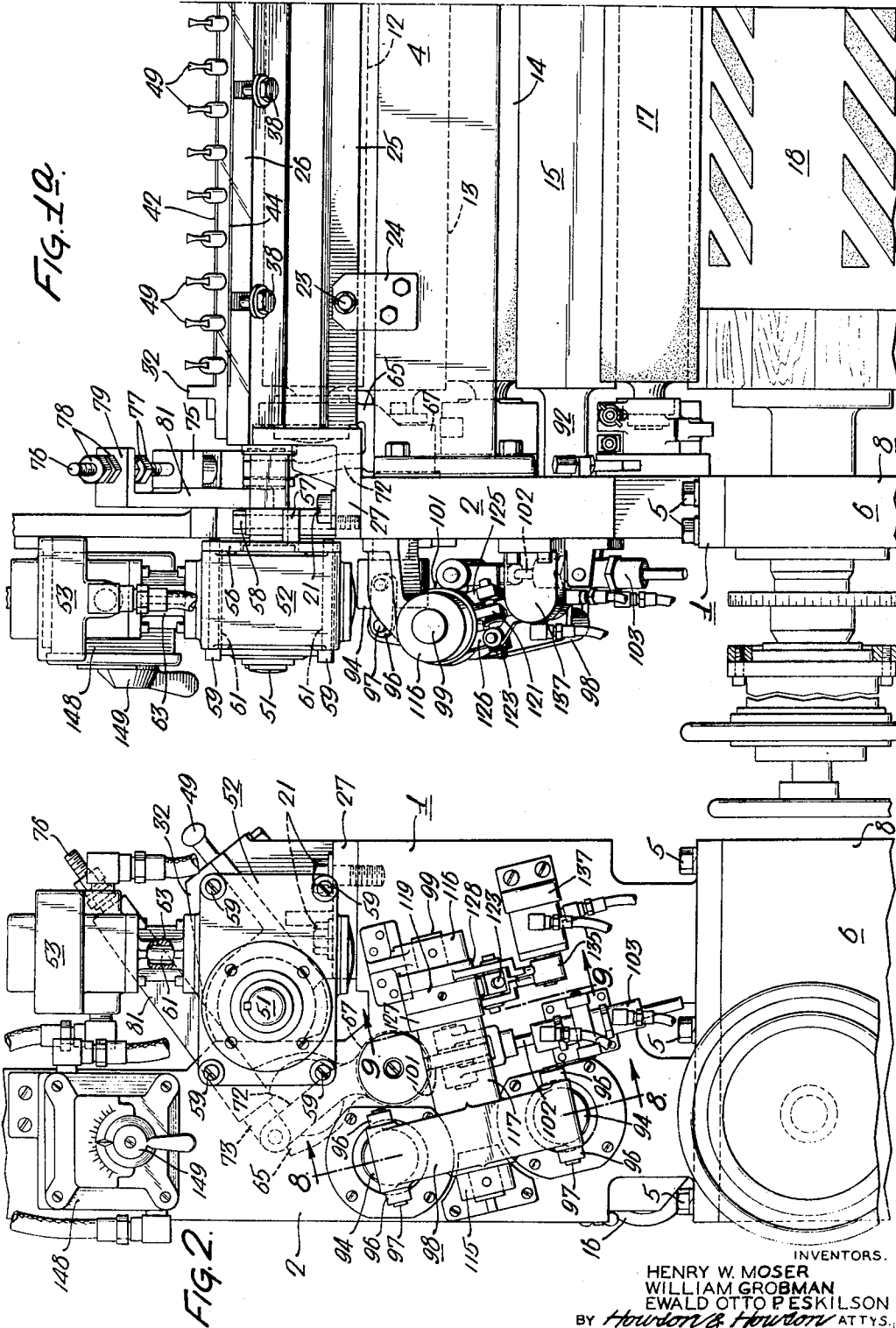
H. W. MOSER ET AL

3,013,489

PRINTING MACHINE INK ROLL VIBRATOR

Original Filed Oct. 1, 1957

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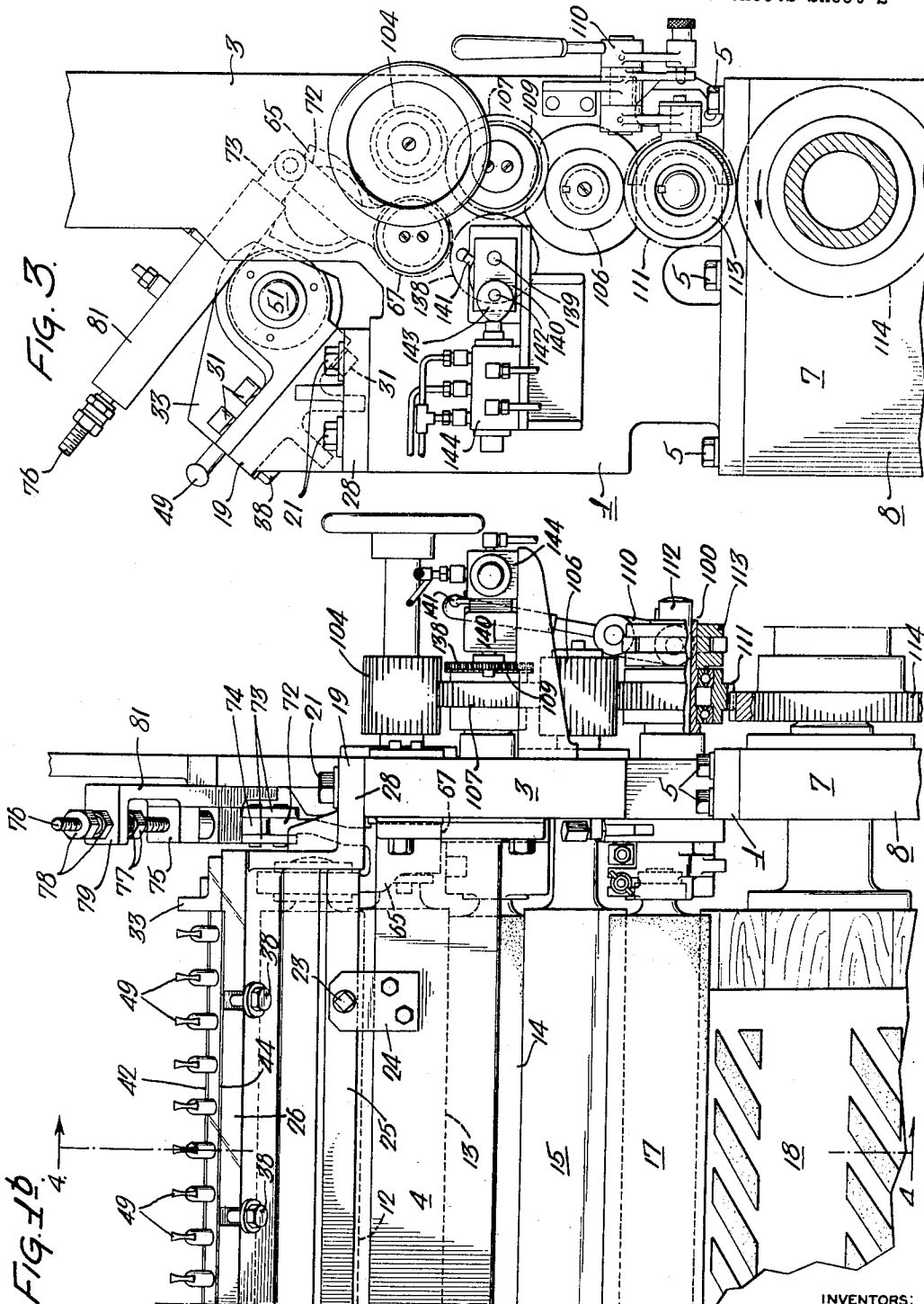
H. W. MOSER ET AL

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INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN
EWALD OTTO P. ESKILSON
BY *Howard & Howard* ATTYS.

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H. W. MOSER ET AL

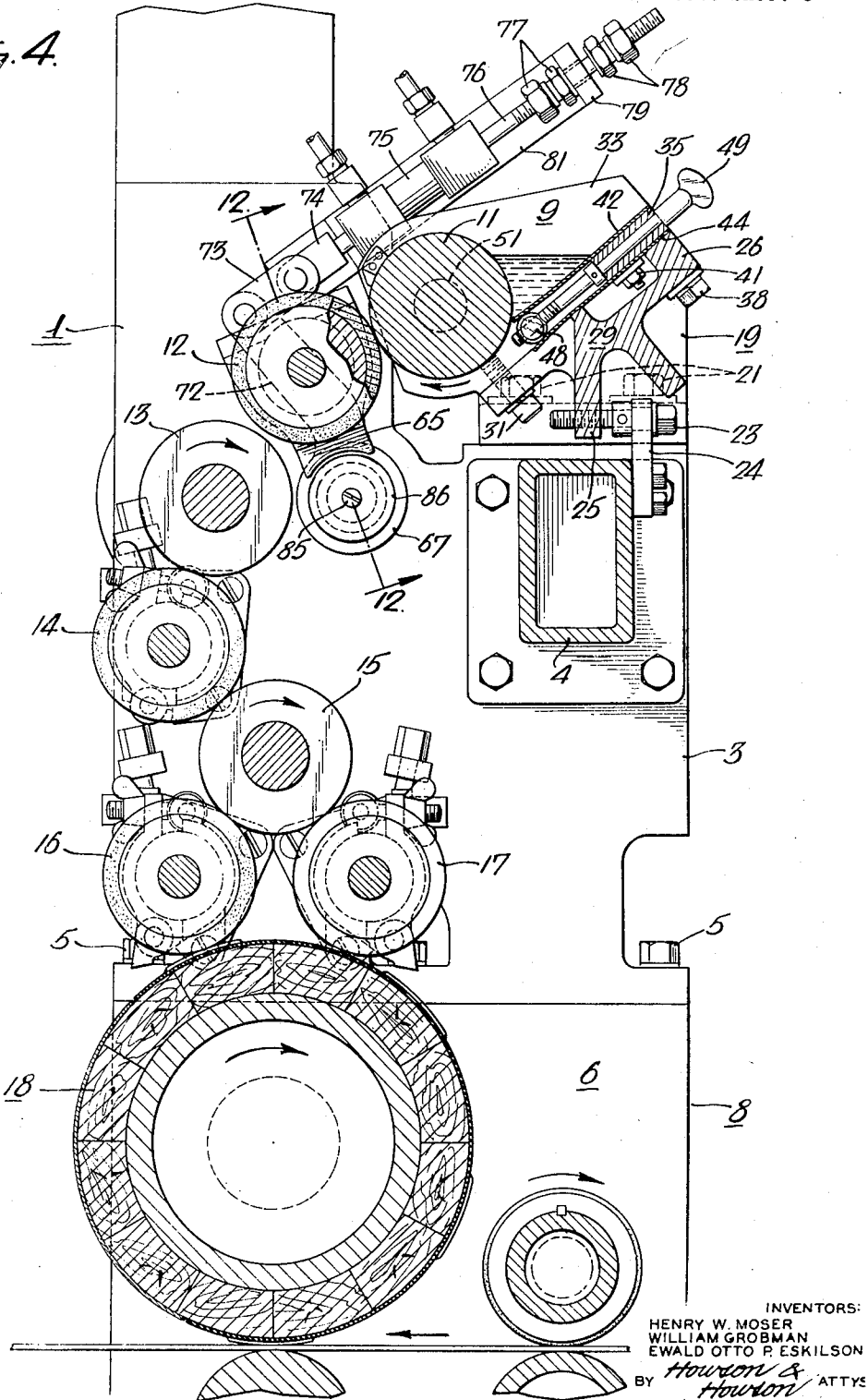
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FIG. 4.



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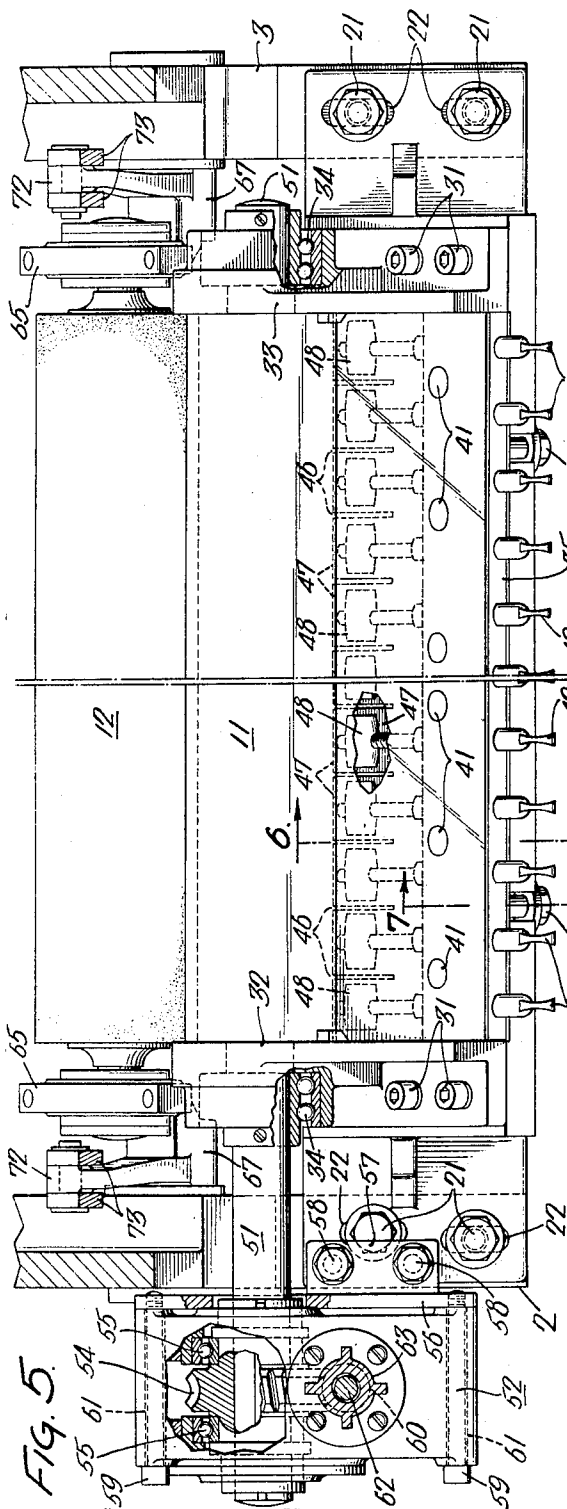
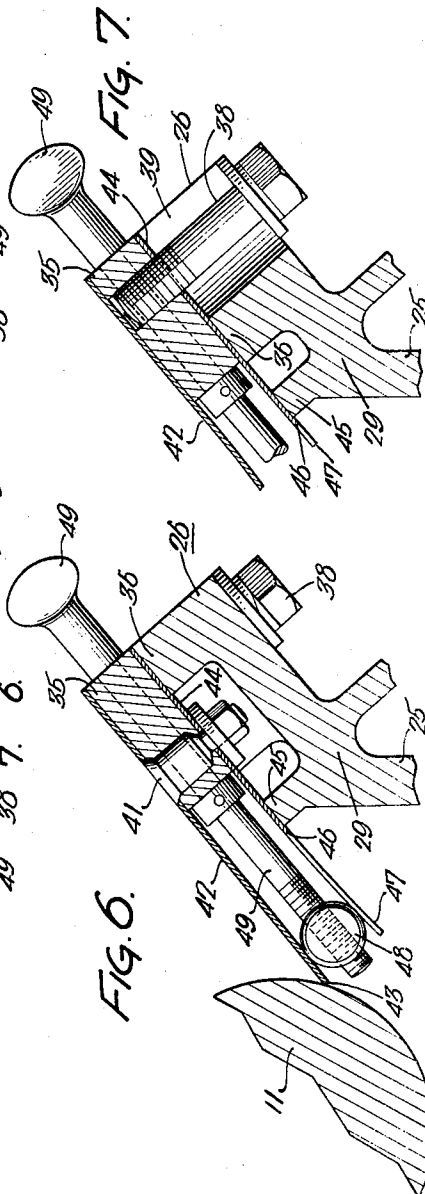
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INVENTOR:
HENRY W. MOSER
WILLIAM GROBMAN
EWALD OTTO P. ESKILSON
By *Howdore & Howdore* ATTYS.

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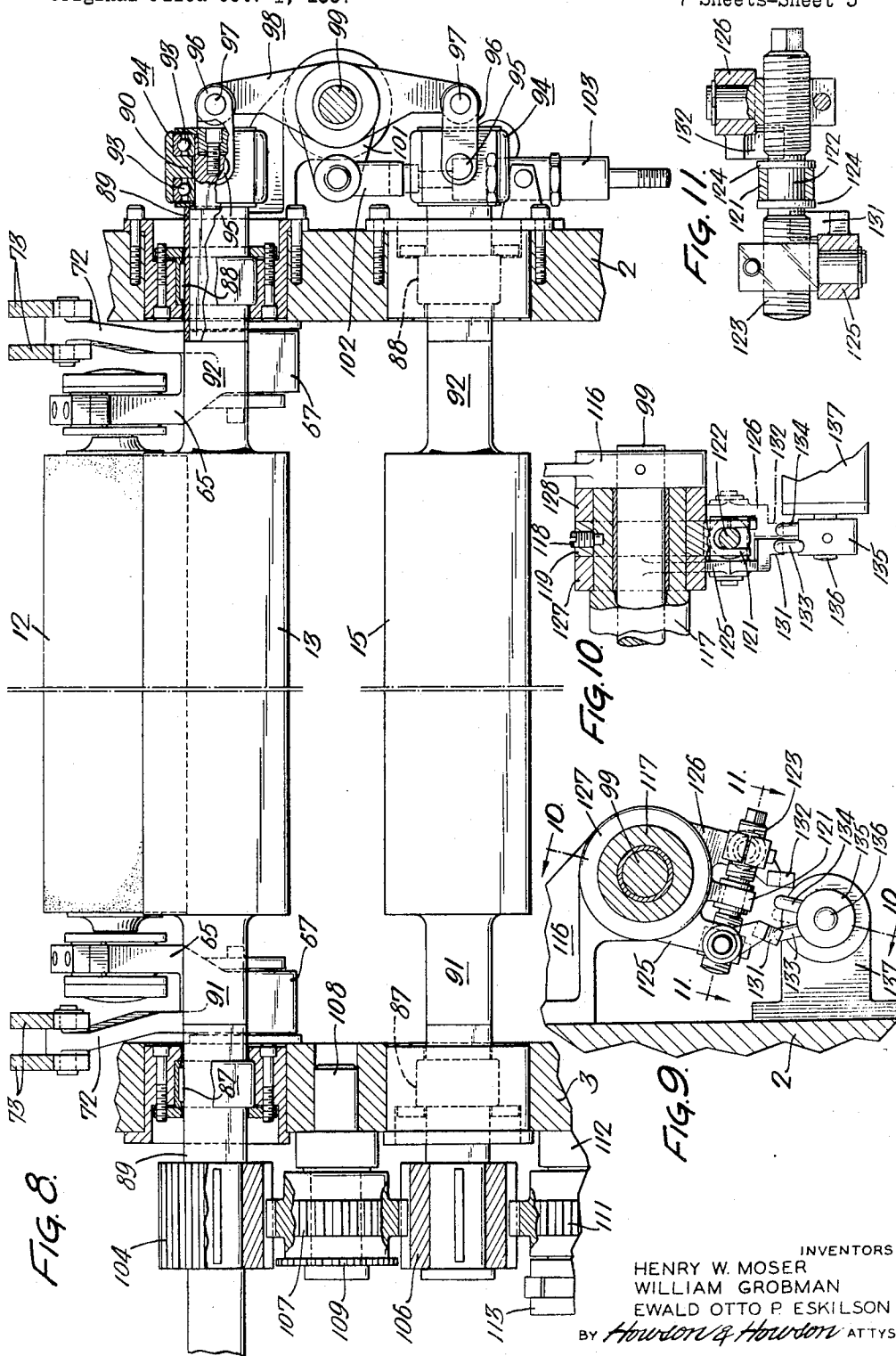
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H. W. MOSER ET AL

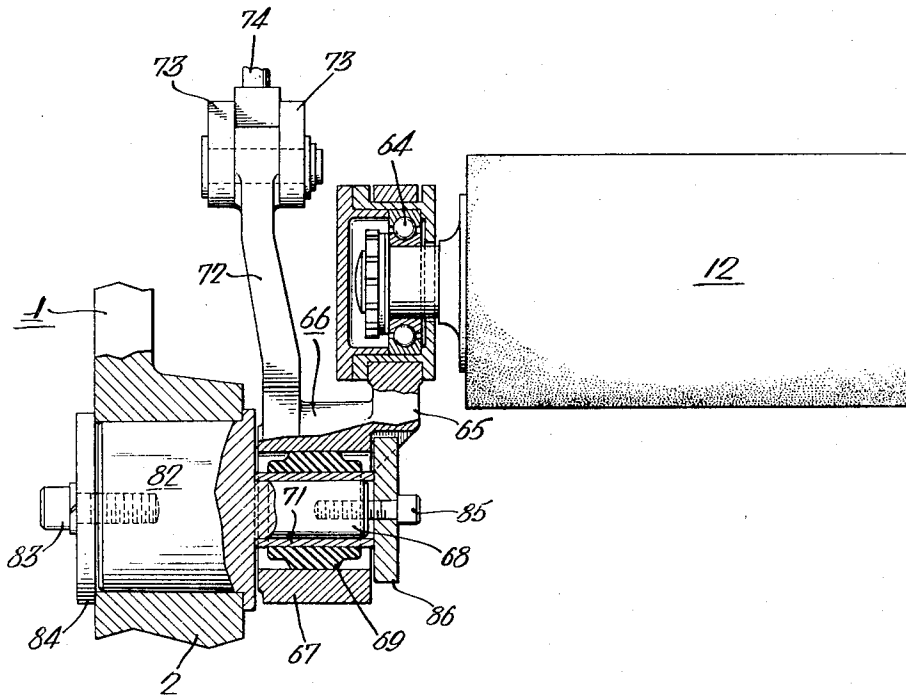
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FIG. 12.



INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN
EWALD OTTO P. ESKILSON
BY *Howson & Howson* ATTYS.

Dec. 19, 1961

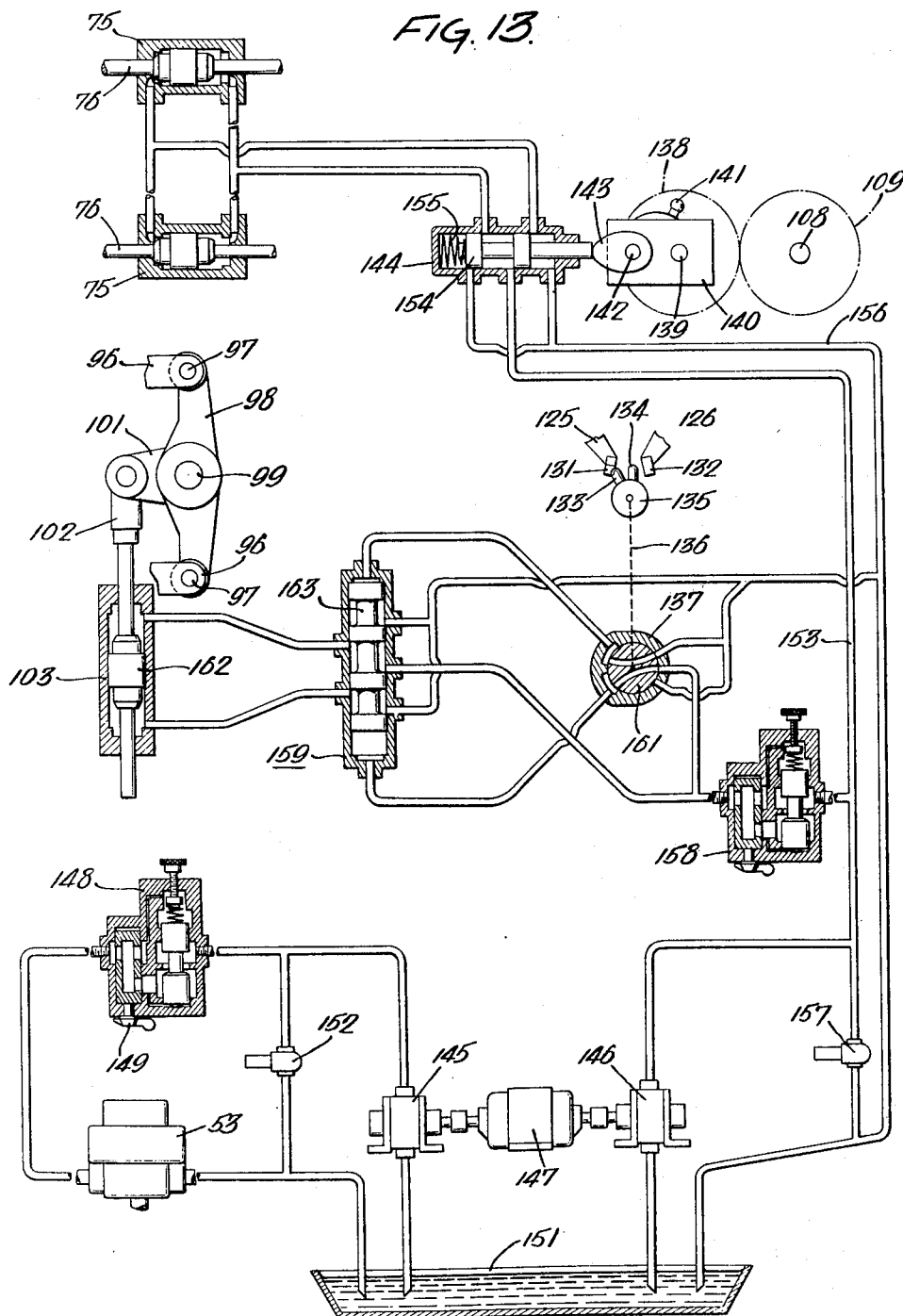
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INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN
EWALD OTTO P. ESKILSON
BY *Howdon & Howdon* ATTYS.

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3,013,489

PRINTING MACHINE INK ROLL VIBRATOR

Henry W. Meser, Haddonfield, N.J., and William Grobman and Ewald O. P. Eskilson, Philadelphia, Pa., assignors to Samuel M. Langston Company, Camden, N.J., a corporation of New Jersey
Original application Oct. 1, 1957, Ser. No. 687,568.
Divided and this application Apr. 22, 1959, Ser. No. 898,129

2 Claims. (Cl. 101—350)

This is a division of our copending application S.N. 687,568, filed October 1, 1957 entitled Ink Fountains for Rotary Printing Presses.

In the attached drawings FIGURES 1a and 1b 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 of FIGURE 1b.

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 sub structure 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

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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 adjusted 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 in 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 rotatably mounted in the bar 35 and threaded through the said member, as best shown in FIGURES 6 and 7. When the screw is turned the wedge member will be moved longitudinally of 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 anti-friction 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 independently 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 62 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 trans-

mission 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 to 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.

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. 1b 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 midsection. 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 so 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

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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 1a 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

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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 a printing machine, a printing roll and means for rotating said roll, an ink fountain including a fountain roll, an axially reciprocatory spreader roll spaced from the fountain roll, a ductor roll angularly traversible in the space between the fountain roll and the spreader roll into rolling contact alternately with said rolls, independently operable means for independently rotating the fountain and spreader rolls respectively, an independently operable reversible hydraulic motor means for automatically and continuously traversing the ductor roll into alternate contact with the fountain and spreader rolls and independently operable hydraulic motor means for reciprocating the spreader roll, said hydraulic motor means for traversing the ductor roll and for reciprocating the spreader roll consisting of independent hydraulically actuated piston means, a common hydraulic pressure source for both said piston means, and separate valve means for controlling the flow of pressure fluid to the piston means.

2. A printing machine according to claim 1 wherein the valve means for the ductor roll traverse piston means is operatively connected to the means for rotating the printing roll, said connection including means for regulating the traverse frequency.

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