

June 12, 1934.

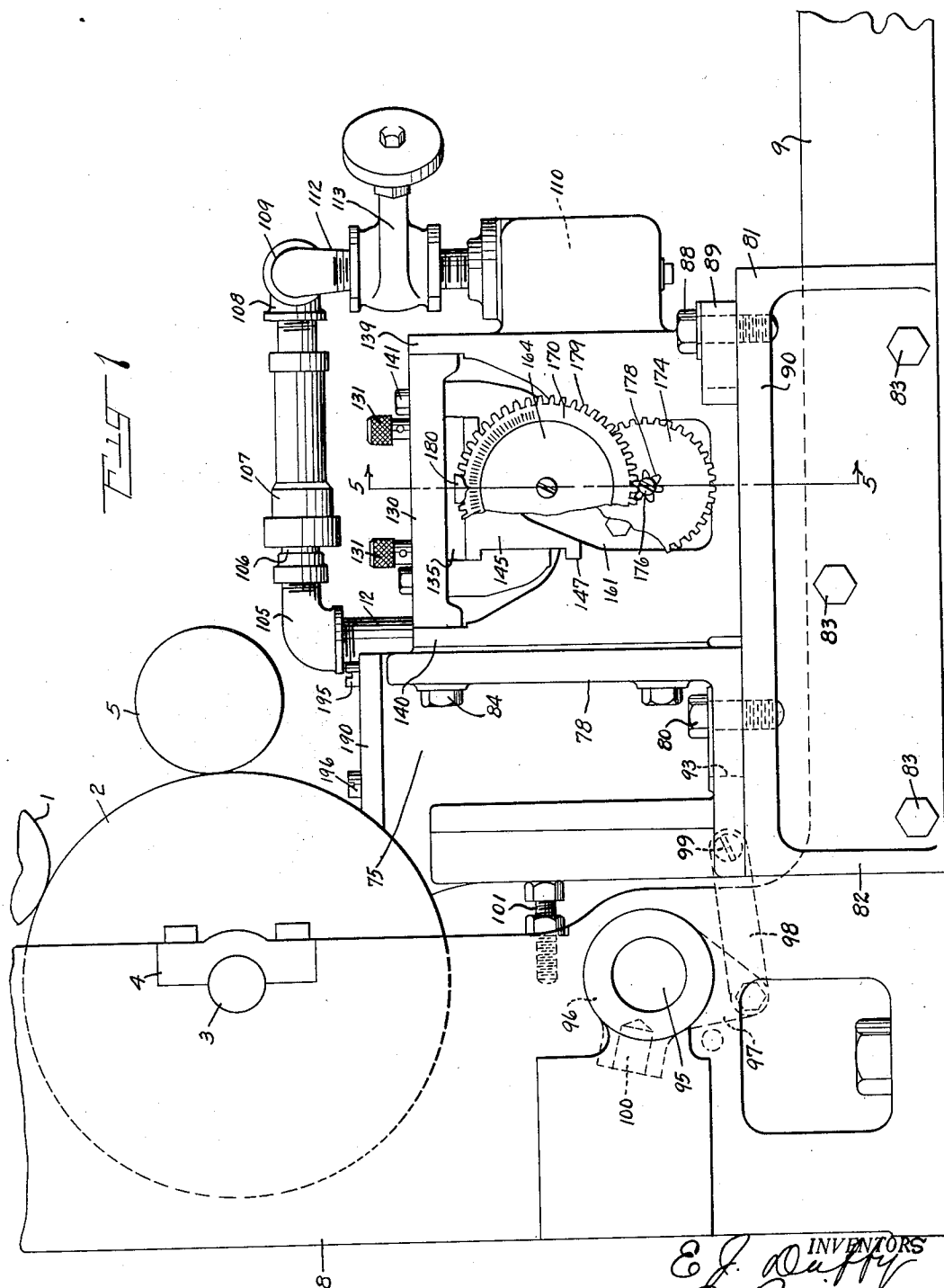
E. J. DUFFY ET AL

1,962,897

PRINTING PRESS

Filed Nov. 3, 1931

14 Sheets-Sheet 1



INVENTORS
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June 12, 1934.

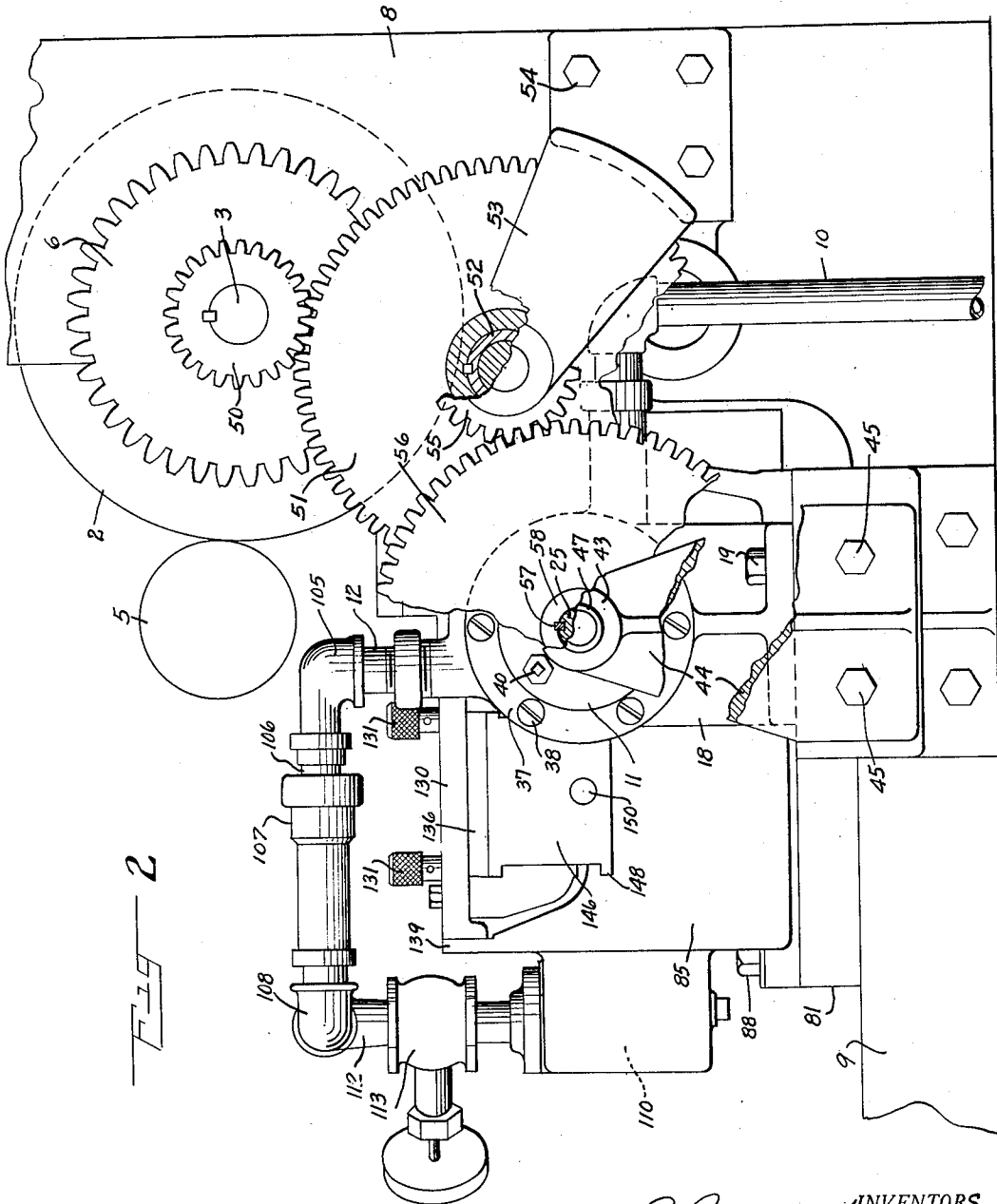
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14 Sheets-Sheet 2



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14 Sheets-Sheet 3

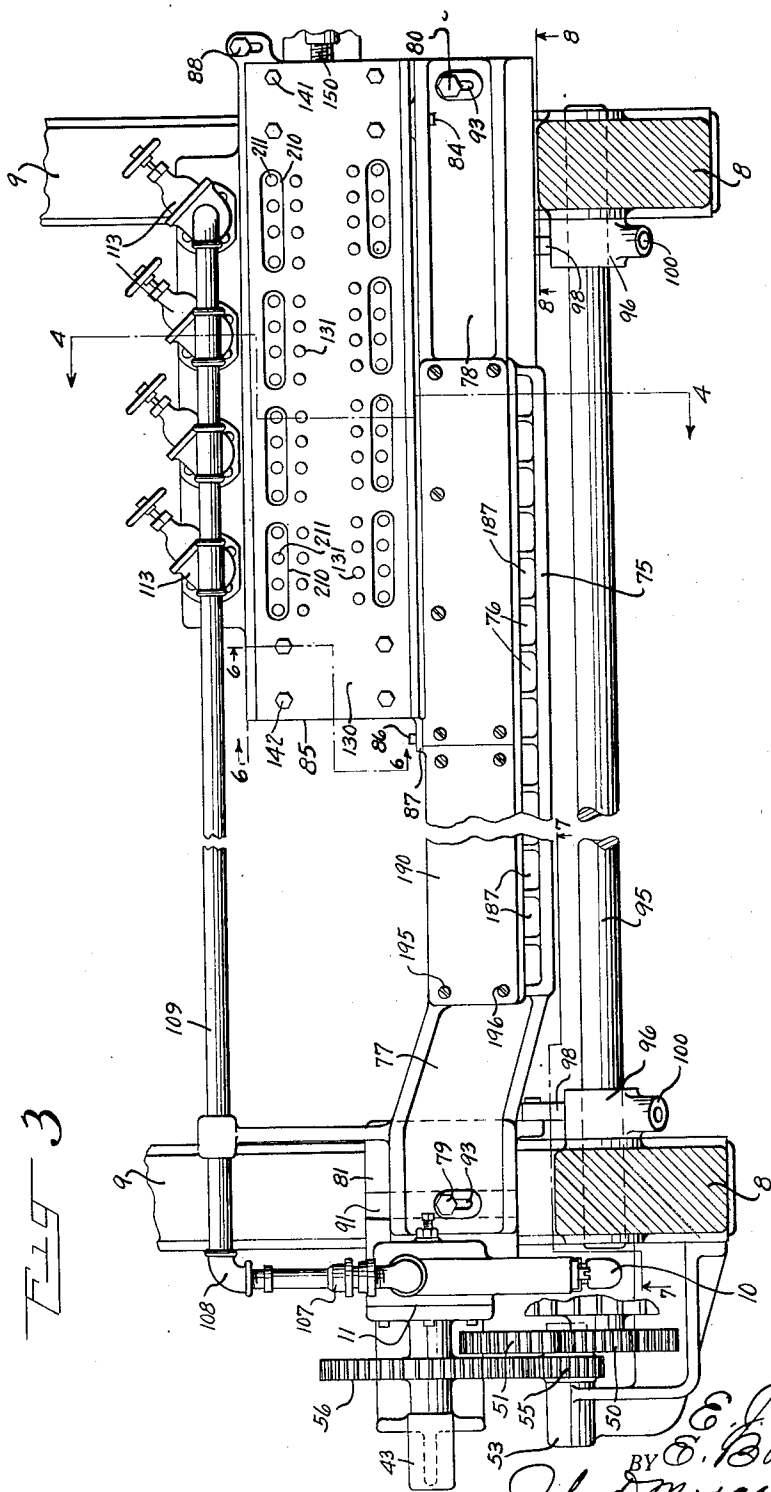


Fig. 3

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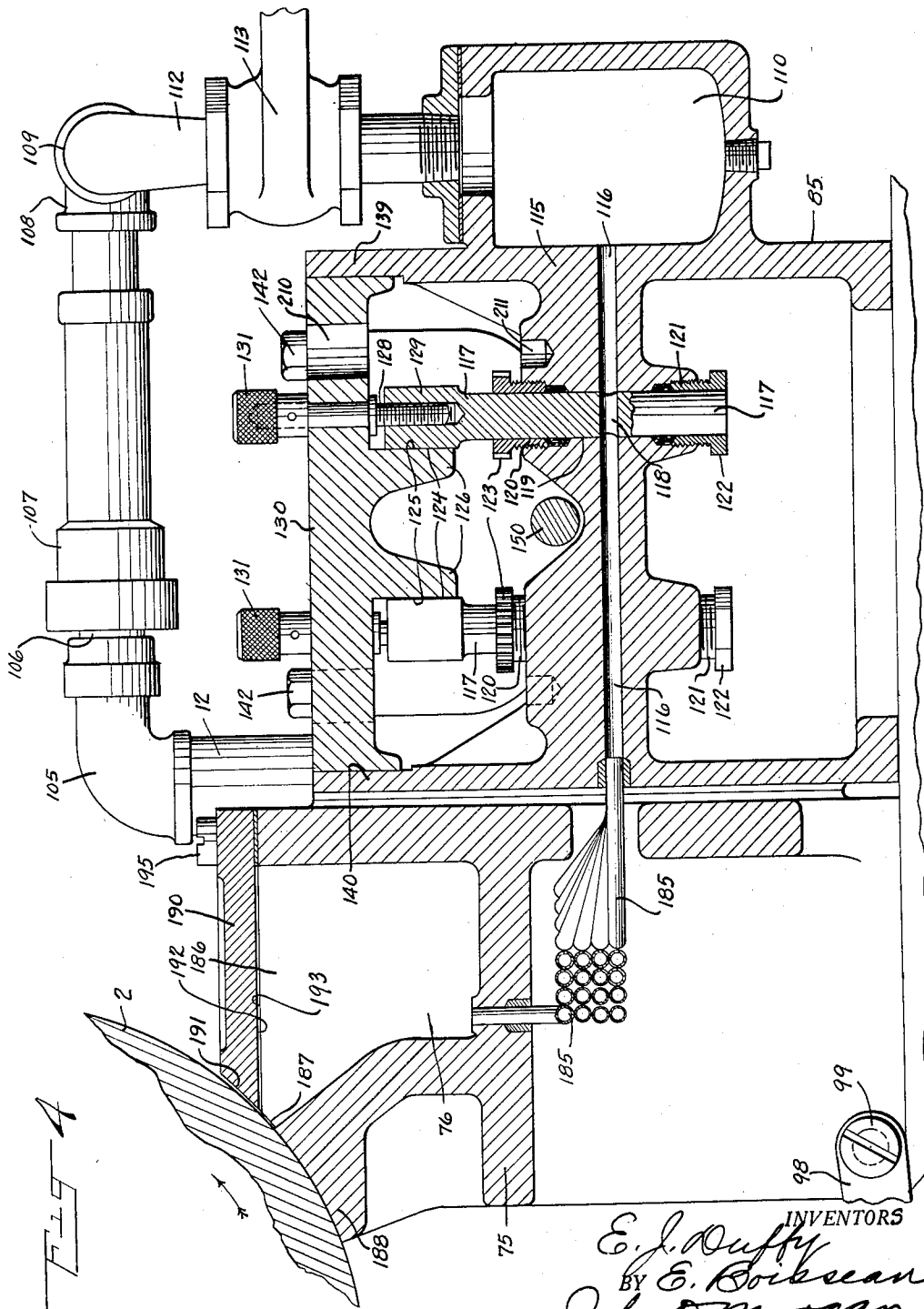
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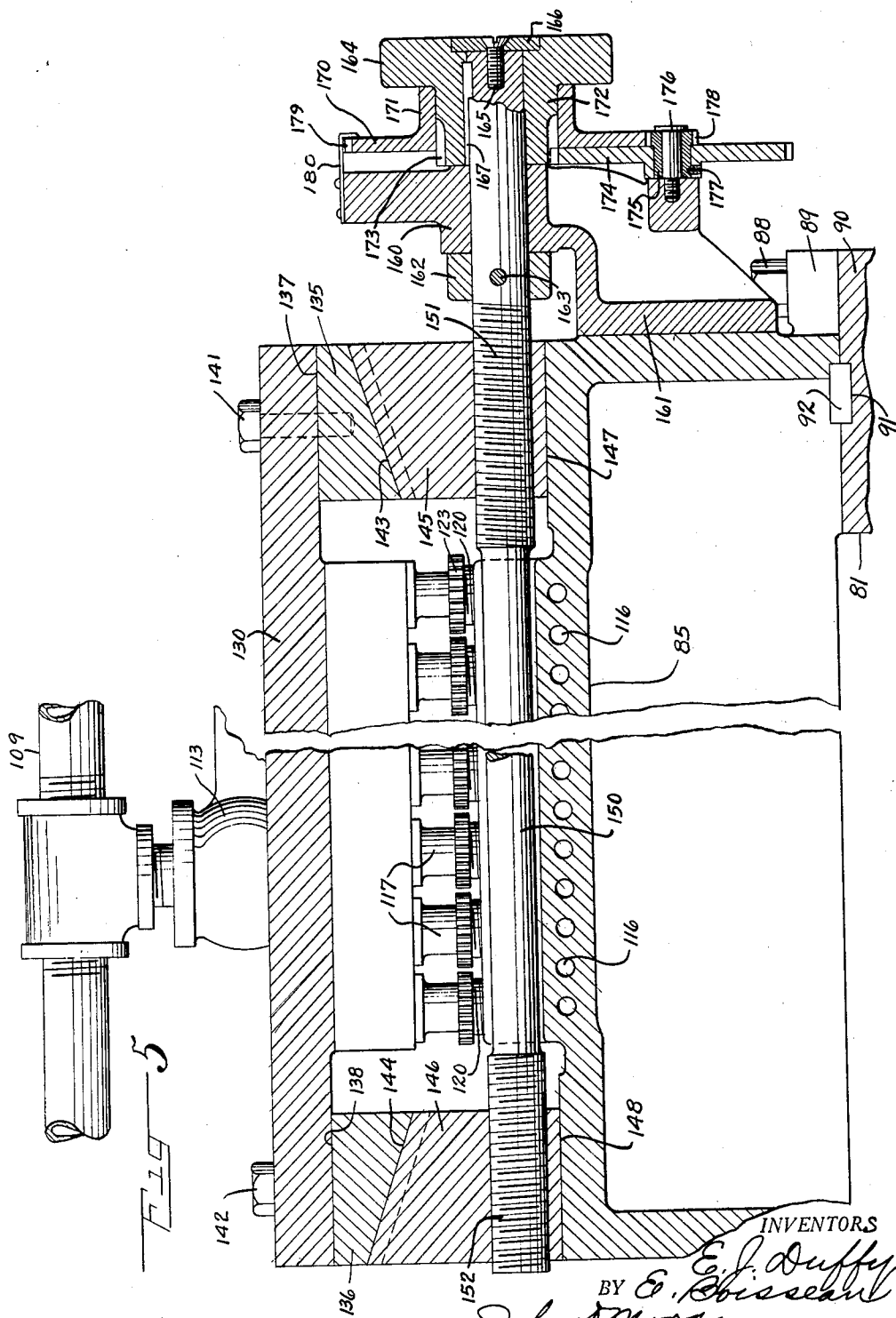
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14 Sheets-Sheet 5



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14 Sheets-Sheet 6

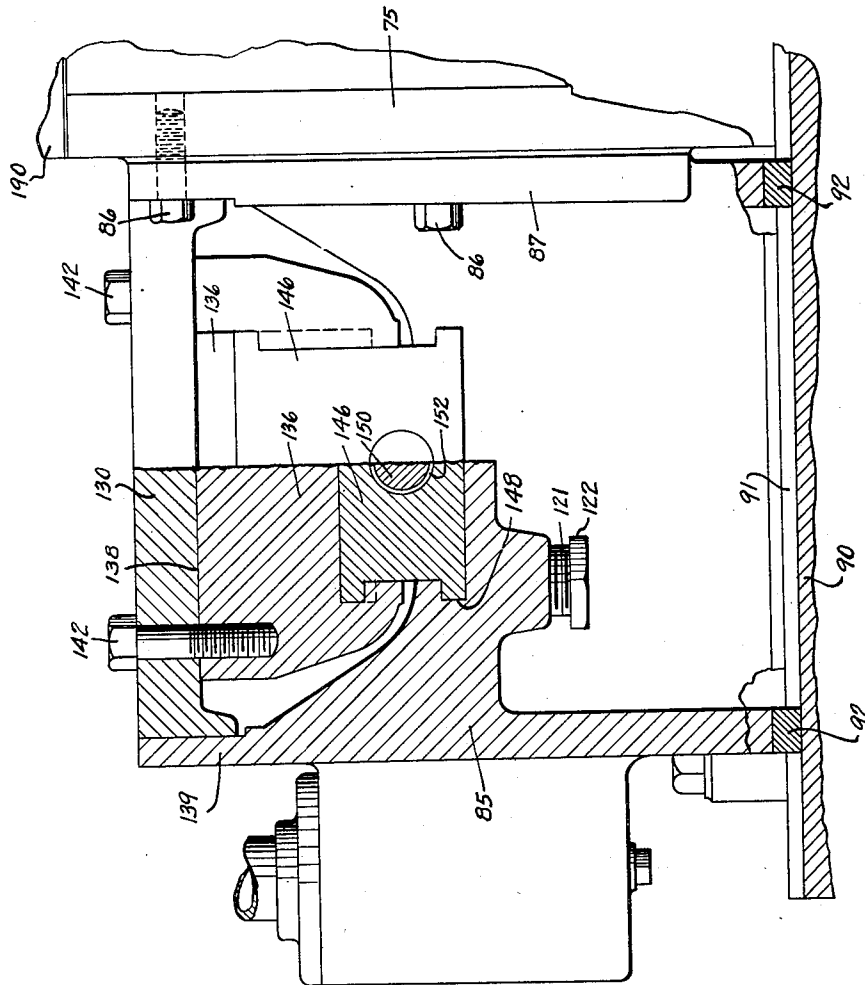


Fig. 6

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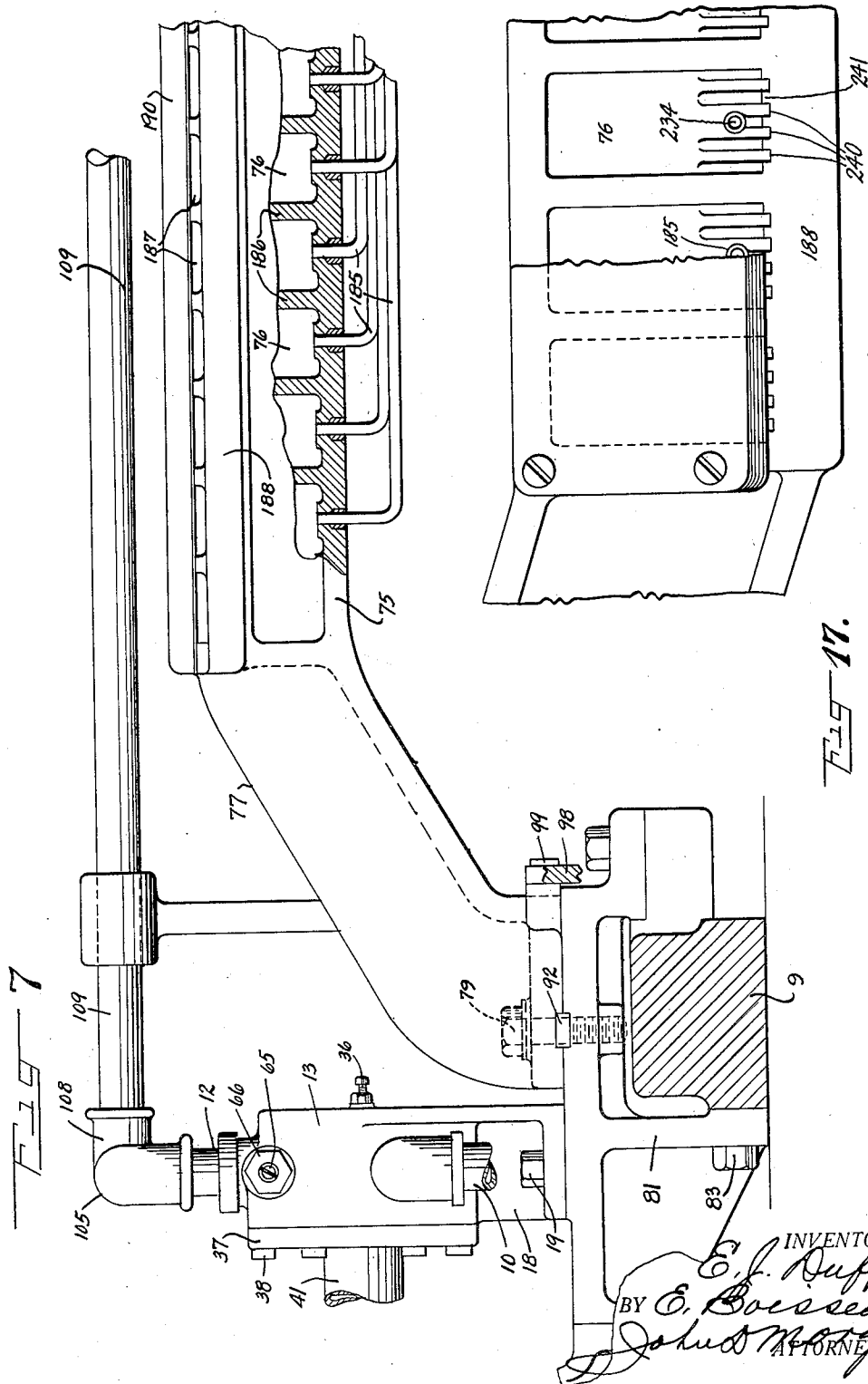
E. J. DUFFY ET AL

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14 Sheets-Sheet 7



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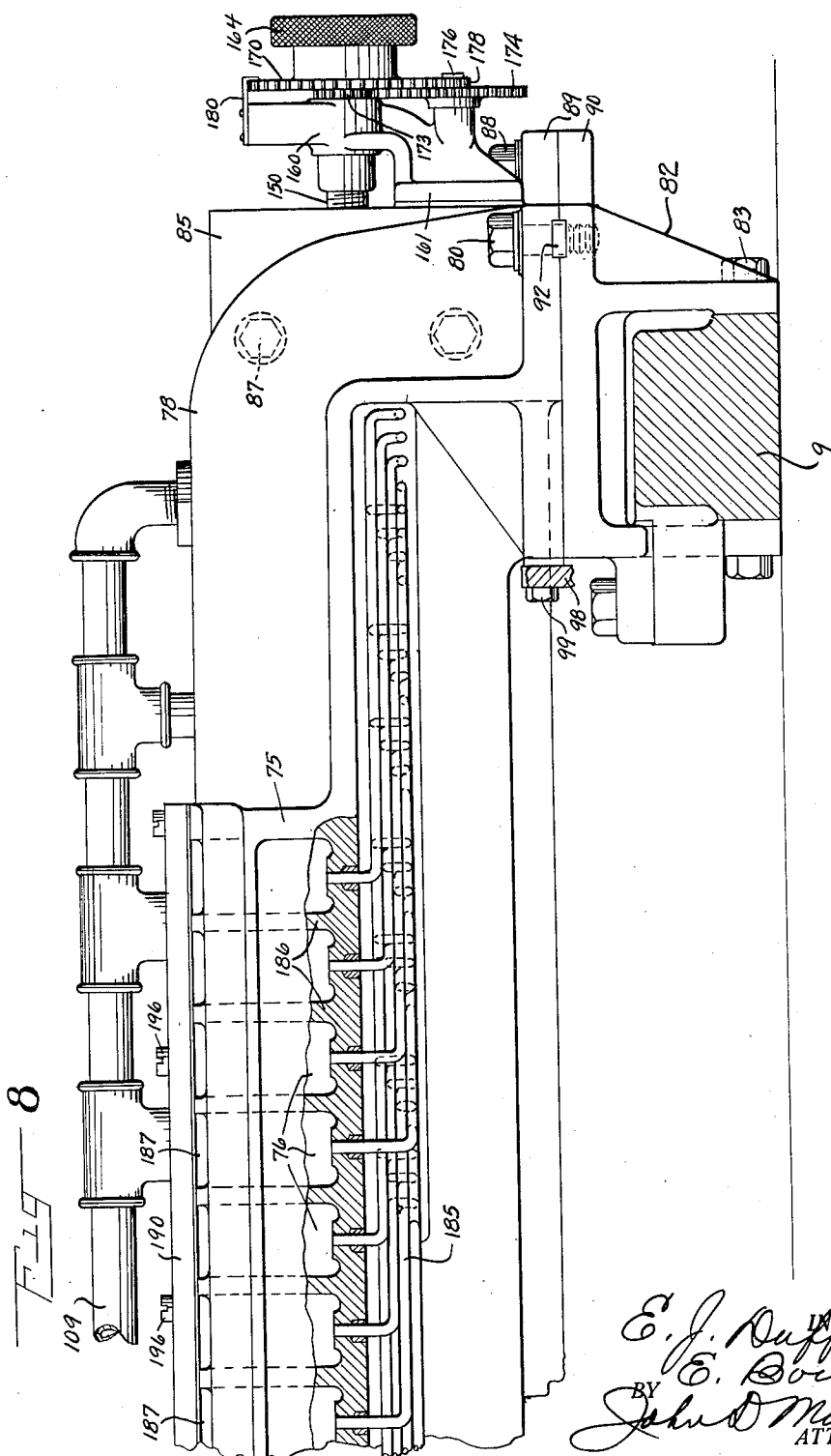
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14 Sheets-Sheet 8



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1,962,897

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14 Sheets-Sheet 9

Fig-18.

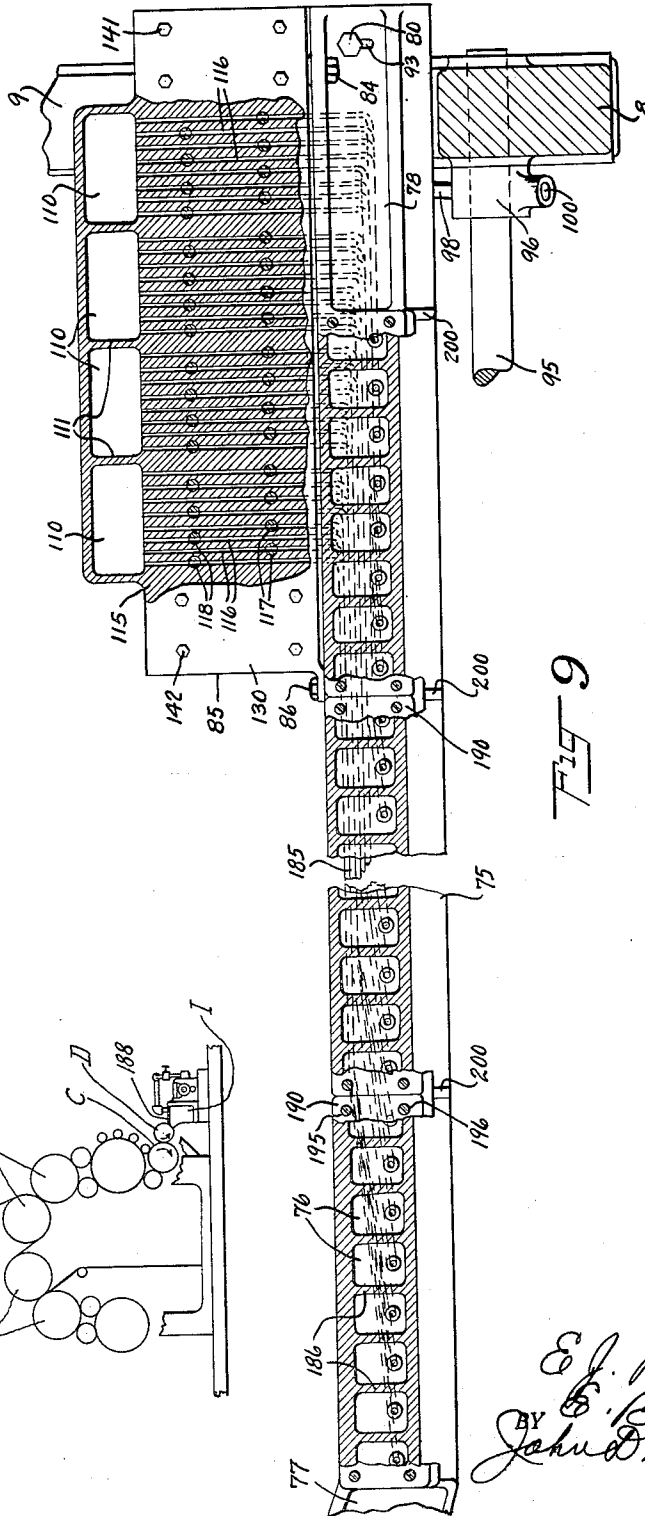
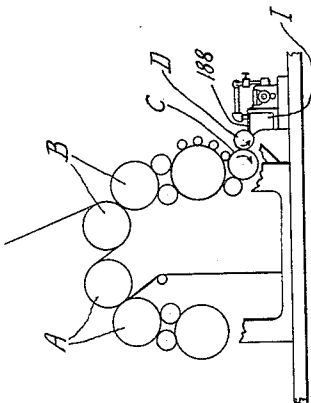


Fig-9

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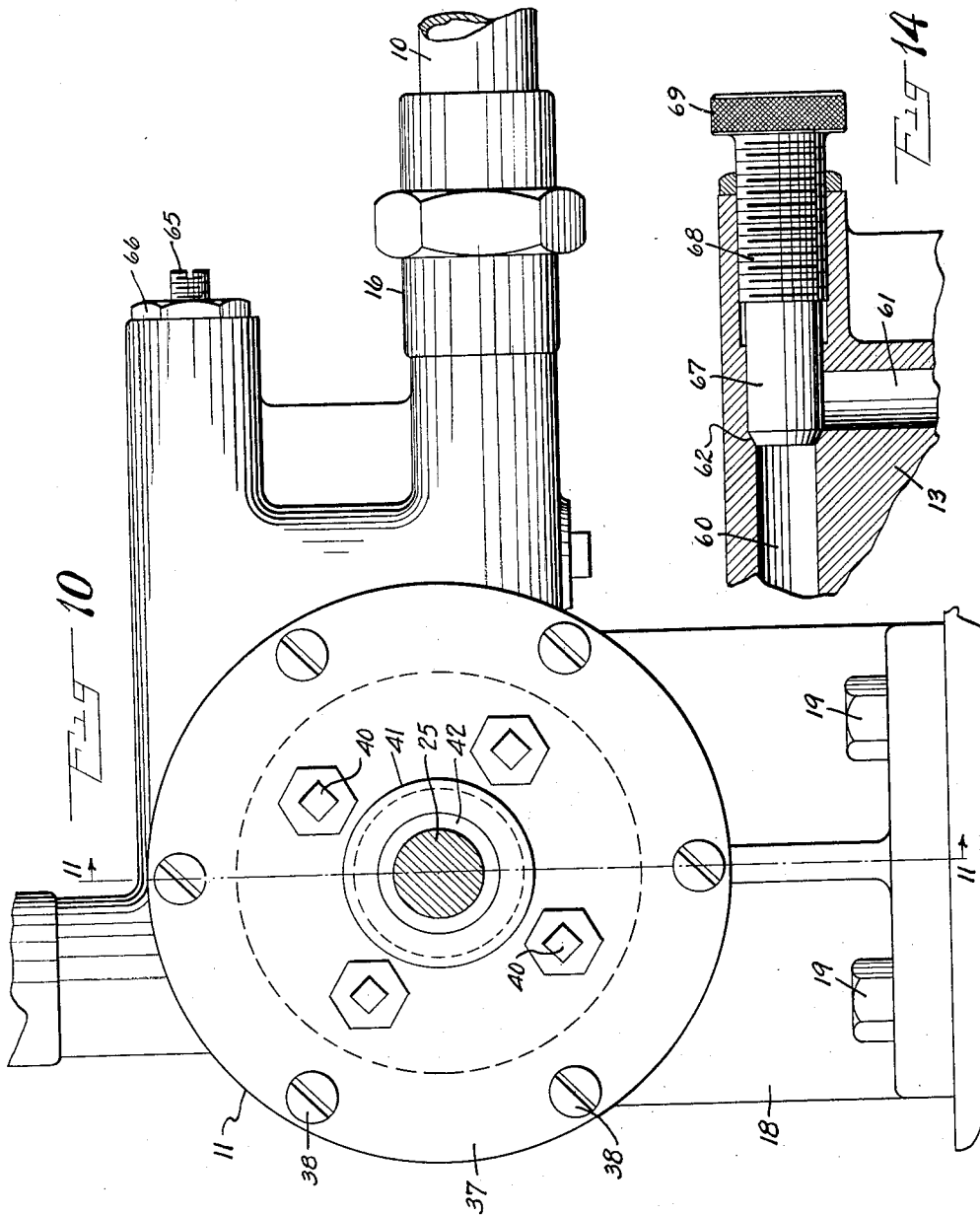
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14 Sheets-Sheet 10



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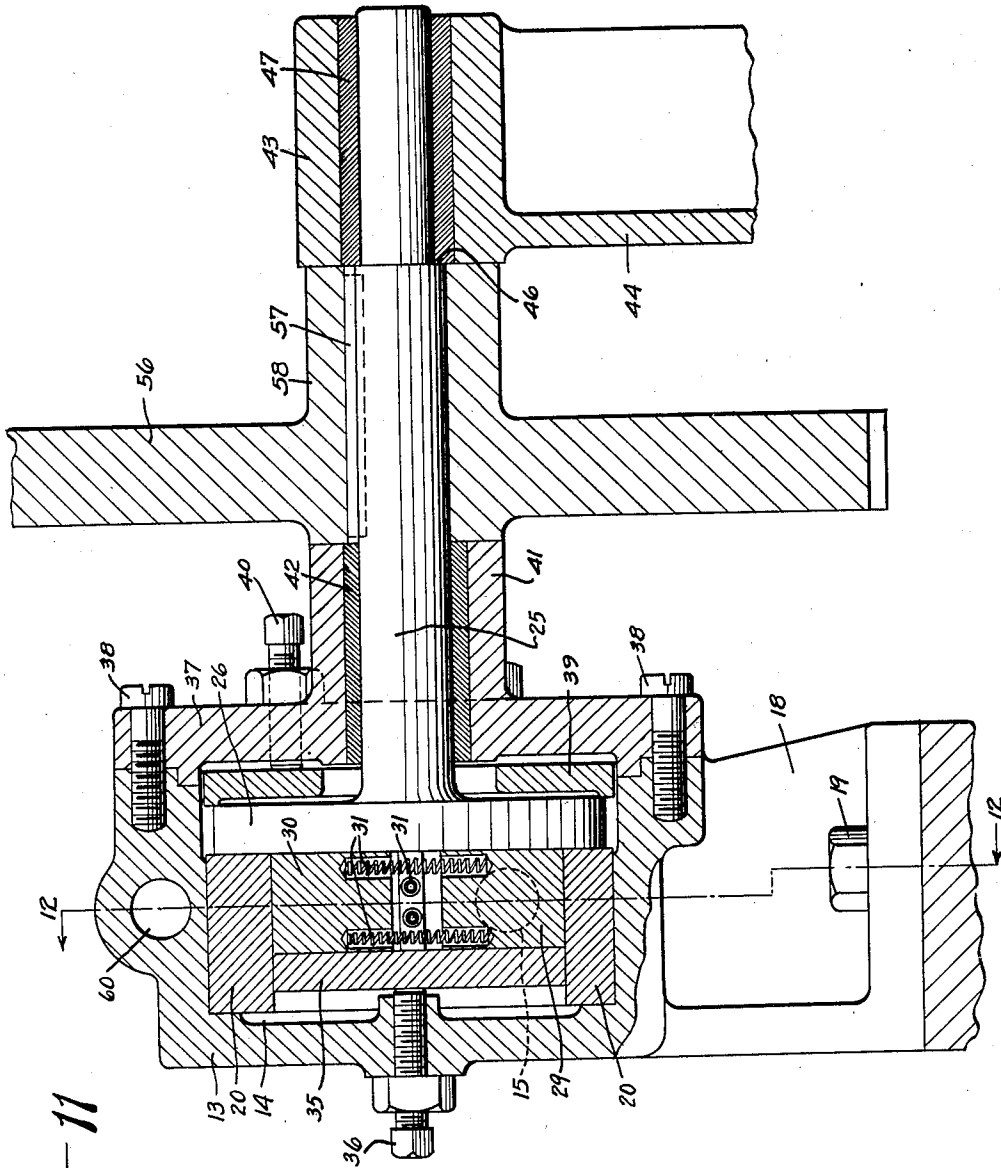
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14 Sheets-Sheet 11



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E. J. DUFFY ET AL

1,962,897

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14 Sheets-Sheet 12

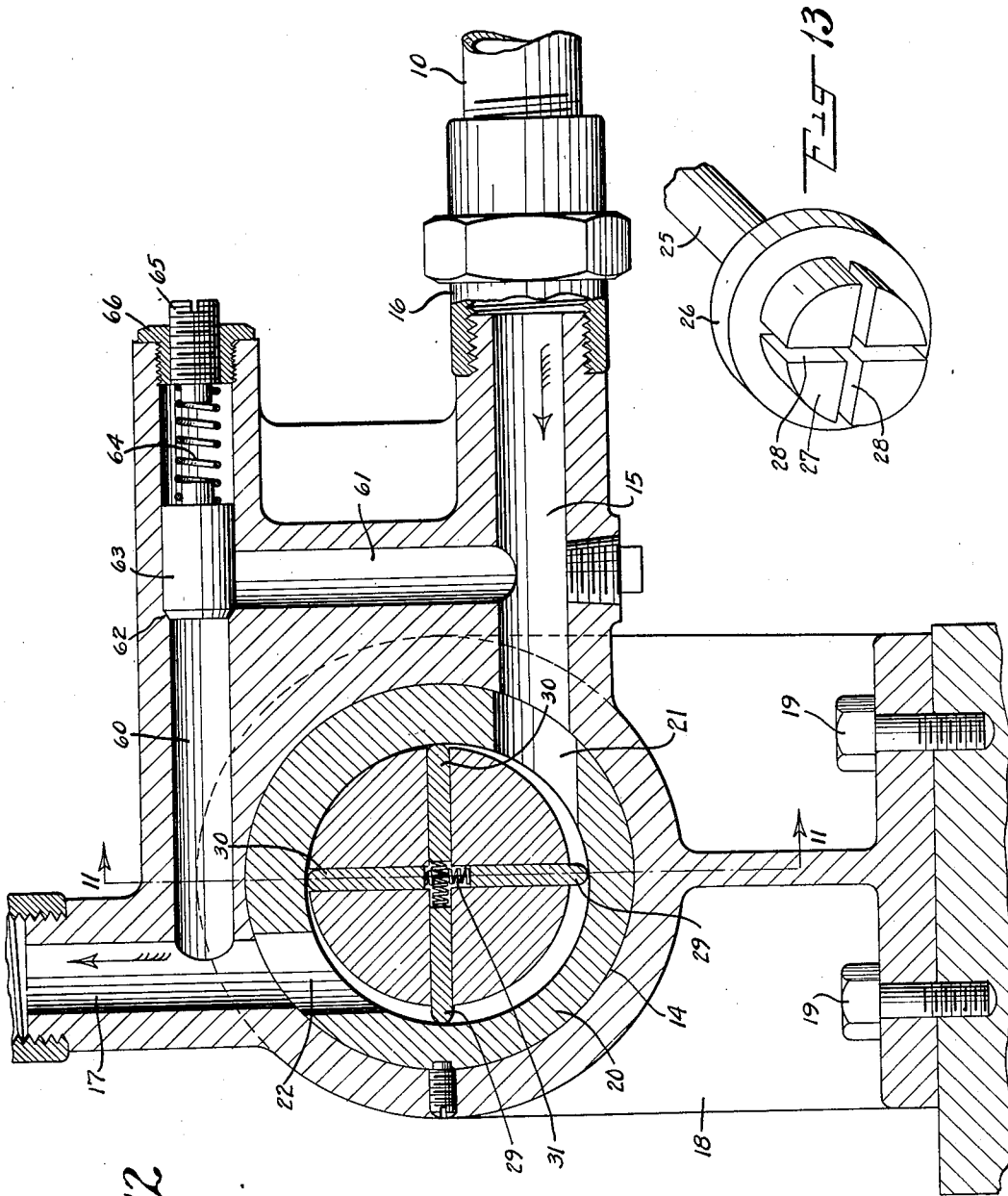


Fig. 12

Fig. 13

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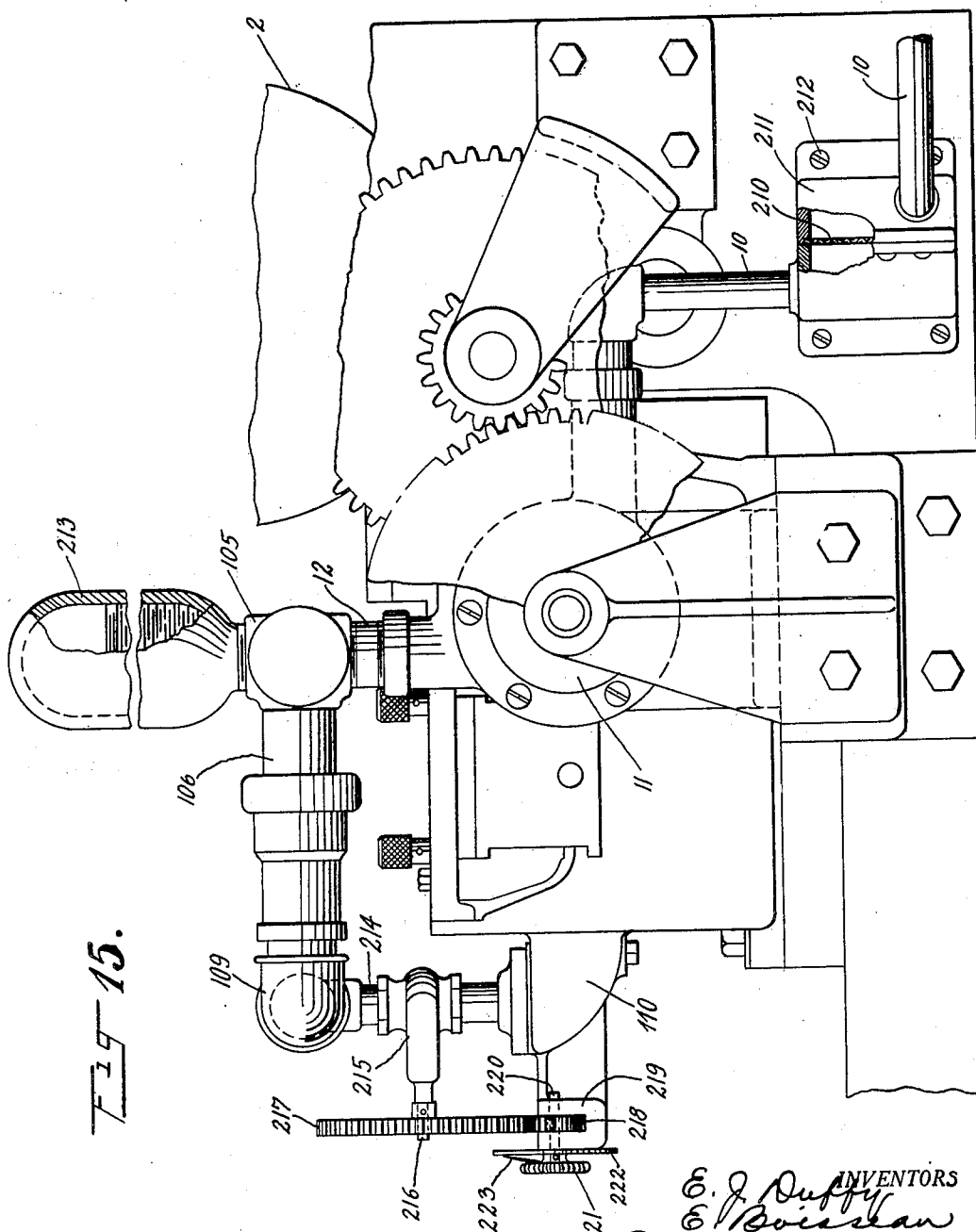
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14 Sheets-Sheet 13



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June 12, 1934.

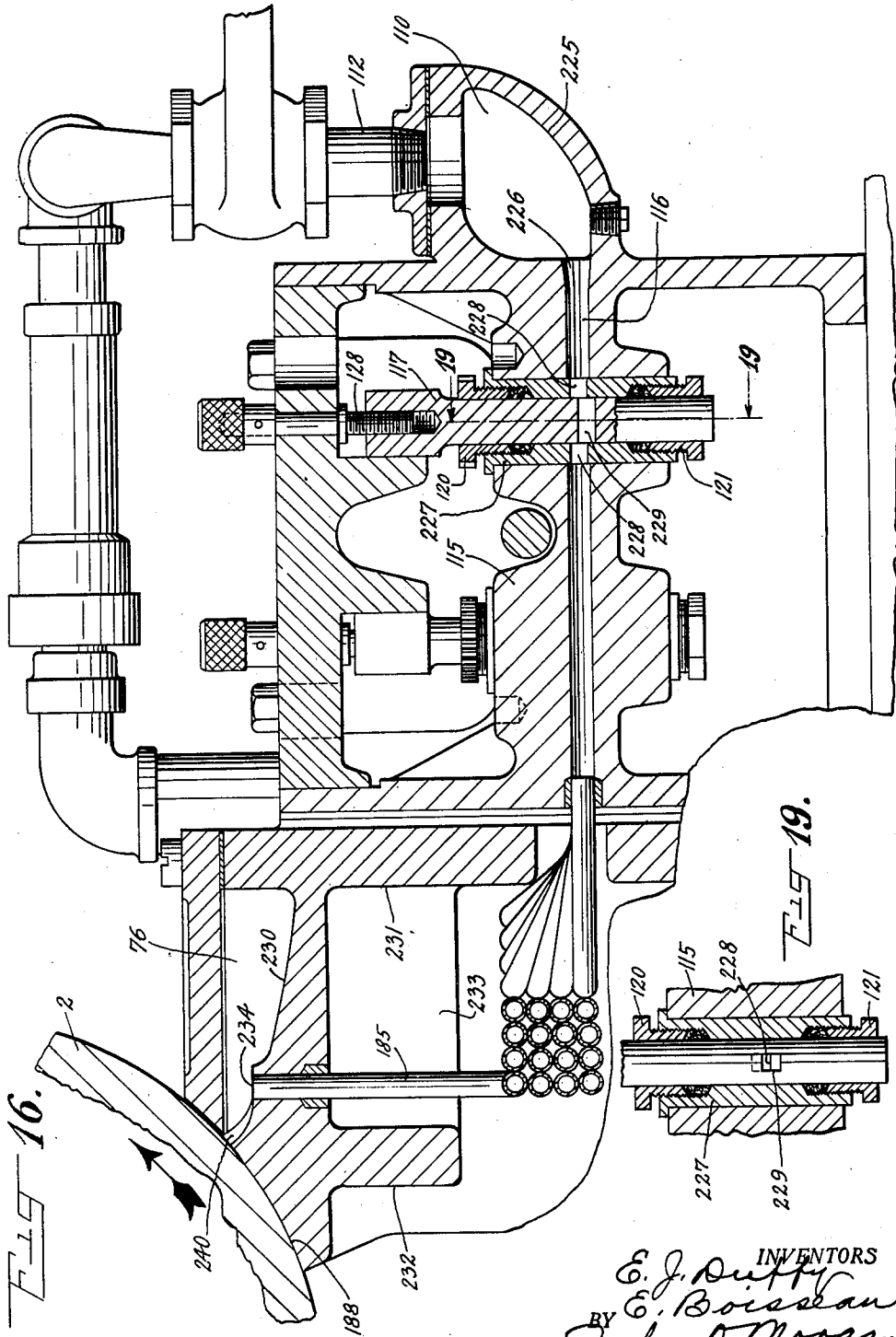
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14 Sheets-Sheet 14



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UNITED STATES PATENT OFFICE

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PRINTING PRESS

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Application November 3, 1931, Serial No. 572,782

15 Claims. (Cl. 101—365)

The invention relates to printing presses, and more particularly to a novel and useful inking mechanism for fast rotary presses.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Fig. 1 is a fragmentary elevation of a rotary printing press inking mechanism embodying the invention;

Fig. 2 is a fragmentary side elevation of a rotary printing press inking mechanism embodying the invention, viewed from the opposite side of Fig. 1;

Fig. 3 is a plan view of the mechanism embodying the invention;

Fig. 4 is a fragmentary transverse vertical section along lines 4—4 of Fig. 3;

Fig. 5 is a fragmentary transverse vertical section along line 5—5 of Fig. 1;

Fig. 6 is a fragmentary transverse vertical view along line 6—6 of Fig. 3 partly in section and partly in elevation;

Fig. 7 is a fragmentary elevation of the left hand portion of the mechanism of Fig. 3, with parts broken away, taken on line 7—7 of Fig. 3;

Fig. 8 is a fragmentary elevation of the right hand portion of the mechanism of Fig. 3, with parts broken away, taken on line 8—8 of Fig. 3;

Fig. 9 is a fragmentary plan view of the mechanism of Fig. 3, with parts broken away to show the arrangement of the ink pipes and valves;

Fig. 10 is a fragmentary side elevation of the ink pump;

Fig. 11 is a transverse vertical section taken on line 11—11 of Figs. 10 and 12;

Fig. 12 is a transverse vertical section on line 12—12 of Fig. 11;

Fig. 13 is a fragmentary perspective detail showing the end of the pump shaft; and

Fig. 14 is a transverse vertical detail view of a modified form of the by-pass valve.

Fig. 15 is a view similar to Fig. 2, showing sev-

eral modifications and additions in the ink supply mechanism;

Fig. 16 is a fragmentary, transverse, vertical section similar to Fig. 4 showing several modifications in the mechanism;

Fig. 17 is a fragmentary plan view, with parts broken away, of a modified form of the ink reservoirs;

Fig. 18 is a diagrammatic end elevation of a perfecting unit of a rotary printing press embodying the invention, and

Fig. 19 is a fragmentary vertical section of the valve mechanism, taken on line 19—19 of Fig. 16.

The invention has among its objects providing a more adequate, flexible and nice regulation for the inking supply of fast rotary presses, and especially for such presses using printing plates varying widely in their characteristics and requirements as to inking. An example of such variations is found in the illustrated newspapers, which upon one part of a plate cylinder will run possibly one or more half tones or other illustrations, and on another part of the same plate cylinder will have straight letter press matter. Such variations are to be found in both the major and minor areal divisions and sub-divisions of the plate cylinder, as, for instance, in an illustrated newspaper an entire page may be taken up by half-tones or other illustrations, another page may be entirely straight letterpress matter, and still a third page may have its minor sub-divisions broken up in such a way as to greatly vary its inking requirements.

Our invention provides a very nice, exact and flexible areal control for any and all parts of the plate cylinder so as to secure the best results under all the diverse conditions and requirements of fast newspaper printing. Means are provided for this purpose which are manually settable or regulable and having this adaptability in cooperative relation with other setting and regulating means, both automatic and manual.

It will be understood, however, that while our invention finds one of its chief fields of usefulness in fast rotary presses, it is both applicable and extraordinarily efficient with other kinds of presses and printing.

The invention is directed further to providing a general regulation and control of the inking mechanism and the ink supply to adapt them for use with the different kinds or qualities of printing paper which may be used on the presses. Such general or universal regulation of the ink supply

to fit the quality of paper used, is capacitated to cooperate with the regional or areal control of the ink supply for all parts or areas of the various plate cylinders or other printing surfaces requiring different amounts of inking. There is further provided by the invention means cooperating with, and functioning simultaneously with, the controlling and regulating means already described, which automatically generates, regulates and controls the pressure at which the ink is supplied to correspond to the speed of the press, thereby providing a supply of ink proportionate to the press speed.

Other objects and advantages of the invention will be primarily set forth later herein in connection with the detailed description of the present preferred embodiment of the invention.

The invention comprises among its principal instrumentalities, in the present preferred embodiment, a source of ink supply under regulable pressure, adapted to give a continuous and uniform primary supply. This supply, which may be primarily regulated as stated, is further subjected to the control and regulation of a mechanism in speed responsive relation to the press for generating additional pressure. This mechanism automatically increases the pressure at which the ink is supplied proportionately with increases in the press speed, and automatically decreases it proportionately to decreases in the press speed, thereby automatically increasing and decreasing the amount of ink supplied to the press.

Cooperating with the mechanism for generating additional pressure in the ink supply proportionate to the press speed is a device for automatically regulating and controlling the pressure developed, whereby a pressure in excess of a predetermined amount is automatically relieved by means independent of the press speed. This automatic device is itself adapted for regulation and control so that the predetermined limit of pressure may be varied as desired according to the needs of the ink supply.

In sequential relation to the foregoing are devices for effecting a varied feed or regulation of the ink to different major areal divisions of the plate cylinder, dependent on the needs or requirements of the particular page or corresponding major printing surface on the particular area of the cylinder. Cooperating with these devices for controlling the ink supply to the various major divisions of the plate cylinder, there is provided a series of devices for effecting a very nice and varied feed or regulation of the ink supplied to different minor areal sub-divisions of each major areal division of the plate cylinder, dependent on the needs and requirements of the particular kind of stereotype plate or other printing surface on the corresponding minor printing surface of the plate cylinder.

In conjunction with the latter devices for controlling and regulating the supply to the minor areal divisions of the printing surface, there is also provided a manual regulation, which cooperates with, while leaving undisturbed, the regulating mechanism just described for both the major and minor areal divisions of the printing surface; and which cooperates as well with the press-speed-governed regulating devices (likewise already described). This manual regulation is adapted to regulate the entire mechanism for the quality or kind of paper being run through the press.

The invention provides further means for applying the ink supply resulting from the various

governing and regulating devices to an ink distributing cylinder, which may be the same as or similar to the corresponding device in the ordinary inking mechanism usually provided for fast rotary presses.

It will be understood that the foregoing general description of the invention, and the following detailed description thereof as well, are exemplary and explanatory of the invention, but are not restrictive thereof.

Referring now in detail to the embodiment of the invention, illustrated by way of example in the accompanying drawings, the invention is shown applied to the usual or standard inking mechanism for fast rotary printing presses. In the drawings (Figs. 1 and 2) a form inking roller 1, which may be of any desired form, receives its ink from an ink distributing cylinder 2, having its shaft 3 journaled in the machine frame 8 by bearings 4. One or more ink rolls 5, which may be of any known or suitable kind, cooperate with the cylinder 2. Any suitable or convenient form of drive may be provided for the cylinder 2, and as shown a pinion 6 is fixed on shaft 3, and may be driven by any suitable intermeshing driving mechanism. The foregoing structure may be regarded as typical and may be varied as desired or as may be found most convenient or efficient.

Referring now to the details of the present preferred embodiment of our invention, a source of ink supply under pressure is provided, and this pressure may be provided by gravity, or by a pump or by air pressure, or otherwise. The supply of ink under pressure is represented in the drawings by a pipe 10, coming from the source of ink under pressure (Figs. 2, 10 and 12). This pipe communicates with the pressure generating means provided by the invention to feed ink thereto.

The invention provides means for generating a pressure in the ink supply for advancing ink to the printing mechanism under a pressure proportionate to the press speed. As embodied a rotary circulating pump, (Figs. 2, 3, 7, 10, 11 and 12) indicated generally by 11, communicates with supply pipe 10 and propels ink delivered by the supply pipe to a vertically extending delivery pipe 12. A pump housing 13 embodies the general structure of the pump and comprises a cylindrical chamber 14 provided with a horizontally-extending inlet conduit 15 which is suitably coupled at 16 to feed pipe 10, and with a vertically-extending outlet conduit 17. A supporting bracket 18 formed integral with the housing casting 13 is fixed to the press frame by screw bolts 19.

Tightly seated in the cylindrical chamber 14 is a bushing 20 having an eccentric inner periphery. Eccentric bushing 20 is provided with an inlet opening 21 and outlet 22 for co-operating with the conduits 15 and 17 respectively of the pump housing.

The active or pressure generating member for the pump comprises a shaft 25 mounted with its longitudinal axis concentric with the cylindrical chamber 14 and having an enlarged circular disc 26 (Fig. 13) at its inner or pumping end with a reduced cylindrical head portion 27 extending from the disc, the portion 27 being adapted to rotate within the eccentric bushing 20. Reduced head portion 27 is provided with two diametral slots 28 intersecting at right angles and extending the full length of head 27 to disc 26. Slidably mounted in each slot 28 is a pair of vanes 29 and 30, each vane being adapted to move radially outward from the center of head 27 under

the influence of coil springs 31 fixed to the inner edges of each pair of opposed vanes 29 and 30.

Means are provided for effectively sealing the moving parts of the pump from leakage of ink. As embodied, the side of the pump adjacent the press is sealed by a disc 35 firmly seated in the eccentric bushing 20 and contiguous to the end of the pump head 27. Means are provided for insuring a tight fit of the disc, comprising screw-bolt 36 threaded in the inner end of the pump housing for adjusting the position of the disc 35. The outer end of the pump is sealed by disc 26 of the pump shaft which is contiguous to the outer side of eccentric bushing 20. The pump chamber 14 is closed by a circular cap 37 apertured for shaft 25 and fixed to the outer rim of the housing by screw bolts 38. A sealing disc 39 is disposed between disc 26 and the closing cap 37, being likewise centrally apertured for passage of shaft 25 and having an inwardly disposed flange bearing against the outer surface of disc 27 near its rim. Screw bolts 40 are provided for tightly positioning the sealing disc 39 against disc 26, being threaded through sealing cap 37 and bearing against disc 39.

Referring now to the embodied means for rotatively supporting the pump shaft 25, sealing cap 37 is provided with an outwardly extending hub portion 41, for supporting the inner end of the pump shaft, being provided with a suitable bearing bushing 42. The outer end of the pump shaft is supported in a boss 43 on the bearing bracket 44 suitably bolted at 45 to the press frame. Shaft 25 is prevented from longitudinal movement by being reduced near its outer end to form a shoulder 46 which bears against the bearing bushing 47 in boss 43.

Referring now to the means for driving the pump 11, whereby a pressure responsive to the press speed is developed in the ink supply, as embodied, (Figs. 2, 3 and 11), pinion 50 is keyed to the outer end of ink distributing cylinder 2 and meshes with an idle speed-reducing gear 51 suitably keyed to stub shaft 52, which is supported in bearing bracket 53 mounted on the frame at 54. Also keyed to stub shaft 52 is pinion 55 which meshes with speed-reducing gear 56 to drive the pump. Gear 56 is suitably keyed to pump shaft 25 by key 57, being provided with a hub 58 which engages boss 43 and hub 41 to prevent sliding of the gear on shaft 25. Thus the pump is driven at a slow speed proportionate to that of the inking cylinder to thereby regulate the ink pressure, and consequently the ink supply, throughout the entire inking mechanism in accordance with the speed of the press.

Referring now to the embodied means for automatically relieving an ink pressure in excess of a predetermined amount, a by-pass valve cooperating with the pump is provided, preferably forming an integral part of the pump housing casting 13, (Fig. 12). As embodied, a horizontally-disposed conduit 60 communicates with vertical pump outlet 17 just above the cylindrical pump chamber 14 and extends parallel to the inlet conduit and for substantially the same distance. A vertical conduit 61 communicates with horizontal conduit 60 to complete the by-pass from the pump outlet 17 back to pump inlet 15. At the junction of the horizontal and vertical conduits, the former is enlarged to form a beveled valve seat 62 in which a valve plunger 63 is adapted to fit. The enlarged portion of horizontal conduit 60 extends from valve seat 62 to the outer end of the conduit to accommodate the

sliding movement of the plunger. A helical spring 64 engages the rear reduced portion of the plunger to normally urge the plunger to valve-closing position, the other end of the spring engaging the reduced end of a plug 65 suitably seated in the outer end of the conduit 60. The effect of the foregoing construction is to permit uninterrupted passage of ink from the pump through outlet 17 to the inking mechanism so long as the pressure generated by the pump is insufficient to overcome the force of spring 64, while a pressure in excess of the amount determined by the compressive force of spring 64 will be automatically relieved by the opening of the by-pass valve due to displacement of plunger 63 by the ink under pressure.

The invention provides means for varying the predetermined limit to which the ink pressure can attain, which as embodied comprises screw-threaded plug 65 which is mounted for rotative movement in conduit closing member 66 which is internally threaded for cooperation with plug 65 and externally threaded to form a sealing closure with the end of conduit 60. It will be apparent that the turning of threaded plug 65 to vary its position longitudinally with respect to the conduit will increase or decrease the compression on spring 64 to thereby correspondingly vary the pressure at which by-pass valve becomes effective to open.

In Fig. 14 is shown a modified form of valve plunger and mounting wherein the plunger 67 forms, itself, the closure for the conduit 60, being provided with screw-threaded outer portion 68 adapted to cooperate with the internally-threaded end portion of conduit 60 whereby the valve may be manually fixed with any desired opening. A knurled head 69 is provided for the manipulation of plunger 67.

The invention provides means, cooperating with the mechanism already described, for supplying the ink under pressure to the inking cylinder and for regulating and controlling the supply for major and minor areal divisions of the plate cylinder, as well as a further general regulation and control, which may be desired, as for a particular kind of paper run through the press. These enumerated control and supply mechanisms are preferably arranged longitudinally of the distributing cylinder and are supported by the press frame, being furthermore mounted for a nice and exact positional regulation with respect to the distributing cylinder or equivalent mechanism.

Referring primarily to the general arrangement and supporting structure for the ink supplying and controlling devices (Figs. 1, 3, 4, 7, 8 and 9), an integral ink reservoir block 75 extends longitudinally of the distributing cylinder, being formed with a plurality of cells or compartments 76 for the ultimate feeding of ink to the distributing cylinder. Supporting brackets 77 and 78 extend downwardly and outwardly from the reservoir block and are fixed by bolts 79 and 80 to brackets 81 and 82 respectively. Brackets 81 and 82 are suitably fixed to horizontally extending portions 9 of the press frame at their respective side of the press by screw bolts 83. Fixed to the reservoir block 75 so as, for practical purposes, to form a substantially integral part thereof, is a general boxlike structure 85 which contains the ink supply regulating and controlling means for the major and minor areal divisions of the plate cylinder and for the general supply regulation hereinbefore-mentioned. This struc-

ture 85, which for convenience may be called the ink control box, is rigidly fixed to ink fountain container 75 by screw bolts 86 which clamp flange 87 of the ink control-box to the rear side of the reservoir block 75, and by screw bolts 84 which fix flange 78 to the other end of the control box. Control box 85 is supported in a manner similar to reservoir block 75 by bolt 88 which fixes flange 89 of the control box to a suitable bracket 90 which in turn is suitably fastened to the press frame.

Means are provided for giving the ink reservoir block 75 and its contiguous ink control box 85 a positional adjustment with respect to the ink-distributing cylinder. As embodied, brackets 81, 82 and 89 are provided with key-ways 91 (Figs. 3, 5 and 6) in which keys 92, fixed to the supporting brackets 77, 78 and 89 of the reservoir block 75 and the control box 85 respectively, are adapted to slide. Slots 93 in the brackets 77, 78 and 89 are provided to accommodate the positioning movement of the structures by permitting a movement of the bolts 79, 80 and 88 respectively within the limits of their respective slots. The embodied form of means for moving the substantially integral structure of the reservoir block and control box comprises shaft 95 extending longitudinally parallel to the axis of the ink distributing cylinder and rotatively mounted at either end in the press frame, (Figs. 1, 3, 7 and 8). Hubs 96 fixed to each end of the shaft adjacent the press frame are provided with cranks 97 which connect to the forward edge of brackets 77 and 78 by means of links 98 and screw bolts 99. Each hub is provided with a socket 100 for the insertion of a lever or suitable tool for turning the shaft. It is evident that the rotation of shaft 95 effects a sliding movement of the ink reservoir and control box structure along its supporting brackets within the limits of the slots 93. An adjustable screw bolt 101 is mounted in the press frame for further limiting the movement of the structure toward the distributing cylinder.

Referring now to the embodied means for supplying ink to the ink control box 85, (Fig. 2), the vertically-extending outlet pipe 12 of the pump 11 is connected by an elbow joint 105 to a horizontally extending pipe 106 which extends away from the distributing cylinder and is connected by a slip joint 107 to another elbow 108, which in turn communicates with a horizontally extending pipe 109 which runs parallel to the axis of the distributing cylinder. Slip joint 107 is provided for accommodating the positional movement of the ink controlling and supplying structure described above.

The embodied means for regulating and controlling the ink supply to the major areal divisions of the plate cylinder is next in sequence in the mechanism. A plurality of chambers 110 constituting an integral part of the ink control box 85 are divided by vertical partitions 111 and are fed from the main supply pipe 109 by downwardly-extending branch feed pipes 112. Each branch pipe 112 is provided with a manually-operable screw-down valve 113 for controlling the ink supply to its respective chamber 110. Thus any desired amount of ink, primarily dependent always on the pressure at which the ink is supplied to the general feed pipe 109, may be admitted to a chamber 110, the amount admitted being determined by the needs of the particular major areal division of the plate cylinder corresponding to the particular chamber 110.

Next in sequence in the mechanism are the further means provided by our invention, cooperating with the mechanisms already described, for regulating the supply of ink to the various minor sub-divisions of the plate cylinder. This local areal regulation may be as minute as desired, depending upon the structure of the mechanism, which in turn will depend upon the needs or requirements of the particular case. As embodied, the main block 115 of the control-box is provided with a plurality of channels or ink conduits 116 communicating with chambers 110, there being preferably a number of conduits communicating with each chamber corresponding to the number of sub-divisions into which the particular major area of the plate cylinder is divided.

Carrying out the invention as it relates to the control of the ink supply to the minor areal sub-divisions of the plate cylinder, there is a settable regulating device for the flow of ink through each of the ink conduits 116. This device preferably operates sequentially, for each of the ink conduits 116, after the general pressure control from the press speed, and the major areal control already described.

Referring now to the details of structure of the embodied form of said devices, a plurality of longitudinally-movable valve cylinders 117 are provided, one for each ink conduit 116. The valves 117 are arranged in two rows in staggered relation as shown in Figs. 3, 4 and 9, for convenience and compactness.

Each valve 117 is disposed in the path of the corresponding ink conduit 116 and moves endwise of itself and transversely to its conduit 116. Each of the valve cylinders 117 is provided with a passage 118 similar in shape to the conduits 116 and adapted to pass more or less into and out of register with the corresponding conduit 116, to control the ink flow therethrough by the longitudinal movement of the valve 117. The valves 117 are each reciprocally mounted in cylindrical openings 119 in the control box block 85, and are preferably provided with packing box joints 120 and 121 above and below the ink passage 118 to render them ink-tight. The packing box joints are preferably screw-threaded into suitable mountings in the block 85, the lower packing box joint 121 being provided with a hexagonal head 122 to provide a grip for a tightening tool, while the joint 120 is provided with a serrated head 123 for easy engagement of a tightening tool.

The heads of the respective cylindrical valves 117 have attached thereto means for effecting a nice and exact longitudinal movement of the valve cylinders while preventing rotary movement thereof so as to maintain their openings in angular alinement with the ink conduits. The heads 129 of the valve cylinders (Fig. 4) are of rectangular cross section having flat sides 124 for sliding engagement with contiguous guiding faces 125 on the downwardly extending flanges 126 of valve plate 130. The rectangular heads 129 of valves 117 have rotatively attached thereto, respectively, screw-threaded rods 128, which are screw-threaded into the valve plate 130 and are provided with suitable hand turning heads 131.

Thus each of the valves 117 is individually nicely and exactly positionable with respect to the valve plate 130, and also with respect to every one of the other valve cylinders 117, thereby providing an independent and individual con-

trol for the ink flow under pressure through each of the respective ink conduits 116, thereby to control the ink supply to the respective minor areal sub-divisions along and around the plate cylinder.

Means are provided for permitting easy and rapid tightening or adjustment of the upper packing joint 120, which as embodied, comprise slots 210 in the valve plate 130 and cooperating sockets 211 in the control box block 85, there being a socket 211 adjacent each valve 117, whereby a tool introduced into a slot 210 and seated in a socket 211 may engage the serrated head 123 of the packing joint 120 to effect a tightening or adjustment thereof.

The valve plate 130 is further positionable and controllable so as to provide a further general regulation and control of the ink supply through all the valves 118, simultaneously, without disturbing the individual regulation effected by the setting of the separate valve cylinders 117, through their respective setting screws 128, which mechanism will now be described.

One of the purposes for which a general or universal regulation of all the valves 117 together might be desired without disturbing their individual relative settings, would be to control the ink supply to suit the particular quality or kind of paper which might be run through the press. Such a regulation or control would be necessary or advantageous coincident with the major and minor areal controls which might be necessary or desirable for the different characteristics of the plates, such as the presence of halftone and letter-press on different parts of a plate cylinder.

In the embodied form of said means for positionally controlling the valve plate 130, this plate at either end thereof is seated in supports 135 and 136, the ends of the valve plate resting upon supporting surfaces 137 and 138. The valve plate is maintained against lateral displacement by flange plates 139 and 140 projecting upwardly from the general casing 85. The valve plate is attached to the supports by suitable means such as screw bolts 141 and 142.

Each of the supports 135 and 136 is provided on its underside with beveled surfaces 143 and 144, which contact and cooperate with like surfaces on two travelable wedge blocks 145 and 146. The wedge blocks are seated in guideways 147 and 148, formed in the structure of the general casing block 85, to have longitudinal movement toward and from each other, to raise and lower the valve plate 130, but are constrained from lateral displacement.

The embodied form of actuating and controlling means for the wedge blocks comprises a screw shaft 150, having screw-threaded portions 151 and 152, screw-threaded respectively into blocks 145 and 146. One screw thread is left-handed and the other right-handed, so that the wedge blocks simultaneously will approach each other or will recede from each other. The embodied means for rotating and positioning screw shaft 150 comprises a bearing 160 in a bracket 161, bolted upon the valve-controlled box casing 85. A collar 162 is pinned to screw shaft 150 by a pin 163, the collar bearing on the inner face of the journal block 160. A positioning knob 164 is fastened to the end of shaft 150 by a set screw 165 which maintains the knob 164 in position by means of a set-in plate 166. A key 167 is also preferably used between the shaft and the knob.

Suitable indicating means are provided, and as

embodied, a calibrated dial 170 having a hub 171 loosely mounted on an inwardly projecting hub 172 of the knob 164. Reduction gearing is provided, cooperating with the shaft-turning knob 164 and the calibrated dial 170, whereby a number of turns given to the knob 164 will result in only a fractional turning of the calibrated dial. As embodied the inner end of hub 172 is provided with gear teeth 173 which mesh with gear 174 mounted on a rotatable bushing 175, the bushing being rotatively supported by stub shaft 176 screw-threaded into a suitable supporting portion of bracket 161. The gear 174 is fixed to rotate with bushing 175 by set screw 177. Contiguous to gear 174 and fixed to or forming an integral part of the bushing, is a pinion 178 which meshes with gear teeth 179 on the periphery of the calibrated dial 170. Thus a complete turn of the knob 164 to rotate the shaft 150 results in only a very slight rotation of the calibrated dial, thereby giving a very accurate reading of the setting of the valve-plate 130. A pointer 180 may be fixed on the upper surface of journal block 160 for indicating the setting of the calibrated dial. The calibrations of the dial will furnish an accurate indication of the setting for any particular quality of paper, or any other factors affecting the printing, and the experience and observation of the pressman will be a factor in nice regulation.

Means are provided for conducting the various regulated streams of ink under pressure to the different parts of the inking mechanism, and in the embodied form (Figs. 4, 7, 8 and 9), each of the ink conduits 116 delivers ink into a pipe 185. The pipes 185 communicate with the individual means for supplying ink to a relatively small area on the inking mechanism or plate cylinder in order to maintain the regulation throughout. As embodied, the pipes 185 discharge the ink into corresponding compartments 76, of relatively narrow width in the reservoir block 75. These compartments are separated by walls 186.

The respective individual supply reservoirs terminate at their ink delivering end in narrow, horizontally-disposed passages 187, and there may be either one of these discharge passages, or a plurality thereof, for each of the individual reservoirs. As shown in the drawings, there is a single discharge opening 187 formed in the forward wall of each of the individual supply reservoirs.

Below the series of discharge orifices is a concaved lip 188, having its exterior surface curved substantially on the radius of the distributing cylinder 2, and this lip extends in the direction opposite to the rotational direction of the cylinder. This constitutes an effective seal and safeguard against leakage and spreading of the ink downwardly from the supply reservoir. Lids or closures 190 are provided for the individual supply reservoirs, each of the major divisions of the series of supply reservoirs corresponding to the major areal divisions of the plate cylinder being preferably supplied with its individual lid 190. As embodied, each lid 190 is provided with a beveled nose 191, and a horizontal edge 192, fitting closely upon the horizontal seats 193 between the supply orifices 187. The lids 190 are held in position by suitable means, such as screw bolts 195 and 196. The reservoir block 75 is preferably reinforced at the major division points by ribs 200.

Various modifications of the control and ink regulating features hereinbefore described may be provided when the operating conditions are such as to require even more accurate regula-

tion than usual. Furthermore, it may sometimes be necessary or desirable to introduce additional controls into the system to take care of irregularities in the flow of the ink which may be generated by or are inherent in the system itself. Referring to Figs. 15 and 16, there are shown several mechanisms which may be introduced into the system; if desired, for effecting various refinements in the ink control as indicated.

Means may be provided for preliminary screening or filtering the ink before it passes into the system. As embodied, a filter screen 210 may be interposed in the main-line feed pipe 10 on the intake side of the pump 11. The screen 210 may be supported in any suitable manner, as shown being enclosed in a box-like structure 211 composed of riveted plates, the screen being set in the plates and bridged across the passage of the ink. The box may be suitably fastened to the press frame as by the screw 212.

In the operation of a hydraulic system such as that disclosed by the invention, comprising a number of factors which operate to affect the ink flow and pressure at different parts of the system, it is possible that minor disturbances or pressure variations, such as air bubbles, may occur, and these variations would seriously disturb the operation of the system in supplying a regular and even flow of ink to the cylinder by causing "dead spots" at certain times when no ink would be delivered to a given area and at other times the ink would spout with undue force from the delivery pipes.

Means are provided for automatically absorbing or damping these minor variations in pressure whereby the flow of the ink is at all times maintained smooth and regular. As embodied, a closed air chamber 213 is incorporated in the system, being preferably located in the main ink line beyond or at the outlet side of the pump and, as shown, communicating with the main line pipe 106 at the junction 105 and extending upwardly therefrom. The air chamber 213 operates in a well-known manner to absorb and smooth out pressure variations in the ink system, which may be engendered by the pump or other source. For instance, when there is a pressure slightly higher than the desired normal, the ink will rise in the air chamber and compress the air to a smaller volume, while a lower pressure will be compensated for by the expansion of the air in the chamber.

Another regulatory feature which may be incorporated in the system relates to the structure of the main supply pipe 109 and the branch pipes to the chambers 110 of the control box. As embodied, (Fig. 15) the down pipes 214 are formed of substantially smaller diameter than the main pipe 109 whereby the pressure in the four branch pipes 214 is maintained substantially constant and is not depleted to the extent that would occur if the down pipes were all of the same diameter as the header pipe 109.

In addition, the down pipes 214 may be provided with micrometer-adjusted valves for affecting a very nice regulation of the supply to the main chambers 110. As shown, the pipe 214 is formed in two lengths connected by a union 215 having therein a minutely regulable valve provided with an outwardly extending operating stem 216. The stem 216 has a large pinion 217 keyed thereto and in mesh with a small gear 218, the latter being supported in a suitable bracket 219 extending outwardly from

the chamber 110. Gear 218 is mounted on a shaft 220 having a knurled handle 221. An indicator comprising a marked circular plate 222 and a pointer 223 on the handle 221 may be provided for indicating the setting of the valve.

In Fig. 16 are shown a number of modifications and refinements in the mechanisms of the ink-control box 85. In order to obviate the possibility of undesirable eddy currents and non-circulation of ink in the chambers 110, these chambers may be formed as shown in Figs. 15 and 16, the rear and bottom walls being curved at 225 to form a short and substantially unidirectional course for the ink as it travels from the feed-pipe 112 into the conduit 116. The construction shown eliminates any dead spaces in the ink chamber so that there is no possibility for any of the ink to become stagnant and the solid particles to settle out. Cooperating with the curved wall 225 of the chamber 110 to facilitate the smooth and continuous flow of ink, the mouths of the conduits 116 may be enlarged or widened to form a flaring or bell-shaped orifice as shown at 226.

Referring to the valves 117 of the control box, as shown in Fig. 16, the valves may be provided with regulable openings which are rectangular in cross-section, whereby the cross-sectional change of opening effected by the movement of the valve stem 117 across the conduit will be linearly proportional to the movement of the valve. That is, for a given amount of valve-stem movement the change in cross-sectional area of the conduit will be a constant. This form of valve is better for certain purposes than the type having a circular cross-section, wherein the cross-sectional change is not constant. It will be understood that the rectangular valve shown is illustrative, but not restrictive of the invention, which may embrace any suitable type of valve for nicely regulating the ink flow in the conduits as desired.

In the structural embodiment shown, cylindrical bushings 227 are set in the block 115 and are adapted to receive the valve stems 117, set in staggered relation across the conduits 116 as hereinbefore described. The bushings 227 are provided with valve openings 228 which are rectangular in cross-section and adapted to cooperate with the rectangular valve channel 229 of the valve stem 117, it being understood that the valve stem is slidable but not rotatable in the bushing, being controlled in its movement by the screw-threaded members 128 hereinbefore described. The packing-box joints 120 and 121 are, in this construction, screw-threaded into bushing 227, which is provided with suitable enlarged openings at either end and for this purpose.

Referring to the individual ink-supply reservoirs which deliver the ink to the distributing cylinder 2, in Fig. 16 reservoir 230 is shown as relatively shallow compared to the form shown in Fig. 4, the bottom wall being sloped downwardly and rearwardly from the ink delivery mouth. The bottom 230 is formed as an integral portion of the reservoir block which is thereby provided with a longitudinally-extending, recessed portion having downwardly-extending rear and front flanges 231 and 232 and end-supporting walls 233. The ink conduits 185 project vertically upwardly to feed into the bottoms of the shallow reservoirs at 234. It will be apparent that the construction shown eliminates the maintenance of dead or inactive bodies of ink in the reservoir to the greatest extent possible and also

does away with the pressure-head set up by a large mass of inert ink in the deeper reservoirs. Furthermore, by virtue of the construction shown, the ink in the shallow reservoirs is practically immediately responsive to the slightest changes in the system controls.

Cooperating with the reservoir constructions shown in Figs. 4 and 16, a modified ink-discharge mechanism may be employed as desired, a preferred form being shown in Fig. 17, wherein the concaved lip 188 is provided with a plurality of individual discharge ducts 240 which are formed in the upwardly curved edge 241 of lip 188.

The ink feeding and control mechanism of the invention has been hereinbefore described as conducting ink directly to the distributing cylinder in the inking train of a rotary printing press. In Fig. 18 is shown an arrangement whereby the mechanism of the invention may be used with the inking train of either couple of a rotary perfecting unit without necessitating any change or rearrangement of the parts in the mechanism of the invention. As embodied, the perfecting unit comprises the two printing couples A and B, each having its separate inking train. The distributor cylinder C for the right-hand couple B is shown as having a clockwise direction of rotation, counter to that of the companion cylinder 2 for the couple A, in connection with which the operation of the invention has been described. In order that the concave lip 188 of the ink reservoirs may properly cooperate with the inking mechanism of the couple B and the ink control unit I still be located at the exterior of the press frame, an additional cylinder D may be interposed between cylinder C and lip 188. It will be noted that cylinder D rotates in a counter-clockwise direction and thereby cooperates to receive the ink from lip 188 of the reservoirs in the manner hereinbefore described in connection with cylinder 2.

The manner of operation of the mechanism will be clear from the foregoing description of the operation of each group of mechanism, but a brief résumé may be given as follows:

The ink is supplied under pressure through the pipe 10, and the supply thereof is primarily regulated in accordance with the speed of the press by means of the pump 11, which is positively driven from the ink distributing cylinder 2. An absolute or basic relation of the ink pressure and consequently of the ink supply to the press speed can be determined by the pressman through the setting 65, whereby the by-pass valve 62 will automatically keep the pressure below a predetermined limit, the predetermined limit itself being variable through the setting 65 while the press is running. Further regulation of the pressure when below the predetermined limit will be automatically effected by the speed of the press and by the air chamber 213.

Further regulation of the ink supply to conform to the varying inking requirements along the plate, dependent primarily upon the demands of the major areal divisions of the plate, as, for instance, whether full page half-tone plates, full page advertisements, or letter-press, can be effected by the individual settings of the various valves 113 or 215; while the varying inking requirements of the minor subdivisions of the inking plate, dependent upon the nature of the plate, as, for instance, whether columns in half-tone or other illustrational matter, or letter-press, can be satisfied by the individual settings of the various valves 118. Here also a common or basic

setting for all of the valves 118 may be primarily effected by the use of a gauge or marker between the heads of the screws 131 and the top of the valve plate 130. The individual setting of the screw rods to either slightly increase or decrease the supply will be a very simple matter within the skill and experience of the pressman.

Should further general regulation and control be desired, as, for instance, for a particular kind of paper run through the press, or any other reason or factor, this can be effected immediately and with the greatest degree of nicety and correctness through the knob 164.

From all the foregoing it will be understood that a mechanism has been provided constituting an exemplary embodiment of the invention, and realizing the objects and advantages herein set forth, together with other objects and advantages. It will be understood further that departures may be made from the exact mechanism as shown and described, within the scope of the accompanying claims, without departing from the principles of the invention and without sacrificing its chief advantages.

What we claim is:—

1. A printing press inking mechanism including in combination means for supplying ink at a pressure proportionate to the press speed and automatic means for absorbing pressure variations in the ink supply.

2. A printing press inking mechanism including in combination means for supplying ink at a pressure proportionate to the press speed and regulable automatic means for preventing the maintenance of a pressure in excess of a predetermined amount.

3. A printing press inking mechanism including in combination a pump driven by the printing press for supplying ink under pressure and a yieldingly mounted by-pass valve for automatically regulating the pressure at which the ink is supplied.

4. A printing press inking mechanism including in combination an inking cylinder, a pump controlled by the press speed for supplying ink under pressure to the cylinder, a by-pass valve associated with the pump for regulating the pressure created, and an air chamber for maintaining the pressure regular.

5. A printing press inking mechanism including in combination an inking cylinder, a pump driven by the inking cylinder for supplying ink under pressure to the cylinder, and a by-pass valve associated with the pump for regulating the pressure created.

6. A printing press inking mechanism including in combination an inking cylinder, a pump driven by the inking cylinder for supplying ink under pressure to the cylinder, and a spring mounted by-pass valve associated with the pump for automatically relieving the pressure when it exceeds a predetermined limit.

7. A printing press inking mechanism including in combination an ink-distributing cylinder, a device for supplying ink thereto, said device being divided into a plurality of major compartments longitudinally of the cylinder, each major compartment being subdivided into a plurality of minor compartments longitudinally of the cylinder, means for independently regulating the supply of ink to the various major compartments and individual means for independently regulating the supply of ink to each minor compartment.

8. A printing press inking mechanism including in combination an ink-distributing cylinder,

- a device for supplying ink thereto, said device being divided into a plurality of major compartments longitudinally of the cylinder, each major compartment being subdivided into a plurality of minor compartments longitudinally of the cylinder, means for independently regulating the supply of ink to the various major compartments, and common, independently operating means for regulating the supply of ink to all the minor compartments.
9. A printing press inking mechanism including in combination an ink-distributing cylinder, a device for supplying ink thereto, said device being divided into a plurality of major compartments longitudinally of the cylinder, each major compartment being subdivided into a plurality of minor compartments longitudinally of the cylinder, individual means for independently regulating the supply of ink to each minor compartment, and common independently operating means for regulating the supply of ink to all the minor compartments.
10. A printing press inking mechanism including in combination an ink-distributing cylinder, a device for supplying ink thereto, said device being divided into a plurality of major compartments longitudinally of the cylinder, each major compartment being subdivided into a plurality of minor compartments longitudinally of the cylinder, means for independently regulating the supply of ink to the various major compartments, individual means for independently regulating the supply of ink to each minor compartment, and common independently operating means for regulating the supply of ink to all the minor compartments.
11. A printing press inking mechanism including in combination an ink-distributing cylinder, means controlled by the press speed for supplying ink to the cylinder under pressure, means independent of the press speed for regulating the pressure, means for independently controlling the ink supply to major areal divisions of the cylinder, and means for further controlling the ink supply areally along the cylinder.
12. A printing press inking mechanism including in combination an ink-distributing cylinder, means controlled by the press speed for supplying ink to the cylinder under pressure, means for independently controlling the ink supply to major areal divisions of the cylinder, and means for further controlling the ink supply areally along the cylinder.
13. A printing press inking mechanism including in combination an ink-distributing cylinder, means controlled by the press speed for supplying ink to the cylinder under pressure, means independent of the press speed for regulating the pressure, means for independently controlling the ink supply to major areal divisions of the cylinder, and means for further controlling the ink supply to minor areal subdivisions of the cylinder.
14. The method of controlling the ink for a printing press which comprises supplying ink under pressure proportionate to the press speed, distributing the ink according to the requirements of the major areal divisions of the plate cylinder and independently controlling the supply to minor areal sub-divisions of the plate cylinder.
15. The method of controlling the ink for a printing press which comprises supplying ink under pressure proportionate to the press speed, distributing the ink according to the requirements of the major areal divisions of the plate cylinder and independently controlling the supply to minor areal subdivisions of the plate cylinder and further regulating the entire supply according to an arbitrarily predetermined standard.
- EDMOND BOISSEAU.
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