April 27, 1954 A. P. BAMFORD 2,676,538

CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 1

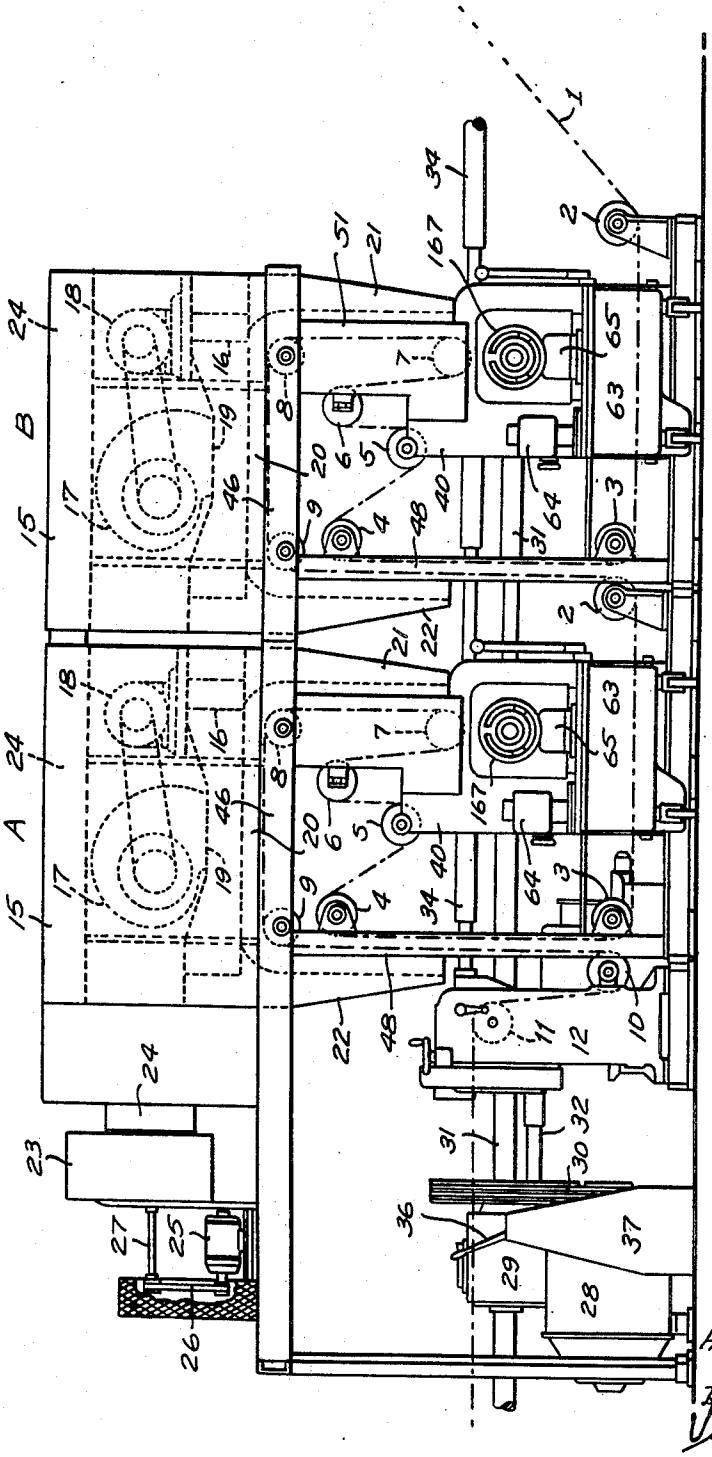


Fig. 1.

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CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 2

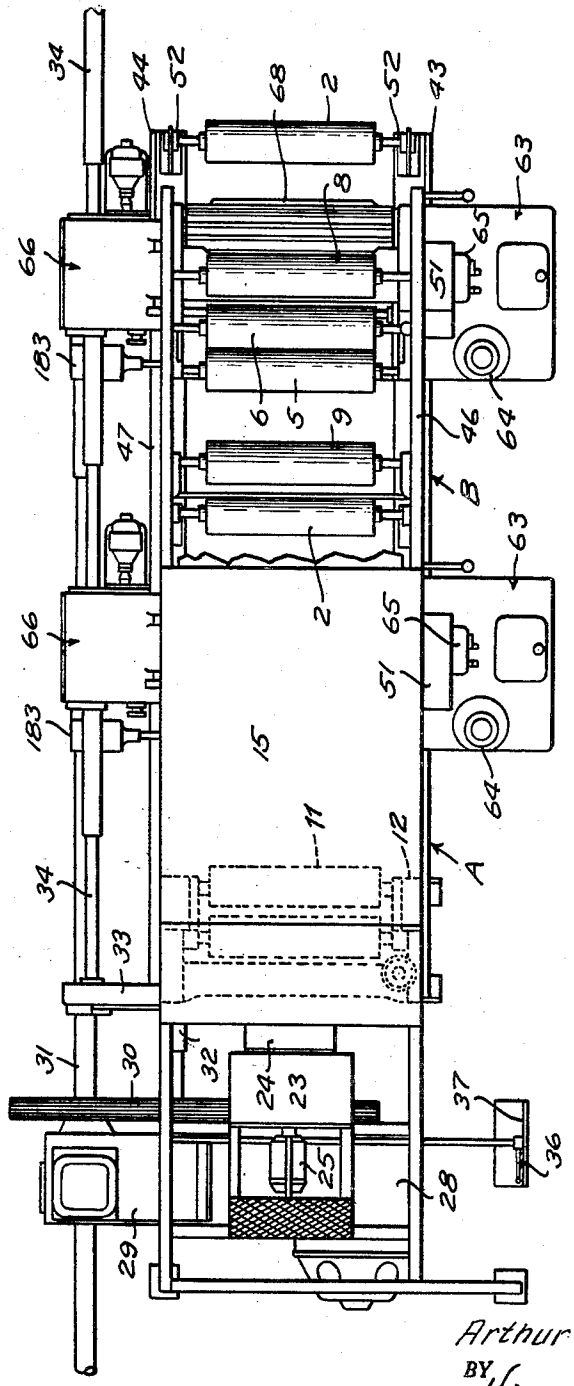



Fig. 2.

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CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 3

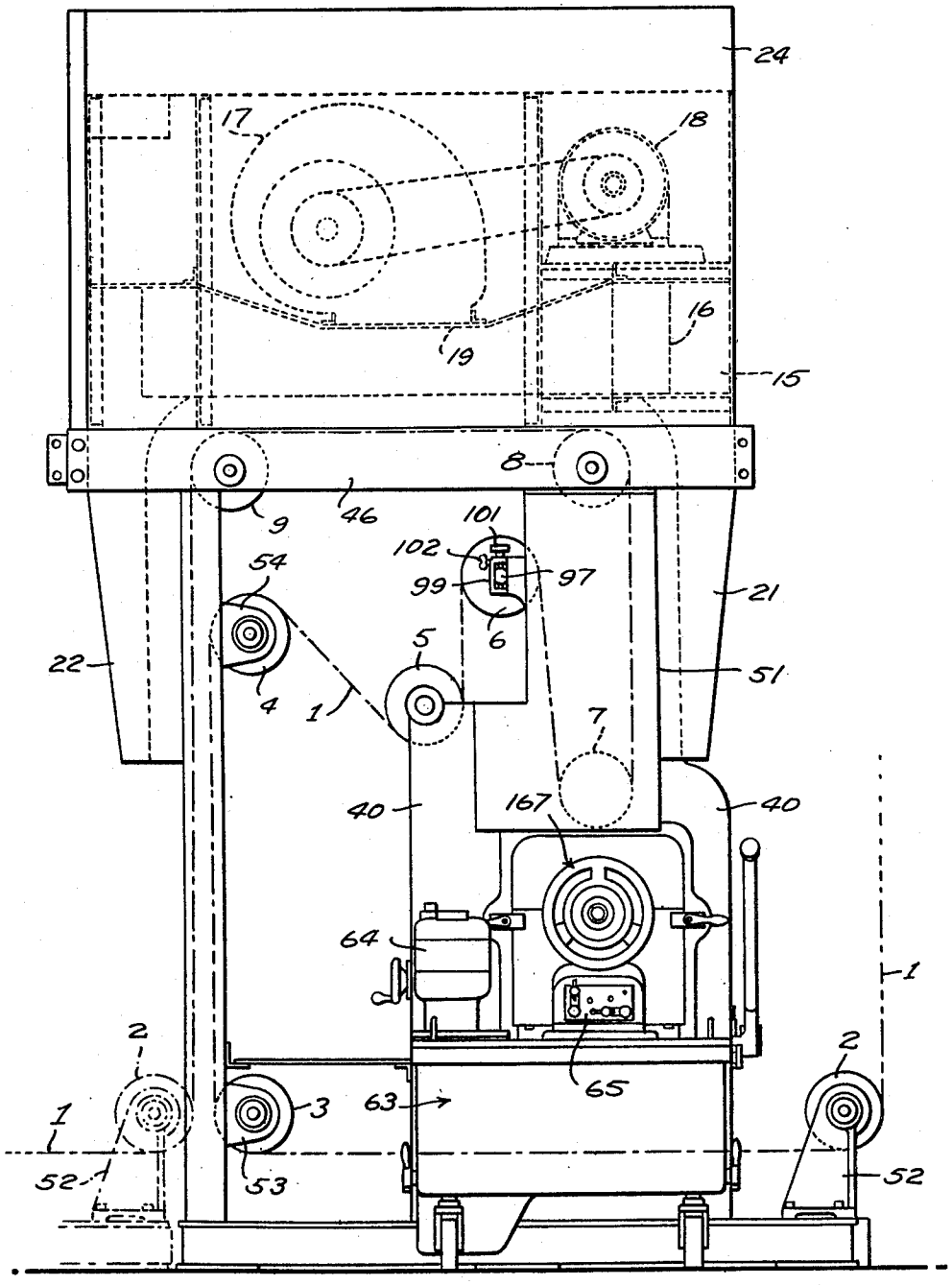



Fig. 3.

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April 27, 1954 A. P. BAMFORD 2,676,538

CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 4

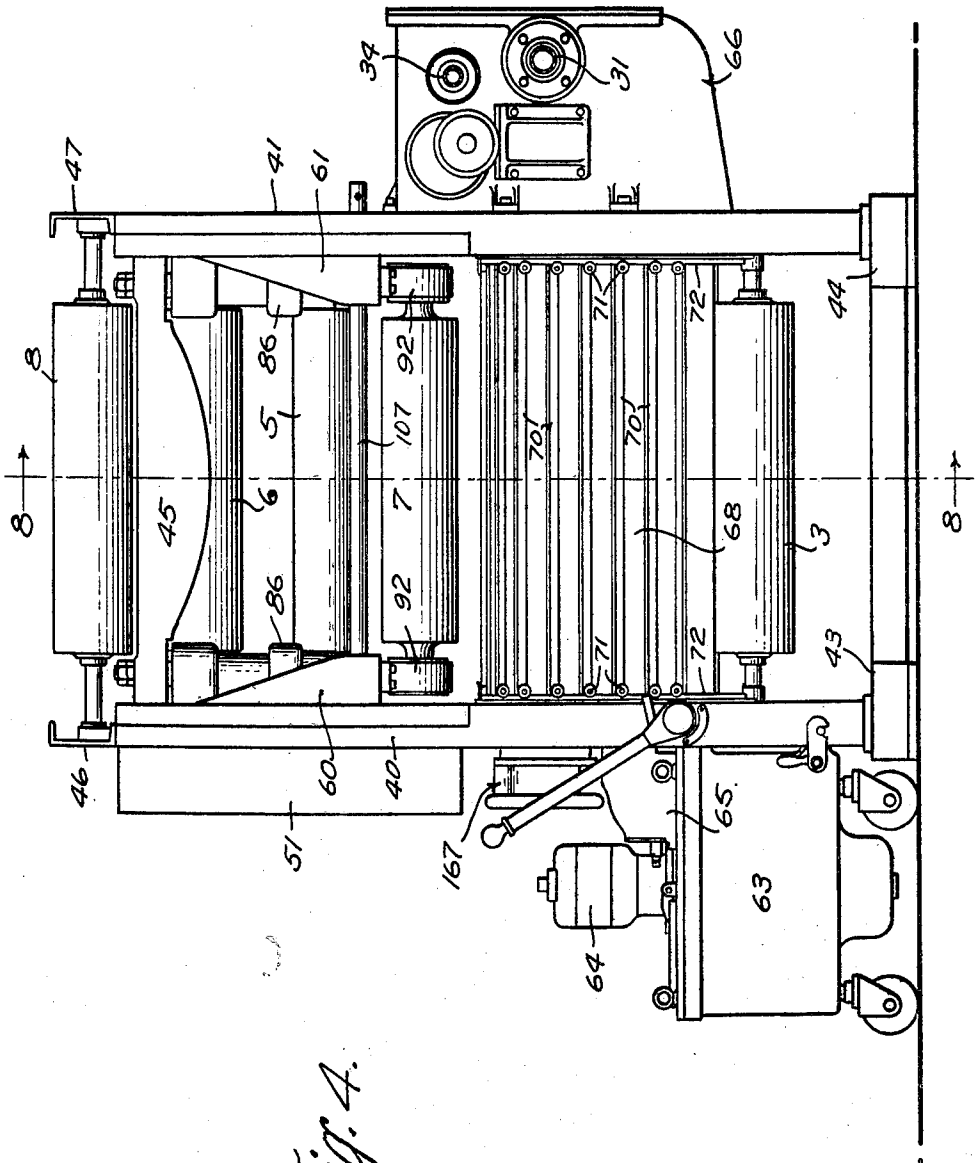



Fig. 4.

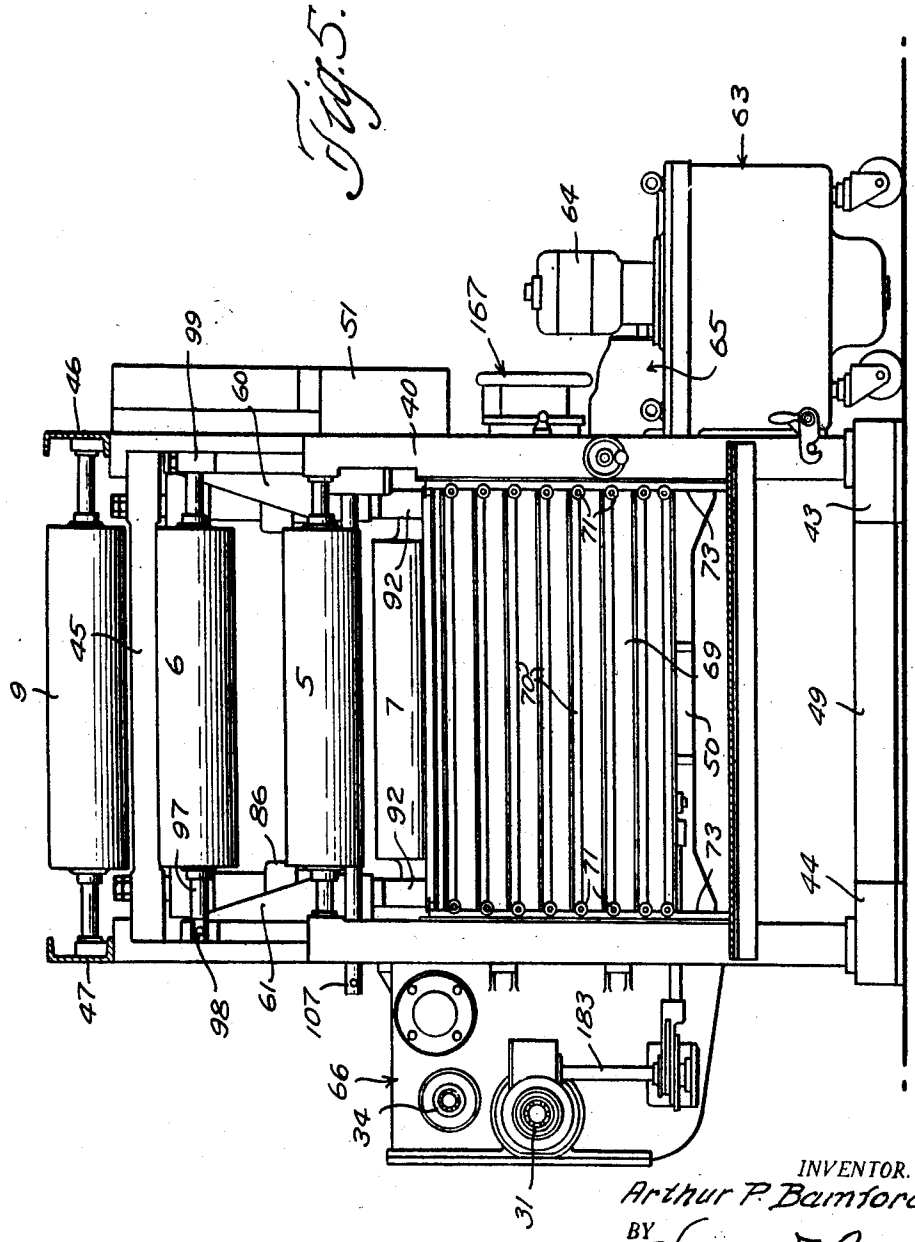
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April 27, 1954 A. P. BAMFORD 2,676,538

CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 5

Fig. 5.




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CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 6

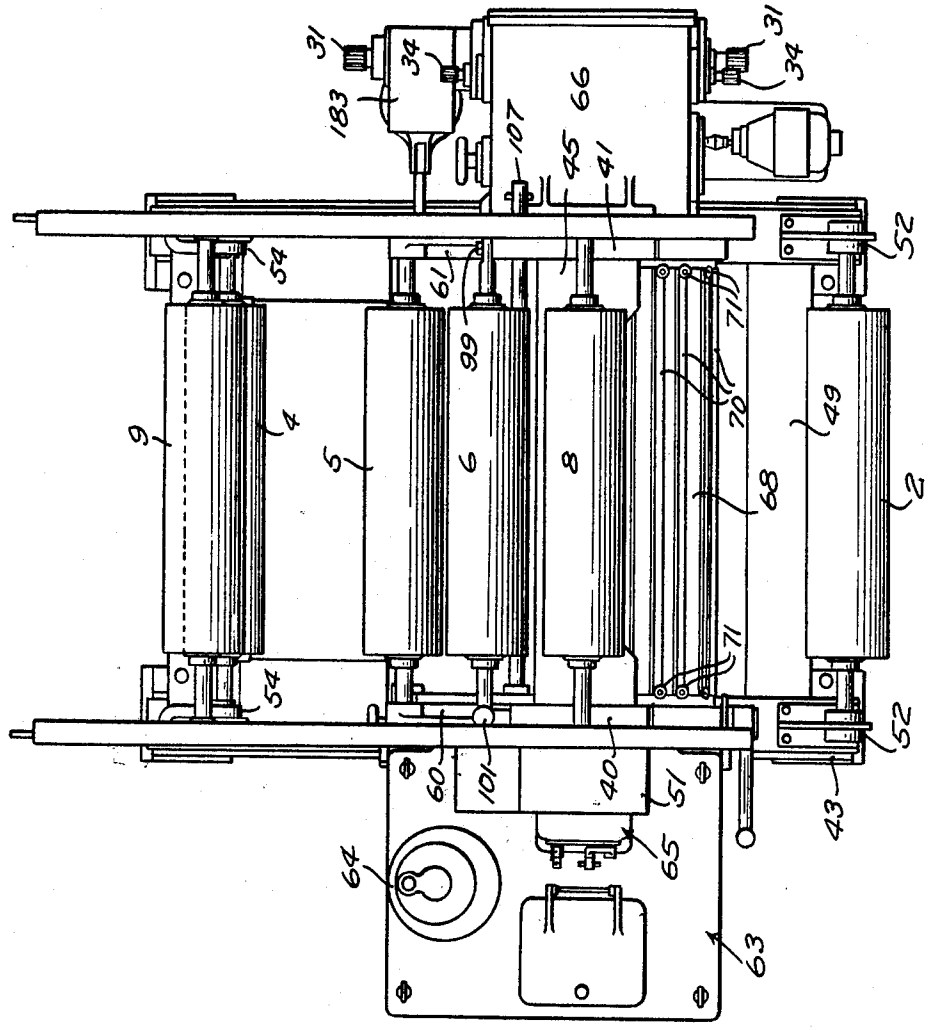



Fig. 6.

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CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 7

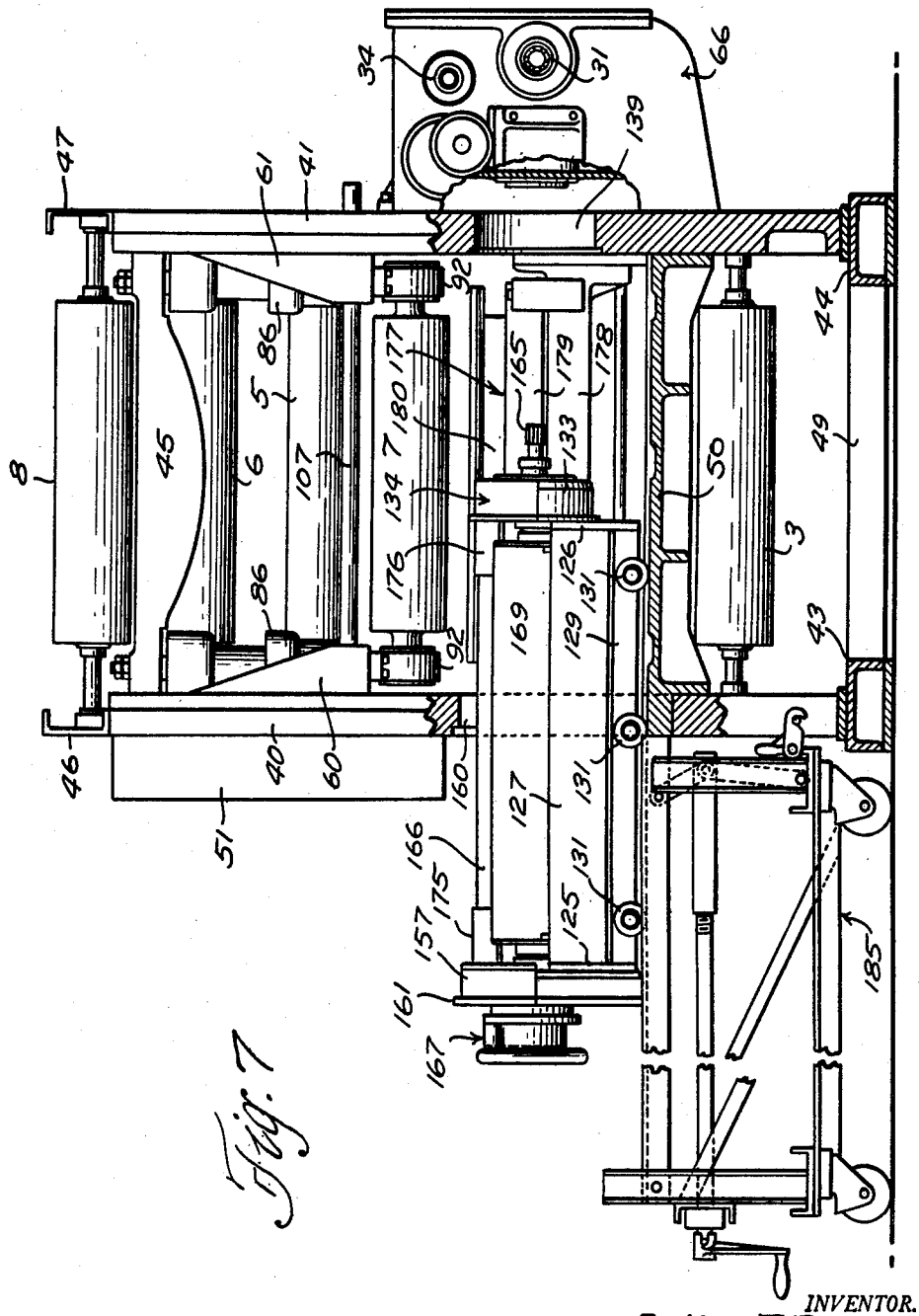



Fig. 7

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CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 8

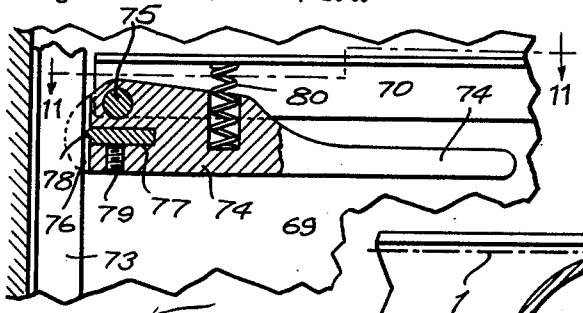



Fig. 10.

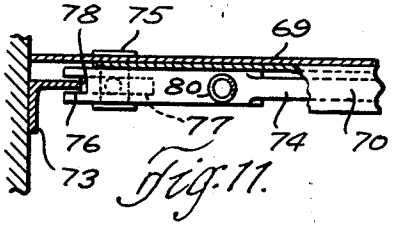



Fig. 11.



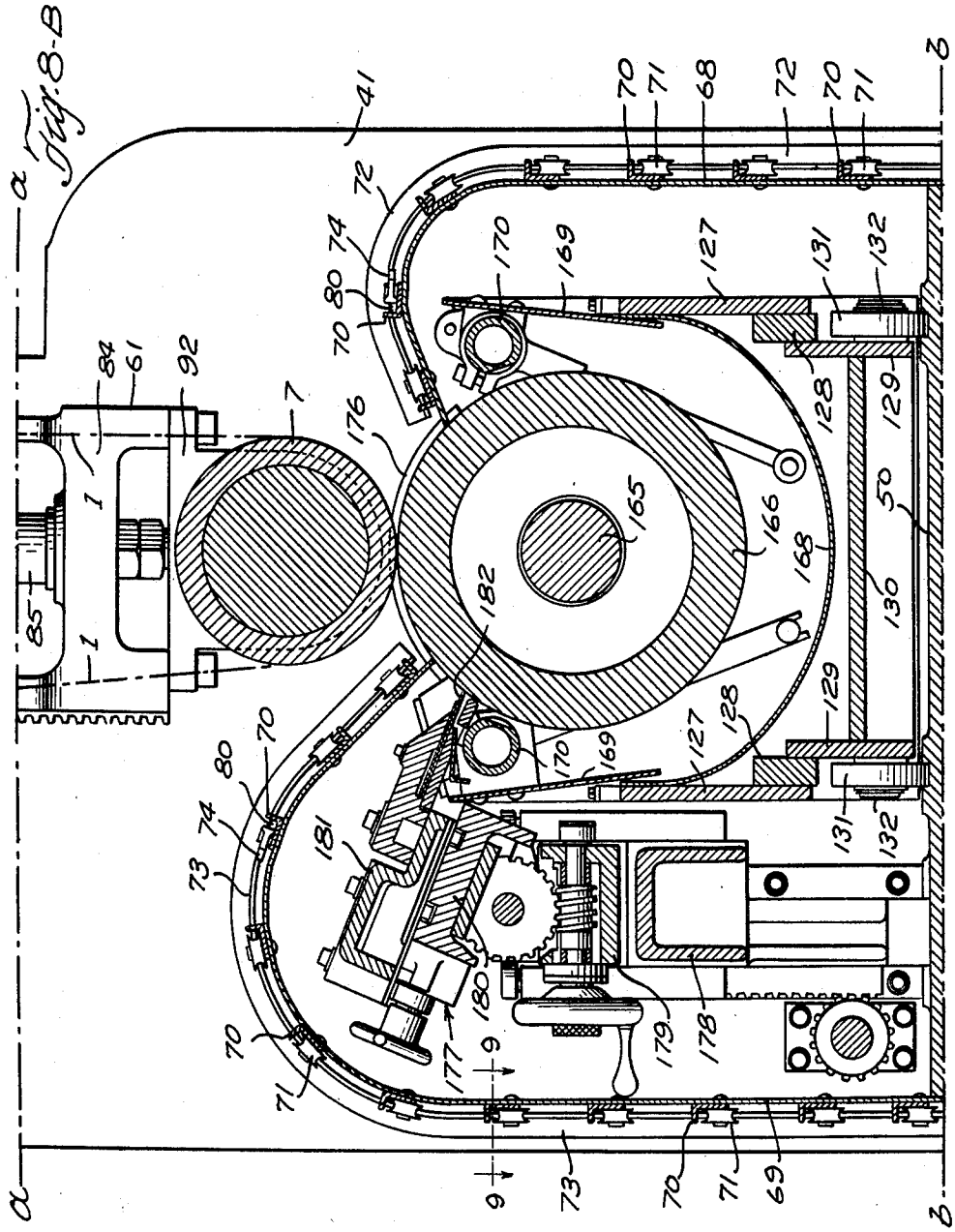

Fig. 8-A.

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CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 9



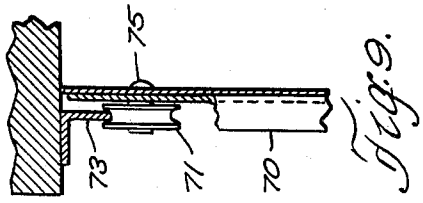




Fig. 9.

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CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 10

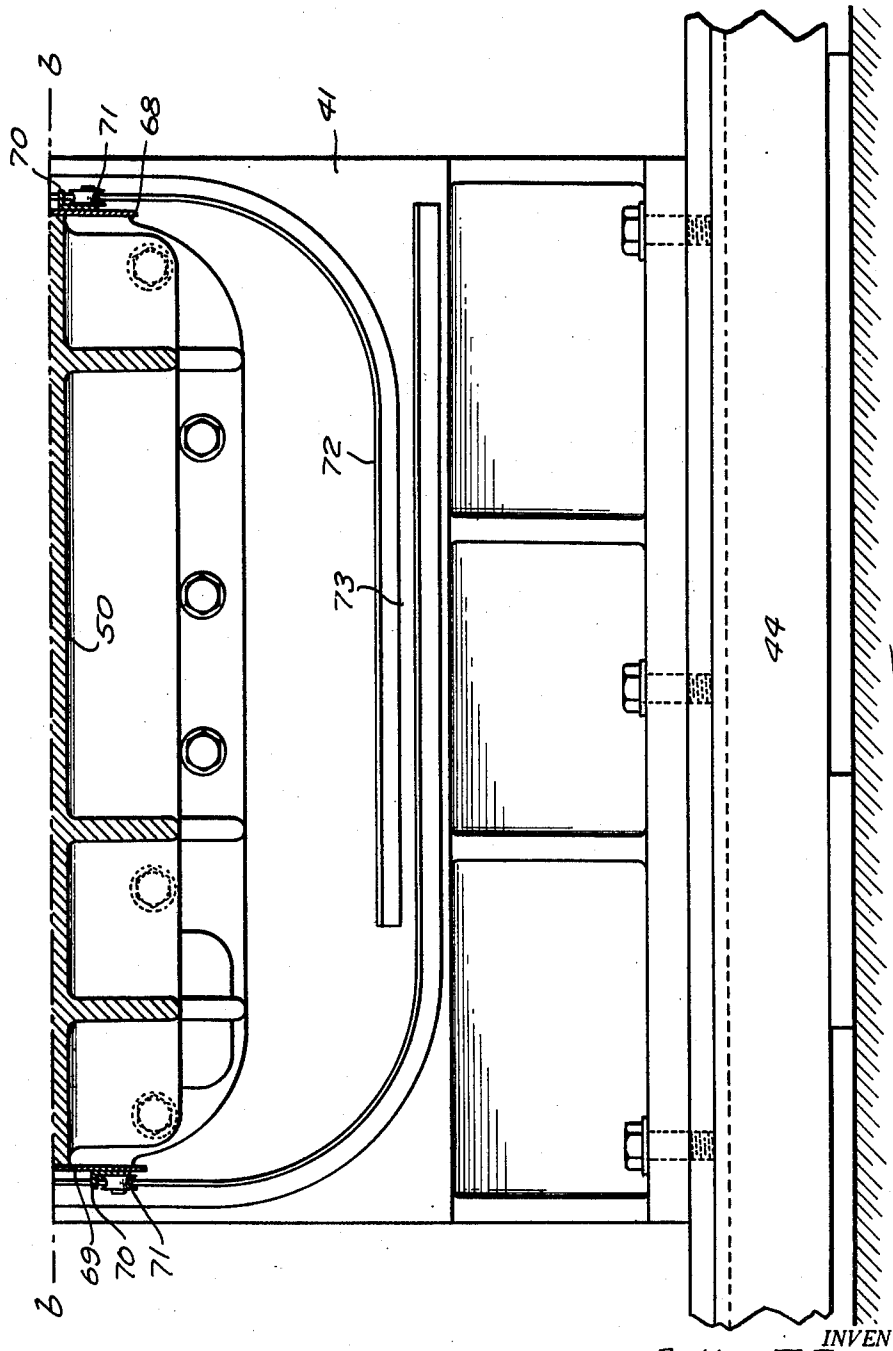



Fig. 8-C

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CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 11

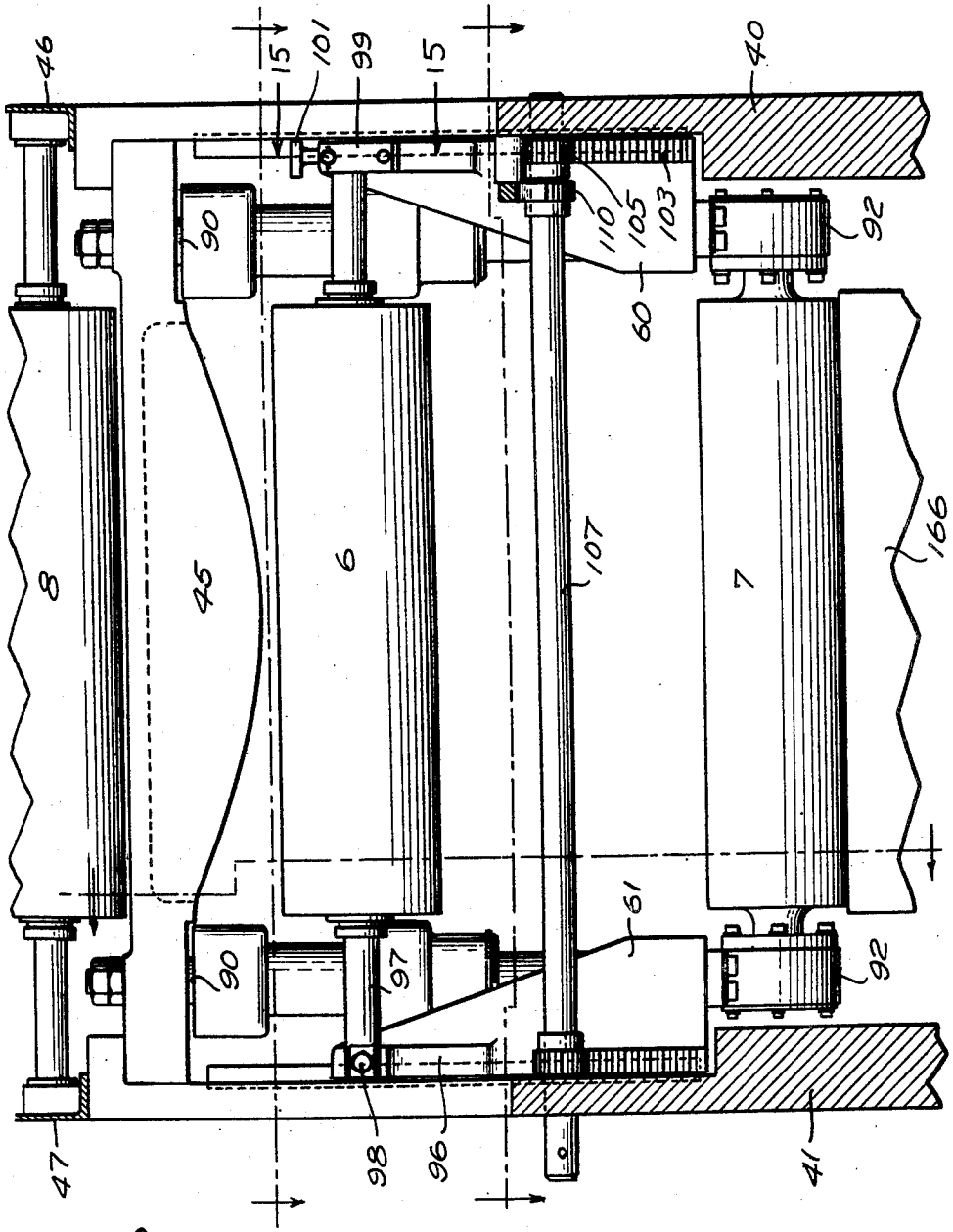



Fig. 12

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CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Original Filed June 23, 1949 12 Sheets-Sheet 12

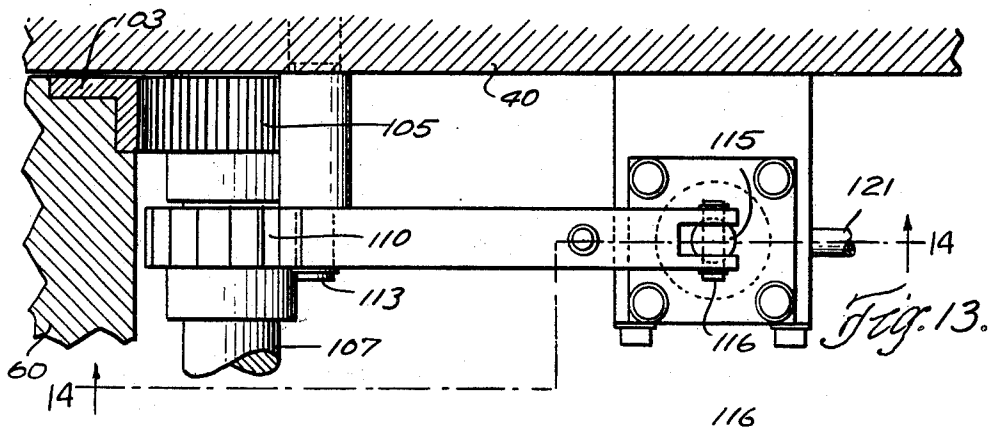



Fig. 13.

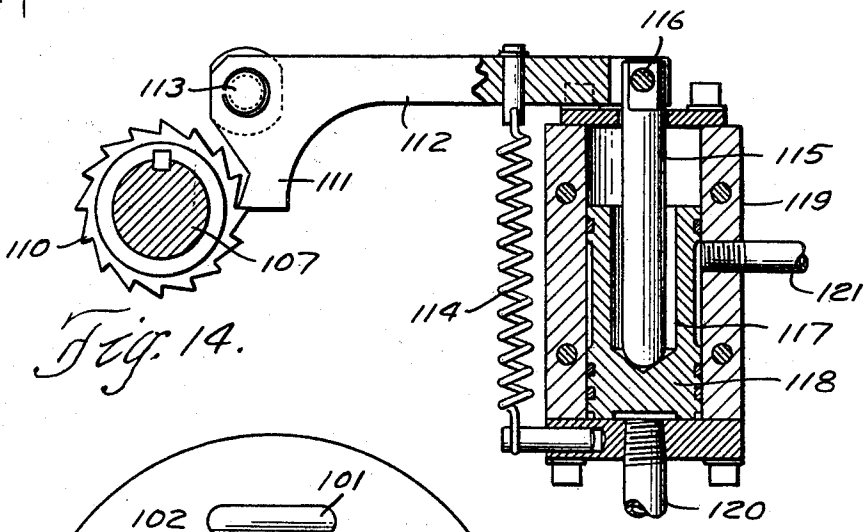



Fig. 14.

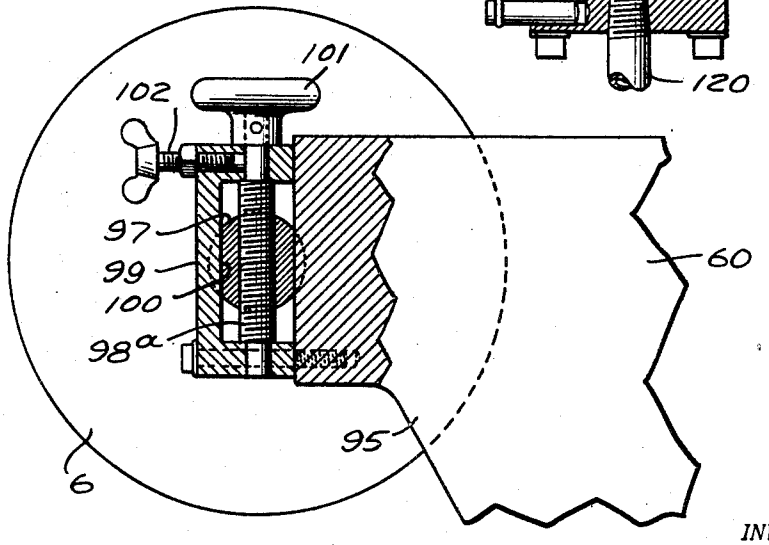



Fig. 15.

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Patented Apr. 27, 1954

2,676,538

# UNITED STATES PATENT OFFICE

2,676,538

## CLOSED CYLINDER HOUSING FOR INTAGLIO PRINTING PRESSES

Arthur P. Bamford, East Orange, N. J., assignor, by mesne assignments, to E. G. Staude Manufacturing Company, Inc., Concord, N. H., a corporation of New Hampshire

Original application June 23, 1949, Serial No. 100,890. Divided and this application July 5, 1951, Serial No. 235,301

15 Claims. (Cl. 101—153)

1

This invention relates generally to intaglio printing presses and this application is a division of my co-pending application Serial No. 100,890, filed June 23, 1949, and issued May 5, 1953, as Patent No. 2,637,270. More specifically the invention relates to an improved housing by which various parts of an intaglio printing press are enclosed during operation.

As disclosed herein the invention is shown as applied to a multicolor intaglio printing press consisting of two identical units each of which is adapted to print a different color on a web being fed through the press. Each unit comprises a printing cylinder, an inking mechanism by which ink is sprayed onto the printing cylinder, a doctor blade mechanism by which the ink is spread over the printing cylinder, an adjustable pressure roll by which the web is held against the printing cylinder during printing and a drying and exhaust mechanism for drying the ink on the web after printing.

The printing cylinder is mounted on a carriage which is supported by wheels riding on a track which facilitate the removal thereof from the machine. The carriage includes bearing blocks which are insertable in the frame of the machine and support the weight of the printing cylinder when the carriage is in printing position. A hand ratchet mechanism is provided which may be used to ratchet the carriage into or withdraw the carriage from its printing position. When the carriage is withdrawn sufficiently to remove the bearing blocks from the frame it rests on its rollers and may readily be moved out of the press.

The carriage also carries ink applicator tubes which are disposed on opposite sides of the printing cylinder and are independently adjustable to accommodate cylinders of different diameters. An ink reservoir is mounted on separate casters and is positionable to supply ink to the applicator tubes through the coupling members which are automatically separated when the reservoir is removed. The reservoir carries an ink feed pump and adjusting valves for controlling the supply of ink to the respective tubes.

The carriage also carries an end register control mechanism which provides for accurate adjustment of the axial position of the printing cylinder and is controlled by a manually operable hand wheel which is accessible from the front of the machine. The printing cylinder is driven from a main drive shaft which runs along the back of the machine and drives all of the

2

units. The connection to the main drive shaft is made through suitable running register control mechanism in the form of planetary gearing which provides an accurate control of the running register of the cylinder.

The doctor blade is slidably supported on and extends between the front and rear frames of the machine and is provided with manual means for vertically adjusting the same, with automatic reciprocating means driven by the main drive shaft for reciprocating the doctor blade, with a tilting control for varying the angular position of the doctor blade on the carriage, with adjusting means for shifting the doctor blade to or from the printing cylinder so as to position the same accurately in contact with the surface of said cylinder, and with means for adjusting the position of the blade in the holder. Means is also provided for allowing the blade to be retracted from the cylinder and to be again brought into operative position without disturbing the previous adjustments.

The pressure roll is designed to hold the web in engagement with the printing cylinder during the printing operation and is mounted to be advanced or retracted as desired without altering the web tension and without changing the web feed to or from the unit.

The drying mechanism includes a drying chamber through which the printed web passes and which is mounted on the top of the press frame with downwardly extending portions at the two sides of the frame forming a hood. The drying chamber includes suitable heating elements and a blower for blowing air against the printed web. A suction fan is also provided for removing the vapor laden air from the web and discharging the same in a suitable location.

The printing cylinder except the small printing area thereof under the pressure roll, the inking mechanism and the doctor blade mechanism are all enclosed during operation by a housing which constitutes the subject matter of this application. The housing is so constructed and arranged that it can be quickly and easily opened up to provide access to the various mechanisms adapted to be enclosed thereby. When closed the housing provides a substantially air tight chamber for confining the inflammable vapors created by the highly volatile inks used today in high speed intaglio printing presses.

The principal object of the invention is to provide in an intaglio printing press improved means for enclosing the entire inking mechanism thereof during operation.

Another object of the invention is to provide enclosure means of this character which is of simple construction, is efficient in operation and which can be quickly and easily opened up to provide access to the various mechanisms adapted to be enclosed thereby.

Other and more limited objects of the invention will be apparent from the following specification and the accompanying drawings forming a part thereof wherein:

Fig. 1 is a front elevation of a multicolor intaglio press embodying the present invention, showing two of the color units and the drive mechanism;

Fig. 2 is a top plan view of the units shown in Fig. 1 with the heating and drying mechanism of one of the units broken away;

Fig. 3 is a front elevation of a single unit taken on a larger scale;

Fig. 4 is a side elevation of a unit taken from the right side of Fig. 3;

Fig. 5 is a side elevation of a unit taken from the left side of Fig. 3;

Fig. 6 is a top plan view of the unit of Fig. 3 with the heating and drying unit removed;

Fig. 7 is a side elevation, similar to Fig. 4, partially in section and showing the printing cylinder carriage partially removed from the press onto the dolly by which it is transported to and from the press;

Figs. 8*a*, 8*b* and 8*c*, when joined along the lines *a*—*a* and *b*—*b*, respectively, constitute a central vertical section through the machine taken on the line 8—8 of Fig. 4 but on a larger scale;

Fig. 9 is a detail section taken on the line 9—9 of Fig. 8*b*;

Fig. 10 is a detail view partly in section showing the latching mechanism for the slidable side closures by which the inking mechanism is closed when in operation;

Fig. 11 is a horizontal section taken on the line 11—11 of Fig. 10;

Fig. 12 is a vertical section showing the web tensioning mechanism;

Fig. 13 is a detail view of the latching mechanism for latching the pressure roll in up position;

Fig. 14 is a vertical section taken on the line 14—14 of Fig. 13, and

Fig. 15 is a detail section view taken on the line 15—15 of Fig. 12 but on an enlarged scale.

Referring to Figs. 1 and 2, the invention is shown as applied to an intaglio printing press composed of two units A and B, each of which is adapted to print one color onto a web. Each unit includes a printing cylinder together with inking and control mechanism, a doctor blade mechanism, a web-guiding mechanism and a drying chamber. A single driving means is provided for all of the units which includes power means and drive shafts which extend in back of all of the units.

Referring to the figures more in detail, a web 1 is shown as fed to the unit B over guide rollers 2, 3, 4, 5 and 6 to a pressure roll 7, thence through a drying chamber and over guide rollers 8 and 9 and around the guide roll 2 of the unit A, thence over the correspondingly numbered rolls of the unit A from which it is discharged over a guide roll 10 similar to the roll 2, thence over a roll 11 in a pulling mechanism 12, whence it is discharged to suitable cutting or stacking mechanism or to a reeling mechanism as desired.

Each drying chamber 15 which is disposed over the top of the printing unit comprises a heating source 16 which may comprise a steam heating unit and blower mechanism comprising a fan 17 driven by a motor 18 and discharging air through a port 19 into a zone 20 in which the air is applied to the top of the web passing through the chamber 15. The zone 20 also communicates wtih chambers 21 and 22 which are disposed on the sides of the machine to apply air from the blower 17 to the webs as they advance toward and recede from the drying chamber 15. The air from the web 1, containing the vapors which are picked up thereby, is removed from the chambers 21 and 22 and from the zone 20 by means of a suction fan 23 communicating with a duct 24 which extends through and communicates with each of the drying chambers 15. The vapor-laden air from the exhaust fan 23 may be discharged to the outside or to a ventilator as desired. The exhaust fan 23 is driven by means of a motor 25 through a driving belt 26 which in turn drives a shaft 27 on which the exhaust fan is mounted.

The various units are driven by means shown as a main drive motor 28 driving a reduction gear train in a housing 29 through a multiple V-belt 30. The reduction gear in the housing 29 drives the main drive shaft 31 and a secondary drive shaft 32. The main drive shaft 31 extends along the rear of the various units and serves to drive the various printing rolls through means to be described. The secondary drive shaft 32 drives a reduction gearing mounted in a housing 33 which in turn drives a secondary drive shaft 34 which extends along the rear of the units and drives the paper feed mechanism (not shown). The gear reduction mechanism in the housing 29 includes a clutch of any standard type which is actuated by a clutch lever 36 supported in suitable brackets on a pedestal 37. The lever 36 is adapted to control the operation of the main drive shaft 31 and the secondary drive shaft 34 and is mounted in a position readily accessible to the operator.

Figs. 3 to 6 illustrate the general arrangement of each unit. Referring to these figures, each unit comprises a front frame 40 and a rear frame 41 on which the various elements, including the printing cylinder, are mounted. The frames 40 and 41 are secured on longitudinal channel members 43 and 44, respectively, and are tied together at their tops by cross beams 45. A top frame, comprising front and rear members 46 and 47 which are secured at one end to the top of the front and rear frames 40 and 41 and are supported at their other ends by uprights 48 which are also secured to the longitudinal channel members 43 and 44, is provided. The channel members 43 and 44 are tied together by spaced cross members 49 to provide a rigid unit.

A platform 50 secured between the front and rear frames 40 and 41 supports the printing cylinder carriage 55, to be described. The hydraulic control mechanism for the press is mounted in a casing 51 attached to the front frame piece 40.

The roll 2 is mounted on suitable brackets 52 carried by the channel members 43 and 44. The rolls 3 and 4 are supported by the brackets 53 and 54 on the uprights 48. The rolls 8 and 9 are rotatably supported between the longitudinal members 46 and 47. The roll 5 is supported, in suitable bearings, between frames 40 and 41. Guide roll 6 and pressure roll 7 are mounted on suitable slides 60 and 61 which are supported on the front and back frames 40 and 41, respectively, for vertical sliding movement, so that the

rolls 6 and 7 are raised or lowered in unison to bring the pressure roll 7 into printing position or to retract the same from the printing cylinder. An ink reservoir generally indicated by the numeral 63 is detachably connected to the front frame 40. The reservoir 63 carries a suitable pump mechanism which is driven by a motor 64. The reservoir also carries a valve housing and connecting means, generally indicated at 65, by which ink is supplied to and removed from the inking mechanism.

The running register 66 through which the printing cylinder is driven from the main drive shaft 31, is mounted in a suitable casing which is attached to the rear frame 41. The secondary drive shaft 34 extends through this casing but is not connected to any of the mechanism therein. Flexible cover plates 68 and 69, shown in Figs. 4, 5, 8*b* and 8*c*, respectively, are slidably mounted between the front and rear frames 40 and 41 and are adapted to form side closures for the printing cylinder, inking mechanism and doctor blade mechanism. These flexible plates are mounted for sliding movement to afford access to the printing cylinder and associated mechanisms.

Referring to Figs. 8*b* and 8*c*, each of the flexible plates 68 and 69 is provided with a plurality of angle irons 70 which extend thereacross at spaced points. Rollers 71 are carried at each end of each of the angle irons 70. The rollers 71 which are carried with the plates 68 ride on tracks 72 which are attached to the front and back frames 40 and 41. The rollers 71 associated with the plate 69 ride on tracks 73 which are also carried by the front and back frames 40 and 41. The lower ends of the track 73 are turned inwardly under the inturned lower ends of the track 72 to provide sufficient space to receive the cover plates when they are in fully opened position.

One of the angle irons 70 of each of the cover plates 68 and 69 carries at each end thereof a clamping means comprising an arm 74 pivoted to the angle iron 70 at 75 and having a bifurcated end 76 which spans the track 72 or 73. Adjacent the bifurcated end 76 a hardened insert 77 is provided having a sharp edge 78 and secured by a set screw 79. The insert 77 is located in a position to grip the track 72 or 73 and is normally held in gripping position by means of a spring 80. The levers 74 are so positioned that they allow the cover plates 68 and 69 to be raised into closed position but automatically grip the tracks 72 and 73 to prevent the cover plates from sliding to open position. However, the cover plate is freely slidable to open position when the two levers are grasped and the free ends thereof rocked toward the supporting angle iron for retracting the sharp edges 78 of the inserts 77 from the track 72 or 73. The plates 68 and 69 have sufficient flexibility to follow the curvature of the track as the plates are raised or lowered.

The pressure roll slides 60 and 61 which are mounted for vertical sliding movement on suitable gibs bolted or otherwise secured to the front and rear frames 40 and 41, are provided with transverse webs 84 which are secured to piston rods 85 projecting from cylinders 86, the details of which may be of standard construction and are preferably arranged for the raising or lowering of the piston rods by the application of fluid pressure above or below the piston inlet and outlet ports 87 and 88, respectively. The cylinders 86 are attached by bolts 90 to the cross piece 45 of the frame.



At its lower end each of the slides 60 and 61 carries a bearing 92 which rotatably supports the pressure roll 7. The slides 60 and 61 also carry brackets 95 and 96, respectively, for supporting a shaft 97 on which the roll 6 is rotatably mounted. One end of the shaft 97 is pivotally supported on the bracket 96 by means of a pin 98. The other end of the shaft 97 is adjustably supported by the bracket 95 by means of a threaded shaft 98*a* journalled in a bracket 99 attached to the bracket 95 and extending through a threaded hole 100 near one end of the shaft 97. A handle 101 is provided for rotating the shaft 98*a* and a set screw 102 is provided for securing the threaded shaft 98*a* in adjusted position. The arrangement is such that actuation of the handle 101 varies the angularity of the shaft 97 and of the roll 6 for controlling the feed of the web.

In order to cause the slides 60 and 61 to operate in unison and thereby prevent any binding, the slides 60 and 61 are provided with racks 103 and 104, respectively, at their lower ends meshing with gears 105 and 106 which are carried on opposite ends of a shaft 107 journalled in the front and rear frames 40 and 41, respectively. The shaft 107 and the meshing gear teeth cause the slides 60 and 61 to operate in unison. However, in order to provide a certain clearance to permit the pressure roll 7 to adjust itself to the position of the printing cylinder when the pressure roll is in its lower position, the teeth at the upper portions of the respective racks 103 and 104 are made with more than normal clearance.

In order to provide a mechanical latch to prevent the slides 60 and 61 from drifting downwardly due to loss of hydraulic pressure when in raised position, a ratchet 110 is secured to the shaft 107 adjacent the gear 105 and is engaged by a pawl 111 carried by an arm 112 pivoted to the frame 40 of the machine at 113 and normally held in engagement with the ratchet by a spring 114. The arm 112 may be raised by a pin 115 which is pivoted to the end of the arm 112 at 116 and rests in a cup 117 formed in a piston 118 which is slidably mounted in a cylinder 119. Hydraulic pressure is supplied to the lower end of the piston 118 by means of a duct 120 which is also connected to the line leading to the port 88 so that pressure is applied beneath the piston 118 whenever pressure is applied above the pistons in the cylinders 86 for lowering the slides 60 and 61. In the absence of pressure in the lines leading to the ports 88 and in the line 120 the spring 114 causes the pawl 111 to engage the ratchet 110 and thereby prevent rotation of the shaft 107 in the direction to lower the slides 60 and 61. Whenever pressure is applied to the cylinders 86 for lowering the slides, however, pressure is also applied to the cylinder 119 for releasing the pawl 111. A vent 121 may be provided in the wall of the cylinder 119 to drain any fluid which may leak past the piston 118 from the pressure chamber therebelow.

The printing cylinder is mounted in a carriage 55 which comprises a front plate 125 and a back plate 126 joined by side plates 127. Spacer bars 128 are attached on the inside of the side plates 127 with their lower ends extending slightly below the bottoms of the side plates. The spacer bars 128 carry lower side plates 129 which extend nearly to the bottom of the end plates and are joined by a bottom plate 130. A plurality of

wheels 131 are attached to the lower side plates 129 by means of studs 132. In the form shown three wheels 131 are spaced along each side of the carriage.

The back plate 126 is bolted to the lower half 133 of a split bearing block 134. The outer peripheral surface of the bearing block 134 is cylindrical and seats in a cylindrical surface 139 in the rear frame 41. The bearing block 134 is slidable axially with the carriage 55 into the rear frame 41.

The other end plate 125 of the carriage is bolted to the lower half 156 of a rectangular bearing block 157. The bearing block 157 is slidably mounted in a rectangular opening 166 in the front frame 40 and is provided with flanges 162 and 161 by which it is positioned in the frame. The front plate 125 is provided with a rectangular ink return opening registering with an opening in the bearing block 157. The sides and bottom of the bearing block 157 may be tapered slightly to facilitate its insertion into the rectangular opening 166 in the front frame 40.

The bearing blocks 134 and 157 carry antifriction bearings in which the printing cylinder shaft 165, on which the printing cylinder 166 is removably secured, is mounted. The shaft 165 is driven from the main drive shaft 31 through the running register mechanism 66. An end register mechanism 167 secured to the bearing block 157 is provided to adjust accurately the position of the printing cylinder 166 between the bearing blocks 134 and 157.

The carriage 55 also carries an ink sump which consists of a bottom pan 168 and vertically adjustable side plates 169. The side plates 169 carry ink applicator tubes 170 which extend parallel to and the full length of the printing cylinder 166. Ink is pumped from the reservoir 63 through the connector 65 and into the applicator tubes 170 which spray the ink over the surface of the printing cylinder 166 as it rotates. The excess ink falls into the sump pan 168 and drains back into the reservoir 63 through the ink return openings in the plate 126 and bearing block 157 and the connector 65.

In order to close the space between the ends of the printing cylinder and the front and back frames 40 and 41, arcuate shields 175 and 176 are provided which are bolted, respectively, to bearing blocks 157 and 134. The shields 176 and 175 are provided with arcuate lower surfaces which are accurately machined and overlie the ends of the printing cylnider 166 and engage the peripheral surface thereof with a running fit. Of course the shields 175 and 176 are changed when different sized cylinders are used. The shields 175 and 176 cooperate with the sliding cover plates 68 and 69 to enclose completely the printing cylinder and inking mechanism except for the limited area of the printing cylinder which is required to be exposed for contact with the web passing around the pressure roll 7. The upper edges of the cover plates 68 and 69 are shaped to engage the shields 175 and 176 which form a limiting stop and are spaced a minute distance from the peripheral surface of the printing roll.

Whenever it is desired to change a printing cylinder the ink reservoir 63 is first removed and then the printing cylinder carriage 55 and everything carried thereby is rolled out onto a dolly 185, as shown in Fig. 7, on which the carriage can be transported to any desired place.

A doctor blade mechanism, generally indicated by the numeral 177, is mounted between the side frames 40 and 41 along one side of the printing cylinder carriage within the confines of the flexible cover plate 69. The mechanism generally comprises a vertically adjustable slide 178 on which is mounted a reciprocal platform 179. The platform carries a tiltable frame 180 on which is adjustably mounted a doctor blade holder 181 carrying a doctor blade 182. The platform 179 is reciprocated by the main drive shaft 31 through suitable driving connections 183.

By particular reference to Figs. 4, 5, 8*b* and 8*c* it will be apparent to those skilled in this art that I have provided a very simple and effective housing for enclosing the printing cylinder, the inking mechanism and the doctor blade mechanism of an intaglio printing press, and for preventing the escape of highly inflammable ink vapor. It will also be apparent that this housing is so constructed and arranged that it can be quickly and easily opened up to provide access to the various mechanisms adapted to be enclosed thereby.

It is to be understood that I am not limited to the specific construction shown and described herein as various modifications may be made therein within the scope of the appended claims.

What is claimed is:

1. An intaglio printing press comprising a pair of end frames, a shaft carrying an intaglio printing cylinder journalled in said end frames, and a closed cylinder housing comprising end closures carried by said frames, a bottom platform extending between said end closures and transversely beyond the sides of said cylinder, and flexible side closures extending between said end frames and slidable vertically on opposite sides of said platform, guide means carried by said end frames from adjacent the top of said cylinder to below the sides of said platform forming an at least partly arcuate path for said side closures whereby said flexible side closures may slide into and out of sealing relationship with said cylinder on opposite sides of the printing area thereof.

2. An intaglio printing press comprising a pair of end frames, a shaft carrying an intaglio printing cylinder journalled in said end frames, and a closed cylinder housing comprising end closures carried by said frames, a bottom platform extending between said end closures and transversely beyond the sides of said cylinder, and flexible side closures extending between said end frames and slidable vertically on opposite sides of said platform into and out of sealing relationship with said cylinder on opposite sides of the printing area thereof, tracks on said frames slidably carrying said side closures, said tracks extending in an at least partly arcuate path from a position overlying said cylinder downwardly past the sides of said platform, whereby said side closures may be brought into sealing relationship with said cylinder or retracted to expose the sides to provide access to said cylinder.

3. An intaglio printing press comprising a pair of end frames, a shaft carrying an intaglio printing cylinder journalled in said end frames, and a closed cylinder housing comprising end closures carried by said frames, a bottom platform extending between said end closures and slidable side closures extending between said end frames and slidable vertically on opposite sides of said platform, said side closures having members to fit in sealing relationship with said cylin-

der on opposite sides of the printing area thereof, tracks on said frames slidably carrying said side closures, said tracks extending from a position overlying said cylinder downwardly past the sides of said platform, whereby said side closures may be brought into sealing relationship with said cylinder or retracted to expose the sides to provide access to said cylinder, the lower ends of said tracks overlapping beneath said platform to receive said side closures when retracted.

4. An intaglio printing press comprising a pair of end frames, a shaft carrying an intaglio printing cylinder journalled in said end frames, and a closed cylinder housing comprising end closures carried by said frames, a bottom platform extending between said end closures and transversely beyond the sides of said cylinder and slidable side closures extending between said end frames and slidable vertically between guide means carried by said end frames and extending from a position overlying said cylinder in an at least partly arcuate path downwardly on opposite sides of said platform into and out of sealing relationship with said cylinder on opposite sides of the printing area thereof, said side closures being flexible and adapted to follow a non-linear slide path.

5. In intaglio printing press comprising a pair of end frames, a shaft carrying an intaglio printing cylinder journalled in said end frames, and a closed cylinder housing comprising end closures carried by said frames, a bottom platform extending between said end closures and transversely beyond the sides of said cylinder, and flexible side closures extending between said end frames and slidable vertically on opposite sides of said platform into and out of sealing relationship with said cylinder on opposite sides of the printing area thereof, tracks on said frames slidably carrying said side closures, said tracks extending in an at least partly arcuate path from a position overlying said cylinder downwardly past the sides of said platform, whereby said side closures may be brought into sealing relationship with said cylinder or retracted to expose the sides to provide access to said cylinder, and releasable gripping members mounted on said side closures and arranged to grip said track for holding said side closures in closed position.

6. An intaglio printing press comprising a pair of end frames, a shaft carrying an intaglio printing cylinder journalled in said end frames, and a closed cylinder housing comprising end closures carried by said frames, a bottom platform extending between said end closures, and transversely beyond the sides of said cylinder and flexible side closures extending between said end frames and slidable vertically on opposite sides of said platform into and out of sealing relationship with said cylinder area on opposite sides of the printing area thereof, tracks on said frames slidably carrying said side closures, said tracks extending in an at least partly arcuate path from a position overlying said cylinder downwardly past the sides of said platform, whereby said side closures may be brought into sealing relationship with said cylinder or retracted to expose the sides to provide access to said cylinder, releasable gripping members mounted on said side closures and arranged to grip said track for holding said side closures in closed position, said members being spring pressed into gripping position and being automatically releasable in response to movement of said side closures in closing direction.

7. An intaglio printing press comprising a pair of end frames, a shaft carrying an intaglio printing cylinder journalled in said end frames, and a closed cylinder housing comprising end closures carried by said frames, a bottom platform extending between said end closures and transversely beyond the sides of said cylinder, and flexible side closures extending between said end frames and slidable vertically on opposite sides of said platform into and out of sealing relationship with said cylinder on opposite sides of the printing area thereof, tracks on said frames slidably carrying said side closures, said tracks extending in an at least partly arcuate path from a position overlying said cylinder downwardly past the sides of said platform, whereby said side closures may be brought into sealing relationship with said cylinder or retracted to expose the sides to provide access to said cylinder, releasable gripping members mounted on said side closures and arranged to grip said track for holding said side closures in closed position, said members being spring pressed into gripping position and manual handles positioned and connected to release said members in response to pressure exerted in closing direction.

8. An intaglio printing press comprising a pair of end frames, a shaft carrying an intaglio printing cylinder journalled in said end frames, and a closed cylinder housing comprising end closures carried by said frames and spaced axially from the ends of said cylinder, arcuate top closures carried by said end closures and overlapping the ends of said cylinder, a bottom platform extending between said end closures and transversely beyond the sides of said cylinder, and flexible side closures extending between said end frames and slidable vertically between guide means carried by said end frames and extending from a position overlying said cylinder in an at least partly arcuate path downwardly on opposite sides of said platform into and out of sealing relationship with said top closures and with said cylinder on opposite sides of the printing area thereof.

9. An intaglio printing press comprising a pair of end frames, a shaft carrying an intaglio printing cylinder journalled in said end frames, and a closed cylinder housing comprising end closures carried by said frames and spaced axially from the ends of said cylinder, arcuate top closures carried by said end closures and overlapping the ends of said cylinder, a bottom platform extending between said end closures and transversely beyond the sides of said cylinder, and flexible side closures extending between said end frames and slidable vertically between guide means carried by said end frames and extending from a position overlying said cylinder in an at least partly arcuate path downwardly on opposite sides of said platform into and out of sealing relationship with said top closures and with said cylinder on opposite sides of the printing area thereof, said top closures having bottom shoulders spaced from the end of said cylinder to provide clearance for axial adjustment thereof.

10. An intaglio printing press having a pair of spaced end frames, a shaft carrying a printing cylinder journalled in said end frames, a platform extending between said end frames below said printing cylinder and transversely be-

yond the sides of said cylinder, and a housing comprising a pair of flexible closure plates extending between said end frames, one of said plates being slidably mounted on each side of said platform for vertical sliding movement into and out of sealing relationship with said cylinder on opposite sides of the printing area thereof, tracks on which said closure plates are slidably mounted secured to said end frames, said tracks extending in an at least partly arcuate path from a position overlying said cylinder downwardly past the sides of said platform, whereby said closure plates may be brought into sealing relationship with said cylinder or retracted to provide access to said cylinder.

11. An intaglio printing press having a pair of spaced end frames, a shaft carrying a printing cylinder journalled in said end frames, a platform extending between said end frames below said printing cylinder, and a housing comprising a pair of flexible closure plates extending between said end frames, one of said plates being slidably mounted on each side of said platform, and each of said closure plates being provided with means to fit in sealing relationship with said cylinder on opposite sides of the printing area thereof, tracks on which said closure plates are slidably mounted secured to said end frames, said tracks extending from a position overlying said cylinder downwardly past the sides



of said platform and then inwardly under said platform in overlapping relationship, whereby said closure plates may be brought into sealing relationship with said cylinder or retracted under said platform to provide access to said cylinder.

12. An intaglio printing press as defined in claim 10 in which means is provided to releasably hold said closure plates in adjusted position.

13. An intaglio printing press as defined in claim 10 in which releasable gripping means is mounted on said closure plates and arranged to grip said tracks and hold said closure plates in adjusted positions.

14. An intaglio printing press as defined in claim 10 in which said closure plates are provided with a plurality of spaced parallel horizontal strengthening bars.

15. An intaglio printing press as defined in claim 14 in which rollers are mounted on said strengthening bars in position to engage said tracks.

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