

Aug. 17, 1948.

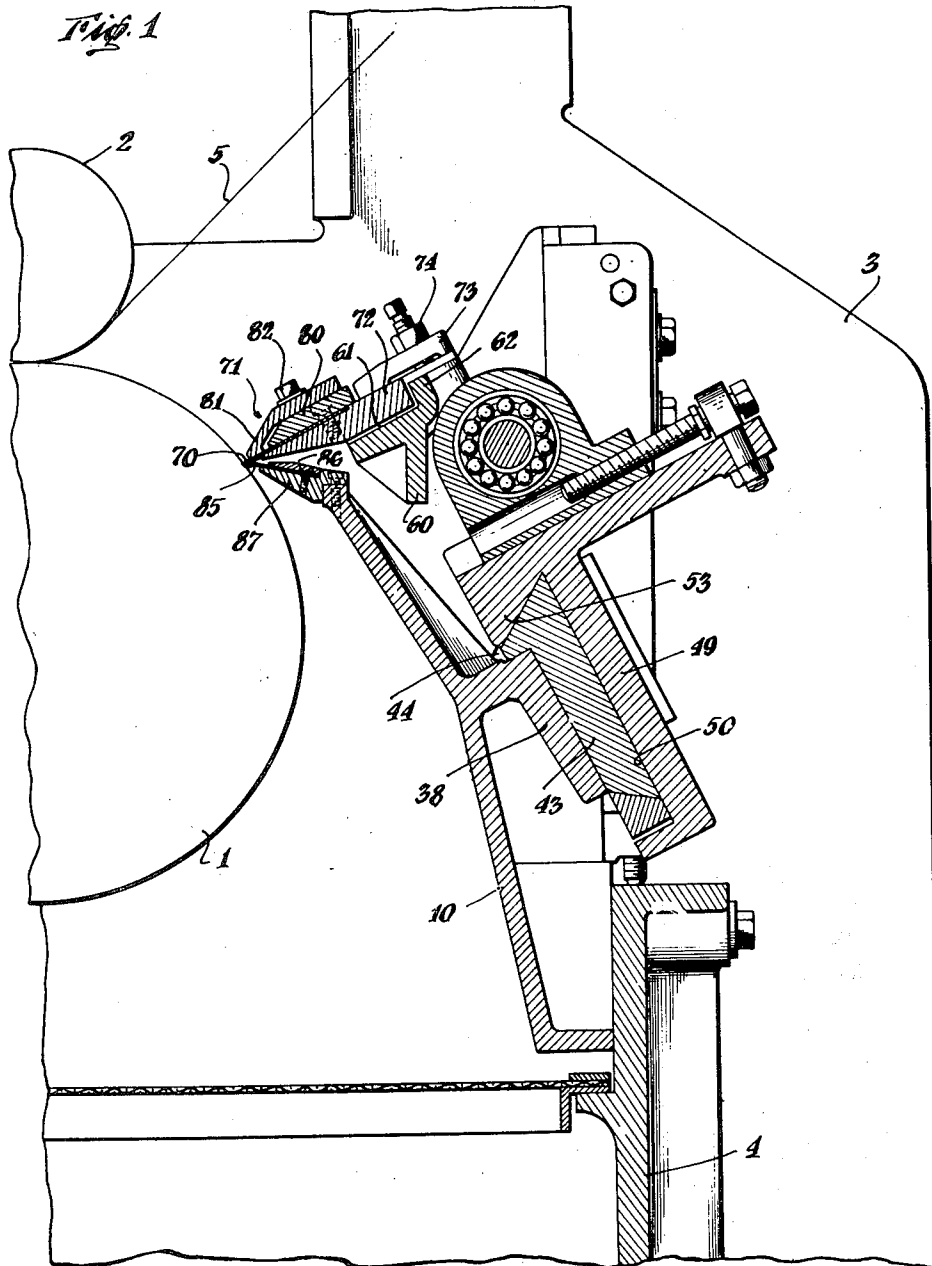
W. M. POLLOCK

2,447,090

ROTARY INTAGLIO PRINTING PRESS

Filed Jan. 14, 1944

4 Sheets-Sheet 1



INVENTOR.
Willard M. Pollock
BY
Robert N. Dusham
Attorney

Aug. 17, 1948.

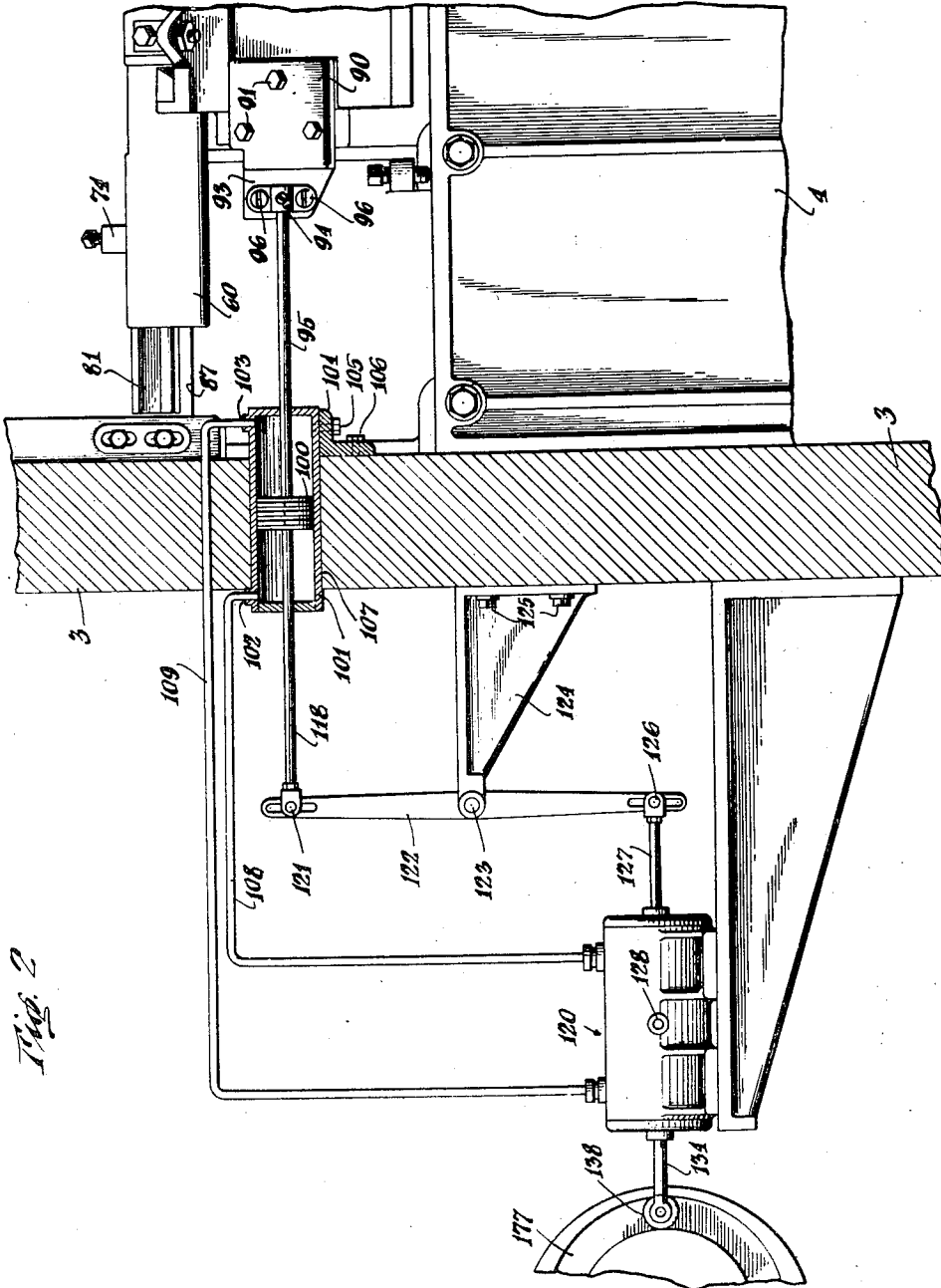
W. M. POLLOCK.

2,447,090

ROTARY INTAGLIO PRINTING PRESS

Filed Jan. 14, 1944

4 Sheets-Sheet 2



210

Willard M. Pollock
BY *Halsted W. Dinsmore*
Attorney.

Aug. 17, 1948.

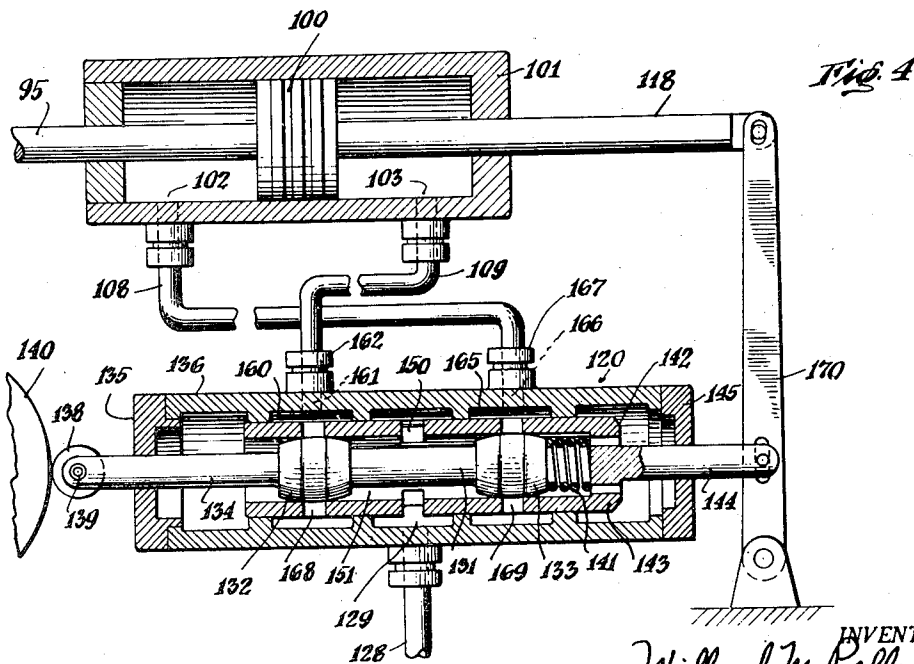
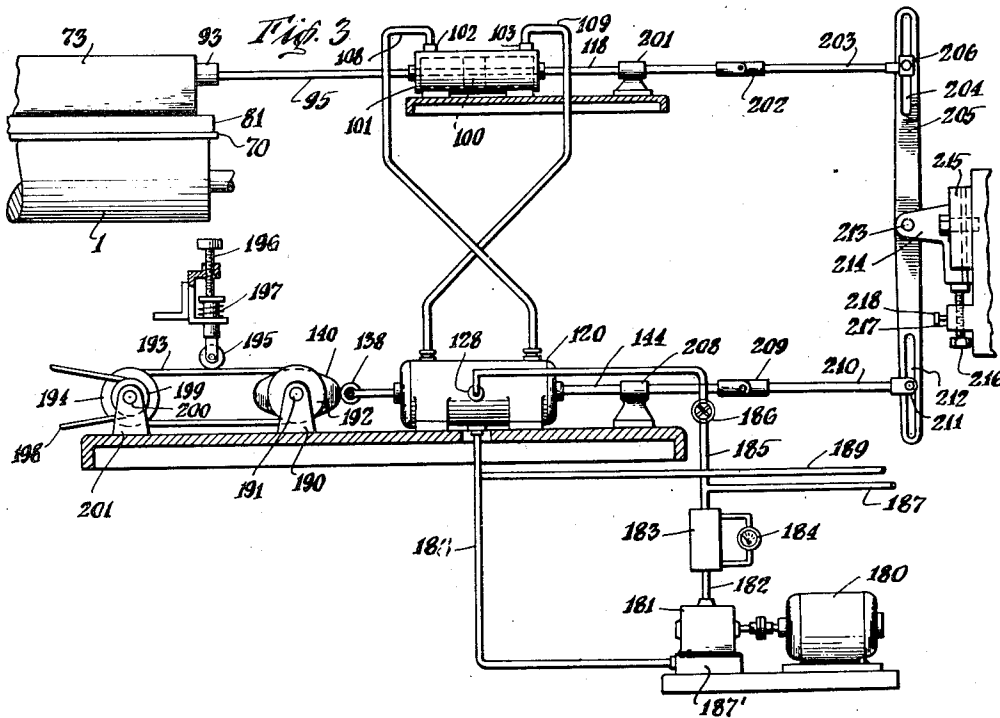
W. M. POLLOCK

2,447,090

ROTARY INTAGLIO PRINTING PRESS

Filed Jan. 14, 1944

4 Sheets-Sheet 3



INVENTOR.
Willard M. Pollock
BY
Robert H. Winkham
Attorney.

Aug. 17, 1948.

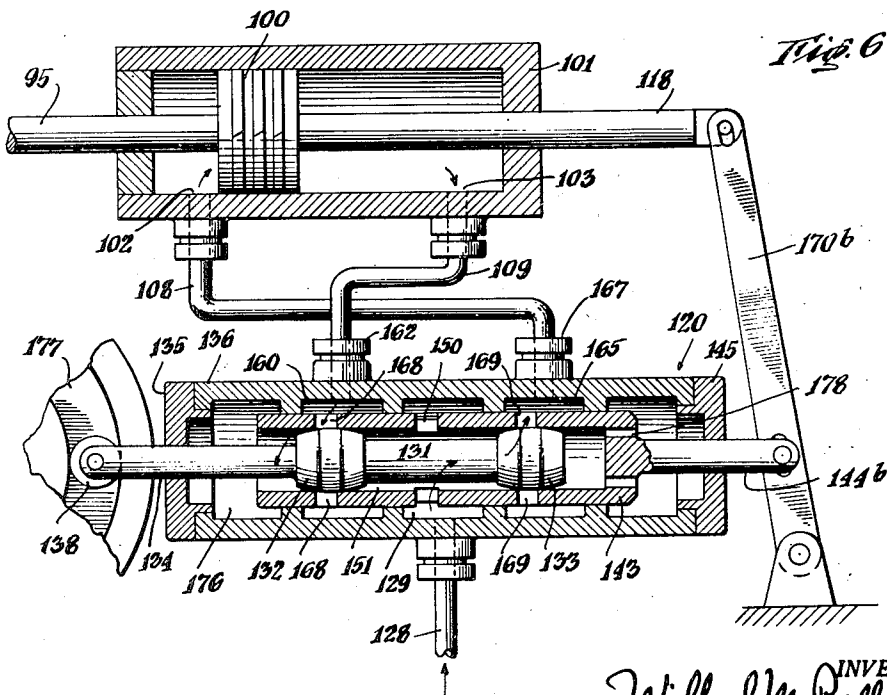
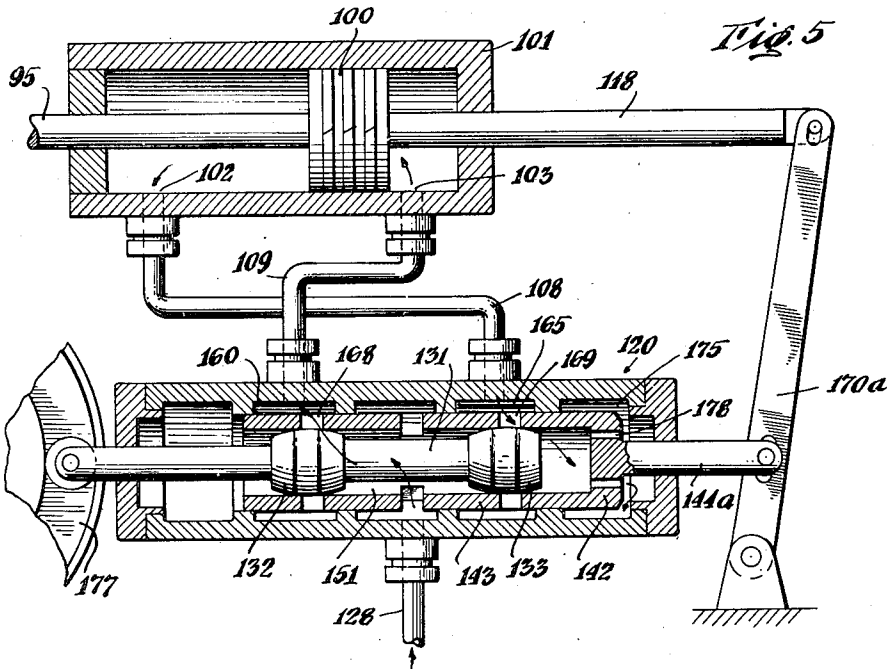
W. M. POLLOCK

2,447,090

ROTARY INTAGLIO PRINTING PRESS

Filed Jan. 14, 1944

4 Sheets-Sheet 4



INVENTOR.
Willard M. Pollock
BY Robert W. Graham
Attorney

UNITED STATES PATENT OFFICE

2,447,090

ROTARY INTAGLIO PRINTING PRESS

Willard M. Pollock, Glen Ellyn, Ill., assignor to
The Goss Printing Press Company, Chicago,
Ill., a corporation of Illinois

Application January 14, 1944, Serial No. 518,217

6 Claims. (Cl. 101-169)

1

This invention relates to new and useful improvements in inking mechanisms for rotary intaglio presses and more particularly in improvements in the operation of the doctor blade for such inking mechanisms.

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 vertical transverse section through a typical arrangement of doctor blade and mounting in a rotary intaglio printing press;

Fig. 2 is a fragmentary side elevation of the doctor mechanism of Fig. 1, having parts thereof in section, and showing the new and improved means to operate the doctor blade in accordance with this invention;

Fig. 3 is a detailed diagrammatic exploded view of the complete doctor blade operating mechanism according to the present invention;

Fig. 4 is a detailed sectional view of part of the operating mechanism for imparting movement to the doctor blade, as shown in Figs. 2 and 3; the means being shown in a central or intermediate position; and

Figs. 5 and 6 are detailed sectional views of the operating means of Fig. 4 but showing the means in an extreme right and extreme left position, respectively.

Objects of the invention are to provide a doctor blade operating mechanism constructed and capacitated to operate reliably and efficiently under modern high speed, high quality requirements; to provide a doctor blade operating mechanism permitting variation of the rate of reciprocation of the doctor blade; variation of the length of stroke of the doctor blade; variably timing the reciprocation of the doctor blade in direct proportion to the speed of the press; and smooth operation of the doctor blade through a preselected cycle of operation; as well as to effect other objects which are set forth hereinafter or will be

2

apparent to those skilled in the art through practicing the invention or otherwise.

To this end, in a preferred embodiment herein exemplified, various cooperating structures and principles are embodied, some of which will be briefly and generally here indicated.

A supporting and guiding means is firmly supported in fixed position upon a press frame, and on said guiding means a carriage carrying the entire doctor blade mechanism is reciprocably mounted. Various known devices for adjustably positioning the blade carrier and blade with respect to the design cylinder of the press may be provided, and these will be mounted preferably on said carriage.

In the Patent No. 2,178,069, granted October 31, 1939, there is disclosed a doctor blade mechanism for a rotary intaglio printing press where such blade positioning and regulating means are utilized, mounted upon the blade supporting carriage, and the present invention, consisting in providing new and improved reciprocating means for a doctor blade mechanism, may be utilized with such a doctor blade mechanism as is disclosed in said patent, although the present invention is in no way to be construed or limited to such form of doctor blade mechanism.

In accordance with the present invention fluid operated means, for example, hydraulic means, are provided for reciprocating the doctor blade mechanism.

To this end, in the preferred embodiment, cam actuated means operated from any desired part of the press driving means and thus in a direct proportion to the speed of running of the press, are provided adapted to operate a pilot valve which is so arranged as to control the flow of fluid under pressure to one side or the other of a single piston movable in a cylinder. The blade carrier mechanism is directly connected to the piston so that reciprocating movements thereof may be obtained under control of the pilot valve.

It is a feature of this invention that the pilot valve is so arranged as to receive flow of fluid under pressure to either side of the piston for a controllable time which can be altered to suit the desired movement to be imparted to the doctor blade.

Heretofore the doctor blade has been reciprocated by other than fluid pressure means with the result that while the desired cycle of acceleration and deceleration has been generally approached, it has never been achieved. Particularly, it is greatly desired that, at the extreme end of each stroke, a deceleration is effected, after

which the blade movement be quickly reversed, that is, without any lag, and prior mechanisms have been largely unable to accomplish this.

The present invention attains this result completely and also accomplishes a complete control of acceleration and deceleration, namely, permitting a preselected cycle of movement to pertain for the doctor blade.

This is accomplished by utilizing a specific, and variable, cam contour to give a desired or preselected movement to an inner plunger which has thereon two pistons adapted to cooperate with ports arranged in an outer barrel surrounding the plunger and slidably mounted within the outer casing or body of the pilot valve. The ports of the barrel communicate at all positions of the barrel with exit ports connected through the body of the pilot valve, one of each of these ports communicating with a chamber of the cylinder previously referred to, the two chambers of which are on either side of the operating piston.

Thus, movements of the plunger under urge of the cam, result in one or the other port in the barrel being opened to a source of fluid under pressure admitted to the chamber formed by the pistons and the inner wall of barrel whereby the operating piston will be moved one way or the other to reciprocate the doctor blade.

By changing the shape of the cam it is possible to arrive at a definite cyclic acceleration and retardation of the doctor blade to suit any purpose. Thus, the cam contour positions the barrel and causes reciprocatory movements thereof, the rate of travel of the doctor blade, as well as the amount of travel, being determined by the movements of the barrel and thus being capable of preselection by choice of the contour of the cam.

The actual flow of fluid under pressure to the piston within the cylinder is governed by movements of the barrel under influence of the rise and fall of the cam, and the rate of such rise and fall will determine the rate of flow to said cylinder.

It is desired in practice to provide for such a doctor blade a smooth even movement and the curve or contour of the cam will in practice be chosen to give a deceleration of the doctor slide as it approaches the end of each stroke, a rapid reversal, and a smooth acceleration at the beginning of each stroke.

The distance between the high point and low point of the cam will determine the length of the doctor blade stroke.

Thus, changing the cam contour gives complete variable and adjustable factors with respect to the cycle of reciprocation of the doctor blade.

Either an edge cam or a box cam can be utilized in this invention as hereinafter brought out.

It is a further feature of this present invention to vary the rate of reciprocation of the doctor blade independently of any variability of its cyclic movements.

To this end, the cam is adapted to be driven from a press driven shaft, whereby the speed of driving of the cam will always be proportional to the speed of driving of the press.

Any desired means of changing the speed of the cam may be utilized such being well known in the art and including change gears, variable gear drives, variable belt drives and the like.

It is a further feature of the present invention to provide for varying the length of the stroke of the doctor blade, irrespective of the other featured adjustments and variables given above, and ac-

cordingly the other end of the operating piston in the cylinder mentioned above has a rod extension which is linked to one end of a fulcrumed lever, the other end of which is linked to a shaft attached to one end of the barrel of the pilot valve.

The fulcrum is so mounted as to be adjustable between the linked ends whereby a complete variability of the operating stroke of the operating piston is achieved since the fulcrumed lever moves under urge of the operating piston to slide the barrel of the pilot valve relatively to the pistons on the plunger and variation of the arc of movement of the fulcrumed lever, thus caused, will alter the length of time of application of fluid under pressure to the cylinder, by movements of the barrel relative to the plunger.

Also, the linkage above described, may be variable by having the rod extension at one end of the lever and the shaft at the other end mounted for sliding movement in slots in the lever and adapted to be locked in any desired position in the slots whereby to alter the operative length of either the shaft or rod or both.

It is obvious that the barrel of the pilot valve will thus travel in the same direction as the plunger in an amount determined by the linkage and if the proportions of the linkage are changed, the travel of the operating piston and thus the doctor blade will decrease or increase accordingly.

This invention has been generally described above with respect to a unit for operating by fluid pressure means a doctor blade mechanism, this unit comprising a pilot valve and an operating piston and cylinder connected therewith, but obviously a plurality of such units will be provided for a press having a plurality of couples, and said units can each be actuated from a single source of fluid under pressure, conventionally comprising a motor, pump and manifold for multiple circuit operation with suitable cut-out valves for each unit to silence same when not needed.

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

Referring now in detail to the embodiment of the invention illustrated by way of example in the accompanying drawings, as shown in Figs. 1 and 2, there is provided an intaglio printing couple comprising a design cylinder 1 and an impression cylinder 2, which are suitably journaled in the vertical side press frames 3, the web 5 running through the impression.

The supporting structure of the doctor blade mechanism is connected with and carried by the vertical side frames 3 and also by the vertical wall 4 which is part of the ink fountain structure and extends across the press, being fixed to and carried by, the frame members 3.

The doctor blade mechanism, as here exemplified, comprises a stationary support or base 10, supported by the wall 4 and frame members 3, and may comprise an upwardly and inwardly inclined wall which constitutes part of the fountain closure.

Guide means are suitably carried by support 10 and the entire doctor blade mechanism is reciprocably mounted on the guiding and supporting means.

To this end, on the outer face of support 10 is formed a long horizontal supporting surface 38. Supported upon the surface 38 and fastened thereto by any suitable means is a bevelled or undercut guide 43, having a shoulder 44 running

within its upper edge, the shoulder fitting over the upper horizontal face of surface 38, whereby the guide piece 43 has hanging support on pad 38.

The carriage which supports the doctor blade mechanism and which slides reciprocally on guide 43 comprises a flat plate 49 having its inner surface contacting the surface of guideway 43, as at 50. The plate 49 has a forward extension 53 in sliding engagement with the upper undercut edge of guideway 43.

The doctor blade carrier 60 is mounted on the carriage 49 and is carried thereby during reciprocating movements, as hereinafter described.

Carrier 60 comprises a longitudinally extending bar having a bottom seat 61 and a rearwardly extending flange having a seat 62 upon and within which the immediate support for the doctor blade is mounted.

In the embodied form of mounting the doctor blade 70 and its carrier, the blade 70 rests upon a seat formed on a bar 72, bar 72 resting on support 61 already mentioned. Clamping fingers 73 hold the bar 72 in place and bolts 74 attach the clamping fingers 73 against the seats 61 and 62. The blade 70 is held firmly against bar 72 by holders 80 which are clamped thereagainst by a plate 81 and screw bolts 82.

If desired, a resilient sealing and backing blade 85 may be mounted in jaws 86 and 87 suitably clamped together.

Further details of this specific form of doctor blade carrier, carriage and mounting may be obtained in Patent No. 2,178,069 hereinbefore mentioned.

In accordance with the present invention, the embodied form of means for reciprocating the carrier 71 on the guide 43 include fluid operating means, and hydraulic means are illustrated, specifically.

A plate 90 is formed on the end of the carriage 49 and is attached thereto by screw bolts 91. A lug 93 extends therefrom and is adapted to have attached thereto a rod 95 by a strap 94 bolted to the lug 93, as at 96, and preferably formed integrally with rod 95 or permanently attached thereto as by welding.

Means are provided for reciprocating rod 95 whereby to reciprocate doctor blade carriage 49 on guide 43.

To this end, a piston 100 is located within a cylinder 101 and is adapted to slide therein under hydraulic pressure applied alternately through ports 102 and 103 within the cylinder.

Cylinder 101 is supported within a side frame 3 of the press by, for example, an angle bracket 104 attached by bolts 105 to the cylinder and by bolts 106 to the side frame. A suitable bore 107 throughout the side frame 3 may equally serve as the means of support, if desired. Fluid under pressure, such as oil, is supplied to the ports 102 and 103 through connecting conduits 108 and 109 respectively, these conduits communicating with a pilot valve, hereinafter described, which is adapted to force the fluid under pressure alternately through the conduits 108 and 109, the return fluid being drained back to the supply source through whichever conduit is not connected to the pressure side.

Cylinder 101 is also mechanically connected to the pilot valve generally indicated at 120, by suitable linkage, to which end, in the embodiment illustrated in Fig. 2, a rod 118 is connected to the side of piston 100 opposite to the rod 95 and the end of rod 118 is slip-linked at 121 to a pivoted

lever 122. Lever 122 is fulcrumed at 123 on a suitable bracket 124 carried by a side frame 3, and attached thereto, as by bolts 125. The other end of lever 122 is slip-linked at 126 to a shaft 127. Shaft 127 is drivingly connected with parts of valve 120 as now more clearly described.

As shown in Figs. 4, 5 and 6, giving details of three positions of valve 120, oil or like fluid under pressure is adapted to be introduced to a central part of the valve from any suitable source of supply through a conduit 128 to a port 129.

Valve 120 is provided with an inner plunger valve 131 having two piston portions 132 and 133 and terminating at one end as a shaft-like extension 134, mounted for guided movement in the valve body 136 by an end cap 135. Shaft 134 has mounted thereon at its extremity a cam follower 138 which is preferably rotatably supported on shaft 134, by an anti-friction bearing 139. Cam follower 138 is driven by a cam which in Fig. 4 is shown as an edge cam 140, this cam being preferably driven from a drive shaft of the press and being so designed as to give a desired acceleration and deceleration of reciprocating movement to the inner plunger valve 131 for the purpose hereinafter described. When using edge cam 140 for operatively moving valve plunger 131 a spring 141 is arranged at the other extremity of the plunger, this spring abutting against the end of plunger 131, serving to keep the cam follower 138 always in contact with cam 140. The other end of spring 141 abuts against a flange 142 of a sleeve 143 surrounding plunger 131 and adapted to slide on the piston portions 132 and 133 of plunger 131, the sleeve 143 and flange 142 forming an outer barrel for the valve 120 adapted to slide within the body 136.

Attached to the flange 142, or formed integral therewith, if desired, is a shaft 144 which extends beyond the confines of body 136 of the valve, and is mounted in a flanged end thereof 145 to reciprocate. This shaft 144 is connected by suitable linkage to the operating rod 118 of cylinder 101 and may be the shaft 127 of Fig. 2 or it may be suitably articulated thereto.

Various ports are provided in the barrel 143 for the purpose of permitting the oil under pressure, supplied through conduit 130, to be introduced into the interior of barrel 143 and to selectively flow therefrom to one side or the other of piston 100 in cylinder 101. To this end, port 129 communicates with a port 150 in the barrel 143 and permits the oil under pressure to be contained within a chamber 151 formed by the confines of the interior walls of the barrel 143 and the pistons 132 and 133.

Body 136 of the valve 120 has two exit ports therein, one exit port 160 communicating with an outlet 161 through the wall of the body 136 to which outlet conduit 109 connects as by a nipple 162, while in the same way the other exit port 165 communicates with an outlet 166 to which is connected conduit 108 by a nipple 167.

Barrel 143 has ports 168 and 169 communicating with exit ports 160 and 165, respectively, whereby oil under pressure from chamber 151 can be allowed to flow either through communicating ports 160 and 168 and thence through conduit 109 to port 103 of the cylinder 101, or through communicating ports 165 and 169 through conduits 108 to port 102 of cylinder 101, the movements of the inner plunger 131 under urge of cam 140, and particularly the position of piston parts 132 and 133 relative to entry ports 168 and 169 of the barrel, determining which of con-

duits 108 or 109 receive fluid under pressure. The actual controlling movements of the various parts of valve 120 can be more clearly understood by reference to the relative positions of Figs. 4, 5 and 6.

In Fig. 4 barrel 143 is in its center position and both ports 168 and 169 thereof are sealed off or closed from connection with chamber 151 by the pistons 132 and 133. As the cam 140 rotates it causes cam follower 138 and thus plunger 131 to move inwardly or outwardly. In Fig. 5 the parts are shown in their extreme right hand position while in Fig. 6 the parts are shown in extreme left hand position. In Fig. 5 it will be seen that the oil under pressure from chamber 151 is flowing through the open port 168 through exit port 160 and into conduit 109 to apply pressure to piston 100 through port 103 and push the piston to the left of Fig. 5. Ports 169 and 165 are sealed off from pressure fluid by piston 133 but can allow drainage back of fluid through port 102, conduit 108 into a return chamber 175 from whence it can be returned to the source of supply.

Due to rod 118 being moved over to the position shown, lever 170 is placed in position 170a and shaft 144 is in position 144a thus moving the barrel 143 to follow the plunger and move over to an extreme right position.

The positions of Fig. 6 are exactly opposite to those of Fig. 5, the pressure side being on the left through port 102, conduit 108, ports 165 and 169, with the drainage through conduit 109, the lever 170 then occupying position 170b and lever 144 being in position 144b with the barrel in its extreme left hand position. The chamber 176 now receives drainage.

Thus, by this valve arrangement, a relatively small movement of the shaft 134 from cam follower 138 coupled with following movements of the barrel 143 give a maximum controlled movement of piston 100 in cylinder 101.

The cam shown in Figs. 5 and 6 is a box cam 177, so that the spring 141 may be dispensed with in such a modification of cam form.

In order to prevent build up of pressure against the flange 142 of barrel 143 and to permit feeding back into drainage chamber 176, holes 178 in said flange may be drilled, as shown.

The pistons 132 and 133 may be of cylindrical form but in such event, as the ports 168 or 169 are cleared by the pistons 132 or 133 and thus are placed in communication with pressure chamber 151, an immediate flow of fluid under the full pressure will take place and will remain at the same pressure until the opened port is closed again. In use, the barrel 143 closely follows movement of the inner plunger 131, and in order to provide for adequate flow through the various ports of the fluid under pressure, the pistons 132 and 133 will be preferably formed as clearly shown in Figs. 4, 5 and 6 with both advance and return edges tapered.

In Fig. 3 an exploded view of the whole apparatus for operating the doctor blade mechanism is shown. Motor 180 drives pump 181 and the oil thus under pressure is passed through conduit 182 to a manifold 183. A suitable pressure gauge 184 is associated with manifold 183. Conduit 185 leads the fluid under pressure to the valve 120, a suitable cut-off valve 186 for silencing the unit when desired, being provided in the line. More than one doctor blade reciprocating unit may be operated from the one source of supply of fluid under pressure, and therefore a branch line 187 is shown from manifold 183 each of which may

be identical with the unit illustrated comprising valve 120, cylinder 101, and operating connections. Return or drainage oil from the chambers 175 and 176 may be taken into the sump 187 of pump 181 through conduit 188, the drainage from other units being also passed thereto by conduit 189.

In Fig. 3, cam follower 138 is shown in contact with edge cam 140 which is driven from the press at an adjustable speed.

To this end, cam 140 may be pivotally mounted in a bracket 190 on a shaft 191, on which shaft a pair of pulleys 192 each with an inclined face are splined and are spring urged toward each other. A V shaped belt 193 is driven from a pulley 194 and is adapted to simultaneously contact both pulleys on the inclined faces thereof in such way that, as the belt is tightened about the pulleys, the two pulleys move away from each other and the belt contacts a different peripheral portion, whereby the relative speed of driving cam 140 is changed.

An idler 195 mounted to be adjusted by a screw 196 against a spring 197 rides on the upper face of belt 193 and by adjusting the idler 195, the position of belt 193 with respect to the inclined faces of pulleys 192 is altered, to vary the driving speed, at will.

Driving pulley 194 is driven from any suitable moving shaft of the press by a belt 198 and a pulley 199 mounted on shaft 200 in a bracket 201.

The linkage between the operating piston 100 and the barrel shaft 144 in Fig. 3 is of somewhat modified form. Rod 118 is mounted in a bearing block 201 for support and is linked at 202 to an extension arm 203, the link 202 being pivotal. Arm 203 is slip-linked in a groove 204 in one arm of a fulcrumed lever 205, slip-link 206 being adapted to be adjusted and clamped in place longitudinally of lever 205.

In the same manner, shaft 144 is supported by a bearing block 208 and is linked at 209 to an extension 210 which is slip-linked at 211 in a groove 212 in the other arm of lever 205.

Furthermore, fulcrum 213 of lever 205 is mounted in a block 214, the block being vertically slidable on a guide 215. Adjustments of the fulcrum point 213 may be made by screw 216 which is carried by an extension 217 of said slide, a lock screw 218 being provided for preventing accidental movement of the fulcrum.

By altering the position of the fulcrum the length of stroke of the doctor blade can be varied and by altering the angular attachment of the slip-links 206 and 211 further adjustment of the length of the operative thrust exerted on the blade carrier can be made.

Thus, there is provided by the present invention, new and improved actuating means for reciprocating the doctor blade mechanism, such means providing smooth, economical operation and being hydraulic actuated or actuated by equivalent fluid pressure means with additional features of control and adjustability including means for varying the rate of reciprocation of the doctor blade; means to vary the length of stroke of the doctor blade; and means for timing the reciprocation to vary in direct proportion with the speed of the press.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the in-

vention and without sacrificing its chief advantages.

What I claim is:

1. A rotary intaglio inking mechanism including in combination a guide, a doctor blade carrier mounted for reciprocation thereon, and fluid pressure means for reciprocating said doctor blade carrier including a pilot valve having an inner plunger and a barrel surrounding same and mounted for relative sliding movement therewith, ports in said barrel communicating with exit ports through the body of said pilot valve, means for conducting fluid under pressure to the interior of said pilot valve, means to move said barrel and plunger to periodically permit flow of said fluid under pressure through first one and then the other of said exit ports, a piston within a cylinder, ports on either side of said piston, means to connect said exit ports with said cylinder ports, whereby said piston is reciprocated under flow of pressure from said pilot valve, a driving rod from said piston to said blade carrier, and a connection between the other side of the piston and the barrel of said pilot valve whereby movements of said barrel relative to said plunger may be effected.

2. A rotary intaglio inking mechanism including in combination a guide, a doctor blade carrier mounted for reciprocation thereon, and fluid pressure means for reciprocating said doctor blade carrier including a pilot valve having an inner plunger and a barrel surrounding same and mounted for relative sliding movement therewith, ports in said barrel communicating with exit ports through the body of said pilot valve, means for conducting fluid under pressure to the interior of said pilot valve, means to move said barrel and plunger to periodically permit flow of said fluid under pressure through first one and then the other of said exit ports, a piston within a cylinder, ports on either side of said piston, means to connect said exit ports with said cylinder ports, whereby said piston is reciprocated under flow of pressure from said pilot valve, a driving rod from said piston to said blade carrier, and a connection between the other side of the piston and the barrel of said pilot valve whereby movements of said barrel relative to said plunger may be effected, said connection being a linkage including a fulcrumed lever, the fulcrum of which can be varied relative to the piston and the barrel to vary the length of stroke of the blade carrier.

3. A rotary intaglio inking mechanism including in combination a guide, a doctor blade carrier reciprocably mounted thereon, a hydraulically operated piston attached to said carrier adapted to receive fluid under pressure on one side or the other to reciprocate said carrier, a pilot valve having two internal moving parts, cam means to move one part relative to the other, means to move the other part under urge of said piston to follow the first part, and means to apply fluid under pressure to said piston from said pilot valve under control of the relative movements of said parts.

4. A rotary intaglio inking mechanism including in combination a guide, a doctor blade car-

rier reciprocably mounted thereon, a hydraulically operated piston attached to said carrier adapted to receive fluid under pressure on one side or the other to reciprocate said carrier, a pilot valve having two internal moving parts, cam means to move one part relative to the other in predetermined variable amounts, means to move the other part in predetermined variable amounts under urge of said piston to follow the first part, and means to apply fluid under pressure in predetermined variable amounts to said piston from said pilot valve under control of the relative movements of said parts.

5. A rotary intaglio inking mechanism including in combination a guide, a doctor blade carrier mounted for reciprocation thereon, fluid pressure means for reciprocating said carrier, a pilot valve governing the application of fluid pressure to said reciprocating means, and mechanical means acting to operate said pilot valve to determine the rate of flow of fluid under pressure to said reciprocating means in a continuous accelerating and decelerating cycle, whereby the cycle of movement of said carrier follows a predetermined acceleration-deceleration pattern, said mechanical means including a cam operating on a moving part of said pilot valve, and linkage between another moving part of said pilot valve connected to said reciprocating means to cause said other moving part of the pilot valve to follow the stroke of said reciprocating means in a predetermined proportion.

6. A rotary intaglio inking mechanism including in combination a guide, a doctor blade carrier mounted for reciprocation thereon, fluid pressure means for reciprocating said carrier, a pilot valve governing the application of fluid pressure to said reciprocating means, and mechanical means acting to operate said pilot valve to determine the rate of flow of fluid under pressure to said reciprocating means in a continuous accelerating and decelerating cycle, whereby the cycle of movement of said carrier follows a predetermined acceleration-deceleration pattern, said mechanical means including a cam operating on a moving part of said pilot valve, and linkage between another moving part of said pilot valve connected to said reciprocating means to cause said other moving part of the pilot valve to follow the stroke of said reciprocating means in a predetermined proportion, said linkage being adjustable to alter the proportion of following of the stroke of the reciprocating means assumed by said other moving part of the pilot valve, whereby the length of travel of said carrier can be adjusted independently of the amount of fluid pressure supplied.

WILLARD M. POLLOCK.

REFERENCES CITED

The following references are of record in the file of this patent:

FOREIGN PATENTS

Number	Country	Date
753,303	France	Aug. 7, 1933
512,135	Germany	Feb. 26, 1932