

Dec. 20, 1960

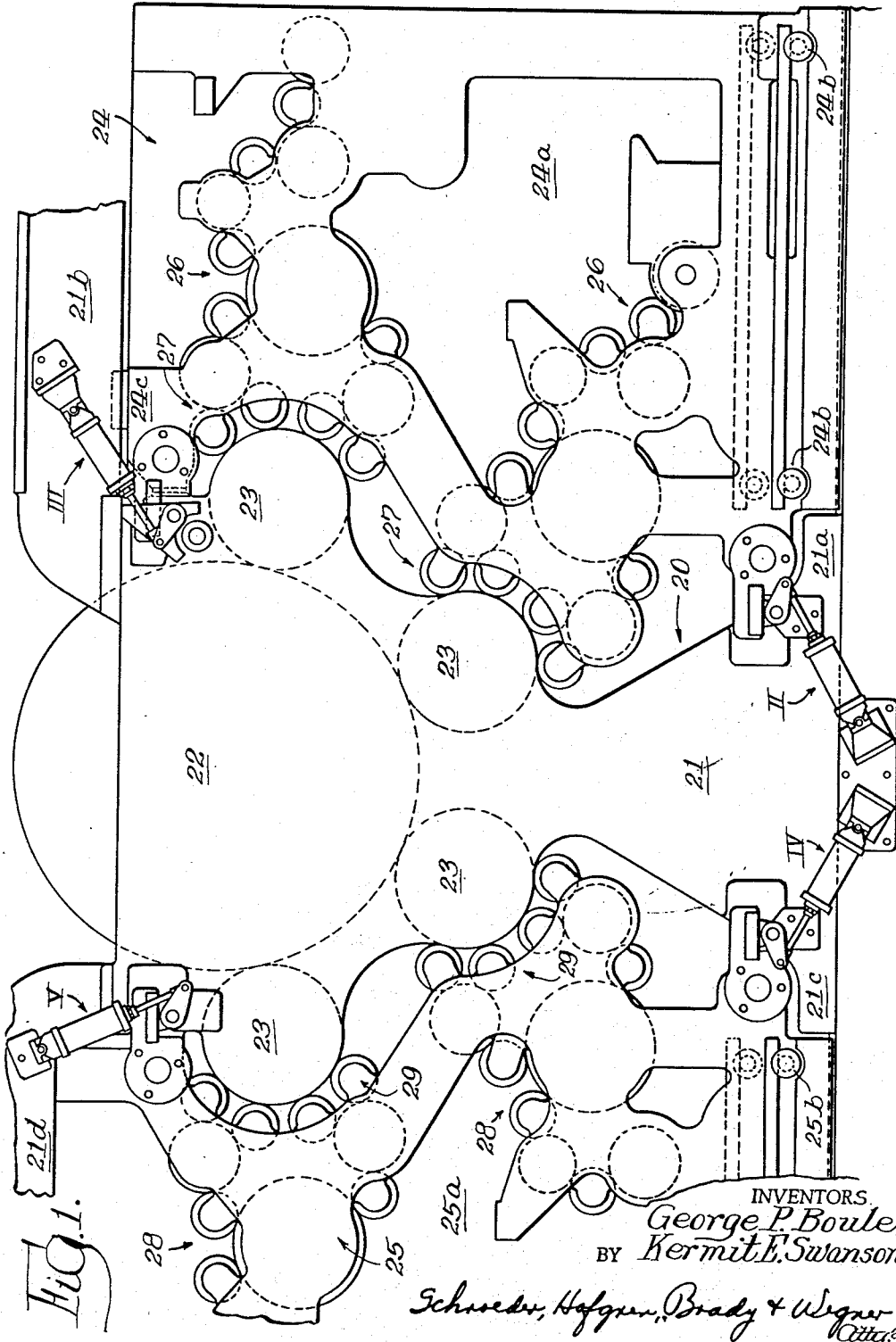
G. P. BOULE ET AL

2,965,023

LATCH AND THRUST MECHANISM FOR PRINTING PRESS INK CARRIAGES

Filed Sept. 18, 1957

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Fig. 3

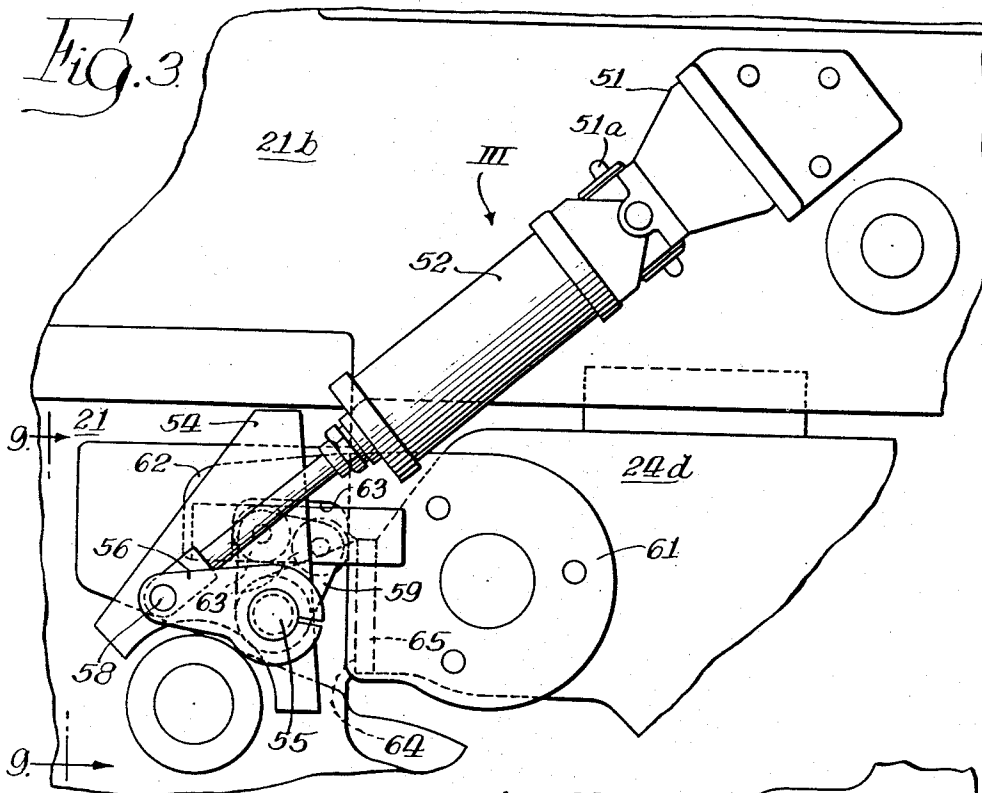
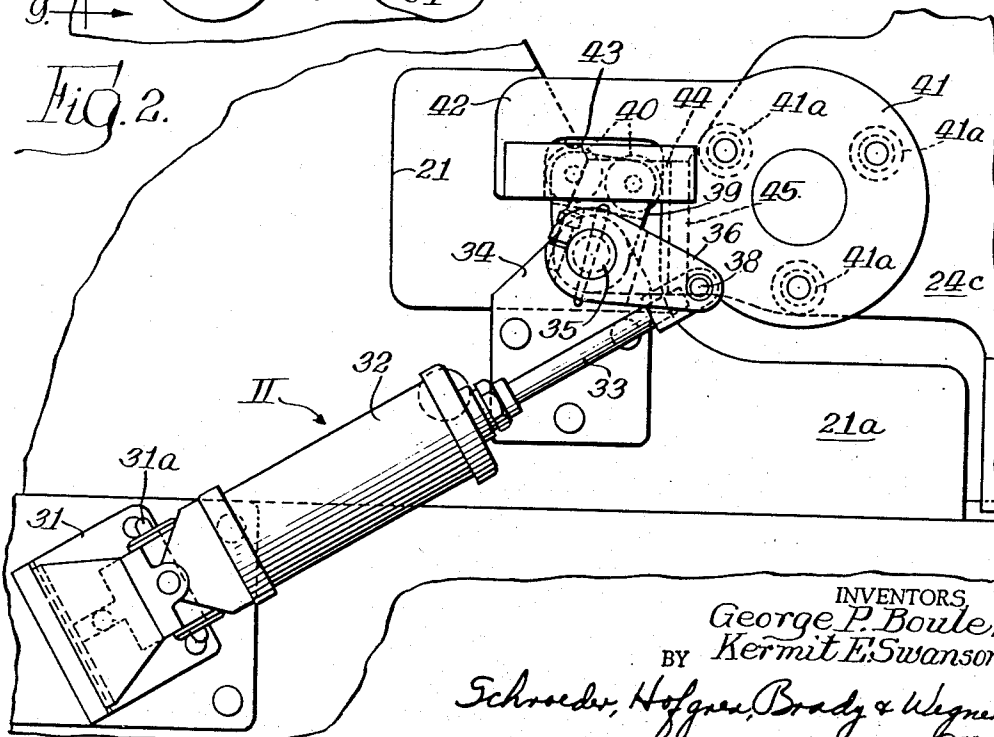


Fig. 2



INVENTORS,
George P. Boule,
BY Kermit E. Swanson
Schroeder, Holgren, Brady & Wagner
Attorneys

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G. P. BOULE ET AL

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5 Sheets-Sheet 3

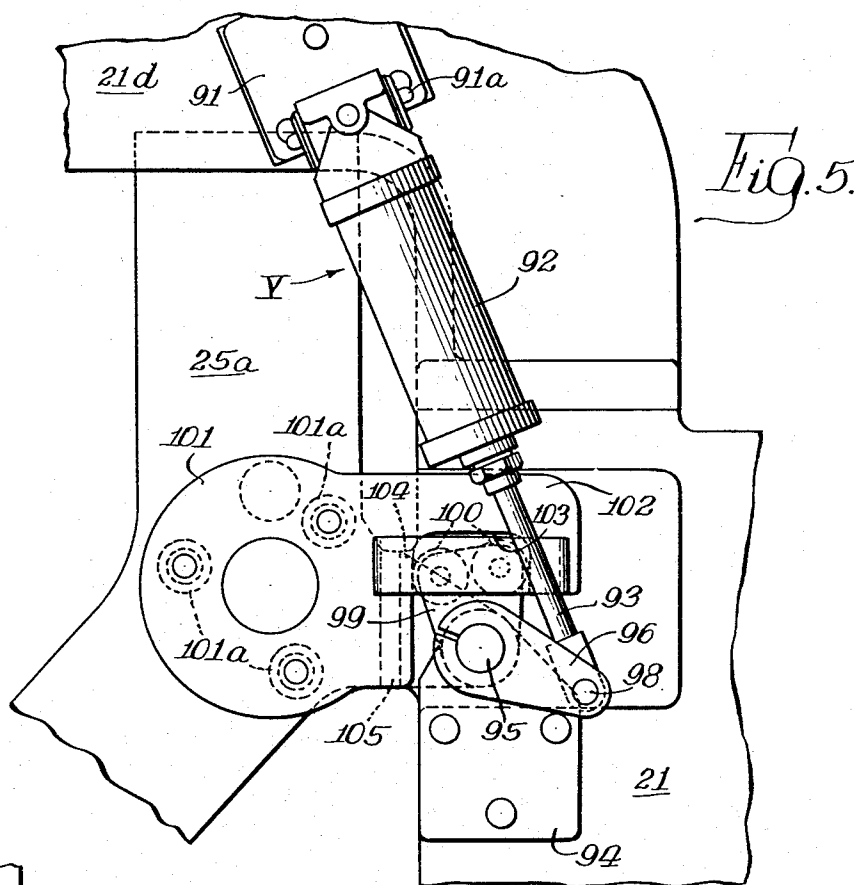


Fig. 5.

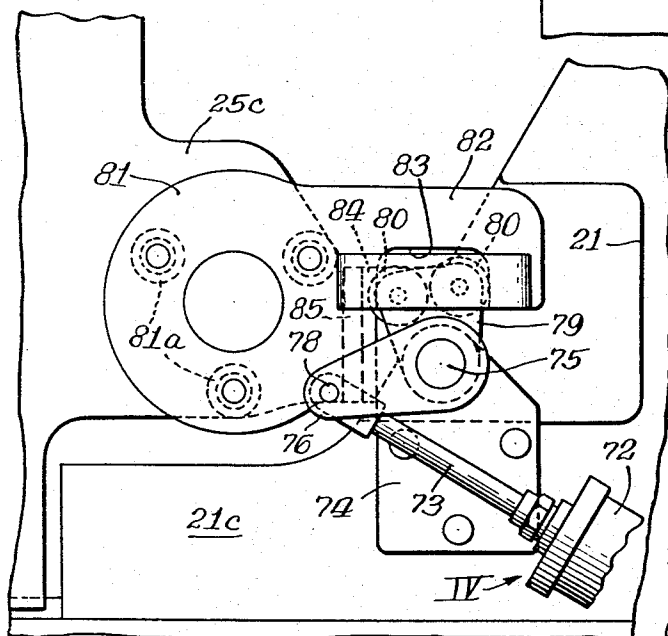


Fig. 4.

INVENTORS.
George P. Boule,
Kermit E. Swanson.
BY Schneider, Helgren,
Brady & Wegner Attys.

Dec. 20, 1960

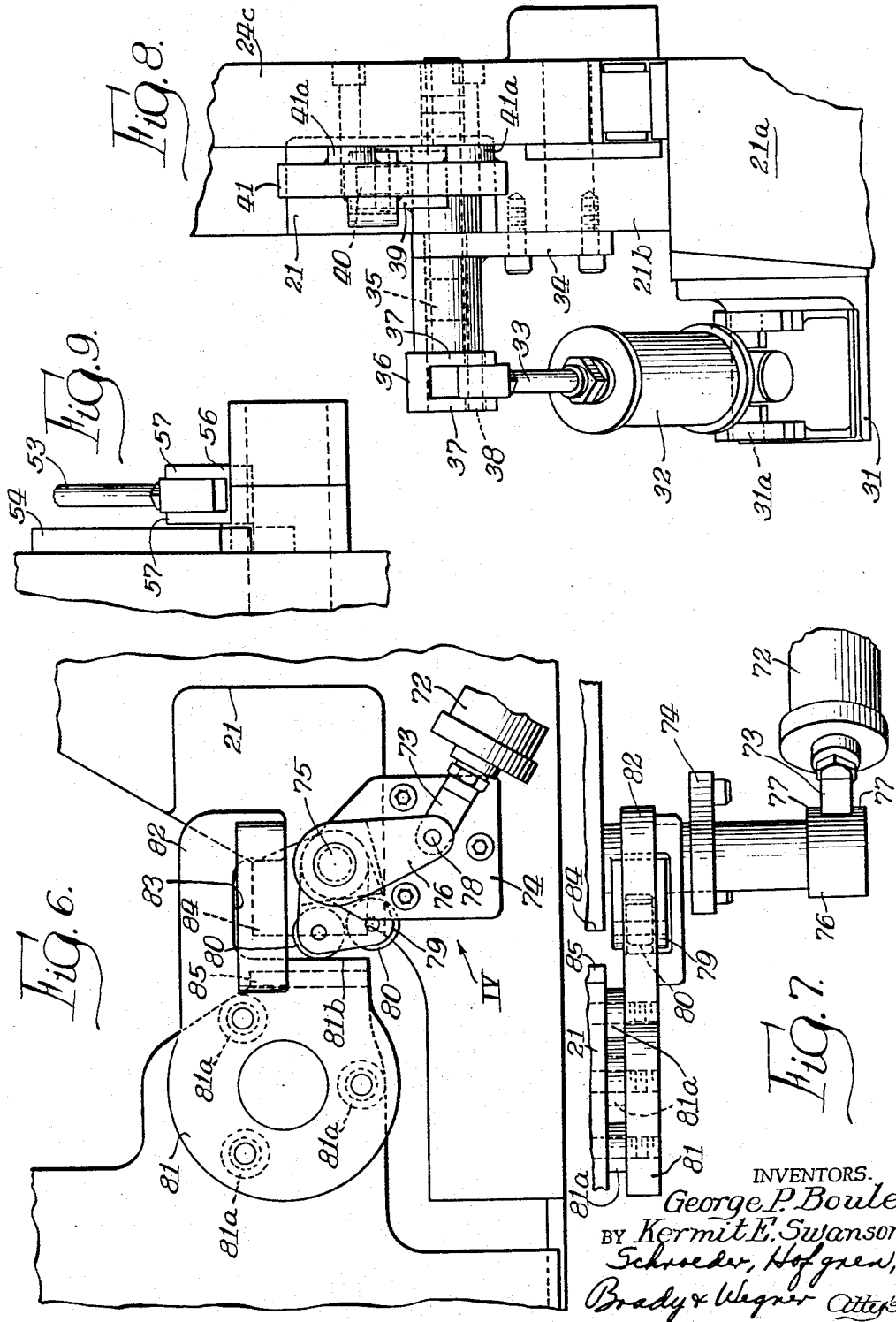
G. P. BOULE ET AL

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5 Sheets-Sheet 4



INVENTORS.
 George P. Boule,
 BY Kermit E. Swanson
 Schroeder, Hofgren,
 Brady & Wagner Attys.

Dec. 20, 1960

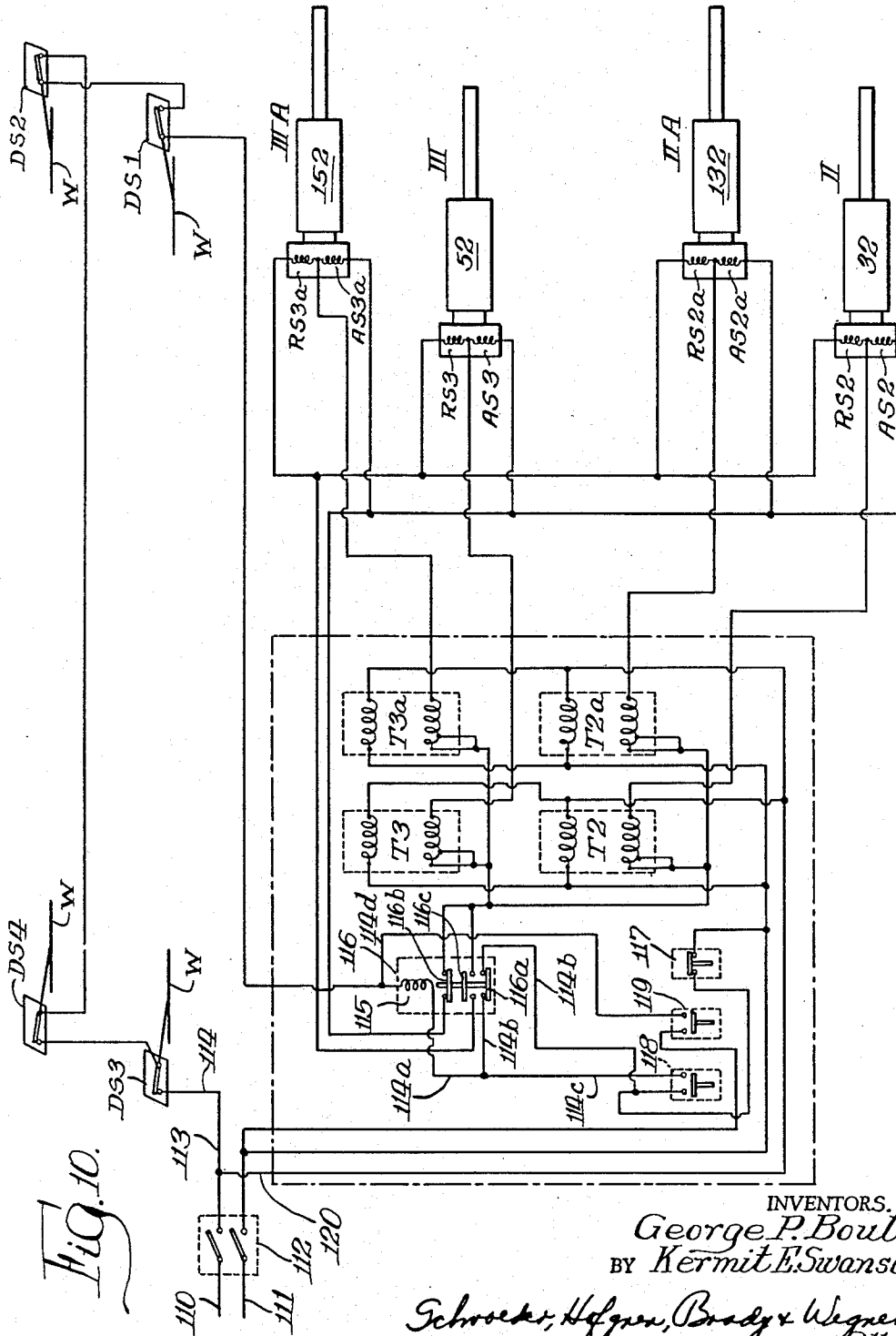
G. P. BOULE ET AL

2,965,023

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Filed Sept. 18, 1957

5 Sheets-Sheet 5



INVENTORS,
George P. Boule,
BY Kermit E. Swanson,

Schroeder, Hefgen, Brady & Wagner
Attys.

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2,965,023

LATCH AND THRUST MECHANISM FOR
PRINTING PRESS INK CARRIAGES

George P. Boule, Chicago, and Kermit E. Swanson,
Berwyn, Ill., assignors to R. R. Donnelley & Sons
Company, a corporation of Delaware

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This invention relates to a latch and thrust mechanism for the ink carriages of a printing press, and in particular it relates to such a mechanism which is controlled by a paper web detector system so as to unlatch and thrust the ink carriage away from the press when a tear is detected in the margin of a paper web passing through the press.

There have been numerous efforts in the printing art to devise dependable mechanisms for latching the movable ink carriages to a rotary printing press and for automatically unlatching and thrusting the carriages away from the press when a break or an incipient break appears in the paper web passing through the press. The need for such mechanisms is occasioned by the fact that the loose end of a broken paper web may be caught in the driven rolls of the ink carriage and carried a substantial distance into the ink roller system. If the form rollers of the ink carriage may be separated a short distance from the plate cylinders of the press before a loose web end may be caught between them, this problem of rewind of the loose web into the inking system is substantially eliminated.

The prior art ink carriage latch and thrust mechanisms have generally included rather complicated mechanical linkages to distribute latching and thrusting power from a central power source to a plurality of latch mechanisms at the sides of the press and the ink carriages. These arrangements have generally been unsatisfactory for their intended purpose because wear in the linkages usually causes a plurality of latch mechanisms to get out of alignment with each other, or out of phase with each other, so that the latches jam and fail to function as they should. When such a latch linkage fails to function properly, there may be as much time required to open the jammed latch mechanism as there is to clear the rewind which results from the jam. Obviously, this is a rather unsatisfactory situation.

In accordance with the present invention the plurality of latches for each ink carriage of a printing press are unlatched, and the ink carriage is thrust from the press, by the simultaneous operation of individual fluid motors which are associated directly with the latch mechanisms. A common type of ink carriage latch arrangement has a latch mechanism at each of the four corners of the ink carriage, so as to lock the carriage to the press at the top and at the bottom. Some carriage lock systems may use latches only at the bottom. The particular embodiment of the invention herein disclosed is applied to a press in which latches are supplied at all four corners of each carriage.

Simultaneous operation of the four fluid motors for each carriage, or of the eight fluid motors for the two carriages associated with a single impression cylinder, may be readily accomplished by a suitable electric control circuit wired through the web detectors, so that when any one of the web detectors detects a tear in a margin of the paper web passing through the printing press, the

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control system functions to simultaneously energize the solenoids of fluid control valves for the four, or eight fluid motors, thus actuating the motors to unlatch the several latch mechanisms simultaneously and thrust the ink carriages away from the press. When the press crew has cleared the web if there is an actual break, or verified that the incipient break will not be harmful, a push-button may be operated to reverse the positions of the several solenoid valves and thus operate the fluid motors to return the latch mechanisms to their engaged positions. In the particular embodiment disclosed in the present application, return of the latch mechanisms automatically draws the ink carriages back to their operative positions secured to the press frame.

The invention is illustrated in a preferred embodiment in the accompanying drawings in which:

Fig. 1 is a generally schematic side elevational view of a typical rotary press and two associated ink carriages with the latch mechanism of the present invention applied to the upper and lower corners of each carriage;

Fig. 2 is a fragmentary side elevational view on an enlarged scale of the lower right hand latch mechanism of Fig. 1;

Fig. 3 is a view similar to Fig. 2 of the upper right hand latch mechanism of Fig. 1;

Fig. 4 is a view similar to Fig. 2 of the lower left hand latch mechanism of Fig. 1;

Fig. 5 is a view similar to Fig. 2 of the upper left hand latch mechanism of Fig. 1;

Fig. 6 is a view of the lower left hand latch mechanism of Fig. 4 in released position with the ink carriage thrust away from the press frame;

Fig. 7 is a fragmentary plan view of the mechanism of Fig. 6;

Fig. 8 is a fragmentary front elevational view of the mechanism of Fig. 2, viewing Fig. 2 from the right;

Fig. 9 is a fragmentary section taken substantially as indicated along the line 9—9 of Fig. 3; and

Fig. 10 is a wiring diagram of the control circuit for operating the four latch mechanisms on one ink carriage.

Referring to the drawings in greater detail, and referring first to Fig. 1, a single stand 20 of a printing press has a frame 21 on which is journaled an impression cylinder 22 and a plurality of plate cylinders 23. Associated with the stand 20 is a pair of ink carriages, the right hand ink carriage in Fig. 1 being numbered 24 and the left hand carriage being numbered 25. The ink carriage 24 is provided with a frame 24a mounted on rollers 24b so as to be movable with respect to the press stand 20, while the carriage 25 similarly has a carriage frame 25a on rollers 25b. The ink carriage 24 has two suitable systems of ink distributing rollers, indicated generally at 26, terminating in two sets of form rolls 27 which are normally in contact with the plate cylinders 23 at one side of the press frame; while similarly the ink carriage 25 has two sets of inking rollers 28 terminating in form rolls 29 which are in contact with the plate cylinders 23 on the opposite side of the press stand.

The present invention is concerned with the ink carriage latch and thrust mechanisms which are indicated generally in Fig. 1 by the Roman numerals II and III for the lower and upper latches of the carriage 24, and by the Roman numerals IV and V applied, respectively, to the lower and upper latches of the ink carriage 25. For convenience in associating the views with the various latch mechanisms, the Roman numeral reference for each latch mechanism is the same as the figure number for the detailed view of the same latch mechanism; and the same numbering series is also employed in the wiring diagram Fig. 10.

It is seen from Fig. 1 that the four illustrated latch mechanisms differ slightly from one another in the mounting of the fluid cylinders and the bases for the latch elements, due to differences in the structures of the two sides of the press stand 20 and in the associated parts of the ink carriages 24 and 25. However, the basic components of the four latch mechanisms are the same. It will be understood that the ink carriage 24 has, on its opposite side, latch mechanism which duplicate mechanisms II and III; and that the carriage 25 has on its opposite side latch mechanisms duplicating IV and V.

Referring now to Figs. 2 and 8, the press frame includes a base member 21a on which is mounted a bracket 31 which has a pivot pin 31a supporting a fluid motor 32 of the latch mechanism II. Preferably the fluid motor 32 is an air motor, rather than a hydraulic motor, so as to avoid the use of hydraulic liquid. The motor 32 has a piston provided with a piston rod 33 which is seen in Fig. 2 to be in its advanced, or extended position with respect to the cylinder of the air motor.

Mounted on a foot 21a of the press frame 21, adjacent the piston rod 33, is a bracket 34 in which is journaled a rock shaft 35; and as best seen in Fig. 8 the rock shaft is provided with a crank 36 which is bifurcated as seen at 37 to receive a pin 38 by means of which the crank is pivotally connected to the piston rod 33. Also mounted on the rock shaft 35, but closer to the press frame 21 than is the crank 36, is a combined latch and thrust arm 39 having a pair of thrust rollers 40.

The ink carriage frame 24a has a forwardly extending boss 24c at its lower corner on which is mounted a fixed latch hook 41 having a hook finger 42 in the lower margin of which is a suitably shaped recess 43 which receives the combined latch and thrust arm 39 with its thrust rollers 40. Hook 41 is provided with spacing bosses 41a to align it properly with latch arm 39. Precise positioning of the ink carriage 24 with respect to the press stand 20 is assured by matching machined abutment pads on the press frame 21 and the carriage 24, said machined pads being indicated respectively by the reference numerals 44 and 45.

Referring now to Fig. 3, it is seen that the press frame includes an upper press rail 21b on which is mounted a bracket 51 having a pin 51a which supports a fluid motor 52. The motor 52 includes a piston provided with a piston rod 53 which is seen in Fig. 3 to be in its advanced, or extended position with respect to the cylinder of the air motor, so that in this respect it is like the air motor 32 of the mechanism II.

Mounted on the press frame 21, adjacent the piston rod 53, is a bracket 54 in which is journaled a rock shaft 55; and as best seen in Fig. 9 the rock shaft is provided with a crank 56 which is bifurcated as seen at 57 to receive a pin 58 by means of which the crank is pivotally connected to the piston rod 53. Also mounted on the rock shaft 55, but closer to the press frame 21 than is the crank 56, is a combined latch and thrust arm 59 having a pair of thrust rollers 60.

The ink carriage frame 24a has a forwardly extending boss 24d at its upper corner on which is mounted a fixed latch hook 61 having a hook finger 62 in the lower margin of which is a recess 63 which receives the combined latch and thrust finger 59 with its thrust rollers 60. Machined abutment pads 64 and 65 are positioned, respectively, on the press frame 21 and the upper boss 24d of the ink carriage. These machined pads cooperate with the similar pads 44 and 45 seen in Fig. 2, and with similarly positioned pads on the opposite side of the press frame and the ink carriage, to assure that the carriage is correctly positioned with respect to the press stand 20.

As seen in Fig. 4, the latch mechanism IV includes an air motor 72 the piston rod 73 of which is shown in extended position; and adjacent the piston rod 73 on a foot 21c of the press frame is a bracket 74 for a rock shaft

75. A crank 76 on the rock shaft is bifurcated as seen at 77 in Fig. 7 to support a pin 78 which pivotally receives the outer end of piston rod 73. On rock shaft 75 is a combined latch and thrust arm 79 having thrust rollers 80 adjacent its outer end.

The ink carriage frame 25a has a forwardly extending boss 25c at its lower corner; and a fixed latch hook 81 is provided with spacing bosses 81a (see Fig. 7) which align it with the latch arm 79. Latch 81 has a hook finger 82 in the lower margin of which is a recess 83 which receives the latch arm 79 and thrust rollers 80.

As seen in Fig. 5, the latch mechanism V includes a bracket 91 on an upper press rail element 21d, and the bracket has a pin 91a on which is mounted a fluid motor 92 the piston rod 93 of which is seen in extended position. A bracket 94 on the press frame 21 supports a rock shaft 95 on which is a crank 96 carrying a pin 98 for a pivotal connection to the piston rod 93. A combined latch and thrust arm 99 is also mounted on rock shaft 95 and has a pair of thrust rollers 100 journaled in its outer end portion. The ink carriage frame 25a is provided adjacent its upper corner with a fixed latch hook 101 having spacing bosses 101a to align it with latch arm 99; and a hook finger 102 is recessed to receive the latch arm 99 and the rollers 100.

Like the carriage 24, the carriage 25 is seen in Figs. 4 and 5 to be provided with lower machined pads 85 which abut matching pads 84 on the press frame, and with upper machined pads 105 which abut matching pads 104 on the upper portion of the press frame.

The latching and unlatching of the four described latch members is similar in all cases, and accordingly only the latch mechanism IV is seen in dis-engaged position in Figures 6 and 7. Comparison of these views with Fig. 4 shows that retraction of the piston rod 73 acts through the crank 76 to turn the rock shaft 75 and swing the latch and thrust arm 79 with its rollers 80 outwardly and away from the press frame 21. This carries the rollers 80 out of the hook recess 83 and into camming and thrusting engagement with a hook thrust face 81b, so as to thrust the ink carriage 25 away from the press stand 20 on its rollers 25b. The extent of movement of the carriage 25 may be seen by comparing the position of the hook finger 82 with respect to the press frame 21 in Fig. 4 and in Fig. 6, and the space between the abutment pads 84 and 85 in Figs. 6 and 7. Although the movement is not great, it is adequate to open a space between the form rolls 29 and the plate cylinders 23 and thus eliminate the possibility of any substantial rewind of a broken paper web into the ink distributing rolls 28 of the carriage 25.

Simultaneous actuation of the air motors 32 and 52, for the latch mechanisms II and III, and of corresponding air motors 132 and 152 for latch mechanisms IIA and IIIA (Fig. 10) on the opposite side of carriage 24, is accomplished through the control system illustrated in Fig. 10. Basically, the control mechanism consists of the usual solenoid control valves for actuating the air motors to advance and retract their pistons and piston rods, together with a suitable control circuit containing four normally open web detector switches which are wired in series and held closed by the action of the paper web passing through the press stand 20. A duplicate circuit for the latch mechanisms IV and V of carriage 25 is operated off the same four detector switches, so that a web break causes the unlatching of both ink carriages.

With further reference to Fig. 10, the control circuit includes 220-volt supply lines 110 and 111 which enter the system through a fused disconnect switch 112. From the line 110 a control branch circuit 113 has a first line 114 with four normally open web detector switches wired in series, there being detector switches DS1 and DS2 at the two sides of the paper web entering the press stand 20, the detector switches DS3 and DS4 at the two sides of the paper web leaving the press stand. The margins

of the paper web in contact with the detector fingers of the switches are indicated in Fig. 10 as W; and the detector switches are of the customary type which may open if the detector finger riding on the web encounters a break in the web margin.

Control circuit 114 also includes a solenoid 115 of a control relay 116 which has a normally open switch 116a forming a part of the control circuit. Relay 116 serves as an actuating member for the air motor solenoids through a normally open switch 116b and a normally closed switch 116c. As shown in the drawings, the normally open switches 116a and 116b are closed and the normally closed switch 116c is open, which are the positions occupied by them during normal operation of the system with a web passing through the press and the four detector switches all closed.

From the solenoid 115 a control circuit lead 114a has a branch 114b containing contacts for the normally open relay switch 116a. Circuit 114b also passes through the contacts of a normally closed "unlock" pushbutton switch 117. A branch circuit 114c contains the contacts of a normally open momentary "lock" pushbutton switch 118 and also passes through normally closed switch 117.

In the condition shown in Fig. 10, the control circuit 114 is completed through the four closed detector switches DS1, DS2, DS3, and DS4, through the solenoid 115, through the branch circuit 114b, the contacts of relay switch 116a, and normally closed pushbutton switch 117.

If one of the web detector switches opens because of a break in the web margin, control circuit 114 is deenergized, and the switches of relay 116 move from the position shown in the drawing to their normal positions—i.e., 116a and 116b open, 116c closed. To re-establish the circuit after the web break has been repaired so that all of the detector switches are closed, it is necessary to press the normally open momentary "lock" pushbutton switch 118 which closes the control circuit through branch circuit 114c, energizes solenoid 115, and returns the relay switches to the positions shown in Fig. 10.

If the ink carriages are to be released and retracted with the detector switches all closed, "unlock" button 117 may be pressed to break the control circuit through relay solenoid 115.

There is also a detector bypass circuit 114d having a normally open, momentary contact pushbutton switch 119 which entirely bypasses relay 116 and the pushbutton switches 117 and 118.

Also coming off line 110 is a transformer branch circuit 120 which is connected to the high voltage side of transformers T2, T3, T2a and T3a which are associated, respectively, with the valve control solenoids for the air motors of the latch mechanism II, III, IIA and IIA. The secondary windings of the four transformers are connected by suitable circuits with the valve control solenoids. Thus, transformer T2 has its secondary in circuit with a first valve control solenoid AS2 which is for advancing the piston of air motor 32 of latch mechanism II, and with a solenoid RS2 for retracting the piston of air motor 32. Similarly, T3 is in circuit with solenoids AS3 and RS3 of the air motor 52; T2a is in circuit with solenoids AS2a and RS2a of air motor 132; and T3a is in circuit with solenoids AS3a and RS3a of air motor 152. The circuits for all of the solenoids which control the advance of the air motors are in circuit with the contacts of relay switch 116b; while the circuits for all of the solenoids for controlling retraction of the air motors are in circuit with the relay switch 116c. Thus, as seen in Fig. 10, with the relay switch 116b closed the valve control solenoids AS2, AS3, AS2a and AS3a are all energized, and the piston rods of the four air motors are all advanced as shown in Figs. 2, 3, 4 and 5. In this position of the air motor piston rods

the carriages are locked to the press stand 20, and thus occupy their normally secured positions for printing.

Upon occurrence of a web break, relay switch 116b opens and 116c closes, thus deenergizing the advance control solenoids and energizing the retract control solenoids RS2, RS3, RS2a and RS3a, inclusive. This retracts the air cylinder pistons, unlatches the carriages and thrusts them away from the press stand.

As previously stated, the circuit of Fig. 10 controls the four air motors for the latch mechanisms of carriage 24; and an identical control circuit is wired through the same four detector switches AS1 to AS4, inclusive, to operate the four air motors for the other ink carriage 25 associated with the press stand 20. Thus, a tear in the margin of the paper web either entering or leaving the press stand causes both of the ink carriages to be unlatched and thrust away from the press.

The foregoing detailed description is given for clearness of understanding only and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

We claim:

1. In a printing mechanism having a rotary press member with a single movable ink carriage member releasably secured at one end thereof, carriage latch and thrust mechanism comprising: a fluid motor at each corner of one of said members; a latch lever pivotally mounted on each corner of said one of said members and operatively connected to the adjacent fluid motor, said lever having spaced rollers on one arm; and means at each corner of the other of said members providing space, upright latch thrust surfaces, said rollers on a latch lever being movable in and out of thrusting relationship with said thrust surfaces when the lever pivots, so that the rollers thrust the members apart when the fluid motor is actuated in one way and draw the members together when the motor is actuated in the opposite way; and control means for simultaneously actuating said motors to selectively release or latch the members.

2. In a printing mechanism having a rotary press member with a single movable ink carriage member releasably secured at one end thereof, carriage latch and thrust mechanism comprising: a fluid motor at each corner of one of said members; a bell crank latch pivotally mounted on each corner of said one of said members and operatively connected to the adjacent fluid motor, said bell crank having spaced rollers on one arm; a latch hook at each corner of the other of said members, each latch hook having a latch recess with spaced puright thrust surfaces, said rollers on a bell crank being movable in and out of said recess when the bell crank pivots, said rollers bearing on one of the upright surfaces to thrust the members apart when the fluid motor is actuated in one way and bearing on the other upright surface to draw the members together when the fluid motor is actuated in the opposite way; and control means for simultaneously actuating said motors to selectively release or latch the members.

3. The mechanism of claim 2 in which the bell crank comprises a rock shaft, a crank arm on said shaft connected with the fluid motor, and a latch arm on said shaft, the rollers being on said latch arm.

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