

Nov. 10, 1959

T. H. JOHNSON
PRINTING PRESS

2,911,908

Filed Jan. 22, 1958

3 Sheets-Sheet 3

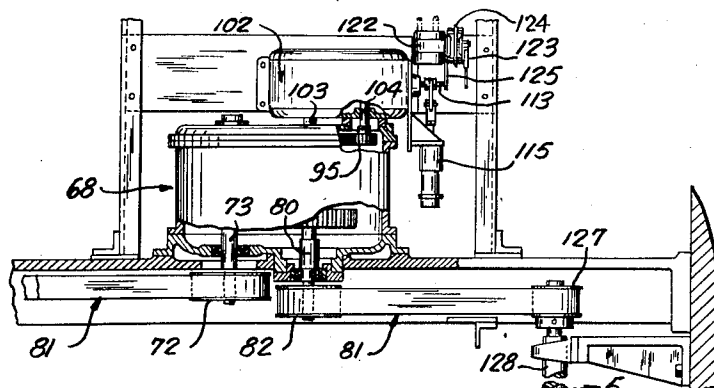


FIG. 3

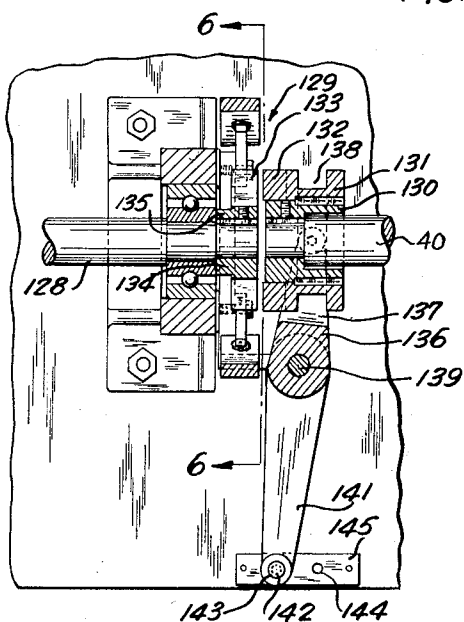
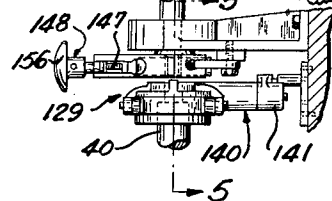


FIG. 5

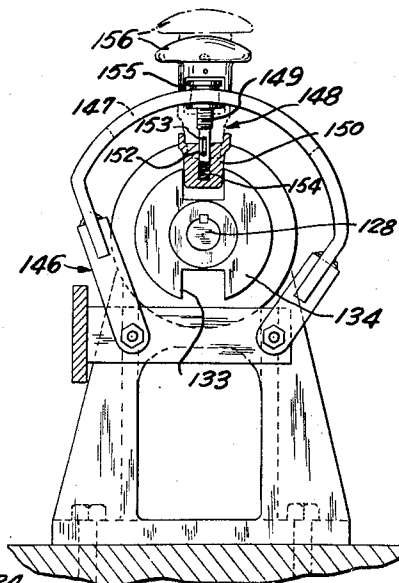


FIG. 6

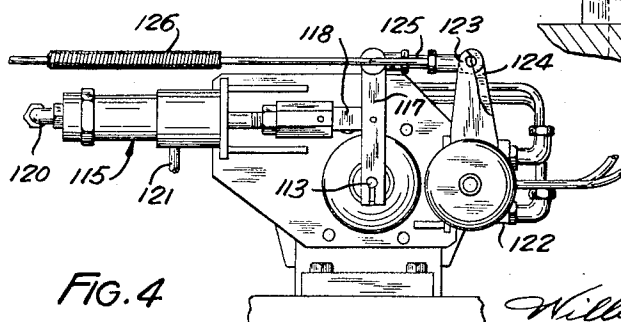


FIG. 4

INVENTOR.
THOMAS H. JOHNSON
BY *Hudson, Baughton,*
Williams, David & Hoffmann
ATTORNEYS

1

2,911,908

PRINTING PRESS

Thomas H. Johnson, Westerly, R.I., assignor to Harris-Intertype Corporation, Cleveland, Ohio, a corporation of Delaware

Application January 22, 1958, Serial No. 710,455

17 Claims. (Cl. 101—181)

The present invention relates to high speed, web-fed printing presses having the web supplied to the printing couple or couples of the press from a driven supply roll.

In high speed web-fed printing presses, it is important that a substantially constant tension be maintained in the web of the press. This may be done by providing a tensioning roller which engages the web of the press to maintain a constant tension therein and by providing a variable speed drive mechanism for the web of the press which is controlled by the movements of the tensioning roller to drive the web supply roll at the necessary speed to feed paper from the roll at substantially the same rate at which the web is being drawn into the press, thereby enabling the tensioning roller to maintain constant tension. High speed web-fed printing presses of the described type are conventionally provided with web break detectors that engage the tensioned web at a plurality of points and if the web breaks or becomes slack these detectors are actuated to effect a press control operation, such as the automatic stopping of the press drive motor and the throwing off of the printing pressure.

In the type of printing press described, it is often desirable to rotate one or more cylinders of the printing couple or couples of the press while the printing pressure is off. This is particularly true in lithographic offset presses where it is necessary to clean up the blanket cylinder each time the press is shut down for a period of time, such as over night, even though the lithographic plate of the press is not to be changed. While the press is running with printing pressure off it is desirable that the web be held stationary so that large quantities of the web are not wasted during the blanket cylinder cleanup operation. Furthermore, it is desirable to be able to maintain the tension in the web to prevent operation of the web break detectors and to make it unnecessary to retension the web when the press is again started. The tension in the web may be highly critical and the initial tensioning operation can be a relatively long and tedious operation and considerable web can be wasted before proper tensioning is effected.

An important object of the present invention is to provide a web-fed press in which the web can be threaded therethrough and held stationary without slack while the press is run.

Another object of the present invention is to provide a high speed web-fed printing press having a variable speed drive mechanism, preferably controlled by a web tensioning roller, for driving the web supply roll and in which the web may be held stationary and tension maintained in the web while the printing pressure is off and the press drive operated to effect rotation of one or more of the cylinders of the printing couple or couples of the press.

Another object of the present invention is to provide a new and improved high speed web-fed printing press having a variable speed drive mechanism for rotating the web supply roll and in which the drive mechanism for the web supply roll is controlled by a web tensioning

2

roller and is driven from the main press drive and is declutchable therefrom to permit operation of the press drive without driving the web and in which web tension can be maintained to prevent actuation of the web break detectors of the printing press when the printing pressure is off and the variable speed driving mechanism for the web supply roll declutched from the press drive.

A further object of the present invention is to provide a new and improved high speed web-fed printing press in which a web is supplied to the printing couples of the press from a web supply roll driven by a variable speed mechanism controlled by a tensioning roller for tensioning the web and in which the web is driven at a plurality of points in the press by driving rollers driven from the press drive and is engaged by web break detectors which are actuated upon the web breaking or becoming slack to stop the press and preferably throw off printing pressure, the press being so constructed and arranged that the main press drive may be operated to drive the cylinders of the printing couple when the printing pressure is off and the web held stationary with tension therein to prevent operation of the web break detectors and the loss of web tension.

Further objects and advantages of the present invention will be apparent from the following detailed description of the preferred embodiment made with reference to the accompanying drawings forming a part of the present specification, and in which:

Fig. 1 is a view, primarily schematic, of a printing press embodying the present invention;

Fig. 2 is a fragmentary side elevational view of the press showing the web supply roll and variable speed drive mechanism therefor;

Fig. 3 is a fragmentary sectional view taken approximately along line 3—3 of Fig. 2;

Fig. 4 is an end view of control mechanism for the variable speed transmission of the drive mechanism for the web supply roll;

Fig. 5 is a sectional view taken approximately along line 5—5 of Fig. 3;

Fig. 6 is a sectional view taken approximately along line 6—6 of Fig. 5 but showing certain of the parts in a relative position different from their position shown in Fig. 5, and

Fig. 7 is a fragmentary view looking from the left side of Fig. 2.

The present invention is susceptible of use in various types of web-fed printing presses but is particularly useful in a lithographic offset printing press and is herein shown as embodied in such a printing press.

The particular press illustrated is a back-to-back perfecting printing press comprised of two printing units in a line each unit comprising four printing couples; one unit being adapted to print four colors on one side of the web, and the other unit being adapted to print four colors on the other side of the web.

Referring to the drawings, the printing press includes a first printing unit 11 comprising two horizontally spaced, parallel impression cylinders 12, 13 and a second printing unit 14 in line with the first unit and having two horizontally spaced, parallel impression cylinders 15, 16. The cylinders 12, 13, 15 and 16 have uninterrupted, smooth surfaces. Each of the impression cylinders 12, 13, 15, 16 cooperates with a respective blanket cylinder 17 disposed above the particular impression cylinder and a respective blanket cylinder 18 disposed below the impression cylinder to print a web passing therebetween. A respective cooperating plate cylinder 19 is provided for each of the blanket cylinders 17, 18. The plate cylinders 19, the blanket cylinders 17, 18 and the impression cylinders 12, 13, 15, 16 will not be described in detail since they may be of a conventional construction well known to those

3

skilled in the art and since they do not, per se, form a part of this invention. The cylinders may be linked in any conventional manner.

The printing units, 11, 14 operate upon a web 20 which is fed to the printing unit 11 from a feeding device 21 positioned adjacent the front side of the press as the latter is viewed in Fig. 1 so as to be laterally offset from the line of the press. The feeding device comprises a carrier 22 adapted to support three web supply rolls 23 with their axes horizontal and to move the rolls sequentially and one at a time into position to be fed into the press. The axes of the supply rolls are parallel to the line of the press, i.e., perpendicular to the axes of the impression cylinders, and the web is fed from the supply roll in feeding position on the feeding device into the press along a path extending transversely of line of the press and parallel to the axes of the impression cylinders so that width of the web is parallel to the press line, as is best shown in Figs. 1 and 2. The web 20 enters the press at a point above the impression cylinder 12 of the first printing unit and is turned by an angle, or turning, bar 25 disposed above the cylinder 12 so that the width of the web traveling through the press extends parallel to the axes of the impression cylinders. The web is guided from the angle bar 25 to the impression cylinder 12 by a plurality of rolls 26 and passes between the impression cylinder 12 and its cooperating upper blanket cylinder 17. From the impression cylinder 12 the web travels to the impression cylinder 13 and first passes between the upper blanket cylinder 17 cooperating therewith, wraps around the cylinder 13 and then passes between the impression cylinder 13 and the lower blanket cylinder 18 cooperating therewith. From the impression cylinder 13 and lower blanket cylinder 18 the web returns to the impression cylinder 12, passes between the impression cylinder 12 and the cooperating lower blanket cylinder 18 and exits from the first printing unit. From the first printing unit the web is guided by rolls to and through the lower pass of an oven drier 27 positioned adjacent the top side of the press. As the press is viewed in Fig. 1, the web passes through the drier from left to right and exits from the right-hand end of the drier and passes around three cooling rolls or drums 28, 29, 30. The three cooling drums 28, 29, 30 are preferably arranged so that the web wraps at least 180° of the periphery of each of the drums and after passing over the drums 28—30 the web is led into the second printing unit 14 and passes between the printing couples thereof in the following order: The impression cylinder 15 and the cooperating blanket cylinder 17; the impression cylinder 16 and the cooperating blanket cylinder 17; the impression cylinder 16 and the cooperating blanket cylinder 18; and, finally, the impression cylinder 15 and the cooperating blanket cylinder 18. The web then exits from the second printing unit at the right-hand end thereof, which is the end remote from the first printing unit, as viewed in Fig. 1, and is guided by rollers through an upper pass of the drier unit 27 and exits from the left-hand end thereof as viewed in Fig. 1. Upon exiting from the left-hand end of the drier unit 27, which is the end adjacent the first printing unit, the web 20 passes around and is driven by three cooling drums 28', 29', 30' arranged in the manner of the cooling drums 28, 29, 30. From the cooling drums 28'—30' the web is led over a series of rolls including driven rollers 32, 33 each having trolley rollers 34 cooperating with the upper periphery thereof. From the roller 33 the web passes into a sheeting mechanism 35 including severing rolls 36.

The impression cylinders 12, 13, 15, 16 are directly driven from a main press drive shaft 40 which, in turn, is driven by a pair of synchronous motors 41. The blanket and plate cylinders of each printing couple are geared in a conventional manner to the impression cylinder so as to be driven thereby. The arrangement of the cylinders and gearing is such that the blanket and impression cylinders of each couple may be relatively moved as indicated in Fig. 1 to throw off printing pres-

4

sure without disturbing the drive between the impression cylinders and the other cylinders of the printing couple to permit the cylinders to be rotated without printing pressure. The gearing interconnecting the cylinders of each couple and the printing pressure throw-off mechanisms are conventional mechanisms well known to those skilled in the art and constitute part of every standard web-fed printing press. A description of this throw-off mechanism and gearing is therefore unnecessary, insofar as those skilled in the art are concerned, for an understanding of the nature of and manner of constructing and using the present invention. If desired, the press may embody the type of throw-off mechanism and gearing disclosed in the application of Arthur G. Royer and William J. Thompson, Serial No. 382,381, entitled Cylinder Throw-Off and filed September 23, 1953, now U.S. Patent No. 2,874,636.

The water cooled drums 28—30 and 28'—30' are driven from the press drive shaft through suitable variable speed mechanism to be described and certain of the rolls in the drier are also driven by a shaft 43 geared to the main drive shaft. The rolls 32, 33 are driven from the sheeting mechanism 35 by suitable gearing not shown in the drawings, since it is not necessary for an understanding of the present invention.

When the press is operating with printing pressure on, the action of the impression cylinders and the driven rolls or drums of the press is such as to tend to draw the web through the press at a certain speed. In the illustrated machine, the web supply roll is driven to supply the web to the press at the average rate at which it is being used by the press and at the speed necessary to enable a constant tension to be maintained in the web. In addition to controlling the speed with which the web is fed into the press, the speeds of the water cooled drums 28—30 and 28'—30' are preferably manually variable to respectively control the web tension at the exit side of the first printing unit and at the exit side of the second printing unit.

The feeding device 21 comprises a frame 45 including spaced side members 46 which stand on the floor and which support a shaft 47 upon which the carrier 22 is mounted. The carrier 22 includes spaced spiders 48 each formed with three radially extending arms 50. The web supply rolls are supported between corresponding radial arms of the spiders 48 and the latter are rotatable to move the rolls individually into engagement with a plurality of driving belts 52. The driving belts 52 engage the peripheral surface of the web supply roll to be fed and drive the roll to supply the web to the printing units. The web is fed from the supply roll which is being driven by the belts 52 upwardly over a plurality of rollers rotatably supported by the frame 45 including rollers 53, 54 disposed respectively below and above a floating take-up or tensioning roller 55. The rollers 53, 54 together with the floating, tensioning roller 55 are disposed so that the web forms a loop, a horizontally extending loop in the illustrated machine, with the bight of the loop being formed around the tensioning roller 55. The web 20 is guided from the roller 54 upwardly over rollers 56 to the turning bar 25 disposed above the printing unit 11. The rollers 54, 55, 56 are supported by the spaced frame members 57 extending upwardly from the side members 46 and connected to the press frame at their upper ends.

The tensioning roller 55 is rotatably mounted on a shaft 58 supported at its opposite ends by arms 59 of a rocker shaft 62. The shaft 62 is rockably supported between the frame members 57 above the tensioning roller 55 and the arms 60 extend downwardly from the shaft 62 to support the tensioning roller 55. A crank arm 63 is provided adjacent each end of the shaft 62 and the tensioning roller 55 is biased against the web 20 to apply a constant force thereto by a pair of air cylinders 64 having their pistons connected to the crank arms 63. The cylinders 64 are supported by the frame members 57 adjacent the opposite ends of the shaft 62.

The air pressure in the cylinders 64 operates through the tensioning or take-up roller 55 to maintain a constant tension between the web supply roll and the first printing unit. If the first printing unit is drawing the web 20 faster than it is being supplied from the web supply roll, the loop about the tensioning roller 55 will shorten and the roller will move to the left, as the latter is viewed in Fig. 3. If the web is being supplied faster than it is being drawn into the first printing unit, the loop about the tensioning roller 55 lengthens and the roller will move to the right, as viewed in Fig. 3. The tension of the web 20 will remain constant as long as the take-up roller 55 has not reached its limit of movement in the direction of change.

The movements of the tensioning roller 55 are utilized to control the driving mechanism for the belts 52. The details of supporting the belts 52 and the manner in which they operate to drive the web roll are conventional and, therefore, will not be described in detail. The drive to the belts, however, will be fully described where it is necessary for an understanding of, or forms part of the present invention. Suffice it to say that the belts 52 pass around corresponding drive pulleys fixed to a shaft 66 rotatably supported by the frame 45 and driven by a belt drive 67 from the output of a differential unit 68. The belt drive 67 comprises a drive pulley 70 fixed to one end of the shaft 66, a drive belt 71, and a pulley 72 fixed to an output shaft 73 of the differential unit 68 so as to be driven thereby.

Each of the belts 52 also pass around a plurality of guide pulleys 74 disposed to cause the outer side of the belts 52 to engage a web supply roll supported by the carrier 22 and around a take-up pulley 75 only one appearing in the drawings. Each take-up pulley 75 is supported at the outer end of a piston rod 76 of an air cylinder 77 which functions to take up the slack in the corresponding belt to maintain a tension therein and engagement with the supply roll as the diameter of the web supply roll diminishes.

The belt drive 67 is driven at a speed which varies in accordance with the movement of the tensioning roller 55. The output speed of the differential unit 68 is determined by the relative speed of two input elements of the differential unit. One of the input elements of the differential unit 68 comprises a shaft 80 journal supported by the casing of the differential unit and driven from the main drive shaft 40 of the press through a belt drive 81. The shaft 80 extends transversely of the differential unit and has an end thereof extending outwardly of one side of the casing and on which a pulley 82 is fixed. The pulley 82 is the output pulley of the belt drive 81.

The second input element of the differential unit is a gear 95 driven from the shaft 80 by an infinitely variable speed transmission 102 having an input shaft 103 connected to the end of the shaft 80 remote from the pulley 82 so as to be driven thereby and an output shaft 104 to which the gear 95 is connected.

Input and output shafts 103, 104 are parallel shafts and the drive between the shafts is, in the illustrated embodiment, a positive drive with ratio of the input shaft speed to the output shaft speed being infinitely variable within the range of variation. The particular type of mechanism for interconnecting the shafts 103, 104 does not, per se, constitute a part of the present invention and any suitable drive meeting the requirements set for it may be utilized. A suitable drive is one manufactured by the Link Belt Company and sold under the trade name, "P.I.V." The variable speed mechanism 102 includes a control arm 113 which extends outwardly of the casing of the variable speed transmission 102 to provide a rotatable adjustment for controlling the speed ratio of the output shaft 104 to the input shaft 103. When the control member 113 is rotated in one direction, the speed ratio is increased and when rotated in the other direction, the speed ratio is decreased.

The control member 113 is actuated to vary the output obtained of the variable speed mechanism by a double-acting fluid pressure motor 115. The fluid pressure motor includes a piston rod 116 connected to an arm 117 extending radially outwardly from the control member 113 by a link 118. The motor 115 has fluid pressure conduits 120, 121 connected thereto for supplying fluid pressure to one side of the motor and connecting the other side to drain to actuate the motor.

The connection of the conduits 120, 121 to drain, or fluid pressure supply, is controlled by a servo valve 122 having a movable valve element operated by movement of a control lever 123 and a follow-up lever 124. The valve 122 is a conventional valve and will, therefore, not be described in detail. Suffice it to say that the valve is of the type which is in a position blocking the conduits 120, 121 when the movable valve element is in a neutral position and wherein fluid pressure is supplied to one side of the motor if the valve element is displaced in one direction and to the other side of the motor if displaced in the opposite direction. The control lever 123 is initially moved to displace the valve element. The follow-up lever 124 is connected to a crank arm on the control member 113 of the variable speed transmission by a rod 125, and, when the fluid pressure motor 115 is actuated in response to movement of the control lever 123, causes the follow-up element 124 to move in a direction to return the valve element to its predetermined position in which the valve is closed. In the particular servo valve shown in the drawings, the control levers are connected to a rotatable valve member through differential gearing where the movement imparted to the valve member is the differential of the movement of the control lever and the follow-up lever. A further description of the operation of the variable speed transmission 102, the fluid pressure motor 115, and the servo valve 122 is not deemed necessary inasmuch as the transmission 102, motor 115, and valve 122 are available commercially as a unit. The variable speed transmission and differential unit are described in detail in the application of William R. Spiller and Thomas H. Johnson, Serial No. 647,641, filed March 21, 1957, and reference is made thereto for the further details of construction and operation not believed necessary for an understanding of the present invention.

The control lever 123 of the servo valve 122 is connected to one of the cranks 63 on the rocker shaft 62 by a cable 126. Movement of the tensioning roller 55 is transmitted through the cable 126 to the control lever 123. If the speed of the belts 52 is too slow, the tension roller 55 will move to the left causing the control lever 123 to shift in a direction to supply fluid pressure to the motor 115 to operate the latter in the direction necessary to change the speed of the variable speed transmission in the direction to increase the speed of the output shaft 73 of the differential unit. If the speed of the web supply roll is too fast, the tensioning roller 55 will move in the opposite direction to cause the output shaft of the differential unit 68 to slow down. In the illustrated embodiment, the output of the positive, infinitely variable speed transmission is superimposed on the differential unit as an overriding component to provide an overriding speed transmission variable a given amount in either direction from a center speed.

The belt drive for rotating the input shaft 80 of the differential 68 is, as heretofore mentioned, driven from the main press drive. The belt drive 81 includes, in addition to the output pulley 82 fixed to the shaft 80, an input pulley 127 fixed to one end of a shaft 128 which is selectively connectable to the main drive shaft 40 of the press by a clutch 129. The shaft 128 and the main drive shaft 40 of the press are supported in end-to-end alignment and the clutch 129 includes a sleeve member 130 keyed to the drive shaft 40 and a slidable clutch member 131 keyed to the sleeve 130 for axial sliding movement

7

with respect thereto. The end of the slideable member 131 adjacent the shaft 128 is provided with spaced axially extending projections or teeth 132 adapted to be received in respective spaced slots 133 in a clutch output member 134. The clutch output member 134 is in the form of an annular plate having cutouts therein providing the spaced slots 133 and a hub portion 135 fixed to the end of the shaft 128 adjacent the drive shaft 40.

In the illustrated clutch, the slots 133 are diametrically opposed to each other and the slideable member 131 is provided with two diametrically opposed axially extending teeth 132. The clutch 129 is engageable by sliding the member 131 axially on the sleeve 130 to move the teeth 132 into the slots 133 of the output member 134. If the slots 133 and the teeth 132 are not aligned with each other when the clutch is to be engaged, the press may be jogged to rotate the drive shaft 40 until the alignment is effected.

The slideable member 131 is shiftable by the operation of a yoke 136 having spaced arms 137 which straddle the member 131 and which mount rollers which ride in an annular recess 138 in the member 131. The end of the yoke 136 remote from the rollers thereon is fixed to a rotatable pin 139 supported in a boss in a support bracket 140. A lever 141 is also fixed at the one end to the pin 139 and the lever 141 can be manually oscillated to engage and disengage the clutch. The other end of the lever 141 is provided with an aperture 142 into which a pin 143 may be inserted to connect the yoke 136 to one of two openings 144 in an adjacent plate 145. The plate 145 is fixed to the press frame and the pin 143 is respectively receivable in the openings 144 to prevent movement of the yoke 136 relative to the frame and the lever is respectively in its clutch-engaged and clutch-disengaged positions.

In accordance with the present invention, brake means is provided for preventing rotation of the web supply roll when the clutch 129 is disengaged. In the illustrated embodiment a bracket 146 fixed to the frame includes an arcuate portion that extends about the output clutch member 134 and coaxially with the shaft 128. The bracket 146 has a slot 147 therein which a locking plunger 148 is supported for movement therealong. The locking plunger 148 includes a threaded shaft 149 that lies along an extended radius of the output clutch member 134 and a locking member 150 fixed to the inner end of the shaft adjacent the clutch member 134. The locking member 150 is receivable in either one of the slots 133 when properly aligned therewith and is provided with a bore 151 which receives the shaft 149. The locking member 150 is pinned to the shaft 149 by a pin 152 received in an elongated slot 153 in the shaft 149. The elongated slot 153 permits relative movement between the locking member 150 and the shaft 149 and the locking member 150 is biased to move toward engagement with the output clutch member 134 by a spring 154 interposed between the bottom of the bore 151 and the end of the shaft 149.

The shaft 149 is movable axially to clear the locking member 150 from the clutch member 134 when the locking member is positioned in one of the slots thereof and is supported for such axial movement by a block 155 into which the shaft threads and which is disposed in the slot 147 and slideable therealong. The outer end of the shaft 149 on the side of the bracket 146 remote from the output clutch member 134 has a nob 156 fixed thereto which may be operated to rotate the shaft 147 to thread it toward and away from the clutch member 134.

From the above description it can be seen that when the press is stopped and the clutch 129 actuated to a disengaged position, the locking plunger 148 can be moved along the slot 147 of the bracket 146 until the locking member 150 is aligned with the slots 133 of the output clutch member 134. When the locking member 150 is so aligned, the handle 156 may be rotated to move the locking plunger inwardly to engage the locking member

8

150 in the slot 133 aligned therewith. It will be noted that if the handle 156 is moved inwardly before the locking member 150 is aligned with one of the slots 133, the movement of the locking member will stop when it engages the periphery of the clutch member 134 but the shaft may be moved inwardly relative to the locking member 150 by compressing the spring 155. Then, when the locking member is moved into alignment with one of the slots 133 the compressed spring will urge the locking member 150 into the aligned slot. Fig. 3 shows the position of handle 156 when the locking member 150 is clear of the slots 133 and Fig. 6 shows the clutch member 134 rotated from its position in Figs. 3 and 5 and the locking member received in one of the slots 133.

It can also be seen from the above that the clutch 129 cannot be engaged until the locking member 150 is clear of the slots 133 since the locking member 150 is received in the same slots of the output member 134 as are the clutch teeth 132 of the clutch member driven by the drive shaft 40. This makes it impossible to connect the shaft 128 to the press drive when the shaft 128 is braked against rotation.

When the locking plunger 148 is engaged with the output clutch member 134 and the air pressure maintained on the air cylinders 77 to engage the belts 52 with the web supply roll in feeding position, the web supply roll will be held against rotation since the belts 52, the belt drives 67, 81, the differential 68 and the variable speed transmission 102 are held against movement by the locking plunger.

During the printing operation the web is drawn from the web supply roll by the printing couples and by the water cooled drums 28, 29, 30 and 28', 29' 30' which, as hereinbefore mentioned, are driven from the press drive. The drive to the drums 28—30 includes a vertical drive shaft 160 having included therein a clutch 161 comprising input and output elements 162, 163 respectively. The drive shaft 160 and output element 163 of the clutch 161 drive an input element of a manually controlled variable speed mechanism 164 having an output element connected to drive the drum 28—30. The variable speed mechanism 164 and the connection of the output element of the variable speed mechanism to the drums 28—30 do not, per se, form a part of the present invention and are not herein described in detail. The clutch 161 is preferably a jaw type clutch and is movable between engaged and disengaged positions by the operation of a pivoted lever 165 actuated between clutch-engaged and clutch-disengaged positions by a double-acting air cylinder 167.

The drums 28'—30' are similarly driven from the press drive by a drive mechanism including a variable speed drive mechanism 169 and a clutch 170 which is operable to selectively drive the drums 28'—30' from the press drive and when disengaged effects a de-clutching of the drive to these rolls. As in the case of the clutch 161 the clutch 170 is preferably a jaw tooth clutch and is operated between engaged and disengaged positions by operation of a pivoted operating lever 171 between clutch-engaged and disengaged positions. The lever 171 is operated between its clutch-engaged and clutch-disengaged positions by a double-acting air cylinder 172 connected to the lever 171.

The web exiting from the press is received by delivery means which, in the illustrated embodiment, is the sheeter 35. The sheeter 35 is preferably driven from the main press motors 41 through a drive shown schematically in Fig. 1 and including a clutch 175, preferably of the jaw tooth type, which is operable between engaged and disengaged positions by actuation of a pivoted clutch operating lever 176 between clutch-engaged and clutch-disengaged positions. The clutch operating lever 176 is shown as actuated to its clutch-engaged and its clutch-disengaged positions by a double-acting air cylinder 177 connected to the lever 176.

The press shown in Fig. 1 is provided with a plu-

rality of web break detectors 180 which are engaged by the tensioned web and held in a non-actuated position as long as tension is maintained in the web. When the tension in the web slacks or if the web breaks, the web break detectors will be moved to an actuated position to perform a control operation. Web break detectors are conventional and they commonly effect the stopping of the press motor and the throwing off of the printing pressure.

In the described press it is possible to maintain the web threaded therethrough stationary and under tension when the printing pressure is thrown off the printing couples. To accomplish this, the drums 28—30 and 28'—30' are declutched from the press drive mechanism so that the web will not be driven thereby, the clutch 175 is operated to declutch the sheeter from the press drive, the clutch 129 is actuated to a declutched position and the locking plunger 148 engaged to prevent rotation of the web supply roll. Air pressure is maintained on the air cylinders 77 of the feeding device to maintain the belt 52 in engagement with the web supply roll in feeding position. Air pressure is also maintained on the air cylinders 64 to maintain tension on the web by urging the tensioning roller 55 into engagement with the web. The air pressure to the cylinders may be controlled by individual electric switches each of which controls the operations of an individual solenoid valve in the system for supplying air to the particular cylinder. It will be noted that the web wraps around the impression cylinders of the press and that when the drive is operated with the printing pressure off, the impression cylinders will be rotated. Since the impression cylinders are smooth-surfaced, the impression cylinders will slip with respect to the web and will not cause a breaking of the web. The driving drums 28—30 and 28'—30' are declutched when the web is held stationary since the wrap around these drums is substantial and if the drums were driven a breaking of the web would result when the web supply roll is being held through the locking plunger 148. It should be noted that the web is continuously gripped or held at the exit end of the press by rollers 32, 33 and co-operating trolley rolls 34. The rollers 32, 33, as mentioned earlier, are driven from the sheeter. When the sheeter is declutched through clutch 175, the rollers 32, 33 are held stationary and do not drive the web.

It should also be noted that if brake means were not provided to brake a part of the drive mechanism for the web supply roll, the web supply roll would be free to creep while the press is being operated with the printing pressure off and the drums 28—30 and 28'—30' declutched and such a creeping will in fact result in and cause a loss of web tension. When web tension is lost the web break detectors will be actuated and shut off the motors 41. The slackened web would then lie against the lower blanket cylinders and smudge the web.

It can now be seen that the present invention provides a new and improved web-fed printing press having web tensioning means for tensioning the web, the web preferably having substantial wrap around the impression cylinder of the press and, in the illustrated embodiment, around variable speed web driving rollers the speed of which may be varied to effect a control of tension in the web and the press being so constructed and arranged that the web may be held stationary and without slack while printing pressure is off and while the impression cylinders are being driven from the press drive. The maintaining of tension in the web with printing pressure off prevents the actuation of the web break detectors of the press and further eliminates the necessity for retensioning the web each time the press is shut down for a period of time.

While the preferred embodiment of the present invention has been described in considerable detail, it is

hereby my intention to cover all modifications, constructions and arrangements which fall within the ability of those skilled in the art and the scope and spirit of the present invention.

Having thus described my invention, what I claim is:

1. In a rotary web-fed printing press including a press drive and a printing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, a drive mechanism connecting said press drive to rotate a web supply roll to feed the web to the printing couple of the press at the rate required by said printing couple and including means for selectively connecting and disconnecting the drive from the press drive to said roll, brake means for preventing rotation of said web supply roll when the drive from the press to the roll is disconnected and when printing pressure is off, and roller means on the exit side of the web from the printing couple, said roller means continuously gripping the web.

2. A printing press according to claim 1 wherein said printing couple comprises an impression cylinder having a smooth, uninterrupted surface, said cylinder being capable of being driven from the press drive during both the feeding and braked conditions of the web supply roll.

3. A printing press according to claim 1 wherein the printing couple includes a printing cylinder located below the impression cylinder in such position that slack in the web would cause the web to lie against the printing cylinder.

4. In a rotary web-fed printing press including a press drive and a printing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, tensioning means for tensioning the web of the press including a tensioning roller biased into engagement with the web, a drive connecting the press drive and a web supply roll for rotating the web supply roll to feed the web to the printing couple of the press and including a variable speed drive mechanism controlled by the tensioning roller, said variable speed drive mechanism including an input member connected to the press drive and clutch means for selectively disconnecting the drive to said web supply roll from the press drive, brake means selectively engageable to prevent rotation of said web supply roll, and roller means adjacent the exit end of the press continuously gripping the web.

5. In a rotary web-fed printing press including a printing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, tensioning means for tensioning the web of the press including a tensioning roller biased into engagement with the web, a variable speed drive mechanism controlled by the tensioning roller for rotating a web supply roll to feed the web to the printing couple of the press, said variable speed drive mechanism including an input member, clutch means for selectively connecting said input member to the press drive, brake means selectively engageable with a part of said variable speed drive mechanism to prevent rotation of said web supply roll, and roller means adjacent the exit end of the press continuously gripping the web.

6. In a rotary web-fed printing press including a press drive and a printing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, a tensioning roller biased to engage the web of the press to tension the web, web driving rollers about which the web of the press has substantial wrap disposed on the exit side of the printing couple, variable speed means for driving said rollers at different speeds to control web tension including clutch means for selectively connecting said driving rollers to be driven from the press drive, a

11

variable speed drive mechanism connecting the press drive to rotate a web supply roll to feed the web to the printing couple of the press, said drive mechanism being controlled by said tensioning roller and including an input member connected to the press drive and clutch means for selectively disconnecting the web supply roll from the press drive, brake means selectively engageable to prevent rotation of said web supply roll, and roller means adjacent the exit end of the press and on the side of said variable speed means remote from said couple and continuously holding the web.

7. In a rotary web-fed printing press including a press drive and a printing couple comprising cylinders rotated from the press drive and operable while connected to the press drive to throw off printing pressure, drive means for selectively driving a web supply roll from the press drive to rotate the web supply roll from the press drive to forward the web to the printing couple of the press and including clutch means for selectively disconnecting the drive to the web supply roll from the press drive, said clutch means comprising a clutch input member driven from the press drive and a clutch output member connected to a part of said drive means rotatable with the web supply roll, said input and output members being supported for relative movement between clutch-engaged and clutch-disengaged positions and said input member having a projecting portion received in a slot in said output member when said clutch means is engaged and disposed clear of said slot when disengaged, brake means including a member selectively engageable with said slot when said clutch means is disengaged for selectively preventing rotation of said output clutch member and of said web supply roll, and roller means adjacent the exit end of the press and continuously gripping the web.

8. In a rotary web-fed printing press including a press drive and a printing couple comprising cylinders rotated from the press drive and operable while connected to the press drive to throw off printing pressure, a tensioning roller biased to engage the web of the press to tension the web, drive means for selectively driving a web supply roll from the press drive including a variable speed drive mechanism for rotating the web supply roll to feed the web to the printing couple of the press, and clutch means for selectively disconnecting the drive to the web supply roll from the press drive, said clutch means comprising a clutch input member driven from said press drive and a clutch output member connected to a part of said drive means rotatable with the web supply roll, said input and output members being supported for relative movement between clutch-engaged and clutch-disengaged positions and said input member having a projecting portion received in a slot in said output member when said clutch means is engaged and disposed clear of said slot when disengaged, brake means including a member selectively engageable with said slot when said clutch means is disengaged for selectively preventing rotation of said output clutch member and of said web supply roll, and roller means adjacent the exit end of the press and continuously gripping the web.

9. In a rotary web-fed printing press including a press drive and a printing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, a tensioning roller biased to engage the web of the press to tension the web, web driving rollers about which the web of the press has substantial wrap disposed on the exit side of the printing couple, variable speed means for driving said rollers at different speeds to control web tension including clutch means for selectively connecting said driving rollers to be driven from the press drive, a variable speed drive mechanism for rotating a web supply roll to feed the web to the printing couple of the press and clutch means for selectively disconnecting said web supply roll from the press drive, said drive mechanism

12

being controlled by said tensioning roller and said clutch means comprising a clutch input member driven by said press drive and a clutch output member connected to drive a part rotatable with said web supply roll, said input and output members being supported for relative movement between clutch-engaged and clutch-disengaged positions and said input member having a projecting portion received in a slot in said output member when said clutch means is engaged and disposed clear of said slot when disengaged, brake means including a member selectively engageable with said slot when said clutch means is disengaged for selectively preventing rotation of said web supply roll, and roller means continuously gripping the web adjacent the exit end of the press.

10. In a rotary web-fed printing press having a press drive including a press drive shaft, first and second printing couples each including a smooth-surfaced impression cylinder about which the web of the press wraps and which is directly connected to the press drive shaft for rotation thereby and a second cylinder cooperating with each of said impression cylinders to print the web and driven from the press drive, each of said impression and cooperating second cylinders being supported for relative movement while connected to the press drive to throw off printing pressure, variable speed web driving roller means engaging the web on the exit side of the first printing couple to drive the web and control tension therein, second variable speed web driving roller means engaging the web on the exit side of the second printing couple to drive the web and control the tension therein, the web having substantial wrap around both of said web driving roller means, clutch means for selectively connecting said web driving roller means to the press drive, a variable speed drive mechanism for rotating a web supply roll to feed the web to the first printing couple of the press, a tensioning roller biased into engagement with the web at a point between the supply roll and the first printing couple, said mechanism being controlled in response to the movements of said tensioning roller and including an output member rotatable with the supply roll and an input member driven from the press drive and clutch means for selectively disconnecting the drive from the press drive to said web supply roll, and brake means selectively engageable to prevent rotation of said web supply roll.

11. In a rotary web-fed printing press, the structure as defined in claim 10 wherein the last-said clutch means comprises a first clutch member driven by said press drive and a second clutch member connected to drive the web supply roll, said clutch members being supported for relative movement between clutch-engaged and clutch-disengaged positions and said first clutch member having a projecting portion received in an opening in said second clutch member when said clutch means is engaged and disposed clear of said opening when disengaged and wherein said brake means includes a member receivable in said opening to brake said web supply roll.

12. In a rotary web-fed printing press including a printing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, web break detectors engaging the web of the press and having a first position when the web is tensioned and a second position when the web slacks, said web break detectors effecting a control operation when actuated to their second position, a drive mechanism operatively connected to the press drive to rotate a web supply roll to feed web to the printing couple of the press at the rate required thereby and including clutch means for selectively disconnecting the web supply roll from the press drive, brake means selectively engageable to prevent rotation of said web supply roll when the latter is disconnected from the press drive, and roller means adjacent the exit end of the press continuously gripping the web.

13. In a rotary web-fed printing press including a print-

13

ing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, tensioning means for tensioning the web of the press including a tensioning roller biased into engagement with the web, web break detectors engaging the tensioned web and actuated when the web slacks to perform a press control operation, a variable speed drive mechanism controlled by the tensioning roller for rotating a web supply roll to feed the web to the printing couple of the press, said variable speed drive mechanism including an input member connected to be driven from the press drive and clutch means for selectively disconnecting the press drive from said web supply roll, brake means selectively engageable to prevent rotation of said web supply roll, and roller means adjacent the exit end of the press continuously gripping the web.

14. In a rotary web-fed printing press having a press drive including a press drive shaft, a printing couple including an impression cylinder about which the web of the press wraps and which is directly connected to the press drive shaft for rotation thereby, a second cylinder cooperating with said impression cylinder to print the web and driven from the press drive, said cylinders being supported for relative movement while connected to the press drive to throw off printing pressure, variable speed web driving roller means engaging the web on the exit side of the said couple to drive the web and control tension therein, the web having substantial wrap around said roller means, clutch means for selectively connecting said web driving roller means to be driven from said drive shaft, a variable speed drive mechanism for rotating a web supply roll to feed the web to said printing couple, a movable tensioning roller engaging the web between said supply roll and said printing couple to tension the web, web break detectors engaging the tensioned web and actuated when the web slacks to perform a press control operation, said mechanism being controlled in response to the movements of said tensioning roller and including an output member rotatable with the supply roll and an input member, clutch means for selectively connecting said input member to the press drive, and brake means selectively engageable with a part of said variable speed mechanism to prevent rotation of said input and output members and of said web supply roll.

15. In a rotary web-fed printing press including a press drive and a printing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, a drive mechanism connecting said press drive to rotate a web supply roll to feed the web to the printing couple of the press at the rate required by said printing couple and including means for selectively connecting and disconnecting the drive from the press drive to said roll, brake means for preventing rotation of said web supply roll when the drive from the press to the roll is disconnected and when printing pressure is off, roller means on the exit side of the web from the printing couple, said roller means continuously gripping the web, a sheeter which receives the printed web on the exit side of said rolls continuously gripping the web, sheeter drive means for driving said sheeter from the press drive including clutch means operable to engage and disengage said

14

sheeter from the press drive, and drive means driven from said sheeter drive means for driving said roller means continuously gripping said web to pull the web and disconnected from the press drive when the last-said clutch means is operated to disconnect the sheeter from the press drive.

16. In a rotary web-fed printing press including a press drive and a printing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, tensioning means for tensioning the web of the press including a tensioning roller biased into engagement with the web, a drive connecting the press drive and a web supply roll for rotating the web supply roll to feed the web to the printing couple of the press and including a variable speed drive mechanism controlled by the tensioning roller, said variable speed drive mechanism including an input member and clutch means for selectively disconnecting the drive to said web supply roll, brake means selectively engageable to prevent rotation of said web supply roll, roller means adjacent the exit end of the press continuously gripping the web, a sheeter which receives the printed web on the exit side of said roller means continuously gripping the web, sheeter drive means for driving said sheeter from the press drive including clutch means operable to engage and disengage said sheeter from the press drive, and drive means driven from said sheeter drive means for driving said roller means continuously gripping said web to pull the web and disconnected from the press drive when the last-said clutch means is operated to disconnect the sheeter from the press drive.

17. In a rotary web-fed printing press including a printing couple comprising cylinders rotated from the press drive and relatively movable while connected to the press drive to throw off printing pressure, web break detectors engaging the web of the press and having a first position when the web is tensioned and a second position when the web slacks, said web break detectors effecting a control operation when actuated to their second position, a drive mechanism operatively connected to the press drive to rotate a web supply roll to feed web to the printing couple of the press at the rate required thereby and including clutch means for selectively disconnecting the web supply roll from the press drive, brake means selectively engageable to prevent rotation of said web supply roll when the latter is disconnected from the press drive, roller means adjacent the exit end of the press continuously gripping the web, a sheeter which receives the printed web on the exit side of said roller means continuously gripping the web, sheeter drive means for driving said sheeter from the press drive including clutch means operable to engage and disengage said sheeter from the press drive, and drive means driven from said sheeter drive means for driving said roller means continuously gripping said web to pull the web and disconnected from the press drive when the last-said clutch means is operated to disconnect the sheeter from the press drive.

References Cited in the file of this patent

UNITED STATES PATENTS

2,675,756	Vegell	Apr. 20, 1954
2,723,620	Huck	Nov. 15, 1955