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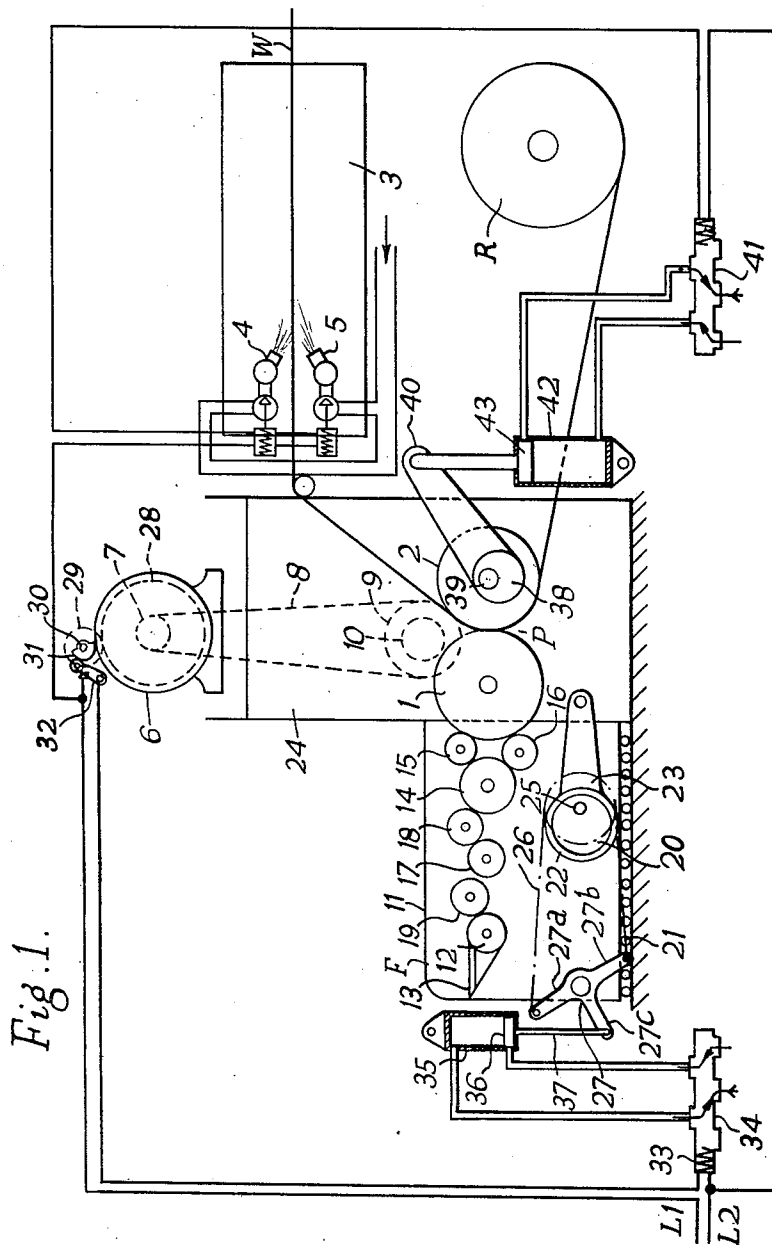
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## ROTARY PRINTING MACHINES

Filed July 16, 1959

2 Sheets-Sheet 1



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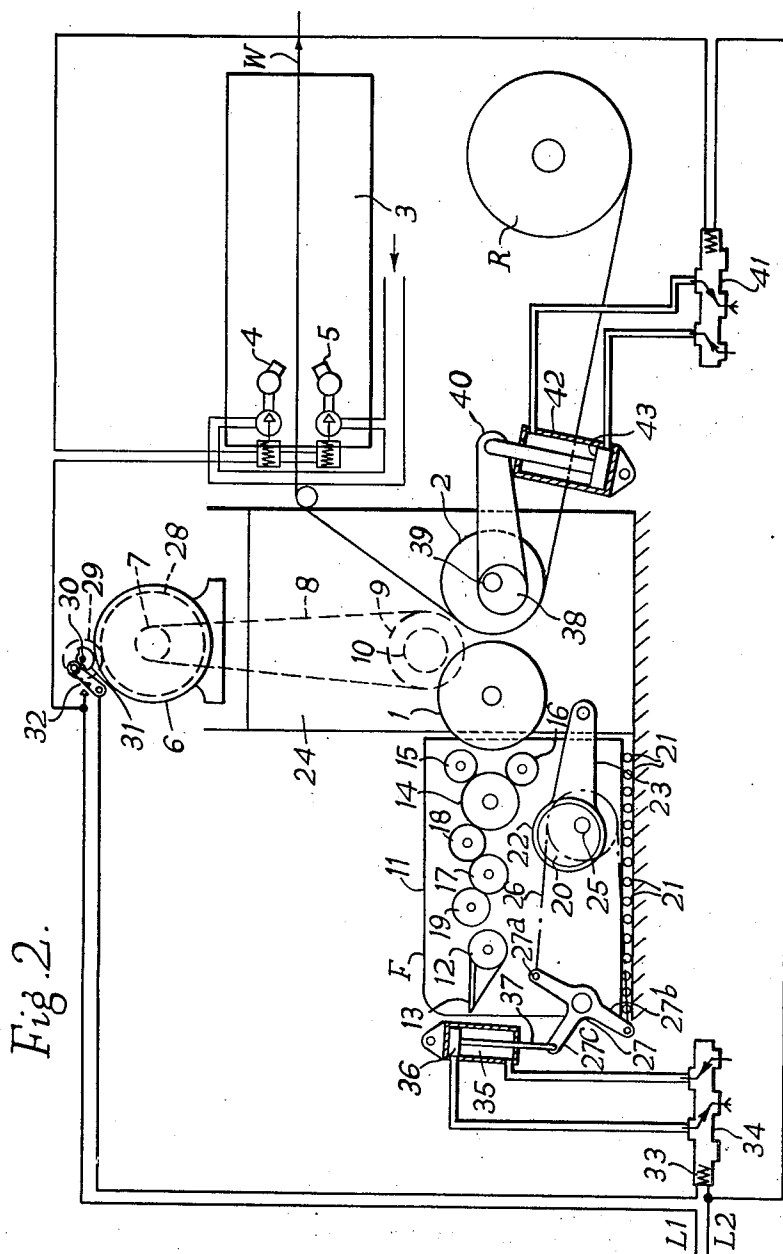
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## ROTARY PRINTING MACHINES

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This invention appertains to rotary printing machines of the kind adapted to print upon a web of relatively thin and flexible material such as paper, film, foil or the like and comprising co-operable cylinders between which the traveling web passes to be printed upon, ink-applicator means for inking the surface or surfaces of the appropriate cylinder or cylinders, and heating devices at a drying zone through which the web travels after having been printed upon.

Thus, a machine of this kind is suitable for printing upon a web with volatile ink or like medium, the purpose of the heating devices in this instance being to expedite evaporation of the solvent in the medium.

Rapid drying of inks is, for example, essential in a case where a web is to be printed upon, on one or both sides, in more than one colour.

The ink-applicator means in a rotary printing machine of the kind concerned are, of course, for transferring ink from a supply to the surface of the or each appropriate cylinder.

Of the co-operable cylinders at the or each printing station in the machine the one to which ink is applied is a plate or design cylinder; the other may be an impression cylinder, in which instance the web to be printed upon would be passed directly between the two. Alternatively, the plate or design cylinder may be associated with an offset or transfer cylinder in which case the web would be passed between the last mentioned cylinder and either an impression cylinder or a further offset or transfer cylinder operating in counter pressure and applying matter to the back of the web, according to printing requirements. Moreover, the ink-applicator means in a printing machine of the kind referred to conventionally comprise a duct roller mounted for rotation in an ink reservoir or trough, at least one rotary inking drum having associated therewith inking or form rollers arranged to run in direct contact with the cylinder to be inked, a group of ink distributing rollers, for the transference of ink from the reservoir or trough to the said inking drum, and a swinging ductor which is movable back and forth between the surfaces of the duct roller and the first of the said distributing rollers. Such means are in the form of an inking unit, hereinafter for convenience referred to simply as an "inker."

Although there is no limitation in this request the invention is primarily applicable to a rotary printing machine wherein a drying chamber (defining the drying zone) is fitted with fluid fuel, e.g. gas or oil, burners of the form comprising a pipe or manifold into which combustible fluid fuel from a supply is introduced and through which the said fuel passes to burner nozzles spaced along it. Thus, when the fluid fuel in such a burner is ignited, flame jets issue through the nozzles and, with the burner alight and fully operative these jets are directed towards an opposed surface of the traveling web.

The object of the present invention is to provide, in a rotary printing machine of the kind herein referred to, simple and efficient means for ensuring that the drying zone is at a temperature sufficient to dry ink before such ink is actually applied to the web. That is to say, the aim is to ensure that after the machine has been started up, inking of the forme on the plate or design cylinder shall be delayed until the heating devices at the

drying zone, turned on in timed relation with the start, have been in operation sufficiently long to achieve the required ink-drying temperature. Conversely, the aim is that, during a slow down of the machine, prior to a stoppage, the inking of the said cylinder shall be automatically suspended as the temperature in the drying zone falls as a consequence of the heating devices being turned or switched off.

In this way smudging of undried ink is prevented.

According to this invention the ink-applicator means are adapted to be moved bodily towards and away from the co-operable cylinders at a printing station, and means influenced by the speed of the rotary printing machine, and hence functioning in accordance with the linear speed of the travelling web, are so interlinked with mechanism for effecting such movements of the ink-applicator means that the said mechanism is automatically actuated to move the ink-applicator means into their working station adjacent to the plate or design cylinder at a predetermined speed of the machine during a start. The interlinkage is also such that, conversely, the said mechanism is automatically actuated to move the ink-applicator means back clear of the plate or design cylinder, at the same or other suitable speed, during a slow down of the machine.

The primary idea of the invention accordingly is that as the machine and the running web gather speed during a start, and the heating devices are, as a consequence, turned on or switched on, actuation of the mechanism in a sense to effect forward movement of an inker into its working station shall be delayed until the speed of the machine has still further increased to a predetermined extent to permit of the required increase in the temperature of the drying zone before printing of the web commences.

On a slow down of the machine the inker is moved away from the forme at the same or another critical speed of the machine.

In order that the invention may be more clearly understood and readily carried into practical effect, a specific arrangement thereof will now be described with reference to the accompanying purely diagrammatic drawings, wherein,

FIGURE 1 is a diagram of a rotary printing machine of the kind concerned provided with means for automatically throwing an inker off a plate cylinder during slowing down of the machine to a stop, the inker being shown in its working station in this figure, and

FIGURE 2 is a similar diagram with the inker retracted clear of the plate or design cylinder.

In the drawings, the numeral 1 indicates a rotary plate or design cylinder which is arranged to co-operate with an impression cylinder 2 at a printing station P in the machine. In FIGURE 1, a web W of paper or the like to be printed upon is shown being drawn from a roller R through the station P and also through a drying chamber 3 incorporating web-heating fluid fuel, e.g. gas, burners such as 4 and 5 controlled respectively by two solenoid-operated valves.

For drawing the web W through the printing station P and the drying chamber 3 there is provided an electric motor 6. Drive connections from this motor to the plate or design cylinder 1 are diagrammatically illustrated at 7, 8, 9 and 10.

Mounted adjacent to the cylinder 1 is a unitary inker 11 including a duct roller 12 mounted for rotation in an ink reservoir or trough 13, an inking drum 14 having associated therewith inking or forme rollers 15, 16 arranged to run in direct contact with the plate or design cylinder 1 to be inked, ink distributing rollers such as 17 and 18 for transferring ink from the reservoir or trough 13 to the inking drum 14, and a swinging ductor 19 which is movable back and forth between the duct roller 12 and the distributing roller 17. All of the component

of the inker just enumerated are mounted in a common carriage framework F which is longitudinally movable to a limited extent into and away from the operative station of the inker (compare FIGURES 1 and 2), and a turnable component, such as an eccentric 20, is provided to effect the required bodily movements of the inker as occasion demands. The carriage F may advantageously be supported upon, and be arranged for rolling movement back and forth over, a series of anti-friction rollers 21. The eccentric 20 is mounted in a sheave 22 carried by an arm 23 which is pivotally mounted upon the fixed framework 24 of the machine. A trunnion, pin or the like such as 25 fixed in the carriage F of the inker is engaged in the eccentric 20. Consequently, as the said eccentric is turned in a clockwise direction from the position shown in FIGURE 1 to that shown in FIGURE 2, it will be swung up with the result that the trunnion, pin or the like 25 will be constrained to move to the left on the drawing—thereby bodily retracting the inker 11 and throwing it off the cylinder 1. Conversely, an anti-clockwise turning movement of the eccentric 20 will result in the trunnion, pin or the like 25 being moved to the right so that the inker 11 is bodily thrown on to the cylinder 1. For imparting the required turning movements to the eccentric, the latter has rigidly secured thereto a chain wheel (not shown) around which is passed a length of chain 26. The opposite ends of this chain are respectively connected to the outer ends of two oppositely directed arms 27a and 27b of a lever 27 pivoted upon the inker 11. To enable it to be turned in one direction or the other, according to requirements, the lever 27 is provided with a third arm 27c.

In carrying the invention into effect in the arrangement just described, the aforementioned means influenced by the speed of the machine are interlinked with the eccentric 20 and the solenoid-operated valves associated with the gas burners.

At 28 is represented the brush gear or other speed control mechanism of the electric motor 6 and, as will be seen, a process timer 29 synchronised with the mechanism 28 is employed to initiate and time the actuation of the pivoted lever 27 whereby the inker 11 is moved, at the appropriate time, either to throw the inking or former rollers 15 and 16 on to the design or plate cylinder 1 at a predetermined speed of the machine during a start, or to throw the said rollers off the cylinder 1 at a corresponding speed during a slow down of the machine.

The timer 29 is incorporated in an electrical circuit L1, L2 and comprises a shaft 30 driven from the mechanism 28 and upon which is rigidly secured a rotary cam 31 for operating and controlling a switch 32 whereby the circuit is opened and closed. The electrical circuit includes the said solenoids for controlling the valves associated with the burners 4 and 5 and a solenoid 33 arranged to influence an air valve 34 which, when suitably actuated at the dictates of the timer 29, passes air into the cylinder of a pneumatic cylinder and piston device 35, 36 arranged, through the medium of a piston rod 37, to impart turning motion to the pivoted lever 27. The piston rod 37 is connected directly to the arm 27c of this lever. These means accordingly initiate and time the control of the burners 4 and 5 and the turning of the eccentric 20 whereby the inker 11 is moved into or withdrawn from its operative station depending on whether the machine is being started up or slowed down to a stop.

Instead of a turnable component in the form of an eccentric, it would alternatively be possible to employ a pinion included in a rack and pinion mechanism or the like for effecting the required bodily movements of the inker.

Moreover, hydraulically or electrically operated means may be provided to actuate the eccentric, pinion or other turnable component under the control of a timing mechanism influenced by the speed of the machine.

If the power operating the machine fails for any reason,

the inker will be automatically retracted from the impression or design cylinder during the slow down and the burners will be turned off.

The complete arrangement illustrated in the drawings includes a throw-off mechanism 38, 39, 40 for the impression cylinder 2, and means interlinked with the control for the inker 11 whereby whenever the said inker is moved back clear of the cylinder 1 during a slow down of the machine, the impression cylinder 2 will also be automatically and simultaneously thrown off the cylinder 1. Conversely, the arrangement is also such that, during a start, the inker 11 will be moved forward into its working station adjacent to the cylinder 1 (at a predetermined linear speed of the web W) simultaneously with actuation of the mechanism 38, 39, 40 to throw the impression cylinder 2 on to the cylinder 1. Although this particular feature is separately covered in U.S. Patent No. 3,063,369 and accordingly forms no part of the present invention, nevertheless it will be useful to observe that the same electrical circuit L1, L2 previously described herein and represented in the drawings includes another solenoid-influenced air valve 41 which, through the medium of a pneumatic cylinder and piston device 42, 43 operates connections for throwing the impression cylinder 2 on to and off the cylinder 1.

I claim:

1. In combination with apparatus for moving a web through printing means and thereafter through a drying chamber and including a stationary frame supporting the printing means, means for moving the web at a predetermined speed, and a plurality of inking rollers for supplying ink to the printing means, the improvement comprising:

a movable carriage supporting the inking rollers; driving means moving the carriage towards and away from the printing means to selectively supply ink to the printing means, the driving means including a fluid pressure actuated piston and cylinder device, a lever pivotally mounted on the carriage and pivoted in response to actuation of the piston and cylinder device, a turnable eccentric mounted on the carriage and eccentrically rotatable relative to the carriage in response to pivoting of the lever, and an arm joining the eccentric and the stationary frame and controlling the movement of the carriage; and synchronous means responsive to the speed of the web moving means and operatively controlling the driving means for automatic shifting of said carriage away from the printing means when the web is advanced at a speed less than said predetermined speed and for automatic shifting of the carriage toward the printing means when the web is advanced at a speed at least equal to said predetermined speed, the said synchronous means including a fluid valve communicating with the piston and cylinder device and operable to control transmission of fluid to the piston and cylinder device, an actuable solenoid operatively controlling the fluid valve, an electric switch controlling the actuation of the solenoid, and cam means engaging the switch and responsive to changes in the speed of the web moving means.

2. In the combination according to claim 1, wherein the drying chamber includes heating means, the improvement further comprising means controlling said heating means and actuated by said synchronous means for selectively supplying heat to the web when the carriage is in the position toward said printing means and limiting the heat when the carriage is in the position away from said printing means.

3. In the combination according to claim 1, the improvement further comprising a rod joining the piston and

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cylinder device and the lever, and chain gearing joining  
the lever and the turnable eccentric.

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