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DAMPENING SYSTEM FOR LITHOGRAPHIC PRINTING PRESS

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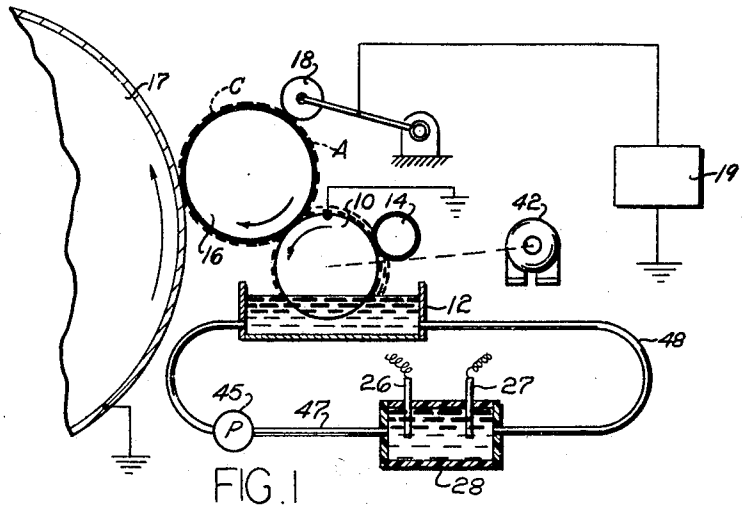



FIG. 1

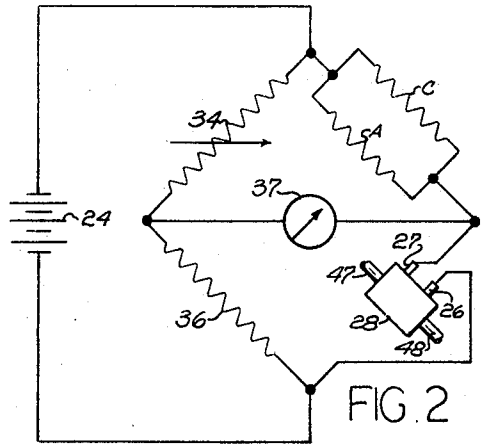



FIG. 2

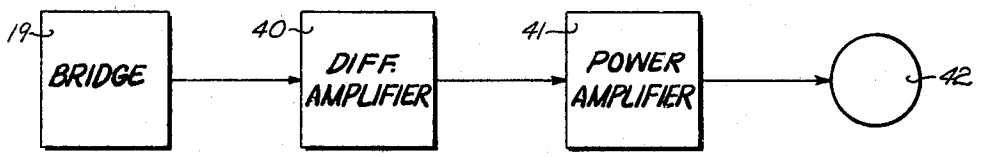



FIG. 3

INVENTOR.
DONALD L. SOUTHAM
BY
Yount, Flynn, & Tarolli
ATTORNEYS

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# DAMPENING SYSTEM FOR LITHOGRAPHIC PRINTING PRESS

Donald L. Southam, Brecksville, Ohio, assignor to Harris-Intertype Corporation, Cleveland, Ohio, a corporation of Delaware

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Int. Cl. B411 *23/16*
U.S. Cl. 101—148 4 Claims

## ABSTRACT OF THE DISCLOSURE

Dampening system for lithographic printing presses including means for monitoring the electrical resistance of a film on a dampening roll of the system to indicate changes in dampening fluid supply with compensation for changes in the specific resistivity of the dampening fluid.

The amount of dampening fluid supplied to the plate of a lithographic press by the dampening system of the press is important in determining the quality of printing achieved. Consequently, the dampening systems of lithographic printing presses have been the subject of much development work to obtain fine control over the amount of dampening fluid supplied.

In dampening systems for printing presses, a pan roller rotates in a reservoir of dampening fluid to pick up a film of the dampening fluid. This film is transferred from the pan roller to the plate through roller means which comprises a form roller that runs in engagement with the plate on the plate cylinder of the printing press. The form roller has a film of dampening fluid on its peripheral surface which has been transferred to it from the pan roller and applies the film to the surface of the printing plate.

The thickness of the film on the form roller of the plate either in advance or remaining on the roller after the plate is an indication of the amount of dampening fluid being applied to the plate. If the thickness of the film changes, the amount of dampening fluid being supplied also changes.

Heretofore, it has been proposed to monitor the film thickness on the form roller to obtain an indication of changes in the supply of dampening fluid to the plate. One system of monitoring the film thickness which has been heretofore proposed is an electrical system which measures the resistance of the film on the form roller to the flow of electric current. This resistance is a function of film thickness.

One of the problems in the system heretofore proposed is that changes occur in electrical resistance of the film without corresponding changes in film thickness. In accordance with my invention, the performance of such systems can be improved by continuously monitoring the resistivity of the dampening fluid itself and compensating the measurement of the resistance of the film for changes in the resistivity of the dampening fluid.

Accordingly, it is an object of the present invention to provide a new and improved dampening system in which the electrical resistance of a film on roll means for transferring a film of liquid to the printing plate is electrically monitored to obtain an indication of film thickness with compensations being made for changes in the resistivity of the dampening fluid.

Another object of the present invention is to provide a new and improved dampening system in which a part of the film of dampening fluid on a roller means of the system is included as a resistance element in one leg of a Wheatstone bridge while a sample of the dampening fluid is included as a resistance element in another leg of the Wheatstone bridge to render the film thickness indication obtained by measuring the resistance of film substantially independent of the changes in the resistivity of the dampening fluid.



A further object of the present invention is to provide a new and improved dampening system in which electric measuring means for measuring the resistance of a film of dampening fluid functions independently of the resistivity of the dampening fluid.

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

FIG. 1 is an illustrative view of a dampening system for lithographic printing press embodying the present invention;

FIG. 2 is an electrical circuit diagram of a measuring circuit used with the dampening system of FIG. 1; and

FIG. 3 is a block diagram illustrating a control circuit which may be used with the dampening system of FIG. 1.

Referring to the drawings, FIG. 1 illustrates a dampening system embodying the present invention. In the dampening system illustrated, a hard metal pan roll **10** which is water receptive operates with its lower portion running in a reservoir of dampening fluid contained in a pan **12**. The pan roll picks up a film of dampening fluid as it rotates and this film is metered to provide a uniform thin film by a metering roll **14** which runs in engagement with the periphery of the pan roll **10** to meter the film formed on its surface by dipping into the dampening fluid in the pan **12**. The metering roll may be a conventional rubber roll that operates with an adjustable pressure relationship between it and the pan roll. The metered film is transferred to a form roll **16** which runs in a pressure relationship with the pan roll **10** and with a plate on a plate cylinder **17**. The form roll **16** has a relatively soft yieldable surface which is not electrically conductive. The form roll is driven at the same surface speed as the plate while the pan roll **10** is driven independently of the form roll and the surface speed of the pan roll is adjustable to adjust the amount of damping fluid transferred to the form roll.

A detector roll **18** runs in engagement with the form roll between the plate and the pan roll in the direction of rotation of the form roll from the plate. The detector roll preferably engages the form roll about half way between the pan roll and the plate and rides on the film of dampening fluid remaining on the form roll after the plate. The thickness of this film is an indication of the amount of dampening fluid being supplied to the plate of the printing press.

The detector roll **18** has an electrically conductive surface, for example copper or chrome, electrically connected to its suporting arm which is insulated from its support or mounting. The plate cylinder and pan roll are grounded.

The film of dampening fluid between the detector roll and the pan roll designated by the reference character A and the film of dampening fluid between the detector roll and the plate designated by the reference character C provide eelctrically conductive paths from the surface of the detector roll to ground. The electrical resistance of these paths is a function of the film thickness. Accordingly, by measuring the electrical resistance of these films, we can obtain an indication of the amount of dampening fluid being supplied to the printing plate.

In the illustrated and preferred embodiment, a measuring circuit **19** for establishing and measuring current in the film portions A and C, e.g. an ohmmeter, is connected between the auxiliary detector roll and ground.

Referring to FIG. 2, the ohmmeter comprises a source

of constant voltage power, illustrated as a battery **24**, which has one side connected to the detector roll **18** and the other side connected to a conductor **26** of spaced conductors **26, 27** of a fluid sample cell **28**. The conductors **26, 27** are electrically connected by fluid within the cell. The cell **28** contains a sample of the dampening fluid from the pan and the second conductor **27** of the cell is connected to ground. This effectively connects the cell **28** and the electrical resistance provided by the film on the dampening roll in series across the battery. Connected in parallel with the resistance provided by the dampening fluid and the cell **28** across the battery are a pair of series connected resistors **34, 36**. The resistor **34** is adjustable and is connected to the same terminal of the battery as the surface of the detector roll **18** while the resistor **36** is connected to the same terminal of the battery as the conductor **26** of the cell **28**. An indicating meter **37** is connected to the junction between the resistors **34, 36** and ground.

The resistance measuring circuit described is a Wheatstone bridge circuit where the resistance of the dampening film provides two legs of the bridge which are connected in series across the power supply while the resistance **34, 36** constitute the other two legs of the bridge connected across the power supply. The output voltage of the bridge which is indicated by the meter **37** will vary as the resistance of the film on the form roll varies. This variation in the resistance of the dampening film may be due either to changes in film thickness or in changes of the resistivity of the dampening fluid. However, the cell **28** compensates the output of the measuring circuit to render it substantially independent of changes in the resistivity of the dampening fluid. As the leg of the bridge into which the resistance of the dampening films is connected changes because of changes in the resistivity of the dampening fluid, the resistance in the leg into which the cell **28** is connected will also change to compensate the output of the measuring circuit. As will be appreciated by those skilled in the art, the sample of the dampening fluid is selected so that the resistance of the cell **28** is related to the resistance of the dampening film at the desired thickness so that the changes in resistivity of the dampening fluid effects proportional changes in the resistance of the two legs. While changes in resistance in the film leg and cell leg of the bridge because of changes in dampening fluid resistivity may not be precisely proportional for certain film thickness, it will be understood that as a practical matter an approximation will provide improved results over known systems. In operation, the operator will set the speed of the pan roll to produce a desired quality of printing and will note the reading on the meter **37**. If the meter changes, he will know that it is the film thickness that has changed and effect the necessary correction.

It will be further understood by those skilled in the art that the output of the bridge, since it can be adjusted to switch in polarity to indicate resistances above and below that of a film thickness of a given resistance, may be utilized to operate a motor control for slowing or speeding a motor **42** for driving the pan roll **10**. Conventional motor control systems may be provided and one is schematically illustrated in FIG. 3. Referring to FIG. 3, the bridge is adjusted to have no output at the desired film thickness. The signal from the bridge is applied to the input of a differential amplifier **40** whose output has a polarity dependent upon the polarity of the input signal. The output of the differential amplifier may be applied to a power amplifier **41** which controls the speed of the motor **42** driving the pan roll to increase or decrease the speed setting depending on the polarity of the output signal, with the magnitude of the change in speed setting being a function of magnitude of the output signal from the differential amplifier. Such power amplifiers are well known in the art.

The system for supplying dampening fluid to the cell **28** is illustrated in FIG. 1. As shown therein, a pump **45** has its intake connected to the pan to draw dampening fluid from the pan and supply it through a conduit **47** to the cell **28**. Fluid is returned from the cell **28** to the pan through a conduit **48**. Consequently, during operation, dampening fluid is being continuously supplied to and withdrawn from the cell **28**. The conductors **26** and **27** extend into the dampening fluid and the dampening fluid forms the electrical connection between the conductors. Consequently, the resistance of the cell **28** is a function of the resistivity of the dampening fluid in the pan and the continuous recirculation of the dampening fluid between the cell and the pan assures that the sample will be an accurate indication of the electrical characteristics of the dampening fluid in the pan.

It is important that the sample continuously reflect the nature of the dampening fluid since during operation of the printing press the resistivity of the dampening fluid may vary widely. Commonly alcohol is used as a part of the dampening fluid. Because of the volatile nature of alcohol, the amount of alcohol in the dampening fluid may vary widely during operation of the printing press and this will cause significant changes in the resistivity of the dampening fluid. Also, the resistivity is affected by temperature.

It can now be seen that the present invention provides a new and improved method for monitoring film thickness in a dampening system and has provided one which is substantially independent of the resistivity of the dampening fluid.

What is claimed is:

**1.** In a dampening system comprising a reservoir for dampening fluid and roller means for transferring a film of dampening fluid to a printing plate, electrical means for monitoring the electrical resistance of a portion of the dampening film on a dampening roller for transferring dampening fluid to the plate, which portion indicates the amount of dampening fluid being supplied to the plate, comprising means for connecting said film portion as a resistance element in an electrical circuit to provide an output signal which is a function of the resistance of the film portion and including compensating means for varying said signal in accordance with changes of the resistivity of the dampening fluid itself to compensate for the latter.

**2.** In a dampening system as defined in claim **1** wherein said film portion is connected into a Wheatstone bridge circuit as a resistance element in one leg of the bridge circuit and said compensating means comprises means for connecting a reference sample of the dampening fluid into the bridge as a resistance element of another leg of the said Wheatstone bridge.

**3.** In a dampening system as defined in claim **2** wherein said sample is continuously replaced by dampening fluid from the said pan.

**4.** In a dampening system as defined in claim **1** wherein said compensating means comprises means for measuring the resistivity of a sample of dampening fluid.

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ROBERT E. PULFREY, Primary Examiner

E. H. EICKHOLT, Assistant Examiner

U.S. Cl. X.R.

101—350

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(5/69)

# UNITED STATES PATENT OFFICE
# CERTIFICATE OF CORRECTION

Patent No. 3,499,383 Dated March 10, 1970

Inventor(s) Donald L. Southam

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the claims: Column 4, line 36, before "portion" insert --film--
Column 4, line 38, after "plate", insert --the electrical resistance of --

SIGNED AND
SEALED
JUL 14 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents