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Underwood et al.

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[54] **PRINTING PRESS INK SUPPRESSION APPARATUS**

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[21] Appl. No.: **354,444**

Related U.S. Application Data

[63] Continuation of Ser. No. 230,776, March 1, 1972, abandoned.

[52] **U.S. Cl.** **101/349**

[51] **Int. Cl.** **B41f 31/26**

[58] **Field of Search** ..... 101/348–352, 101/363, 364, 206–209, DIG. 13; 339/5 R, 5 A, 5 P, 5 S, 6 R, 6 A, 6 RL, 8 R–8 RL; 343/877; 310/247

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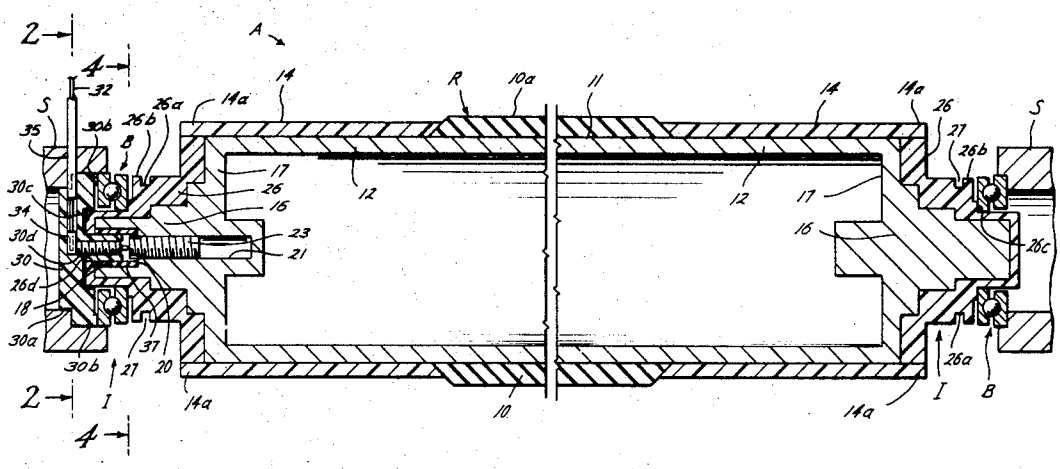
[57] **ABSTRACT**

The present invention provides a new and improved method and apparatus for suppressing ink mist in and around printing presses, reducing the risk of fire and waste of ink.

5 Claims, 5 Drawing Figures



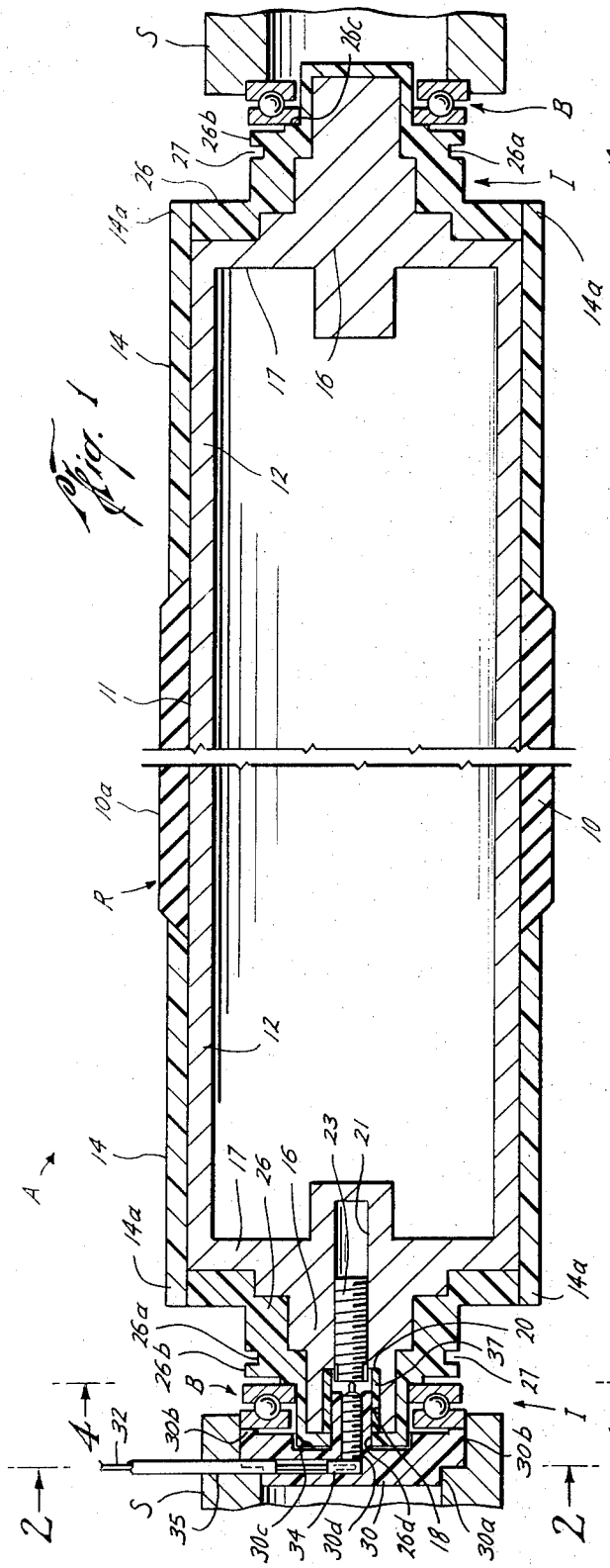


Fig. 1

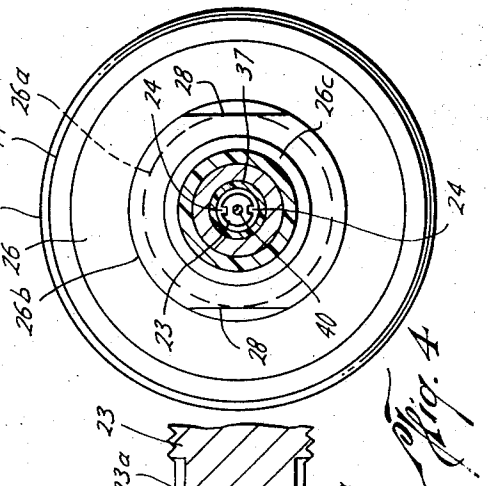


Fig. 4

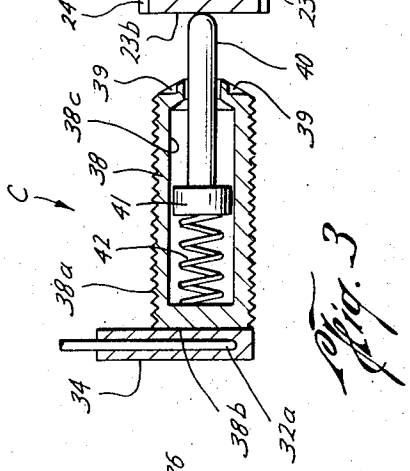


Fig. 3

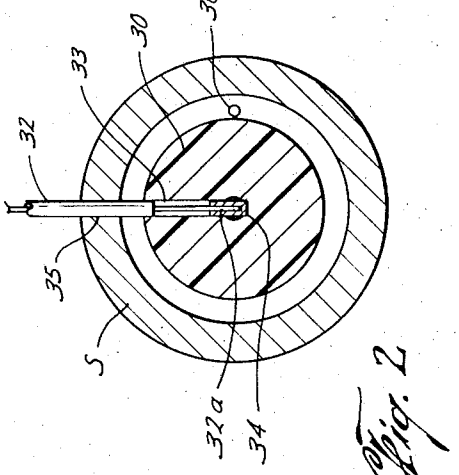
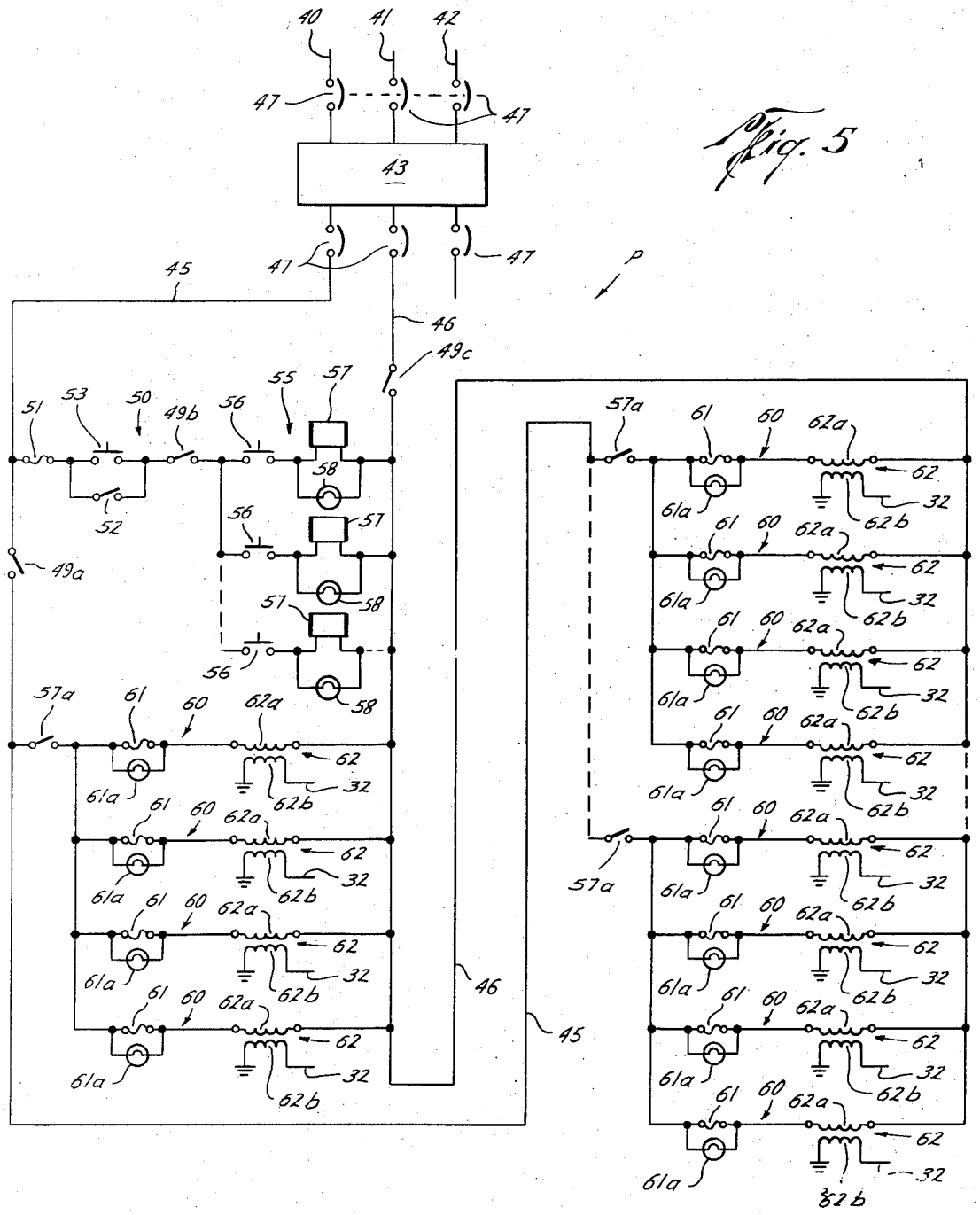


Fig. 2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49a
57a
61
60
62a
62
32
62b
61a

Fig. 5

PRINTING PRESS INK SUPPRESSION APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation of application Ser. No. 230,776, filed Mar. 1, 1972, copending herewith, and now abandoned.

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention relates to methods and apparatus for suppressing ink mist in and around printing presses.

2. Description of Prior Art

In printing presses, such as the web fed type used to print newspapers, a filament of ink bubbles was formed at the nip, as the junction between contacting surfaces on counter-rotating rollers in presses was known. As the surfaces moved away from each other during movement of the rollers, the ink filament stretched and then ruptured, forming a fine mist of ink near the rollers. The ink mist was undesirable for several reasons: from an economic standpoint, ink was wasted; from a pollution, health and cleanliness standpoint, the ink mist was undesirable; and from a safety standpoint, the fine mist of ink presented a fire and explosion hazard when exposed to sparks.

The prior art has attempted to suppress the ink mist by using electrified conductors known as corona wires. The corona wires were small diameter wires energized to a very high voltage, such as 15,000 volts D. C. The corona wires were mounted under tension between sides of the printing press frame very close to the outside surface of the rollers at the nip. The corona wires would often break under tension, and the high voltage present in the wires presented a risk of sparks and arcing, which in the presence of the ink mist represented a substantial fire hazard.

SUMMARY OF THE INVENTION

With the present invention, ink mist formed by inking rollers in a printing press is suppressed by electrifying the inking rollers with electrical energy from a power supply to attract the ink mist to the inking rollers.

Insulation is provided between the moving inking roller and the frame of the printing press. A sleeve covers an exposed cylindrical surface at each end of the roller, and a journal insulates and mounts the ends of the roller with an insulating cap in a socket in the frame of the printing press. A ball bearing or other suitable means is mounted between the cap and journal to permit relative rotational movement between the roller and the printing press.

A conductive plug is mounted in the inking roller to receive electrical energy from an electrical contact mounted in a socket in the cap. A conduit is formed in the cap for passage of an electrical conductor from the power supply to the contact. The contact includes a carbon contact plunger for long wear and a spring or other resilient means for urging the brush into connection with the conductive plug in the inking roller.

The power supply includes a transformer for each inking roller in the printing press so that a failure of one transformer does not interfere with electrification of other inking rollers. Fuses and indicators are provided to protect against power surges in the power supply, and indicate the fuse which has operated to protect the transformer in the power supply.

It is an object of the present invention to provide a new and improved ink suppression method and apparatus for a printing press.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is an elevation view, taken in cross-section of the present invention;

FIG. **2** is a cross-sectional view taken along the lines **2—2** of FIG. **1**;

FIG. **3** is a sectional view illustrating in detail a portion of the apparatus of FIG. **1**;

FIG. **4** is a cross-sectional view taken along the lines **4—4** of FIG. **1**; and

FIG. **5** is a schematic electrical circuit diagram of an electrical power supply of the apparatus of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings, the letter A designates generally the apparatus of the present invention for suppressing ink mist formed by inking rollers in a printing press, such as the web fed type used to print newspapers.

The apparatus A includes a cylindrical metal roller R mounted by spindles **16** at ends **12** with sockets S of a frame of a printing press. A ball bearing B or other suitable means for permitting relative rotational movement is mounted between the roller R and the sockets S at each spindle **16.** It should be understood that the apparatus A of the present invention is intended for and is suitable for use in numerous types of printing presses.

The inking roller R is electrified by electrical energy furnished from a power supply P (FIG. **5**) through a connector C (FIG. **3**), in a manner to be set forth hereinbelow, in order to attract the ink mist formed at the nips between inking rollers R in the printing press. Insulating structure I insulates the electrified rotating inking roller R from the stationary sockets S of the printing press in order to prevent arcing and grounding of the electrical energy present on the electrical roller R.

A vulcanized rubber coating **10** is mounted along a central portion of a cylindrical external surface **11** of the roller R, as is known in the art. Ink for the printing press is moved from the inking founts in the printing press to the printing apparatus in the press by being moved along the inking rollers R as is known in the art. The ink is moved by the vulcanized rubber coating **10** and is applied on an external cylindrical surface **10***a* of the rubber coating **10.**

End portions **12** at each end of the inking roller R do not have a rubber coating **10** applied thereto. A cylindrical insulating sleeve **14,** made from a suitable synthetic resin, is mounted with each end **12** of the roller. The insulating sleeve **14** insulates the end portions **12** of the inking roller R from the socket S and the printing press in order to prevent arcing and electrical discharge of the electrical energy on the electrified inking roller R.

The spindle **16** is formed extending outwardly from an end surface **17** of each end of the cylindrical roller R. The spindles **16** are mounted within the insulating structure I to support the rollers R with respect to the sockets S of the printing press. A socket is formed adjacent a cylindrical side-wall **18** and a circular end wall

20 extending inwardly into the spindle **16.** A threaded socket **21** is formed extending inwardly into the spindle **16** from the end wall **20** thereof. A threaded conductive plug **23** of brass or other suitable conductive material is mounted in the threaded socket **21** in the spindle **16.** Notches **24** (FIG. **3**) are formed adjacent surfaces **23***a* on the plug **23** in order to permit insertion, removal and adjustment of the plug **23** from the socket **21.** The plug **23** is thus mounted with the inking roller R and moved therewith. The plug **23** receives electrical current from the connector C (FIG. **3**) and permits such current to pass to the inking roller R and electrify same. The electrified inking roller R thus attracts the ink mist formed during the operation of the printing press to the external surface **10***a* of the vulcanized rubber coating **10,** suppressing the ink mist.

An insulating journal **26** of the insulating structure I is mounted with each of the spindles **16** to insulate the spindles **16** from the socket S of the printing press. The journal **26** is made of a suitable synthetic resin and is mounted on the spindle **16** and enclosed within an end portion **14***a* of the insulating sleeve **14** at each end of the inking roller R.

A notch **27** is formed adjacent a recessed cylindrical wall surface **26***a* in the journal **26.** The notch **27** permits the journal **26** to be grasped during removal and insertion of the journal **26** with respect to the roller R. A surface **28** is formed by removal of a portion of a cylindrical lip **26***b* of the journal **26** adjacent to the notch **27.** The surfaces **28** provide a space for passage of a grasping means to remove the ball bearing B from the journal **26** during assembly and disassembly of the apparatus A.

A lip **26***c* (FIG. **1**) is formed on the journal **26** for spacing the ball bearing B at each end of the inking roller R. AN opening or aperture is formed in the journal **26** adjacent a surface **26**d (FIG. **1**) in one of the journals **26** at one end of the inking roller R, called the "live" end. The opening adjacent to surface **26**d permits passage therethrough of the connector C (FIG. **3**) in order that electrical energy to electrify the inking roller R may be provided. No opening is formed in the journal **26** at the end opposite the "live" end, in order to prevent a ground for the inking roller R.

A cap **30** of the insulating structure I is mounted in the socket S at the "live" end of the inking roller R. The cap **30** insulates an electrical conductor **32** and the connector C from the socket S to prevent the electrical energy being furnished to the plug **23** and inking roller R from passing to the socket S.

A conduit **33** is formed extending radially inwardly into the cap **30** (FIG. **2**) in order to permit passage of the electrical conductor **32** therethrough. A conductive cup or receptacle **34** is inserted in the conduit **33** and receives an end **32**a of the electrical conductor **32.** A passage **35** is formed through the socket S to permit passage therethrough of the conductor **32.**

A pin or plug **36** (FIG. **2**) is mounted with the cap **30** and engages in a slot (not shown) formed in the socket S to insure that the passage **35** and conduit **33** in the cap **30** are aligned (FIG. **2**) in order that the conductor **32** may be inserted through the socket S into the cap **30.**

A rim **30**b is formed on the cap **30** (FIG. **1**) to engage the ball bearing B which permits relative rotational movement between the cap **30** and the journal **26.** A socket is formed in the cap **30** adjacent a surface **30**c to provide a clearance and prevent contact between the rotating insulating journal **26** and the stationary cap **30.**

An insulating bushing **37** of suitable synthetic resin is mounted between a cylindrical surface **30***d* and the side wall **17** for further insulation. A central socket is formed in the cap **30** adjacent the cylindrical surface **30***d* in order to receive a contact **38** of the connector C (FIG. **3**). The contact **38** has a threaded external surface **38***a* formed thereon to mount the contact **38** in the central socket of the cap **30.** Notches **39** are formed in an end of the contact **38** to receive an inserting tool in order that the contact **38** may be inserted and removed from the socket formed adjacent the surface **30***d* in the cap **30.** When the contact **38** is inserted in the socket in the cap **30,** the metallic cup **34** is held in place within the cap **30** by engagement with an end **38***b* of the contact **38.** The contact **38** is electrically conductive and preferably metallic, and thus is in electrical connection with the conductor **32** at the end **32***a* thereof through the metallic cup **34.**

The contact **38** has mounted therein a carbon plunger **40** (FIG. **3**). The plunger **40** is mounted with a base member **41** in an interior space **38***c* formed in the contact **38.** A spring **42** is mounted between the base **41** and the end wall **38***e* of the contact **38.** The spring **42** resiliently urges the carbon plunger **40** into contact with an end surface **23***b* of the conductor plug **23** mounted with the inking roller R (FIG. **3**). The resilient spring **42** urges the plunger **40** into firm contact with the surface **23***b* and assures firm electrical connection between the connector C and the plug **23.** The carbon plunger **40** further exhibits long service life and resists wear.

The power supply P (FIG. **5**) of the present invention, furnishes electrical energy in the form of alternating current to electrify the inking rollers R in order that the ink mist formed by the moving inking rollers R is suppressed.

The power supply P is energized by incoming power from three phase power mains, **40, 41** and **42,** through a transformer **43.** It should be understood, however, that other suitable sources of alternating current electrical power could be used in place of the three phase power mains **40, 41** and **42,** if desired. The power supply P is connected between two conductors **45** and **46** to the transformer **43.** Fuses **47** are connected with each of the conductors on each side of the transformer **43,** as is conventional in the art for overload protection purposes.

For safety purposes, an interlock switch having contacts **49***a*, **49***b* and **49***c* is included within the power supply P. When a repairman is working with the power supply P, the interlock is actuated, moving the contacts **49***a*, **49***b* and **49***c* to the position shown in the drawings, preventing the remainder of the power supply P from receiving electrical power from the conductors **45** and **46.** In this manner, the risk of injury or harm to personnel repairing the power supply P is reduced.

The power supply P includes a control circuit **50** and a plurality of voltage increaser or step-up circuits **60** with each circuit **60** furnishing power to a single inking roller R. The power is furnished in order that the inking roller R may be electrified and suppress the ink mist formed during the operation of the printing press.

With each of the inking rollers R having a voltage step-up circuit **60** individually connected therewith, a

malfunction of one of the individual voltage step-up circuits **60** does not prevent electrifying of the remaining plurality of inking rollers R. With the inking rollers R so connected to an individual voltage step-up circuit **60**, a failure of one such voltage step-up circuit **60** does not interfere with the operation of the remaining voltage step-up circuits **60** furnishing operating power to electrify their associated inking rollers R.

The number of step-up circuits **60** and their arrangement in groups in the power supply P is determined in accordance with the number of inking rollers and their arrangement in the printing press with which the present invention is used. In the embodiment shown, (FIG. **5**), the power supply P has twelve step-up circuits **60** arranged in three groups of four for use with a printing press having two groups of four inking rollers R for black ink used in the printing press and one group of four inking rollers for colored ink used in the printing press. It should be understood that the number of step-up circuits **60** and their grouping is accordingly determined by the number and grouping of inking rollers used in the printing press with which the present invention is used.

Considering the control circuit **50** more in detail, a protective fuse **51** is electrically connected to protect the control circuit **50** from excess current. A speed switch **52**, for example a Euclid Electric Model 312C1, controls the application of electrical power to the remainder of the control circuit **50**. The speed switch **52** closes in response to the rotational speed of the inking rollers R in the printing press reaching a level at which the ink mist is formed due to rotation of the rollers. An example speed is 15,000 rpm. For purposes of testing the electrical circuits in the power supply P for continuity when the printing presses are not operating, a bypass switch **53** is provided. The bypass switch **53** may be depressed in order to furnish electrical power to the remainder of the control circuit **50** when the switch **52** is open.

The control circuit **50** includes a plurality of operating circuits **55** of like number to the number of banks of inking rollers in the printing press. In the embodiment shown, three control circuits **55** are shown, one for each of the three groups of inking rollers in the printing press. Each of the operating circuits **55** includes an on-off switch **56** which controls the application of electrical power to a relay **57** and associated indicator light **58**. The indicator light **58** is illuminated by electrical energy flowing through the closed switch **56** which further energizes the relay **57**. When the relay **57** is receiving power, a contact **57***a* thereof is given to a closed position, permitting a bank of step-up circuits **60** to receive electrical power to connection between the conductors **45** and **46** in the power supply P.

When the operating switch **56** is in the off position, the relay **57** associated therewith is not energized and the contact 57a thereof is open, preventing the bank of step-up circuit **60** associated therewith from receiving operating power.

Considering the step-up circuit **60** more in detail, each includes a fuse **61** for limiting the flow of current therethrough to protect against current surges and consequently reduce the risk of arcing, sparks and the like in the printing press with which the present invention is used. An indicator light **61***a* is associated with each of the fuses **61** and receives electrical current when the fuse **61** operates and opens in response to receipt of a current surge. Thus, the indicator lamps **61***a* indicate the operation of a particular fuse **61** in the power supply P for fault location and repair purposes.

The step-up circuits further include a voltage step-up transformer **62** whose primary coil **62***a* is electrically connected to the fuse **61** associated in step-up circuit **60**.

Each of the transformers **62** has a secondary coil **62***b* therewith. The secondary coil **62***b* is inductively coupled with the primary coil **62***a* and has a suitable number of turns in such coil to step-up or increase the voltage present at the output of the secondary coil **62***b* to a desired level to attract the ink mist to the electrified inking rollers R. a suitable level, for example, is 10,000 volts RMS.

The secondary coil **62***b* is electrically connected between a ground, as indicated in the drawings, and the conductor **32**. The conductor **32**, as has been previously set forth, furnishes the electrical energy which is provided by the power supply P to the connector C in order that the rollers R in the printing press may be supplied with electrical energy and electrified. The electrical energy from the power supply P supplied to the inking rollers R by the connector C electrifies the inking rollers R and attracts and suppresses the ink mist formed by the moving inking rollers during operation of the printing press.

In the operation of the present invention, the printing presses are started when it is desired to begin printing operations. When the inking rollers assume a desired rotational speed, the feed switch **52** closes, and the operator of the printing press depresses the operating button **56** in order to permit the flow of current to the relay **57**. The relay **57**, upon receiving the current, closes the contacts **57***a* and permits the step-up transformers **62** in the power supply P to receive operating power from the conductors **45** and **46**.

The step-up transformers increase the voltage of the power furnished by the conductors **45** and **46** to the desired level and provide such electrical power over the conductor **32** to the connector C. The connector C is mounted with the insulating cap **30** and the socket with the printing press and is consequently stationary with respect thereto. The electrical energy from the conductor **32** is insulated from the ground in the socket S of the printing press by the insulating cap **30**, as has been previously set forth. The contact **38** is in electrical connection with the end **32***a* of the conductor **32** mounted in the conductor cup **34**. The carbon plunger **40** in contact **38** consequently furnishes the electrical energy from the conductor **32** to the conductor plug **23**.

The conductor plug **23**, as has been previously set forth, is mounted with the inking roller R and consequently rotates therewith. The contact between the moving conductor plug **23** and the carbon plunger **40** does not inhibit the transfer of electrical energy therebetween, due to the wearing action of the carbon plunger **40** and the rotating metallic plug **23**. Spring **42** urges plunger **40** into firm engagement with the metallic plug **23**. The rotating metallic plug **23** furnishes the electrical energy from the carbon plunger **40** and the remainder of the connector C to the inking roller R. The electrical energy so received electrifies the inking roller R and causes such inking roller R to attract the ink mist formed by the rotating inking roller R during operation of the printing press. The insulating journal **26** and the insulating sleeve **14** insulate the rotating

inking roller R from the ball bearing B and the socket S at each end of the inking roller R and prevent arcing and sparking and consequent danger of fire and explosion.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, materials, components, circuit elements, wiring connections and contacts as well as in the details of the illustrated circuitry and construction may be made without departing from the spirit of the invention.

We claim:

1. An apparatus for suppressing ink mist in a printing press, comprising:

a. an electrically conductive inking roller having an outwardly extending spindle at an end portion thereof, said spindle having a socket formed extending inwardly adjacent a side wall and an end wall formed therein;

b. an electrically insulating bushing mounted adjacent said side wall in said socket in said spindle;

c. an electrically insulating journal mounted externally of said spindle, said electrically insulating journal having an opening formed therein adjacent said socket in said spindle, said insulating journal further having a rim adjacent said opening for retaining said electrically insulating bushing in said socket in said spindle;

d. means for supplying electrical energy to electrify said inking roller, wherein the electrified inking roller attracts and suppresses the ink mist; and

e. an electrically insulating cap mounted with the printing press, said electrically insulating cap insulating said means for supplying electrical energy from the printing press, said electrically insulating cap having a portion extending inwardly through said opening in said electrically insulating journal, said inwardly extending portion having an external surface adjacent said electrically insulating bushing in said spindle.

2. The structure of claim **1**, further including:

an electrically conductive plug mounted in said end wall in said socket in said spindle to receive electrical energy from said means for supplying electrical energy.

3. The structure of claim **2**, wherein said means for supplying electrical energy comprises:

a. an electrical power supply;

b. an electrical conductor connected with said electrical power supply;

c. a contact mounted in said inwardly extending portion of said electrically insulating cap, said contact being in electrical connection with said electrical conductor; and

d. a plunger mounted in said contact and electrically connecting said electrical conductor with said electrically conductive plug.

4. The structure of claim **3**, wherein the printing press is equipped with a plurality of inking rollers and wherein said electrical power supply comprises:

a. an alternating current voltage source; and

b. a plurality of transformers, each individually connected to one of said plurality of rollers, wherein a malfunction of one of said plurality of transformers does not prevent electrifying of the remainder of said plurality of rollers.

5. The structure of claim **1**, wherein:

a. said electrically conductive inking roller further comprises a metal body having a vulcanized rubber coating along a portion of an outer surface thereof and uncovered end portions of said outer surface; and

b. sleeve means for electrically insulating said end portions of said inking roller from the printing press.

* * * * *