

[54] HEATING UNIT FOR COPYING MACHINE

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[58] Field of Search 219/216, 388, 483, 486

[56] References Cited

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[57]

ABSTRACT

Circuitry for use in a copying machine capable of copying on copy papers of at least two different widths comprising a voltage source; a heating unit including a central heating element and two end heating elements, the latter elements being substantially coaxially disposed at and connected to the opposite ends of the central heating element; and switching means for: (1) connecting the central and two end heating elements in parallel across the voltage source when the larger of the two different width copy papers is used, and (2) disconnecting the two end heating elements from the voltage source when the smaller of the two different width copy papers is used to thereby optimize power consumption from the voltage source while at the same time accommodating different sized copy papers.

3 Claims, 2 Drawing Figures

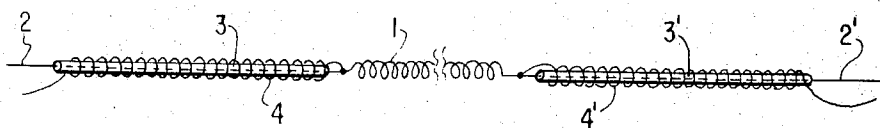


FIG. 1

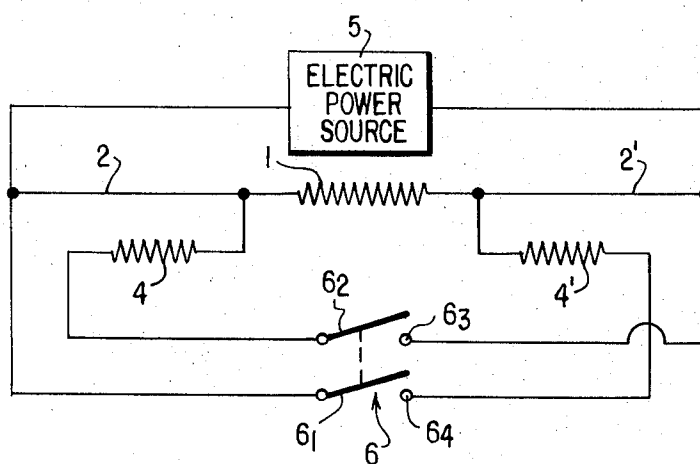
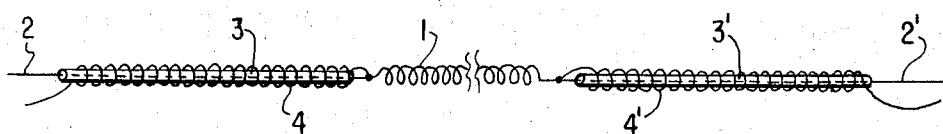


FIG. 2

HEATING UNIT FOR COPYING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to heating units for copying machines and, in particular, to heating units, the heat-generating length of which can be varied according to the size of the copy paper used.

2. Description of the Prior Art

Generally, in the fixing section of an electrophotographic copying machine or in the developing section of a thermo-developing diazo-type copying machine, there is provided a heating unit of a capacity adjusted to the size of the largest possible copying paper usable in a particular copying machine. Therefore, when copy paper of a size smaller than the maximum usable copy paper is used, the heating section becomes wider than necessary for heating, thus wasting electric power consumption. Also, the temperature toward the sides of the copy paper becomes lower than that in the central portion to thereby prevent uniform heating over the entire surface of the copy paper.

SUMMARY OF THE INVENTION

The primary object of this invention is to provide an improved heating unit for use in a copying machine, whereby it is possible to change the heat-generating length according to the size of the copy paper used.

Other objects and advantages of this invention will become apparent upon reading the appended claims in conjunction with the following detailed description and the attached drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a diagrammatic illustration of an illustrative heating unit in accordance with the invention.

FIG. 2 is a schematic circuit diagram of illustrative circuitry incorporating the heating unit of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown a central heating element 1 which is connected at its both ends to low resistance conductors 2 and 2' which are disposed in respective insulating tubes 3 and 3' provided on both sides of the central heating element 1. Coiled around the insulating tubes 3 and 3' are end heating elements 4 and 4', each of which is connected at one end to the corresponding end of central heating element 1.

As shown in FIG. 2, the heating unit of FIG. 1 is connected to a constant voltage, electric power source 5 and to a double-throw switch 6 comprising movable contacts 6₁ and 6₂ and fixed contacts 6₃ and 6₄. The outer ends of the low resistance conductors 2 and 2' together with contacts 6₁ and 6₃ are connected to power source 5, while the outer end of heating element 4 is connected to contact element 6₂ and outer end of heating element 4' is connected to the contact element 6₄.

When the switch 6 is opened (see FIG. 2), voltage from the power source 5 is applied only to the central heating element 1 so that the heating length is limited to the length of element 1 alone. But when switch 6 is closed, power is applied to central heating element 1 and to the end heating elements 4 and 4', so that the heating length is expanded to the total length of the entire heating unit including both central heating element

1 and end heating elements 4 and 4', thus enabling copying on the maximum sized copying paper. Since elements 1, 4, and 4' are connected in parallel across constant voltage source 5, the power consumed by the heating unit varies according to the size of the paper — that is, the smaller the paper, the less the power consumed.

When heating the maximum permissible copying width, the amount of heat generated in the end portions of the copying paper may be made greater than that in the central portion by changing the resistance per unit length of the central and end heating elements 1, 4, and 4' to thereby prevent temperature decrease in the end portions to hence facilitate uniform heating over the entire surface of the copying paper.

As described above, the present device is capable of varying the heating length according to the size of copy paper used, so that it is possible to economize on power consumption when copying on copy paper smaller than the maximum permissible copying width. Further, if the colorific values of the respective heating elements are suitably set, it becomes possible to perform uniform heating over the entirety of the copy paper thereby facilitating clearer reproductions.

Numerous modifications of the invention will become apparent to one of ordinary skill in the art upon reading the foregoing disclosure. During such a reading it will be evident that this invention provides a heating unit for a copying machine for accomplishing the objects and advantages hereinstated.

What is claimed is:

1. Circuitry including a heating unit for use in a copying machine capable of copying on copy papers of at least two different widths comprising:

an elongated central heating element;
two electrically insulating, elongated members substantially coaxially disposed at the opposite ends of said central heating element;

two electrically conductive wires respectively disposed in said two electrically insulating, elongated members, first ends of said wires being respectively connected to said opposite ends of the central heating element and the other ends of said wires extending out from said electrically insulating elongated member to form a first pair of terminals which may be energized when the smaller of said two different width copy papers are used; and
two end heating elements respectively coiled around said two electrically insulating, elongated members, first ends of said end heating elements being respectively connected to said opposite ends of the central heating element and the other ends of said end heating elements comprising a second pair of terminals which may be energized when the larger of said two different width copy papers are used.

2. Circuitry as in claim 1 including:

a voltage source connected across said first pair of terminals and

switching means connected to said first and second pairs of terminals for: (1) connecting said central and two end heating elements in parallel across said voltage source when said larger width copy paper is used, and (2) disconnecting said two end heating elements from said voltage source when said smaller width copy paper is used to thereby optimize power consumption from said voltage source.

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3. Circuitry as in claim 2 where said switching means comprises:

a double-throw switch having two fixed contacts and two movable contacts which respectively contact the two fixed contacts when the switch is closed, the first of said movable contacts being connected to one of said second pair of terminals and the first of said fixed contacts being connected to that one of said first pair of terminals which is on the side of said central heating element opposite to the side at which said one terminal of the second pair is disposed so that when said first movable contact contacts said first fixed contact, the end heating el-

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ement connected to said one terminal of the second pair is connected in parallel across said central heating element,

the second of said fixed contacts being connected to the other terminal of said second pair of terminals and the second of said movable contacts being connected to the other terminal of said first pair of terminals so that when said second movable contact contacts said second fixed contact, the end heating element connected to said other terminal of the second pair is connected in parallel across said central heating element.

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