

FIG. 3

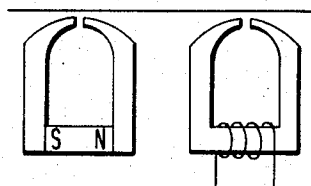


FIG. 4

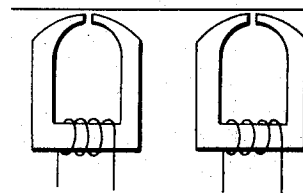


FIG. 5

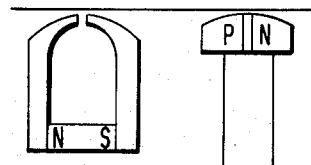
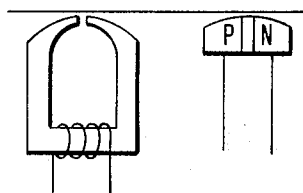


FIG. 6



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METHOD OF AUTOMATICALLY CUTTING ROLLED PHOTOGRAPHIC PAPER WEB

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a method of cutting a photographic paper web, and more particularly to a method of automatically cutting the photographic paper web by the use of electromagnetic means.

2. Description of the Prior Art

Heretofore, various methods of automatically cutting a rolled photographic paper web have been put into practice. For example, one method utilizes an optical means for optically detecting a black ink mark provided on the photographic paper. Another method utilizes electrical means for detecting the variation in resistance of a paper provided with a graphite mark. A further method utilizes mechanical means for mechanically detecting a mechanical mark provided on the paper to define the position to be cut or position spaced from the position to be cut by a prescribed length. However, these methods, as described above, have suffered from a defect as follows. In the case of the optical detecting means, the detecting means often detects stains and dust on the paper which results in undesired cutting of the paper. Even in the case of where electrical or mechanical detecting means are used, there is a possibility of misdetection caused by an electrical or mechanical irregularity accidentally made on the paper.

SUMMARY OF THE INVENTION

Therefore, it is a primary object of the present invention to provide a method of cutting a longitudinally fed paper web in which there is no possibility of misdetection of the position to be cut.

Another object of the present invention is to provide a method of cutting a paper in which detection of the position to be cut is achieved by electromagnetic means.

Still another object of the present invention is to provide a method of cutting a paper by detection of the position thereof to be cut by the use of a pair of magnetic heads one of which records a mark on the paper when the paper is printed and the other of which detects the recorded mark to operate the paper feeding means and paper cutting means.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and features of the present invention will be made apparent from the following description of preferred embodiments of the invention taken in conjunction with the accompanying drawing in which:

FIG. 1 is a rear perspective view of a photographic paper web showing the magnetically provided marks thereon.

FIG. 2 is a partial schematic elevational view of a paper cutting apparatus for carrying out the method of cutting according to the present invention in relation with the electromagnetic system shown in block diagram.

FIG. 3 is a side view of a marking magnetic head and a detecting head arranged in accordance with an embodiment of the present invention.

FIG. 4 is a side view of a marking magnetic head and a detecting head arranged in accordance with another embodiment of the present invention.

FIG. 5 is a side view of a marking magnetic head and a detecting head arranged in accordance with still another embodiment of the present invention.

FIG. 6 is a side view of a marking magnetic head and a detecting head in accordance with a further embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now referring to the drawing, a photographic paper web 1 is provided marks 2 thereon at positions corresponding to the printed frames thereof defined by boundaries 3. A roll 4 of the photographic paper is unrolled and fed along a predetermined passage. Along the path are provided a magnetizing device 5 for magnetically marking the photographic paper 1, a detecting device 6 for detecting the marks 2 magnetically recorded, a pair of feeding rollers 7, and a cutting device 8 arranged in downstream order. The detecting device 6 is a magnetic head in the embodiment shown in FIG. 2 connected to an amplifier 10 for amplifying the detecting signal from the magnetic head 6. The amplified signal from the amplifier 10 is transmitted to an electromagnetic clutch 12. The reference numeral 11 indicates a driving motor for rotating a cam 13 operating cutter 8 through the electromagnetic clutch 12 and for rotating the paper feeding rollers 7.

The marks 2 provided on the paper 1 are made by applying magnetizable material thereon and magnetized by the magnetizing device 5 which is a magnetic recording head in the embodiment shown in FIG. 2. That is, the paper 1 is provided with a magnetizable material coating at the positions shown in FIG. 1 when the photographic paper is printed, and then after developing the paper 1 is unrolled from the roll 4 and fed along the path in which the magnetizing device 5 and the detecting device 6 are arranged. When fed along this passage, the magnetizable material at the position 2, representing the mark, is magnetized by the magnetizing device 5 and then the magnetized mark 2 is detected by the detecting magnetic head 6. In response to the detection of the mark 2 by the detecting device 6, the detected signal is amplified by the amplifier 10 and the amplified signal is transmitted to the electromagnetic clutch 12. The rotation of the motor 11 is transmitted to the paper feeding rollers 7 through the clutch 12. In such a construction, when the amplified signal is transmitted from the amplifier 10 to the electromagnetic clutch 12, the paper feeding rollers 7 are stopped and rotation of the cam 13 is initiated. The cam 13 during rotation makes the cutter 8 cut the paper 1 after the predetermined time designed by the cam shape thereof, so that the paper 1 may be cut at the position detected by the detecting device 6.

The arrangement or combination of the magnetizing device 5 and the detecting device 6 may be any of the various combinations such as shown in FIGS. 3 through 6. In FIG. 3, an embodiment involving an arrangement of two magnetic heads is shown in which the magnetizing head is a permanent magnetic head and the detecting head is an electromagnetic coil head. FIG. 4 shows another embodiment of the arrangement of the two

magnetic heads in which the magnetizing head is an electromagnetic and the detecting head is also an electromagnetic coil head. In FIG. 5 is shown still another embodiment of the arrangement of the heads in which the magnetizing head is a permanent magnetic head and the detecting magnetic head is a magnet diode. A further embodiment of the arrangement of the heads is shown in FIG. 6 in which the magnetizing head is an electromagnetic head and the detecting head is a magnet diode. In any embodiment of the invention as described above, the magnetizable mark 2 on the paper is magnetized and detected so that the paper may be cut at the position of the boundary 3 of the frames by the combination of the clutch 12, feeding roller 7 and cam 13 working in response to the detected signal from the amplifier 10.

What is claimed is:

1. A method of cutting a running photographic paper web after photographic development, said method

comprising:

providing magnetizable material marks at spaced positions along a photographic paper web prior to photographic printing of said web,
developing said photographic paper web,
magnetizing said magnetizable material after photo-development,
detecting the presence of the magnetizable material marks during movement of said paper web, and
cutting the paper at spaced longitudinal positions by means operating in synchronized response to detection of magnetized material marks.

2. The method of cutting a running paper web as claimed in claim 1, wherein said paper is sheared by a cam rotating through a clutch operated by a signal generated in response to detection of said magnetized material marks.

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