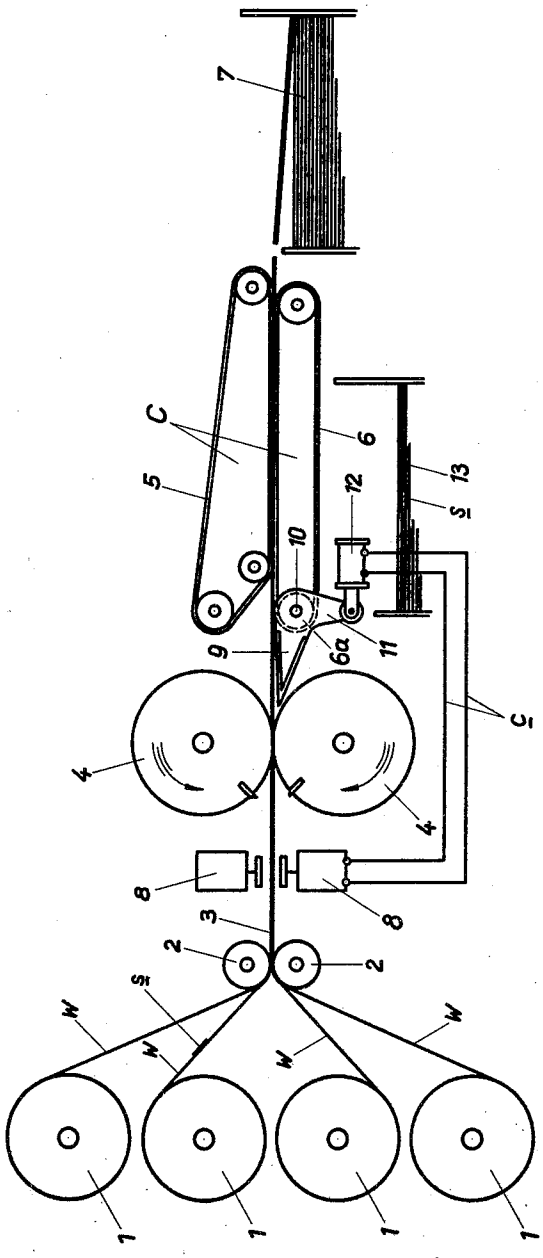
Dec. 25, 1962 E. LOHRMANN 3,070,365

METHOD OF AND MEANS FOR DETECTING FLAWS AND THE LIKE IN A PLURALITY OF SUPERPOSED WEBS OR SHEETS

Filed Feb. 24, 1959 4 Sheets-Sheet 1

Fig. 1



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Fig. 2

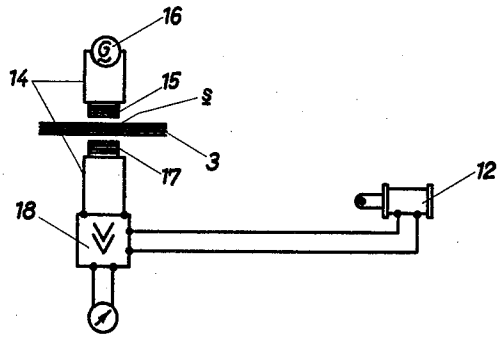


Fig. 3

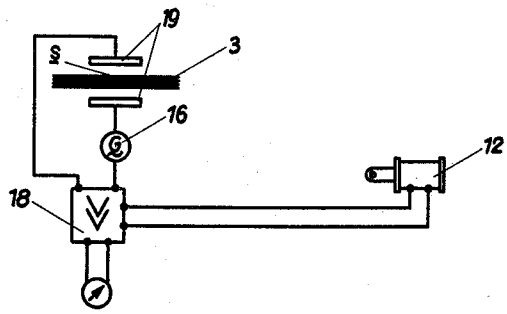
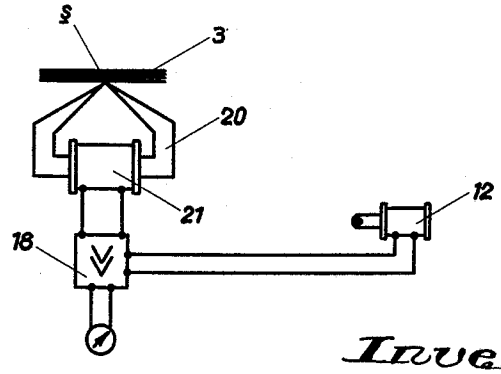


Fig. 4



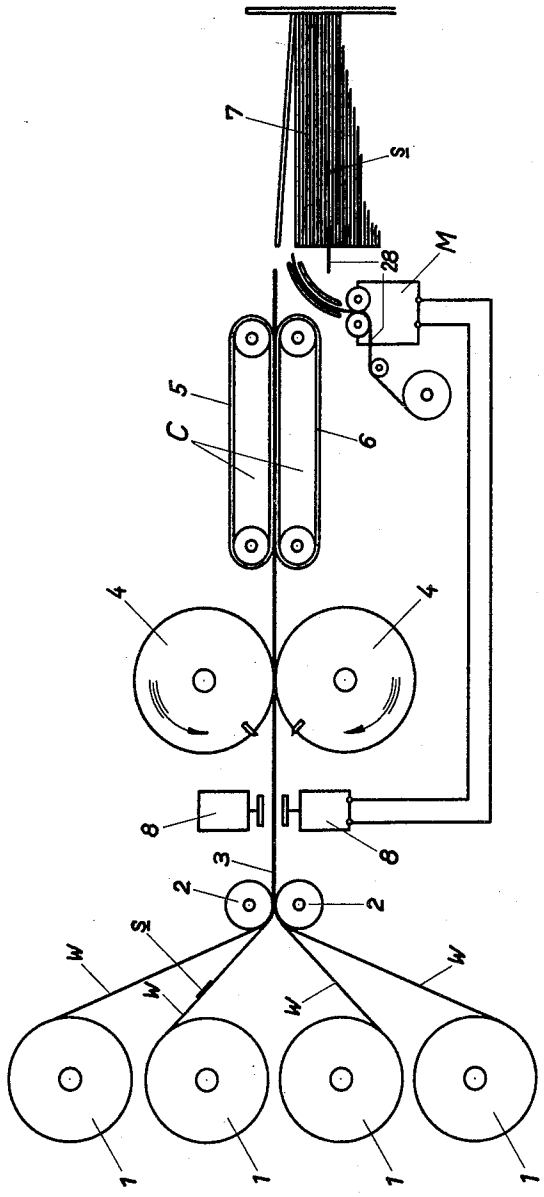
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Fig. 5



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Fig. 6

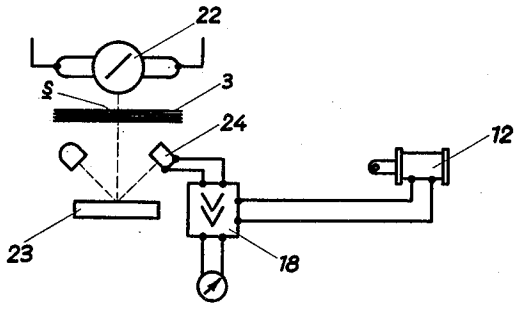


Fig. 7

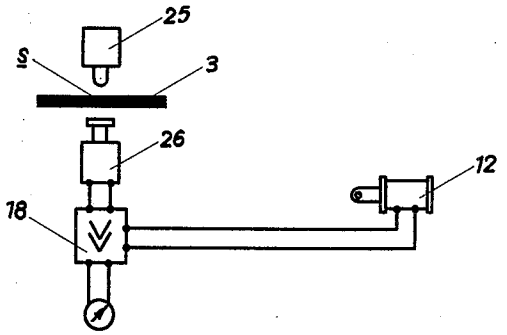
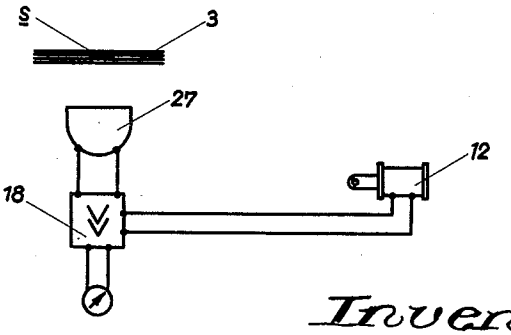


Fig. 8



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METHOD OF AND MEANS FOR DETECTING FLAWS AND THE LIKE IN A PLURALITY OF SUPERPOSED WEBS OR SHEETS

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3 Claims. (Cl. 270—52)

The invention relates to methods of and means for detecting in a plurality of superposed webs or sheets of paper and like material, those webs or sheets containing at least one seam, joint or flaw.

More particularly, the invention relates to methods of and means for indicating and/or separating from superposed webs or sheets, those webs or sheets containing at least one seam, joint or flaw.

In paper processing machines, especially sheet producing machines, such as transverse cutters and the like, to avoid problems in the subsequent processing of the sheets, it is desirable to mark or eliminate the sheets having seams or defective areas. For this purpose, apparatus has been proposed, which with the assistance of light-sensitive cells transforms the seams or defective areas into electrical impulses and these impulses are used to operate a unit for marking and/or eliminating the undesirable sheet. However, this type of apparatus is essentially restricted to paper machines in which the web emanates from one and at the most two supply rolls, so that the web is never more than two layers in thickness.

In the case of machines employing three or more supply rolls, it is very difficult to detect seams, joints and flaws which are concealed by two webs or sheets free from such defects since the same cannot be readily determined by optical-electrical means.

It has been proposed in machines employing a plurality of supply rolls to associate with each web, a unit including a light-sensitive cell, but this particular arrangement requires a multiplicity of units thereby necessitating an undesirable high expenditure of capital.

To overcome the foregoing and other objectionable characteristics existing in the art is an important object of the invention.

Broadly, to accomplish the various objects and advantages of the invention, the invention comprises passing a plurality of superposed webs along a predetermined path, passing such webs through a zone in which the presence of a seam, joint or flaw in one of the layers initiates an impulse which is transmitted to means operative to mark the webs or separate the webs possessing such defect.

In one specific embodiment, the seam, joint or defect is rendered electrically conductive, by a metallized coating, a metal foil strip or the like, so that upon passing the superposed webs through the electromagnetic field of a high frequency transformer, the voltage drop produced in the secondary portion furnishes the impulse required to operate the separating or marking means.

In another embodiment, upon passing the superposed webs through the electric field of a condenser, the change in the dielectric constant produces a voltage change which initiates the functioning of the separating or the marking means.

Yet a further embodiment comprehends the concept of rendering the seam, joint or defect electrically conductive whereby upon passing the webs through the field of an electro-magnet, the inductivity of the magnetic field in the magnet coil produces an impulse which serves to operate the separating or marking means.

A still further means effecting the controlled impulse is the use of α, β, γ or roentgen rays, so that when the plurality of webs is passed through the area of radiation, a change in absorption generates the impulse which after amplification actuates the separating or indicating means. The means can also be such that the flaw appears as a shadow on a luminous screen, which by optical means is transformed into an electrical impulse for controlling the indicating or separating means.

Additionally, it is possible to use radioactive isotopes with such isotopes being contained in the seam, joint or flaw and with the radiation thereof in a Geiger counter or similar receiving unit producing the impulse operative to actuate the indicating or separating means, and such isotopes may be directly contained in the seam or the like, in an adhesive strip employed for the seam or the substance used for indicating the defect can contain the isotopes.

Further objects and advantages of the invention will become more readily apparent to one skilled in the art from a study of the following specification and drawings, and in which drawings:

FIGURE 1 is a diagrammatic representation of a transverse cutter for paper webs embodying the invention,

FIGURE 2 is a diagrammatic view of the use of the electromagnetic field of a high frequency transformer, through which field the webs or sheets are passed,

FIGURE 3 is a view similar to FIGURE 2, in which the webs or sheets are passed through the electrical field of a condenser,

FIGURE 4 is a diagrammatic representation in which the webs or sheets are passed through the field of the lines of force of an electromagnet,

FIGURE 5 is a diagrammatic view similar to FIG. 1 showing a transverse cutter with a device to insert marking tabs,

FIGURE 6 shows diagrammatically the use of a röntgen tube through which field of radiation the webs or sheets are passed,

FIGURE 7 shows the use of a sound generator in connection with a receiver to indicate the joint or flaw in the webs or sheets,

FIGURE 8 is a diagrammatic view of a device in which a Geiger counter is used to indicate the isotopes being contained in the seam or joint of the paper.

Referring to FIGURE 1, individual paper webs W are drawn from a plurality of superposed supply rollers 1, there being four such rollers illustrated, and by means of feed rollers 2 the individual webs are brought together to provide a multi-layered web 3. The web 3 is moved through the nip of knife rollers 4, which rollers sever the web 3 into sections or packs of the desired length. A conveying device C, consisting of movable parts 5 and 6 transfer the severed sections or packs into a suitable or convenient receiving means 7.

Between the rollers 2 and the knife rollers 4, there is located suitable means 8 serving to produce a controlled impulse, and by means of such impulse the indicating or separating means is actuated. In FIGURE 1, there is illustrated a separating means which comprises a switch means 9 located immediately rearward of the knife rollers

4. The switch means 9 is pivotally mounted about pivot point 10 of the roller 6a of the lower endless belt 6, and the switch means 9 is of a length to correspond substantially to the width of the multi-layered web 3, and the length of the knife rollers 4. The switch means 9 further includes a depending arm 11 which is operably connected to the movable bar of a magnet 12. The magnet 12 receives an impulse from the means 8 when the web 3 having a seam such as shown at *s* passes through the means 8 through circuit-forming component *c*. When the web containing such defect passes through the means 8, the impulse actuates the magnet 12 to extend the bar, whereupon the switch means 9 is rocked upwardly about pivot point 10 to block entrance to the conveying device C, thereby directing the severed section or pack downwardly into a waste receptacle 13 located below the conveying means C.

As previously mentioned, the means 8 for producing the control impulse may be of various types, and in FIGURE 2 the web is passed through the electromagnetic field of a high frequency transformer. More specifically, in this embodiment, the seam, joint or defect has been made electrically conductive by metallizing, bronzing, or by an adhesive strip having a metal foil layer. The web is passed through the electromagnetic field of a high frequency transformer 14, and primary winding 15 thereof is fed by means of a high frequency generator 16. When the web containing the seam, joint or defect is passed through the electromagnetic field, a voltage drop is effected in secondary winding 17, and the impulse produced is transmitted through an amplifier 18 to the magnet 12 to actuate the switch means 9 (not shown), as in the fashion previously described.

In FIGURE 3, the web 3, when containing a defect, passes through the electric field of a condenser 19 and through alteration of the dielectric constant effects a voltage change in the current of the condenser 19, which initiates an impulse which is transmitted through amplifier 18 to the magnet 12 to operate the switch means 9.

In the embodiment illustrated in FIGURE 4, the particular defect is made electrically conductive and magnetizable by convenient means, and when the web containing such defect passes through the field of the lines of force of the electromagnet 20, the defect causes a change in the inductivity of the magnetic field to produce in coil 21 of the magnet an impulse, which through amplifier 18 actuates the magnet 12 to control the movement of the switch means 9.

Thus, in each of the embodiments, the movement through what may be termed the detecting means 8 of the multi-layered web containing a seam, joint or flaw, immediately effects the operation of the separating or eliminating means to divert the web section or pack to a receiver for imperfect or undesirable web sections.

It is further possible to operate the switch means 9 by actuation of the magnet 12 by the use of α, β, γ, or roentgen rays, as shown in FIG. 6. In this form, the multi-layered web having a defect is passed through the radiation of a röntgen tube 22 which through the change in absorption produces an impulse, which impulse, after amplification, actuates the magnet 12 and as a consequence the switch means 9. It is also feasible that the defect can appear as a shadow on a luminous screen 23, and by photoelectric cell 24 the same is transformed into an electrical impulse for controlling the movement of the switch means 9. Furthermore, as shown in FIG. 7, it is within the scope of the invention to pass the web through the wave range of a sound generator 25, so that a web containing a defect passes therethrough, the control impulse initiated by the absorption or reflection of the sound waves is generated by a receiver 26. The arrangement can also be such that due to the reduced sound transmittance, the defect will appear as a shadow on an image converter screen, and be changed by known optical means into an electrical impulse,

FIG. 8 shows the possibility to detect a joint or defect in a multi-layered web by the use of radioactive isotopes to accomplish the desired results.

The defect contains radioactive isotopes whose radiation in a Geiger counter 27 or other receiving unit generates an impulse which is used to actuate the means for controlling the movement of the switch means 9.

While in each embodiment there is specifically shown a switch means for separating or eliminating the undesired section or pack, the invention contemplates the use of means for marking such undesired sections or packs. Accordingly, there is shown in FIGURE 5 an arrangement similar to FIGURE 2, in which the impulse generated by means 8 functions to control a suitable marking device M. In this case it is possible to use a well known device to insert marking tabs 28 in the lay-boy 7. Manifestly, this particular arrangement can be used in connection with the other impulse producing means shown and described herein.

What I claim is:

1. A method for indicating and eliminating hidden flaws and the like in multi-layered webs of paper and similar material, comprising the steps of passing individual webs from at least three supply sources to a uniting zone for producing a multi-layered web, rendering each flaw occurring in such webs electrically conductive prior to passage of the individual webs to the uniting zone, moving the multi-layered web in the direction of a cutting zone for cutting the web transversely, subjecting the multi-layered web during its movement in the direction of the cutting zone and prior to cutting to the action of a zone in which the electrically conductive flaw generates an impulse, and utilizing such impulse to indicate and eliminate the cut multi-layered web section leaving the cutting zone.

2. A method for indicating and eliminating hidden flaws and the like in multi-layered webs of paper and similar material, comprising the steps of passing individual webs from at least three supply sources to a uniting zone for producing a multi-layered web, rendering each flaw in such webs electrically conductive prior to passage of the individual webs to the uniting zone, moving the multi-layered web in the direction of a cutting zone for cutting the web transversely, conducting the multi-layered web during its movement to the cutting zone and prior to cutting through the electro-magnetic field of a high frequency transformer whereby the flaw effects an impulse generating voltage drop in the secondary of the transformer, and utilizing such impulse generating voltage drop to indicate and eliminate the cut multi-layered section leaving the cutting zone.

3. A method for indicating and eliminating hidden flaws and the like in multi-layered webs of paper and similar material, comprising the steps of passing individual webs from at least three supply sources to a uniting zone for producing a multi-layered web rendering each flaw in such webs electrically conductive prior to passage of the individual webs through the uniting zone, moving the multi-layered web in the direction of a cutting zone for cutting the web transversely, conducting the multi-layered web during its movement to the cutting zone and prior to cutting through the field of an electro-magnet thereby producing an impulse through a change of the inductance of the field in the coil of the magnet, and utilizing such impulse to indicate and eliminate the cut multi-layered section leaving the cutting zone.

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