United States Patent [19]

Holm

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[54] **SELF-CALIBRATING SEAM DETECTOR**

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[52] **U.S. Cl.** **200/61.13**, 200/61.14

[51] **Int. Cl.** **B65h 25/14**

[58] **Field of Search** ..... 200/61.13–61.18, 153 T

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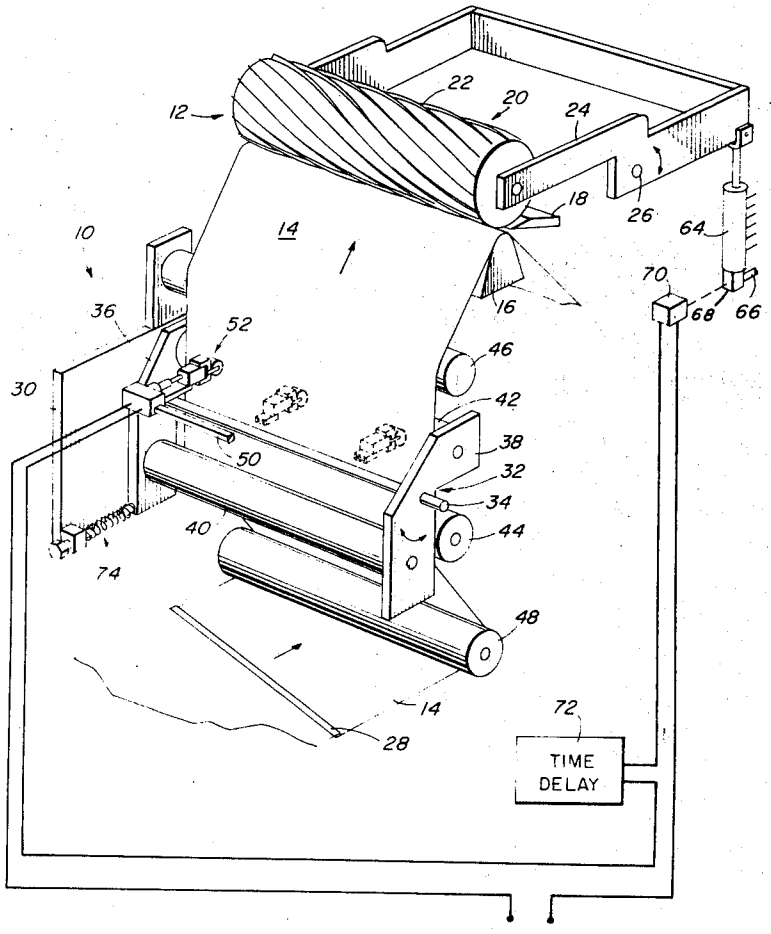
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[57] **ABSTRACT**

Seams or other protrusions on a running web are detected by a sensor bearing against the web surface. A pair of spaced parallel rollers mounted on a common pivoted bracket engage opposite sides of the web, one roller positioned opposite the sensor and the other roller positioned opposite a fixed position roller. Means are provided for urging the pivoted rollers against the web surfaces whereby a change in web thickness will automatically calibrate the sensor to roller gap by self-adjustment of the pivoted rollers. The detector is particularly useful in combination with a seam jumper in a cloth shearing machine.

2 Claims, 3 Drawing Figures



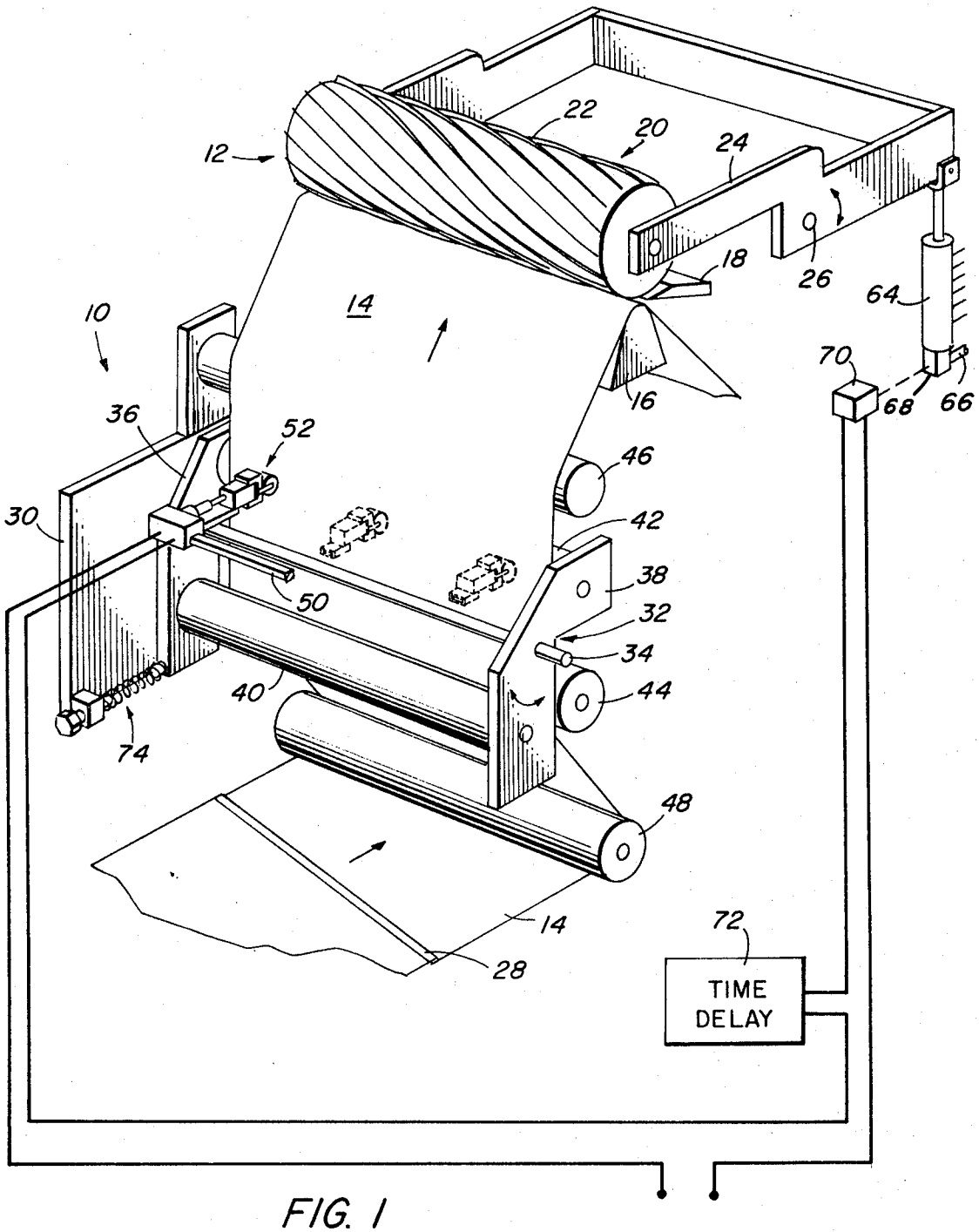
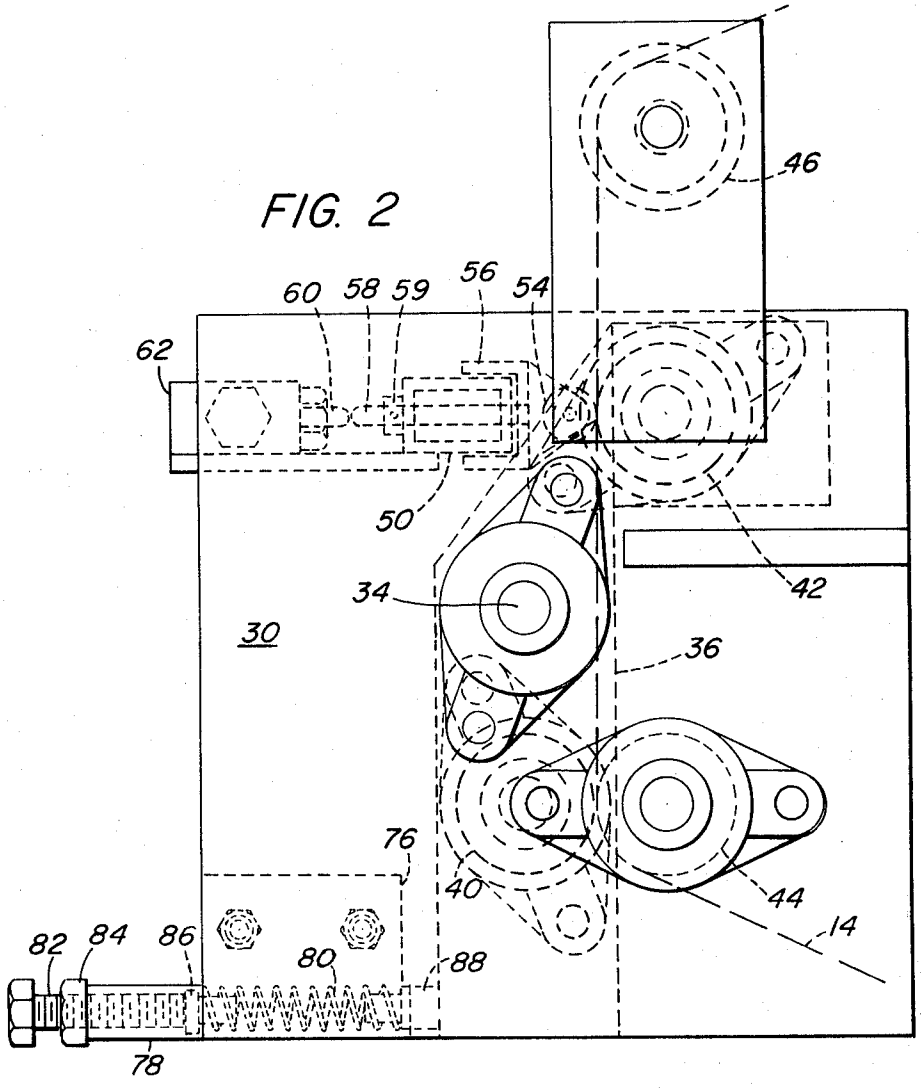


FIG. 1

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FIG. 2



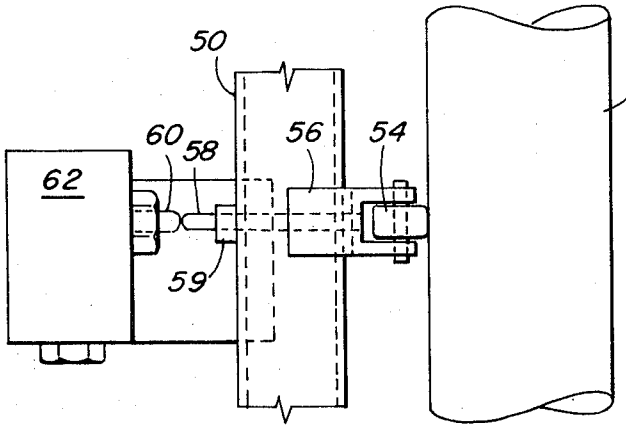


FIG. 3

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SELF-CALIBRATING SEAM DETECTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to seam detectors for running webs and more particularly is directed towards a self-calibrating seam detector especially useful in combination with seam jumpers in a cloth shearing machine.

2. Description of the Prior Art

In a number of web handling machines, seams or other protrusions must be detected and corrective measures taken to prevent damage to the seam or to the machine. For example, in a cloth shearing machine, one length of a running cloth web will be joined to another length in order to maintain a continuous feed through for the shearing machine. The webs customarily are joined in end to end relation by sewing the trailing end of one section to the leading end of the next section. This sewing produces a transverse seam across the web, the seam being thicker than the rest of the web. Since a cloth shearing machine generally is set with a very small clearance, the seam would be cut and possibly the shearing mechanism may be damaged if corrective measures were not taken.

While various types of seam detectors have been employed to detect the oncoming seam in a running cloth fabric, and jumpers are available for moving the shearing revolver and ledger knife away from the cloth rest as the seam passes through, these devices usually require adjustment each time there is a change in the thickness of the web being processed.

Accordingly, it is an object of the present invention to provide improvements in seam-detectors and more particularly it is an object of this invention to provide a self-calibrating seam detector for use with a running web. A more specific object of this invention is to provide a self-calibrating seam detector in combination with seam-jumping apparatus and a cloth shearing machine.

SUMMARY OF THE INVENTION

This invention features a self-calibrating seam detector for a running cloth web, comprising a support pivoted about an axis extending transversely of the web length and parallel to the plane thereof, a pair of spaced members mounted to said support in spaced parallel relation to the axis thereof and disposed on opposite sides of said web, means mounting a relatively fixed member in parallel relation to one of the pivotally mounted members and on an opposite side of the web, and a relatively fixed web engaging sensor positioned on the other side of said web opposite the other of said pivoted mounted members whereby a change of thickness of said web will pivot said support to change automatically the gap between the pivotally mounted members, the fixed member and the sensor. This invention also features a self-calibrating seam detector in combination with seam jumping mechanism in a cloth shearing machine for automatically changing the shearing gap upon detection of a seam in the web passing through the machine.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, somewhat schematic, of a self-calibrating seam detector made according to the invention and in use with a cloth-shearing machine,

FIG. 2 is a view in side elevation partly in section of a self-calibrating seam detector made according to the invention, and,

FIG. 3 is a detailed top plan view of a seam-sensing device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and to FIG. 1 in particular, there is illustrated a self-calibrating seam detector generally indicated by the reference character **10** mounted for use with a cloth shearing machine generally indicated by reference character **12** with a running web **14** passing through the detector **10** and the shear **12.** The shearing machine **12** is employed to trim to a uniform height the upstanding fibers on the web **14** and is used frequently in the manufacture of various types of woven materials. The shearing machine includes a fixed cloth rest **16** of triangular cross section over the top of which passes the web to present the fibers for shearing by means of a ledger knife **18** and a shearing revolver **20** provided with a plurality of helical cutting elements **22** which coact with the ledger knife to shear the fibers. The knife **18** and revolver **20** are mounted on a movable bracket assembly **24** pivoted at **26** to the machine frame, (not shown). The bracket **24** can be biased about the pivot **26** to raise the revolver **20** and ledger knife, opening the shearing gap with the rest **16,** to allow passage of a thickened seam **28** extending transversely of the web **14.** The seam is formed by sewing the trailing end of one web section to the leading end of another web section to maintain a continuous run of cloth.

The self-calibrating seam detector **10** is generally organized about a pair of fixed frame plates **30,** one on either side of the path of travel of the web **14** and supporting therebetween a bracket assembly **32** pivoted by means of a pinion shaft **34** to the plates **30.** The pinion shaft **34** extends transversely of the web **14** in spaced parallel relation thereto to permit a pivoting action of the bracket assembly **32** about an axis parallel to the plane of th web and perpendicular to the length thereof. The bracket assembly **32** includes a pair of end plates **36** and **38,** one mounted at each end of the pinion shaft **34** and formed with extended portions, the opposing lower portions, as viewed in FIG. **1,** carrying therebetween a roller **40** and the opposing upper offset portions carrying a roller **42,** the two rollers being in spaced parallel relation to one another at opposite ends of the plates and positioned on opposite sides of the web **14.** Idler rollers **44** and **46** are mounted between the fixed plates **30,** the roller **44** being disposed in adjacent parallel relation to the roller **40** but on the opposite side of the web **14** while the roller **46** is located above the pivoted bracket assembly **32.** An additional idler roller **48** may be provided to guide the web into the detector **10.**

Mounted between the fixed plates **30** as by a crossbar **50** is a seam sensor **52** adapted to detect the seam **28** as it passes opposite the sensor. The sensor is positioned directly opposite the roller **42** on the reverse side of the web and, in the preferred embodiment, is comprised of a relatively small roller **54** which is carried by a yoke **56** drivingly engaging by means of a stem **58** an actuator **60** for microswitch **62** or the like. It will be understood that should a seam pass against the sensing roller **54,** the roller, together with the yoke and

stem 58, will move back against the fixed microswitch 62, closing a circuit which will actuate the seam jumper for the cloth shearing machine. The axial motion of the stem 58 in the direction towards the web is limited as by a pinned collar 59 which acts as a stop against the crossbar 50. The switch 62 typically is spring-loaded whereby its actuator 60 will normally urge the stem 58 and roller 54 axial outward to its stop position to engage the web.

In the illustrated embodiment, the seam jumper is actuated by means of a pneumatic or hydraulic cylinder 64 fixed to the shear frame and drivingly connected to a rearwardly extending portion of the bracket 24. The cylinder 64 is connected by a conduit 66 to a source of pressurized air or hydraulic fluid and is controlled by means of a solenoid actuated valve 68. A coil 70, which operates the valve 68, is connected to the switch 62 and, typically, an adjustable time delay unit 72 is provided to compensate for the distance between the sensor 52 and the shearing line across the rest 16. The time delay may be adjusted also to compensate for changes in the speed of the web and in this manner the seam jumper will be actuated as close as possible to both sides of the seam to minimize waste.

In practice, a number of sensors 52 will be mounted across the width of the web whereby skewed, bowed, or other irregular seams may be detected and the seam jumper actuated for a sufficient length of time.

The bracket rollers 40 and 42 are urged into engagement with opposite sides of the web and against the roller 44 and the sensor roller 54 by means of a tension device 74 mounted to at least one of the fixed plates 30. The tension device in the illustrated embodiment and as best shown in FIG. 2, includes a bracket 76 fastened to the fixed plate and carrying a tube 78 housing a compressed coil spring 80 and a bolt 82 threaded to a fixed nut 84 with plugs 86 and 88 at opposite ends of the spring 80. The plug 88 bears against the lower edge of the end plate 36 and, under the force of the spring 80, urges the entire bracket assembly 32 in a counterclockwise direction as viewed in FIGS. 1 and 2. This urges the roller 40 towards the roller 44 nipping the web and also urges the roller 42 towards the sensor roller 54. The tension may be readily adjusted by manipulating the bolt 82 as required.

The seam detector is self-calibrating in that the clearance between the rollers 40 and 44 will automatically set the clearance between the roller 42 and sensor roller 54. In this manner, should one web section be thicker than another web section, as may occur when changing from one type of material to another, the unit will automatically adjust itself to the change in thickness and there will be no need to adjust the position of the sensors 52. Assuming a thick material passes through the unit, this will force the rollers 40 and 44 apart, the roller 40, in turn, biasing the bracket 32 about its pinion 34, automatically moving the roller 42 a corresponding distance from the sensor roller 54. In this fashion, the sensor roller 54 remains in the same relative position regardless of web thickness and will at all times be able to detect a seam since the roller 42 has moved away from it by a distance corresponding to the new thickness of cloth.

The self-calibrating unit while shown in combination with a shearing machine may be employed to advantage in other applications. The unit can be mounted in a variety of locations on the machine and at various attitudes.

Having thus described the invention what I claim and desire to obtain by Letters Patent of the United States is:

1. A self-calibrating seam detector for a running web, comprising

a. a first web-engaging roller mounted in fixed position along one side of the path of travel of said web,

b. a second web-engaging roller movably mounted along the other side of the path of travel of said web opposite said first roller to form a web thickness gauge therewith,

c. resilient means operatively connected to said second roller for urging said second roller towards said first roller with said web therebetween,

d. a third web-engaging roller movably mounted along said one side of the path of travel of said web,

e. movable mounting means supporting said second and third rollers for simultaneous cooperating movement to and away from the plane of said web, and,

f. seam sensing means mounted along the other side of the path of travel of said web opposite said second roller adapted to be actuated by a seam in said web passing between said third roller and said sensing means,

g. the spacing between said sensing means and said third roller controlled by the thickness of said web as said web first passes between said first and second rollers, said second roller moving to and away from said first roller according to changes in the thickness of said web and thereby simultaneously moving said third roller and said sensing means,

h. the axes of said rollers being parallel and extending transversely of said web,

i. said mounting means including a rigid bracket carrying said rollers in spaced parallel relation and mounted for pivotal movement about an axis parallel to said rollers and substantially mid way between said second and third rollers,

j. said seam sensing means including a resiliently mounted web-engaging roll bearing against said web and a switch operatively connected to said roll whereby said switch will be actuated by a seam engaging said roll.

2. A self-calibrating seam detector according to claim 1 wherein said resilient means includes an adjustable spring fixed at one end and bearing against said bracket at another end.

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