Oct. 9, 1951 E. VOSSEN 2,570,995

HOLE AND PRESS OFF DETECTOR WITH PLURALITY OF FEELERS

Filed Nov. 29, 1950

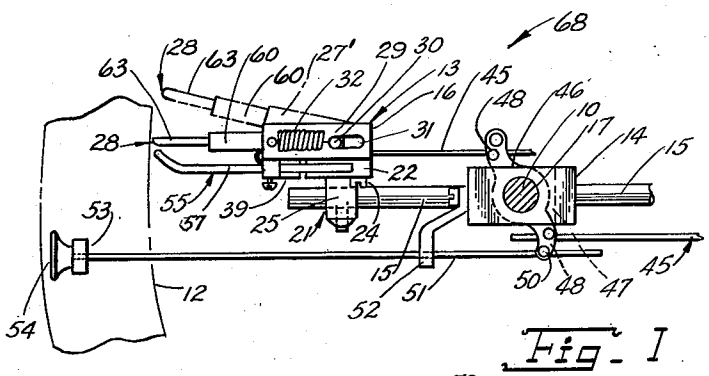


Fig. 1

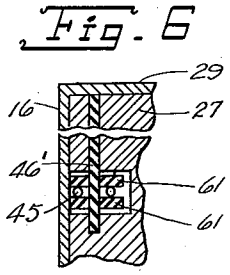


Fig. 6

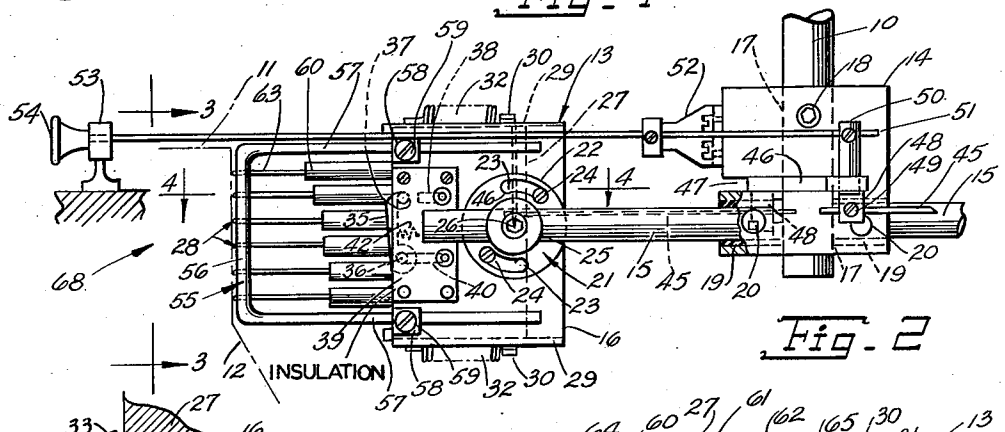


Fig. 2

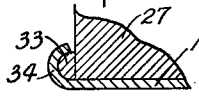


Fig. 5

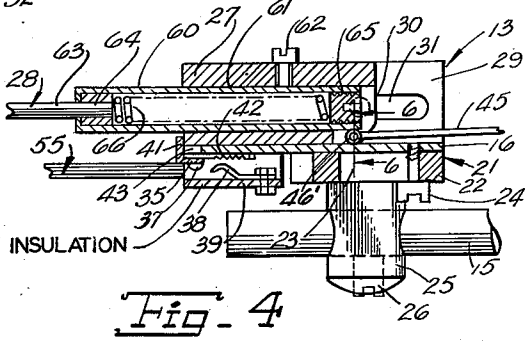


Fig. 4

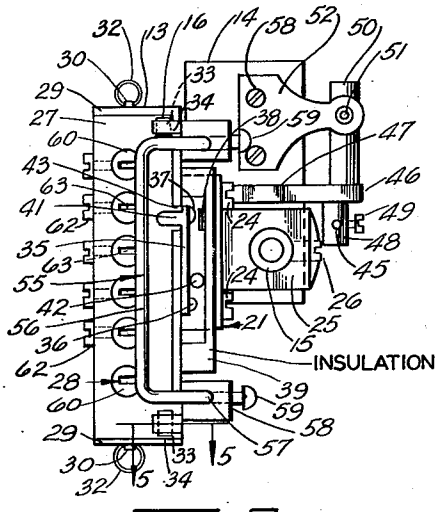


Fig. 3

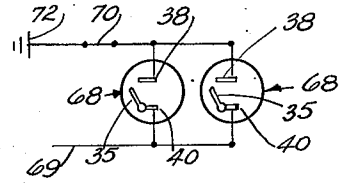


Fig. 7

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## HOLE AND PRESS-OFF DETECTOR WITH PLURALITY OF FEELERS

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9 Claims. (Cl. 66—166)

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This invention relates to new and useful improvements in hole and press-off detectors provided with a plurality of feelers.

The detectors, in accordance with this invention, are intended for open head knitting machines having center shafts protruding below the cylinder lines and extending into the circular cloth material being knitted. It is proposed that each detector be provided with a plurality of hole feelers preferably arranged in a vertical line and engageable against the circular cloth being knitted so as to detect holes and press offs. When a plurality of hole feelers are arranged in a vertical line a new problem presents itself because then the hole feelers extend quite a distance down the circular material being knitted and in said low area the material being knitted is elliptical and not circular because the circular material is flattened out and feed between a pair of parallel rollers some distance beneath the cylinder line of the knitting machine. Naturally, in order to maintain a contact between the hole feelers and the knitted cloth during the knitting operation when the cloth and feelers are turning relative to each other, it would be necessary for the feelers to move radially inwards and outwards large amounts. It is an object of this invention to avoid such large movements of the hole feelers.

It is further pointed out that the hole and press-off detectors may be provided with four, six, eight or any other number of the hole feelers in accordance with this invention. Each knitting machine may be provided with a number of the new hole and press-off detectors, for example, two, four, etc.

It is proposed to characterize the new hole and press-off detector by a support for attachment to said central shaft of a knitting machine and adapted to extend substantially radially thereof to a short distance from the cloth material being knitted. A member upon which the hole feelers are mounted should be slidably and pivotally mounted on the outer end of said support for sliding substantially radially of said shaft and pivoting laterally so that said member may be pivoted laterally when one of said hole feelers engages in a hole or opening in said cloth material during the knitting thereof.

Another and very important object of this invention resides in providing resilient means for urging said member into a normal forward position in which said hole feelers engage said cloth.

It is also contemplated to provide means for signalling the stopping of the knitting machine (1) when said member is pivoted laterally, and

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(2) when said feelers electrically ground to the frame of the knitting machine because of a press-off or other reasons.

Another and important object of this invention resides in the provision of a connector eccentrically connected with the said member for simultaneously pivoting said member back to a straight position and drawing said member backwards so that it may be released for again engaging said hole feelers against said cloth material.

Another object of the invention is the construction of a device as described which is simple and durable and which may be manufactured and sold at reasonable cost.

Another important object of this invention resides in the provision of a cloth holding guide adjacent said feelers to straighten out the knitted cloth and eliminate the necessity of the feelers moving large distances in and out to maintain contact with the knitted cloth during operation of the knitting machine. It is again pointed out that the tubular knitted material is pulled down from the needles between a pair of parallel rollers and consequently is not truly circular but more of an ellipse shape at the height where the feelers engage the knitted cloth. Without the cloth holding guide the feelers would be required to move large distances in and out. It is proposed to eliminate this objectionable motion by the use of said cloth holding guide.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawing, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 is a plan view of a hole and press-off detector constructed in accordance with this invention, a portion of the knitting machine being schematically shown to show the relationship of the detector to the knitting machine.

Fig. 2 is an enlarged front elevational view of Fig. 1.

Fig. 3 is an enlarged vertical sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged fragmentary horizontal sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary enlarged horizontal sectional view taken on the line 5—5 of Fig. 3.

Fig. 6 is an enlarged fragmentary vertical sectional view taken on the line 6—6 of Fig. 4.

Fig. 7 is a schematic wiring diagram of the installation of the detectors.

The hole and press-off detector 66 for an open head knitting machine having a center shaft 10 protruding below the cylinder line 11 of a knitting machine, not illustrated, and extending into the circular cloth material 12 being knitted, in accordance with this invention, includes a support 13 for attachment to said shaft 10 and extending substantially radially thereof to a short distance from said cloth material 12. This support 13 is made from several adjustably connected sections in order that the hole feelers of the detector may be properly engaged against said circular cloth material 12. Specifically, the support 13 comprises a bracket 14 which is attached to the shaft 10, a rod 15 extending substantially radially of the shaft 10, and an outer bracket 16.

The bracket 14 is in the nature of a block having an opening 17 into which the shaft 10 extends. A set screw 18 engages through the bracket 14 and against the shaft 10 for holding the bracket 14 upon the shaft 10 in selected raised and lowered positions. An insulation tube 19 is mounted on one end of the rod 15 and extends into an opening in the bracket 14 and is held in a fixed position with a set screw 20. The purpose of the insulation tube 19 is to insulate the new detector from the ground of the knitting machine. The bracket 16 is attached to the rod 15 with a connector 21. This connector 21 has a circular flange 22 formed with several arcuate slots 23 through which holding screws 24 engage. These screws 24 are threadedly mounted on the bracket 16 by which the bracket 16 may be angularly adjusted in relation to the rod 15. The connector 21 has a hub portion 25 formed with an opening through which the rod 15 passes. A set screw 26 engages the hub portion 25 and engages against the rod 15 for fixedly connecting these parts.

A member 27 provided with a plurality of hole feelers 28 is slidably and pivotally mounted on the outer end of said support 13 for sliding radially of said shaft 10 and pivoting laterally thereto so that said member 27 will pivot laterally when one of said hole feelers 28 engages in a hole or opening in said cloth material 12 during the knitting thereof. The bracket 16 of the support 13 is provided with flanges 29 spaced from each other between which said member 27 is slidably mounted. The member 27 is provided with top and bottom pins 30 which slidably engage through slots 31 formed in the flanges 29 by which the member 27 is pivotal laterally, as for example indicated by the dot and dash lines 27' in Fig. 1. The pins 30 and the slots 31 comprise the means by which the member 27 is slidably and pivotally mounted on the support 13.

The member 27 is associated with resilient means urging it into a normal forward position in which said hole feelers 28 engage said cloth material 12. This resilient means comprises springs 32 acting between said pins 30 and said flanges 29. The springs 32 are located outside of the flanges 29 and extend in a direction radially of the shaft 10. The springs 32 act to move the pins 30 away from the shaft 10 and in this way indirectly urge the support 27 into its normal forward position. The member 27 is provided with small projections 33 on its front end which are engaged by hooks 34 projecting from the front edge of the bracket 16. These hooks 34 and projections 33 serve to releasably hold the member 27 in its normal forward position.



When said member 27 is pivoted laterally it will cause the operation of a means for signalling the stopping of the knitting machine. This means includes an electric switch having a contact arm 35 extending along the outer face of the bracket 16. The contact arm 35 is pivotally supported by a pintle 36 at its bottom end mounted on the bracket 16. The top end of the contact arm 35 is provided with a contact 37 which is engageable with a terminal spring 38 mounted upon an insulation member 39. This insulation member 39 is attached to the bracket 16. The terminal spring 38 must be connected to the ground of the knitting machine, said ground being schematically illustrated in Fig. 7 by reference numeral 72. The insulation member 39 is provided with another terminal spring 40 making contact with the contact arm 35. Said terminal spring 40 must be connected with the current supply lead 69 of the controller circuit of the knitting machine which forms no part of the invention and therefore is not shown here. The contact arm 35 is provided with a lateral projecting lug 41 which extends over the end of the member 27. A spring 42 is connected between the contact arm 35 and with the bracket 16 and normally tends to urge the contact arm 35 rearwards. The lug 41 engaging the member 27 holds the contact arm 35 forwards out of contact with the terminal spring 38. The bracket 16 is formed with a cutout 43 adjacent the lug 41 into which the lug 41 may engage when the member 27 is pivoted laterally so that the contact arm 35 may pivot and have its contact 37 engage the terminal spring 38. The terminal springs 38 and 40 are intended to be electrically connected with the controller system of the knitting machine to operate the controller to stop the knitting machine when the contact arm 35 engages the terminal spring 38. The controller system of the knitting machine will also stop the knitting machine when one of the feelers 28 engages through an opening or press-off of the cloth material 12 and engages the ground 72 of the knitting machine. The path of the current will be from supply lead 69 to terminal spring 40 to contact arm 35, the member 27, and feeler 28 to the frame of the knitting machine which is its ground.

A connector 45 is eccentrically connected with the member 27 for simultaneously pivoting said member 27 back to a substantially radial position and drawing said member 27 backwards so that it may be released for again engaging said hole feelers 28 against the cloth material 12. This connector 45 is connected with a pin 46' mounted in the member 27 at a location between the axes of the pins 30 and the adjacent wall of the bracket 16. Because the pin 46' is in this location it is eccentrically connected with the member 27. When the member 27 is in its lateral position shown in Fig. 1 by the dot and dash lines 27', and the connector 45 is pulled towards the right, the member 27 will obviously be moved rearwards and simultaneously pivoted back to its straight position. The connector 45 eccentrically connects with a wheel 46 having projecting fingers which is engaged in a horizontal slot 47 in the block 14 and which is furthermore turnably mounted upon the shaft 10. This wheel 46 is provided with a stud 48 having an opening into which the connector 45 extends. A clamp screw 49 on the stud 48 serves to clamp the connector 45 in proper position on said stud 48.

Means is provided for manually turning the

wheel 46 to pull the connector 45 for the purpose of resetting the member 27. This means includes a stud 50 mounted on the wheel 46. A connector 51 connects with the stud 50 and passes through a guide bracket 52 mounted on the bracket 14. The connector 51 extends to an outer point of the knitting machine and then through an outer bracket 53 mounted on a stationary part of the knitting machine. The outer end of the connector 51 is provided with a knob 54 by which the connector 51 may be manually pulled. The pin 46' is of insulation material and insulation washers 61 are mounted on the pin 46' above and below the connector 45 to prevent a short circuit from contact arm 35 to member 27 and then through connector 45 to the ground of the knitting machine. At this point it may be best to point out that a plurality of the hole and press-off detectors may be used on one machine. These additional detectors may also be supported on the bracket 14. In fact, the bracket 14 is illustrated provided with a second rod 15 for supporting the outer bracket of a second detector, not illustrated on the drawing. Similarly, the wheel 46 may be provided with an additional stud 48 for an additional connector 45 for the additional detector just referred to. If more than two detectors are desired for a knitting machine, the wheel 46 may be provided with an additional number of the studs 48. Of course, in such a case the wheel 46 must have additional fingers upon which these studs 48 may be mounted.

A cloth holding guard or guide 55 is adjustably mounted upon the bracket 16. This cloth holding guide 55 is in the form of a wire having a vertical section 56 adjacent the feelers 28. The guide 55 also has side arm sections 57 which extend through blocks 58 mounted on the bracket 16. These blocks 58 are provided with set screws 59 for holding the guide 55 in selected adjusted positions. The guide 55 engages against the cloth material 12 being knitted during the relative motion of the cloth material 12 and the feelers 28 for permitting the feelers 28 to properly engage the cloth without excessive inward and outward motion of said feelers 28.

Each of the fellers 28 comprises a tube 60 which slidably engages into an opening 61 formed in the member 27. The tubes 60 are held in position by screws 62. A finger 63 projects from each tube 60. These fingers 63 are provided with inner heads 64 upon their inner ends. Plugs 65 close the inner ends of the tubes 60. Each tube 60 is provided with an expansion spring 66 which resiliently urges each finger 63 into an outward position. The knitted cloth material 12 normally extends downwards in a misformed conical fashion in which horizontal sections are elliptical and not circular. However, the guide 55 straightens out the cloth 12 adjacent the feelers 28 into true cylindrical form during the relative rotation of the cloth 12 and guide 55. Because of this the feelers 28 may maintain contact with the cloth 12 without excessive inwards and outward motion.

The hole and press-off detectors just described are schematically indicated in Fig. 7 by the circles 68. These detectors 68 are connected in a current supply lead 69 which connects up with the controller system of the knitting machine, not shown. A switch 70 closes the circuit of the detectors 68 to the ground 72 of the knitting machine. However, the switch 70 may be manually opened by the operator of the knitting machine in order to open the circuit from the detectors 68 so that the knitting machine may operate even though one or more of the detectors 68 signal the stopping of the machine. This is necessary so that a hole in the knitted material 12 may be passed after the operator has corrected the cause for the hole.



The operation of the invention may be understood from the following:

On the drawing the hole and press-off detector 68 is illustrated in its "loaded" position. In the event that the knitted material 12 develops a hole, the hole will engage one or more of the feelers 28 and the relative rotation of the cloth material 12 to the detectors 68 will pivot the member 27 into the lateral position 27' illustrated in Fig. 1. This releases the lug 41 of contact arm 35 and then the spring 42 pivots the contact arm 35 so that contact 37 engages the terminal spring 38. This closes the circuit to the controller of the knitting machine which stops the knitting machine. The knitting machine will also be stopped if one of the feelers 28 passes through an opening or press-off in the material 12 and grounds to the frame of the knitting machine. The operator must then make the necessary adjustment or repairs that caused the hole or press-off to develop in the material 12. The operator may open switch 70 so that current is not supplied to the ground 72 and then the knitting machine may be operated even though a member 27 is in its lateral position 27'. The knitting machine is operated until the hole passes and then the operator recloses the switch 70 and pulls the knob 54 so as to pivot the finger wheel 46. This pulls the connector 45 of each detector 68, which moves the member 27 rearwards and simultaneously pivots the member 27 laterally against the bracket 16. When the knob 54 is released the springs 32 move each member 27 back to its original position in which the projections 33 again engage the hooks 34. Each hole and press-off detector is now in its original position ready to function again.

The screws 62 may be loosened and the tubes 60 may be adjusted inwards and outwards so as to set the feelers 28 to proper positions in relation to the contour of the knitted material 12. Similarly, the support 13 may be adjusted for assisting in properly positioning the feelers 28 in relation to the cloth 12.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and the right is reserved to all changes coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. In a hole and press-off detector for an open head knitting machine having a center shaft protruding below the cylinder line and extending into the circular cloth material being knitted, a support for attachment to said central shaft and extending substantially radially thereof to a short distance from said cloth material, a member with hole feelers having fingers resiliently urged against said circular cloth material, said member being slidably and pivotally mounted on the outer end of said support for sliding substantially radially of said shaft and pivoting laterally so that said member will be pivoted laterally when one of said fingers engages in a hole in said cloth

during the knitting thereof, a pair of spaced flanges on said support, pins projecting from the sides of said member and engaging in slots formed in said flanges and comprising the means by which said member is slidably and pivotally mounted on said support, resilient means urging said member into a normal forward position in which said hole feelers engage said cloth, means for signalling the stopping of said knitting machine when said member is pivoted laterally, and a connector eccentrically connected with said member for simultaneously pivoting said member back to a substantially radial position and drawing said member backwards so that it may be released for again engaging said hole feelers against said cloth material.

2. A hole and press-off detector as defined in claim 1, in which a pair of spaced flanges are vertically spaced from each other, and said pins project vertically from the top and bottom of said member.

3. A hole and press-off detector as defined in claim 2, in which said resilient means comprises springs acting between said pins and said flanges.

4. A hole and press-off detector as defined in claim 1, including means for releasably holding said member from pivoting laterally on said support, comprising hooks on said support engaging projections on said member.

5. A hole and press-off detector as defined in claim 1, in which said means for signalling comprises a switch mounted on said support and having a movable contact arm engaged by and held outwards by said member, and a contact engageable by said contact arm when said contact arm is released.

6. A hole and press-off detector as defined in claim 1, including a guard adjacent said hole feelers and engaging said cloth material for holding said cloth material relatively straight adjacent said hole feelers, said guard being mounted on said support.



7. A hole and press-off detector as defined in claim 6, in which said guard is adjustably mounted on said support.

8. In a hole and press-off detector for an open head knitting machine having a center shaft protruding below the cylinder line and extending into the circular cloth material being knitted, said center shaft and said cloth material being knitted rotating relative to each other during the knitting operation, a support for attachment to said central shaft, a plurality of hole feelers mounted on said support and engaging said cloth material, and a guard adjacent said hole feelers, and engaging said cloth material for holding said cloth material relatively straight adjacent said hole feelers during the relative rotation of said guard and cloth material, said guard being mounted on said support.

9. A hole and press-off detector as defined in claim 8, in which said plurality of hole feelers are located in a vertical line, and in which said guard has a vertical section which engages said cloth material adjacent said hole feelers to hold said cloth material relatively straight in a vertical line adjacent said hole feelers.

EDWARD VOSSEN.


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