

Nov. 11, 1958

A. EDELMAN ET AL

2,859,603

STOP MOTION DEVICE FOR FABRIC PRODUCING MACHINES

Filed June 12, 1956

4 Sheets-Sheet 1

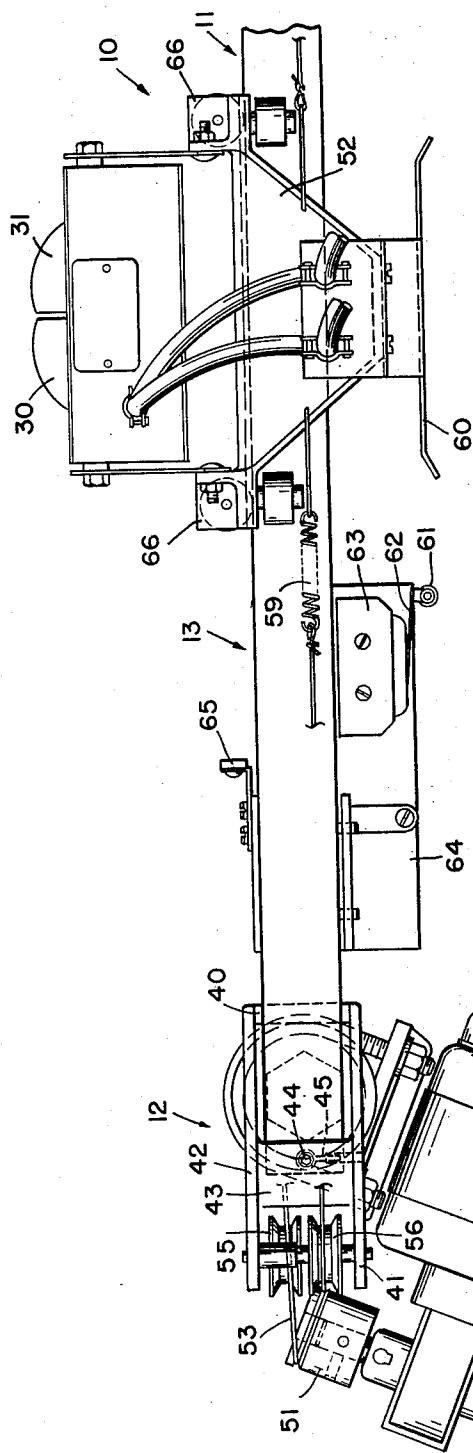


FIG. 2

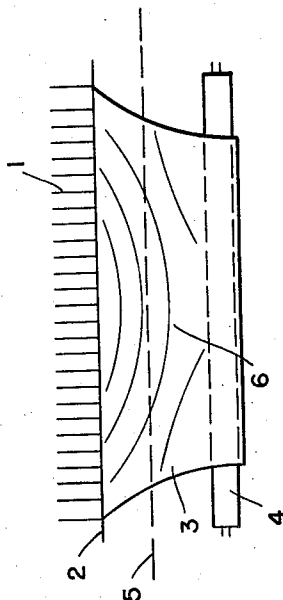


FIG. 1

INVENTORS
ABRAHAM EDELMAN
& THEODORE LASAR
BY *Hane and Nydick*
ATTORNEYS

Nov. 11, 1958

A. EDELMAN ET AL

2,859,603

STOP MOTION DEVICE FOR FABRIC PRODUCING MACHINES

Filed June 12, 1956

4 Sheets-Sheet 2

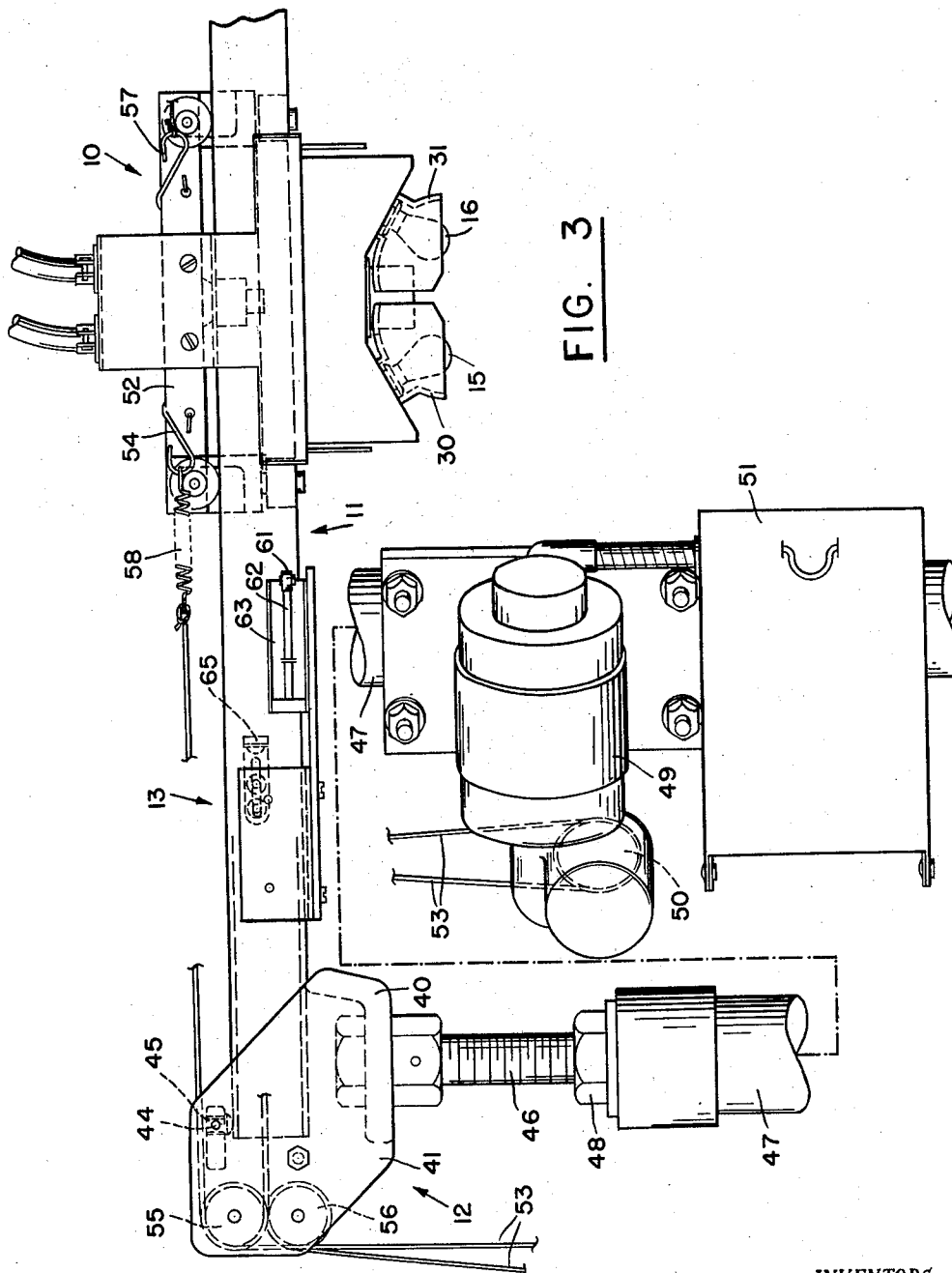


FIG. 3

INVENTORS
ABRAHAM EDELMAN
& THEODORE LASAR
By *Hane and Hydiak*
ATTORNEYS

Nov. 11, 1958

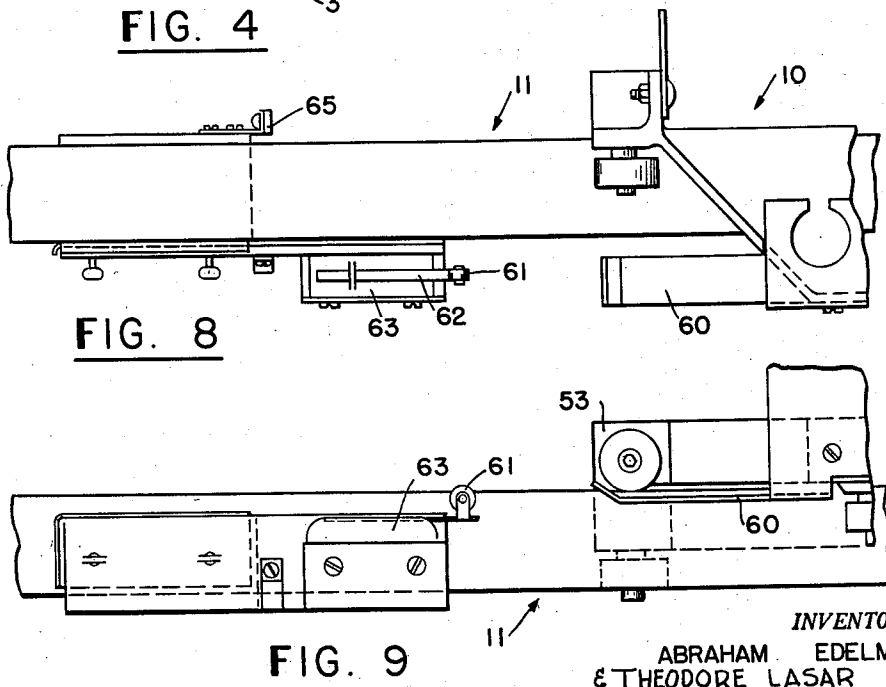
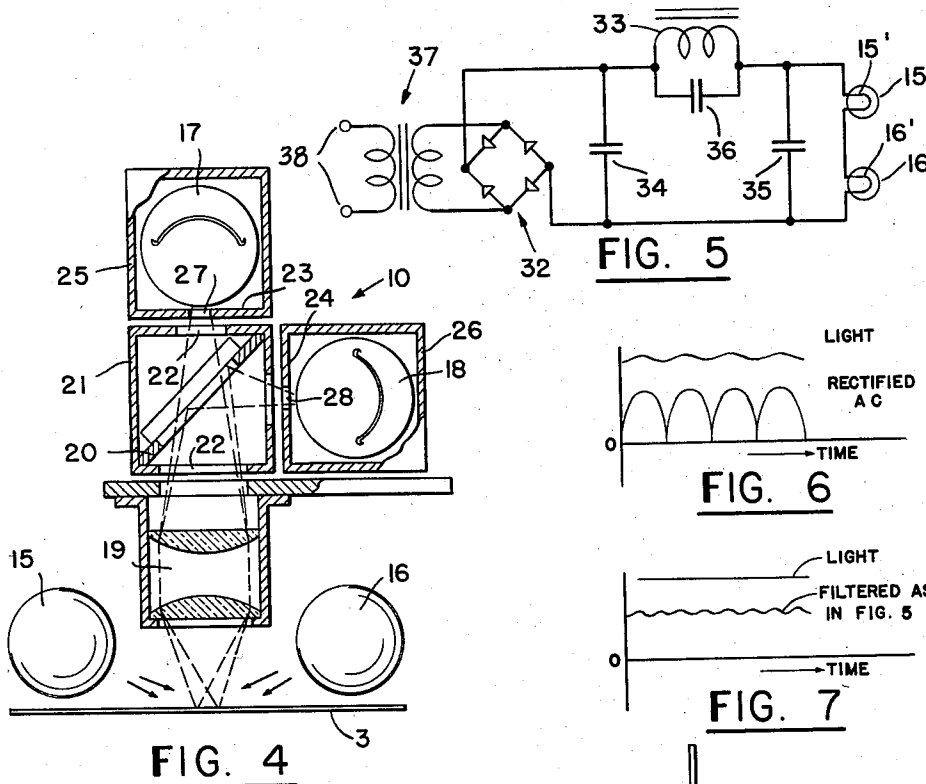
A. EDELMAN ET AL

2,859,603

STOP MOTION DEVICE FOR FABRIC PRODUCING MACHINES

Filed June 12, 1956

4 Sheets-Sheet 3



INVENTORS
ABRAHAM EDELMAN
& THEODORE LASAR
By *Haue and Nydick*
ATTORNEYS

Nov. 11, 1958

A. EDELMAN ET AL

2,859,603

STOP MOTION DEVICE FOR FABRIC PRODUCING MACHINES

Filed June 12, 1956

4 Sheets-Sheet 4

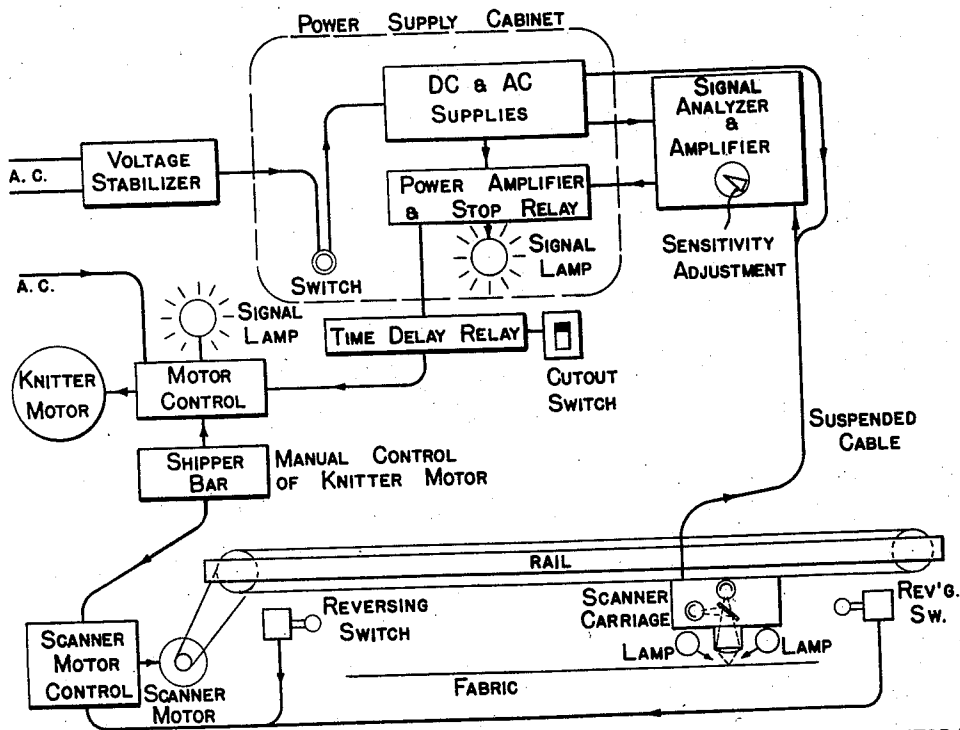
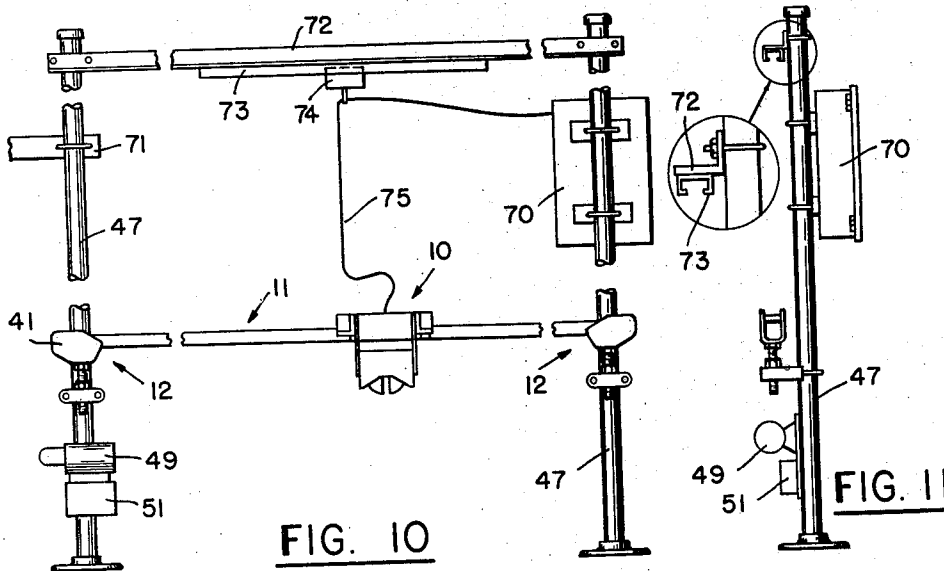


FIG. 12

INVENTORS
ABRAHAM EDELMAN
& THEODORE LASAR
By *Hane and Nydink*
ATTORNEYS

1

2,859,603

STOP MOTION DEVICE FOR FABRIC PRODUCING MACHINES

Abraham Edelman, New York, N. Y., and Theodore Lasar, Fort Lee, N. J., assignors to Photobell Company, New York, N. Y., a partnership composed of Abraham Edelman and Johanna Edelman

Application June 12, 1956, Serial No. 590,990

15 Claims. (Cl. 66—166)

The present invention relates to stop motion devices for fabric producing machines and more particularly to stop motions for textile machines, especially warp knitting machines such as tricot knitting machines.

Textile machines of the general kind referred to, often employ thousands of needles knitting thousands of individual threads. If any of the many possible needle faults occurs or any of the threads breaks, the knitted fabric completed thereafter shows a continuing defect.

In recent years automatic stop motion installations have been developed. These installations employ a scanning device which rides back and forth across the width of the fabric as it emerges from the knitting machine and continuously examines the knitted fabric close to the needle bar. The scanning device comprises a source of light illuminating successive areas of the fabric to be inspected and a pair of light sensitive devices such as phototubes which receive light from different portions of the illuminated area and control a stop circuit for the knitting machine. When the portions of the fabric scanned by the light receivers are both flawless, the signals generated by the two receivers are in balance, but when there is a fault in the fabric such fault manifests itself in a light differential which energizes the stop circuit. As a result, the machine is stopped until it is manually restarted after the fault is remedied. Automatic stop motions of this type permit the supervision of a greater number of machines by a single operator than was possible before the development of automatic stop motions thereby materially reducing defective yardage and the costs of supervision. However, automatic stop motions as heretofore known, have certain shortcomings and it is the general object of the present invention to remedy these shortcomings.

As will be more fully explained hereinafter, the fabric while being knitted vibrates and flutters somewhat at the area of inspection. Such motions of the fabric, which are unavoidable in practice, produce small variations in the light reflected from the fabric as seen by the light receivers, and experience shows that the variations in the reflected light as caused by the motions of the fabric are sometimes sufficient to stop the machine even though there is no defect in the fabric.

Accordingly, one of the objects of the present invention is to provide novel and improved scanning means, the light receivers of which see the variations in the reflected light as caused by vibrations and fluttering of the fabric below the level of the variations as caused by a fault in the fabric and requiring a stoppage of the machine. As a result, changes in the reflected light due to spurious signals resulting from the operational vibration and fluttering of the fabric cannot effect an unnecessary and undesirable stoppage of the machine.

Another object of the invention is to provide novel and improved means for controlling the illumination of the fabric at the area of inspection so as to keep this illumination substantially constant and independent of variations in the surrounding illumination. As is apparent,

2

variations in the surrounding illumination causing changes in the relative illumination of the fabric portions as seen and compared by the light receivers, which reach the level of the changes caused by a defect in the fabric will also result in a stoppage of the machine. Consequently, a constant illumination of the inspected areas eliminates this source of unwanted stoppage.

Still another object of the invention is to provide novel and improved mounting means which assure that the distance between the scanning means and the fabric is maintained sufficiently constant and uniform when and while the scanning means travels across the width of the fabric, even if the knitting machine has a very wide needle bar.

A further object of the invention is to provide a carriage for guiding and supporting the loose wire connections of the scanning means while the same is moving across the fabric thereby avoiding damage to the wire connections and entanglement of the same.

A still further object of the invention is a novel and improved control assembly for controlling the reversal of the travel of the scanning means at each edge of the fabric. The control assembly of the invention affords the advantage of greater compactness than theretofore available thereby correspondingly reducing the total width of the installation necessary to span the fabric.

Further objects, features and advantages of the invention will be pointed out hereinafter and set forth in the appended claims forming part of the application.

In the accompanying drawing several preferred embodiments of the invention are shown by way of illustration and not by way of limitation.

In the drawing:

Fig. 1 is a diagrammatic view of a knitting machine and the fabric emerging therefrom.

Fig. 2 is a plan view of a stop motion installation according to the invention.

Fig. 3 is an elevational side view of Fig. 2.

Fig. 4 is a diagrammatic view of the optical system of the scanning means.

Fig. 5 is a typical circuit system for producing a uniform illumination of the area to be inspected.

Figs. 6 and 7 are graphs exemplifying the effect of the circuit system according to Fig. 5.

Fig. 8 is a plan view of a modification of the control means for reversing the travel of the scanning means.

Fig. 9 is an elevational side view of Fig. 8.

Fig. 10 is a further elevational front view of the scanning installation.

Fig. 11 is an elevational side view of Fig. 10, and Fig. 12 is a block diagram of the entire installation.

Referring first to the diagrammatic Fig. 1, this figure shows warp threads 1 guided to a needle bar 2. While only rather few threads are shown it should be visualized that in actual practice there may be thousands of warp threads. The fabric 3 which emerges from the needle bar is guided to a take-up roller 4 upon which it is rolled up. The line of inspection across which the scanning means travels back and forth is indicated by a dashed line 5. The figure further shows as curved lines 6 a typical pattern of fabric waves. These fabric waves are unavoidable in practice. The distance from peak to peak of adjacent waves varies. The distance may be as short as two to four inches and it may be considerably longer, but the waves are always present. As a result of the two light receivers of the scanning means previously referred to, one may view fabric at the top of a wave while the other is viewing fabric at the bottom of a wave. As is evident, light reflected from fabric at the bottom of a wave has an intensity different from that reflected from the peak of a wave. Since the light receivers and with it the entire stop motion installation are controlled by a

balance or unbalance of reflected light, the aforementioned difference in the reflection caused by the different location of the fabric portions viewed by the light receivers may be and often is sufficient to produce a false indication that there is a defect present in the fabric with the attendant unnecessary stoppage of the machine. A stoppage of a machine constitutes not only a loss of time, but also results in undesirable "stop marks" on some fabrics.

As mentioned before, the distances from peak to peak of adjacent waves may and do vary, but no instance has been observed in which the distance from peak to peak is less than about two inches. The present invention is based upon this observation and the scanning means of the invention permits to view portions of the fabric which are spaced extremely close to each other. In actual practice the viewed portions of the fabric may be spaced apart about $\frac{1}{4}$ inch or less. This affords the advantage that the effect of the waves upon the reflection of light as seen by the light receivers is nullified since both the receivers see approximately the same condition on the fabric.

All the features of the invention which have been previously described or will be described hereinafter serve the purpose of attaining uniform and constant conditions to avoid signals due to causes other than actual defects in the fabric.

Turning now to the figures showing the installation according to the invention, the exemplified installation comprises a scanning device generally designated by 10. This device rides back and forth across the width of the fabric on a traverse rail generally designated by 11. The rail is mounted at each end on a mounting device generally designated by 12. A control means generally designated by 13 serves to control the reversal of the scanning device at the end of each travel in either direction.

Fig. 4 shows the optical system of the scanning device. The optical system comprises two lamps 15 and 16 the specific features of which will be more fully explained in connection with Figs. 5 through 7, two light receivers 17 and 18 such as photo tubes or crystals, a lens system 19 and a beam splitter 20. The beam splitter is shown as a thinly silvered mirror. Such a mirror has the optical property that it passes part of the incident light and reflects the remaining part of the light. As can be seen in the figure, light receiver 17 is mounted in alignment with the optical axis of the lens system whereas light receiver 18 is mounted at a right angle thereto. The lens system which views the area of the fabric to be inspected and brightly illuminated by lamps 15 and 16, is focused upon the light sensitive part of receivers 17 and 18. The beam splitter may be mounted in any suitable manner. By way of example, a casing 21 is shown the respective walls of which have each an opening 22 the area of which is such that they will pass light from an area larger than the fabric portion to be inspected by each light receiver. Light beams actually received by the light receivers are controlled by masks 23 and 24 interposed between the beam splitter and each light receiver. While the masks are shown as a wall of a casing 25 and 26 respectively, it is apparent that the masks may also be in form of separate discs or plates. Each mask has a small opening 27 and 28 respectively. A circular aperture in the mask has been found to be most suitable. The essential feature of apertures 27 and 28 is that the two apertures are correlated with each other, the beam splitter and the lens system so that the two receivers will sequentially receive light from different but closely adjacent portions of the fabric area inspected at each moment. As is evident, the relative location of the viewed fabric portions can be very accurately controlled by slightly varying the relative location of the apertures. The difference in the location of the inspected fabric portions is indicated in the figure by dashed lines indicating different beams received by receivers 17 and 18. To shield the phototubes from the ambient fluctuating illumination each lamp is set in a

shield 30 and 31 respectively which shields also act as reflectors. In addition the forward part of the bulb of each lamp may be frosted thereby avoiding shadows due to bulb imperfections.

While the aforedescribed reflector shields and the frosting of the lamp bulbs, if used, prevent a disturbing effect due to the ambient illumination upon the fabric as seen by the light receivers 17 and 18, care must further be taken that the yield of light of lamps 15 and 16 is such that it does not cause spurious signals.

The source of current which is used for the lamps is for all practical purposes a 60 cycle A.-C. line. It has been found that if the alternating current is applied directly to the lamps, the 60 cycle fluctuations in the supply voltage cause 120 cycle fluctuations in the filament temperature and that the changes in the light output caused by such fluctuations are large enough to interfere with the defect detecting operation. In a typical case, the light from the lamps would fluctuate 120 times per second reducing the light output 2% at each fluctuation. Defects may produce a light reduction of the same order of magnitude which would interfere with the discovery of many defects.

The circuit system according to Fig. 5 serves the purpose of eliminating or at least reducing to a harmless level the 60 cycle fluctuations in the supply voltage.

There is shown a step-down transformer 37 the primary terminals 38 of which are fed with A.-C. line voltage and which converts the line voltage to a suitable low voltage. This voltage is full-wave rectified by a rectifier 32 and filtered by series inductance means 33 and shunting capacitors 34 and 35 before being fed to lamp filaments 15' and 16' respectively. While only one inductance and two capacitors are shown, it should be understood that a greater number of inductances and capacitors may be employed.

By rectifying the A.-C., using a full-wave rectifier as shown, the A.-C. is converted into D.-C. having a superimposed "ripple" of 120 cycles and its harmonics. Fig. 6 shows the rectified A.-C. and the corresponding output of light. As is apparent from the previous description and Fig. 6, the light output produced as the result of the rectification is only slightly better than the original A.-C. The aforementioned filters serve to remove the ripple. While the capacitors and the inductances are capable of removing the ripple to a satisfactory extent, a rather large and expensive filter network is necessary to achieve the purpose. According to a further improvement of the invention also shown in Fig. 5, the ripple is rendered harmless by adding highly efficient yet very inexpensive circuit components.

It has been found that the thermal inertia of the filament of a lamp as now available in the market is such that the filament responds to a material extent by changing its temperature and with it the output of light at a rate of 120 cycles per second, but that it cannot respond at a rate of 240 cycles per second (which is the second harmonic of 120 cycles), or at higher frequencies. Hence, the filtering means need to be efficient only at 60 120 cycles but do not require efficiency at the harmonics of 120 cycles.

According to the invention a shunting capacitor 36 is provided and the inductance 33 is tuned to resonance at 120 cycles per second. As a result, the impedance of the filter network to 120 cycles per second is extremely high. The resulting light output has almost no 120 cycle ripple. While the lamp current shows higher frequencies, the light output of the filament does not show the same. Fig. 7 shows the filtered D.-C. and the corresponding light output. As may be noted, the light output is practically constant. Consequently, the lamps will supply a uniform illumination to the fabric area to be inspected.

As has been previously explained and can best be seen in Figs. 2 and 3, the scanning device 10 travels back and

5

forth on rail 11 across the width of the fabric. The rail must span the fabric and is frequently of considerable length so that it will sag unless made of uneconomically heavy material. Sagging of the rail obviously causes a change in the distance between the optical system of the scanning device and the fabric which adversely affects the detecting operation.

To maintain constant the spacing between the scanning device and the fabric, the rail rests near each end upon a preferably generally wedge-shaped rail gripper 40. The gripper is mounted in or integral with a bracket comprising two plates 41 and 42 joined by any suitable means such as a cross bar 43. The bracket mounts a device for exerting a downward pressure upon the rail portions overhanging grippers 40. These means are shown as a screw 44 which can be secured in position by a set screw 45. As is evident, each gripper 40 forms in effect the fulcrum of a two-arm lever so that by raising or lowering screw 44 the long arm of the lever, or in other words the long middle portion of the rail can be lowered or raised to compensate for sagging of the rail. Each bracket is supported on a screw bar 46 which is threaded in a stanchion 47 and can be adjusted as to height by any suitable means such as a lock nut 48. The base of the stanchion on one side of the scanning assembly mounts a motor assembly 49 driving a pulley 50 for supplying the power to move the scanning device back and forth and a control box 51 housing the equipment required for controlling the motor and the reversal thereof. The motor assembly and the control assembly should be visualized as being of conventional design and a detailed description thereof is not essential for the understanding of the invention. For the sake of clarity of illustration the motor and the control assembly are shown rotated through an angle from the actual operating position.

The aforescribed components of the scanning device are mounted on a carriage 52. To pull the carriage along rail 11, one end of a drive cord or belt such as a nylon cord 53 is attached to the carriage by any suitable means such as a hook 54. The cord is guided over a roller 55 disposed between bracket arms 41 and 42, motor driven pulley 50, a second roller 56 also disposed between arms 41 and 42, a return roller (not shown) on the mounting means supported on the other stanchion and back to the carriage to which it is attached by any suitable means such as a hook 57. Tension springs 58 and 59 are preferably included in the drive cord to hold the cord taut and reducing jerks when the movement of carriage 52 is reversed. As is apparent, rotation of pulley 50 will pull the carriage of the scanning device along the rail in one or the other direction depending upon the rotational direction of the motor.

To reverse the direction of the carriage at each end of its travel, a reversing cam 60 is provided. This cam is shown in form of a bar outwardly slanted at each end to facilitate coaction with a roller 61. This roller is supported on an arm 62 the position of which controls a switch 63 in a manner well known in the art. Each switch is mounted on a bracket 64 secured by any suitable means such as screws to the rail laterally protruding therefrom as can best be seen in Fig. 2. Bracket 64 also mounts a springy bumper 65 which coacts with a suitable abutment surface on the carriage if the reversing action fails to operate. Actuation of switch 63 by engagement of its roller 61 with respective slanted end of cam 60 controls the control equipment in box 51 so as to effect reversal of the motor.

A corresponding arrangement of a switch 63 and a bumper 65 are provided near the other end of the rail also. The motor and the motor control shown in Figs. 2 and 3 as being associated with the left hand stanchion may of course alternatively be associated with the other stanchion.

Figs. 8 and 9 show a modification of the reversal con-

6

trol which affords the advantage of a very compact design. The assembly of these figures is designed to occupy a minimum space between the traverse rail 11 and the take-up roll of the knitting machine.

According to the design of Fig. 2, roller 61 which by coaction with reversing cam 60 controls the respective switch 63 is disposed on the farside of the control assembly relative to rail 11 and cam 60 is correspondingly widely spaced from the rail. The design of Figs. 8 and 9 shows a location of roller 61 and arm 62 which is closely adjacent to rail 11. The relocation of the switch and the associated components permits to move cam 60 correspondingly closer to the rail. As a result, the overall width of the control assembly as seen in the direction of travel of the fabric relative to the rail is materially reduced.

Figs. 10 and 11 show an overall elevational front view and side view respectively of the entire assembly. For sake of clarity certain details shown in Figs. 2 and 3 have been omitted. Figs. 10 and 11 also show an arrangement for guiding the electric connections between the scanning device 10 and a control cabinet 70 which houses the electrical components controlled by the signals received from the scanning device and in turn controlling the stopping of the machine upon detection of a defect in the fabric.

As is apparent from the previous description, the scanning device moves through a rather considerable distance. This entails correspondingly long cables which are subject to damage by entanglement and undue flexing. To protect the cables and also to provide means for conveniently mounting the stanchions of the assembly both stanchions 47 are extended beyond the mountings for the rail. The extended part of the stanchions lends itself conveniently to bracing the entire assembly to a wall, the machine, etc. by means of brackets such as bracket 71. The extension of one of the stanchions may also be used to mount control cabinet 70. The upper ends of both stanchions are joined by a bar 72 which mounts a trolley rail 73. On this rail rides a carrier 74 which guides the cable 75 leading from the scanner to control cabinet 70. As is evident, carrier 74 will move along the trolley rail when the scanner carriage travels back and forth on traverse rail 11 thereby assuring that cable 75 cannot become entangled with any parts of the assembly or be unduly flexed.

Finally, the block diagram of Fig. 12 shows the electric components of the entire assembly. The coaction of the several electrical components of the assembly is essentially self-evident from the legends applied to the block diagram. The circuit system which is controlled by the signals received from the light receivers such as photo tubes 17 and 18 does not constitute part of the present invention and need hence, not to be described or shown in detail. It suffices to state that loss of light from both photo tubes simultaneously tends to balance out whereas loss of light sequentially tends to cause an unbalance which stops the machine. Circuit systems suitable for the purpose are fully described in Patent 2,711,094 issued June 21, 1955 in which one applicant herein is one of the inventors.

The operation of the installation as hereinbefore described, is as follows:

The traverse rail may be inserted between the stanchions with a slight upwardly arching camber to compensate for the weight of the scanning device and the rail. After the rail is installed it is adjusted by means of set screw 44 so that the spacing between the fabric and the lower edge of the optical system is practically uniform along the entire length of travel of the rail. The assembly is now ready for operation by starting the scanner motor.

The defects in the fabric which are of principal importance are in the form of lines which travel with the fabric movement, that is, approximately perpendicular

to the movement of the scanner. As a result, a defect in form of a line will be viewed sequentially first by one light receiver and then by the other. Due to the afore-described distortions of the fabric as it emerges from the needle bar, the line defect is capable of being at different angles to the direction of the scanner movement. For example, it may be at 30° to the direction of the scanner movement on one side and at 150° on the other side. Due to the provision of circular or approximately circular apertures 27 and 28 the two light receivers may still view such defect sequentially. Furthermore, by adjusting the size of the apertures lack of uniformity in the sensitivity of the light receivers and in the transparency of beam splitter 20 can be conveniently compensated. Light receivers for instance photo tubes as commercially available do not have a sensitivity sufficiently identical for the purpose. Similarly, thinly silvered mirrors as used for the beam splitter reflect considerably more light than they will transmit and the reflected light does not have the same spectral composition as the transmitted light. As previously mentioned, all such variations may be conveniently and precisely corrected by suitable selection of the size of the apertures 27 and 28. To facilitate adjustment of the apertures the same may be formed by shutters for instance of the iris type, or by employing simple mechanical slides which vary the effective aperture.

Whenever the carriage reaches one edge of the fabric the reversing cam 60 actuates the respective miniature switch thereby reversing the direction of travel of the carriage. Upon the detection of a defect the resulting unbalance of the light receivers generates signals activating the relay for stopping the machine and also energizing a signal light as indicated in Fig. 12.

While the invention has been described in detail with respect to certain now preferred examples and embodiments of the invention it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed as new and desired to be secured by Letters Patent, is:

1. In a stop motion device of the kind wherein a scanning means travelling across the width of an illuminated fabric inspects the fabric as it emerges from a fabric handling machine and stops the machine upon detection of a defect in the fabric, a scanning means comprising lens means facing the fabric area under inspection, two light receiving means, light deviating means interposed between said lens means and each of said light receiving means, said light deviating means directing a direct beam upon one light receiving means and a second beam upon the other light receiving means, said lens means being focused upon the light receiving means, a mask disposed in front of each of said light receiving means, each of said masks passing light incident from different but immediately adjacent portions of the fabric area under inspection to the respective light receiving means, and control means controlling a stop circuit for the machine and controlled by an unbalance in the light received by said two light receiving means from said adjacent fabric portions.

2. In a stop motion device of the kind wherein a scanning means travelling across the width of an illuminated fabric inspects the fabric as it emerges from a fabric handling machine and stops the machine upon detection of a defect in the fabric, a scanning means comprising lens means facing the fabric area under inspection, two light receiving means, one disposed in the optical axis of said lens means and the other at an angle thereto, beam splitting means interposed between said lens means and each of said light receiving means for directing a direct beam upon one light receiving means and a defect-

ed beam upon the other light receiving means, said lens means being focused upon the light receiving means, a mask disposed in front of each light receiving means, each of said masks passing light incident from different but immediately adjacent portions of the fabric area under inspection to the respective light receiving means, and control means controlling a stop circuit for the machine and controlled by a difference in the light received by said two light receiving means from said adjacent fabric portions.

3. A stop motion device according to claim 2, wherein each of said masks has a circular aperture there-through, the positions of said apertures relative to the beam splitting means and the respective light receiving means being different one from the other to pass light from said adjacent portions of the fabric area under inspection.

4. A stop motion device according to claim 3, wherein said apertures are disposed in a spatial relationship such that the area portions under inspection are scanned sequentially in the direction of travel of the scanning device.

5. A stop-motion device according to claim 1, wherein said scanning means comprises a source of light including an incandescent lamp, and a circuit system for feeding the lamp filament with a voltage of a character to which the thermal inertia of the lamp filament is substantially non-responsive whereby the luminous output of the lamp is approximately constant.

6. A stop motion device according to claim 5, wherein said circuit system comprises full-wave rectifying means converting an A.-C. supply voltage for the source of light into a D.-C. voltage having superimposed cycles, and filter network means filtering the rectified voltage, said filter network means comprising capacitance means connected in shunt to said incandescent lamp and a resonance network connected in series therewith, said resonance network including capacitance means and inductance means connected in parallel, said inductance means being tuned to resonance for imparting to said filter network an impedance value at which the resulting filtered D.-C. voltage fed to the lamp filament is substantially free of cycles below the number of cycles to which the thermal inertia of the lamp filament is responsive.

7. In a stop motion device of the kind wherein a scanning means travelling across the width of an illuminated fabric inspects the fabric as it emerges from a fabric handling machine and stops the machine in response to a defect in the fabric, a traversing assembly for traversing said scanning means across the width of the fabric to be inspected, said assembly comprising a traverse rail spanning the width of the fabric, and mounting means at each end of said rail, each of said mounting means including a rail support upon which the rail rests at a point inwardly spaced from the respective end thereof, and a rail loading means at each end of said rail, each of said loading means applying a downwardly directed load to the rail portion protruding beyond the respective support thereby exerting an upwardly directed force upon the middle portion of the rail between said two mounting means to compensate for a sagging of said middle portion.

8. A stop motion device according to claim 7, wherein each of said rail loading means is adjustable for applying a variable downward pressure to the respective protruding rail portion.

9. A stop motion device according to claim 8, wherein each of said adjustable loading means comprises a pressure member mounted axially displaceable on the respective mounting means and engageable with the respective protruding rail portion.

10. A stop motion device according to claim 9, wherein said pressure member is a screw threaded through the respective mounting means.

11. A stop motion device according to claim 7, wherein

said mounting means comprise two stanchions each mounting one of said rail supports, a trolley rail joining the upper ends of said stanchions, and a carrier slidably suspended from said trolley rail for guiding electrical wire connections for said scanning means.

12. In a stop motion device of the kind wherein a scanning means traveling across the width of an illuminated fabric inspects the fabric as it emerges from a fabric handling machine and stops the machine upon detection of a defect in the fabric, a scanning means comprising a lens means facing the fabric area under inspection, two light receiving means, light deviating means interposed between said lens means and each of said light receiving means, said light deviating means directing one light beam upon one light receiving means and a second beam upon the other light receiving means, said lens means being focused upon the light receiving means, a mask disposed in front of each of the light receiving means, each of said masks passing light incident from different but immediately adjacent portions of the fabric area under inspection to the respective light receiving means, control means controlling a stop circuit for the machine and controlled by an unbalance in the light received by said two light receiving means from said adjacent fabric portions, a traversing assembly for traversing said scanning means across the width of fabric to be inspected, said assembly comprising a traverse rail spanning the width of the fabric, and reversing control means comprising a controlled means mounted near each end of said traverse rail and a controlling means on the scanning means moving in unison therewith, each of said controlled means including reversing switch means having an actuating arm pivotal into a position effecting reversal of the movement of said scanning means and said controlling means including an actuating cam secured to the scanning means and slidably engaging the respective switch arm at the end of each traverse for guiding said arm into its reversing position.

13. A stop motion device according to claim 12, wherein said switch actuating element comprises a pivotal arm, and said actuating cam comprises a bar having slanted end portions for slidable engagement with either one of said arms to pivot the respective arm into its reversing position.

14. A stop motion device for a fabric producing machine comprising, in combination, a frame structure in-

cluding two uprights and a cross rail horizontally extending between said two uprights, scanning means slidably supported by said rail for scanning a fabric passing under the rail as to defects in the fabric, drive means mounted on one of said uprights and drivingly connected with said scanning means for driving the latter back and forth on said rail, rail adjustment means on at least one of said uprights for adjusting the perpendicular distance between the scanning means and the fabric passing thereunder to a uniform distance along the length of the rail, a second cross rail extending between said two uprights above said first rail, a carriage slidable on said second rail, electric control means controlled by said scanning means and controlling the operation of the machine for stopping the same upon detection of a defect by the scanning means, and a flexible electric cable connecting said scanning means to said control means, said cable being attached to said carriage for guidance by the same during the traversing motion of the scanning means on said first rail.

15. In a stop motion device of the kind wherein a scanning means travelling across the width of an illuminated fabric inspects the fabric as it emerges from a fabric handling machine and stops the machine in response to a defect in the fabric, a traversing assembly for traversing said scanning means across the width of the fabric to be inspected, said assembly comprising a traverse rail spanning the width of the fabric, mounting means at each end of said rail, each of said mounting means including a rail support upon which the rail rests at a point inwardly spaced from the respective end thereof, and adjustable rail loading means exerting upon the middle portion of the rail between said mounting means an upwardly directed variable force to compensate for a sagging of said middle portion of the rail by the weight of the scanning means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,290,257	Stanley et al.	July 21, 1942
2,346,240	Thomas	Apr. 11, 1944
2,413,486	Denysen	Dec. 31, 1946
2,611,097	Stanley et al.	Sept. 16, 1952
2,711,094	Edelman et al.	June 21, 1955