

July 6, 1965

H. MORTON ETAL

3,193,688

PHOTOSENSITIVE WEFT STRAIGHTENER AND ALIGNMENT DETECTOR

Filed Dec. 22, 1960

4 Sheets-Sheet 1

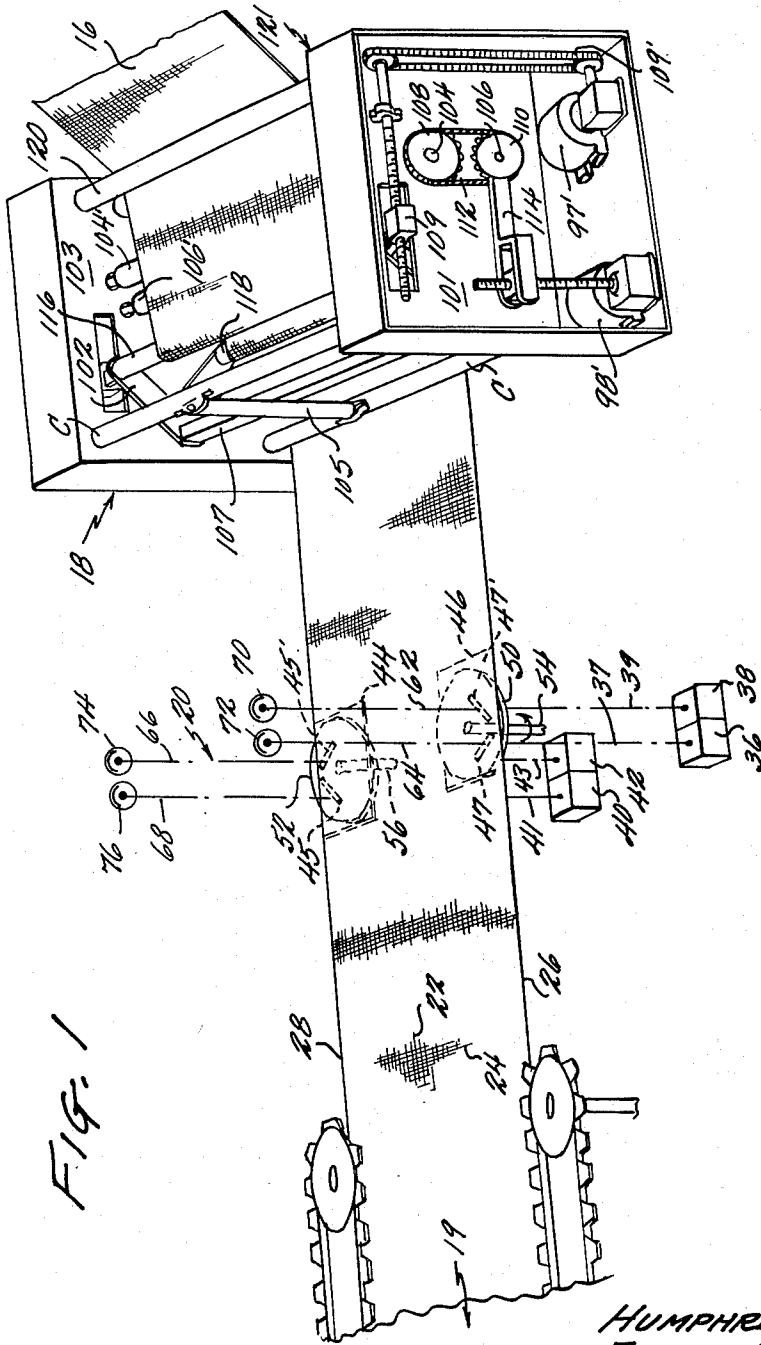


FIG. 1

INVENTORS  
HUMPHREY MORTON  
FRANK W. LEITNER  
BY *Fisher Kriston & Goodson*  
ATTORNEYS

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4 Sheets-Sheet 2

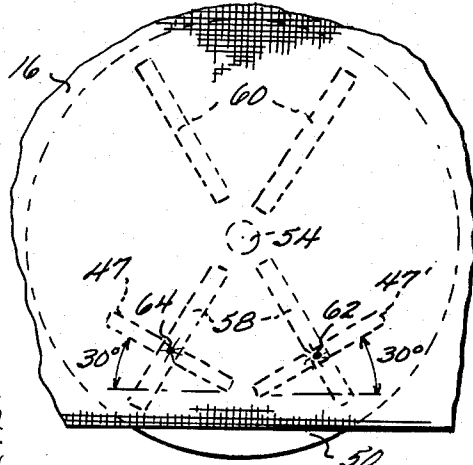
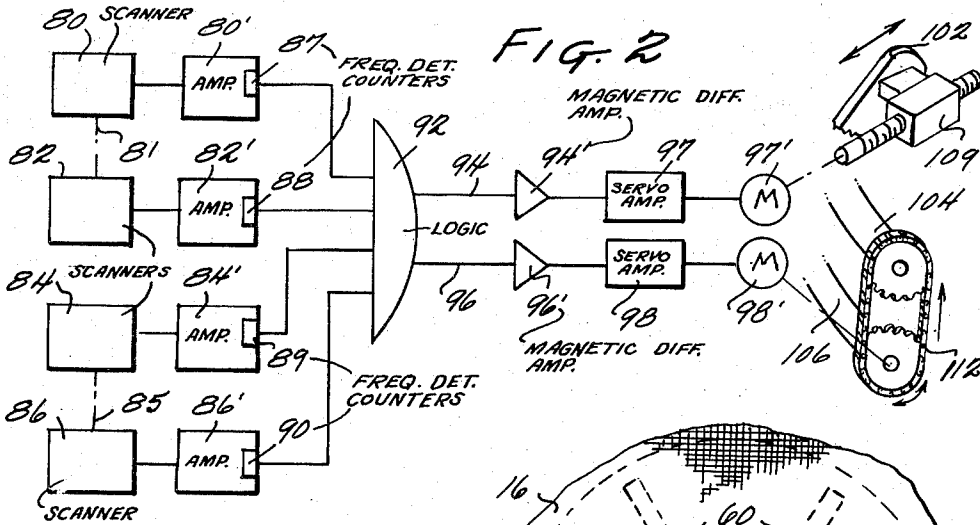


FIG. 7

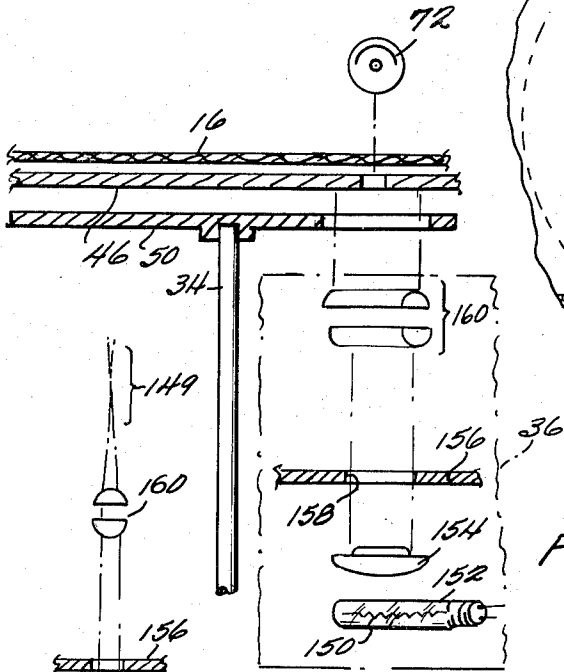


FIG. 5

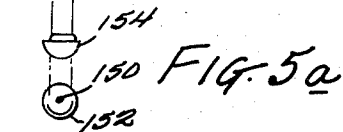


FIG. 5a

INVENTORS  
 HUMPHREY MORTON  
 FRANK W. LEITNER

BY *Fisher Christen & Goodson*  
 ATTORNEYS



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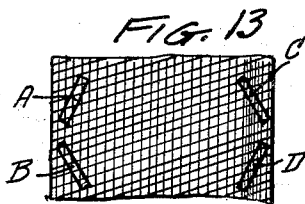
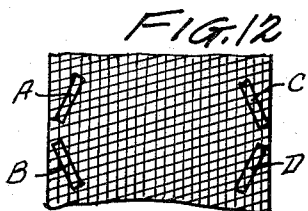
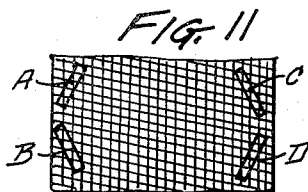
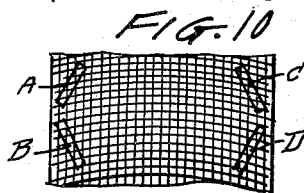
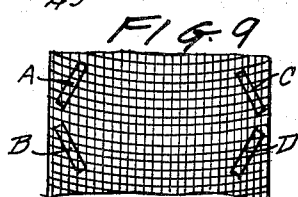
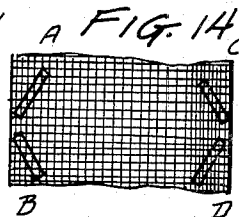
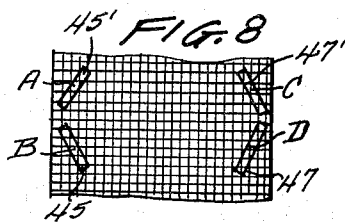
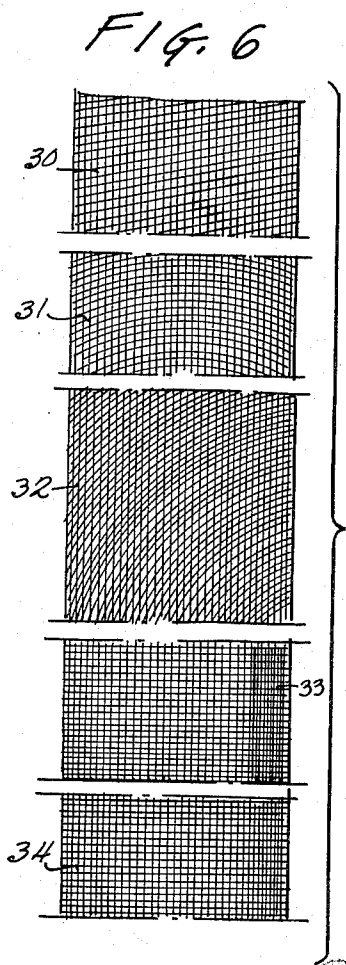
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4 Sheets-Sheet 4



INVENTORS  
HUMPHREY MORTON  
FRANK W. LEITNER  
BY Fisher, Christen & Goodson  
ATTORNEYS

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**PHOTOSENSITIVE WEFT STRAIGHTENER AND ALIGNMENT DETECTOR**

Humphrey Morton, Danville, Va., and Frank W. Leitner, Charlotte, N.C., assignors to American Cloth-Strait Company, Charlotte, N.C., a corporation of North Carolina

Filed Dec. 22, 1960, Ser. No. 77,568  
13 Claims. (Cl. 250-219)

This invention relates to a weft straightening device and specifically to a device for detecting and correcting misaligned weft in a traveling strip of woven fabric whether it be a skew, a bow, or a combination of skew and bow.

In the art of weft sensing and correcting, there have been many ingenious mechanisms devised which will detect and correct both weft and bow, and some to additionally correct a bow-skew condition. However, these prior art mechanisms respond to irregular conditions which are in no way relative to the condition of the weft alignment. This invention, however, not only provides apparatus for correcting the three listed conditions but provides apparatus which will permit a mechanical correction assembly to ignore erroneous signals from a detection means caused by irregularities which exist across the cloth width due to woven patterns or to contaminants. The mechanical correction units to which this invention relates are straight rollers which can be canted across the direction of travel to correct skew, and bowed rollers which have a middle section capable of extending into the planes of said fabric to increase its path of travel to correct bow. A skew-bow condition is correctable by using a combination of such rollers.

Therefore, a leading objective of this invention is to provide apparatus which will correct for the above-identified misalignments in the weft and at the same time not respond to side or spot conditions which are not indicative of weft alignment.

Another important objective of this invention is to provide means which will correct skew, bow and skew-bow misalignments in the weft and which does not act erroneously to that condition referred to as "thick stripes" in the trade. This objective is accomplished by a unique system of double counting wherein the warp threads and the weft threads are counted twice on each side of the fabric as the fabric traverses a set of sensing means. When the warp density (threads per inch) varies across the width of the material, the closely woven portions are referred to as "thick stripes." The instant detection has scanners placed longitudinally of the path of travel so that the same number of warp threads will appear over the scanning windows regardless of warp density variations. Thusly, this invention provides a cloth straightener which operates effectively even though the lateral warp density varies. The invention also provides a weft aligning mechanism which, specifically, does not respond to substantially obliterated signals caused by heavy or uneven starching, or other faulty impregnation by foreign materials.

A still further objective of this invention is to provide scanning devices which convert the scanning intelligence into frequency, rather than voltage, in order that tube-life, power variations and other electronic characteristics which occur in voltage comparison circuits due to specification standards, aging, and the like will not affect the efficiency of the machine.

A still further objective of this invention is to provide a scanning means which include two angularly disposed windows along the path of travel of said cloth which are traversed by apertures in a single disc whereby synchronous beams of light travel the length of each of said

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windows. This assures absolute equal velocity of the scanning beams as comparisons are made.

A further objective of this invention is to provide a method for detecting abnormalities in the weft of a traveling piece of woven material by comparing the thread count along a pair of windows angularly disposed with each other, and longitudinally spaced along the direction of fabric travel, and comparing the count between windows. This scanning angle is maintained at various processing speeds by mechanical linkages of the scanning discs with a roll measuring the velocity of the material. In existing systems, responses in correction assemblies are made to count differences between opposite sides of the fabric which results in correction signals where actually no correction is in order.

Another important improvement advanced, by this invention is a weft straightening framework wherein a plurality of bowed rollers and a plurality of skew rollers are mounted for independent movement with respect to each other.

A still further objective of this invention is the accomplishment of improved weft correction by providing skew and bow correction rollers which are alternately mounted on a frame and have an idler roll between each correction roll. The invention also provides a plurality of such rollers, mounted on a single frame so that a plurality of alternately independent skew or bow corrections are made in response to error correction signals from the sensing means.

A still further objective of the invention is to provide an optic system for use with a weft counting assembly, capable of focusing intense bands of light at the counting stations from which an improved traveling light beam may be obtained. A still further objective of this invention is to provide a unique optical means for use with a weft straightening device in which said intense band of light is focused within sensing slots and cross-focused at the site of the fabric which lessens the criticality of the fabric distance from the light source.

In general, the invention is comprised of an improved mechanical assembly for correcting a weft alignment error which is determined by novel and improved sensing methods and apparatus. Basically, the improved sensing method is comprised of the steps of counting the threads twice along each side of traveling cloth and comparing the results of these two counts to determine if the threads are perpendicular on each side of the cloth.

Further objectives and advantages of this invention will be apparent from the following description and claims wherein the construction, arrangement and cooperation of the several parts of the apparatus are set forth.

In the drawings:

FIG. 1 is a floated perspective view of the invention in a preferred form;

FIG. 2 is a schematic block diagram of an electrical system for use with the weft straightening assembly;

FIG. 3 is a diagrammatic view of the correction assembly;

FIG. 4 is a diagrammatic end view of the mechanical correction assembly;

FIG. 5 is a diagrammatic floated perspective view showing in detail the optical assembly;

FIG. 5a is a partial end elevation showing the band of light;

FIG. 6 is a diagrammatic showing of fabric conditions;

FIG. 7 is an enlarged view of a portion of a counting station; and

FIGS. 8-14 are diagrammatic showings of the relationship between elements of the sensing assembly and various thread irregularities in the traveling strip of cloth.

Referring now to FIG. 1 there is shown an elongated strip of woven fabric 16 traveling between processing sta-

tions. The fabric is drawn through a mechanical weft straightening assembly 18 and thence of a weft counting or sensing station generally designated by the numeral 20. After departing from the sensing station the fabric travels to further processing stations as indicated by the arrow 19.

The fabric is comprised of warp threads 22 running the longitudinal length of the fabric, and weft threads 24 which run laterally thereof. The longitudinal selvage edges of the fabric are designated as 26 and 28. As is well understood in the field, it is important that any lack of perpendicularity occurring between the weft and warp be promptly detected and corrected.

FIG. 6 diagrammatically shows the most common misalignments the fabric threads acquire during processing. From top to bottom, the sectors respectively accentuate a skew condition 30, a bow condition 31, a skew-bow 32, a "thick stripe" caused by contaminants 33, and a "thick stripe" caused by irregular warp densities 34. The conditions 30, 31 and 32 are the conditions correctable by the type mechanical assembly to which this invention pertains. Although conditions 33 and 34 are not correctable by roller assemblies, they are capable of transmitting false signals to the sensing devices of the prior art.

Referring to FIG. 1, counting station 20 is equipped with four identical optical systems 36, 38, 40 and 42 for providing the band of light necessary for the counting mechanism. These optical systems will be described more fully hereinafter, but it will suffice to say here, that the systems respectively furnish intensified thin bands of light 37, 39, 41 and 43 for counting purposes.

Spaced below and on both sides of the fabric at station 20, are fabric support tables 44 and 46. The table 44 has two angularly disposed windows 45 and 45' therein near selvage 28, and table 46 has a like pair of angularly disposed windows 47 and 47' near selvage 26. The pairs of windows are so disposed laterally across the cloth that a line bisecting the angles formed by each pair of windows is a line perpendicular to the path of fabric travel.

The intensified thin bands of light 37, 39, 41 and 43 are directed respectively at the elongated windows 47, 47', 45 and 45'. Interposed between the tables 44 and 46 and their associated light sources are a pair of scanning discs 50 and 52. The discs are geared to rotate about their respective axes 54 and 56 at an r.p.m. proportional to cloth speed.

As best seen by referring to FIG. 7, the disc 50 is provided with a plurality of pairs of slots such as 58 and 60 which traverse the windows 47 and 47' at exactly the same instant and at equal speeds, and thus cause synchronous beams of light to traverse the windows during the same and equal lengths of time. The traveling synchronous beams of light are modulated by the weft and warp threads as they cross the windows to produce interrupted or modulated beams of light. The modulated beams are indicated by the numerals 62, 64, 66 and 68. The actual scanning beams traverse the material at approximately 30° lagging and leading angles to a line drawn perpendicular to the line of material travel. Slots in disc 52 and windows 45 and 45' on the other side of the fabric operate in an identical manner.

Photoelectric devices 70, 72, 74 and 76 pick up the modulated light beams and determine the frequency with which the threads pass the windows. It is this intelligence which is processed to determine weft misalignment and compute the correction necessary.

Referring now to FIGS. 8-14, there is diagrammatically shown the alignment of the fabric threads as they pass over the windows during various conditions. The fabric in each illustration is traveling toward the bottom of the sheet of drawings. The thread count in windows 45', 45, 47' and 47 will arbitrarily be referred to as A, B, C and D, respectively.

In FIG. 8, the warp and weft threads are uniform and perpendicular to each other. The thread counts A, B, C

and D as the fabric passes therepast are equal and no correction signal is necessary or desired.

FIG. 9 demonstrates a forward bow (bow-lead) which results in thread count A being greater than B, and C being greater than D. Since there is a count difference a bow correction is sent to the mechanical assembly. It should be pointed out, that the difference in count between the windows of each pair (e.g., the difference between A and B, or the difference between C and D) gives the correction indication, and not the count difference between the sum of the counts between the pairs of windows.

FIG. 10 indicates a bow-lag which makes count B greater than A, and D greater than C. As in FIG. 6, an error or correction signal is sent to the mechanical assembly opposite in sign to that of FIG. 9.

FIG. 11 shows a skew condition in which the right side is leading. This renders count A greater than B and count C less than count D. This condition transmits a skew correction signal to the mechanical correcting assembly.

FIG. 12 demonstrates a left side leading condition which results in count B being greater than A, and count C being greater than D. This would send an error signal to the correction assembly, opposite to that discussed for the FIG. 11 condition.

FIG. 13 shows a "thick stripe" with a skew condition. FIG. 14 shows a "thick stripe" condition where the weft is correctly aligned with the warp. Here count A equals count B, counts C and D would be partially obliterated but would drop off substantially uniformly. As long as both pairs remain above an intelligible level, the control system remains balanced and no correction signal is sent. Conventional detection devices, comparing counts on either side of the cloth, send strong correction signals in response to such a condition.

Compare now on the other hand, FIG. 13 where there is a "thick stripe" condition and skew at the same instance. Count B is greater than count A, and count C is greater than count D (at least for the short period of time for which it is exposed). This condition calls for a skew correction to be sent to the mechanical assembly. It is true that if a count difference between C and D cannot be determined for long periods of time, by virtue of a fail safe circuit, no correction is sent in response to the A-B count. However, starch-caused "thick stripes" are erratic and as a practical matter a count difference in C and D can be determined under all but the most unusual conditions. This unusual condition is detected when one or more signals drop below the critical operating signal which under current operating conditions is approximately 400 cycles per second.

The block diagram of FIG. 2 is a teaching of one network which is suitable for accepting the count signals and properly computing a result for the correction assembly. However, there is known to the electrical art, other systems for comparing count signals and setting desired response to result from various count patterns. Here, four sets of scanners are designated by the numerals 80, 82, 84, and 86. Each scanner includes that apparatus necessary to obtain the individual thread counts; hence, the mechanical ties represented by the dotted lines 81 and 85 represent the single discs 50 and 52 associated with each scanner assembly. As the threads, both warp and weft, modulate the traveling beams of light, an electrical representation is detected by the photoelectric eyes and transferred to amplifying systems 80', 82', 84' and 86'. Diagrammatically depicted by squares 87, 88, 89 and 90, are frequency detectors which send this frequency intelligence to a logic network 92. The frequency detectors may be of a type of magnetic frequency detector which is commercially available from Airpax Electronics. The application of such devices as direct reading pulse counters is described in "Electronics," at pages 194-204, December

1956 issue. As early as 1954 use of magnetic amplifiers as counters had been indicated in Loran, Shoran and Radar, as is evidenced from a Department of the Navy, Bureau of Ships publication entitled "Magnetic Amplifiers" NAVSHIPS 900,172, pages 41 and 42.

The network 92 is of a type such that counts A, B, C and D can be set to send skew and bow corrections in a direction and amount desired by the operator for various count differences. The prior art is familiar with networks which will perform certain functions in response to count signals. A suitable logic network for determining which of two signals is greater; i.e. is A greater than B, is illustrated in FIG. 7 of a bulletin, Bulletin No. 221, published by Airpax, second edition, March 1957, and the use of two such circuits will provide also a relative measure of C to D. Two such circuits are combined with their outputs through AND networks in accordance with well-known computer techniques. Reference may be had to an article entitled: "Magnetic Logic Circuits for Industrial Control Systems" by Evans, Hall and Van Nice, in "Transactions of the AIEE," July 1956 edition, which teaches such techniques and illustrates at FIG. 3 a typical four-input and AND network. Also, see Navships 900,172 (infra) at page 16.

Outputs 94 and 96 from the logic network represent correction signals to be applied to mechanical correction assemblies 102 (skew) and 104 (bow), respectively. Prior to being applied to the assemblies, the signals are processed, respectively, through magnetic differential amplifiers 94' and 96', power amplifiers 97 and 98 and the reversible electric skew motor 97' and the reversible electric bow motor 98'. The application of magnetic amplifiers in differentiation systems is set forth in the NAVSHIPS 900,172 (infra) publication at page 41, section (j) and section (n). Also, reference may be had to "Transactions of the AIEE" for September 1953, page 455, for an article entitled "An Application of Magnetic Amplifier Circuits To Perform Multiplication and Other Analytical Operations," by Finzi and Mathias.

Referring to FIGS. 1, 3 and 4, the mechanical correction assembly 18 will be described in greater detail. The assembly is supported by a suitable frame 121 to which the reversible motors 97' and 98' are affixed. The principal correction elements of the assembly are supported between two parallel side frames, 101 and 103. A pair of bow rollers 104 and 106 have their ends journaled in said side frames and are vertically spaced with respect to each other. The rollers have straight journals 104' and 106', respectively, which extend through the side frame 101 and are equipped with sprockets 108 and 110 at their outer ends. The sprockets are connected by a link chain 112 for equal pivotal movement. The rollers 104 and 106 are free-wheeling and as is well known in the art, it is the position of their curved axles with respect to cloth travel which gives a bow correction. A lug 114 operatively connected to motor 98' and sprocket 110 transfers the desired movement to chain 112 for pivoting bow rollers.

An upright 105 is pivotally mounted midway between side frames 101 and 103 on crossbars C. A stabilizing arm 107 extends outwardly from the upright and supports bell cranks 100 and 102 at either end thereof.

Between the side frames and at each end of the bell cranks are two freely rotating skew rollers 116 and 118 which are journaled thereto. The skew rollers are vertically spaced from each other and laterally spaced from the bow rollers.

The skew roller bell cranks 100 and 102 pivot laterally about the upright 105. The pivoting movement is controlled by the motor 97'. The bell crank 100 being operatively connected to the skew motor via a linkage system comprised of worm 109 and chain 109'.

Five idler rollers 120, 122, 124, 126 and 128 are mounted closely adjacent the correction assembly and positioned normal to the direction of travel of cloth 16. The idler rollers are journaled in frame members 101

and 103. Cloth 16 is threaded around an idler roller and alternately between each bow and skew correction roller.

As shown best in FIG. 4, the path of travel of cloth 16, therefore, is as follows: idler roller 120, skew roller 116, idler roller 122, bow roller 104, idler roller 124, skew roller 118, idler roller 126, bow roller 106, and finally, idler roller 128. It can be seen that the bow roller axes can pivot into the path of the cloth without a skew pivot and a skew-bow correction can be accomplished by pivoting bell cranks 100 and 102 at the same time the bow rollers are in their operable position.

The unique spacing of idler rollers between all correction rollers gives a much improved correction, and the dual bow and skew rollers act as a dual correction from a single error signal. Each correction roller applies a partial correction to the fabric such that the entire required correction is fully introduced by the time the fabric leaves the correction mechanism. This is possible because the present invention provides a closed loop type system wherein the detection and correction may take place simultaneously and at all times, if necessary. As is apparent from FIG. 4, skewed bow condition is corrected by using skew roller 116 in conjunction with idlers 120 and 122 to correct approximately one-half of the skew distortion. Bow roller 104 with idlers 122 and 124 removes approximately one-half of the bow; then skew roller 118 and idlers 124 and 126 complete the skew correction as does bow roller 106 with idlers 126 and 128 for the bow correction. The other type corrections are similarly made by virtue of the roller configuration of FIG. 4.

In apparatus of the type described, the error or count signal developed is one of the important keys to successful operation. In this invention the signal is developed by threads interrupting a traveling beam of light. It is apparent that the sharpness and control of this beam of light are of much practical importance. The control of the beam, as previously described is controlled by the slotted discs 50 and 52. The sharpness is achieved by the optical systems 36, 38, 40 and 42.

Since each of the optical systems is identical, only system 36 will be described. Exploded diagrammatic views are shown in FIGS. 5 and 5a. The prime objective of each optical system is to provide a thin intensified vertical band of light 149 over one-fourth inch deep at the area of cloth intersection. In existing systems, light focused along a line (parallel to its associated window slot) at the point of fabric intersection, is used. The position of the focus line in these existing systems is critical and careful adjustment is necessary.

In order to overcome this limitation and to accomplish the objectives of a good light source, the light source filament 150 of light 152 is longitudinally aligned with a lens 154 which magnifies along the axis of light filament three times as much as it magnifies the breadth of filament. Positioned above the lens 154 is a member 156, having a thin longitudinal slot 158. The slot is oriented so that the magnified beam extends throughout the slot width and length. In the described embodiment, the slot 158 is only approximately 20 thousandths of an inch wide, which, of course, provides a very narrow band of light.

A split cylinder lens 160 then focuses this thin band at the point of fabric travel. Since the original beam is narrow, the focus area 149 embodies a plane or band about 1/2 inch deep. Since the focus area is a band of substantial length, the distance of the fabric from the light source is not so critical as heretofore.

The general operation of the entire apparatus is as follows. The fabric 16 is received by the structure of this invention from a processing center to the right in FIG. 4. The fabric travels through the correction assembly 18 and passes the weft sensing station 20 and departs from the sensing center to further processing centers. The optical devices 36, 38, 40 and 42 send a beam of light which is modulated by the traveling fabric and the modu-

lated signal is picked up by the photoelectric scanning devices 70, 72, 74 and 76. The intelligence gained by the scanning heads is sent to the logic network 92 which transmits signals back to the mechanical correction assembly 18.

Therefore, while we have, in the above description, disclosed what we deem to be the most practical and efficient embodiment of our invention, it should be well understood that we do not wish to be limited thereto, as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

We claim:

1. A machine for detecting misalignment of the weft threads with respect to the warp threads of a traveling strip of fabric, comprising in combination, a member over which said fabric travels having two slots angularly disposed, other than at 0° or 180° with respect to the path of travel, on one side relative to and equi-distant from the center line of said fabric, and longitudinally spaced along said path, means causing a beam of light to traverse each of said slots such that the beams of light are modulated by the threads of said fabric, and light-sensitive means to receive the resulting modulated beams to provide a signal indicative of the difference in the number of threads which modulate the light beams.

2. The machine described in claim 1, wherein said first-mentioned means includes a rotating disc having slots therein which synchronously traverse said first-mentioned slots whereby the beams of light are synchronously related to each other.

3. The machine described in claim 1, wherein the angles at which said two slots are disposed with the direction of travel of said fabric have a sum of 180°.

4. Apparatus for developing control signals for correcting misalignment of the weft threads with respect to the warp threads of a traveling strip of cloth comprising in combination, an optic assembly including means for developing a first pair of traveling beams of light having paths angularly disposed with one another, other than along or normal to the path of strip travel, to traverse the right side of said cloth at longitudinally spaced apart positions whereby the beams are modulated by thread interruptions, means for developing a second pair of traveling beams of light having paths angularly disposed with one another, other than along or normal to the path of strip travel, to traverse the other side thereof at longitudinally spaced apart positions whereby the beams are modulated by thread interruptions, counter means in operable relationship with each of said beams and responsive to the modulations thereof to continually count the number of threads traversed by each of said beams, means responsive to any differential in the thread count between the modulations of said first pair and any differential in the thread count between the modulations of said second pair to produce control signals.

5. A system for determining the number of weft threads in a traveling piece of woven fabric which pass a station along the path of travel thereof, comprising a table in said station, said table having a pair of windows angularly disposed with respect to each other forming an angle which is bisected by a line running through its apex and normal to said path of travel, a plurality of light sources one for each of said windows, an optical apparatus for converting each said light source to bands of light which are directed through said windows respectively, a disc rotated synchronously with the speed of travel of said fabric and having equally spaced radial apertures therein, said disc spaced between said light sources and said fabric and disposed such that said apertures traverse said windows synchronously whereby a traveling beam of light of identical scanning velocity strikes said fabric at each of said windows, a photoelectric responsive counter means operatively associated with each of said windows and re-

sponsive to the number of threads which interrupt said beams of light in a given time.

6. Apparatus for developing misalignment corrective signals useful for straightening the weft threads with respect to the warp threads of a traveling strip of cloth comprising in combination, an optic assembly including means for developing a first pair of traveling beams of light having paths angularly disposed with one another, other than along or normal to the path of strip travel, to synchronously traverse a section of the right side of said cloth at positions spaced along the direction of travel whereby the beams are modulated by thread interruptions, means for developing a second pair of beams of light having paths angularly disposed with one another, other than along or normal to the path of strip travel, to synchronously traverse a section of the left side thereof at positions spaced along the direction of travel whereby the beams are modulated by thread interruptions, counter means in operable relationship with each of said beams to continuously count the number of threads modulating the traveling beams, means responsive to said counters for comparing the thread count between the modulated beams of said first pair and the thread count between the modulated beams of said second pair, and means responsive to said last-mentioned means for developing corrective signals when there is a count differential between the modulated beams of said pairs.

7. A system for determining the number of weft threads in a traveling piece of woven fabric which pass a station along the path of travel thereof, comprising a table at said station, said table having a pair of windows therein over which said fabric passes, said windows angularly disposed with respect to each other forming an angle which is bisected by a line running through its apex and normal to said path of travel, said windows being spaced along the path of travel, a plurality of light sources one for each of said windows, a plurality of optical apparatuses for converting said light sources to bands of light which pass through said windows respectively as traveling beams of light, a plurality of discs rotated synchronously with the speed of travel of said fabric and each having equally spaced radial apertures therein, said discs disposed between said light sources and said fabric path of travel respectively and placed such that said apertures traverse said windows causing the traveling beams of light of identical speed to strike said fabric via each of said windows, light-sensitive means operatively associated with each of said windows and responsive to the light beams as they are interrupted by the threads, and means responsive to the number of interruptions to develop weft misalignment corrective signals when said interruptions are different in the respective windows of each pair.

8. An optic system for providing a thin, intensified band of light to be directed at a window associated with a counting station comprising in combination, a light source, a member having a thin slot spaced between the counting station and the light source, a longitudinally shaped filament in said light source, a lens to magnify said light along the axis of said filament and direct said light at said slot whereby a band of light extends through said slot, a split cylinder lens disposed between the thin slot member and the window for receiving said band of light and focussing said band so that the focus area of said light is a plane of substantial depth extending through said window, a rotating disc having a plurality of apertures therein, between said member and said window, said disc arranged so that said apertures traverse said windows whereby a traveling beam of light passes through said windows.

9. Apparatus for developing control signals useful for straightening the weft threads with respect to the warp threads of a traveling strip of cloth comprising in combination, an optic assembly causing a first pair of traveling beams of light having traces angularly disposed with one another to traverse a section of the right side of said

cloth with the beams being modulated by thread interruptions and a second pair of traveling beams of light having traces angularly disposed with one another to traverse a section of the left side thereof with the beams being modulated by thread interruptions, counter means in operable relationship with each of said modulated beams to continuously count the number of thread interruptions of said modulated beams, logic means responsive to said counter means for comparing the frequency of modulation of said first pair of beams and the frequency of modulation of said second pair of beams, and means developing control signal in accordance to any frequency differential between the modulations of said pairs.

10. Apparatus for developing control signals for correcting misalignment of the weft threads with respect to the warp threads of a traveling strip of fabric comprising in combination, means for simultaneously scanning a section of the righthand side of the fabric with light at a pair of spaced apart locations with the light to fabric movement following traces each oriented at an angle other than normal to or along the path of travel and each trace scanning the same warp threads, means responsive to the light passing through the fabric at each trace to develop signals primarily indicative of the frequency of weft threads scanned; means simultaneously scanning a section of the lefthand side of the fabric with light at a pair of spaced apart locations with the light to fabric movement following traces each oriented at an angle other than normal to or along the path of travel and each trace scanning the same warp threads, means responsive to the light passing through the fabric at each trace to develop signals primarily indicative of the frequency of weft threads scanned; and, means for differentially combining the developed signals to produce the control signals.

11. Apparatus for generating separate control signals useful for correcting misalignment of the weft threads with respect to the warp threads of a traveling strip of fabric comprising, in combination, frame means over which the fabric is passed including a pair of spaced apart windows each oriented at an angle other than 0° or 180° relative to the path of travel and each exposed to the same warp threads; means for synchronously scanning the fabric with separate light beams via the windows; and means responsive to the interrupted light transmitted through the fabric to develop signals primarily indicative of the number of weft threads simultaneously passing each window.

12. Apparatus for signalling a misalignment of the weft threads with respect to the warp threads of a strip of woven material traveling in the direction of the warp threads comprising light source means, means for causing two beams of light from the light source means to traverse, synchronously and repeatedly, two respective, short, equal linear paths along the plane of the material, said paths being inclined to the direction of travel and to each other and spaced apart in the direction of travel, two light-sensitive devices being arranged to collect respectively the light from each beam modulated by the threads of the cloth to provide two synchronously pulsing currents modulated respectively at a frequency dependent upon the number of weft threads traversing each path, and means for comparing the said frequency and deriving an electric signal varying with the frequency difference between the two said currents to signal misalignment as a change in the frequency difference.

13. Apparatus as claimed in claim 12, wherein the light source means, means causing the light beams to traverse, and light sensing devices are provided at two positions respectively near each border of the cloth and displaced normally to the warp threads, means for comparing the sign and magnitude of one said frequency difference with the sign and magnitude of the other said frequency difference, and means for deriving therefrom one said signal when the signs are similar and indicating bow distortion and a second said signal when the signs are opposed and indicating skew distortion, the sign and amplitude of each signal being dependent respectively upon the sign and magnitude of a said frequency difference.

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RALPH G. NILSON, *Primary Examiner.*

RUSSELL C. MADER, *Examiner.*