Oct. 27, 1931. E. D. WALEN 1,829,318

FABRIC MEASURING APPARATUS AND METHOD

Filed May 27, 1929 5 Sheets-Sheet 1

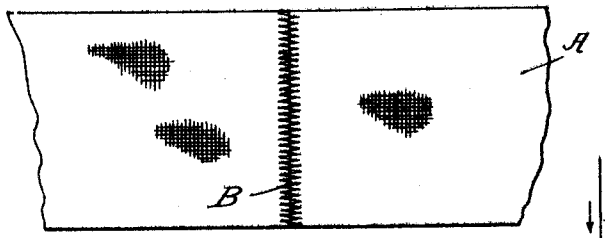



Fig. 2.

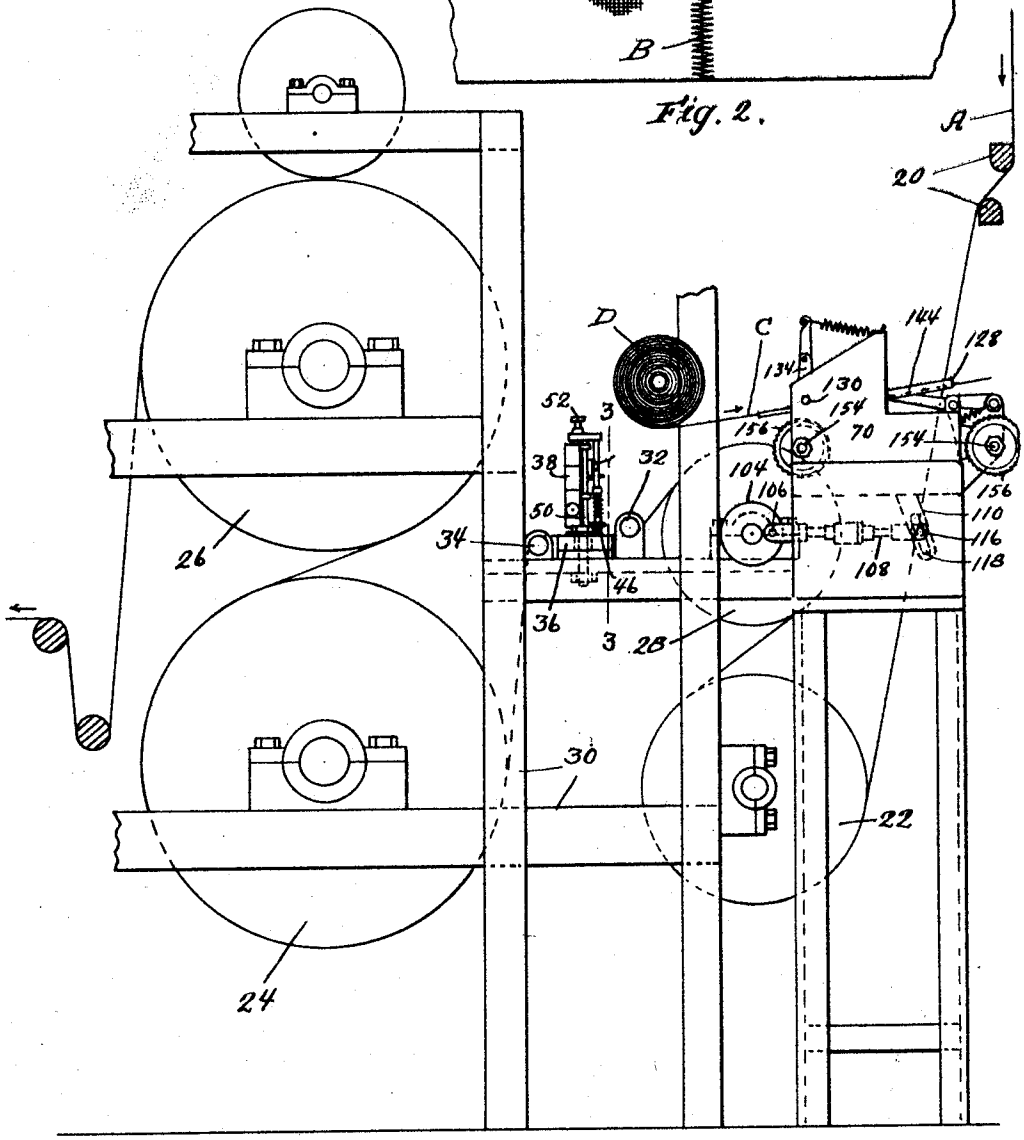



Fig. 1.

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FABRIC MEASURING APPARATUS AND METHOD

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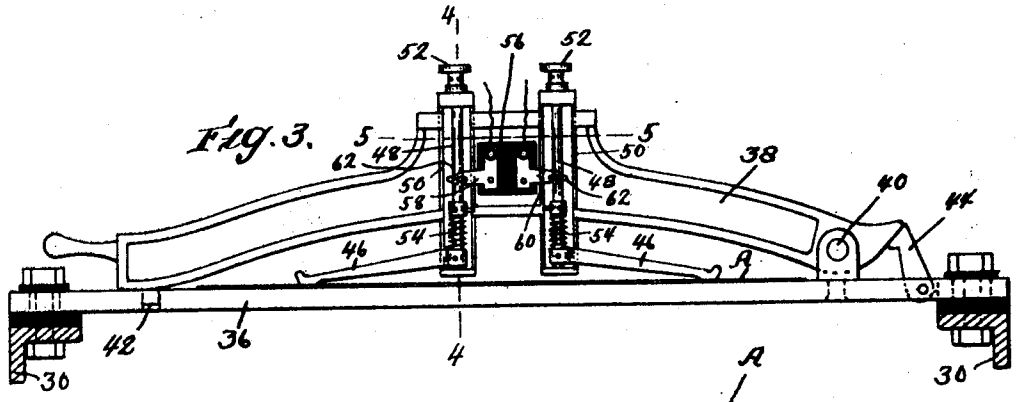



Fig. 3.

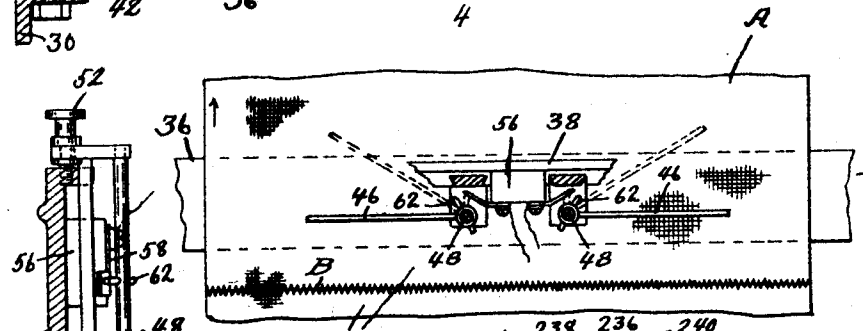



Fig. 5.

Fig. 4.

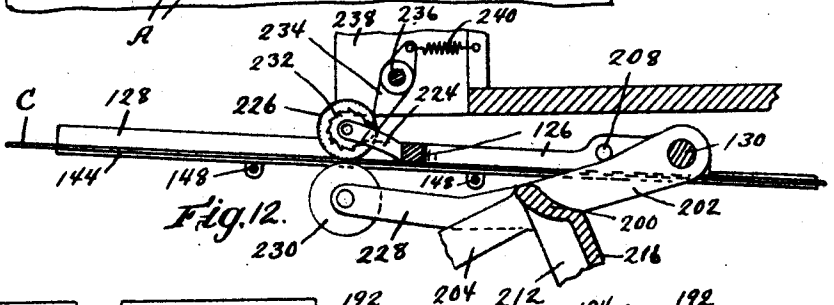



Fig. 12.

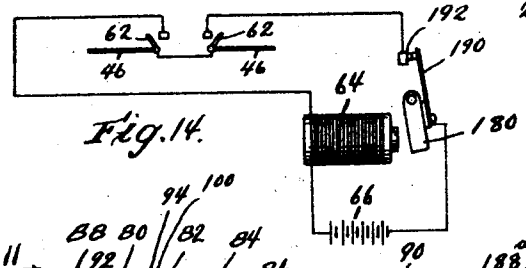



Fig. 14.

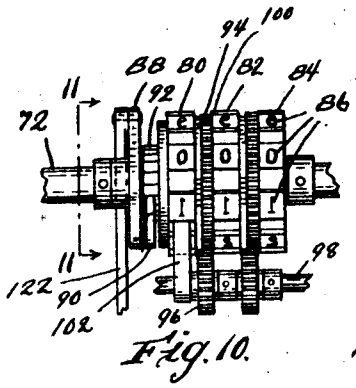



Fig. 10.

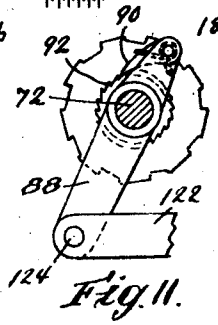



Fig. 11.

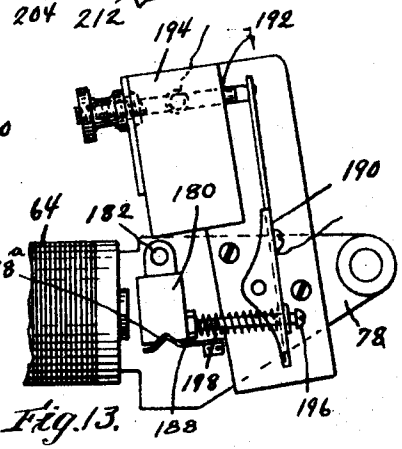



Fig. 13.

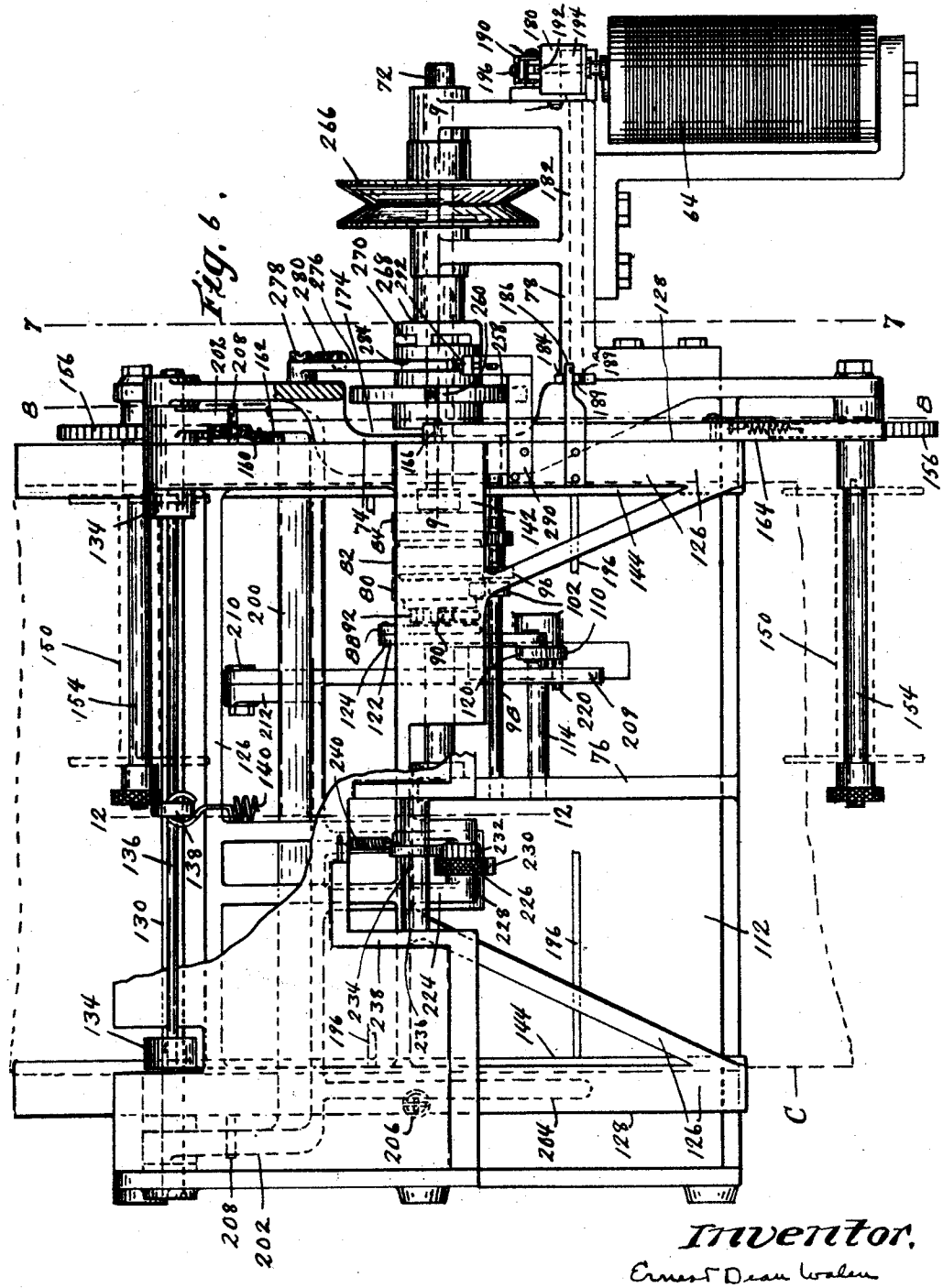
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FABRIC MEASURING APPARATUS AND METHOD

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Fig. 6.



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FABRIC MEASURING APPARATUS AND METHOD

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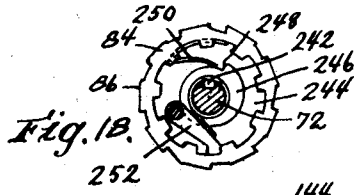



Fig. 18.




Fig. 7.

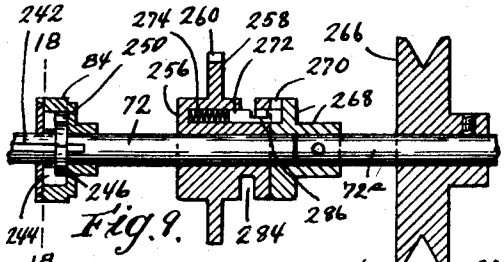



Fig. 9.




Fig. 8.

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FABRIC MEASURING APPARATUS AND METHOD

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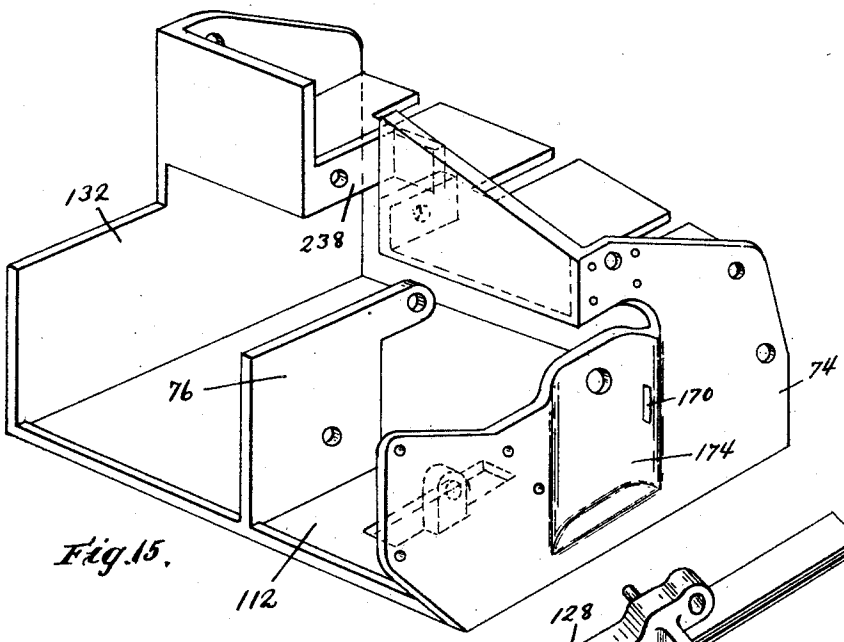



Fig. 15.

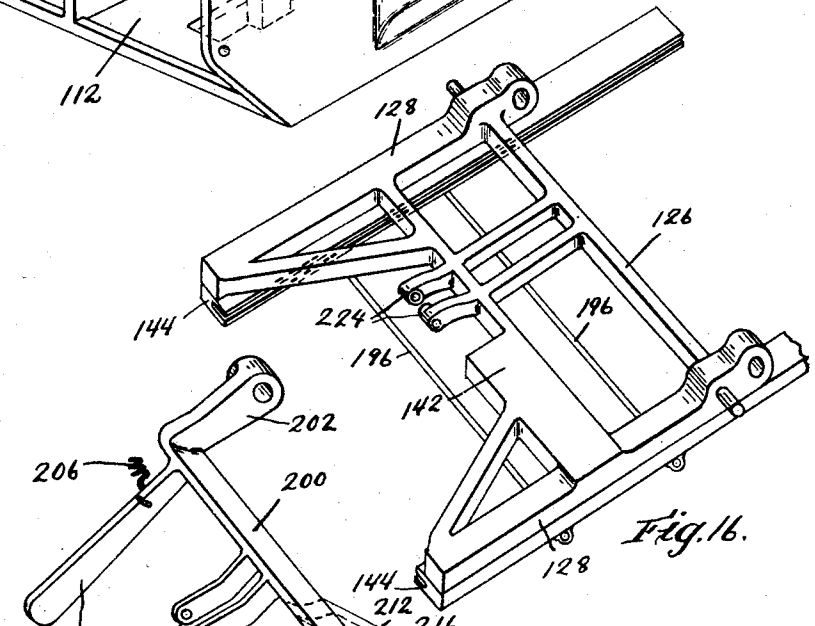



Fig. 16.




Fig. 17.

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Patented Oct. 27, 1931 1,829,318

# UNITED STATES PATENT OFFICE

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## FABRIC MEASURING APPARATUS AND METHOD

Application filed May 27, 1929. Serial No. 366,156.

This invention relates to the measuring of fabric and especially to measuring the short lengths that are united to make up a long length or roll of fabric.

In the manufacture of textile fabrics, it is usual to make up a roll of about one thousand yards in length by attaching shorter lengths of about one hundred and twenty yards of fabric together as they come from the loom. Usually by reason of defects in weaving, printing or otherwise, the various sections making up the total roll are of varying lengths. The united fabrics in the large rolls are then calendered or otherwise treated as desired and are cut into standard lengths which must be free of seams. It is important that the length of the various pieces making up a roll shall be known before the piece is cut so that as many pieces as possible may be cut to a length which the purchaser will take at full price and so that as few as possible ends which are unsalable at full price may be made. Consequently, one of the objects of the present invention is to determine and record automatically the length of fabric between seams in each roll or long length of fabric.

A further object of the invention is to provide the cutter with a record of the number of pieces in the large roll and the length of each piece in the order in which they are located in the roll so that he can plan his cutting to get the best results.

A further object of the invention is the combination of the fabric measuring and recording apparatus with another fabric treating apparatus, as the winding apparatus, or the calendering device, so that the operations of measuring and recording the lengths of fabric are carried on conjointly with either the winding or the calendering operation, as the case may be.

A further object of the invention is the provision of fabric measuring and length recording mechanism the operation of which shall be governed by the seams which unite the various sections of fabric.

Another object of the invention is the provision of apparatus to measure the length of fabric that is passed through it and means operated by the seams which unite the various lengths of fabric to control the operation of the measuring apparatus to record the measured length of fabric between the consecutive seams.

Another object of the invention is the provision of fabric measuring and recording apparatus which shall present on a record-sheet, as a strip of paper, the lengths of the various pieces of fabric that are united into a long length or roll in the order in which the pieces of fabric occur in the long length or roll.

Another object of the invention is the provision of fabric measuring apparatus which is caused to print a record of the length of the section measured and to be reset into condition to measure the length of the next following section by means governed by the movement of the seams in the roll through a given position.

A further object of the invention is generally to improve upon methods and apparatus for measuring lengths of fabric.

In carrying out the invention, the fabric to be calendered or wound into a roll is guided over a steady work support and under a feeler which rides upon or is supported close to the moving fabric. Whenever a protuberance of sufficient magnitude, as a seam which unites two short pieces of fabric, strikes the feeler, the feeler is caused to move and to actuate a recording device to record the length of fabric moved since its preceding action and also to cause the measuring device to be reset so as to be ready to measure the next succeeding length of fabric. If one feeler only is used every movement of the feeler of sufficient magnitude will cause the operation of the recording device. Thus, a mere protuberance of the fabric not constituting a defect may move the feeler a predetermined amount and thus make a false record. Consequently, a further object of the invention is the provision of a plurality of feelers which are located along the width of the fabric and so arranged that all feelers will be actuated only when a plurality of raised portions, as the seam, coincide in a transverse line. Thus, the recording mechanism will be actuated

only when a seam or a defect effecting a great part of the width of the fabric passes under the feelers.

Fig. 1 is a side elevation of the invention applied to the calenders.

Fig. 2 is a plan view of two contiguous sections of fabric of a long length or roll thereof and the seam that unites the sections.

Fig. 3 is a side elevation taken along line 3—3 of Fig. 1, and illustrating the feeler mechanism.

Fig. 4 is a section taken along line 4—4 of Fig. 3.

Fig. 5 is a plan view taken along line 5—5 of Fig. 3 and illustrating in dotted lines the operated positions assumed by the feelers when a seam passes thereunder.

Fig. 6 is a plan view partly broken away of the recording apparatus.

Fig. 7 is a sectional elevation taken along line 7—7 of Fig. 6.

Fig. 8 is a sectional elevation taken along line 8—8 of Fig. 6.

Fig. 9 is a sectional detail of the resetting shaft taken along line 9—9 of Fig. 6.

Fig. 10 is a plan detail of the printing and recording wheels.

Fig. 11 is an end view of Fig. 10 and taken along line 11—11 of Fig. 10.

Fig. 12 is a sectional detail taken along line 12—12 of Fig. 6, and illustrating particularly the record-sheet feeding means.

Fig. 13 is a detailed elevation of the electro-magnet and associated parts operated thereby.

Fig. 14 is a diagrammatic representation of the circuit connections between the feelers and the electro-magnet.

Fig. 15 is a perspective view of the supporting frame for the recording mechanism of Fig. 6.

Fig. 16 is a perspective view of a record-sheet supporting frame.

Fig. 17 is a perspective view of the resetting frame.

Fig. 18 is a sectional detail taken along line 18—18 of Fig. 9.

The present invention is adapted to measure and make a record of the lengths of the sections of fabric in the long piece of fabric A, see Fig. 2, between the seams B which unite the short sections or pieces of fabric end to end and extend transversely thereacross. The seams B are of substantial thickness and protrude above the surface of the sheet sufficiently to engage and operate feeler mechanism hereinafter to be described when the seams pass thereunder.

The invention is here shown as applied to the calenders for the fabric, wherein the sheet A is guided about tension bars 20 and over a roll 22 and thence through the feeling and measuring apparatus embodying the present invention and thence about the lower and upper calender rolls 24 and 26 respectively and thence to the usual winding roll, not shown, where the length of fabric is wound into a roll from which pieces of standard length are adapted subsequently to be severed.

The measuring and recording apparatus embodying this invention includes a measuring roll 28 about which the fabric is made to pass in its passage between the rolls 22 and 24. All of the rolls are suitably supported on a suitable frame 30 and are caused to rotate at the speed of passage of the fabric in any suitable manner not necessarily shown. The periphery of the measuring roll 28 is of known extent, as a yard, and the recording mechanism includes means to count each revolution of said roll thereby to record the length of fabric that passes over said roll between successive operations of the recording device.

The feeler mechanism which detects the ending of one of the short pieces or sections of fabric and the beginning of the next piece is interposed between the measuring roll 28 and the calender roll 24, and includes a pair of horizontally spaced tension bars 32 and 34 respectively under and over which the fabric is drawn. A flat plate 36 extends transversely under the fabric between said bars 32 and 34 and forms a fixed support for the fabric and is secured to and electrically-insulated from the supporting frame 30. A yoke 38, see Figs. 3, 4 and 5, is located above said bar and is pivotally connected therewith at one end as at 40. The other end has a pin 42 which is received within a recess in said bar whereby to hold the yoke in the operative position shown in Fig. 3 against displacement in the direction of movement of the moving fabric. The yoke is adapted to be elevated about its pivot and locked releasingly in said position by a lock 44 which engages the pivoted end of the yoke so that the fabric can be threaded through the calenders.

The yoke carries two duplicate feeler mechanisms both of which must be actuated at the same time by the passage thereunder of the seam or other protuberance of sufficient transverse extent as to constitute a defect in the fabric. Each feeler mechanism includes a feeler arm 46 which is fixed to the lower end of a vertical shaft 48 that is journalled in a carriage 50 vertically adjustable in dovetailed guide-ways of the yoke 38 and secured in any adjusted position by the adjusting screw 52. Each feeler arm is held yieldingly transversely over the fabric support 36 and the fabric thereon by means including the spring 54 which encircles each shaft and has one end connected therewith and the other end bearing upon the carriage 50. The two feeler arms 46 extend in opposite directions. The feeler arms are normally held preferably just out of contact with the fabric as it passes

thereunder, .001 of an inch clearance being sufficient, so that any small protuberance in the fabric such as yarn bunches and the like that do not constitute a defect, can pass under the feelers without actuating them or, if the bunch is sufficiently high to engage one feeler, it is hardly possible that both feelers will be engaged by separate bunches at the same time. The seam which unites the consecutive short pieces of fabric is high enough to engage the feeler and, since it extends clear across the width of the sheet, it engages both feelers. Due to the movement of the fabric, the feelers are moved rearwardly along the seam until the fabric-engaging ends of the feelers pass beyond the rear edge of the bar 36. The seam then passes below and beyond the feelers and the springs 54 return them to their normal position. Such movement of the feelers is caused to actuate the length-recording mechanism. This operation is performed electrically.

To this end, an insulated plate 56 is carried by the yoke 38 between the feeler shafts 48 and supports a pair of relatively insulated resilient contact members 58 and 60. Each feeler shaft is provided with a transverse pin 62 constituting a contact member that, in the normal position of each feeler arm, is free from engagement with its respective fixed contact member. When, however, a feeler is moved rearwardly, the pin 62 is brought into engagement with its fixed contact member. The two feeler arms are electrically connected through the yoke 38 and thus both feeler arms must be operated to effect the bridging of the circuit between said fixed contact members. The closure of the circuit through said contact members is adapted to energize an electro-magnet 64, see Figs. 6, 13 and 14, of the recording apparatus from a suitable source of energy 66, thereby to actuate said recording apparatus to print the already-measured yardage and to reset the measuring and printing mechanism in readiness for recording the length of the next successive section of fabric. Due to the electrical connection between the feeling mechanism and the recording mechanism, each can be located in the most suitable position.

The recording apparatus is supported by a frame 70 adjacent the measuring roll 28. The recording apparatus includes what is essentially counting mechanism that records the number of revolutions of said measuring roll 28 and consequently the length of fabric. Said counting mechanism includes a normally stationary shaft 72, see especially Figs. 6, 7, 9, 10 and 11, which is journalled in an upstanding side wall 74 of the frame 70 and also in an upstanding intermediate wall 76 thereof.

A plurality of counting wheels 80, 82 and 84 are journalled on said shaft and constitute respectively the tens, hundreds, and thousands printing wheels and bear upon their outer periphery printing numerals 86 which run from zero to 9. The wheel 80 is adapted to be advanced one step or one printing numeral for each complete revolution of the measuring roll 28. The wheel 82 is adapted to be advanced one printing numeral for each complete revolution of the wheel 80. The same is the case with regard to the wheel 84 with respect to the wheel 82. The wheel 80 is rotated in a step by step manner continually in one direction by an arm 88 which is reciprocable on the normally stationary shaft 72 and carries a pawl 90 that engages a ratchet wheel 92 which is in driving engagement with said wheel 80. The wheel 80 also carries a gear 94 that has but a small number of teeth, as three teeth, which teeth are adapted to drive the loose pinion gear 96 journalled on the shaft 98. Said pinion gear is in continuous driving engagement with a large gear 100 that is in driving engagement with the second printing wheel 82. The arrangement is such that the wheel 82 will be advanced one printing character for each complete rotation of the wheel 80. The arrangement is the same with regard to the wheel 84. A pawl 102 is carried by the shaft 98 and engages the projections of the wheel 80 and thus prevents it from backward rotation.

The printing wheels are advanced in a step by step manner by the rotation of the measuring roll 28. The shaft of said roll has a disc 104, see Fig. 1, fixed thereto which carries a crank pin 106. A connecting rod 108 is journalled on said crank pin and is connected with a vertical lever 110, see Fig. 8, which extends through the bottom wall 112 of the frame 70 and is pivoted on the shaft 114 carried by said frame. The connection between said connecting rod 108 and the lever 110 is adjustable by means of the pivot pin 116 and the slot 118 in said lever so that the throw of said lever can be adjusted to suit the requirements. The upper end of said lever is pivotally connected by a pin 120 with a link 122 which link in turn is pivotally connected by a pin 124 with the reciprocable wheel-actuating arm 88. Thus, each complete revolution of the measuring roll is caused to advance the printing wheel 80 one step.

The printing wheels are adapted to print a record of the length of fabric measured upon a strip C of paper which is contained preferably in a roll D, see Fig. 1, that is rotatably supported in a suitable location on the frame 30 of the calender. The paper strip is supported and is caused to pass above the printing wheels by the supporting means which includes a frame 126, see especially Figs. 6, 7, 8 and 16, having side arms 128 that are fixed at their rear ends on a cross shaft 130 extended between and journalled in the side walls 74 and 132 of the frame 70. Arms 134 are fixed to said shaft and to said frame and upstand

thereabove and are connected by a cross rod 136. An arm 138 is carried by said cross rod intermediate its length and at its lower end engages the shaft 130 whereby it is held, in effect, fixed to said arms 134. A tensile spring 140 is connected to said arm 138 and to the frame 70 and thus constantly urges said strip-supporting frame downwardly or into a printing position. Means, hereinafter to be described, are employed to hold said frame releasably in elevated position. The sheet-supporting frame overlies the printing wheels and has a platen 142 which is located immediately above said printing wheels and the paper strip and is adapted to provide support for the paper strip during the printing operation. The arms 128 are provided with grooved tracks 144 on their under sides in the grooves of which the opposite edges of the paper strip are slidably received. The paper strip passes along said tracks from the roll D and the end thereof hangs freely beyond the end of the tracks so that the printed record thereon can be torn off from the body of the strip.

The sheet-supporting frame 126 is adapted to be lowered to bring the paper sheet into printing relation with the upper peripheral portions of the printing wheels, and on top of an interposed ink-containing ribbon 146. Said ribbon is threaded over supporting rods 148 carried by said frame 126 and under the platen 142 and is wound upon and is extended between spools 150 located at the opposite ends of the frame 70. Said spools are rotatably supported on stud shafts 154 carried by the wall 74 of the frame 70 and are moved in a step by step manner by means including ratchet wheels 156 journalled on said shaft 154 and with which said spools have detachable engagement. The ratchet wheels are advanced in a step by step manner by pawls 158 and 160 respectively, the pawl 160 being pivoted at 162 to the strip-supporting frame 126 and the pawl 158 being pivoted intermediate the ends of a lever 164, which lever is pivoted to the upstanding wall 74 and has a pin and slot connection 166 with the strip-supporting frame 126. A cross-bar 168 is slidable in slots 170 of the wall 74 and has a handle 172 exposed in a depression or recess 174 in said wall and is so arranged that by moving the bar lengthwise one of said pawls at a time can engage and move its respective ratchet wheel. Thus, each reciprocatory movement of the strip-supporting frame 126 advances the ink ribbon by a small amount in one direction or the other, depending upon which pawl and ratchet wheel is operated.

Resilient brake shoes 176 bear upon the hubs 178 of the ratchet wheels whereby to hold them against movement except when actuated.

The movement of the strip-supporting frame 126 is controlled by the electro-magnet 64. Said electro-magnet operates an armature 180, see Figs. 6, 7, 13, 14 and 15. Said armature is fixed to one end of and depends below a shaft 182 which is journalled, see especially Figs. 6 and 7, in the bracket 78. The other end of said shaft is terminated adjacent the upstanding wall 74 and a latch 184 is fixed thereto and upstands thereabove closely adjacent one of the side arms 128 of the strip-supporting frame 126 and under a projection 186 carried by said frame. Said latch 184 is normally held by a spring pawl 188 which fits removably in a V-shaped notch 188*a* in the armature in position to underlie and engage said projection 186, thus to hold the strip-supporting frame releasably in elevated position against the action of the spring 140. When the armature 180 is attracted by the electro-magnet, however, said latch is rotated in a clockwise direction, see Fig. 7, to move out from under said projection, thereby permitting the strip-supporting frame to drop upon the printing wheels and thus effect the printing of the record of the yardage measured by the device upon the paper strip. The projection 186 is adapted to move downwardly into a notch 189 of said latch whereby to hold said latch in operated position until the printing operation and the resetting of the printing wheels and the supporting frame has been effected. The projection 186, in its downward movement, is adapted to engage and ride over the curved side wall 189*a* of the slot 189, whereby to move the armature sufficiently away from the electro-magnet to permit the pawl 188 to enter the V-shaped notch partway. When the projection 186 is raised, the spring pressure of the pawl on the armature causes it to move completely into its inoperative position, where it is held by the pawl.

The operation of the armature also is adapted to open the circuit for the electro-magnet and the dropping of the strip-supporting frame is adapted to hold the circuit open until the printed record and the resetting of the printing wheels has been effected, thus temporarily removing the recording mechanism from the control of the feelers and preventing the making of improper records. To this end, the armature 180 is caused to actuate a normally-closed circuit controller consisting of the pivoted contact member 190 which cooperates with an adjustably-supported stationary contact member 192 carried by the insulating support 194. The two cooperating contact members of the circuit controller are connected in series with the electro-magnet and the feeler contact members as illustrated in Fig. 14. The pivoted contact member 190 is actuated by means of a screw 196 which is adjustably connected with the armature 180. A compression spring 198 encircles said screw and

bears upon said pivoted contact member and thus normally holds it in circuit-closing position. The adjustment between said armature and pivoted contact member is such that the armature may have a sufficient amount of movement to bring the latch 184 out from under the projection 186 before the circuit of the electro-magnet is broken, and said projection, by its position in the notch of said latch, holds the circuit open until the strip-supporting frame has been restored to normal position.

The movements of the un-latched strip-supporting frame 126 into and out of printing position are controlled by a resetting frame 200, see Figs. 6, 8 and 17. Said frame includes a pair of spaced arms 202 which are journalled on the cross shaft 130 and are disposed on opposite sides of the arms 128 of the strip-supporting frame. Said resetting frame has an extended handle 204 by which the frame may be manually operated to effect the manual operation of parts of the recording device. A tensile spring 206 is connected with said arm 204 and serves to hold the resetting frame yieldingly in an elevated position against laterally-extended pins 208 carried by the strip-supporting frame. The spring 206 is weaker than the spring 140 and consequently over-powers it, thus tending to move the resetting frame downwardly. The resetting frame, however, is normally held up by the lever 110 until it is in a predetermined part of its stroke. To this end, a link 209 is pivoted at 210 to a downwardly-depending ear 212 of said resetting frame and has an abutment 214 that engages a flange 216 of said ear. A spring 218 serves to hold said abutment and flange yieldingly in engagement and the link in the elevated position illustrated in Fig. 8. The forward end of said link 209 is disposed normally above and out of engagement with a laterally-extended pin 220 carried by the reciprocable lever 110. Said link also has a horizontally-elongated slot 222 in its free end which has an entrance on the underside of the link under which entrance said pin 220 is adapted to be positioned during the right-hand part of its stroke. When the electro-magnet 64 is energized by the movement of a seam under the feelers, the supporting latch 184 for the strip-supporting frame is removed from supporting engagement therewith. Consequently, the spring 140 is free to move said frame and also the resetting frame downwardly until the link 209 rides upon the pin 220. When the pin 220 moves into confronting relation with the entrance of the slot 222, the pin enters the slot and so permits the strip-supporting frame and the resetting frame to descend further and effect the printing of the strip. On the next succeeding movement of the pin 220 toward the left, Fig. 8, the pin, being now in the slot 222, will move the link 209 toward the left and thus raise the resetting frame and the strip-supporting frame, which latter frame will automatically be latched in elevated position. During the next movement of the pin 220 to the right, the pin will pass out of the slot 222 and the link 209 by its spring 218 will be raised into position clear of the pin. The printing wheels are adapted to be moved only when the pin 220 is moving toward the left so that the printing operation is carried out when the printing wheels are stationary.

The upward movements of the strip-supporting frame also effect the step by step advancement of the paper strip so that the successive printed records are presented in successive order along the length of the strip. To this end, the strip-supporting frame has a pair of laterally-spaced forwardly-extended ears 224, see Figs. 6, 12 and 16 which overlie the paper strip at one side of the ink ribbon and carry between them a strip-feeding roller 226. The resetting frame also has forwardly-extended arms 228 which underlie the paper strip and carry a guide roller 230 which underlies the feed roller 226, and provides a support for the paper as it is being moved by said feed roll. The feed roll has a ratchet wheel 232 that cooperates with a pawl 234 pivoted on a pin 236 carried by an upstanding wall 238 of the frame 70. Said pawl is held yieldingly against the notched wheel by the retractile spring 240. The arrangement is such that as the resetting frame is moved upwardly the roll 230 presses the paper strip against the feed roll 226. The strip-supporting frame is also moved upwardly relatively to the stationarily-supported pawl 234 and thus causes the pawl to engage the ratchet wheel and rotate the feed roller and thus advance the strip.

During the resetting operation of the strip-supporting frame the print wheels 80, 82 and 84 are adapted to be reset to zero. This resetting operation is accomplished by rotating the shaft 72 which carries said wheels. The shaft, at said wheels, is provided with a spline 242, see especially Figs. 9 and 18. Each wheel is provided with an annular recess 244 in which a spiral cam member 246 is located which cam member is carried by and is connected to said shaft for rotation therewith by said spline. The step-portions 248 of said cams of all the wheels are in the same line. Each wheel also carries a leaf spring 250 which rides upon the face of its cam.

In the recording operation of the wheels, each wheel moves in a counterclockwise direction, Fig. 18, to move the free ends of the leaf springs away from the step-portions of the cams. During the resetting operation, the shaft 72 is rotated one complete revolu-

tion in the same direction and thus, sooner or later, the cams engage the springs and pick up and thereafter rotate all of the wheels conjointly and return them to the initial or zero position. The ratchet wheel 92 and also each of the gear wheels 100 carries a pawl 252 that engages internal teeth of the various wheels for driving them. During the resetting movement of the wheels, the teeth raise the pawls and thus rotate free from their driving elements.

The shaft 72 is held releasably in a predetermined position to which it returns after having made one complete revolution for resetting the printing wheels. To this end, the shaft has a hub 256 fixed thereto which carries a peripherally-outstanding disc 258 that is peripherally smooth except for one V-shaped notch 260 in its periphery. A holding pin or plunger 262 has a V-shaped end which is held yieldingly in said notch by the spring 264, see Figs. 7 and 9. When the shaft is rotated, the holding pin 262 is forced out of the notch. The shaft is rotated through a clutch by a pulley 266, see Figs. 6 and 9, which pulley is fixed to a shaft 72*a* co-axially aligned with the shaft 72 and journalled in a bracket 78 that is secured to and extends laterally from the outer face of the side wall 74. Said pulley is adapted to be rotated continuously by suitable means not herein shown. Said pulley is fixed to a hub 268 that has a number, here shown as 4, of peripheral slots 270 therein. The hub 256 carried by the shaft 72 is in confronting relation with the end face of said hub 268 and has a clutch pin 272 therein which is axially movable under the pressure of the compression spring 274 to enter any one of said slots and thereby connect the hub and the pulley together for cojoint rotation. The movement of the clutch pin is controlled by a pawl member 276 which is pivoted on a screw 278 carried by the end wall 74 of the supporting frame and has its forward end overlying the hub 256 and held yieldingly in the aforesaid relation by the tensile spring 280. The forward end of said pawl member has a tapered projection 282 which rides in a groove 284 of said clutch hub and is adapted to be located in the slot 286 of the clutch pin 272 when the shaft is stationary, thus to hold the pin out of driving engagement with the hub 268 of the pulley. When the pawl member 276 is raised momentarily, however, the clutch pin is free to move axially into a notch in the rotating hub 268. When a complete rotation of the clutch again brings the clutch pin into engagement with the pawl member, said member moves the pin out of driving engagement with the driving hubs. The restraining pin 262 at the same time moves into the notch 260, thus to hold the shaft 72 against over-travel.

The pawl member 276 is controlled by the rising movement of the strip-supporting frame. Said frame has an ear 290, see Fig. 7, in which a latch 292 is horizontally movable, the latch being constantly urged to an outward position by a compression spring 294. The outer face of the latch is inclined and cooperates with a correspondingly formed detent 296 which is integral with the pawl member 276. The arrangement is such that as the strip-supporting frame is moved downwardly, the latch 292 is caused to move into position under the detent. Thus, when the strip-supporting frame is moved upwardly following the printing operation the latch raises the detent and consequently the pawl member, thus to cause the engagement of the clutch and the resetting of the printing wheels. The arrangement of the latch and detent, however, due to the different pivotal locations of the pawl member and the strip-supporting frame, is such that when said frame is near its uppermost position, the detent slips off the latch and drops downwardly and pulls out the clutch pin, this action taking place before the resetting shaft has made a complete revolution.

After the long length or roll of cloth has been passed completely through the calenders or other machine, with which this invention is associated, the paper strip bearing the record of the length of each section of cloth that composes the long sheet is torn off and is attached to the roll so that the cutter can ascertain the length of cloth in each section and thus cut the cloth in the most economical manner.

It is apparent that this device will also indicate defects in the fabric which are extensive enough to operate the feelers. The device can also be used for measuring the distance from the beginning at which irregularities other than seams occur in a roll of fabric by attaching thick markers in an obvious manner to the fabric at the desired point to operate the feelers. Thus, the distance to a hole may be indicated as well as to the seam by placing markers in the vicinity of the hole.

I claim:

1. The combination with means for moving a length of fabric consisting of short sections connected together by seams, of means for measuring and recording in succession the length of the sections between seams, and means actuated by the seams in the fabric for controlling the operation of said measuring and recording means.

2. Fabric measuring apparatus including means to move a fabric consisting of short sections connected together by seams, means to measure and record the length of the fabric, and means controlled by the seams in the fabric to govern said measuring and recording apparatus to measure and record in suc-

cession the length of the sections between seams.

3. Fabric measuring and recording apparatus including means to move a fabric connected by seams, fabric measuring and recording apparatus, and means including movable members disposed in cooperative relation with the moving fabric in position to be actuated by the seams therein to control said measuring and recording apparatus for measuring and recording in succession the lengths of the successive sections between seams.

4. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, fabric measuring and recording apparatus having means to measure and record in succession the length of the successive short sections between seams, and mechanism controlling said measuring and recording apparatus including a movable feeler member disposed in position to be engaged and moved to an operative position by a seam in the moving fabric.

5. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, fabric measuring and recording apparatus having means to measure and record in succession the length of the successive short sections between seams, and mechanism controlling said measuring and recording apparatus including a steady fabric-support over which the fabric moves, a supporting frame located above said support and the fabric thereon, and a movable feeler member carried by said support in such proximity with the moving fabric as to be engaged and moved into an operative position by the passage of a seam over said support.

6. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, fabric measuring and recording apparatus having means to measure and record in succession the length of the successive short sections between seams, and mechanism controlling said measuring and recording apparatus including a steady fabric-support for the moving fabric, and a feeler normally held in an unoperative position above said fabric support in position to be engaged and moved by a seam in the moving fabric into a position to control said measuring and recording apparatus.

7. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, fabric measuring and recording apparatus having means to measure and record in succession the length of the successive short sections between seams, and mechanism controlling said measuring and recording apparatus including a steady fabric-support for the moving fabric, and a feeler normally held in an unoperative position above said fabric support in position to be engaged and moved by a seam in the moving fabric into a position to control said measuring and recording apparatus, said feeler having means to return it automatically to an unoperated position after a seam has moved from engagement therewith.

8. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, fabric measuring and recording apparatus having means to measure and record in succession the length of the successive short sections between seams, and mechanism controlling said measuring and recording apparatus including a steady work-support for the moving fabric, a feeler arm having means pivotally supporting it for movement about a vertical axis above said work-support close to the moving fabric, and said feeler arm having means normally holding it in an unoperated position, said feeler arranged to be moved by a seam in said fabric into an operated position and beyond an edge of said work-support so that the seam can pass under and disengage said feeler and said feeler return to an unoperated position.

9. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, fabric measuring and recording apparatus having means to measure and record in succession the length of the successive short sections between seams, including a steady support for the moving fabric, a yoke overlying the fabric and said support and having means by which it is movable vertically toward and away from said support to permit the introduction of the fabric thereunder, a feeler member controlling the operation of said measuring and recording apparatus carried by said yoke above said fabric support and adapted to be engaged and operated by the passage of a fabric seam thereunder, and means to raise and lower said feeler member on said yoke with respect to the fabric.

10. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, fabric measuring and recording apparatus having means to measure and record in succession the length of the successive short sections between seams, including a steady support for the moving fabric, a yoke overlying the fabric and said support and having means by which it is movable vertically toward and away from said support to permit the introduction of the fabric thereunder, a carrier vertically movable on said yoke having means to hold it in vertically-adjusted position thereon, a vertical shaft journalled in said carrier, a feeler arm fixed to said shaft and overlying said fabric support and the fabric thereon, and adapted to be engaged and

moved by a seam in the fabric into an operated position, and means including a spring for holding said feeler normally in an unoperated position and for returning to such position after the seam has passed from under said feeler arm.

11. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, fabric measuring and recording apparatus having means to measure and record in succession the length of the successive short sections between seams, and mechanism controlling said measuring and recording apparatus including a movable feeler member disposed in position to be engaged and moved to an operative position by a seam in the moving fabric, and electrically-actuated mechanism interconnecting said feeler member and said measuring and recording apparatus.

12. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, fabric measuring and recording apparatus having means to measure and record in succession the length of the successive short sections between seams, and mechanism controlling said measuring and recording apparatus including a movable feeler member disposed in position to be engaged and moved to an operative position by a seam in the moving fabric, said fabric measuring and recording apparatus having electro-magnetic means controlling the operation thereof, and means including a circuit controller operated by said feeler member for controlling the operation of said electro-magnetic means.

13. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, measuring and recording apparatus having means to measure and record in succession the length of the successive sections between seams, electro-magnetic means controlling the operation of said measuring and recording means, and means including a circuit controller governing the operation of said electro-magnetic means disposed in position to be actuated by the seams in the moving fabric.

14. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, measuring and recording apparatus having means to measure and record in succession the length of the successive sections between seams, electro-magnetic means controlling the operation of said measuring and recording apparatus, means including a circuit controller governing the operation of said electro-magnetic means, and a feeler member actuated by the passage of a seam thereunder for operating said circuit controller.

15. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, measuring and recording apparatus including means to measure and record in succession the length of the successive short sections, control means for said measuring and recording apparatus actuated by the seams in the moving fabric and having a plurality of control members all of which must be operated in unison by a seam to effect the control of said measuring and recording apparatus.

16. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, measuring and recording apparatus including means to measure and record in succession the length of the successive short sections, and control mechanism for said measuring and recording apparatus actuated by the seams in the fabric having a plurality of seam-detecting feeler members which are disposed transversely of the moving fabric and have means whereby all must be actuated collectively to effect the control of said measuring and recording apparatus.

17. Fabric measuring apparatus including means to move a fabric composed of short sections connected by seams, measuring and recording apparatus having means to measure and record in succession the length of successive sections between seams, electro-magnetic control means for said measuring and recording apparatus, a pair of feeler members located in spaced relation transversely of the fabric adapted to be engaged and operated by the passage of a seam thereunder, and a circuit controller operated by each feeler member, said circuit controllers being connected in series with each other and with said electro-magnetic means, whereby both feelers must be operated conjointly to effect control of said electro-magnetic means.

18. Apparatus for measuring and recording in succession the lengths of the sections of fabric between seams including a measuring roll which is rotatable in engagement with the moving fabric, a plurality of record-printing wheels actuated by said measuring roll, a record-sheet support which is movable toward and away from said printing wheels to move the sheet supported thereby into and out of printing relation with said wheels, and means governed conjointly by the seams in said fabric and by said measuring roll to control the movement of said sheet support.

19. Apparatus for measuring and recording in succession the lengths of the sections of fabric between seams including a measuring roll which is rotatable in engagement with the fabric, record-printing wheels actuated by said measuring roll, a record-sheet support which is biased for movement toward said printing wheels to move a record sheet carried thereby into printing relation with said wheels, means including a latch controlled by the seams in the fabric normally restraining said support from movement, and

other means for moving said support away from said printing wheels and into holding relation with said latch after a printing operation.

20. Apparatus for measuring and recording in succession the lengths of the sections of fabric between seams including a measuring roll which is rotatable in engagement with the fabric, record-printing wheels actuated by said measuring roll, a record-sheet support which is biased for movement toward said printing wheels to move a record sheet carried thereby into printing relation with said wheels, means including a latch controlled by the seams in the fabric normally restraining said support from movement, and means actuated by said measuring roll arranged to move said support away from said printing wheels and into holding engagement with said latch after a printing operation.

21. Apparatus for measuring and recording in succession the lengths of the sections of fabric between seams including record-printing means, a record-sheet support that is movable toward and away from said printing means to move a record sheet into and out of printing relation with said printing means, means including a latch normally restraining said support from movement into sheet printing position, and means governed by the seams in the moving fabric controlling the operation of said latch to release said support.

22. Apparatus for measuring and recording in succession the lengths of the sections of the fabric between seams including record-printing means, a record-sheet support that is movable toward and away from said printing means to move a record sheet into and out of printing relation with said printing means, means including a latch normally restraining said support from movement into sheet printing position, means governed by the seams in the moving fabric controlling the operation of said latch to release said support, and other means to restore said support to the engagement of said latch.

23. Apparatus for measuring and recording in succession the lengths of the sections of fabric between seams including a plurality of record-printing wheels, means including a reciprocating member for actuating said wheels, a measuring roll which is rotatable in engagement with the moving fabric having means for reciprocating said member, a record-sheet support normally biased for movement toward said printing wheels, a latch controlled by the seams in the fabric normally restraining said support from movement, and means having an automatically engageable and disengageable connection with said reciprocatory member arranged to return said support to the holding engagement of said latch following its release.

24. Apparatus for measuring and recording in succession the lengths of the sections of fabric between seams including a plurality of record-printing wheels, means including a reciprocating member for actuating said wheels, a measuring roll which is rotatable in engagement with the moving fabric having means for reciprocating said member, a record-sheet support normally biased for movement toward said printing wheels, a latch controlled by the seams in the fabric normally restraining said support from movement, and means having an automatically engageable and disengageable connection with said reciprocatory member arranged to return said support to the holding engagement of said latch following its release including a resetting frame having means normally holding it in an unoperated position, and a spring-urged link carried by said resetting frame, said link being normally free from connection with said reciprocatory member in the normal position of said resetting frame and movable into engaging position with said reciprocatory member by the movement of said resetting frame and moved by said member to raise said resetting frame and also automatically to disengage it from said reciprocatory member.

25. Apparatus for measuring and recording in succession the lengths of the sections of the fabric between seams including a plurality of record-printing wheels, a reciprocatory member for actuating said wheels, a measuring roll which is rotatable in engagement with the moving fabric and has means for reciprocating said reciprocatory member, a record-sheet supporting-frame located above said printing wheels and adapted to support a record sheet, means biasing said frame for movement toward said wheels to move the record sheet into printing relation therewith, a latch normally holding said supporting frame from movement, means governed by the seams in the fabric for moving said latch out of holding relation with said frame whereby to permit said frame to move toward said wheels, a pivoted resetting frame located below said supporting frame having means normally holding it in raised position, said supporting frame when released adapted to engage said resetting frame and move it downwardly, and means to raise said supporting frame and restore it to the holding engagement of the latch including a link pivotally supported by said resetting frame having an elongated slot therein which is open at one end and is adapted to be entered and engaged by a projection of said reciprocating member in one position thereof whereby to move said link and raise said tripping frame during a reciprocatory movement of said reciprocatory member in one direction, said

link having spring-means adapted to raise said link out of engagement with said reciprocatory member during its movement in the opposite direction.

26. Apparatus for measuring and recording in succession the length of the sections of fabric between seams including fabric measuring apparatus having a plurality of record-printing wheels, means to move said wheels in a step by step manner away from a zero position, and means governed by the seams in the fabric to restore said wheels to the zero position.

27. Apparatus for measuring and recording in succession the length of the sections of fabric between seams including means to measure and record the length of fabric, means for resetting said measuring and recording means after the length of each section has been measured and recorded, means governed by the seams in the fabric controlling said resetting means, and means effective during the resetting operation to remove said resetting means from the control of said controlling means.

28. Apparatus for measuring and recording in succession the length of the sections of fabric between seams including fabric measuring and recording means, means to reset said measuring and recording means prior to measuring the length of the next succeeding sections, means governed by the seams in the fabric controlling said resetting means and initiating the operation thereof, and means removing said controlling means from the control of said resetting means until after said measuring and recording means has been reset.

29. Apparatus for measuring and recording in succession the lengths of the sections of fabric between seams including measuring and recording means arranged to measure and record in succession the length of the sections between seams, means to reset said measuring and recording means after each section has been measured and recorded, electro-magnetic means controlling the resetting of said measuring and recording means, means including a circuit controller operated by the seams in the fabric to control the operation of said electro-magnetic means, and means operated by said electro-magnetic means arranged temporarily to remove said electro-magnetic means from the control of said circuit controller until after said measuring and recording means has been reset.

In testimony whereof, I have signed my name to this specification.

ERNEST DEAN WALEN.