Nov. 28, 1961 H. M. WHITE ET AL 3,010,482

METHOD AND MEANS FOR WEAVING FABRICS WITH PORTIONS OF DIFFERENT PICK COUNT

Original Filed Nov. 7, 1958 4 Sheets-Sheet 1

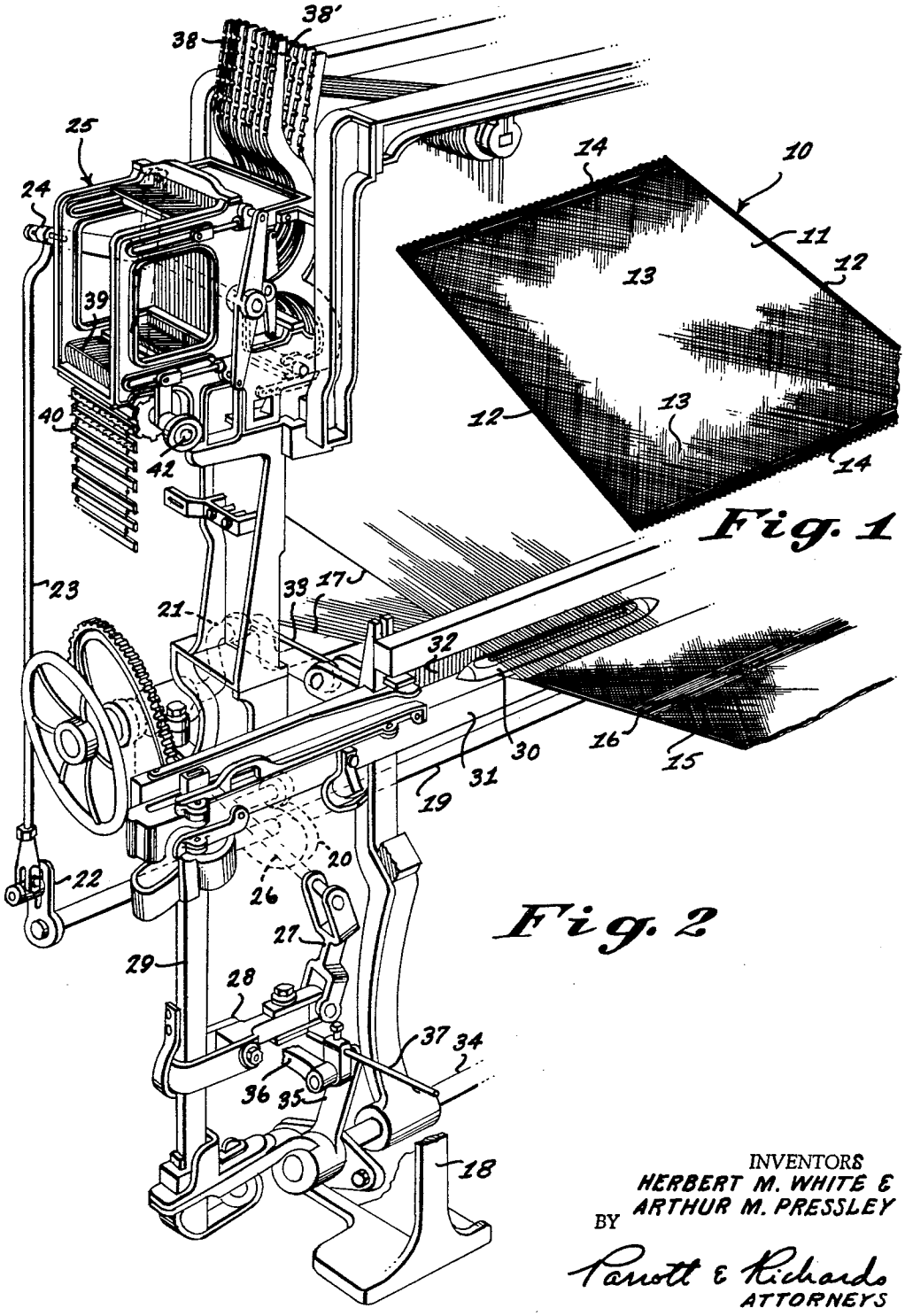


Fig. 1

Fig. 2

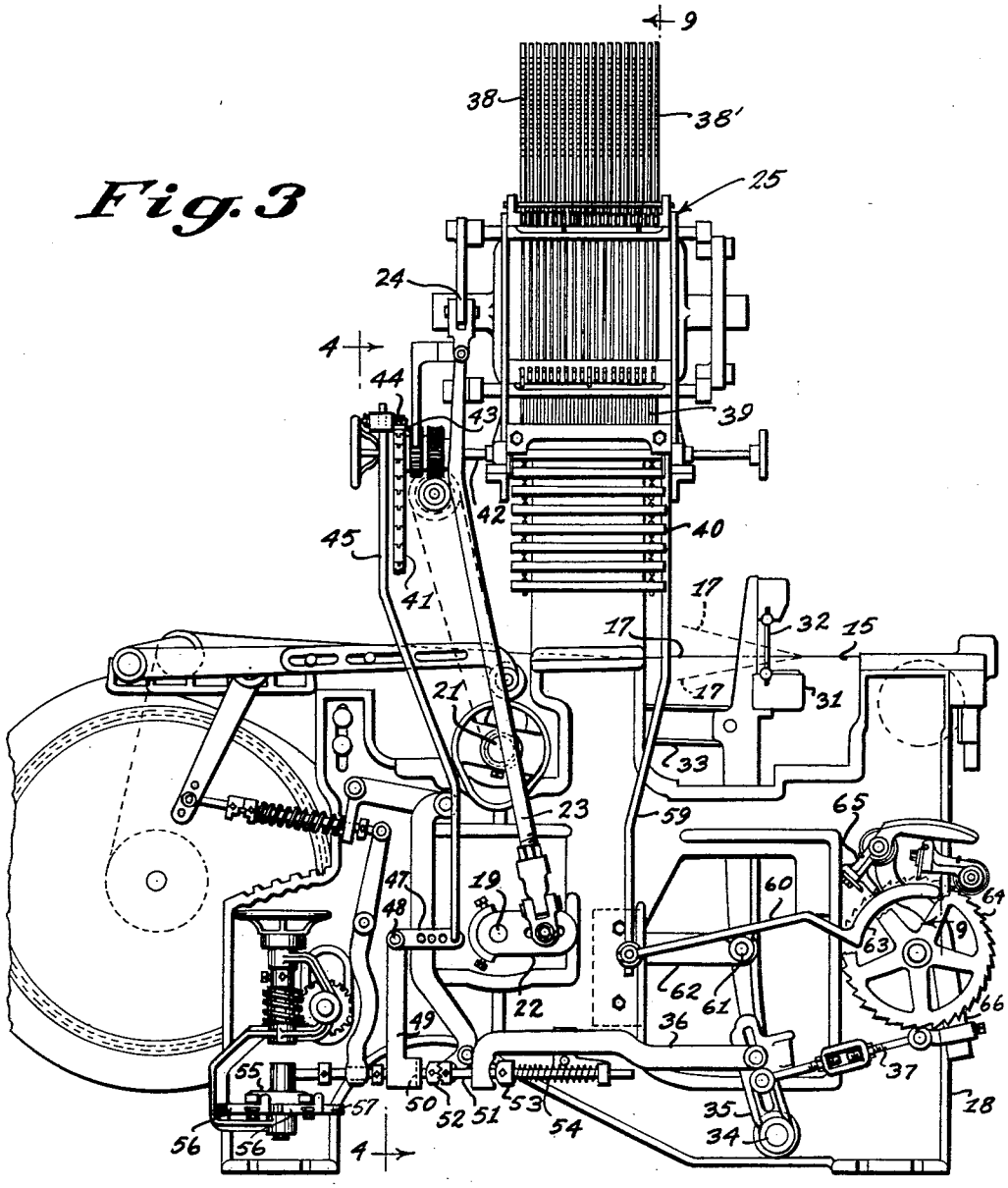
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Fig. 3



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Fig. 4

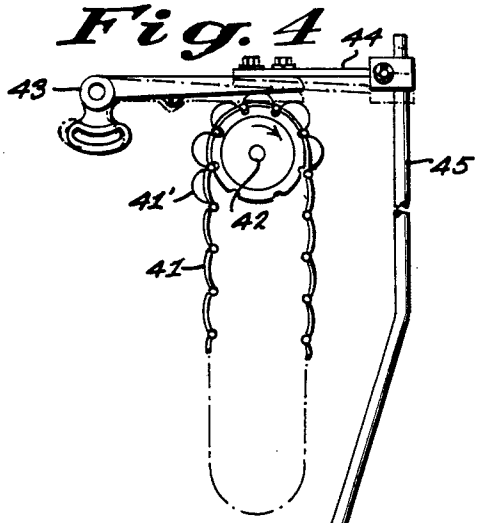
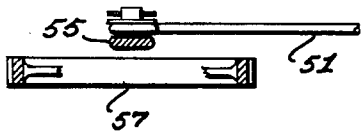


Fig. 7



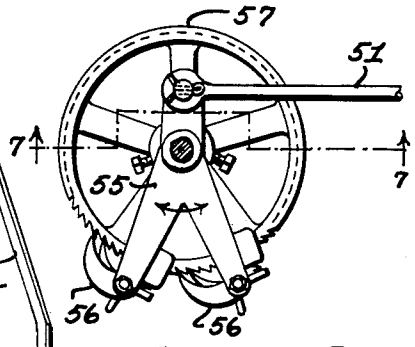
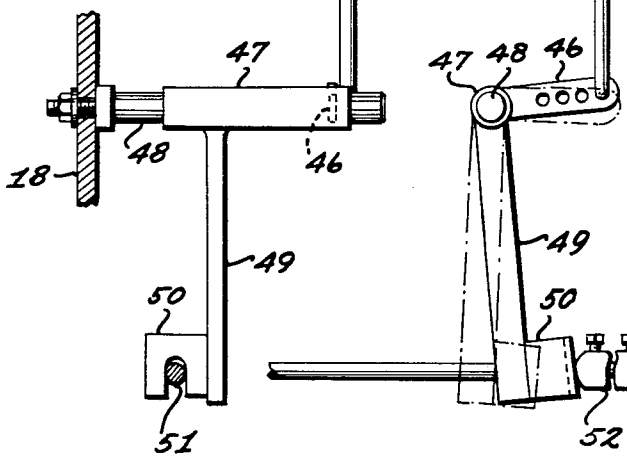


Fig. 8



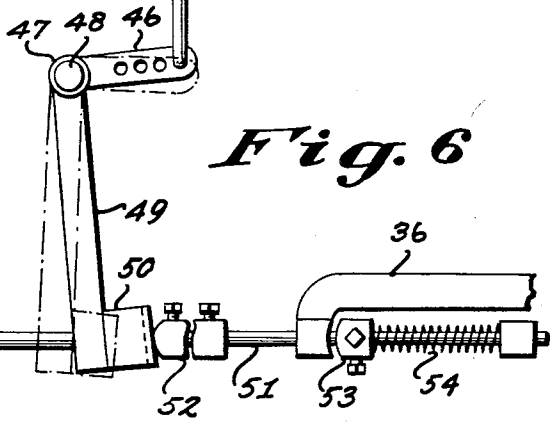


Fig. 6

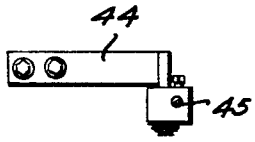


Fig. 5

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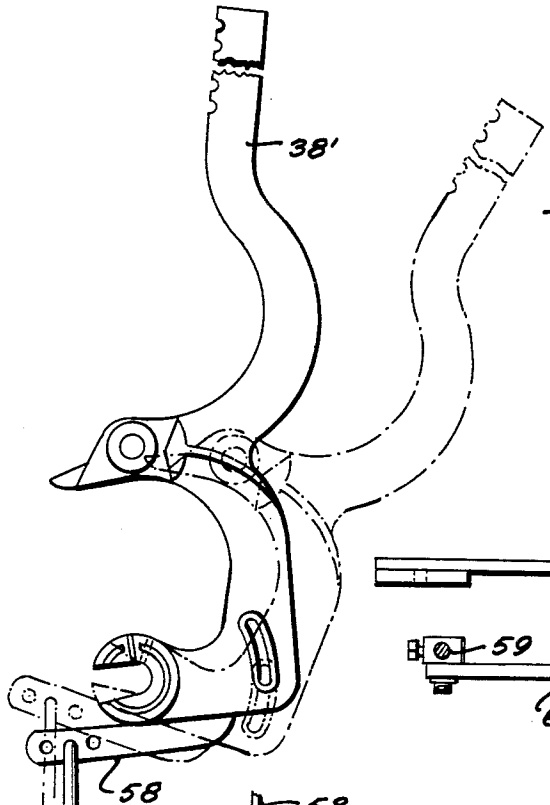


Fig. 9

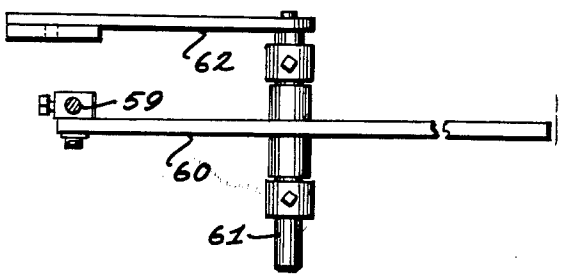


Fig. 11

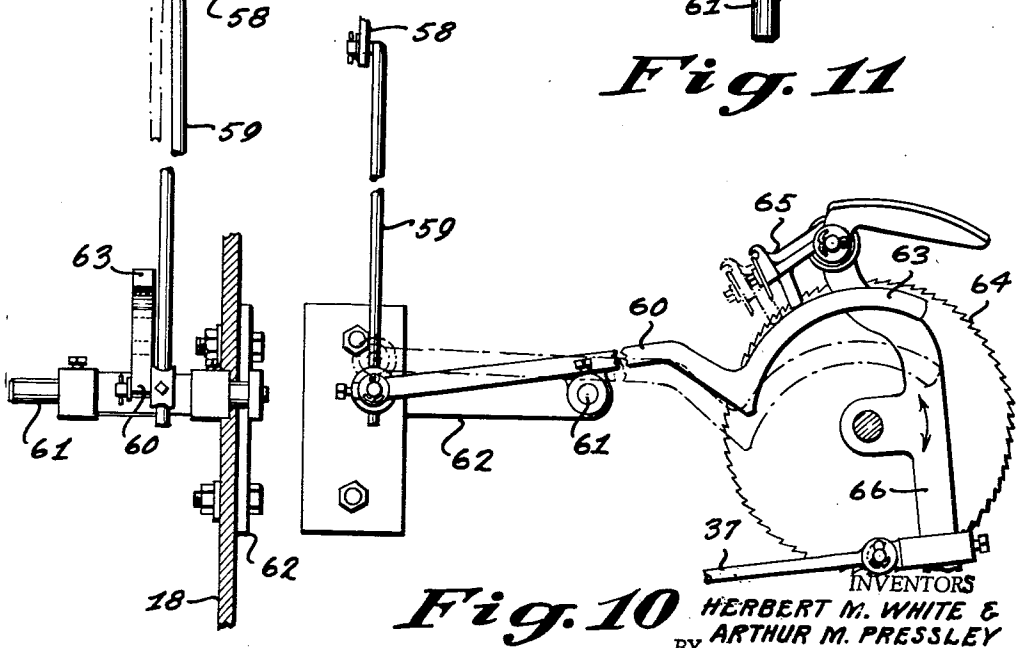


Fig. 10

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3,010,482

METHOD AND MEANS FOR WEAVING FABRICS WITH PORTIONS OF DIFFERENT PICK COUNT

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Original application Nov. 7, 1958, Ser. No. 772,478. Divided and this application Mar. 12, 1959, Ser. No. 798,897

7 Claims. (Cl. 139—99)

This invention relates generally to the formation of diaper fabrics, and more particularly to a novel form of birdseye diaper fabric incorporating a pinking bar and to the method and means by which this fabric is formed. The present invention is also applicable generally for forming fabric structures in which comparable functional or appearance characteristics are desired, as pointed out further below. This is a division of our copending application Serial No. 772,478 filed November 7, 1958, now abandoned.

The predominant diaper fabrics are gauze and birdseye, both of which are commonly formed on a dobby loom. These fabrics have heretofore differed characteristically, beyond the different weaves involved, in that gauze diaper fabric normally incorporates a fillingwise pinking bar at which the individual diaper units are cut from a running web with finished edges by pinking, while birdseye diaper fabric has been woven in a uniform running web that is cut straight in the fillingwise direction to separate units of diaper size that must then have the raw cut edges thereof finished by sewing which amounts to a substantial additional item of production expense.

The formation of a pinking bar in gauze diaper fabric presents no problem because gauze diapers have a two-ply construction, the fabric therefor being tubular woven to provide the two plies, and while a pinking bar in order to be suitably resistant to fraying requires a weave construction of substantially higher pick count than diaper fabric, this higher pick count is readily obtainable simply by changing the gauze fabric tubular weave to a single ply at the pinking bar which automatically doubles the pick count to the order required without any change in the actual picking rate. In birdseye diapers, however, the construction is single ply so that a changed pick count for a pinking bar requires a corresponding change in picking rate which has not heretofore, insofar as we are aware, ever been provided for in a practical manner.

According to the present invention, the incorporation of spaced fillingwise pinking bars in a birdseye diaper web is provided for by arranging automatically to slow the rate of letting-off and taking-up during the weaving of the pinking bar so as to obtain the necessary increased picking rate or pick count thereat. The arrangement provided by the present invention for this purpose operates uniquely to effect the picking rate change sharply at the pinking bars and to maintain the pick count consistently uniform from one pinking bar to another so that a required pick count can be obtained dependably at each pinking bar formed in a running web, all as described in further detail below in connection with the accompanying drawings, in which:

FIG. 1 is a perspective illustration of a pinked birdseye diaper formed in accordance with the present invention;

FIG. 2 is a fragmentary perspective illustration of a dobby loom indicating the formation of a birdseye diaper web thereon incorporating pinking bars;

FIG. 3 is an end elevation of a dobby loom such as is shown in FIG. 2 and further illustrating an embodiment of the present invention;

FIG. 4 is a side elevation detail, as seen substantially at the line 4—4 in FIG. 3, of means provided according to the present invention on a dobby loom such as is shown in FIGS. 2 and 3 for differentially controlling the let-off motion during weaving of the pinking bars;

FIG. 5 is a top plan detail corresponding to FIG. 4;

FIG. 6 is a further side elevation detail of the FIG. 4 means as seen from the right;

FIG. 7 is a fragmentary section detail taken on the line 7—7 in FIG. 8 and representing a continuation to the left of the means illustrated in FIG. 6;

FIG. 8 is a top plan view of the ratchet wheel for a let-off motion of a dobby loom such as is shown in FIGS. 2 and 3;

FIG. 9 is a side elevation detail, as seen substantially at the line 9—9 in FIG. 3, of means provided according to the present invention on a dobby loom such as is shown in FIGS. 2 and 3 for differentially controlling the take-up motion during weaving of the pinking bars;

FIG. 10 is a related side elevation detail as seen from the left in FIG. 9; and

FIG. 11 is a top plan detail corresponding to FIG. 10.

With reference now in detail to the drawings, FIG. 1 illustrates a single ply diaper formed according to the present invention, as indicated generally by the reference numeral **10**, comprising a birdseye body portion **11** on which selvage edges are formed in any usual manner at **12**, while plain woven margins **13** having pinked edges **14** are provided at each fillingwise end thereof.

A diaper cloth web from which the FIG. 1 diaper unit **10** may be cut is shown being formed in FIG. 2 at **15**, a pinking bar being indicated at **16** extending fillingwise in the web **15**, and such pinking bars **16** being spaced at warpwise intervals in the web **15** corresponding to the size of diaper unit **10** desired, with each pinking bar **16** formed in a width equal to the aggregate width of the fillingwise margins **13** to be provided in the diaper unit **10** so that upon severing the web **15** by pinking fillingwise at the successive pinking bars **16** diaper units **10** are separated in succession therefrom.

The web **15** incorporating the pinking bars **16** is woven from a warp, shown at **17**, which is controlled to weave a birdseye pattern except at the pinking bars **16** where the weave is changed to a plain pattern such as is commonly provided for pinking bars. The weaving of the web **15** in this manner is carried out on a dobby loom of the type illustrated in FIGS. 2 and 3 in which a frame, indicated fragmentarily at **18**, is arranged to support a main drive shaft **19** that: carries cams, such as is indicated at **20**, for actuating the picking motion; is geared through a crankshaft **21** for actuating the beating motion; and is fitted with an eccentric arm **22** and connecting rod **23** running to a rocker arm **24** for operating the dobby head **25** from which the shedding motion is controlled.

The picking motion comprises the usual arrangement of pick shaft **26** operated by the pick cam **20** and fitted with a pick arm **27** for connection through a lug strap **28** to a picker stick **29** by which the flight of a shuttle **30** is actuated to lay the picks in the warp shed during the weaving operation. The shuttle flight takes place across a lay **31** in front of a reed **32** by which each inserted pick is beaten-up, the beating motion comprising a connecting arm **33** extending from the previously mentioned crankshaft **21** to the lay **31** for pivoting the lay on a rock shaft support **34**. This rock shaft **34** further carries a rock arm **35** having driving rods fitted thereon at **36** and **37** to actuate, respectively, the let-off and take-up motions by which feeding of the warp **17** and delivery of the woven web **15** is controlled in relation to the picking motion, as explained in further detail below.

The dobby head **25** that controls the shedding motion comprises the usual series of jacks **38** and operating index elements **39** for actuating the jacks **38** selectively from a pattern or dobby chain **40** so as to cause a required number of the jacks **38** to manipulate the warp harness

(not shown) for shedding in accordance with a desired weave pattern. The dobby head **25** is also equipped in the present case with a conventional form of multiplier motion such as is disclosed, for example, in U.S. Patent No. 691,608, by which provision is made for weaving the diaper cloth web **15** with a birdseye pattern while changing to a plain weave at the pinking bars **16**.

The use of a multiplier motion for this purpose is well known, the multiplier motion characteristically comprising a multiplier chain **41**, as seen in FIGS. 3 and 4, which is mounted on an extension of the shaft **42** carrying the dobby chain **40** (compare FIGS. 3 and 4). The multiplier chain **41** is formed with certain of the links thereof carrying raised lugs as indicated at **41'** in FIG. 4, and these raised lugs **41'** determine the differential action of the multiplier motion on the dobby head **25** through a pivoted multiplier arm **43** riding the multiplier chain **41** and operating to change the phase relation of the dobby chain **40** when shifted by the multiplier chain lugs **41'**, so that a double pegged dobby chain **40** will have the alternate pegs thereon brought into play for changing the shedding motion to obtain an alternate weave pattern. As soon as the raised lugs **41'** on the multiplier chain **41** pass the multiplier arm **43** and allow it to resume its normal position, the dobby chain **40** is caused to revert to its initial phase relation and the shedding thereupon returns to that of the normal weave pattern. In the present case, the normal weave pattern is the birdseye pattern devised for the body portion **11** of the diapers **10**, and the dobby chain **40** is double pegged for an alternate plain weave, while the multiplier chain **41** has the raised lugs **41'** arranged thereon for actuating a change to the plain weave shedding at the intervals in which the pinking bars **16** are to be incorporated in the web **15**.

As previously mentioned, however, it is also necessary that the pick count be substantialy increased for the pinking bar **16** as they are incorporated in the single ply web **15** in order to form these pinking bars **16** with adequate resistance to fraying when pinked. Diaper cloth is normally woven with a pick count in the order of about 34 picks per inch, while a pick count about double this order is needed in a pinking bar. To effect this necessary pick count change evenly and consistently in weaving the pinking bars **16**, the present invention provides means such as are illustrated particularly in FIGS. 4 to 11 for slowing the rate of letting-off and taking-up during weaving of the pinking bars **22** and in this way controlling the pick count thereat differentially.

For this purpose, the multiplier arm **43** is fitted with an extension **44**, as seen in FIGS. 4 and 5, and this extension **44** is connected to a control rod **45** extending therefrom to one arm **46** of a bell crank **47** supported on a pivot stud **48** attached to the loom frame **18**. The other arm **49** of the bell crank **47** extends to dispose a slotted ear portion **50** thereof over a let-off motion connecting rod **51** adjacent a stop collar **52** thereon. The let-off connecting rod **51** extends to the right as seen in FIG. 6 to a slidable connection at the adjacent end of the let-off driving rod **36**, having a driving collar **53** fixed thereon at which the driving rod **36** normally acts to pull the connecting rod **51** to the right in the extent determined by the throw of the beating motion rock arm **35** as each pick is beaten-up, and a return spring **54** being arranged to keep this driving collar **53** normally in following relation with the driving rod **36**.

Upon actuation of the multiplier arm **43** by the raised lugs **41'** of the multiplier chain **41**, however, the let-off control rod **45** pivots the bell crank **47** from the dotted line to the full line position shown in FIG. 6 so as to bring the slotted ear portion **50** thereof into abutting relation with the adjacent connecting rod stop collar **52** and thereby back off the connecting rod driving collar **53** in relation to the driving rod **36** to shorten the shifting stroke of the let-off connecting rod **51**. The result of this shortened stroke for the connecting rod **51** is seen in FIGS. 7 and 8 to be a lessened oscillating amplitude for the let-off pallet lever **55** to which the other end of the let-off connecting rod **51** extends and on which the pawls **56** are carried that operate the let-off ratchet wheel **57**, so that the let-off motion is consequently slowed in a selected degree determined by the extent to which the let-off connecting rod **51** is made to back off when the action of the multiplier motion commences the plain weaving of the pinking bars **16**.

In order at the same time to slow correspondingly the take-up motion, one of the otherwise inactive jacks, such as **38'** at the dobby head **25** is fitted with an extension arm **58**, as seen in FIG. 9, from which a control rod **59** extends to one end of a lifter arm **60** that is mounted intermediate its length on a pivot stud **61** carried by a bracket structure **62** attached to the loom frame **18** (compare FIGS. 10 and 11). The other end of the lifter arm **60** has an arcuate portion **63** arranged in relation to the peripheral portion of the take-up motion ratchet wheel **64** at which the pick pawl **65** operates, the pick pawl **65** being carried on a rocking lever **66** to which the take-up motion driving rod **37** extends from the beating motion rock arm **35** carried by the lay rock shaft **34**. The mechanism thus provided is operated from the dobby jack **38'** by pegging the dobby chain **40** so that the jack **38'** becomes active at the same time that the plain weave shedding is commenced by the multiplier motion. In this way, the jack **38'** is caused to operate between the FIG. 9 dotted line and full line positions throughout the plain weave shedding for the pinking bars **16**, and upon so operating to actuate the lifter arm **60** between the dotted line and full line positions shown in FIG. 10. At the FIG. 10 dotted line position of lifter arm **60**, the pick pawl **65** is allowed to operate in its normal fashion at the take-up ratchet wheel **64** to effect delivery of the woven web **15** at a rate corresponding to the pick count incorporated in the main birdseye pattern. In its full line position, however, the lifter arm **60** presents the arcuate portion **63** thereof to lift the pick pawl **65** off of the ratchet wheel **64** and thereby slow down the take-up motion by selectively preventing action of the pick pawl **65** on the ratchet wheel **64**. Accordingly, by pegging the dobby chain **40** so as to render the pick pawl **65** inactive on a certain portion of its strokes, the take-up motion can be slowed in the particular degree desired in relation to the previously described slowing of the let-off motion so as to adjust the pick count sharply and with consistent regularity to the particular requirements for weaving the pinking bars **16**.

A representative diaper unit **10** may be formed according to the present invention using 25's cotton warp in a sley of about 76 and 20¼'s cotton filling at 34 picks per inch in the birdseye body portion **11** and at 70 picks per inch in the pinked marginal edge portions **13**, the diaper cloth web **15** having the pinking bars **16** incorporated therein at a plain woven width of 1⅝ inches and at a regular spacing warpwise of the web **15** corresponding to the size of diaper unit **10** desired. A construction of this sort provides a birdseye body portion **11** of normal form and substance, while incorporating the substantial advantage of pinked edges **14** at plain woven marginal edge portions **13** that are reliably formed to prevent fraying.

The particular specifications given for the representative construction above may, of course, be varied in accordance with common practice in forming diaper cloth, except that the pick count at the pinking bars **16** must be regulated carefully. In general, the pinking bar pick count should be in the order of twice that of the birdseye body portion of the diaper cloth web **15**, which will ordinarily provide a necessary minimum in the order of 60 to 64 picks per inch at the pinking bars **16**.

The close selective control of the rate of letting-off and taking-up afforded by the present invention allows the required or desired pinking bar pick count to be introduced sharply and uniformily as a regular incident of the weaving operation despite the substantial pick count

increase at the pinking bar in relation to the birdseye portion of the web **15**, and it will be recognized that the same principle may be employed for varying the pick count according to a consistently uniform pattern in any continuously woven fabric, whether or not the shedding changes as the pick count varies, because a multiplier motion might be used to effect the pick count variation without changing the shedding if desired, or the dobby chain **40** might be pegged to actuate the jack **38'** specially at selected intervals to adjust the take-up motion in the manner described above, while an additional normally inactive jack of the dobby head series **38** might be similarly actuated for corresponding adjustment of the let-off motion.

The present invention has been described in detail above for purposes of illustration only, and is not intended to be limited by this description or otherwise except as defined in the appended claims.

1. The method of forming a fabric structure for diapers which comprises weaving a fabric web by picking and shedding, controlling said shedding in a birdseye pattern for a sufficient number of picks to weave a diaper body portion, and then changing said control to shed in a plain pattern for a sufficient number of picks to weave a pinking bar portion extending fillingwise in said web, while simultaneously and positively through pattern means slowing both the letting-off and taking-up simultaneously with changing of said shedding to increase the pick count sufficiently to render said pinking bar portion adequately resistant to fraying upon severing of said web thereat by pinking, said positive slowing of both the letting-off and taking-up producing a substantially uniform pick count throughout said pinking bar portion.

2. The method of forming a pinked birdseye diaper which comprises weaving a single ply fabric web while picking continuously and shedding for each pick, while controlling said shedding alternately in a birdseye pattern for a sufficient number of adjacent picks to weave a diaper body portion and in a plain pattern for a sufficient number of adjacent picks to weave a pinking bar portion extending fillingwise of said web, and while simultaneously and positively through pattern means slowing both the letting-off and taking-up during said plain weave shedding to substantially half the rate thereof during said birdseye weave shedding, said positive slowing of both the letting-off and taking-up producing a uniform pick count throughout said pinking bar portions.

3. In a dobby loom having positively operated let-off and take-up motions and a dobby head equipped with a multiplier motion for changing the shedding pattern at selected pick intervals, means positively controlled by said multiplier motion for simultaneously changing the rate of travel of both said let-off and take-up motions upon each change in the shedding pattern effected by said multiplier motion.

4. In a dobby loom having positively operated let-off and take-up motions and a dobby head equipped with a multiplier motion for changing the shedding pattern at selected pick intervals, means operated from said dobby head for controlled simultaneous slowing of both the rate of travel of said let-off and take-up motions simultaneously with changing of the shedding pattern by said multiplier motion, said last mentioned means being operable while maintaining a constant picking motion and while shedding continuously for each pick.

5. In a dobby loom having let-off and take-up motions positively driven during weaving and a dobby head equipped with a multiplier motion for changing the shedding pattern at selected pick intervals during weaving, means operated from said multiplier motion for simultaneously and positively changing the driven rate of operation of both said let-off and take-up motions simultaneously with each change of shedding pattern by said multiplier motion.

6. In a dobby loom having let-off and take-up motions positively driven during weaving and pattern means for changing the shedding pattern at selected pick intervals during weaving, said pattern means simultaneously and positively controlling changes in the driven rate of operation of both said let-off and take-up motions simultaneously with changes of said shedding pattern by said pattern means.

7. In a loom having positively operated let-off and take-up motions, and pattern means for changing the shedding pattern at selected pick intervals during weaving, said pattern means positively controlling changes in the rate of travel of said let-off and take-up motions for simultaneously changing the shedding pattern and the let-off and take-up rates.

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