Jan. 29, 1946. M. J. LENARTOWICZ ET AL 2,393,786

FABRIC FEEDING DEVICE

Filed Oct. 18, 1943 4 Sheets-Sheet 1

FIG. 1.

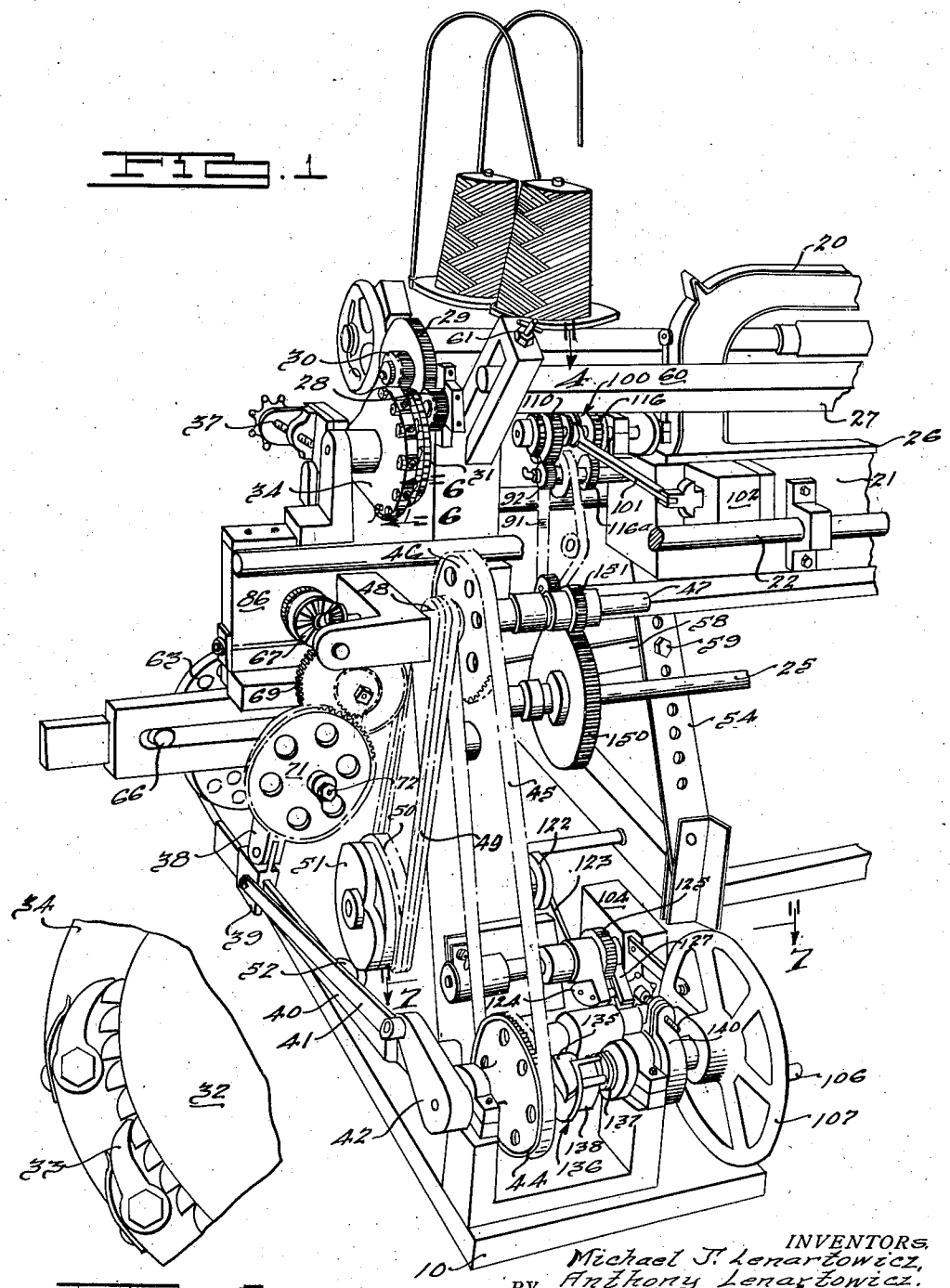


FIG. 6.

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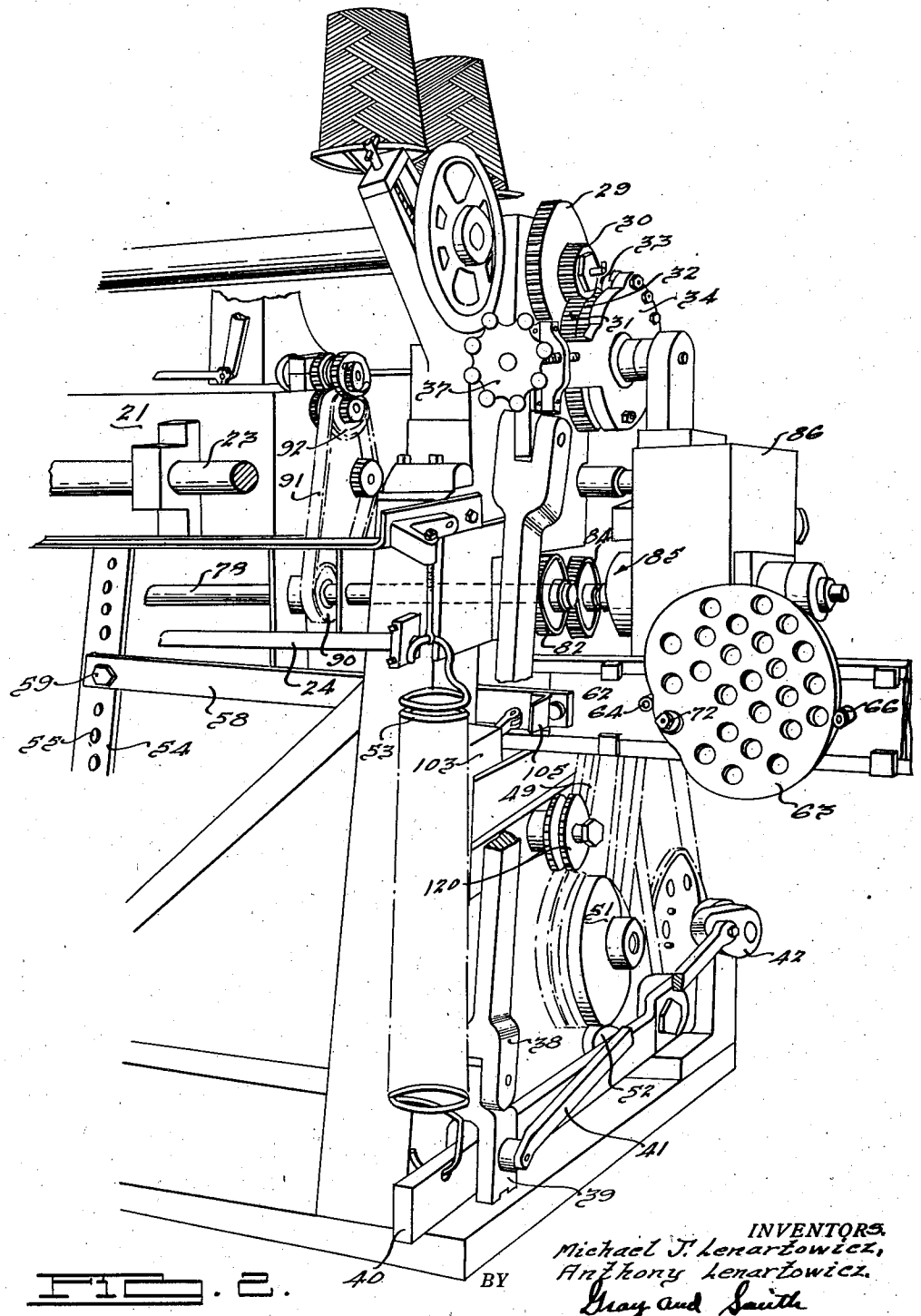


FIG. 2.

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FABRIC FEEDING DEVICE

Filed Oct. 18, 1943 4 Sheets-Sheet 3

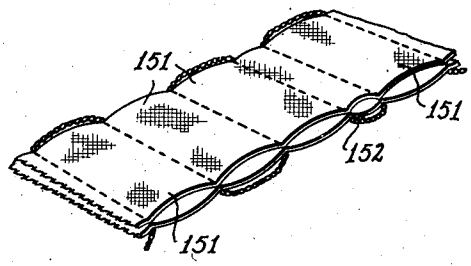


Fig. 5.

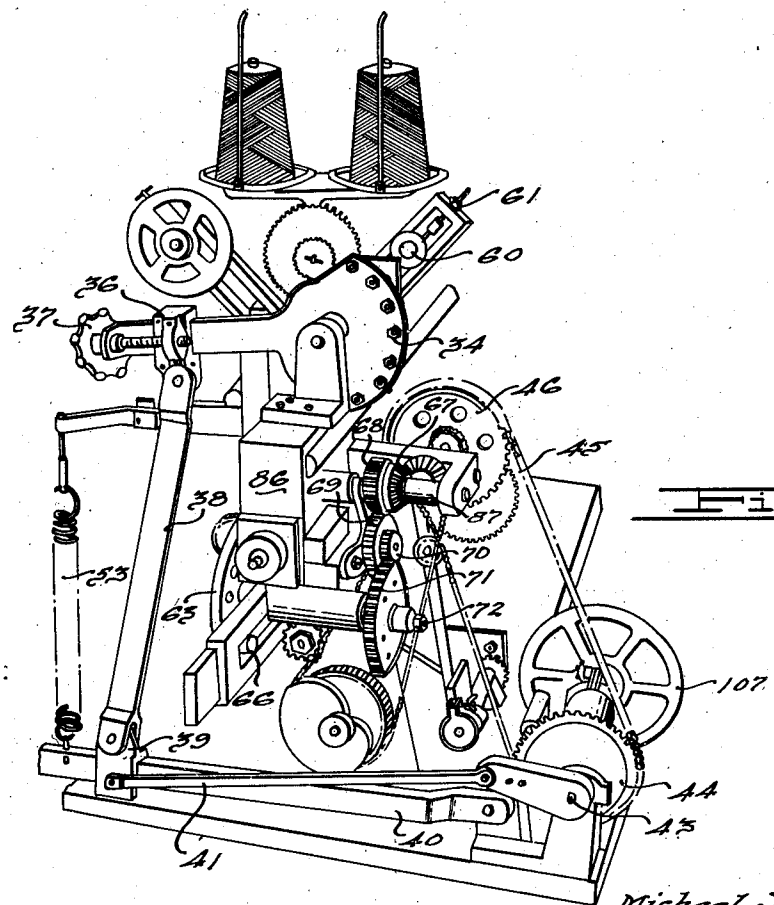


Fig. 3.

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FABRIC FEEDING DEVICE

Filed Oct. 18, 1943 4 Sheets-Sheet 4

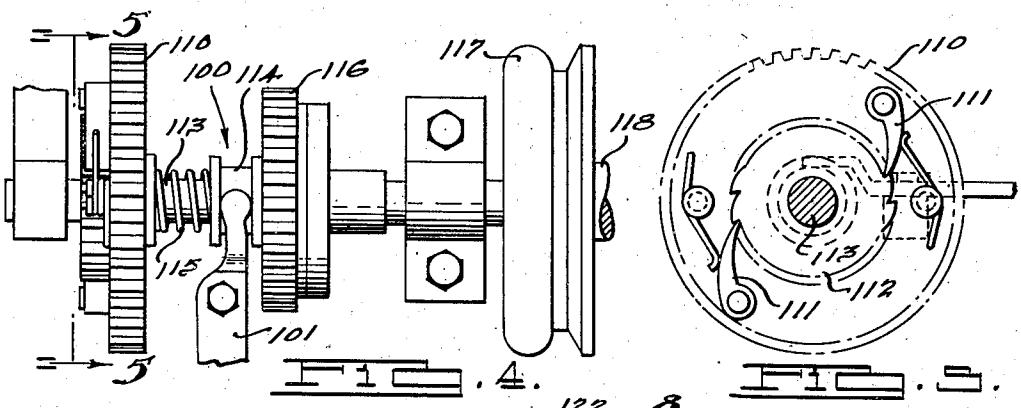


Fig. 4. Fig. 5.

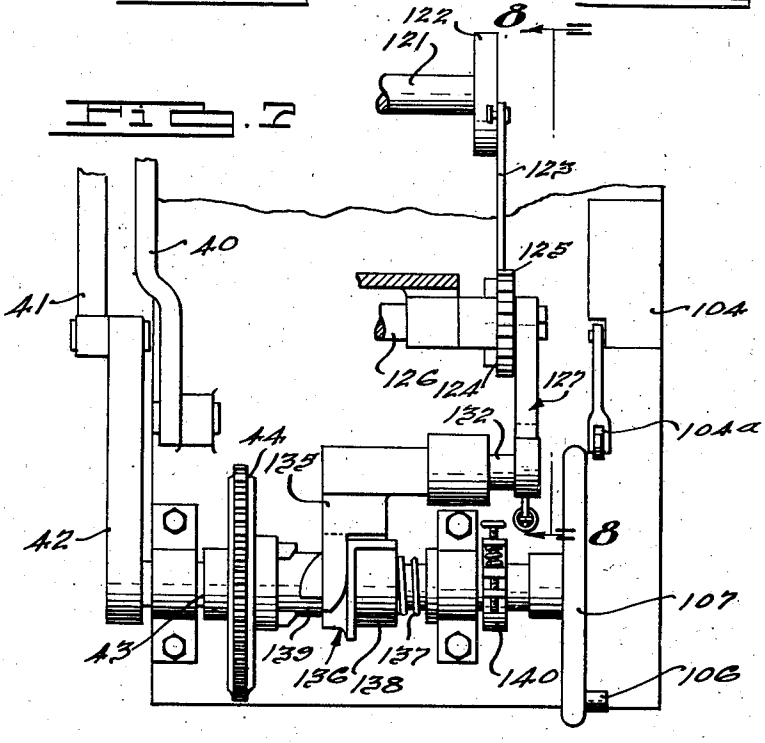


Fig. 7.

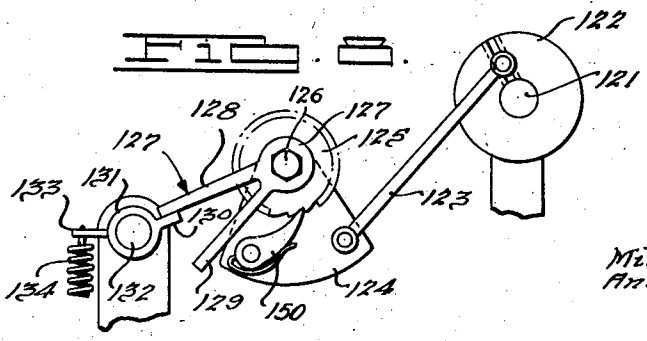


Fig. 6.

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Patented Jan. 29, 1946 2,393,786

UNITED STATES PATENT OFFICE

2,393,786

FABRIC FEEDING DEVICE

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Application October 18, 1943, Serial No. 506,647

7 Claims. (Cl. 112—2)

The present invention relates to a fabric feeding device for feeding fabric to sewing machines, particularly of the multiple head type adapted, for example, for sewing a plurality or series of pockets in relatively coarse fabric material, such as burlap.

One of the objects of the invention is to provide an improved machine capable of forming a plurality of pockets in folded material or separate pieces or strips of material economically and more rapidly than has heretofore been possible.

Another object of the invention is to provide a machine wherein folded fabric material or a pair of superimposed layers or pieces of fabric material may be intermittently fed flatwise in a substantially straight line path through the machine, in which the machine is provided with one or more sewing heads which move transversely with relation to the travel of the fabric material to sew spaced pockets therein.

Another object of the present invention is to provide a machine of the foregoing character having intermittently movable or operable mechanism capable of moving one or more sewing heads transversely with respect to the fabric material, together with means for indexing the material forwardly when the sewing head or heads approach each extreme position of their transverse travel.

Another object of the present invention is to provide an improved machine having sewing heads reciprocable back and forth in unison longitudinally of the machine to intermittently sew pockets in fabric material passing transversely through the machine in either direction and in a substantially straight path.

A further object of the invention is to provide an improved machine of the foregoing character and/or an improved method or process capable of forming or producing a series or plurality of successive pockets of the same size in folded fabric material or in a pair of superimposed pieces or layers of fabric material, and which is capable of forming single pockets of a different size at predetermined times and after a predetermined number of said same size pockets have been produced.

Another object of the invention is to provide an improved machine of the foregoing character capable of successively forming a series of pockets of the same size in a piece of folded material or in a pair of superimposed separate pieces or strips of material and at predetermined intervals forming in said series, a pocket of a different size.

A further object of the present invention is to provide an improved machine of the foregoing character capable of being operated at a given speed to successively form a series or plurality of pockets of the same size in a piece of folded fabric material or in a pair of superimposed separate pieces or strips of fabric material, and capable of being operated at a reduced rate of speed at predetermined times for the purpose of producing, at predetermined intervals, in said series of pockets, a pocket of a different size.

The foregoing and other objects and advantages of the invention will appear from the following description and appended claims when considered in connection with the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In said drawings:

Figs. 1, 2 and 3 are end perspective views taken respectively from the right and left sides and from the front and the end of the fabric feeding device embodying the present invention showing the driving and control mechanisms.

Fig. 4 is a top plan of the area indicated by the arrow 4 of Fig. 1.

Fig. 5 is an elevation taken substantially on the line 5—5 of Fig. 4 looking in the direction of the arrows.

Fig. 6 is an enlarged fragmentary plan of the area 6—6 of Fig. 1 looking in the direction of the arrows.

Fig. 7 is a fragmentary view partially in section taken substantially on the line 7—7 of Fig. 1 looking in the direction of the arrows.

Fig. 8 is an elevation taken substantially on the line 8—8 of Fig. 7 looking in the direction of the arrows.

Fig. 9 is a perspective view illustrating one type of finished article produced on the machine of the present invention.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

The present invention is related to the invention disclosed in Hathaway Patent No. 2,318,686, issued May 11, 1943, but differs therefrom in the feeding and control mechanisms which are

the particular subject matter of the present application.

Accordingly, in the interests of simplification of the drawings and the disclosure herein, only such feeding and control mechanisms of the present invention will be discussed in detail, it being understood that the complete machine and the power drive therefor may have a general apperance similar to that shown in Fig. 1 of the Hathaway Patent No. 2,318,686.

While there are various types of sewing heads which may be employed in connection with the fabric feeding device of the present invention, the novel sewing head of our co-pending application Serial No. 506,648, filed October 18, 1943 is particularly adapted for use on machines of the present type.

A machine embodying the present invention is mounted on a main frame 10 and comprises several coordinated and synchronized elements to perform the various functions desired. One such element provides for the longitudinal movement of the sewing head, another provides for the fabric feeding, and another provides for the driving of the sewing head. In addition, control and synchronizing mechanisms are provided for coordinating the several elements during the operation of the machine.

The sewing head 20 is mounted on a base 21 which is longitudinally movable on guide rods 22 and 23 extending the length of the machine. While the drawings here show the use of a single sewing head, it is to be understood that a plurality of heads, preferably arranged in tandem, may be utilized for movement longitudinally of the machine.

A plurality of strips to be sewed are contained on a feed reel (not shown) which is mounted for rotation on the feed reel shaft 24. A take-up reel (not shown) for rolling up the fabric strips after they have been sewed is mounted on and driven by the power driven take-up reel shaft 25.

The fabric to be sewed is drawn transversely of the sewing table 26 by feed-rolls (not shown) which grip the fabric and feed it from the feed reel through the sewing head 20. Each of the sewing heads 20 which is utilized is provided with a separate strip of fabric upon which the sewing operation is to be performed.

The reels, feed rolls and sewing heads and their operation are shown in said Hathaway Patent No. 2,318,686 to which reference is hereby made for the details of construction and operation of said reels.

The feed rolls are power driven from a feed roll shaft 27 which is driven intermittently by the feed roll driving mechanism which comprises the gear train 28, 29, 30 and 31. The gear 31 is secured to a ratchet wheel 32 (Fig. 6) which is adjustably driven by a plurality of spring pressed pawls 33, carried by the oscillating feed ratchet arm 34 mounted on the bracket 35. On the swinging end of the oscillating feed ratchet arm 34 is mounted an adjustable bracket 36 (Fig. 3) which is movable to adjusted positions longitudinally of the said arm by the adjusting screw 37.

The adjustable bracket 36 is pivotally connected with one end of a crank arm 38, the other end of which is pivotally connected with a slide member 39 slidably mounted on a pivoted lever 40, and is power driven reciprocally thereon by a crank 41, which is pivotally connected with a crank arm 42, which is secured to a shaft 43, on which is mounted a free sprocket 44. This sprocket 44 is driven by a drive chain 45 from a drive sprocket 46 which is secured to a power driven shaft 47. The sprocket 44 is selectively connected with and disconnected from the shaft 43 to effect the rotation thereof by the clutching and declutching mechanism which will be hereinafter more fully described.

The sprocket 48 is secured to the shaft 47 and drives a drive chain 49 which drives the sprocket 50, to which is secured a contour cam 51 which moves a cam follower 52 on the pivoted lever 40. A tension spring 53 is secured to the free end of the pivoted lever 40 and maintains the cam follower 50 in operative contact with the contour of the cam 51. As the cam follower rides over the high points of the cam 51, the pivoted lever 40 is pressed downwardly toward the base of the machine while when the cam follower drops into the low point of the cam 51, the action of the spring 53 draws the pivoted lever 40 in an upward direction. The movement of the pivoted lever 40 thus varies the amount of travel of the crank arm 38, and accordingly varies the amount of movement of the arm 34 of the feed ratchet.

To insure gripping of the fabric in the feed rolls, a fabric tensioning and gripping roll (not shown) is provided on the shaft 60, and is moved bodily with the shaft 60 by the shaft adjusting member 61 upon adjustment of the shaft 60 relative to the shaft 27.

In feeding the fabric the shaft 27 is rotated a predetermined amount by the oscillating movement of the feed ratchet arm 34. The amount of movement of the shaft 27 is controlled by the position of the slide member 39 on the pivoted lever 40, which in turn controls the effective movement of the crank arm 38. The position of the slide member 39 on the lever 40 is varied at fixed times by movement of the crank arm 42 which is transmitted through the lever 40. A further adjustment is provided by the adjusting screw 37, which causes the movement of the bracket 36 on the arm of the oscillating feed member 34, and thus varies the extent of the oscillations of the member 34. The high point of the path cam 51 in contact with the cam follower 52, causes the pivoted lever 40 to be moved downwardly against the resilient action of the spring 53 and effects a swinging movement of the member 34 during the rotation of the cam 51. The low point in the cam 51 allows the spring 53 to return the lever 40 and attached members to their initial positions. This provides a predetermined amount of movement of the fabric during each rotation of the cam 51 so that a series of selectively spaced stitches will be provided. However, when the crank arm 42 moves the crank 41, the slide 39 is moved on the pivoted lever 40 to vary the effective travel of the crank arm 38, and thus to vary the amount of movement of the feed roll attached to the shaft 27 by reducing the amount of rotation of the shaft. This provides a narrower spacing. Thus a series of pockets 151 as shown in Fig. 9 may be provided in a folded fabric strip in which the pockets are of a uniform size for a predetermined number, which is controlled by the control mechanism to be hereinafter more fully described. The uniformly sized series of pockets are separated from the next series of such pockets of the same predetermined size by a single narrower pocket 152. Thus when the various series of uniformly sized pockets 151 are separated from each other by cutting the strips transversely through the

narrow pocket 152, there is a substantial saving in the amount of material used over that which would be used if the cutting were to be performed in a wider pocket.

Between each feeding movement of the fabric strip, the sewing heads 20 are moved transversely of the strip and longitudinally of the machine by the mechanism which comprises the bar 54, one end of which is pivotally mounted to a portion of the frame 10, and the other end of which is pivotally mounted to the base 21 of the sewing head. The bar 54 is provided with a plurality of spaced apertures 55, in one of which a connecting link 58 is pivotally connected as by the bolt 59. The other end of the link 58 is connected to a reciprocating slide member 62. The effective movement of the bar 54 and consequently the extent of permitted movement of the sewing head is controlled by the point of connection of the connecting link 58 with the bar 54. Thus by changing the position of the bolt 59 and connecting the ends of the connecting link 58 with one of the other of the spaced apertures 55, the extent of movement of the bar 54 is controlled.

The reciprocating slide member 62 is reciprocated by a slide operating cam 63 which acts on cam rollers 64 and 66 which are carried on the slide 62. The cam 63 is power driven from the power shaft 47 through a gear train consisting of the bevel gears 67, a pinion 68 driven by one of said bevel gears and meshed with the large gear 69 which drives the reducing gear 70. A cam drive pinion gear 71 meshes with the reducing gear 70 and is mounted on the shaft 72 on which the cam 63 is mounted. Rotation of the shaft 72 causes rotation of the cam 63. Thus as the cam 63 is rotated with the shaft 72, it moves the slide 62 by contact with the cam rollers 64 and 66. The contour of the cam 63 provides a uniform reciprocating movement of the slide 62 and provides for a dwell at the limit of the motion of the slide 62 in either direction. This motion is transmitted through the link 58 to the bar 54 and from thence to the base 21 of the sewing head. The sewing head carried by the base 21 moves on the guide bars 22 and 23 to the extent that such movement is permitted by the swinging of the pivoted bar 54.

Power for driving the sewing head 20 is supplied from the shaft 78 which is power driven from the power shaft through the meshed gears 82 and 84, and a worm and pinion gearing indicated by the numeral 85 but not shown in detail, contained in the gear case 86. Power is supplied through the worm and pinion gearing by a shaft 87 which is driven by the bevel gears 67 from the main power shaft 47. A drive gear 90 is keyed to the shaft 78 and is slidable longitudinally thereof. The drive from the gear 90 to the sewing head is mounted on the base 21 and moves with the base 21.

The gearing for driving the sewing heads is driven through a drive chain 91 which drives the sewing head operating gear 92 which is on one end of the shaft 113, and a gear 116a which is also carried on said shaft. Since any desired type of sewing head may be employed, it is to be understood that the gear 92 may be varied as required for a particular head. In the construction here shown a synchronized operation of the material feeding mechanism and the operation of the sewing head is provided so as to permit movement of the material only while the sewing needle is out of the material. This occurs at each end of the transverse movement of the sewing heads. Since the width of the pockets 152 is narrower than that of the pockets 151, the sewing machines preferably are driven slower during the shorter pocket feeding step. This is accomplished by providing a two speed drive for the sewing machine head 20 as shown in Figs. 1 and 4. As here shown, this drive comprises a throwout clutch member 100 which is controlled through a clutch throwout lever 101, whose operation is controlled by a solenoid 102, which is electrically connected with a slide limit switch 103 and with a snap lock switch 104 on the material feeding control. The snap lock switch 104 is provided with an operating arm 104a. The slide limit switch 103 is operated by a switch operating bracket 105, which is carried on the slide 62, and contacts the arm of the switch 103 to close an electric circuit through the switch 104 to the clutch operating solenoid 102. This declutches the gear drive and changes the speed of the drive of the sewing head at predetermined intervals at the end of the transverse travel thereof just prior to sewing the narrower pocket 152. The snap lock switch 104 is operated by a switch operated pin 106 carried by the fly-wheel 107 which contacts the operating arm 104a on each rotation of the fly-wheel 107 during the narrower pocket feeding operation. Upon each revolution of the fly-wheel 107, the pin 106 breaks the circuit through the switch 104 and this de-energizes the solenoid 102 and the clutch lever 101 is moved to cause engagement of the throwout clutch 100 and establish the slower speed drive of the sewing head. The throwout and clutch 100 may be of any desired type. However, we have found that the type shown in detail in Figs. 4 and 5 is very suitable for this purpose. As here shown the drive from the power driven belt 91 is transmitted to a driving gear housing 100 through the drive gear 92 which is meshed with the teeth of the gear housing 100. Drive is transmitted from the gear housing 100 through a plurality of spring pressed pawls 111 each engaging a tooth on a pawl driven ratchet 112, which drives the shaft 113, to which is keyed a clutch throwout collar 114, which is urged by the clutch spring 115 into driving engagement with the sewing machine drive gear 116. The gear 116 is freely mounted on shaft 113 and is driven by a drive gear 116a which is driven directly from the power driven belt 91. Upon declutching, the gear 116 is disengaged and is free to rotate on the shaft 113. Under this condition, the shaft 113 is driven directly by the pawl driven ratchet 112 and the gear 92. When the clutch is engaged, the drive is through the gears 116a and 116 and the spring pressed pawls 111 are disengaged by the overrunning of the pawl driven ratchet 112 now driven by the shaft 113 due to the rotation of the shaft by the gear 116 at a greater speed than the speed of rotation of the gear housing 100. Due to the arrangement of the driving gears, it will be seen that the sewing head operating shaft 113 will be revolved at one speed when the drive is through the gears 116a and 116, and will be driven at a slower speed when the drive is through the gear 92 and the driving gear housing 110.

An inertia fly-wheel member 117 is provided on the shaft 113 and assures a smooth flow of power to the drive shaft 118, which is connected therewith.

The varying of the amount of feeding of the fabric strips is synchronized with the operating cycles of the sewing head so that fabric is fed the smaller predetermined amount at regular in-

tervals. This is accomplished by the control mechanism shown best in Figs. 1, 2, 7 and 8. As here shown, a sprocket gear 120 is driven by a drive chain 49 and revolves the shaft 121 shown in Fig. 7. The shaft 121 drives a crank 122 which is connected by the Pitman shaft 123 to the pawl carrying segment 124 which drives a ratchet gear 125 by action of a spring pressed pawl 150 carried by the said pawl carrier 124. This construction is such that upon each revolution of shaft 121, the pawl carrying segment 124 is moved a predetermined amount to transmit the desired amount of rotation to the ratchet gear 125. The ratchet gear 125 is keyed to a shaft 126 to which is also secured a forked actuating arm 127 having spaced operating arms 128 and 129, the ends of which contact and move the extending stop 130 which is carried on a collar 131, which is secured to a shaft 132. An arm 133, which is secured to the collar 131, is connected with one end of a tension spring 134 for returning the shaft 132 to its normal position after movement thereof caused by the forked actuating arm 127.

The shaft 132 carries a clutch operating member 135 which controls operation of the clutch 136 to connect the shaft 43 and the sprocket 44 for one-half revolution and then to disconnect them. This moves the slide member 39 on the pivoted lever 40 and shortens the effective stroke of the connecting rod 38. The pivoted lever 40 is operated by the cam 51 while the slide is in this position and this produces a smaller amount of material feeding. Upon connection the fly-wheel 107 is rotated one-half revolution each time the arm 129 or 128 contact the stop 130. After the material for the narrow pocket is fed, the arm 128 acts on the clutch and the fly-wheel 107 is rotated one-half revolution to return the slide 39 to its initial position. A clutch operating spring 137 is compressed when the clutch is disengaged as shown in Fig. 7, and exerts a pressure when the clutch is engaged to push the clutch operating dog 138 into operative connection with clutch teeth 139 on the hub of the sprocket 44, thus effecting a drive of the shaft 43 from the sprocket 44 whenever the clutch is operated. An adjustable brake 140 is provided to exert a frictional braking effect on the shaft 43 to prevent rotation thereof upon disengagement of the clutch 136.

The sewed fabric is taken up on the take-up reel which is carried on the take-up reel shaft 124 which is power driven through a gear 150, which meshes with a drive gear 151 carried by the power driven shaft 47.

The operation of the machine as a whole is as follows:

The folded fabric material of a desired width is drawn across the sewing table 26 and power is applied to the operating mechanism through the shaft 47. This causes the transverse sewing of the strips by the sewing heads 20 as previously described, during which time they are power driven through the power drive mechanism previously described. When the sewing heads have completed the transverse sewing of the fabric, the fabric feeding mechanism is brought into engagement and the fabric is moved a predetermined amount, after which the sewing heads are moved transversely of the strip in the opposite direction. At the completion of this movement the fabric feeding mechanism again indexes the fabric forward a predetermined amount and the cycle is repeated. Due to the provision of the fabric feeding device herein disclosed, the machine will provide for the stitching of a predetermined number of pockets 151 of uniform width, each series of such pockets being separated by a stitched pocket 152 of lesser width through which the cut is made for separating each series of pockets from the strip. During the feeding of the material for the narrow pocket, the speed of the sewing heads is automatically reduced.

Various auxiliary controls may be provided as desired but which in the interest of simplicity of disclosure herein are not shown. Among such controls may be an electrical stop control such as that described in the said Hathaway Patent No. 2,318,686 for stopping the machine in the event that the bobbin thread becomes exhausted or in the event that either the sewing thread or the bobbin thread breaks or runs out. Also, there may be provided if desired a marking device such as that described in said Hathaway patent.

It will be observed, therefore, that we have provided a novel and improved machine for economically and rapidly forming pockets in folded material in which the folded material is passed in a substantially straight line through the machine and is indexed forward as required while the sewing heads are at each extreme position of their transverse movement. The sewing heads are adapted to sew a transverse pocket each time the sewing head moves in either transverse direction. In addition, the fabric feeding mechanism herein disclosed provides for the automatic feeding of the fabric forward a predetermined amount to provide a series of pockets of uniform width and the provision of a narrower pocket between each successive series of such pockets of uniform width. Also, effective controls are provided to insure the synchronized operation of the various component elements of the machine.

Having thus described our invention, we claim:

1. In a machine adapted to sew pockets in folded material, a primary drive shaft, a working surface, a sewing head associated with the working surface and movable relative thereto, means driven by the primary drive shaft to move the sewing head back and forth across the working surface, and a fabric feeding mechanism for intermittently feeding folded material across said working surface in a cycle of progressive feeding movements, and means for controlling said feeding mechanism to establish a feeding cycle consisting of a predetermined number of equal movements of the fabric separated by a single movement thereof of lesser extent than said equal movements.

2. In a machine to sew a series of substantially equally spaced pockets separated by a narrower pocket in folded fabric material, a working surface disposed to receive the folded fabric, a sewing head adapted to move relative to the said working surface and across the folded fabric, a driving shaft, speed reducing means driven by the driving shaft to move the sewing head back and forth across the folded fabric, means including a segmental ratchet gear feeding means to intermittently move the folded fabric relative to the sewing head when the sewing head passes beyond the folded fabric in its travel, and means operatively connected with said segmental ratchet gear for varying the amount of feeding movement thereof at predetermined times in its operating cycle.

3. In a machine adapted to sew pockets in folded material, a sewing table over which the folded material is drawn, a sewing head adapted

to move back and forth across the folded material, a driven shaft, means operated by the driven shaft to move the sewing head back and forth across the folded material and to operate the sewing head to form pockets in said strip, and intermittent drive means operably connected to the driven shaft to index the folded material across the working surface a predetermined amount each time the sewing head completes its travel across the working surface, and means for varying the amount of material indexed across the said surface at preselected intervals in the operating cycle.

4. In a machine adapted to sew pockets in folded material, a working surface adapted to receive the folded material, a sewing head adapted to move back and forth across the folded material, a drive shaft, speed reducing means operated by the drive shaft to move the sewing head back and forth across the folded material to sew pockets therein, and means operated by the drive shaft to intermittently index the folded material forwardly when the sewing head passes beyond the folded material at each end of its cycle of operation, and control means therefor adapted to feed identical amounts of material across said working surface during a predetermined number of feeding operations and means operable on said control means to reduce the amount of material fed during a predetermined interval in the feeding cycle to thereby provide a narrow strip at predetermined points in the sewed fabric strip between each series of uniform pockets therein.

5. A machine for sewing a plurality of substantially equal sized pockets in a continuous strip of folded fabric and comprising a sewing table, a sewing head, means for driving said sewing head and means for moving it transversely of said table, fabric feeding means including intermittently driven fabric feeding members adapted to index the folded fabric strip over said table in a series of equal intermittent movements, one such movement occurring immediately following the crossing of the fabric strip by the sewing head, and means connected with said fabric feeding member for varying the amount of movement of said fabric at a predetermined time in each cycle after a predetermined number of said equal intermittent movements.

6. A machine as claimed in claim 5 and further characterized in that the fabric feeding means comprises a fabric feeding roll, an operating member operatively connected with said roll and adapted to rotate said roll a predetermined amount during each operating cycle, and a control unit for varying the action of said operating member at a predetermined point in each cycle of operation.

7. A machine as claimed in claim 5 and further characterized in that the fabric feeding means comprises a fabric feeding roll, an operating member operatively connected with said roll and adapted to rotate said roll a predetermined amount during each operating cycle, and a control unit for varying the action of said operating member at a predetermined point in each cycle of operation, and a synchronizing control unit adapted to permit operation of said fabric feeding means only by the completion of each transverse movement of said sewing head.

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