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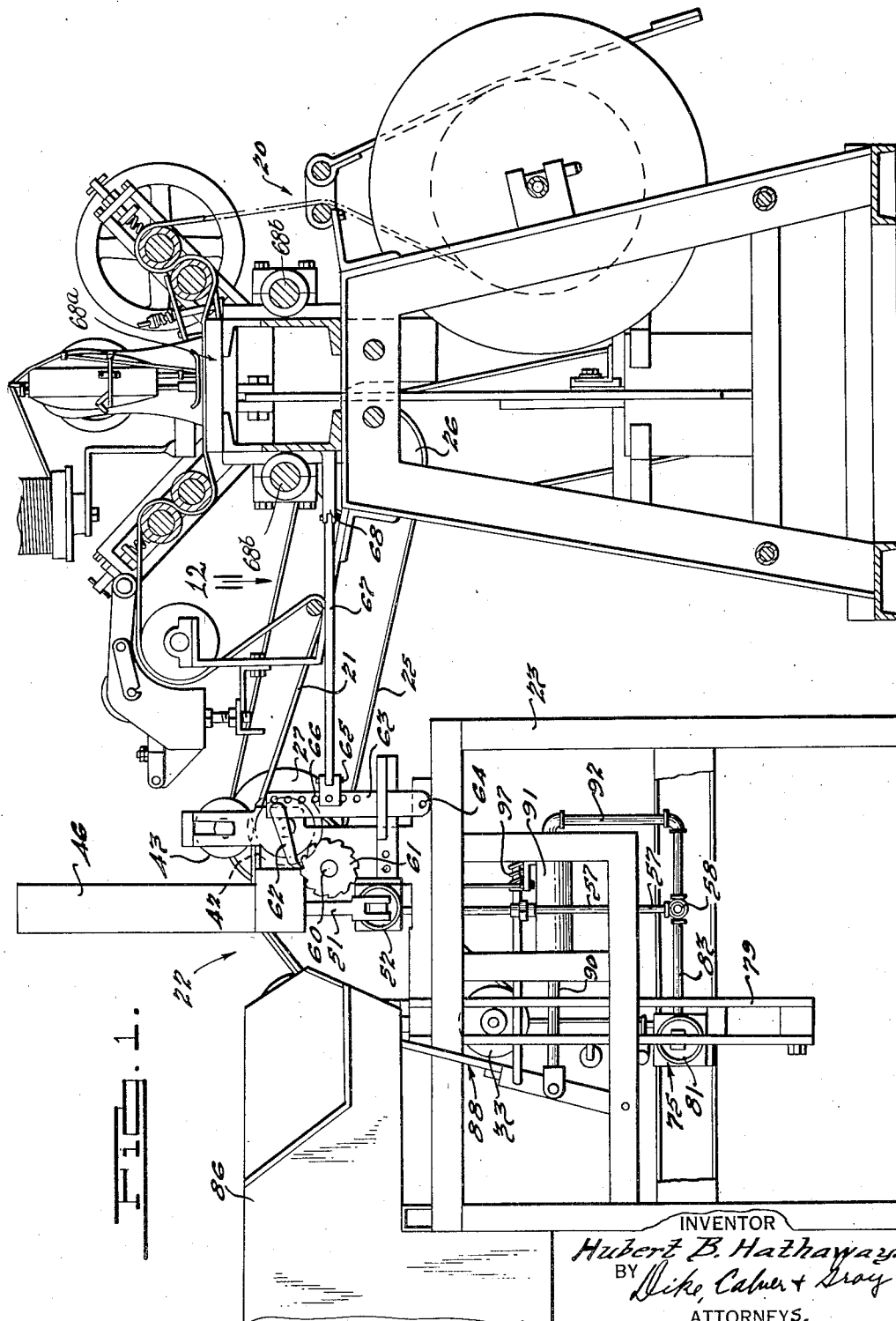
H. B. HATHAWAY

2,311,541

FABRIC FOLDING AND CUTTING MACHINE

Filed June 17, 1940

3 Sheets-Sheet 1



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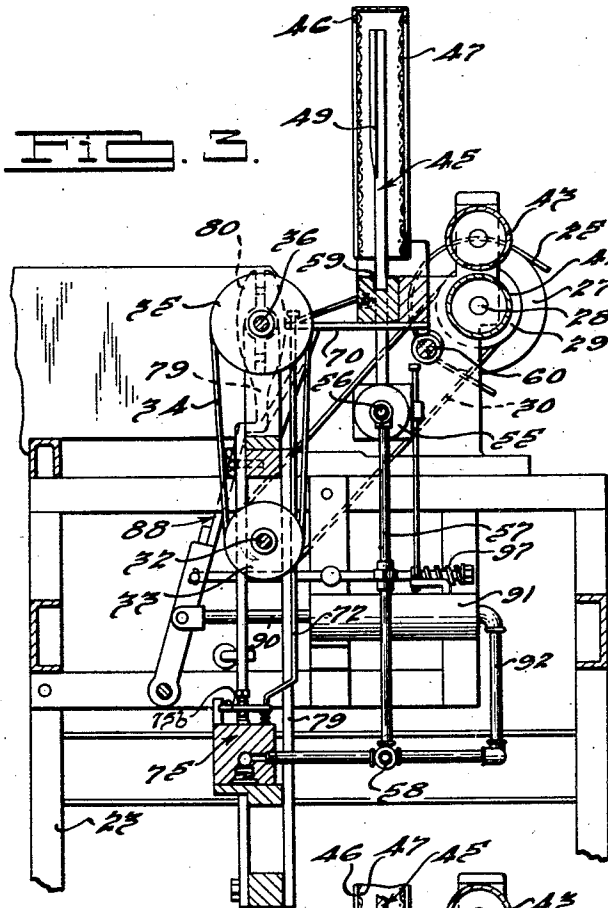
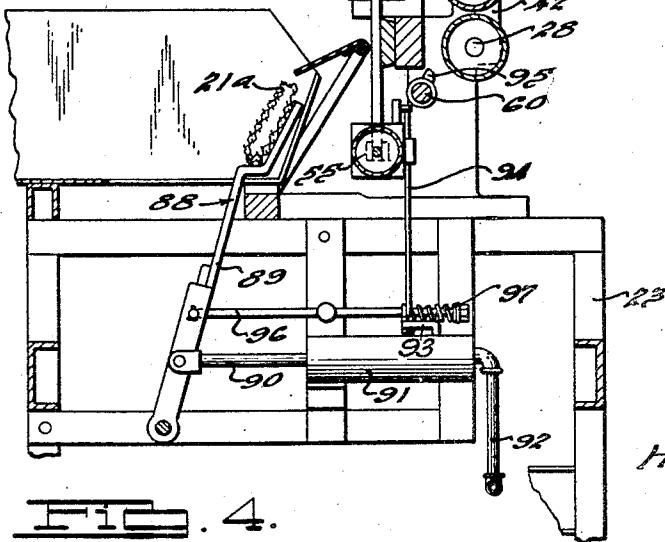
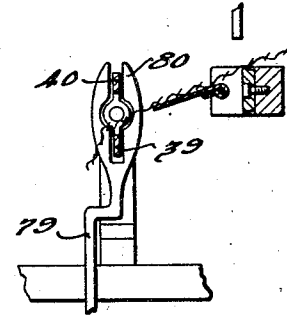
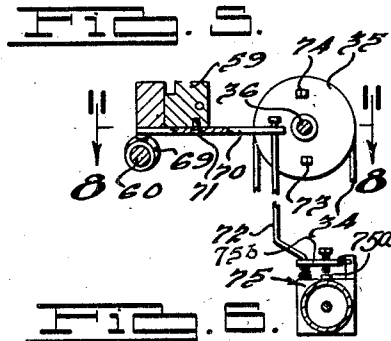
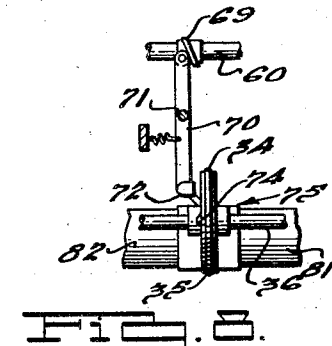
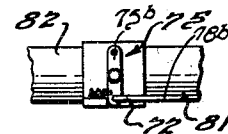
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FABRIC FOLDING AND CUTTING MACHINE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,311,541

FABRIC FOLDING AND CUTTING MACHINE

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Application June 17, 1940, Serial No. 340,914

3 Claims. (Cl. 112—2)

The present invention relates to a fabric folding and cutting machine which is particularly adapted to fold a predetermined length of fabric or similar materials and to cut such predetermined folded length of material from a continuous strip of the same.

The invention is particularly but not exclusively adapted for use in connection with pocket or similar types of sewing machines such as is shown by way of example in my co-pending application Serial No. 329,025. When used in connection with a sewing machine of this type the machine of the present invention receives a continuous strip of the sewed fabric pockets as they are fed from the sewing machine and folds or rolls such strips into folded or rolled pieces containing a predetermined length of material. After the predetermined length of material is thus folded or rolled, it is cut from the continuous strip and the folded or rolled strip is then delivered to a storage compartment or to a conveyor which carries the cut strip to a predetermined point where it may be used in connection with further manufacturing operations, such for example as a spring cushion assembly where each pocket is filled with a coiled spring and the open end thereof is closed by a further sewing operation.

The objects of the present invention are:

First, to provide a fabric folding and cutting machine which is adapted to perform automatically and in sequence the operations of folding or rolling a continuous strip of fabric, cutting said strip when it is of a predetermined length, and thereafter discharging the folded strip or delivering the folded strip at a predetermined station.

Second, to provide a machine of the type above set forth which is adapted to perform automatically and in a predetermined sequence a plurality of operations which accomplishes a folding, cutting and delivery of a folded fabric strip of a predetermined length, the machine being particularly adapted to handle a strip containing a plurality of thicknesses of material and in which a plurality of open-ended stitched pockets is provided, the machine being relatively simple to construct and operate and economical and efficient in performing its sequence of intended operations.

Other objects and advantages of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification, wherein like reference characters des-

ignate corresponding parts in the several views, and in which:

Fig. 1 is an elevation partially in section showing a machine embodying the present invention connected for operation with a pocket sewing machine such as that shown in my co-pending application Serial No. 329,025.

Fig. 2 is an end elevation partially in section and with parts broken away, looking in the direction of the pocket sewing machine, and showing the machine embodying the present invention.

Figs. 3, 4, 5, 6 and 7 are sections taken respectively on the lines 3—3, 4—4, 5—5, 6—6 and 7—7 of Fig. 2, looking in the direction of the arrows.

Fig. 8 is a section taken substantially on the line 8—8 of Fig. 6, looking in the direction of the arrows.

Fig. 9 is a view in perspective showing a portion of a continuous strip of folded and stitched open-ended pockets with which the machine of the present invention is particularly but not exclusively designed to operate.

Fig. 10 is a view in perspective of a folded or rolled strip of the material shown in Fig. 9 at the completion of the folding and cutting operations which are performed by the machine of the present invention.

Fig. 11 is an enlarged elevational view of the friction clutch pulley shown in detail in Fig. 6.

Fig. 12 is a top plan view of a portion of the mechanism shown in Fig. 1 and taken in the direction of the arrow 12 appearing in Fig. 1.

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.

Referring to the drawings and particularly to Fig. 1, the numeral 20 designates generally a fabric sewing machine such as is shown in my co-pending application Serial No. 329,025, to which reference is hereby made for the details of construction and operation of the said machine. In referring to this machine, it is to be understood that it is for purposes of illustration only and not for purposes of limitation, as the fabric folding machine of the present invention may be used with any type of fabric handling machinery, such for example as cutting and slitting machines, and the like,

where such fabric handling machine delivers a continuous strip of fabric or similar materials to the folding and cutting machine of the present invention which has for its purpose the folding or rolling of a strip of fabric or similar materials of a predetermined length, and thereafter cutting such predetermined length of the folded or rolled material from the continuous strip.

In the present instance the invention will be described in connection with its use in folding or rolling a continuous strip 21 of sewed open-ended pockets which are fed to the machine of the present invention which is indicated in general by the numeral 22.

The machine 22 is mounted on a suitable supporting frame 23 and is connected in spaced relation to the fabric sewing machine 20. A belt 25 provides a driving connection between a power pulley 26 which is secured on the driven shaft or some similarly rotating part of the machine 20. The belt connects the power pulley 26 on the machine 20 with the main drive pulley 27 on the machine 22.

As shown in Fig. 2, the main drive pulley 27 drives the main drive shaft 28 and the power pulley 29 which is connected therewith. A belt 30 is connected with the power pulley 29 and drives a driven pulley 31 which is secured to the shaft 32 which drives a driving clutch pulley 33 which in turn is connected by a belt 34 to drive the friction clutch pulley 35 on the shaft 36 which rotatably drives the fabric winding or rolling members 37 and 38. Each of the fabric winding or rolling members 37 and 38 comprises spaced substantially parallel fingers 39 and 40 which extend from a base portion 41 which is secured to the shaft 36. The strip of fabric as it is fed from the sewing machine 20 is engaged between the spaced fingers 39 and 40 and upon rotation of the fingers is wound or folded around these members. This action of the members is clearly shown in Fig. 5.

The fabric is fed to the members 37 and 38 by the fabric feeding roll 42 which is secured to the shaft 28 and rotates therewith. An upper floating fabric feeding roll 43 cooperates with the roll 42 to insure a continuous feeding of the strip of fabric 21 to the winding members 37 and 38. When a predetermined amount of fabric from the strip 21 is wound on the members 37 and 38, such strip is cut from the continuous strip by the pivoted cutting blades 44 and 45 which are mounted on the frame 46 and are covered by the protective screen guard 47. Each of the blades 44 and 45 comprises a fabric cutting blade 48 having a depending finger 49 on the terminal end thereof which operates as a guide for the blades as they are moved to their closed or cutting positions. The blade 44 pivots about a pivot point 50 and has an actuating crank arm 51 which is operatively connected with the movable piston of a hydraulically actuated power cylinder 52. The blade 45 is pivoted at the pivot point 53 and is connected with an actuating cam arm 54 which is operatively connected with the movable piston of the hydraulically actuated power cylinder 55. The power cylinders 52 and 55 are operatively connected with the hydraulic fluid line 56 through which hydraulic fluid, such for example as compressed air while under pressure, or the like, flows from the main hydraulic fluid supply line 57 which is connected with a supply line 58 which leads to the source of hydraulic fluid which is not shown in the present drawings as

it may be any conventional source, such for example as a compressed air line, an oil compressor pump, or the like.

The cutting edges 48 of the cutting blades 44 and 45 cut the material against a shear block 59 (Fig. 3). As shown in Figs. 1 and 2, the movement of the blades 44 and 45 caused by actuation of the movable pistons in the hydraulic cylinders 52 and 55, is controlled by movement of the control shaft 60 which has a ratchet wheel 61 secured thereto. The ratchet wheel 61 is moved by a movable ratchet dog 62 which is mounted on a ratchet dog arm 63 which is pivotally mounted on the framework 23 so as to pivot about the pivot point 64.

The arm 63 controlling the ratchet wheel 61 is actuated by transverse movement of the sewing head relative to the fabric material. A push arm 67 interconnects a yoke 65 carried by the arm 63 with an arm 68 carried by the movable sewing head 68a. The sewing head 68a is slidably mounted on rods 68b to move transversely back and forth across the strip material 21 to sew pockets therein. The ratchet wheel 61 is thus actuated by the above described linkage each time the sewing head 68a approaches an extreme position on the rods 68b in the operation of sewing pockets in the fabric material.

Upon each rotation of the shaft 60, a cam 69 secured thereto moves the arms 70 causing them to pivot at the pivot point 71. This motion causes the pivoting control rod 72 to move to a position for contact with stop cams 73 or 74 on the pulley 35 (Figs. 6 and 8). The stop cams 73 or 74 are so placed on the pulley 35 relative to the shaft 36 and the fabric winding members 37 and 38 that the rotation of the shaft 36 is stopped only when the members 37 and 38 are in a substantially vertical position so as to permit the operation of the ejecting members 78 and 79.

The stop cams 73 or 74 press the rod 72 in a downward direction and actuate the control valve 75, in the present instance a normally closed poppet valve which, when opened by pressure on the valve stem 75a, admits hydraulic fluid to the cylinders 52 and 55, which causes the movement of pistons therein and the actuation of the attached cutting blades 44 and 45.

Pressure from the rod 72 is applied to a swinging and pivoted valve actuating plate 75b which contacts the end of the valve stem 75a and depresses it when a downward pressure is exerted on the plate 75b by the rod 72. When the rotation of the shaft 36 is stopped as above described, the friction clutch pulley 33 slips and, while keeping a tension on the belt 34, cannot cause rotation of the shaft 36 and the winding members 37 and 38, until the arm 70 is moved away from the cams 73 or 74 at the completion of the stripping operation. When the control valve 75 is closed after the completion of the cutting and stripping cycle, the flow of fluid to the pistons in the cylinders 52 and 55 is reversed and the cutting blades 44 and 45 are elevated to their raised positions. Recoil springs 76 are provided on recoil brackets 77 and cushion the recoil from the operation of the cutting blades.

After the material has been wound on the members 37 and 38 and has cut therefrom as previously described, it is ejected from the members 37 and 38 by the pivoted ejecting members 78 and 79, each of which terminates in a forked

end portion 80 which surrounds and moves longitudinally of the fingers 39 and 40 of the winding members 37 and 38. The ejecting member 78 is operated by movement of the piston in the hydraulic power cylinder 81. The ejecting member 79 is operated by movement of the piston in the hydraulic power cylinder 82. The cylinders 81 and 82 are operatively connected with a fluid supply pipe 83 which in turn is operatively connected with the fluid supply line 58.

The action of the ejecting members 78 and 79 is controlled through the valve 75 which controls the admission of hydraulic fluid into the fluid supply pipe 83. Fluid is thus simultaneously admitted to the supply lines leading to the cylinders 82 and 85 which actuate the cutting blades 44 and 45 and to the cylinders 81 and 82 which actuate the ejecting members 78 and 79.

The arms of the ejecting members 78 and 79 must move relative to the members 37 and 38 after the members 37 and 38 are stopped before there is any stripping of the fabric from the members. The ejecting members 78 and 79 can be actuated only when the fingers 39 and 40 are in the vertical position, consequently the ejecting members cannot operate until the stop members 73 or 74 engage the end of the actuating rod 72. This movement allows the completion of the cutting operation previously described before the ejecting members 78 and 79 contact the fabric on the winding members 37 and 38. As the arm of the ejector member 78 is moved to eject the fabric from the winding member 37, a bracket 78a moves on the rod 78b and contacts the spring 78c. The rod 78b is connected with the valve operating plate 75b which is arranged to swing about a horizontal axis to transmit a pressure to the valve stem 75a of the valve 75 when pressure is applied to the plate 75b from the rod 72. When movement of the bracket 78a sufficiently compresses the spring 78c, the continued movement of the member 78 and the bracket 78a pulls the plate 75b and causes it to pivot about a vertical axis and be pulled out of contact with the valve stem 75a. The spring on the normally closed poppet valve 75 causes the valve to close immediately. The ejector members 78 and 79 are then returned to their relative positions shown in Fig. 2 by any suitable means as, for example, coil springs 100 and 101.

Guides 84 and recoil springs 85 are provided on each of the ejectors 78 and 79 and act to guide the movement of the members and to cushion the shocks on the machine due to operation of the ejector members. The ejecting members 78 and 79 are designed to deliver a folded or rolled strip of predetermined length to the bins 86 and 87 provided on each side of the machine.

Referring to Fig. 9, it will be clear that the fabric before the operation of the rolling and cutting machine of the present invention consists of a continuous flat strip of folded material and referring to Fig. 10 it will be seen that fabric after passing through the machine of the present invention is folded or rolled into a parcel of substantially predetermined size and containing a substantially predetermined length of material. The material which is delivered to the bins 86 and 87 is in the form shown in Fig. 10, and the material which is fed to the machine of the present invention is in the condition shown in Fig. 9.

In order to prevent a piling up of the folded materials in the bins 86 and 87, provision is made for moving such folded pieces longitudinally of the bins. It is to be understood, however, that

in place of the bins 86 and 87, endless conveyor belts or similar conveying means may be provided adjacent the point of ejection of the materials and thus there may be eliminated from the machine the mechanism which is hereafter to be described and which effects a longitudinal movement of the folded fabric parcels relative to the bins 86 and 87. The longitudinal movement of the folded fabric in the bins 86 and 87 is accomplished by the use of the feeding arms 88 which are provided in each of the bins 86 and 87 and are arranged to move longitudinally thereof and in a direction substantially at right angles to the direction of movement of the pivoted ejecting members 78 and 79.

Referring to Fig. 4, it will be seen that the folded fabric feeding arms 88 each consist of a pivoted arm 89 which is operatively connected with a piston rod 90 of the hydraulic power cylinder 91, the piston rod 90 being adapted to be moved longitudinally of the hydraulic power cylinder by movement of the piston therein. The hydraulic power cylinder 91 is operatively connected with a feed line 92 which in turn is operatively connected with the fluid supply lines previously described. Actuation of the hydraulic power cylinder 91 is controlled through the valve 93 which is actuated by movement of the rod 94 which is controlled and effected by movement of the cam 95 which is secured to the shaft 60. A guide 96 and a return spring 97 are connected to each of the feeding arms 88 and effects a return of the same upon the completion of their pivotal movement.

From the foregoing it will be seen that the timing of the machine is controlled through the rotation of the shaft 60 which is effected by the operation of the ratchet dog 62, which in turn is timed with a movable part on the fabric feeding machine 20. By varying the connections between the fabric sewing machine 20 and the ratchet dog arm 63 it will be seen that the shaft 60 may be moved a greater distance or a lesser distance as desired upon each movement of the ratchet dog arm 63 and each actuation of the ratchet 61. In this way the machine of the present invention may be adjusted so as to provide for the actuation of the machine whenever a certain predetermined amount of fabric has been fed thereto. As previously described, the rotation of the shaft 60 operates, either directly or indirectly, the various valves which cause actuation of the hydraulic pistons in the various hydraulic cylinders to effect a timed operation of the various constituent elements embodied in the machine of the present invention. It is to be understood, however, that any suitable type of control and timing mechanisms may be employed in connection with a machine of the present invention and that such control and timing elements may be controlled from the fabric sewing machine 20 or other fabric handling machine, so as to assure the operation of the cutting and ejecting mechanisms of the present invention and the desired intervals to cut off and eject from the machine a folded predetermined length of the fabric or similar material.

In the operation of the device as a whole, foldable material such, for example, as fabric, is received from the feeding roll 42 of the machine 22. As illustrated in Fig. 5 the fabric is directed between the arms 39 and 40 of the winding or rolling members 37 and 38, and is wound thereon. As previously indicated, the shaft 36 which carries the winding members 37 and 38 is

driven through the friction clutch pulley 35 controlled through the stop members 73 and 74, arms 70 and cam 69 carried by the shaft 60 to intermittently actuate the winding members when the feeding roll 42 is operating to intermittently supply fabric from the machine 20.

When a substantially predetermined amount of fabric has been wrapped on the members 37 and 38 as indicated by a predetermined rotation of the shaft 60, the mechanism controlling the pistons in the cylinders 52 and 55 is actuated whereupon the movable pistons actuate the arms 51 and 54 to operate the cutting blades 44 and 45 to separate the fabric into rolls having a substantially predetermined amount of fabric thereon.

As previously explained, the stop members 73 and 74 illustrated in Figs. 6 and 8 operate to stop the members 37 and 38 in a predetermined position such that the blades 39 and 40 will slide through the slot in the forked end portions 80 of the ejecting members 78 and 79. Upon completion of cutting operation the movable pistons in the cylinders 81 and 82 are actuated to move the ejecting members angularly about their pivot connections with the framework to remove the roll of fabric from the winding members 37 and 38.

As the rolls of fabric are ejected from the winding members 37 and 38 they engage the feeding arms 88 and are moved rearwardly in the bins 86 and 87 by movement of the piston in the cylinder 91 transmitted to the arm 89 by the piston rod 90.

I claim:

1. In combination with a fabric pocket strip sewing machine in which the sewing machine oscillates transversely to the line of feed of the fabric and a fabric folding and cutoff machine comprising feeding rolls to feed a strip of fabric to a fabric folding and cutting machine to fold a predetermined length of fabric from a continuous strip, and thereafter to cut said folded length from said strip, said machine comprising fabric feeding rolls, a power driven fabric folding mechanism, fabric cutoff and ejector mechanisms, hydraulically actuated power cylinders operatively connected with each of said cutoff and ejector mechanisms to actuate the same, and a timed control mechanism timed in synchronization with said sewing machine and adapted to operate said cutoff mechanism to cut the fabric and stop said folding mechanism, and thereafter

to eject the folded fabric from said folding mechanism.

2. In combination with a fabric pocket strip sewing machine in which the sewing machine oscillates transversely to the line of feed of the fabric and a fabric folding and cutoff machine comprising feeding rolls to feed a strip of fabric to a fabric folding and cutting machine to fold a predetermined length of fabric from a continuous strip, and thereafter to cut said folded length from said strip, said machine comprising fabric feeding rolls, a power driven fabric folding mechanism, fabric cutoff and ejector mechanisms comprising power operated shears and control mechanism adapted to actuate said shears to cut off predetermined lengths of fabric, hydraulically actuated power cylinders operatively connected with each of said cutoff and ejector mechanisms to actuate the same, and a timed control mechanism timed in synchronization with said sewing machine and adapted to operate said cutoff mechanism to cut the fabric and stop said folding mechanism, and thereafter to eject the folded fabric from said folding mechanism.

3. In combination with a fabric pocket strip sewing machine in which the sewing machine oscillates transversely to the line of feed of the fabric and a fabric folding and cutoff machine comprising feeding rolls to feed a strip of fabric to a fabric folding and cutting machine adapted to fold a predetermined length of fabric from a continuous strip, and thereafter to cut said folded length from said strip, said machine comprising fabric feeding rolls, a power driven fabric folding mechanism, fabric cutoff and ejector mechanisms, comprising power operated shears and control mechanism adapted to actuate said shears to cut off predetermined lengths of fabric, and comprising a ratchet wheel and a ratchet dog actuated from said sewing machine to move said ratchet wheel a predetermined distance upon each actuation of said dog, adjustable means for actuating said dog, hydraulically actuated power cylinders operatively connected with each of said cutoff and ejector mechanisms to actuate the same, and a timed control mechanism timed in synchronization with said sewing machine and adapted to operate said cutoff mechanism to cut the fabric and stop said folding mechanism, and thereafter to eject the folded fabric from said folding mechanism.

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