

Dec. 7, 1971

P. HAFT

3,624,875

MACHINE FOR INSPECTING A WEB OF CLOTH

Filed June 5, 1969

7 Sheets-Sheet 1

Fig. 1.

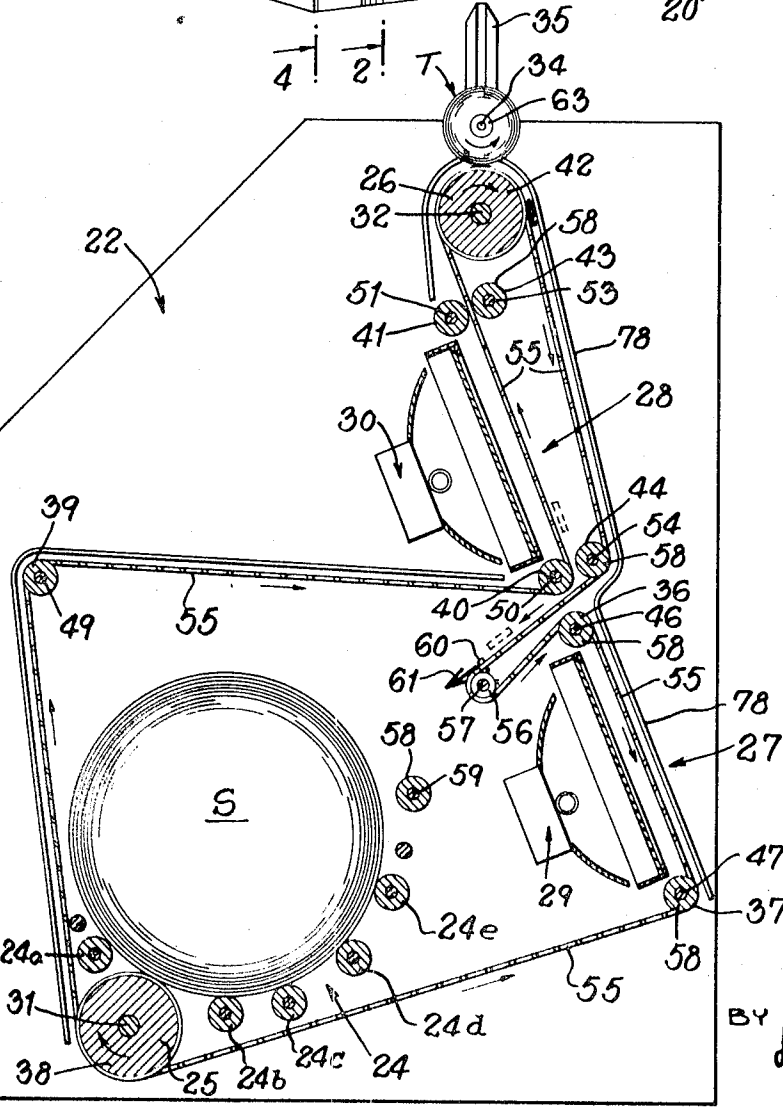
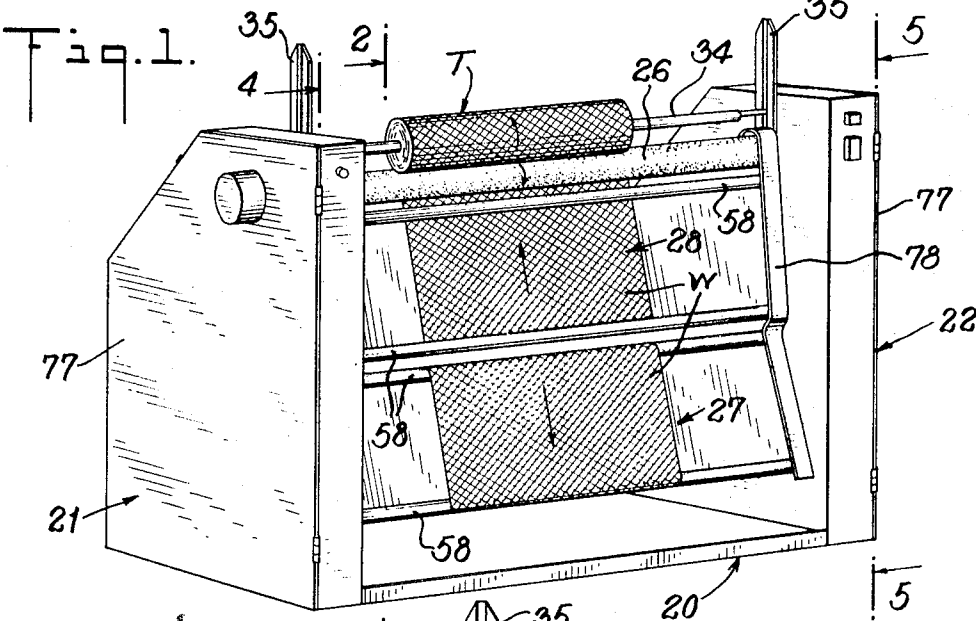


Fig. 2.

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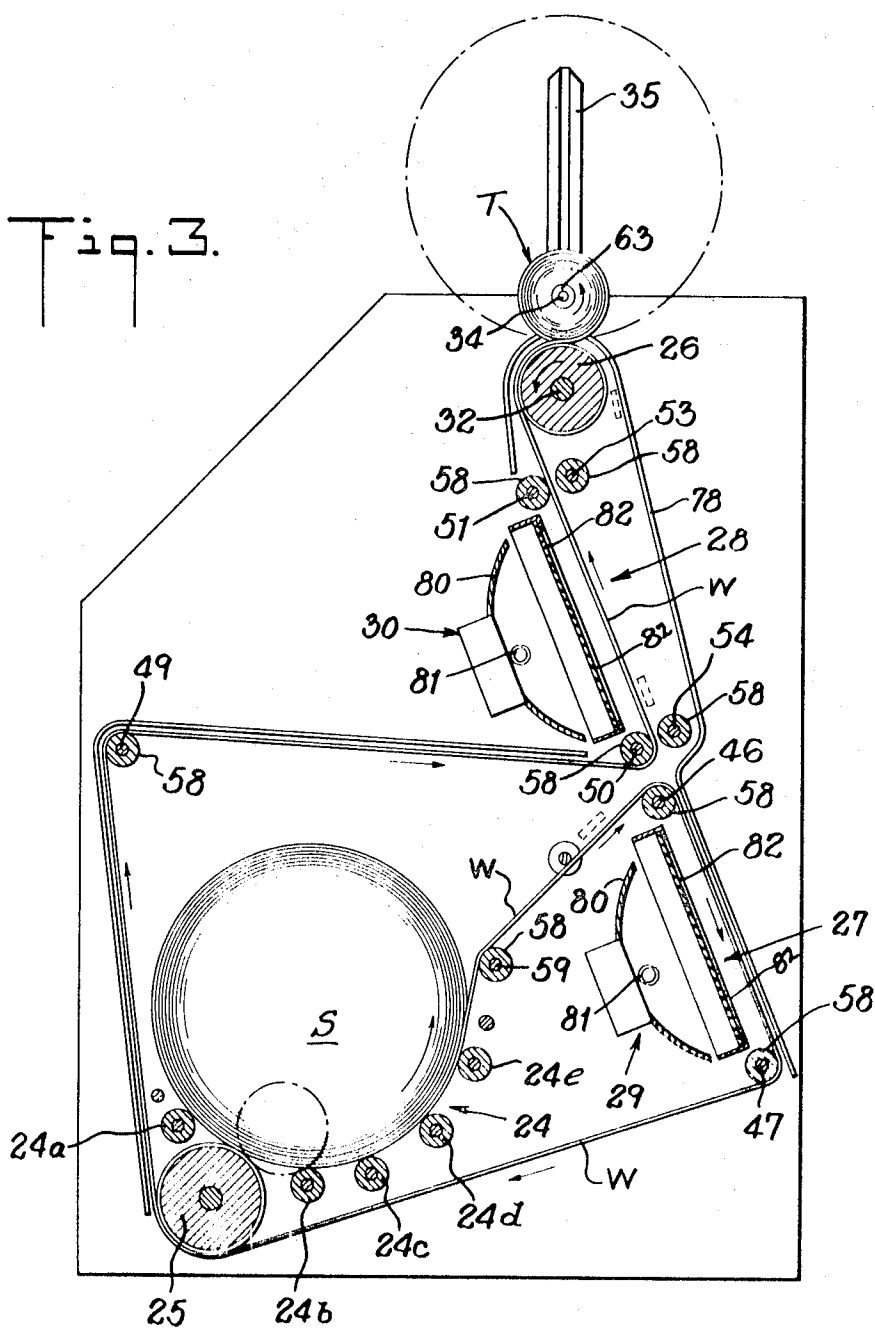
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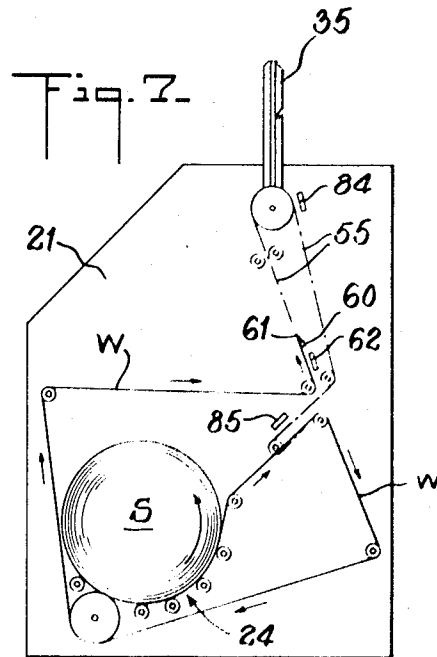
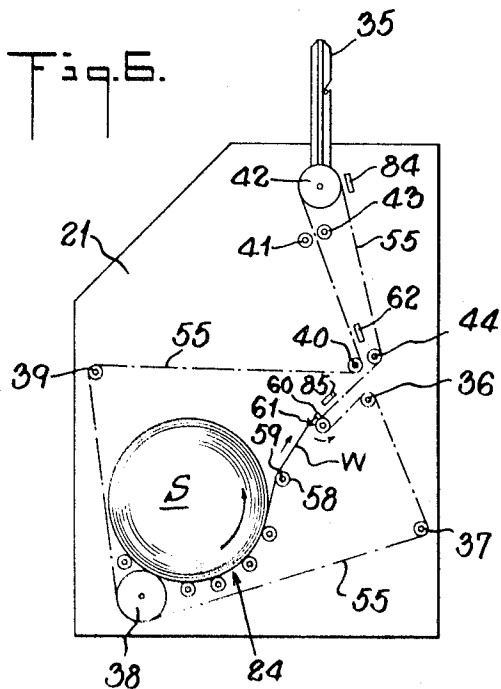
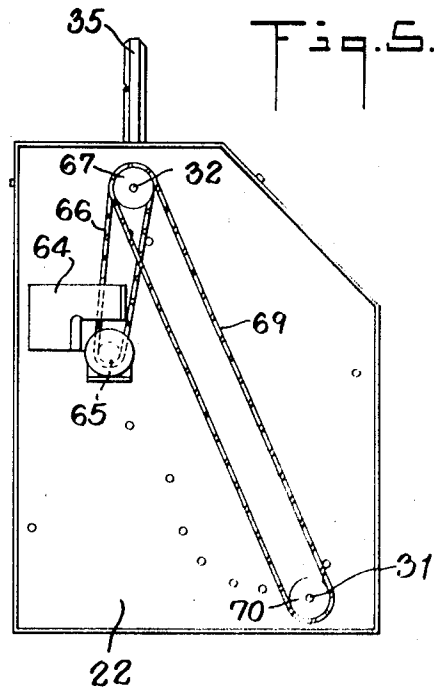
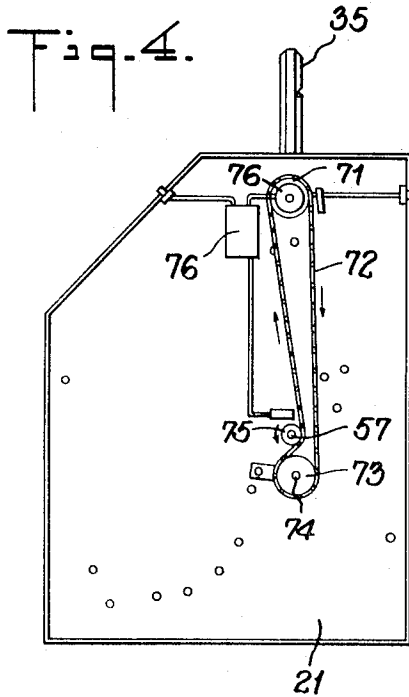
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Fig. 8.

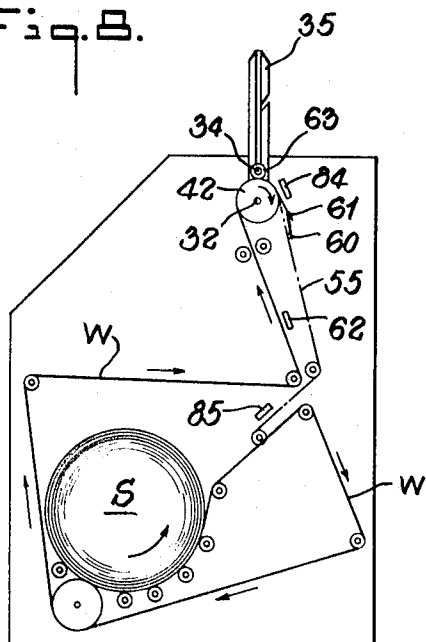


Fig. 9.

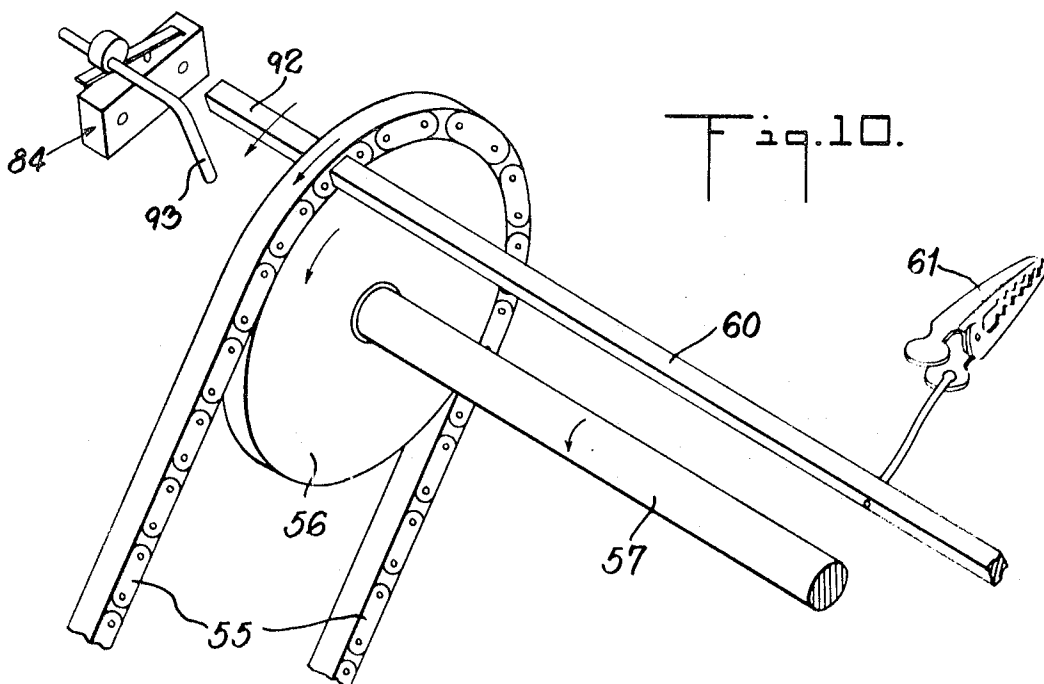
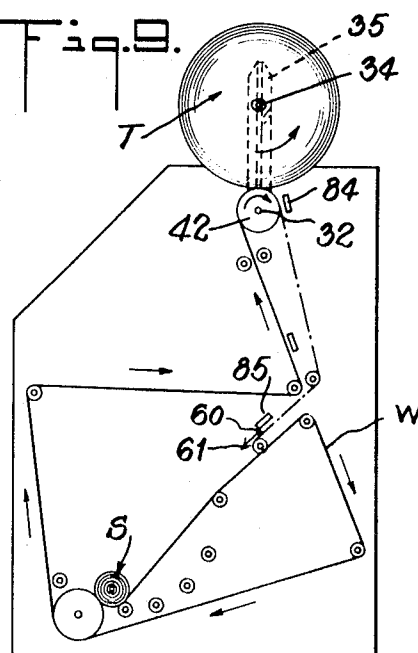


Fig. 10.

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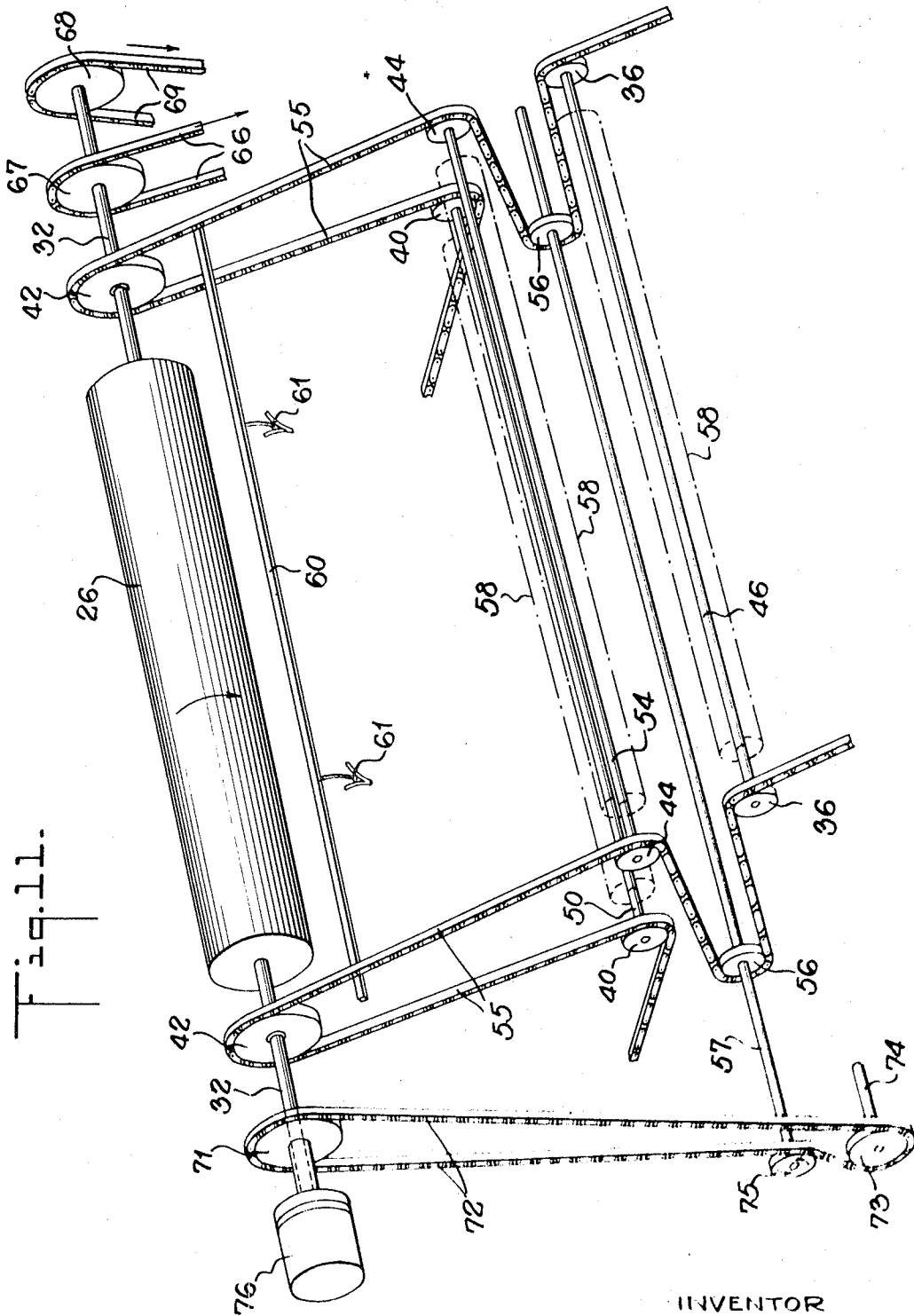
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MACHINE FOR INSPECTING A WEB OF CLOTH

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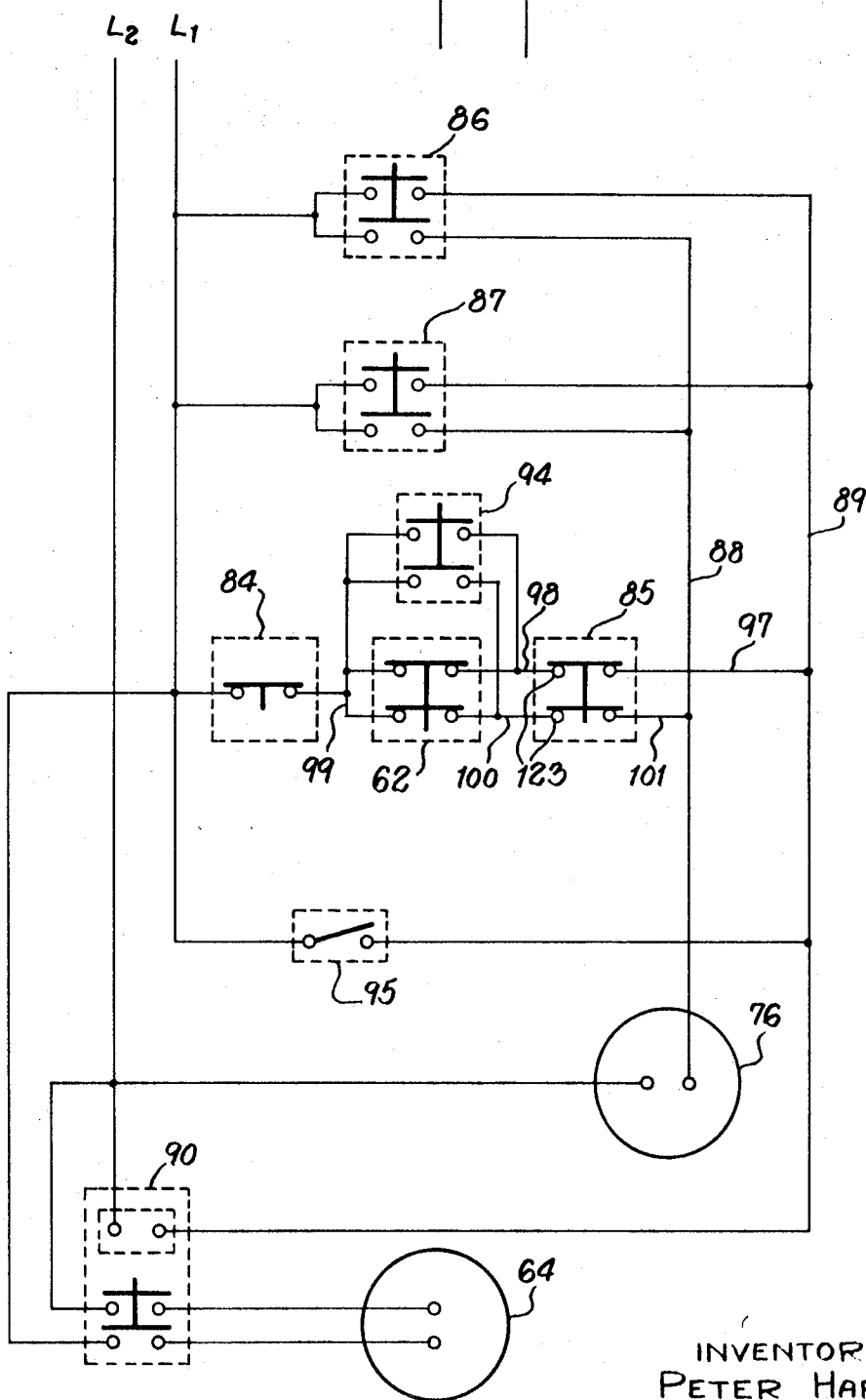
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Fig. 12.



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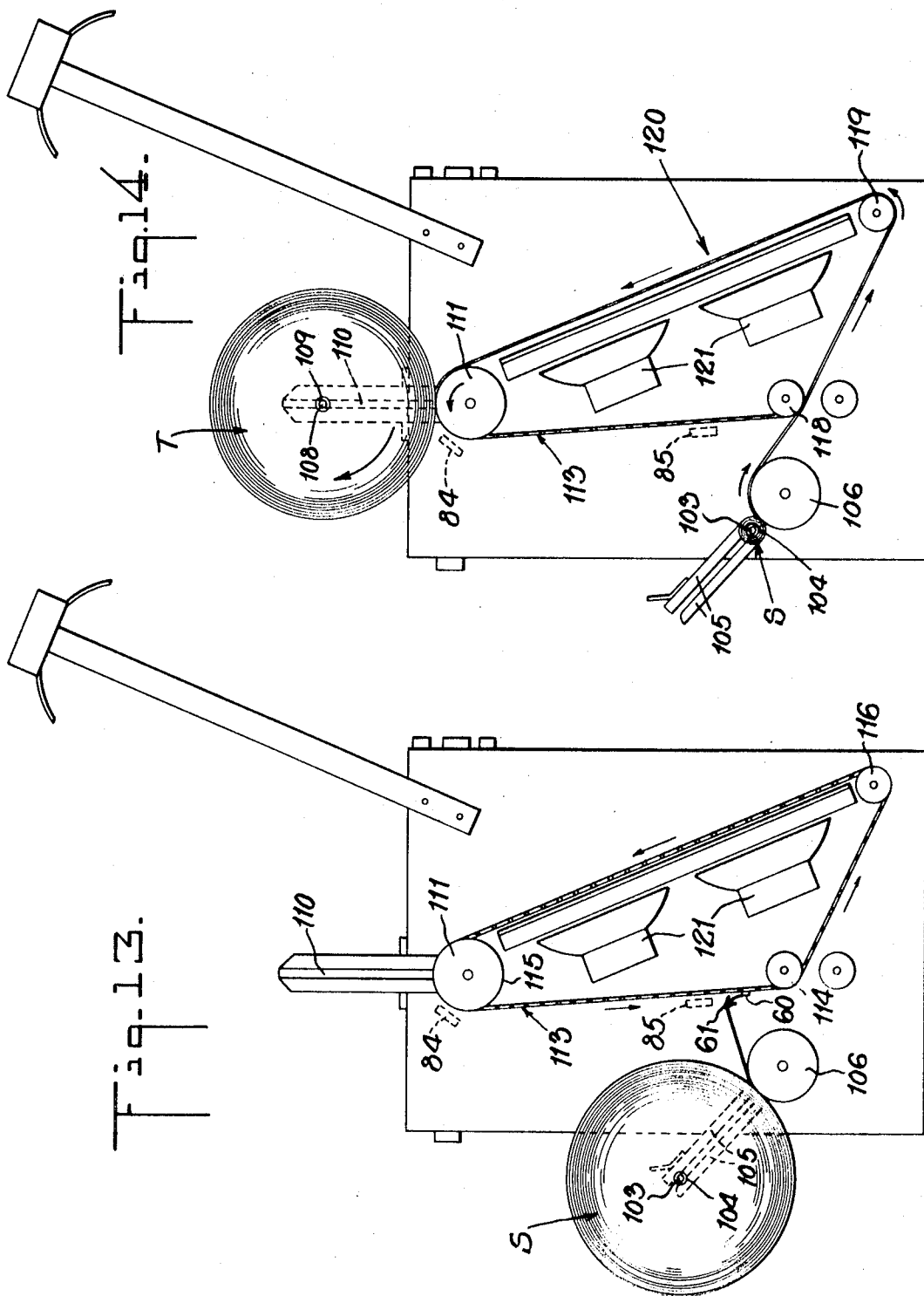
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MACHINE FOR INSPECTING A WEB OF CLOTH

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**MACHINE FOR INSPECTING A WEB OF CLOTH**  
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Int. Cl. D06h 3/04

U.S. Cl. 26—70

1 Claim

## ABSTRACT OF THE DISCLOSURE

A machine for visually inspecting one or both sides of a web of cloth which is particularly adapted for inspecting tubular and open width fabric and is equipped with mechanism for automatically threading the web into the machine.

## FIELD OF THE INVENTION

The present invention relates to textile machinery and, more particularly, to a machine for unwinding and re-winding a web of cloth and passing the web through an inspection station.

## SUMMARY OF THE INVENTION

An object of the present invention is to provide a relatively simple, practical and economical machine of the foregoing type.

Another object is to provide such a machine which is readily operated for threading the web therein and thereafter passing the web therethrough.

Another object is to provide such a machine which enables both sides of the web of cloth to be examined for defects at the same time.

A further object is to provide such a machine which has automatic controls.

Other and further objects will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

In accordance with the present invention the foregoing objects are generally accomplished by providing a machine which comprises a roll for supplying a web of cloth, a cloth take-up roll, drive means for effecting rotation of the rolls, a station for visually inspecting the cloth, including illuminating means for casting light onto the web of cloth, and means operated by the drive means for guiding the web of cloth from the supply roll to the take-up roll and through the inspection station.

More specifically, the inspection station has two sources of illumination and the web guiding means are constructed and arranged to expose one side of the cloth to one source of illumination and to expose the other side of the cloth to the other source of illumination, both sides of the cloth being visible to an inspector simultaneously.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the front of the machine illustrating front and back portions of a web of tubular cloth.

FIG. 2 is a sectional view taken along lines 2—2 of FIG. 1 in the direction of the arrows showing the path of the cloth threading chain.

FIG. 3 is a sectional view similar to FIG. 2 showing the path of the cloth apart from the threading chain.

FIG. 4 is a sectional view taken along lines 4—4 of FIG. 1 in the direction of the arrows showing the drives for the chains.

FIG. 5 is a sectional view taken along lines 5—5 of FIG. 1 showing the drives for the rollers.

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FIG. 6 is a diagrammatic view showing the leading end of the web of cloth secured to the threading chain at the initial stage of the operation of the machine.

FIG. 7 is a diagrammatic view showing the leading end of the web of cloth threaded into the machine at a point further than that shown in FIG. 6.

FIG. 8 is a diagrammatic view showing the leading end of the web of cloth threaded to a point just prior to being detached from the threading chains.

FIG. 9 is a diagrammatic view showing the web of the cloth near the end of its run through the machine.

FIG. 10 is a fragmentary perspective view of a flight bar and an alligator clamp for attaching the web of cloth to the threading chains with a limit switch shown at the top of FIGS. 6—9.

FIG. 11 is a perspective view of the threading and drive chains and roller mechanism including a magnetic clutch at the top left of this view.

FIG. 12 is an electric circuit diagram.

FIG. 13 is a diagrammatic end view, similar to FIG. 2, showing a threading chain for use with a single layer of a web of cloth, whereby it is only necessary to examine one side of the web.

FIG. 14 is a diagrammatic view, similar to FIG. 3, showing the path of a single layer of a web of cloth.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail and more particularly to FIGS. 1 to 11 inclusive, there is shown a machine in accordance with the present invention which generally comprises a base 20, upright side frames 21 and 22 on the base (FIG. 1), a roller cradle 24 for supporting a cloth supply roll S (FIGS. 2 and 3), a driven roller 25 on which the supply roll S rests, a driven roller 26 on which a cloth take-up roll T rests, stations 27 and 28 at the front of the machine for inspecting both sides of a web W of cloth including lamps 29 and 30 for casting light on the web W of cloth at the inspection stations, an arrangement for threading the web W of cloth into the machine and guiding it from the supply roll S to the take-up roll T, and a drive for the threading arrangement and the rollers 25 and 26, which will be described in detail hereinafter.

The roller 25 is secured to a shaft 31 for rotation therewith, and the roller 26 is likewise secured to a shaft 32 for rotation therewith. The shafts 31 and 32 are rotatably supported between the end frames 21 and 22.

The roller cradle 24 comprises a series of arcuately arranged idler rollers 24a, 24b, 24c, 24d and 24e rotatably supported between the end frames 21 and 22. The supply roll S rests upon one or more of these rollers (depending on how much cloth has been unwound) and the driven roller 25 engages the supply roll between the rollers 24a and 24b to rotate the supply roll S in a counterclockwise direction, as viewed in FIG. 3.

The take-up roll T is mounted on a shaft 34 which has its ends disposed in vertical guide channels 35 for allowing the shaft 34 to rise as the take-up roll grows in size.

The arrangement for threading the web W of cloth into the machine and guiding it from the supply roll S to the take-up roll T is an important aspect of this invention and comprises a series of pairs of idler pulleys or sprockets 36, 37, 38, 39, 40, 41, 42, 43 and 44 (FIGS. 2 and 6) with one of each pair at each side of the machine. The pairs of pulleys are mounted on shafts 46, 47, 31, 49, 50, 51, 32, 53 and 54, respectively, which shafts have their ends supported by the side frames 21 and 22 with each of the series carrying an endless belt or chain 55 driven by a drive pulley or sprocket 56 on a shaft 57 (FIGS. 2 and 11). Each of the shafts 46, 47, 49, 50, 51, 53 and 54 has a roller 58

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thereon over which the web W of cloth passes (FIG. 3). A similar roller 58 mounted on a shaft 59 guides the web W from the supply roll S to the roller 58 on the shaft 46.

The belts or chains 55 have connected therebetween the ends of a flight bar 60 which carries clips 61 for clamping the leading end of web W of cloth to pull the web W through the machine, as the flight bar 60 is carried by the chains 55 (FIGS. 10 and 11). In FIG. 6 the leading end of the web W is shown just after it has been attached to the flight bar 60. In FIG. 7, the leading end of the web W is shown threaded into the machine to a point adjacent a limit switch 62 at a spreader bar (not shown) position. In FIG. 8, the leading end of the web W is shown at a point just prior to being detached from the clip 61 of the flight bar 60 and connected to a tube 63 on the shaft 34 for unwinding the web W. In FIG. 9, the web W is shown almost completely unwound from the supply roll S and rewound on the take-up roll.

The drive for the threading and guiding arrangement and for the rolls 25 and 26 comprises a motor 64 (FIGS. 5 and 11) on the side frame 22, a sprocket 65 on the drive shaft of the motor connected by a chain 66 to a sprocket 67 on the shaft 32, a sprocket 68 on the shaft 32 connected by a chain 69 to a sprocket 70 on the shaft 31, and a sprocket 71 on the shaft 32 connected by a chain 72 to a sprocket 73 on a shaft 74 mounted on the frame 21 and engaging a sprocket 75 on the shaft 57 (FIGS. 4 and 11). The sprocket 71 is placed in driven connection with the sprocket 71 on the shaft 32 connected by a chain 72 to a drive the chains 55 via the sprockets 56, the shaft 57 and the sprocket 75.

The side frames 21 and 22 are hollow to enable the motor, the sprockets and chains and the magnetic clutch to be placed therein, as shown in FIGS. 4 and 5, and to be concealed by doors 77 (FIG. 1). A safety guard 78 over the chains protects personnel from accidental contact therewith.

The path of the web W of cloth is such that a panel of the moving web W is presented at each of the inspection stations 27 and 28 which respectively are located between the shafts 46 and 47 and the shafts 53 and 54. The stations are positioned closely one above the other to enable both to be viewed at the same time. The path of the web W further is such that at the station 27 one side of the cloth is viewed and at the station 28 the other side of the cloth is viewed. This arrangement enables both sides of a web W of tubular or open ended fabric to be inspected while passing through a machine only once.

The lamps 29 and 30 (FIGS. 2 and 3) comprise a rectangular reflector 80 about as long as the width of the web of cloth, a fluorescent illuminating tube 81 extending lengthwise with the reflector, and a transparent cover 82 at the front of the reflector. The covers are parallel to the panels of the web W being viewed so that light shines directly through the cloth.

In FIG. 10, an arrangement is shown for enabling the flight bar 60 to trip any one of three limit switches, 62, 85 and 84 at the spreader, cradle and take-up roll positions, respectively, as will be explained hereinafter.

Referring now to FIG. 12, there is shown a circuit diagram for controlling operation of the machine and this can be explained best in describing operation of the machine. Assuming that the supply roll S is resting on the cradle 24, and the flight bar 60 is in the location shown in FIG. 2, an end of the cloth web W is attached to the clips 61 to illustrate the initial arrangement shown in FIG. 6. The web W is now ready to be threaded through the machine with cradle limit switch 85 in an open condition because of actuation by flight bar 60. As shown in FIG. 12, all three limit switches are of the normally closed type. A push button spring retracted switch 86 at the front of the machine and a similar switch 87 at the rear of the machine is provided for initiating operation of the cloth threading mechanism.

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Accordingly, one of the push buttons 86 or 87 is pressed and energy from an alternating current source via supply line LI passes through the momentarily closed push button switch 86 or 87 in parallel paths 88 and 89, energy along path 88 going through the electric clutch 76 and thence back to the other lead L2 of the supply line; while energy along path 89 passes through a magnetic starter switch 90 and back to the other lead L2 of the supply line. The electric clutch 76 upon energization connects sprocket 71 to shaft 32 and, since motor 64 is now energized by magnetic starter switch 90, shaft 32 is caused to rotate by transmission from motor sprocket 65 through chain 66 and sprocket 67 fixed on shaft 32 (FIGS. 5 and 11). As soon as the shaft 32 rotates, clutched sprocket 71 rotates and causes movement of chain 72 which in engaging sprocket 75 causes shaft 57 and in turn threading chains 55 to move, thereby moving flight bar 60 with its attached web W of cloth from its cradle position. The flight bar 60 in moving away from the cradle position permits the cradle limit switch 85 to return to its normally closed position and, since the push button switch 86 or 87 has retracted to its normally open position, electrical energy now passes from the supply line along line L1 through closed take-up limit switch 84, spreader limit switch 62 and now closed cradle limit switch 85 along paths 88 and 89, as heretofore, to maintain the clutch 76 and motor 64 energized.

The flight bar 60 and web W continue their movement along the path shown in FIG. 7 and, assuming that a spreader bar (not shown) is to be inserted in the tubular cloth, an extension 92 (FIG. 10) on the flight bar 60 trips an arm 93 of the limit switch 62 to open it and thereby denenergize the operating circuit for the clutch 76 and motor 64 to stop the machine. After the spreader bar (not shown) is inserted in the cloth, the threading mechanism is restarted by pressing one of the push buttons 86 or 87.

However, in the event that a spreader bar is not to be used, a by-pass selector switch 94, which is wired in parallel with spreader limit switch 62, is provided and this by-pass switch 94 is set to a closed position, so as to permit the flight bar 60 and cloth to proceed past the spreader limit switch 62 to the position of the take-up limit switch 84 (FIG. 8), which is opened by the flight bar extension 92 engaging the switch arm 93. Both the clutch 76 and motor 64 become deenergized. The operator then disengages the cloth from the clips 61, secures it around the tube 63 and mounts the tube 63 with cloth on the shaft 34. The machine is now ready for passage of cloth past the two stations 27 and 28 for simultaneous inspection of both front and back webs of the cloth by the operator stepping on foot switch 95.

Closure of foot switch 95 energizes the magnetic starter 90 and motor 64 in an obvious circuit. In addition and as an important concept of this invention, closure of the foot switch 95 also energizes a circuit for returning the threading mechanism to its initial position adjacent the cradle 24. This circuit may be traced from the supply line LI through foot switch 95 to and along path 89, lead 97, upper closed contacts of cradle limit switch 85, lead 98, upper closed contacts of spreader limit switch 62, around short circuiting lead 99, and back through lower closed contacts of spreader limit switch 62, lead 100, lower closed contacts of cradle limit switch 85, lead 101, path 88 and thence through clutch 76 to the other lead L2 of the supply line. Clutch 76 becomes energized and as a result thereof the chain 55 carries the flight bar 60 from its position adjacent the take-up limit switch 84 (FIG. 8) down and to a position adjacent the cradle limit switch 85 (FIG. 9), which is opened as the flight bar extension 92 passes by to trip the arm 93 of the limit switch 85. The energizing circuit for clutch 76 is thereby disconnected with flight bar in readiness for the next supply roll. Meanwhile, the web W of cloth continues past the inspection stations 27 and 28 until the supply roll S is exhausted after

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which the foot switch 95 is opened to discontinue operation of the motor 64.

In FIGS. 13 and 14, a simplified machine is shown for handling a web W of cloth of which only one side needs to be inspected. The machine comprises a cloth supply roll S, a shaft 103 extending through a tube 104 of the roll and having its ends slidably mounted in channels 105 and a driven roll 106 for rotating the supply roll S to unwind the cloth, a take-up roll T, a shaft 108 extending through a center tube 109 of the take-up roll T and having its ends slidably mounted in channels 110, a driven roll 111 for rotating the take-up roll T to rewind the cloth, a chain arrangement 113 for automatically threading the web of cloth from the supply roll S to the take-up roll T, sprockets 114, 115 and 116 for the chain, guide rolls 118 and 119 for the web of cloth and an inspection station 120 between the chain guide rolls 118 and 119 including lamps 121.

The operation of the machine in FIGS. 13 and 14 is similar to that of the original embodiment, except that in this second embodiment a single rather than a double web of cloth is being inspected, so that a spreader position is not required, thereby eliminating the spreader limit switch 62 and by-pass selector switch 94, the cradle limit switch 85 having its leads 98 and 100 interconnected by lead 99. Thus, in operation, the supply roll S is placed in the machine, as shown in FIG. 13, the leading edge of the web is attached to the chain arrangement, which is operated, as in the first embodiment, to deliver the leading edge to the center tube 109 and the take-up roll T. The leading edge of the cloth is attached to the tube 109 and the machine is similarly operated to unwind and rewind the web of cloth until all of the web has passed through the inspection station 120 and is rewound as shown in FIG. 14, the automatic threading mechanism, that is, flight bar 60 and chain 113, operating substantially the same as heretofore in taking the leading edge of the web of cloth of the take-up roll position and then returning to its initial position after the leading edge is secured to the tube 109 and the foot switch 95 actuated.

#### SUMMATION

From the foregoing description, it will be seen that the present invention provides a useful machine for inspecting both single and tubular webs of cloth with automatic means for threading the cloth from the supply roll to the take-up roll and then returning to its initial position while the cloth is passing by the inspection station.

What is claimed is:

1. In a machine for inspecting at least one side of a web of cloth, the combination of a cloth supply roll,

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a cloth take-up roll, drive means for effecting rotation of said rolls, a station for visually inspecting the cloth including illuminating means for casting light onto the web of cloth, threading means operated by said drive means for guiding the web of cloth from said supply roll through said inspection station to a position adjacent said take-up roll where the cloth is transferred to said take-up roll means for automatically returning said threading means to its starting position adjacent the supply roll, said drive means including clutch means for activating said threading means, said threading means including a continuous chain at each side of the web, means carried by said chains for securing a leading end of the web thereto, said securing means including a bar interconnected between said chains and web clamping means carried on said bar, means operable by said web securing means on said chains to de-activate said drive and clutch means and, in turn, said threading means when the leading end of the web reaches said take-up roll said means for automatically returning said threading means to its starting position including a switch means for re-activating said drive means, whereby movement of said cloth is resumed from the supply roll past the inspection station onto the take-up roll, and for reactivating said clutch means, whereby the threading means is returned to the starting position, and switch means adjacent the supply roll operable by said web securing means on said chains to de-activate said clutch means and, in turn, de-activate said threading means when the bar has reached its starting position.

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