

[54] **CYCLE CONTROL MEANS FOR SEWING MACHINES**
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[22] Filed: **Sept. 21, 1970**
[21] Appl. No.: **73,704**

[52] **U.S. Cl.**112/67, 112/219 A
[51] **Int. Cl.**D05b 69/20
[58] **Field of Search**112/67, 219 R, 219 A, 219 B, 112/220, 252

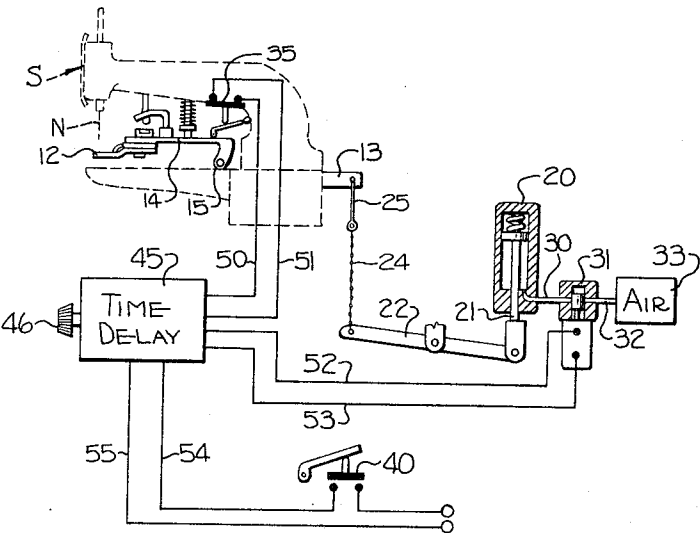
[56] **References Cited**
UNITED STATES PATENTS
2,928,362 3/1960 Benink et al.....112/67

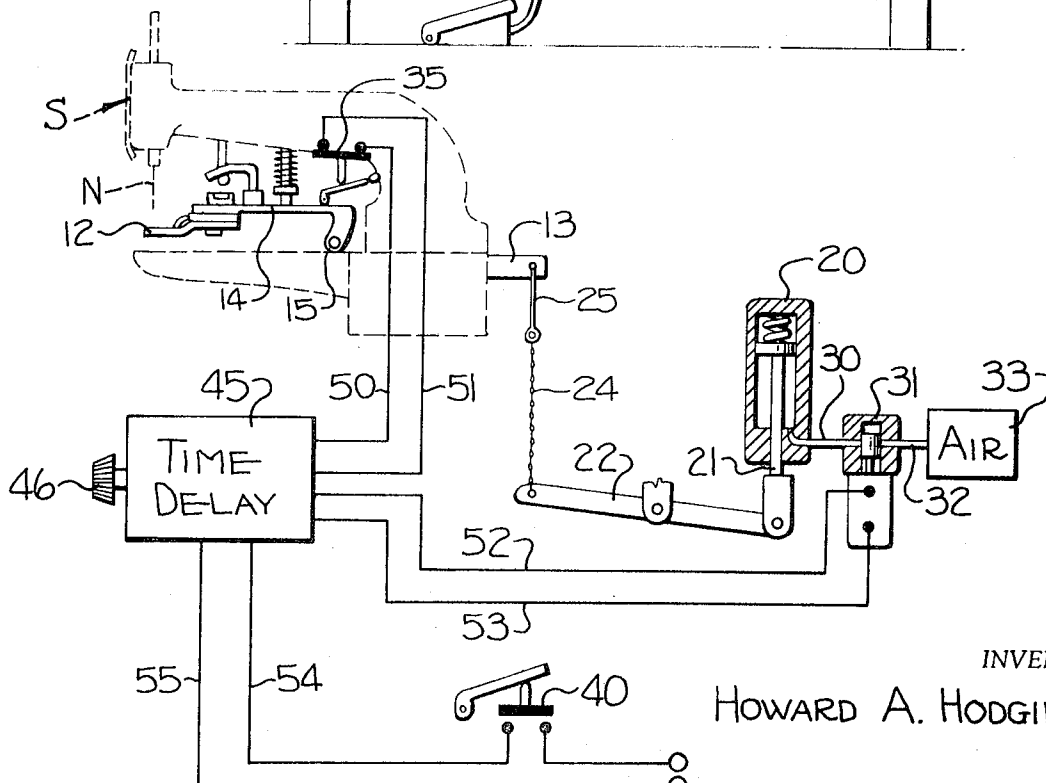
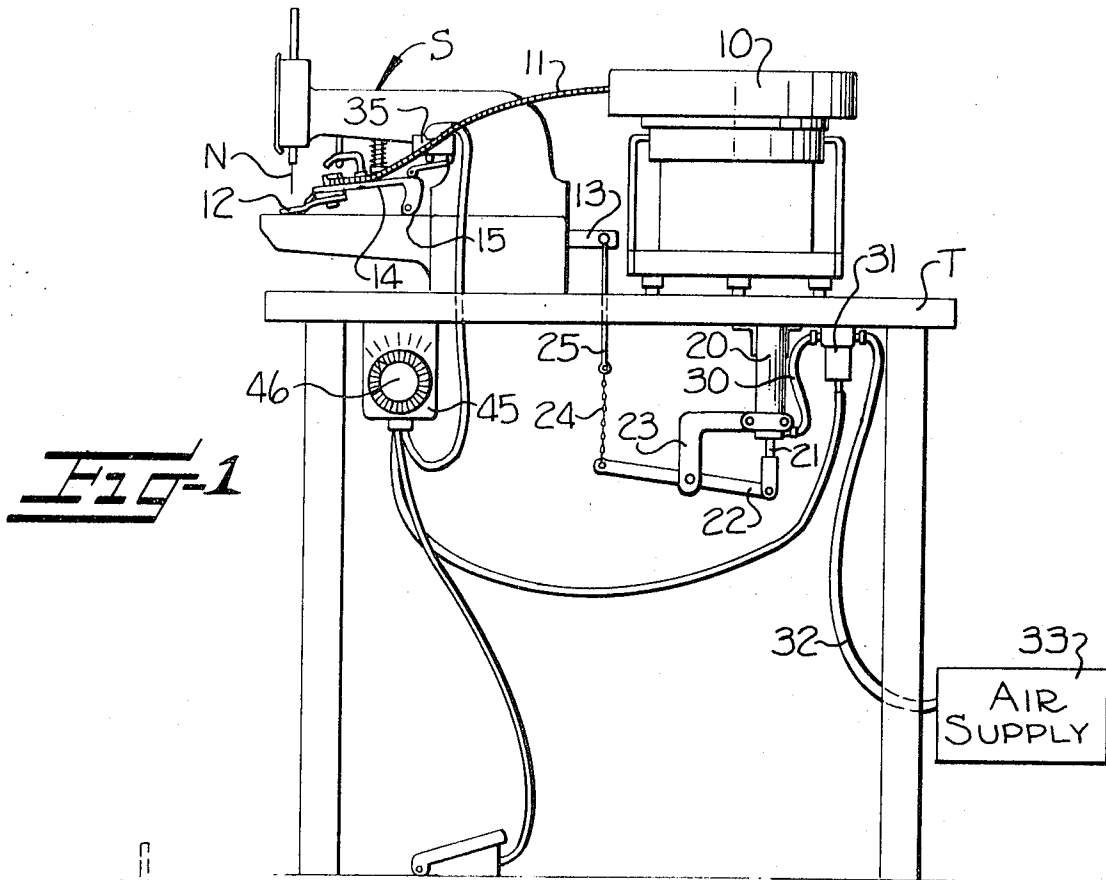
3,008,437 11/1961 Herr112/252
3,482,537 12/1969 Morin112/67 X

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[57] **ABSTRACT**
A time delay is provided between the end of one sewing cycle and the beginning of the next sewing cycle to provide a sufficient delay between sewing cycles that the operator can reposition the article being sewn. The time delay may be adjusted to suit the skill of the operator and a machine-operated switch automatically energizes a time delay relay upon the completion of a sewing cycle.

4 Claims, 2 Drawing Figures





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CYCLE CONTROL MEANS FOR SEWING MACHINES

This invention relates generally to cycle control means for sewing machines and more particularly to means for providing a predetermined delay between the end of one sewing cycle and the beginning of the next sewing cycle.

Industrial sewing machines of the type adapted to sew buttons, buttonholes, and the like are provided with means to automatically stop the sewing operation upon the completion of a sewing cycle. Normally, the sewing cycle is started by the operator depressing a foot treadle which is mechanically connected to the actuator lever of the machine. The force required to depress the foot treadle and actuate the sewing cycle is on the order of 17 to 25 pounds and the repetitive manipulation of the foot treadle introduces a high fatigue factor. Also, the time delay between the end of one sewing cycle and beginning of the next sewing cycle is determined entirely by the machine operator.

In order to reduce operator fatigue, electric solenoids and the like have been connected to the actuator lever to apply the force necessary to start the sewing cycle and cam operated delay devices have been used to continuously and repetitively initiate successive sewing cycles with a predetermined delay between the end of one sewing cycle and the beginning of the next sewing cycle. However, these known devices require frequent repair and require accurate adjustment of parts to vary the amount of delay between sewing cycles. In order to provide the correct delay, in accordance with the differences in skills of different operators, ranging from a beginner to the most highly skilled operator, it is desirable to be able to quickly and easily vary the delay between sewing cycles.

It is an object of the present invention to provide cycle control means for sewing machines which reduces operator fatigue by supplying the force necessary to start each sewing cycle and which provides means for quickly and easily varying the time delay between the end of one sewing cycle and the beginning of the next succeeding sewing cycle so that the proper work pace may be set for operators of varying skills.

In accordance with the present invention, the force necessary to initiate a sewing machine cycle is supplied by a pneumatic cylinder which provides trouble free operation over a long time period. A time delay relay is provided to selectively vary the length of time delay between the end of one sewing cycle and the beginning of the next cycle. Machine operated switch means is operated by a suitable part of the sewing machine which moves to a predetermined position upon the completion of a sewing cycle. Operator controlled switch means is provided in series with the machine operated switch means so that the time delay relay is energized to provide the desired delay before operation of the pneumatic cylinder to initiate the next sewing cycle.

Other objects and advantages of the invention will appear from the description hereinbelow and the accompanying drawings, wherein

FIG. 1 is a side elevation of a conventional type of sewing machine supported on a work table and illustrating the present cycle control means associated therewith; and

FIG. 2 is a schematic diagram illustrating the manner in which the various parts of the cycle control means are associated with each other and with the sewing machine.

The sewing machine, indicated broadly at S and illustrated in FIG. 1, is of the type particularly adapted for sewing buttons, and is supported on a work table T. However, it is to be understood that the cycle control means of the present invention may also be used with other types of sewing machines, such as buttonhole sewing machines and the like. Buttons are automatically fed by a suitable feeder, such as a vibratory bowl type feeder 10, and successively pass through a conveyor chute 11 to a point adjacent the needle N of the machine. The buttons are preferably transferred into button positioning and clamping jaws 12 by means of a button transfer device, not shown, which may be of any suitable construction. The sewing machine illustrated is of the type disclosed in U.S. Pat. No. 2,609,773 and includes the usual clutch and drive mechanism which is initiated upon downward movement of an actuator

lever 13. The drive mechanism is provided with a clutch to stop the sewing machine upon completion of each sewing cycle with the button clamp jaws 12 and the needle N in the raised position shown in FIG. 2. The clamp jaws 12 are supported on a clamp jaw lever 14 which is pivoted at its inner end as at 15.

This type of sewing machine is usually actuated by a foot treadle, not shown, which is mechanically connected to the actuator lever 13 and requires about 17 to 25 pounds of force to start the sewing cycle. In the usual sewing cycle the button is positioned in the clamp jaws 12 while the clamp jaws 12 and the lever 14 are in a raised position. The clamp jaw lever 14 and the clamp jaws 12 are then lowered to hold the button in position on the fabric where it is to be attached thereon. The needle N then goes through its sewing cycle to attach the button to the fabric and the jaws 12 and lever 14 are raised as the machine automatically stops, in position to start the next sewing cycle. In accordance with the normal procedure, the operator then repositions the fabric where another button is to be attached and then depresses the foot treadle to start the next sewing cycle.

In accordance with the present invention, the actuator lever 13 of the sewing machine S is moved to start the sewing cycle by means of suitable actuator means, such as a pneumatic cylinder, indicated at 20. The cylinder 20 is suitably supported at its upper end beneath the work table T and includes a piston rod 21 which is suitably connected to one end of a lever 22. The lever 22 is pivotally supported intermediate its ends on a support arm 23 and its outer free end is connected to the lower end of a chain 24. The upper end of the chain 24 is connected to the lower end of a link 25 which is in turn connected at its upper end to the actuator lever 13.

An inlet air line 30 is connected between the cylinder 20 and a solenoid operated air valve 31. An air supply line 32 is connected to one side of the valve 31 and its other end is connected to a suitable air supply, indicated at 33. Machine operated switch means, illustrated as a normally open micro switch 35, is suitably supported on the frame of the sewing machine S and is adapted to be engaged and closed by a part of the sewing machine when the sewing machine comes to the end of its sewing cycle. In the present instance, the micro switch 35 is closed by the clamp jaw lever 14 as it is raised at the end of the sewing cycle.

Operator actuated switch means, such as a normally open foot switch 40, is provided in an easily accessible location for the operator. A time delay relay 45 is supported on the work table T and is positioned for easy access and adjustment by the operator. The time delay relay is of any suitable type and is preferably of the semi solid state type manufactured by Y. L. Products Company, Inc. of Yeadon, Pennsylvania, and sold under their Model No. P-40 A 1C2. The time delay relay 45 is provided with an adjustment knob 46 which may be manually rotated to vary the effective time delay between the time the relay is energized and the time it actuates the mechanism to which it is connected.

As schematically illustrated in FIG. 2, the machine operated switch 35 is connected to the time delay relay 45 by wires 50, 51. The air valve 31 is connected to the time delay relay 45 by suitable wires 52, 53. The foot switch 40 is interposed in a main supply wire 54 and another main supply wire 55 is connected to the time delay relay 45. The main supply wires 54, 55 are suitably connected to any suitable source of electrical energy, not shown.

OPERATION

Assuming that the sewing machine S is performing a sewing cycle, with the clamp jaws 12 in the lowered position shown in FIG. 1, the clamp jaw lever 14 is also lowered so that the machine operated switch 35 is open and the time delay relay is not energized even though the foot switch 40 is held closed by the operator. Upon completion of the sewing cycle, the clamp jaw lever 14 will be raised to close the machine operated

switch 35, as indicated in FIG. 2. The time delay relay 45 will then be energized and, after the time delay set by the adjustment knob 46, the air valve 31 will be opened to permit air under pressure to enter the cylinder 20 and raise the piston rod 21, thereby pulling down on the actuator lever 13 of the sewing machine S so that the next sewing cycle will be started.

During the time delay between the end of one sewing cycle and the beginning of the next sewing cycle, the operator will have sufficient time to move the fabric into position where the next button is to be sewn. The clamping jaws 12 will then move down and hold the button in position as the sewing cycle is completed. As long as the operator maintains the foot switch 40 in a closed position, successive sewing cycles will be continuously repeated with the selected amount of time delay occurring between the end of one sewing cycle and the beginning of the next succeeding sewing cycle. If it is desired to stop this repetitive cycle or operation, the operator may open the foot switch 40 during any sewing cycle and the machine will automatically stop upon the completion of that cycle. If desired, the foot switch 40 may operate a holding relay, not shown, so that the foot switch 40 will remain closed even though it is depressed and immediately released. Then, when the foot switch 40 is again depressed, the circuit to the time delay relay will be broken.

The cycle control means of this invention is trouble free and is of very simple construction. The cycle control means may be easily attached to existing sewing machines and the length of the time delay between sewing operations may be easily adjusted by simply rotating the adjustment knob 46 to the proper setting to provide the desired time delay. Thus, the time delay is easily varied to suit the difference in skills between different workers and in accordance with the type of sewing operation being carried on.

In the drawings and specification there has been set forth a preferred embodiment of the invention and although specific

terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

I claim:

1. Cycle control means for a sewing machine having an actuator lever shiftable to an operative position for initiating a stitching cycle, a member movable to a predetermined position upon completion of a stitching cycle, and means to stop operation of said sewing machine upon completion of a stitching cycle, said cycle control means being selectively operable to continuously repeat successive sewing cycles, and comprising operator controlled switch means for starting and stopping said cycle control means, actuator means operable to move said actuator lever to said operative position, machine operated switch means operable by said sewing machine member upon completion of a sewing cycle, and a time delay relay interposed between said machine operated switch means and said actuator means for providing a predetermined delay between the end of one sewing cycle and the beginning of the next successive sewing cycle as long as said operator controlled switch means is maintained in the starting position.

2. Cycle control means according to claim 1 wherein said actuator means comprises a pneumatic cylinder operatively connected to said actuator lever of said sewing machine.

3. Cycle control means according to claim 1 wherein said sewing machine is adapted to sew buttons to fabric and said member comprises button clamp jaws movable to a raised position upon completion of a sewing cycle, and wherein said machine operated switch means is closed in response to movement of said clamp jaws to said raised position.

4. Cycle control means according to claim 1 wherein said time delay relay includes adjustment means for varying the length of time delay between the completion of one sewing cycle and the beginning of the next successive sewing cycle.

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