May 16, 1939. J. V. POOLE ET AL 2,158,484

SEWING MACHINE STOP MOTION

Filed Sept. 27, 1935 3 Sheets-Sheet 1

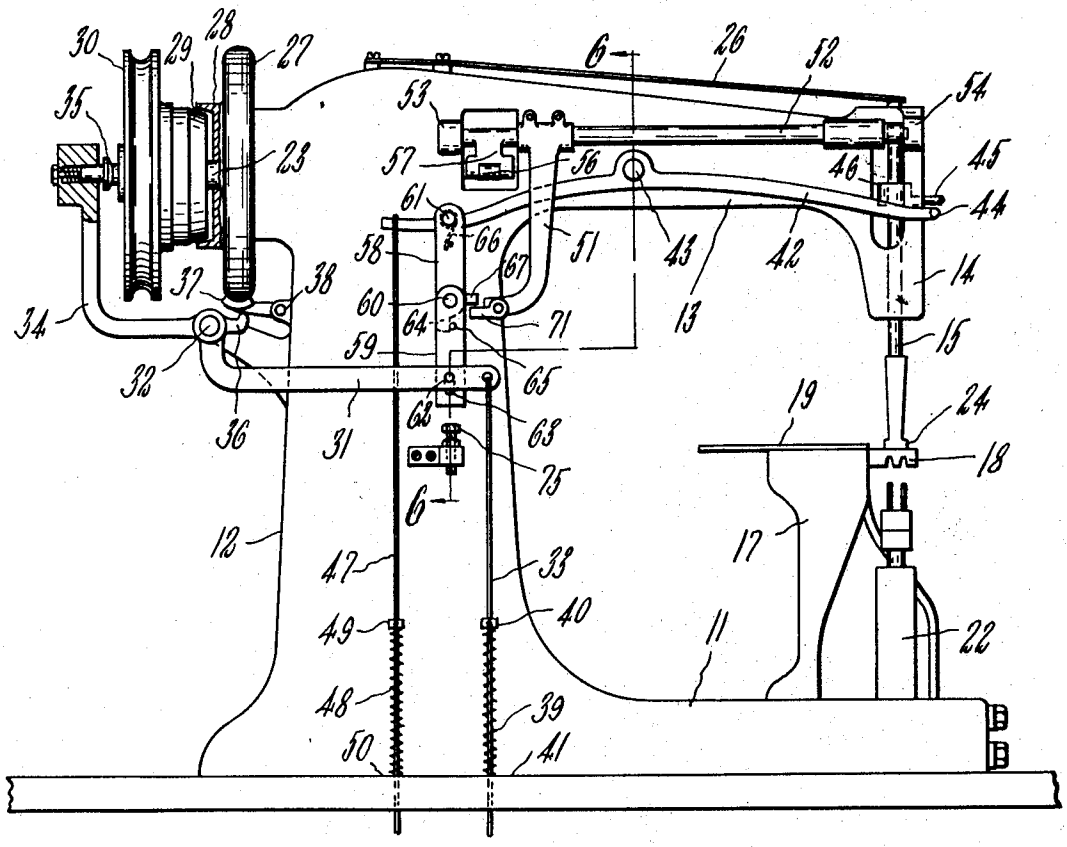


Fig. 1.

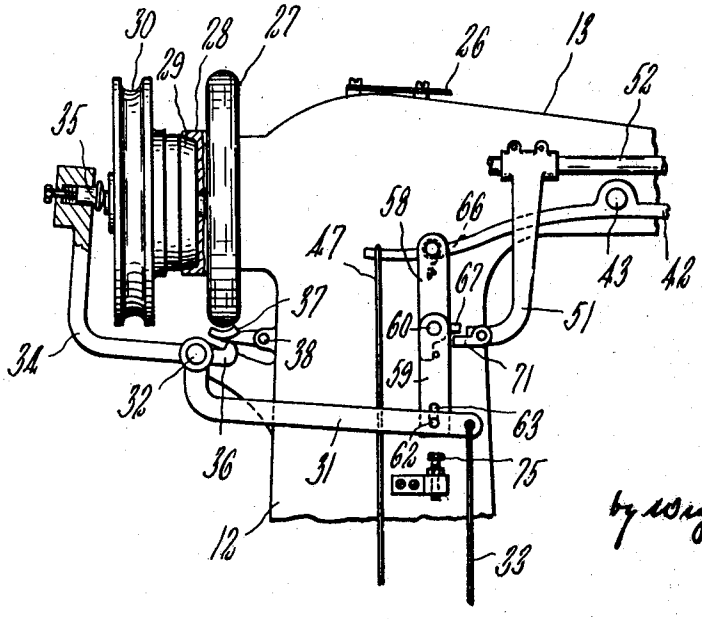


Fig. 2.

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SEWING MACHINE STOP MOTION

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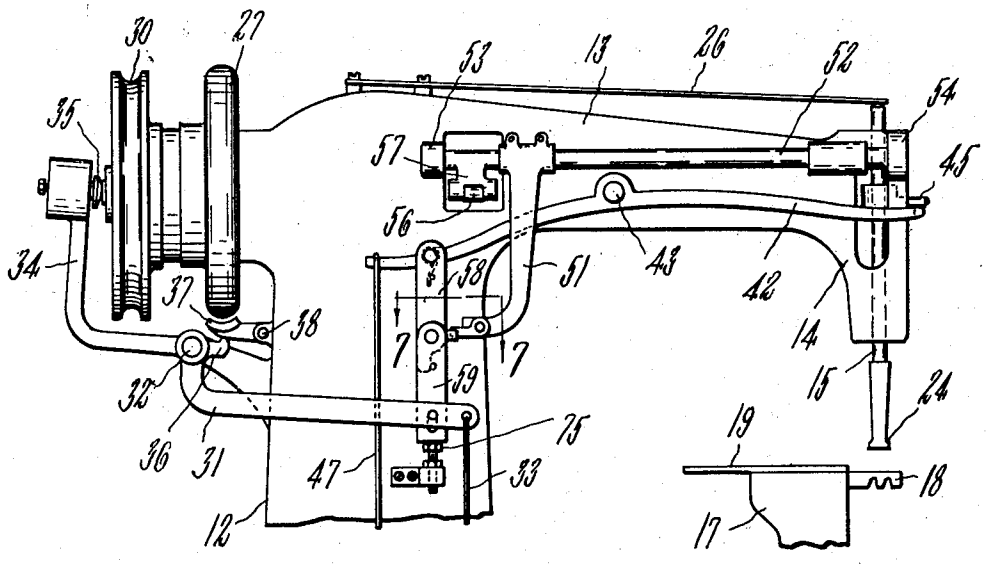


Fig. 3.

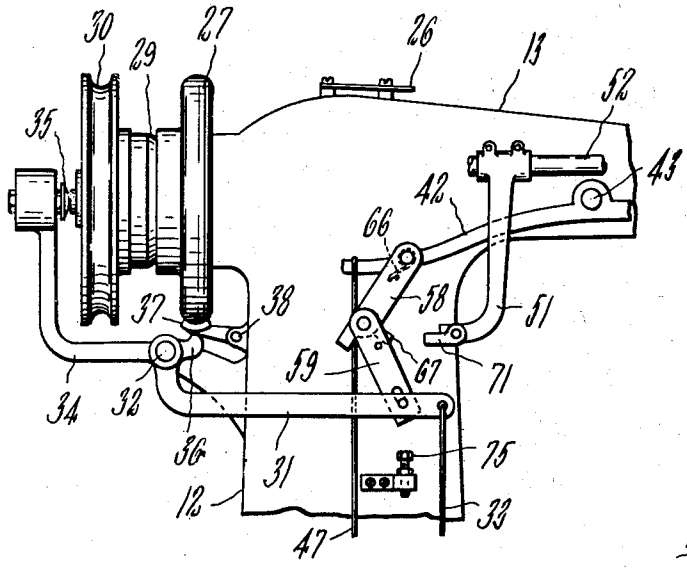


Fig. 4.

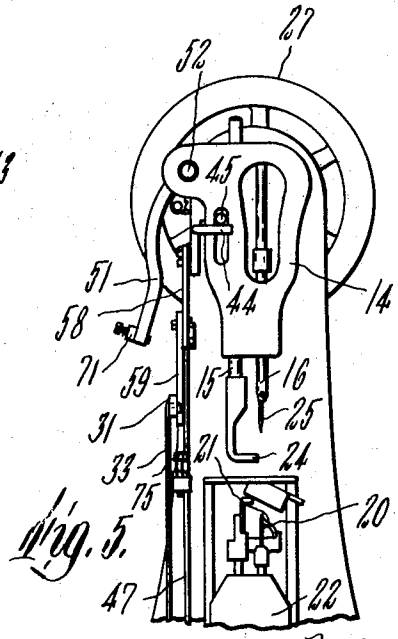


Fig. 5.

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SEWING MACHINE STOP MOTION

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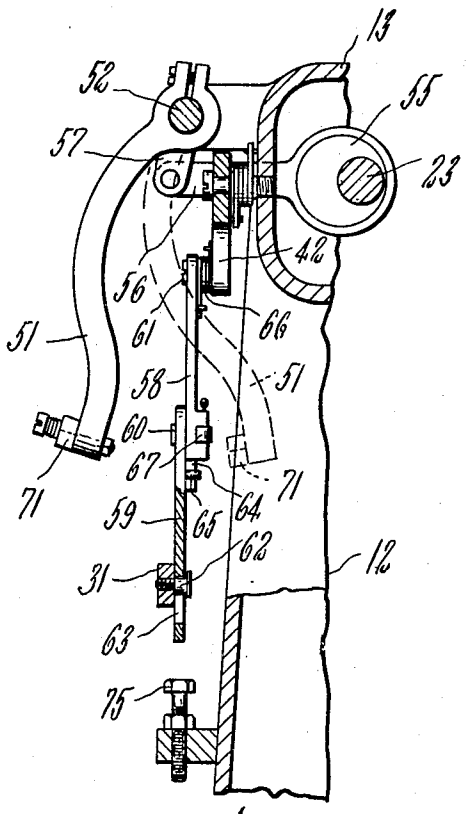


Fig. 6.

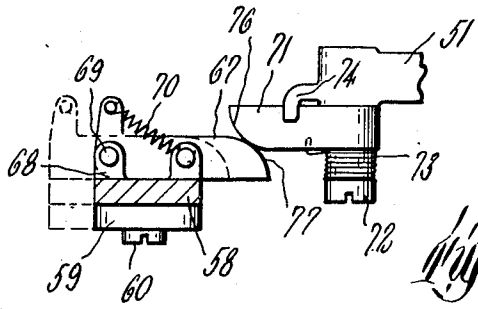


Fig. 7.

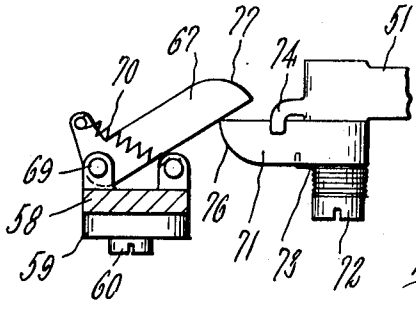


Fig. 8.

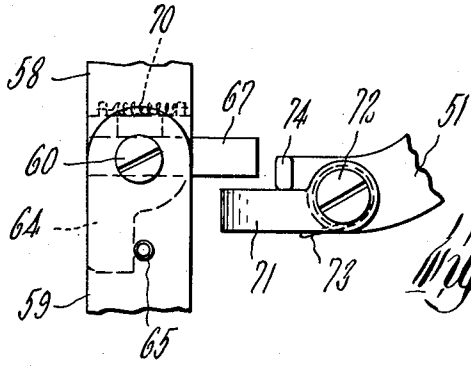


Fig. 9.

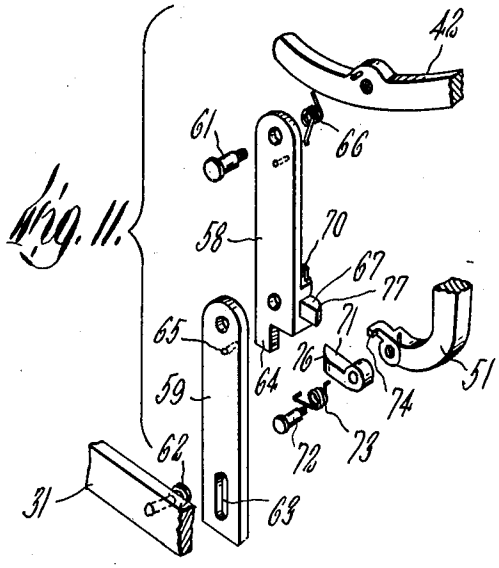


Fig. 11.

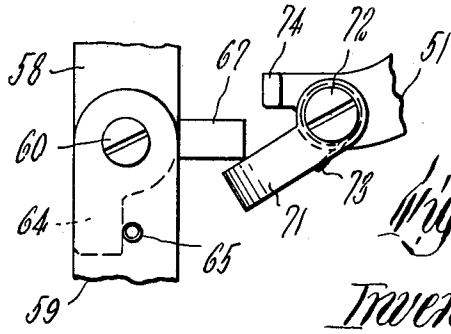


Fig. 10.

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UNITED STATES PATENT OFFICE

2,158,484

SEWING MACHINE STOP MOTION

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Application September 27, 1935, Serial No. 42,480

8 Claims. (Cl. 112—219)

The object of this invention is to provide a means for bringing the stitch-forming instruments of a sewing machine clear of the work when the presser foot is lifted after stoppage of the machine. Machines without stop motions run or coast for a greater or less length of time after the driving clutch has been disconnected to stop them, even though equipped with brakes. With high speed sewing machines it is impossible for the operator to release the clutch at such an exact point as will cause the machine to come to rest with the awl and needle, or other stitch-forming and work feeding instruments, withdrawn from the work, because of the variable and uncertain coasting time, but more particularly because the movements of these instruments are too rapid to permit the operator to estimate accurately the point when the clutch must be disconnected to cause a gradual stoppage with these parts in the desired condition. It results that the best the operator can do is to release the driving clutch as soon as a seam has been completed, and the machine then comes to rest more often than not with some part of the stitch-forming and feeding means in a position which prevents withdrawal of the work. The operator then has to turn the machine by hand, using the hand wheel with which sewing machines are usually provided for that purpose, until the work is cleared, and also raise the presser foot. The machine may need to be thus advanced by hand through anywhere from a small fraction up to about 70% of the stitch-forming and feeding cycle. It is a very slow operation in comparison with the automatic action of the machine. Where a machine is used for stitching comparatively short seams on a large number of work pieces, as in shoe making and bag making operations, the time loss in the course of a working day resulting from these manual advancements of the machine is a substantial proportion of the entire time. Where operators are paid on a piece work basis it considerably reduces their potential income.

We know that starting and stopping mechanisms have heretofore been devised which cause a machine to stop with its working parts in a certain prescribed position. These mechanisms, however, are usually of special character with respect to the starting means as well as the stopping means, and are not applicable to pre-existing machines without substantial change or adaptation in the design of the machine. They generally include also a positive arresting means which stops the moving parts with more or less shock.

Our invention is not of that character. One of its objects is to enable the working parts to be brought automatically into position clear of the work, and stop there, without shock. Another object is to provide mechanism for this purpose which can be applied simply and readily to pre-existing machines, already equipped with disconnectible driving clutches and arresting brakes, and by which the working parts may be placed stationary in the desired position, automatically, after having first been stopped at random by disconnection of the clutch and application of the brake.

The embodiment of our invention here illustrated has been designed for and applied to a commercial sewing machine known as the Puritan machine. This embodiment is illustrated in the accompanying drawings and is described in the following specification, but without intent or implication of limiting the invention, in its broader aspects at least, to such specific embodiment or to combination and use with that particular design or type of machine.

In the drawings,—

Fig. 1 is a side elevation of a Puritan sewing machine with the operating parts shown in the position of rest which they occupy immediately prior to commencement of a stitching operation, a part of the driving clutch being shown in section;

Fig. 2 is a similar view of a part of the machine showing the driving clutch in coupled condition;

Fig. 3 is an elevation of the upper part of the machine showing the manner in which our stop motion mechanism is put into action;

Fig. 4 is a fragmentary elevation of part of the means shown in Fig. 3, illustrating the effect of our stop motion mechanism in stopping the machine with the moving parts thereof in the desired position;

Fig. 5 is a front elevation of all of the machine except the base, showing the parts in the same position as represented in Fig. 4;

Fig. 6 is a fragmentary sectional view taken on line 6—6 of Fig. 1 and shown on a somewhat larger scale;

Fig. 7 is a fragmentary sectional view taken on line 7—7 of Fig. 3 and in which the parts there shown are drawn on a still larger scale;

Fig. 8 is a view similar to Fig. 7 showing the same parts in a different position;

Figs. 9 and 10 are side elevations of the parts

shown in Figs. 7 and 8, and representing these parts in relatively different positions;

Fig. 11 is a perspective view showing the elements of the stop motion control dismembered for greater clearness of illustration, but related to one another similarly to their operative assemblage.

Like reference characters designate the same parts wherever they occur in all the figures.

So much of the machine here shown as represents a standard commercial sewing machine of the type previously referred to, may be briefly described. It comprises a base 11, from which rises a post 12 having a horizontal upper arm 13 overhanging the base, and terminating in a head 14 in which the presser bar 15 and awl-carrying bar 16 are guided for vertical reciprocating movement. A standard 17 rises from the forward part of the base and includes at its upper end a work supporting shelf 18 and extension table 19. One or more needles 20 and cast-offs 21 (Fig. 5) reciprocate in an oscillative carrier 22 rising from the base beneath the head 14. The needle bar and cast-off bar are reciprocated in the carrier 22, and the latter is oscillated for feeding the work, by shafts in the base which in turn are driven from a main shaft 23 (Fig. 6) in the arm 13 by mechanisms well known to all acquainted with the standard machine (and shown also in prior patents) and hence unnecessary to be shown here. Shaft 23 also reciprocates the presser bar and awl bar to cause clamping of the work by the presser foot 24 and piercing of the work by the awl or awls 25 in proper timing with the stitch-forming instruments (needle 20, cast-off 21, and looper not shown) for making stitches and feeding the work, as is well understood. A leaf spring 26 secured at one end to the upper side of arm 13 bears on the upper end of the presser bar to hold the presser foot against the work, or the work support 18, except when the presser foot is lifted by other means.

To the rear end of the main shaft 23 is secured nonrotatably a hand wheel 27 and one member 28 of a friction clutch. The other member 29 of such clutch is connected to a belt pulley 30 which rotates loosely on an extension of the shaft. A clutch and brake controlling lever 31 is pivoted at 32 to a bracket on the rear side of post 12, and is connected by a tension rod or link 33 with a treadle or foot lever, not shown, but so located beneath the bench on which the machine is set that, when the operator presses on it with his foot, the forwardly extending arm of this lever is lowered. Lever 31 has a second arm 34 which extends across the rear of pulley 30 and carries a spring projected stud 35 located to bear against a central boss on the pulley. Thus when the lever is moved as described by the treadle, it brings clutch member 29 into engagement with the complemental clutch member 28 firmly enough to start and drive the machine. A third, and short, arm 36 on lever 31 underlies a brake 37 which is pivoted at 38 to the column 12 in position to bear on the rim of hand wheel 27. This short arm is withdrawn from the brake when the clutch members are coupled as just described. A powerful spring 39 is confined between a collar 40 fixed to the link rod 33 and a stationary abutment 41, which latter may be a shelf on the machine base or alternatively a part of the bench on which the machine is mounted. This spring normally raises the lever to the position shown in Figs. 1 and 4, causing the clutch to be uncoupled and exerting sufficient pressure on the brake, through arm 36, to bring the machine to rest in a brief time after release of the clutch controlling treadle following an operation of the machine.

A presser foot lifting lever, or lifter, 42 is pivoted at 43 to the side of arm 13. Its forwardly extending arm terminates in a finger 44 which extends part way across the front of head 14 and underlies a stud 45 projecting through a slot in the head from a collar 46 on the presser bar 15. This lever has a rear arm connected by a rod 47 with a presser foot control treadle (not shown) beneath the bench or other support on which the machine is mounted. A spring 48 surrounds rod 47 between a collar 49 on the latter and a fixed abutment 50, which may be structurally a part of the abutment 41, or may be otherwise devised. The presser foot control treadle is used only to lift the presser foot and free the work when the machine is at rest. Otherwise it is left alone, and spring 48 insures that the presser foot is free to bear on the work under the influence of its spring 26, and to be lifted automatically from time to time as required to permit the feeding function of the machine.

Machines of this type are stopped simply by removal of pressure from the clutch treadle, with consequent release of the driving clutch and application of the brake. They come to rest gradually in a length of time which varies more or less according to the condition of the machine. More often than not the machine comes to rest at some intermediate point in the stitch-forming and work feeding cycle, which necessitates turning of the hand wheel enough to bring the parts to the starting point of the cycle (which for present purposes may be considered as the part of the cycle where stitch-forming and work-feeding means are clear of the work) before either the finished work can be removed or a new work piece placed for commencing a stitching operation. The new features of the present invention cause the machine after being thus stopped, or even while it is coming to rest after disconnection of the clutch, to continue automatically to a stop with the stitch-forming and work feeding means definitely at the starting point of their cycle. This automatic progress is accomplished more rapidly than the manual advance of the machine and without attention on the part of the operator, leaving his hands and attention free for laying aside the completed work piece and picking up a new piece, without loss of time.

The mechanism here shown for this purpose comprises an arm 51 secured to the presser foot operating shaft 52. This shaft is a standard part of the machine, and its oscillations raise and permit lowering of the presser foot in time with the stitch forming and work feeding cycle. It turns in bearings 53 and 54 on the side of the arm 13, and is oscillated by an eccentric 55 (Fig. 6) on shaft 23, an eccentric rod 56 and an arm 57. The advancing mechanism further comprises an articulated linkage consisting of links 58 and 59 connected together by a pivot 60, connected to the rear arm of the presser foot lifter by a pivot 61, and connected to the forward arm of lever 31 by a lost motion connection, comprising a pin 62 on the lever and a slot 63 in link 59, or vice versa. One of the links, in this case link 58, has a finger 64, and the other link a pin 65 so disposed as to engage one another when the links are in line, making them rigid with one another for transmission of thrust, but permitting them to buckle at the joint away

from the adjacent extremity of arm 51. A spring 66 is coiled around the connecting pivot 61 and reacts between the adjacent arm of lever 42 and the link 58 so as to press finger 64 against pin 65, and one side of slot 63 against pin 62, thereby insuring rigid straight line extension of the compound link except when the latter is acted upon by superior force, as presently described. In effect the joint between the links 58 and 59 is similar to a knee or elbow joint.

A dog or latch 67 is pivoted to the rear side of link 58, between lugs 68 thereon by a pivot 69, and is acted on by a spring 70 so as normally to press outwardly against the rear side of the link, as shown in Fig. 7. But it may yield away from the link in the manner shown by Fig. 8.

A cooperating dog 71 is pivoted to the extremity of arm 51 by a pin 72 and is engaged by a spring 73 which presses it upward against a stop lug 74 on the arm, whereby it is normally held to project parallel and oppositely to the dog 67, but is permitted to yield downwardly, as shown by Fig. 10.

So long as the lift lever 42 is in its normal position, that shown in Figs. 1 and 2, the dogs 67 and 71 are out of register with one another, and the latter is carried back and forth (by swinging of arm 51 between the full line and broken line positions shown in Fig. 6) from one side to the other of the vertical plane which the dog 67 occupies.

Slot 63 in link 59 extends in the direction in which the pin 62 moves when the lever 31 is raised and lowered, and is longer than the range of movement of the pin. This pin occupies the upper end of the slot when the lever is raised to apply the brake, and the lower end of the slot when the lever is depressed to couple the driving clutch and does not shift the jointed linkage. But movement of the presser foot lifter by rod 47 does shift this linkage, and in the direction and sufficiently far to bring dog 67 into the path of dog 71. It is arrested with the dog 67 in that path, by a stop 75 adjustably mounted in a bracket on the side of post 12, which stands in the way of the lower end of link 59, as shown by Fig. 3.

Arm 51 is swung back and forth once with each cycle of the machine. If dog 67 stands in the path of dog 71 during the inward swing of the arm (from the full line to the dotted line position shown in Fig. 6) it is merely swung aside inoperatively in the manner shown in Fig. 8. But in the outward swing of arm 51, the beveled outer side 76 of dog 71 strikes the oppositely beveled side 77 of dog 67 and exerts a wedging or cam action which displaces the joint of the compound linkage and permits this linkage to collapse.

In describing the operation of this stop mechanism we will assume that the machine is running, the driving clutch control means being then in the position shown in Fig. 2, and the presser foot lifter and connected linkage being in the position shown in both Figs. 1 and 2. In order to stop the machine the operator first releases the clutch controlling pedal. This allows the clutch to be released and the brake applied, as shown in Fig. 1. Then if the machine does not stop at the desired point in its cycle of operations, the operator depresses the presser foot lifter pedal, which not only raises the presser foot by the agency of lever 42 and rod 47, but also depresses the jointed linkage 58, 59 to the position shown in Fig. 3. The clutch is again connected and the brake released, by pressure exerted on lever 31 through pin 62 and the upper end of slot 63, and at the same time dog 67 is brought into the path of dog 71. On the next outward swing of arm 51 thereafter, the dogs 71 and 67 engage and displace the joint of the linkage, permitting it to be collapsed by the upward thrust of spring 39 acting on rod 33 and lever 31, which also again disconnects the clutch and applies the brake. This action must occur before the main shaft has made a complete rotation, in any case; hence before the machine has acquired momentum enough to carry it onward appreciably after the brake has been applied. Accordingly the second stoppage of the machine is effected practically instantaneously. The arm 51 is adjustably clamped on shaft 52 and is set in the position which causes it to bring about this result when the awl and stitch-forming means are clear of the work.

If dog 71 should happen to be directly beneath dog 67 when the presser foot control pedal is depressed, it gives way, as shown in Fig. 10, permitting the action to be carried out as described, without obstruction or hindrance. It springs back into place as soon as the movement of arm 51 has carried it clear of dog 67.

The actions described are accomplished with no more effort on the operator's part than to release one treadle and depress another. If both treadles are controlled by the same foot, he merely shifts his foot from one to the other and presses on the latter. These actions on his part are ordinarily necessary in any event in order to raise the presser foot when work is being removed from and applied to the machine. By virtue of the new invention, the action of raising the presser foot causes automatic placement of the machine instruments in their desired positions without further effort and without loss of time. The time heretofore spent in turning the machine over by hand may now be beneficially used in changing the work. It is not even necessary for the operator to wait for the machine to come to a complete stop before throwing the auxiliary mechanism into action, for this can be done when the machine has slowed down nearly to the stopping point, or so nearly that a subsequent application of the brake after release will stop it substantially instantaneously

It will be apparent from the foregoing description that the additional parts needed for applying this invention to the standard commercial machine are a minimum, and that they can be applied without any change in the design of the machine as a whole. This is an important factor of the invention; i. e., the means of simple character, inexpensive and easily applied, for use with preexisting standard machines for the purpose set forth.

However, it is to be understood distinctly that the invention is not limited to this specific means and combination. It is applicable also to other machines and in different forms of design. It consists not only in the parts constituting the attachment herein described, or their equivalent, but also in the combination with machine instrumentalities and driving means, of auxiliary mechanisms for effecting stoppage with the operating instrumentalities of the machine in a desired prescribed position.

It is to be understood further that the treadles hereinbefore described as the parts through which the operator effects his control, are illustrative and typifying any practical devices, whether operated by the foot or by the hand or some other

part of the anatomy of the operator, for producing comparable effects.

What we claim and desire to secure by Letters Patent is:

1. The combination with a sewing machine having a disconnectible driving clutch and a friction brake, and operator-controlled means for actuating said clutch and brake to start and stop the machine, of other operator-controlled means for reconnecting said clutch and automatic means timed with the cycle of operations of the machine for thereafter disconnecting the clutch.

2. The combiantion with a sewing machine having a disconnectible driving clutch, a friction brake, and means for simultaneously disconnecting said clutch and applying the brake to stop the machine, of an auxiliary clutch connecting and brake releasing means, and automatic means for disabling said auxiliary means within the time of one cycle of operations of the machine after the clutch connecting action of said auxiliary means.

3. The combination with a sewing machine having stitch-forming instrumentalities, a presser foot, means for actuating said instrumentalities and presser foot to carry out repeated cycles of stitch forming and work feeding, driving means for said machine including a disconnectible clutch, a friction brake for stopping the machine, a lever movable by the machine operator to connect the clutch and at the same time release the brake, a spring for actuating said lever when released by the operator to disconnect the clutch and apply the brake, a presser foot lifter actuable by the operator to raise the presser foot when the machine is at rest, means connected with said lifter and engaged with said lever to place the lever in clutch connecting and brake releasing position when the lifter is so actuated by the operator, and means operated automatically by the machine for causing the before named means to release said lever and permit disconnection of the clutch and application of the brake by the lever-actuating spring.

4. The combination with a sewing machine having a spring depressed presser foot, an oscillating shaft for lifting and releasing the presser foot in time with the stitch-forming and work feeding cycle of the machine, a presser foot lifting lever actuable by the machine operator when the machine is at rest for raising the presser foot, a disconnectible driving clutch, a friction brake, and a common control member for said clutch and brake movable by the operator in one direction for connecting the clutch and releasing the brake, and automatically movable in the opposite direction when released by the operator for releasing the clutch and applying the brake; of a jointed thrust linkage connected with said lifting lever and engaged with said clutch controlling lever to move the latter into the clutch connecting and brake releasing position when the lifting lever is moved by the operator to raise the presser foot, and an arm oscillated by the said presser foot actuating shaft arranged and organized to displace the joint of said thrust linkage in the course of its movement by said shaft, whereby to permit automatic brake application and clutch disconnection while the lifting lever is in the position of displacement caused by the operator.

5. The sewing machine combination as set forth in claim 4 and including a dog projecting from the thrust linkage near its joint toward the arm, and a second dog projecting from the arm toward the thrust linkage, said dogs being normally displaced from one another so that the one carried by the arm swings past that carried by the linkage without contact during the ordinary operation of the machine, and the linkage-carried dog being moved into the path of the arm-carried dog by displacement of said linkage effected by the operator, whereby the arm-carried dog is caused to engage and displace the linkage-carried dog with the effect described.

6. In a sewing machine having a driver and brake controlling lever, a presser foot controlling rock shaft, and a presser foot lifting lever, a knee jointed linkage carried by the lifting lever and having a thrust transmitting engagement with the controlling lever, a dog protruding laterally from said linkage, an arm carried by said rock shaft, and having a terminal projection extending toward the linkage and being movable with the arm from one side to the other of the plane of the linkage in a path beside, but clear of, the linkage-carried dog, movement of the linkage by the lifting lever being in the direction and to the extent sufficient to place said dog in the path of said projection.

7. The combination as set forth in claim 6 and in which said dog and projection have cam faces arranged to engage one another with movement of the arm in one direction and to displace the joint so as to buckle or collapse the linkage, the dog and projection being relatively rigid against displacement otherwise, but relatively yieldable when engaged by movement of the arm in the opposite direction.

8. A machine including a starting and stopping lever movable in one direction for starting and in the opposite direction for stopping the machine, yieldable means normally acting to hold the lever in, and tend to return it after displacement to, the position occupied in stopping the machine, an operator controlled thrust member having a hinged joint and being organized to exert endwise thrust on said lever for placing the lever in position to start the machine, and a displacer operable automatically by a moving part of the machine to cause buckling of the thrust linkage at its joint, whereby return of the lever into machine stopping position is permitted.

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