April 29, 1941. C. MEYER 2,240,192

RELEASE MECHANISM

Filed June 20, 1940

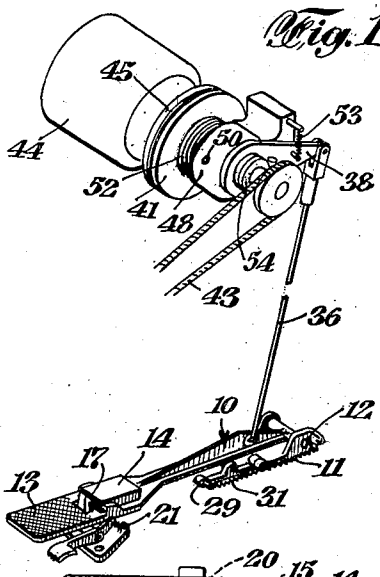


Fig. 1.

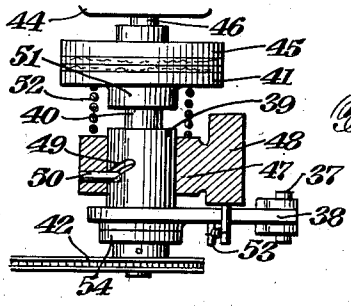


Fig. 2.

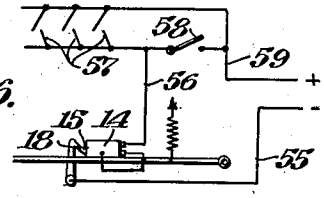


Fig. 6.

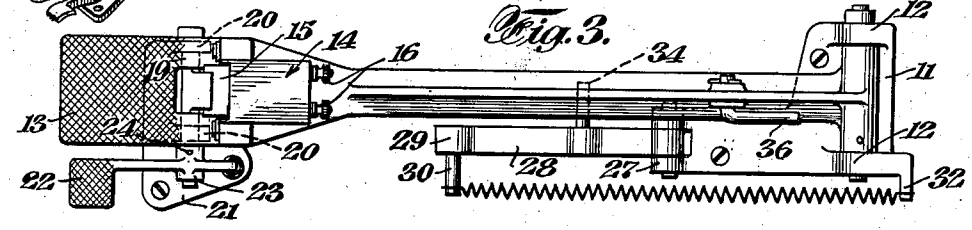


Fig. 3.

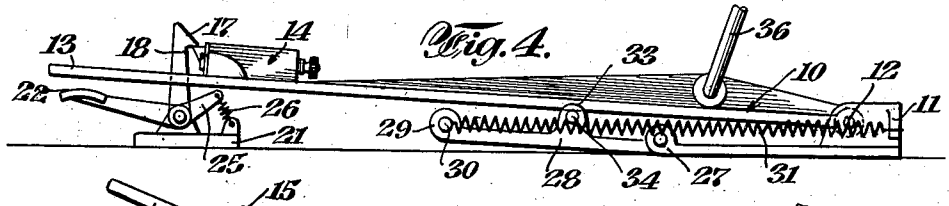


Fig. 4.

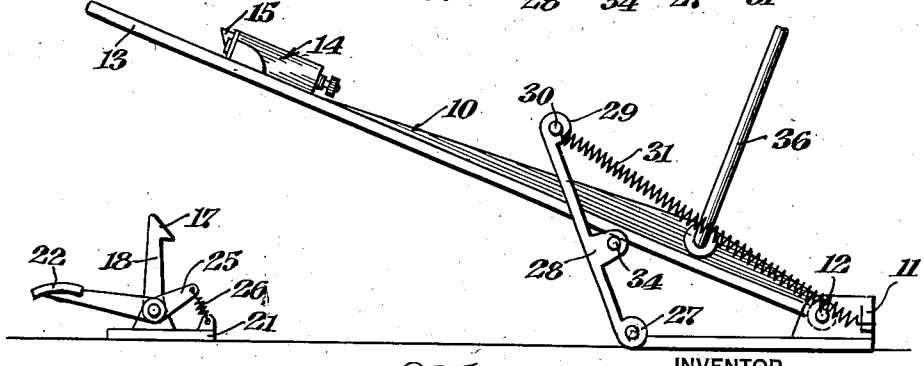


Fig. 5.

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RELEASE MECHANISM

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Application June 20, 1940, Serial No. 341,504

11 Claims. (Cl. 74—2)

This invention relates to a release device, particularly of the type adapted to operatively actuate or disconnect an associated mechanism, such as a brake or clutch arrangement.

In many types of manufacturing apparatus it frequently becomes necessary to cause an immediate stoppage of operation upon the occurrence of certain events. For example, in an apparatus for controlling the flow of pliable material, such as is described in my patent application Serial No. 351,503, filed concurrently herewith, if a needle or bobbin thread of the sewing machine breaks, or the feed or puller rollers at the rear of the machine become disconnected, it is highly desirable that the flow of the material to the sewing machine be discontinued instantly, so as to prevent a mutilation of the material by the sewing machine, or other undesirable effects. To discontinue the flow of the material it is essential that the motor be disconnected from the actuating feed roller, and this is most conveniently accomplished by the use of a declutching mechanism. It is within the contemplation of this invention to enable such a declutching step to be effectuated in an efficient manner and with a minimum of delay.

Cognizance is taken of other attempts to effect declutching operations similar to that above referred to by means of various release mechanisms, but such devices frequently fail to operate particularly when the device is intended to be actuated by a small electrical impulse, or one of short duration. The actual force required to effect a declutching operation is generally of considerable magnitude, and hence in most known devices the releasing or tripping mechanism is held in its locked or untripped position by an almost equivalent force, so that in those instances where the period of electrical contact is relatively short, the resulting small electrical impulse frequently is insufficiently powerful for tripping the mechanism. It is one of the main objects of my invention to overcome this shortcoming which is inherent in many commercial structures of this category,—an objective which I accomplish by providing, in one form of my invention, a treadle maintained in its untripped or normal condition by a very light spring action which will permit a very slight electrical impulse of short duration to operatively trip the mechanism,—the arrangement being such that after the tripping action has occurred, the spring tension progressively increases so as to exert a force of sufficient magnitude to effect a declutching operation.

Other objects, features and advantages will appear from the drawing and the description hereinafter given.

Referring to the drawing,

Figure 1 is a perspective view of a treadle form of my invention operatively associated with a clutch and motor.

Figure 2 is a fragmentary sectional plan view of the clutch and motor arrangement of Figure 1.

Figure 3 is a plan view of the treadle form of my invention shown in Figure 1, the device being in its depressed or untripped condition.

Figure 4 is a side elevation of Figure 3.

Figure 5 is a side elevation of the invention of the device of Figure 3 shown in its tripped or released condition, and

Figure 6 is a wiring diagram of one form of electrical circuit operatively associated with my invention.

The form of my invention shown in the drawing is of the treadle type wherein the tripping or releasing step can, if desired, be performed by a foot-depressing operation. The main lever 10 is pivotally mounted on the base 11 at bearings 12 thereof, the extreme forward end of the lever containing a main treadle portion 13. Suitably secured to main lever 10 in the region of portion 13 is the electro-mechanical oscillator 14. This oscillator is of the conventional type used as a door latch, operable by the closing of an electrical circuit, and its internal construction is accordingly not illustrated inasmuch as it is well known in the art. Within its outer casing are electro-mechanical means operably associated with the reciprocating latch 15, suitable electric conductors being attachable to the terminals 16. In overlying engagement with the upper surface of latch member 15 is the overhanging lip 17 forming the upper terminal portion of the tripping lever 18. This lever extends upwardly from and is preferably integral with the shaft 19 rotatably mounted within bearings 20 of base 21. The tripping treadle 22 is fixedly associated with shaft 19, the sleeve 23 thereof being secured to this shaft by set screw at 24. The treadle 22 contains the arm 25 the terminal of which is attached to spring 26 which is anchored on base 21. The arrangement is obviously such that the spring 26 normally urges arm 25 and consequently tripping lever 18 in a clockwise direction, yieldably holding the lip 17 in overlying engagement with latch member 15, as clearly shown in Figure 4.

Associated with the rear base 11 is the bearing

27 rotatably supporting the actuating lever 28. The free end 29 of lever 28 contains pin 30 to which one end of spring 31 is secured the other end of the spring being anchored to the base 11 at 32. Intermediate the pivotal connection at 27 and terminal 29 of lever 28 is the lug 33 having affixed thereto the pin 34 normally underlying the said main lever 10.

It will be observed that in the normal untripped or locked condition of this device, the spring 31 extends in the general direction of actuating lever 28, and forms a very slight angle therewith at its connection at 30. It is thus apparent that when the parts are in this position, the spring 31 can exert only a very slight rotational effort upon actuating lever 28, in view of the fact that its moment arm is relatively small. And it should also be noted that the effort arm of the main lever 10 extending from pin 34 to pivotal mounting 12 is less than the resistance arm extending from lip 17 to the pivotal mounting 12,—thereby further reducing the effective resistance against retraction of latch 15. Hence a very slight electrical impulse operatively transmitted to oscillator 14 will permit a retraction of the latch member 15, inasmuch as there is no force of any considerable magnitude holding said latch member into frictional engagement with lip 17. And inasmuch as the only element preventing a retraction of latch 15 is the said lip 17, it is evident that once the latch member 15 is retracted out of engagement therewith, even a very slight pull exerted by spring 31 will cause a clockwise rotation of actuating lever 28. When this occurs, the pin 34 will obviously force the main lever 10 upwardly, causing it to rotate in a clockwise direction about pivotal mounting 12. And as the upward movement continues, the angle between spring 31 and actuating lever 28 increases, causing a corresponding increase in the moment arm between spring 31 and lever 28. This obviously causes an increase in the effort exerted by pin 34 on main lever 10 as the clockwise rotation continues, to cause a declutching movement in the manner to be hereinafter set forth.

Should the operator desire at any time to trip the mechanism so as to cause an upward declutching movement of main lever 10, he can depress the pedal 22 against the action of spring 26. This will cause a counter-clockwise rotation of tripping lever 18 and a retraction of lip 17 from its engagement with latch 15, thereby permitting the main lever 10 to move upwardly under the influence of spring 31, as aforesaid.

When the main lever 10 moves upwardly in the manner above set forth, it will force upwardly the clutch rod 36 which is pivotally attached to main lever 10 as shown. The upper portion of said rod is pivotally connected at 37 to clutch lever 38 preferably integral with sleeve 39 rotatably mounted over shaft 40. Fixedly attached to one end of said shaft is the clutch plate 41, the other end of the shaft having fixedly attached thereto the pulley member 42 operably rotatable by belt 43 connected to some device (not shown) intended to be operated by the motor 44. Operatively engageable with clutch plate 41 is clutch plate 45 fixedly secured to shaft 46 associated with motor 44. The said sleeve 39 is rotatably mounted within bearing member 47 attached to suitable framework 48. The sleeve contains an oblique slot 49 in engagement with a pin 50 affixed to said bearing member 47. Mounted over sleeve 39 and collar 51 is the helical spring 52 yieldably urging the clutch plate 41 in the direction of clutch plate 45.

Upon an upward operative movement of rod 36, it is apparent that clutch lever 38 will be correspondingly moved upwardly, causing a rotation of sleeve 39 within bearing 47. Such rotational movement will bring the wall of slot 39 into engagement with stationary pin 50, whereupon the sleeve 39 together with clutch lever 38 will move outwardly against the action of spring 53 anchored to the framework 48 and lever 38. This outward movement will force the pulley collar 54 and pulley member 42 outwardly, thereby causing a corresponding outward movement of shaft 40 together with the clutch 41. This will effect a disengagement of the clutch plates, whereupon the belting 43 will no longer be driven by the motor 44.

The description of the clutch operation hereinabove given merely indicates one manner in which the tripping of the release mechanism can be effective in causing a stoppage of an apparatus. And in the particular illustration hereinabove given, it will be noted that the rod 36 must be moved upwardly with a force of considerable magnitude in order to effectuate the declutching operation. Whenever this condition had to be met with known conventional structures, the releasable lever, equivalent to lever 10, was generally held down by a spring under considerable tension,—an arrangement which held the tripping mechanism locked with a force of such magnitude that it frequently failed to trip under the influence of a slight electrical or other type of impulse. With the arrangement hereinabove described, however, it is apparent that although the rod 36 is moved upwardly under the influence of spring 31 when in a position to exert its greatest force, said spring when in the position shown in Figure 4 is capable only of exerting a very slight holding effect, so that a slight electrical impulse will cause a retraction of latch 15 and an operative release of the mechanism.

In Figure 6 is shown one possible arrangement of the electrical connections wherein the oscillator 14 is shown forming part of the electrical circuit. The conductor 55 from the main source of current supply is electrically connected to the tripping lever 18, the circuit continuing through latch 15, through the oscillator 14 to the conductor 56. The switches 57 arranged in multiple, and the switch 58, are operatively associated between conductor 56 and conductor 59. The switch 58 may be manually controlled, and the switches 57 may be operatively associated with any known automatic switch-closing mechanism which need not herein be described. Should any of these switches be closed, it is apparent that the circuit between conductors 55 and 59 will be closed, causing a retraction of the latch 15 and operative movement of main lever 10 as above described. And it should further be observed that with this arrangement not only is the lever 10 operatively tripped, but the disconnection between latch 15 and lever 18 causes an opening of the circuit.

It is of course understood that the embodiment above described and shown in the drawing is illustrative of my invention and not employed by way of limitation, inasmuch as numerous changes and modifications may be made within the scope of the appended claims without departing from the spirit of this invention.

What I claim is:

1. In a release device, a pivotally mounted lever, retractible latch means holding said lever

in a predetermined locked position, yieldable means urging said lever away from said locked position against the holdng action of said latch means, and means to operatively retract said latch means whereby the lever will be rotatably actuated by said yieldable means about the lever's pivot, said yieldable means being so disposed as to exert its minimum turning effort on the lever when in its said locked position.

2. In a release device, a pivotally mounted lever, retractible latch means frictionally holding said lever in a predetermined locked position, yieldable means urging said lever away from said locked position against the holding action of said latch means, and means to operatively retract said latch means whereby the lever will be rotatably actuated by said yieldable means about the lever's pivot, said yieldable means being so disposed as to exert a progressively increasing turning effort on the lever beyond said locking position.

3. In a release device, a pivotally mounted lever, a latch member attached to the lever, a holding member frictionally engaging said latch member and thereby holding said lever in a predetermined locked position, yieldable means urging said lever away from said locked position against the action of said holding member, means to operatively disengage said holding and latch members whereby the lever will be rotatably actuated by said yieldable means about the lever's pivot, said yieldable means including a movable spring operatively associated with the lever, said spring being so disposed when the lever is in its said locked position as to exert its minimum turning effort on the lever.

4. In a release device, a pivotally mounted main lever, retractible latch means holding said lever in a predetermined locked position, a pivotally mounted actuating lever engageable with said main lever for moving it away from said locked position, a movable spring attached to and movable with said actuating lever and yieldably urging it into operative engagement with the main lever against the action of said latch means, and means to operatively retract said latch means whereby the main lever will be rotatably actuated by said actuating lever, said spring extending in the general direction of said actuating lever but not parallel thereto when in its inoperative position with the main lever in its said locked position, whereby a yieldable effort will be exerted on the main lever when it is in its said locked position, the spring being so disposed that its angle with the actuating lever progressively increases during its operative movement away from said inoperative position.

5. In a release device, a pivotally mounted main lever, retractible latch means holding said lever in a predetermined locked position, a pivotally mounted actuating lever having an intermediate portion thereof engageable with said main lever for moving it away from said locked position, a movable spring attached to and movable with one end of said actuating lever and yieldably urging said intermediate portion into operative engagement with the main lever against the action of said latch means, and means to operatively retract said latch means whereby the main lever will be operatively moved by said actuating lever, said spring extending in the general direction of said actuating lever but forming a relatively small angle therewith when in its inoperative position with the main lever in its said locked position, whereby a yieldable effort of relatively slight magnitude will be exerted on the main lever when it is in its said locked position, the spring being so disposed that its angle with the actuating lever progressively increases during its operative movement away from said inoperative position.

6. In a release device, a pivotally mounted main lever, retractible latch means holding said lever in a predetermined locked position, an actuating lever pivotally mounted at one end thereof and substantially parallel to the main lever when in its inoperative position, said actuating lever having an intermediate portion engageable with said main lever for moving it away from said locked position, a spring attached to and movable with the free end of said actuating lever and yieldably urging said intermediate portion into operative engagement with the main lever against the action of said latch means, and means to operatively retract said latch means whereby the main lever will be operatively moved by said actuating lever, said spring extending in the general direction of said actuating lever but forming a relatively small angle therewith when in its said inoperative position, whereby a yieldable effort of relatively slight magnitude will be exerted on the main lever when it is in its said locked position, the spring being so disposed that its angle with the actuating lever progressively increases during its operative movement away from said inoperative position.

7. In a release device, a main lever pivotally mounted in the region of one end thereof, retractible latch means in spaced relation to the pivotal mounting of the said lever and releasably holding said lever in a predetermined locked position, an actuating lever pivotally mounted at one end thereof and substantially parallel to the main lever when in its inoperative position, said actuating lever having an intermediate portion engageable with said main lever at a point between the pivotal mounting for the main lever and the said latch means for moving it away from said locked position, a spring attached to and movable with the free end of said actuating lever and yieldably urging said intermediate portion into operative engagement with the main lever against the action of said latch means, and means to operatively retract said latch means whereby the main lever will be operatively moved by said actuating lever, said spring extending in the general direction of said actuating lever but forming a relatively small angle therewith when in its said inoperative position, whereby a yieldable effort of relatively slight magnitude will be exerted on the main lever when it is in its said locked position, the spring being so disposed that its angle with the actuating lever progressively increases during its operative movement away from said inoperative position.

8. In a release device, a main lever pivotally mounted at the rear thereof, retractible latch means in spaced relation to the pivotal mounting of the said lever and releasably holding said lever in a predetermined locked position, an actuating lever having one end pivotally mounted forwardly of the pivotal mounting for the main lever and substantially parallel to the main lever when in its inoperative position, said actuating lever having an intermediate portion engageable with said main lever at a point between the pivotal mounting for the main lever and the said latch means for moving it away from said locked position, a movable spring extending from a point behind the pivotal mounting for the ac-

tuating lever forwardly in the general direction of the actuating lever for attachment to the front end thereof for urging said intermediate portion into operative engagement with the main lever against the action of said latch means, said spring forming a relatively small angle with the actuating lever when in its said inoperative position, whereby a yieldable effort of relatively slight magnitude will be exerted on the main lever when it is in its said locked position.

9. In a release device, a main lever, a pivotal mounting at the rear thereof, a treadle portion at the front thereof, a latch member on the lever adjacent the treadle portion, a holding member frictionally engaging said latch member and thereby holding said lever in a predetermined locked and depressed position, an actuating lever having one end pivotally mounted forwardly of the pivotal mounting for the main lever and substantially parallel thereto when in its inoperative position, said actuating lever having an intermediate portion engageable with said main lever at an intermediate portion rearwardly of said latch member, a movable spring extending from a point behind the pivotal mounting for the actuating lever forwardly in the general direction of the actuating lever, said spring being attached to the front end of the actuating lever for urging the said intermediate portion thereof into operative engagement with the main lever against the frictional action of said holding member, said spring forming a relatively small angle with the actuating lever when in its said inoperative position, whereby a yieldable effort of relatively slight magnitude will be exerted on the main lever when it is in its said locked position.

10. In a release lever, the combination according to claim 9, the holding member comprising a pivotally mounted tripping lever containing a terminal lip in overhanging engagement with said latch member, yieldable means to normally hold said tripping lever in engaging position with said latch member, and means to retract said tripping lever from its holding position.

11. In a release device, a pivotally mounted lever, a latch member attached to the lever, a holding member frictionally engaging said latch member and thereby holding said lever in a predetermined locked position, electro-magnetic retracting means operatively connected to said latch member for releasing it from its engagement with said holding member, an electric circuit associated with said electro-mechanical means, said latch and holding members being part of said circuit, and yieldable means urging said lever away from said locked position against the action of said holding member, said yieldable means being so disposed as to exert its minimum effort on the lever when in its said locked position.

CHARLES MEYER.