Nov. 18, 1947. E. KLUG 2,430,935

SWITCH OPERATING MECHANISM

Filed July 26, 1944

Fig. 1.

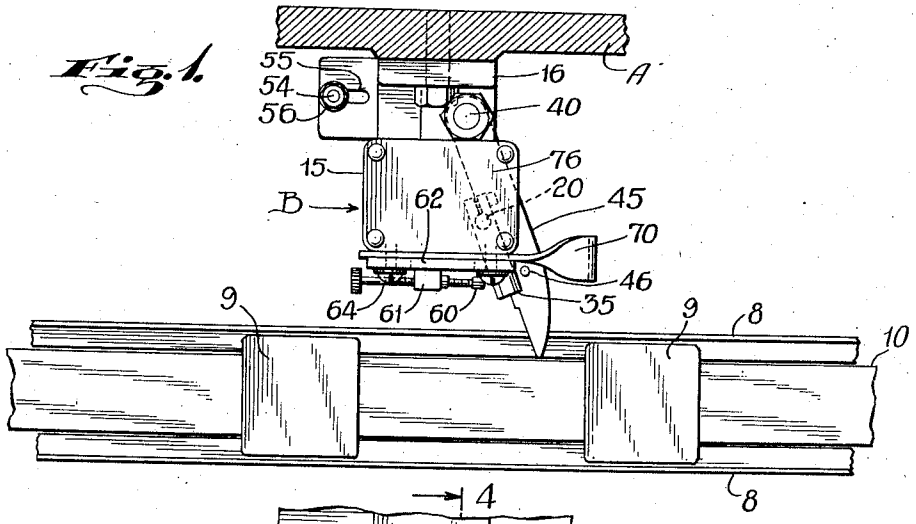


Fig. 2.

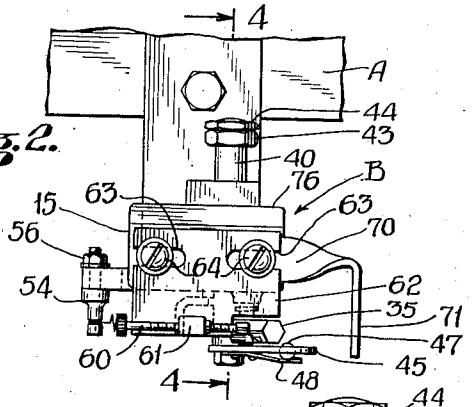


Fig. 3.

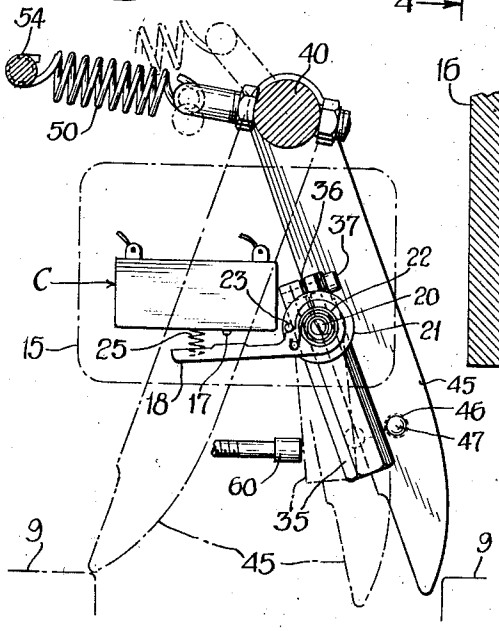
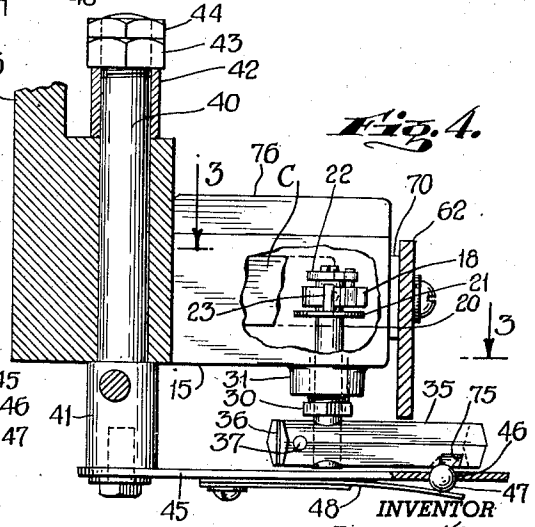


Fig. 4.



INVENTOR
ERHARD KLUG
BY
ATTORNEY

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SWITCH OPERATING MECHANISM

Erhard Klug, Suffern, N. Y.

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10 Claims. (Cl. 74—469)

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This invention relates to improvements in switch operating mechanism, and particularly is directed to switch operating mechanisms for closing or opening an electric circuit to actuate any desired electrically operated device.

The present invention is particularly well adapted for use in article handling machines, wherein the articles are continuously advanced and wherein it is desired to periodically actuate mechanism for performing some function on or with respect to the moving articles. For convenience of description the invention will be described in connection with one of its many uses, that of successively stamping or marking the articles as they move past a predetermined station.

In article handling machines of the character mentioned provision is made for carrying or conveying the articles continuously from station to station and out of the machine on carriers or conveyors of suitable types. It is often desired to print or stamp or otherwise apply information on the articles or on packages containing articles as they are continuously advanced along a conveyor or as they are moved out of the machine. It may be desired to perform such operation not only while the articles are in motion but also while they are at rest.

One of the objects of the present invention resides in the provision of a switch operating mechanism adapted to be actuated by a continuously moving object or series of objects successively wherein provision is made for throwing a switch on and off or off and on.

Another object of the present invention resides in the provision of an article controlled or operated means which is operated automatically by articles during their travel in a predetermined path.

Another object of the invention resides in the provision of apparatus of the character indicated which is automatically operated by articles irrespective of the shape or size of the articles or the irregularity of the spacing of the articles during their travel.

A further object of the invention resides in the provision of declutching, or slip connection between actuating members.

A still further object of the invention resides in the provision of improved means for adjusting or limiting the movement of the switch plunger contacting means whereby to select, vary or adjust the time interval the switch is on or off.

Other objects of my invention will be manifest from the following description and the accompanying drawing, in which,

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Fig. 1 is a plan view of an article handling machine showing my improved switch operating mechanism in position thereon;

Fig. 2 is a front elevational view of my improved switch operating mechanism;

Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 4; and

Fig. 4 is a vertical sectional view on the line 4—4 of Fig. 2.

For the purpose of disclosure I will describe my invention as a means for operating a micro-electric switch which may be employed to control or operate a printing device for printing on the articles in transit.

Referring to the drawing in detail the letter A designates a frame of an article handling machine which may include tracks 8 on which articles or packages 9 are conveyed by means of a belt 10.

My improved switch operating mechanism, generally indicated at B is provided to operate a micro-electric switch C, which is fixed in a box-like housing 15 attached to a bracket 16 suitably secured to the frame of the machine as indicated in Figs. 1 and 2. The switch plunger 17 is engaged and operated by an arm 18 rotatively supported on a rockable shaft 20. The shaft is provided with a fixed collar 21 and a spiral driving spring 22, between the arm 18 and the shaft 20, normally holds the arm 18 against a pin 23 on the collar 21. As shown in Fig. 3 a helical compression spring 25 is provided to move the arm 18 counterclockwise to permit the switch to open.

The shaft 20 is mounted in the bottom wall of the box 15 and is journaled in a journal bearing 30, threaded into a projection 31 on the bottom wall of the box.

Secured upon the lower end of the shaft 20 is an arm 35 which is preferably of hexagonal cross section and is provided with an opening receiving the end of the shaft 20 which may be split as shown at 36 in order that it may be clamped on the shaft in any desired position by means of a threaded clamping bolt 37.

Journaled in the bracket 16 is a shaft 40, the lower end of which is enlarged as shown at 41 forming a shoulder bearing against the lower face of the bracket and the upper end of which is surrounded by a collar 42 which bears against the upper face of the bracket and against which bears a nut 43 threaded on the shaft 40 and locked in position by a nut 44.

Secured on the lower end of shaft 40 is the main operating or driving arm 45, which, as

shown in Figs. 1 and 3 extends into the path of the moving articles 9. This arm is provided with a round hole 46 in which is seated a ball clutch 47 of slightly larger diameter than the hole and which is held seated by a leaf spring 48 secured against the lower face of the arm 45. The ball 47 extends through the arm far enough to engage and drive the arm 35 as it is moved past the arm in a clockwise direction. The arm 35 will be returned in a counterclockwise direction to its normal position by the spring 25.

Figs. 1 and 3 show the relative positions on the shafts supporting these arms and the relative positions of the arms in their normal position. The normal position of the driven arm 35 is determined by the spring 25 and the normal position of the arm 45 is determined by a tension spring 50, Fig. 3 made adjustable by a bolt 54 passing through a slot 55 in a lateral extension on the bracket 16. The adjustment is maintained by a nut 56 threaded on the bolt 54.

As the driving arm 45, Figs. 1 and 2, is moved clockwise by a moving article 9, the ball 47 engages the right hand upper corner or side face of the driven arm 35 carrying this arm in a clockwise direction until the switch is closed, the limit of the clockwise movement of the arm 35 being adjustably controlled by a stop 60 as is obvious from Figs. 1 and 3. The stop 60 is threaded by means of a fine thread in a lug 61 projecting laterally from a plate 62 to provide a fine or vernier adjustment. The plate 62 may be adjustably positioned on the forward face of the housing 15 for coarse adjustment purposes. For this purpose the plate 62 is provided with open ended slots 63 through which pass threaded studs 64 to secure the plate 62 in adjusted position against the face of the housing. The duration or time interval the switch is on is adjustable by means of the stop 60, whereby the length of the current impulses may be selected, varied and/or adjusted to a fraction of a second if desired.

The plate 62 is also used for clamping of a stop member 70 against the front face of the housing 15. This stop member includes a laterally projecting member 71 extending into the path of the driving arm 45 and limiting the counterclockwise movement or overthrow of the arm 45 when it is returned by its spring 50. The forward movement of the switch operating arm 35 will be stopped when the switch is closed, but the driving arm 45 will be carried farther in a clockwise direction by the article. The switch operating driven arm 35, however, will be immediately returned by its spring 25 to release the switch and thence move it into its normal position. To permit and facilitate the movement of the driven arm 35 past the driving arm 45 on its return movement into normal position, the left hand corner or side face of the arm 35 as viewed in Fig. 3, is cut away to provide a shallow bevelled track or cam face, as indicated at 75 in Fig. 4.

The box-like housing 15 may be closed by a cover plate 76 as shown in Figs. 1, 2 and 4.

In operation, an article or package, carried on the conveyor 10 between the guard rails 8 moves toward the left, as viewed in Figs. 1 and 3, into engagement with the driving arm 45, whereupon the arm 45 will be rotated in a clockwise direction. After a short movement of the arm 45, the ball 47 engages the right hand corner or side face of the driven arm 35 and rocks this arm clockwise against the stop 60 into the first broken line position shown in Fig. 3. This actuates the micro-electric switch C to open or close the same as the case may be. As the arm 45 continues its clockwise movement toward the second or final position indicated by broken lines in Fig. 3 the ball 47 rides over the right hand corner of the arm 35 freeing the arm 35 which is immediately returned to its normal position by the spring 22. When the arm 45 is released by the traveling article, it is returned to its normal position shown in full lines in Fig. 3, by its spring 50. The movement of the arm 45 past the arm 35 into its normal position shown is facilitated by the shallow bevel or track 75 in the arm 35. It will be appreciated that on the return movement of the arm 45 the switch is not actuated.

It is to be understood that the circuit which is opened or closed by the micro-electric switch may be used to operate or control any mechanism, to perform any desired operation, on any of the moving articles, or on any device other than the moving articles.

It is also to be understood that the driven arm 35 or the plunger actuating arm 18 may be employed to operate light operating mechanical parts, if desired. In a broader aspect of this invention, the driving arm 45 may be operated by any means other than by moving articles as illustrated and described. For example the switch may be manually operated by the hand or the foot of the operator. In foot operation of switches as at present constructed the operator must move a treadle in one direction to close the switch and in the other direction to open the switch. When my present invention is employed for manual operation a single movement of the hand or foot of the operator in one direction both closes and opens the switch, the advantages of which will be readily appreciated.

As will also be obvious certain features of my invention are applicable to other types of reciprocating or oscillating driving and driven members adapted to move back and forth.

While I have illustrated and described a preferred form of my invention it is to be understood that I do not wish to be limited to the structure herein illustrated and described as obviously various modifications and changes may be made therein without departing from the spirit and scope of the invention.

What I claim is:

1. The combination with driving and driven members adapted to be moved back and forth and which respectively have a variable length of travel and a shorter limited travel, of one way pick-up means on one of said members for picking up said driven member and driving it forwardly, said pick-up means being released at the limit of forward movement of said driven member whereby to render said pick-up means ineffective to transmit a driving force from the driving member to the driven member during the return movement of said driving member, said pick-up means comprising a spring pressed element on one of said members urged into the path of travel of the other member and a beveled edge on said other member with which said spring pressed element cooperates to drive said driven member forwardly and said other member also being provided with a beveled surface extending at a smaller angle to the direction of travel than said beveled edge and small enough to depress said spring pressed element without exerting a component of force in the direction of travel of said other member sufficient to move said other member.

2. The combination with driving and driven

members adapted to be moved back and forth and which respectively have a variable length of travel and a shorter limited travel, of one way pick-up means on one of said members for picking up said driven member and driving it forwardly, said pick-up means being released at the limit of forward movement of said driven member whereby to render said pick-up means ineffective to transmit a driving force from the driving member to the driven member during the return movement of said driving member, said pick-up means comprising a spring pressed element on one of said members urged into the path of travel of the other member and a beveled edge on said other member with which said spring pressed element cooperates to drive said driven member forwardly and said other member also being provided with a beveled surface extending at a smaller angle to the direction of travel than said beveled edge and small enough to depress said spring pressed element without exerting a component of force in the direction of travel of said other member sufficient to move said other member and means in the path of travel of said driven member for limiting the travel thereof.

3. In combination with pivoted driving and driven arms supported in closely spaced parallel planes and on spaced parallel pivotal axes, one of said arms being provided with a hole the edge of which constitutes a seat for a ball, a ball seated in said seat and projecting into the path of the other arm, spring means for urging said ball onto its seat, said other arm being of hexagonal cross section, with one of its faces extending angularly with respect to the planes of movement of said arms and said ball and adapted to be engaged by said ball upon forward movement of said driving arm to move said driven arm forwardly and to move said ball from its seat and disconnect said arm on an increase of load on said driven arm.

4. In combination with pivoted driving and driven arms supported in closely spaced parallel planes and on spaced parallel pivotal axes, one of said arms being provided with a hold the edge of which constitutes a seat for a ball, a ball seated in said seat and projecting into the path of the other arm, spring means for urging said ball onto its seat, said other arm being of hexagonal cross section, with one of its faces extending angularly with respect to the plane of movement of said arms and said ball and adapted to be engaged by said ball upon forward movement of said driving arm to move said other arm forwardly, and means for the arresting of the movement of said other arm whereupon said ball is pressed away from its seat by said face out of engagement with said other arm.

5. In combination with pivoted driving and driven arms supported in closely spaced parallel planes and on spaced parallel pivotal axes, said driving arm being provided with a hole the edge of which constitutes a seat for a ball, a ball seated in said seat and projecting into the path of the driven arm, spring means for urging said ball unto its seat, said driven arm being of hexagonal cross section, with one of its faces extending angularly with respect to the plane of movement of said arms and said ball and adapted to be engaged by said ball upon forward movement of said driving arm to move said driven arm forwardly, and means for the arresting of the movement of said driven arm whereupon said ball is pressed away from its seat by said face out of engagement with said driven arm, and means for returning said driven arm after such disengagement and means for returning said driving arm past said driven arm, said driven arm being provided with a shallow bevel for pressing said ball out of the path of said driving arm without transmitting driving force from said driving arm to said driven arm.

6. In mechanism of the character described, the combination of driving and driven arms mounted side by side in a support and adapted to oscillate therein, a one-way pick-up slip clutch for carrying the driven arm forwardly with the driving arm, individual means for returning said arms to normal position, means for arresting the forward movement of said driven arm and causing said clutch to slip, comprising a finely adjustable stop, means adjustably supporting said stop on said support for approximate adjustment thereof, and a stop for limiting the return movement of said driving arm, said clutch being inoperative during the return of said driving arm.

7. In mechanism of the character described, the combination of driving and driven arms mounted side by side in a support and adapted to oscillate therein, a one-way pick-up clutch for carrying the driven arm forwardly with the driving arm, individual means for returning said arms to normal position, means for arresting the forward movement of said driven arm and causing said clutch to slip, comprising a finely adjustable stop, means adjustably supporting said stop on said support for approximate adjustment thereof, and a stop for limiting the return movement of said driving arm, said clutch being inoperative during the return of said driving arm, said supporting means for said first mentioned stop comprising an adjustably mounted plate on said support, securing said second mentioned stop upon said support.

8. In combination, a main support, a driving arm, means for pivotally connecting said driving arm to said support, said driving arm having a ball detent thereon, a housing carried by said main support, a shaft extending into said housing, a switch operating arm pivoted on the shaft within the housing, a stop member on the shaft within the housing, spring means acting between the shaft and operating arm to maintain said operating arm normally against said stop member on the shaft, a driven arm carried by said shaft and extending in a plane substantially parallel to the plane of the driving arm, said driven arm adapted to be engaged by the ball on the driving arm to cause the rotation of the driven arm with the driving arm through a limited amount of travel of the driving arm and against the action of said spring means, stop means for limiting the movement of the driven arm and to cause the release of the driving arm therefrom, said spring means serving to return the driven arm to its initial position when the driven arm has been released by the driving arm, said driven arm being ineffective to resist the driving arm as it is returned past the driven arm to its initial position.

9. In combination, a main support, a driving arm, means for pivotally connecting said driving arm to said support, said driving arm having a ball detent thereon, a housing carried by said support, a shaft extending into said housing, a switch operating arm pivoted on the shaft within the housing, a stop member on the shaft within the housing, spring means acting between the shaft and operating arm to maintain said operating arm normally against said stop mem-

ber on the shaft, a driven arm carried by said shaft and extending in a plane substantially parellel to the plane of the driving arm, said driven arm adapted to be engaged by the ball on the driving arm to cause the rotation of the driven arm with the driving arm through a limited amount of travel of the driving arm and against the action of said spring means, stop means for limiting the movement of the driven arm to cause the release of the driving arm therefrom, said spring means serving to return the driven arm to its initial position when the driven arm has been released by the driving arm, said driven arm being ineffective to resist the driving arm as it is returned past the driven arm to its initial position, said stop means for the driven arm being adjustable on its support to effect minor variations of movement of the driven arm, a support for said stop means, and means for adjustably connecting said support to the housing to effect larger variations of adjustment of the stop.

10. The combination with driving and driven members adapted to move back and forth, of a one-way driving slip connection between said members adapted to be released by an increase

of load, the driving member being adapted to return to its initial position without the slip connection being effective as a driving connection, and means for returning said driven member to its initial position upon release of said driving connection.

ERHARD KLUG.

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