Oct. 30, 1951 W. HOMAN 2,573,022

OPERATION CONTROL MEANS FOR CALCULATING MACHINES

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FIG.1

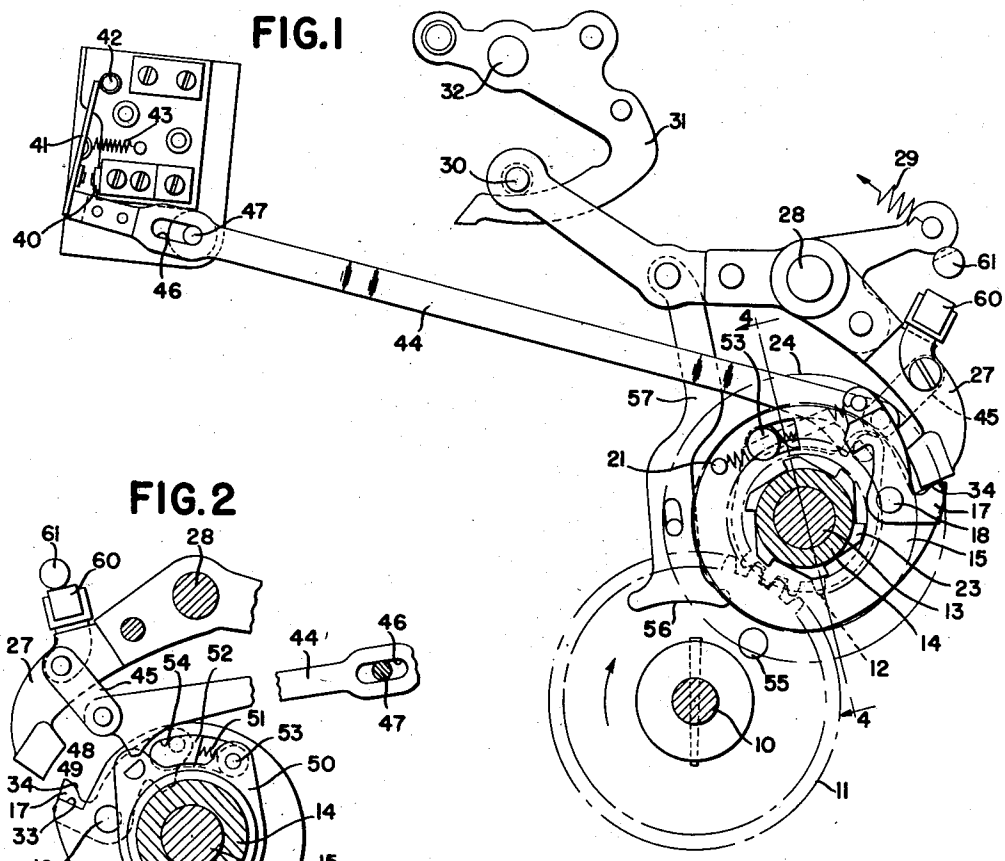


FIG.2

FIG.3

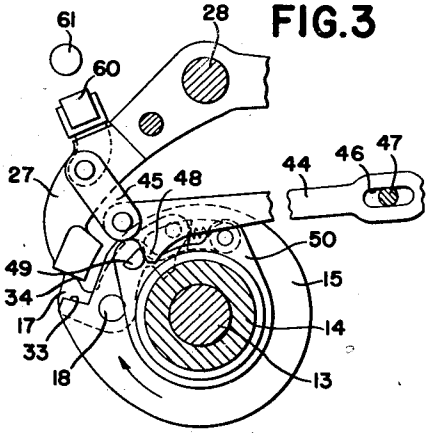
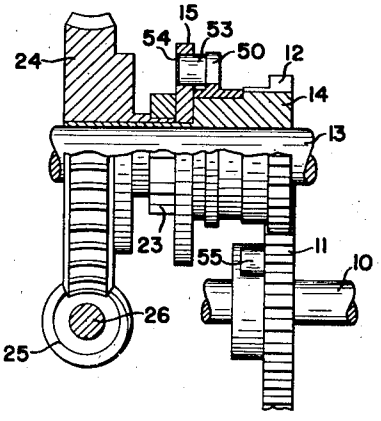


FIG.4



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OPERATION CONTROL MEANS FOR CALCULATING MACHINES

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4 Claims. (Cl. 192—.02)

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This invention relates to switch and clutch mechanisms for starting and stopping calculating machines and the like.

The object of the invention is to provide a simple and effective means to control the release of a calculating machine and simultaneously close a switch and electric circuit through a driving motor therefor.

A specific object of the invention is to simplify the constructions of the prior art for controlling a clutch for a calculating machine and for the closing of a switch of an electric motor therefor.

Another specific object of the invention is to provide direct connections from a clutch arm, usually provided in calculating machines of the class disclosed, to a motor switch arm.

With these and incidental objects in view, the invention includes certain novel features of construction and combinations of parts, a preferred form or embodiment of which is hereinafter described with reference to the drawing which accompanies and forms a part of this specification.

In said drawing:

Fig. 1 is an assembly view showing the clutch mechanism and the switch operating mechanism in their home position.

Fig. 2 is a detail view showing the clutch arm and the switch operating link immediately after the clutch has been released.

Fig. 3 is a detail of the mechanism shown in Fig. 2 in the position which it assumes just prior to opening of the switch and disengagement of the clutch from the machine.

Fig. 4 is a side elevation, partly in section, taken on lines 4—4 of Fig. 1.

General description

The novel clutch and switch control mechanism disclosed herein is provided to simplify the constructions shown and described in United States Letters Patent No. 1,144,418, issued on June 29, 1915, to Charles F. Kettering and William A. Chryst; No. 1,920,328, issued on August 1, 1933, to Bernis M. Shipley; No. 2,060,249, issued on November 10, 1936, to Howard B. Scott; and No. 1,737,907, issued on December 3, 1929, to Charles H. Arnold. Machines of the class in which the invention is shown applied are supplied with what is known in the art as "stop-start" motors; that is, motors which are energized for a single machine operation. To obtain this result, a switch is provided in the motor circuit, which switch is open when the machine is at rest. The machines are also provided with a

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clutch mechanism to clutch the motor to the main shaft of the machine for a single machine operation, and at the end of such an operation the motor is again unclutched from the main shaft. In the prior art, two separate trains of mechanism are provided, one to actuate the clutch release and the other to operate the switch. By his novel construction, applicant has combined the two trains of the prior art, by connecting the switch operating mechanism directly to the clutch control arm, thus not only providing a simpler mechanism but also getting better timing of operations to obtain a better control sequence between the clutch release and the switch closing operations. This sequence also better controls stopping the machine at the end of a machine operation.

Detailed description

Machines to which the present invention is shown applied are provided with a main drive shaft 10, on which is secured a gear 11 (Figs. 1 and 4). The gear 11 meshes with a pinion 12, rotatably mounted on a shaft 13. The pinion 12 is formed on a shouldered hub 14, to which is secured a disk 15. A clutch pawl 17 is pivoted on a stud 18 carried by the disk 15, which pawl is rocked counter-clockwise (Fig. 1) by a spring 19 when the pawl is released in the manner described hereinafter. The spring 19 is connected to a stud 20 carried by the free end of the pawl 17 at one end and on a stud 21 carried by the disk 15 at its other end. When released, the clutch pawl 17 is rocked into engagement with a ratchet wheel 23, secured to a gear, such as a spiral gear 24, rotatably mounted on the extension of the hub 14. The spiral gear 24 engages with a spiral pinion 25, secured to the motor armature shaft 26.

The machines of the class to which the present invention is shown applied, referred to above, are provided with a clutch release arm 27 (Figs. 1, 2, and 3). The clutch release arm 27 is pivotally mounted on a shaft 28 carried by the framework of the machine. A spring 29 normally tends to rotate the clutch release arm 27 counter-clockwise (Fig. 1) but is normally restrained in the position shown in Fig. 1 by a stud 30 thereon engaging a release arm 31 secured to a release shaft 32.

In the machines referred to above, the release shaft 32 is rocked counter-clockwise (Fig. 1) upon release of the machine for operation. Counter-clockwise rocking of the release arm 31 frees the stud 30 to permit the spring 29 to rock

the clutch release arm 27 counter-clockwise to withdraw the clutch release arm from engagement with a shoulder 33 on the disk 15 and a shoulder 34 on the release pawl 17. Withdrawal of the clutch release arm 27 from the shoulder 33 frees the disk 15 for operation, and simultaneous withdrawal of the clutch release arm 27 from the shoulder 34 of the clutch pawl 17 permits the spring 19 to rock the clutch pawl 17 into engagement with a tooth on the ratchet wheel 23.

Upon energization of the motor for operation, the armature shaft 26, through the pinion 25 and the gear 24, rotates the ratchet wheel 23 and, by its engagement with the clutch pawl 17, rotates the disk 15 and, through the hub 14, rotates the gear 11 and the pinion 12 to rotate the main shaft 10 of the machine.

Motors provided for machines disclosed in the above-mentioned patents are normally deenergized, and a switch therethrough must be closed to energize the motor to start it in operation. The switch disclosed in Fig. 1 is in the motor circuit, and therefore, upon said switch's being closed, the motor begins to operate. The motor switch consists of a stationary contact 40 (Fig. 1), suitably mounted on the framework of the machine, and a movable switch 41 pivoted on a stud 42. The movable switch arm 41 is normally urged counter-clockwise by a spring 43. The lower end of the switch arm 41 has connected thereto a link 44 pivoted to the lower end of a short link 45, the latter being also pivoted to the above-mentioned clutch release arm 27. The link 44 is provided with a slot 46 engaging on a stud 47 carried by the framework of the machine to support and guide the left end (Fig. 1) of said link 44. The link 44, and therefore the switch arm 41, are normally restrained in the open position by a toe 48 formed on the link 44, engaging a stud 49 carried by a disk 50. The disk 50 is mounted to rotate on a shoulder of the hub 14, as clearly shown in Fig. 4. A spring 51, mounted between a block 52 carried by the disk 15 and a stud 53 carried on the disk 50, normally maintains the stud 53 in engagement with the one end of a slot 54 in the disk 15. The spring 51 is stronger than the spring 43, and therefore the spring 43 is unable to overcome the stress of the spring 51. Hence, when the machine is in normal position, the switch through the motor will remain open.

Upon rocking of the clutch arm 27, when the machine is released for operation, the link 45 lifts the toe 48 from engagement with the stud 49 to permit the spring 43 to rock the switch arm 41 to close the switch through the motor. The relative positions of the parts at this time are illustrated in Fig. 2.

Near the end of the machine operation, a stud 55 (Fig. 1), carried by the gear 11, engages the end 56 of a link 57 pivoted to the clutch release arm 27 and moves said clutch release arm 27 clockwise (Fig. 1) into the position shown in Fig. 3. When in the position shown in Fig. 3, the clutch arm 27 lies in the path of movement of the shoulder 33 of the disk 15 and of the shoulder 34 on the clutch pawl 17. The clockwise rotation (Fig. 1) of the clutch release arm 27, through the link 45, also lowers the toe 48 into the path of the stud 49. At the very end of the machine operation, the shoulder 34 of the pawl 17 engages the end of the clutch release arm 27, thus rotating the clutch pawl counter-clockwise (Fig. 3) to lift the clutch pawl 17 out of engagement with the ratchet wheel 23.

Immediately thereafter, the shoulder 33 comes into engagement with the end of the clutch release arm 27 to arrest the disk 15, and therefore the main shaft of the machine, in their home positions. Simultaneously with the rocking of the clutch release pawl 17 out of engagement with the ratchet wheel 23, the stud 49 engages the toe 48 and shifts the link 44 to open the switch 41, thus stopping rotation of the motor.

As mentioned above, the disk 50 is rotatably mounted on a shoulder of the hub 14 and is held in its normal position by the spring 51. This construction is used to cushion the blow of the stud 49 against the toe 48 at the end of the machine operation. Normally there is no relative movement between the disks 15 and 50. However, if any obstruction should be encountered, the cushioning effect of the spring 51 will prevent any damage to the switch operating mechanism.

The releasing movement of the clutch release arm 27 is limited by the engagement of a rubber bumper 60 thereon with the stud 61 mounted on the framework of the machine. The bumper 60 is made of rubber, or other resilient material, to lessen the noise and wear coincidental with the operation of the machine. This construction is desirable, inasmuch as the spring 29 is a comparatively strong spring and in the releasing movement whips the arm 27 at a rapid speed.

In the novel mechanism disclosed herein, the spring 43 holds the contact points 40—41 together, and the pitman 44 floats during the machine operation. The rotating clutch members have no mechanical connection with the switch mechanism during the machine operation, hence no wear will develop to cause uncertain switch contacting. This overcomes a serious defect in the type of mechanisms disclosed in the above mentioned patents, where a cam roll riding the periphery of a cam carried on the clutch assembly must exert a constant force during an operation to overcome spring tension and keep the switch contacts closed. In practice it has been found that the said cam roll and its stud wear, with the result that the switch contacts are not properly held closed.

While the form of mechanism shown and described herein is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form or embodiment shown herein, for it is susceptible of embodiment in various other forms.

What is claimed is:

1. In a machine of the class described, a clutch mechanism consisting of a driving member, a driven member, an element carried by one of said members, a spring to move said element from a non-connecting position into a position to connect the driving member to the driven member, and a release arm normally maintaining said element in said non-connecting position; the combination of a motor to drive the driving member, a normally open switch in a circuit through said motor, a first link having one end thereof pivoted on the release arm; a second link connecting the other end of the said first link to the switch; a spring to urge the said second link in switch closing direction; a toe formed on one of said links; means on one of said members coacting with said toe to normally retain said second named link in a position to maintain said switch open, and an operating device to operate said release arm to release said element to the action of the first named spring to cause the element to connect the driving element to the driven

element, said release arm and first named link thereby moving said toe from engagement with said means to release the second-named link to the action of said second-named spring to cause the second-named link to move to close said switch.

2. In a machine of the class described, a clutch mechanism consisting of a driving member, a driven member, an element carried by one of said members, a spring to move said element from a non-connecting position into a position to connect the driving member to the driven member, and a release arm normally maintaining said element in said non-connecting position; the combination of a motor to drive the driving member, a normally open switch in a circuit through said motor, a first link having one end thereof pivoted on the release arm; a second link connecting the other end of the said first link to the switch; a spring to urge the said second link in switch closing direction; a toe formed on one of said links; a projection on one of said members coacting with the toe to normally restrain the second-named link and the switch in open position, and means to operate said release arm to release said element to move into connecting position, said release arm acting through the first-named link to release the toe from the projection to thereafter control the closing of said switch to start the motor operating to operate the driving member.

3. In a machine of the class described, a clutch mechanism consisting of a driving member, a driven member, an element carried by one of said members and movable from a non-connecting position into a position to connect the driving member to the driven member, and a release arm normally maintaining said element in said non-connecting position; the combination of a motor to drive the driving member, a normally open switch in a circuit through said motor, a first link pivoted to the release arm, a second link connecting the first link to the switch, a spring to urge the second link and the switch toward the closed position of the switch, a toe formed on the second link, a projection on one of said members engaging with the toe to normally restrain the linkage against the action of the spring and thereby maintain the switch in open position, means to operate said release arm to release said element to cause the element to connect the driving element to the driven element and to disengage the toe from said projection to thereafter

cause the second link to be moved by said spring to close said switch, said projection movable into contact with the toe to move the second link at the end of a machine operation to open the switch, and connections to restore the release arm to normal position, wherein said element is moved into non-connecting position and the toe is moved into the path of movement of said projection.

4. In a machine of the class described, a clutch mechanism consisting of a driving member, a driven member, an element carried by one of said members and movable from a non-connecting position to a position to connect the driving member to the driven member, and a release arm normally maintaining said element in said non-connecting position; the combination of a motor to drive the driving member, a normally open switch in a circuit through said motor, a first link pivoted to the release arm, a second link pivoted to the first link and connected to the switch arm, a spring to urge the second link and the switch arm toward the closed position of the switch, a projection on one of said members engaging with the toe to normally restrain the second link against the action of the spring and thereby hold the switch in open position, and means to operate said release arm to release said element to cause the element to connect the driving element to the driven element and to disengage the toe from said projection to thereafter cause the second link to be moved by said spring to close said switch, said projection movable into contact with the toe to move the second link at the end of a machine operation to open the switch.

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