

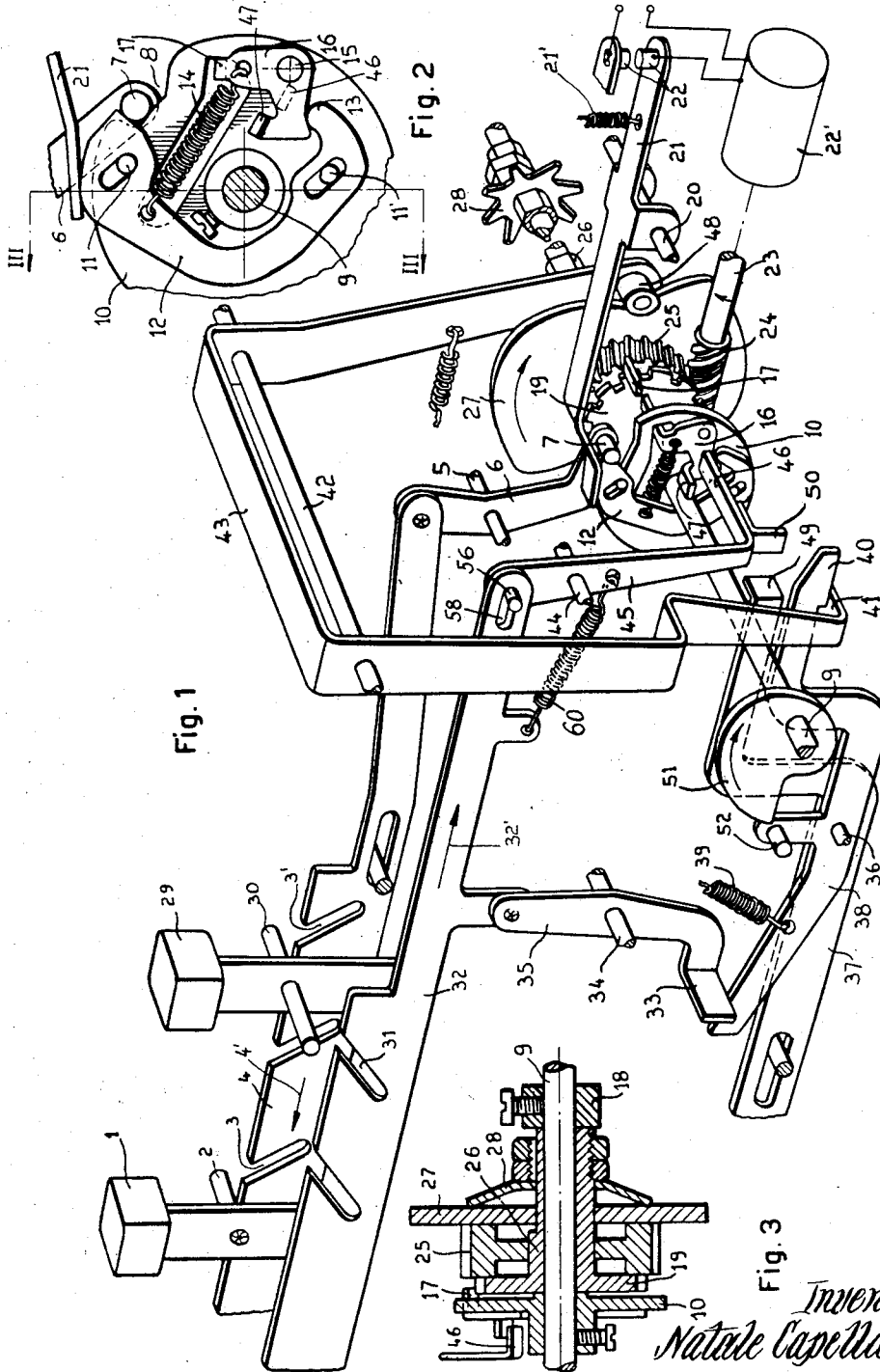
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OPERATING MECHANISM FOR POWER DRIVEN BUSINESS MACHINES

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1

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**OPERATING MECHANISM FOR POWER DRIVEN BUSINESS MACHINES**

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The present invention relates to business machines such as computing machines, calculating machines, and so forth, particularly of the type wherein upon manipulation of a function key a power driven main operating mechanism is started for one or more machine cycles.

As is known in the art, function keys generally control a number of mechanisms which are required to accomplish certain movements upon manipulation of said keys. Sometimes it is difficult to accomplish all the said movements within one single machine cycle. Therefore, two or more consecutive machine cycles have been allotted to certain function keys. This is the case, as for instance, of the total keys of some conventional listing computing machines.

In order to avoid the necessity of increasing the number of machine cycles for the performance of a single function, it has been proposed to provide certain function keys with a spring actuated servo-mechanism, which is released upon manipulation of the key and which relieves the main operating mechanisms from a portion of its work during a first part of the machine cycle. However, the mode of operation of this sort of function keys is rough and noisy, due to the abrupt actuation of the servo-mechanism.

Finally, it has been proposed to reduce the cycling speed of the operating mechanism by means of a reduction gearing which becomes effective upon manipulation of certain function keys. Such reduction gearings are costly and their provision complicates the design of the machine.

It is an object of the invention to provide an improved driving mechanism which is of simple construction and of a smooth and reliable operation.

According to the invention, upon manipulation of certain function keys an auxiliary power driven operating mechanism becomes effective before the main operating mechanism is started.

Further objects and details will be apparent from the following description when read in connection with the accompanying drawings, wherein:

Fig. 1 is a partial lateral rear view of a machine embodying the invention;

Fig. 2 is a fragmentary enlarged plan view of the clutch seen in the lower right-hand portion of Fig. 1, and

Fig. 3 is a sectional view taken as indicated by the line III—III of Fig. 2.

Referring now to Fig. 1, 1 designates a function key such as the motor bar, well known in computing and calculating machines. The stem of the key 1 carries a stud 2, which when lowered is adapted to ride in an inclined slot 3 of a longitudinally shiftable bar 4. A lever 6 pivoted at 5 is linked to the bar 4. The lever 6 carries a stud 7, which is normally situated in a recess 8, Fig. 2, of a one-revolution clutch disc 10 secured to a main operating shaft 9. A plate 12 is shiftable on pins 11 and 11' secured to the clutch disc 10. A projection 13 of the plate 12 normally engages a clutch pawl

2

16 pivoted at 15 on the clutch disc 10 and urged counterclockwise by a spring 14. The pawl 16 is provided with a lug 17 which is engageable with the teeth of a clutch wheel 19, Fig. 1. The latter is loosely mounted upon the shaft 9, Fig. 3, between the clutch disc 10 and a fastening ring 18.

The plate 12 normally engages the forward end of a contact lever 21, which is pivoted at 20 and is urged counterclockwise by a spring 21'. At its rearward end the contact lever 21 operates a motor switch 22, which, when closed, energizes the electric circuit of a conventional motor 22', schematically shown in Fig. 1.

The motor 22' drives a motor shaft 23, which is adapted to transmit drive through helical gears 24 and 25. The gear 25 is loosely mounted upon a hub 26 of the clutch wheel 19, Fig. 3. A leaf spring 28, Figs. 1 and 3, axially movable along the hub 26 but not revoluble thereon, presses the gear 25 against the clutch wheel 19, through a friction disc 27 similarly mounted upon the hub 26.

In the normal position of the stud 7 shown in Fig. 2, the plate 12 is prevented from moving downwards, disabling thus the clutch pawl 16, and the contact lever 21 is prevented from rocking counterclockwise, preventing thus the energization of the motor circuit.

Upon depression of the function key 1 the bar 5 moves forwardly (in the direction of the arrow 4') whereby the stud 7 releases both the plate 12 and the contact lever 21. Upon closure of the switch 22 the motor circuit is energized and the motor shaft 23 starts rotating. This rotation will be transmitted to the gear 25, which will friction-drive the clutch wheel 19. Since the plate 12 has been released, the pawl 16 has been enabled to rock counterclockwise and to fall with its lug 17 into the clutch wheel 19. The clutch disc 10, and, therefore, the main operating shaft 9 will thus be rotated.

The mode of operation described hereinabove does not differ substantially from the mode of operation of a conventional main operating mechanism.

According to the invention, a function key, such as the function key 29, is provided with an auxiliary operating mechanism which is effective before the main operating shaft 9 is clutched to the motor.

The stem of the key 29 carries a stud 30 projecting from both sides of the stem and which when depressed is adapted to ride in an inclined slot 3' of the bar 4 as well as in an inclined slot 31 of a longitudinally shiftable bar 32. To the latter there is linked a lever 35, pivoted at 34 and provided with a lug 33 normally engaging a lever 38 pivoted at 36 on a longitudinally shiftable bar 37. The lever 38 is urged clockwise by a spring 39 and is provided with a projection 40 capable of latching a lug 41 of a bail 43 pivoted on a shaft 42.

A lever 45 linked to the bar 32 and pivoted at 44 is provided with a lug 46 adapted to engage a lug 47 projecting from the pawl 16.

Upon depression of the function key 29 the bar 4 moves forwardly as described above and the bar 32 is shifted rearwardly, in the direction of the arrow 32'. The lug 33 of the lever 35 disengages thereupon the lever 38, enabling the latter to be rocked clockwise by the spring 39 until its projection 40 latches the lug 41 of the bail 43.

Furthermore, upon the rearward movement of the bar 32 the lever 45 is rocked clockwise, whereby its lug 46 is placed beneath the lug 47 of the pawl 16. It will be apparent that the pawl 16 is thus prevented from rocking counterclockwise notwithstanding the stud 7 has disengaged the plate 12. Therefore, the clutch disc 10 is prevented from being clutched to the clutch wheel 19. The latter, however, is rotated by the motor shaft 23 since the motor switch 22 has been closed as before.

As described above, the friction disc 27 rotates together with the gear 25 and the clutch wheel 19. The friction disc 27 is cam-shaped as shown in Fig. 1 and engages a roller 48 carried by an arm of the bail 43. As it will be apparent from Fig. 1, the bail 43 will thus be rotated counterclockwise and the lever 38 will be entrained rearwardly. Since the lever 38 is pivoted on the bar 37, the latter will also be shifted rearwardly.

Generally speaking, the bar 37 may be formed of any suitable control and/or operating member capable of correspondingly controlling machine's operation. It is irrelevant to state what mechanisms or machine functions are actually controlled by the bar 37, the object of the above description having been that to show that upon operation of a function key such as the key 29, an auxiliary operating mechanism such as the bar 37, may be effective before starting the main operating mechanism such as the main operating shaft 9. As for instance, in the case of a conventional listing computing machine having an algebraic totalizer and an automatic true balance mechanism provided for setting the totalizer either additively or subtractively before taking a total, the key 29 may be a total key and the bar 37 may be utilized for controlling the true balance mechanism before starting the main operating shaft 9.

One and the same auxiliary operating mechanism may be provided for more than one function key. In the case mentioned above, both the total and the sub total keys may control the same bar 32, the bar 37 being effective for both keys.

As described above, the bar 37 is shifted rearwardly by the bail 43. Near the end of this movement a lug 49 provided on the bar 37 strikes a lug 50 fastened to the lever 45. The lever 45 is thus rocked counterclockwise, whereupon its lug 46 disengages the lug 47 of the pawl 16. The latter will thus be permitted to engage with the clutch wheel 19 and the main operating shaft 9 will be put into rotation.

For enabling the lever 45 to be rocked counterclockwise by the lug 49 without affecting the bar 32 a flexible joint may be provided between the bar 32 and the lever 45, the same comprising a pin 56 on the lever 45 received in a slot 58 in the bar 32 and a spring 60 interconnecting said bar and lever.

A cam disc 51 is secured to the shaft 9. Upon rotation of the latter, the cam disc 51 engages a stud 52 carried by the lever 38, first rocking the lever 38 counterclockwise until reengaged by the lug 33 and then shifting the lever 38 together with the bar 37 forwardly into the position of rest shown in Fig. 1.

Upon completion of one revolution the clutch disc 10 enables the bar 4, the key 29 and the bar 32 to be restored to normal.

The friction disc 27 is shaped with two similar opposite cams, either cam only being effective upon operation of the key 29. This is due to the fact that the friction-driven disc 27, as well as the gears 24 and 25, have no definite end or starting position. Therefore, the case may happen in which at the end of a revolution of the main shaft 9 the disc 27 and the bail 43 engaged thereby come to rest in a position wherein upon depression of the key 29 the projection 40 is unable to engage the lug 41. The disc 27 will thus rotate ineffective until its

second cam comes into operation. In any case, the main shaft 9 is clutched within one revolution of the disc 27. Of course, the disc 27 may be provided with a different number of cams.

From the foregoing description it will be understood that many changes may be made in the above construction, and different embodiments of the invention could be made without departing from the scope thereof. It is, therefore, intended that all matter contained in the above description, or shown in the accompanying drawings, shall be interpreted as illustrative, and not in a limiting sense.

What is claimed is:

1. In a business machine having power means, a normally latched clutch, and a main operating mechanism drivable by said power means through said clutch, the combination of an auxiliary driving member driven by said power means, a function conditioning device engageable by said driving member for being moved thereby, manipulative means for unlatching said clutch and simultaneously rendering said engagement effective, locking means operable by said manipulative means to temporarily prevent said clutch from being unlatched means controlled by said conditioning device when so moved for rendering said locking means ineffective and thus unlatching said clutch for an operating cycle, and means controlled by said operating mechanism during said cycle for rendering said engagement ineffective.

2. In a business machine having a power shaft, a normally ineffective clutch, and a main operating mechanism drivable by said power shaft through said clutch, the combination of a normally ineffective actuator drivable by said power shaft and having a plurality of sequentially arranged actuating cam portions of substantially the same shape, said actuator having an indefinite normal position, an oscillating member sequentially actuatable by said cam portions, a reciprocable function conditioning member, moving means engageable by said oscillating member for moving said conditioning member in one direction, said moving means being normally prevented from being engaged by said oscillating member, manipulative means for rendering said actuator effective and for enabling said oscillating member to engage said moving means for moving said conditioning member upon actuation of said oscillating member by the first effective one of said cam portions, means controlled by said conditioning member upon being so moved for rendering said clutch effective for an operating cycle, and means controlled by said operating mechanism during said cycle for moving said conditioning member in the opposite direction substantially upon completion of said cycle.

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