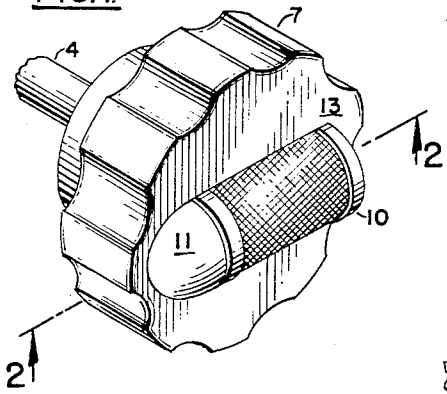
Dec. 20, 1955 W. J. OPOCENSKY 2,727,406

SELECTIVELY ENGAGEABLE CONTROL KNOB

Filed Oct. 28, 1952

FIG. 1.



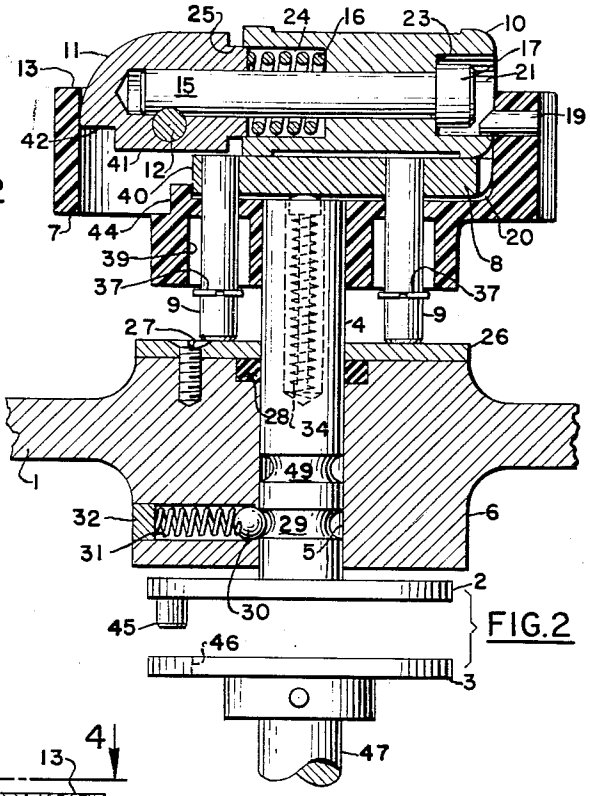


FIG. 2

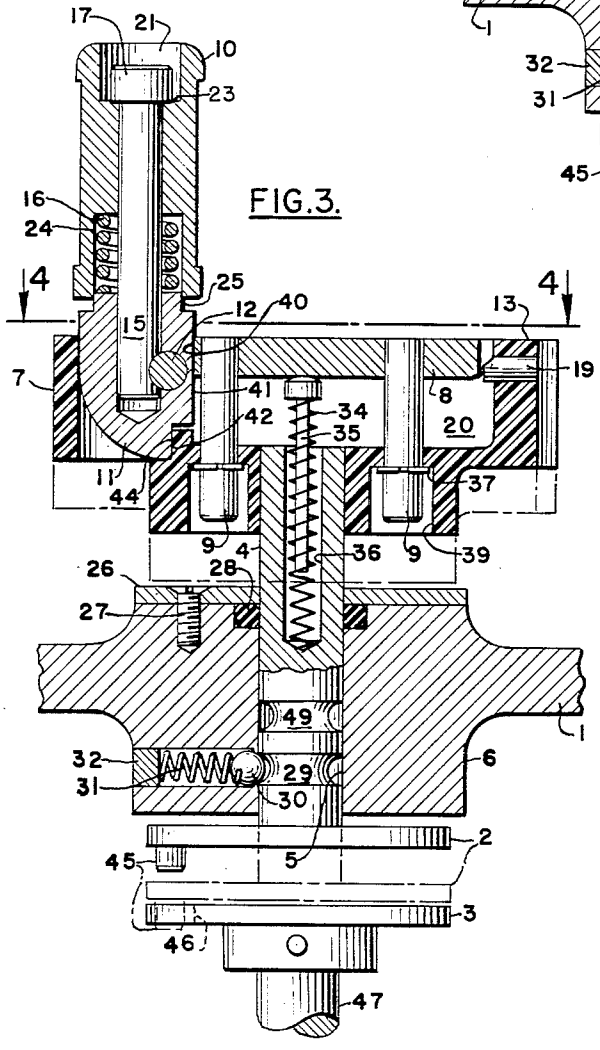
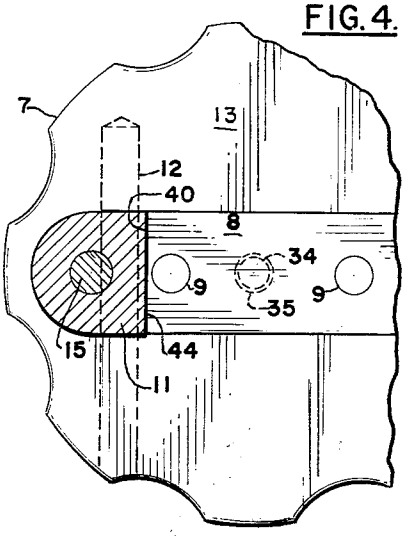


FIG. 3.

FIG. 4.



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SELECTIVELY ENGAGEABLE CONTROL KNOB

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5 Claims. (Cl. 74—548)

This invention relates to control knobs and particularly to selectively engageable knobs which indicate the condition of operability.

The invention comprises a control knob which is normally disengaged from the equipment to be controlled, except during the actual entry of data. The knob has a handle which is raised to a projecting position during data entry, permitting the operator to spin it rapidly. When not in use, this handle is partially recessed into the front surface of the knob. The knob is releasably locked in this position, so that it is impossible for an accidental movement of the knob to be transmitted into the equipment. When the operator releases and raises the knob handle, he automatically unlocks the knob so that it may be engaged with the equipment. Data insertion is still not possible until the operator moves the knob to engage a clutch within the instrument. These results are accomplished with the aid of a pair of retractable pins controlled by the position of the handle, and a detent which locks the knob shaft releasably in either of two positions.

Such a selectively engageable handle is particularly useful in connection with complex computing equipment where the shafts are connected to continuously operating mechanisms. In such case, accidental constraint of the knobs on the surface of the panel or control board might seriously interfere with the internal operation of the machine. By the use of the present invention, the likelihood of such interference is substantially minimized.

It is thus an object of the invention to provide a manually operable control knob which is selectively engageable with the equipment to be controlled.

A further object is to provide a knob with releasable locking means which indicate the state of the operating connection between the knob and the associated equipment.

Another object is to permit the rapid introduction of data into a machine, when desired, while allowing the control knobs to remain out of engagement with the internal operating portions of the equipment at other times.

A still further object is to provide a knob which will not catch the fingers of the operator when he has the handle in position for introducing data rapidly.

These and other objects will be more fully understood by the description following hereafter in connection with the drawings, in which:

Fig. 1 is a perspective view of the control knob of the invention, with the handle portion in its disengaged position.

Fig. 2 is a sectional view of the knob, looking in the direction indicated by the line 2—2 in Fig. 1, together with a portion of the supporting panel structure and clutch mechanism.

Fig. 3 is a sectional view similar to that of Fig. 2,

but with the handle raised to permit engaging the knob for introduction of data.

Fig. 4 is a view, partially in section, taken along line 4—4 of Fig. 3, showing the relation between the handle, the knob and the locking plate, when the handle is raised.

The invention has been shown as applied to a computing device, not shown in detail in the drawing, but mounted in a supporting frame 1. A pair of clutch elements 2 and 3 are suitably mounted relative to the supporting frame 1, and means are provided whereby these elements may be operatively engaged when it is desired to enter values in the device manually.

The operative engagement is effected by shifting one of the clutch elements axially. A stub shaft 4 carries the shiftable clutch element 2, and is journaled for smooth rotation and for traversal parallel to its axis of rotation in a suitable bore 5 thru a boss 6 formed on the supporting frame 1. The axial shifting and rotation of the stub shaft 4 are directly controlled by means of a manually operable knob 7 fixed to the shaft 4.

Knob 7 contains means for locking stub shaft 4 against undesired axial shifting into clutch-engaging position. This locking is effected by a blocking device having a movable plate 8 and a pair of pins 9. The movable plate 8 may be locked in one position to prevent engagement of the clutch members, and shifted to another to permit data entry.

Plate 8 is held in the locked position, to prevent engagement of the clutch members, by a handle member 10. Handle member 10 is pivotally mounted in the knob 7 and is releasably lockable in position to hold plate 8 and pins 9 in the blocking position.

The handle 10 is mounted for pivotal movement thru a 90° arc on a hinged base portion 11, thru which passes a pivot pin 12 fixed in knob 7 parallel to, and recessed within, the knob surface 13.

Handle 10 is connected to the hinged base portion 11 by a central shaft 15. Handle 10 is bored to receive shaft 15 slidably. Movement of handle 10 axially of shaft 15 is permitted, within limits defined by a spring 16 and the shaft head 17, in order that handle 10 may be releasably locked in position to prevent engagement of the clutch members.

Locking is effected by the engagement of a retaining pin 19, fixed in the knob 7 and projecting into the handle recess 20, with a locking bore 21 formed within the outer end of the handle.

The inner end of locking bore 21 is defined by a shoulder 23 against which the shaft head 17 engages to limit the movement of handle 10 outwardly from pivot pin 12. The handle is urged outwardly by spring means 16 held under compression within a bore 24 formed in the end of handle 10 opposite the locking bore 21. Bore 24 fits slidably over a shoulder 25 formed on the hinged base section 11.

When handle 10 is to be locked down, it may be shifted on shaft portion 15 against the compression of spring 16 enough to clear the retaining pin 19; the pin 19 being chamfered, as shown, for this purpose. Spring 16 will then urge the handle 10 into engagement with pin 19 within locking bore 21, as seen in Fig. 2. Pins 9 are thus held firmly in extended position. Any effort to engage clutch members 2 and 3 will be prevented by contact between the pins 9 and a contact plate 26 fixed to the boss 6 by conventional means such as screws 27. The contact plate 26 also serves to retain an oil-sealing ring 28 in position about shaft 4.

The precise axial position of shaft 4 in this case is determined by a locking groove 29 formed there-around and a detent ball 30. Ball 30 is resiliently urged against

shaft 4 by a spring 31 secured in boss 6 by a plug 32. This locks shaft 4 releasably against axial shifting.

When handle 10 has been unlocked and is in erect position, pins 9 are withdrawn into knob 7. Moderate pressure on the operating knob 7 axially of shaft 4 will then suffice to release the detent engagement, so that the clutch member 2 may be moved into the engaging position shown in dotted lines in Fig. 3.

When handle 10 is released from locking engagement with pin 19, the movable plate 8 is urged outwardly by a spring 34 acting on a plunger 35. Spring 34 is compressed within a bore 36 in shaft 4 as shown in Fig. 2, when plate 8 is locked down. When plate 8 reaches a position flush with and forming a continuation of the surface 13 of knob 7, further movement is prevented by locking washers 37 fixed on pins 9, and engaging with the restricted inner ends of bores 39.

In this position, the locking end 40 of plate 8 engages a flat locking surface 41 on the handle base section 11. The engagement occurs with such a relation to the axis of pivot pin 12 that handle 10 cannot be again returned to the locked-down position until plate 8 is manually depressed.

The position of handle 10 is also fixed by the engagement of locking shoulders 42 and 44 formed on base section 11 and within knob 7, respectively, on the side of pivot 12 opposite to that on which plate 8 engages the base section.

With handle 10 in upright position, as shown in Fig. 3, knob 7 may be shifted inwardly. The clutch pin 45 then nests with slot 46 in clutch member 3, so that rotational values, inserted by turning knob 7, will be entered in the device thru shaft 47. Knob 7 is held in the shifted axial position by the cooperation of detent ball 30 with a second locking groove 49 formed in shaft 4. The position of that portion of the means for locking shaft 4 against axial movement constituted by handle 10, the handle base section 11 and plate 8 thus serves as an indicator to the operator of the condition of knob 7 with respect to the entry of data. When the handle is upright, it tells him that it is connected for data insertion, or ready to be made so by pushing the knob inwardly. When handle 10 is locked in its recessed position on knob 7, it indicates to the operator that clutch plate 2 is locked out of engagement with clutch plate 4, and that data cannot be inserted thru shaft 47.

A modification of the knob may be made in cases where it is desired to eliminate the lock-out feature for preventing undesired engagement of the clutch members. In such cases, pins 9 may be cut off immediately below the locking washers 37. Another modification involves the substitution of "bee-hive" type spiral springs for the spring 34. In such case the spiral springs would be disposed about pins 9 between the plate 8 and the bottom of the handle recess 20, while spring 34 and plunger 35 would be omitted.

I claim:

1. In a device of the class described, a supporting frame, a pair of clutch elements; operating means for said clutch elements, comprising a shaft carrying one of said clutch elements, said shaft being rotatably mounted in said frame and longitudinally shiftable therein to move said one of said clutch elements into and out of driving engagement with the other, and an operating knob secured to said shaft for effecting rotation and longitudinal shifting thereof; mechanism for locking said shaft against longitudinal clutch-engaging movement, comprising a blocking device carried by said knob and movable with respect thereto into such a locking position with respect to said frame as to prevent clutch-engaging movement of said shaft while permitting said knob to rotate freely; and means for holding said device in said blocking position, comprising a member movably mounted in said knob, and means for releasably retaining said member in engagement with said blocking device to hold the latter in said blocking position while permitting said knob to rotate freely.

2. The combination, in a device of the class described, of a supporting frame, a pair of clutch elements; operating means for said clutch elements, comprising a shaft journaled in said frame for rotation and axial shifting, and having one of said clutch elements secured thereto and shiftable therewith into and out of driving engagement with the other of said clutch elements, and a control knob secured to said shaft for effecting rotation and axial shifting thereof; and means for locking said shaft against axial clutch-engaging shifting, comprising blocking means disposed in said knob and movable into such blocking position relative to said frame as to prevent clutch-engaging shifting of said shaft while permitting said knob to rotate freely, comprising a handle pivotally disposed in said knob, means for releasably locking said handle in engagement with said blocking means to hold the latter in blocking position while permitting said knob to rotate freely, and means for utilizing said blocking means in unblocked position to releasably lock said handle in position for rapid entry of data.

3. In a device of the class described, the combination of a supporting frame, a driving clutch element, a driven clutch element; operating means for said clutch elements, comprising a stub shaft fixed to said driving clutch element and mounted rotatably in said frame and axially shiftably therein for engagement of said driving clutch element with said driven clutch element, and a manual control knob secured to said shaft for effecting rotation and axial shifting thereof; and releasable locking means effective in a first position to prevent engagement of said clutch elements, and effective in a second position to facilitate rapid entry of data, comprising blocking means disposed in said knob and movable into such position relative to said frame as to prevent clutch-engaging shifting of said stub shaft, a handle member having a base section pivotally mounted in said knob and a handle rotatably mounted on said base section and axially movable relative thereto, means for releasably locking said handle in engagement with said blocking means to hold the latter locked in said first position, said handle being recessed into a surface of said knob when in said first position, and means formed on said blocking means and said base section cooperating to lock said handle releasably in said second position, said blocking means being arranged to form a surface flush with and constituting a continuation of the said surface of said knob into which said handle is recessed when said releasable locking means are in said second position.

4. In a manual control knob arranged to be selectively engaged with equipment to be controlled, the combination of an axially positionable shaft, driving clutch means associated with said shaft and adapted to be engaged with cooperating driven clutch means within said equipment, means for selectively holding said shaft in an engaged or a disengaged position of said clutch means, a knob associated with said shaft, a recess formed in said knob, a handle mounted pivotally within said recess and movable between a position normal to said shaft and a position parallel to said shaft, locking means associated with said handle when in position normal to said shaft, and locking means associated with said handle when in position parallel to said shaft, comprising a movable plate arranged to be held in a depressed position by said handle when said handle is in position normal to said shaft, and arranged to be shifted to a position flush with the surface of said knob and in locking engagement with said handle when said handle is in a position parallel to said shaft.

5. The combination, in a manual control knob arranged to be selectively engaged with equipment in which data is to be entered, of driven clutch means associated with said equipment, supporting means associated with said equipment and arranged to receive a driving shaft, a driving shaft rotatably disposed in said supporting means

and arranged for displacement axially therein, a driving clutch member associated with said driving shaft, spring-loaded detent means disposed in said supporting means and arranged to provide resilient pressure against said shaft, grooves formed in said shaft arranged to cooperate lockingly with said detent means in engaged and in disengaged positions of said driving clutch member relative to said driven clutch means; a knob fixed to said shaft, a recess formed in said knob, a handle pivotally disposed in said knob for movement about an axis normal to the axis of rotation of said shaft, said handle being arranged to cooperate with means for locking said shaft against axial displacement when in locked position in said recess, means for locking said handle releasably in said recess,

and means adapted to permit axial displacement of said shaft and for locking said handle releasably in position parallel to the axis of rotation of said shaft and for constituting a smooth continuation of the face of said knob.

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