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MECHANICAL PRESSURE LATCH

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Fig. 1.

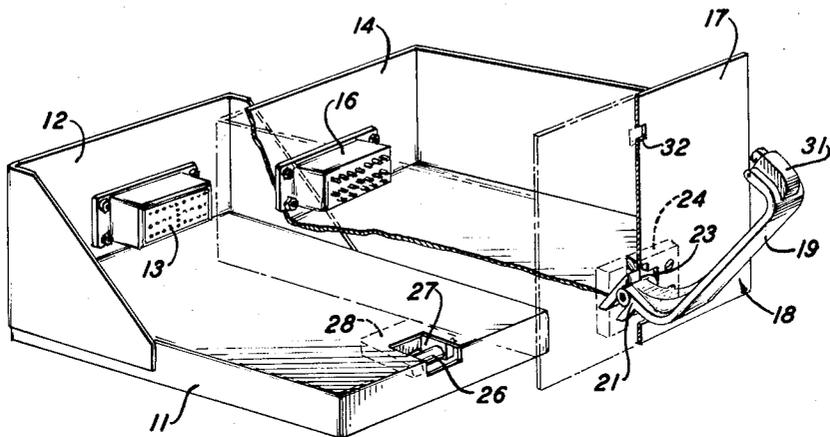
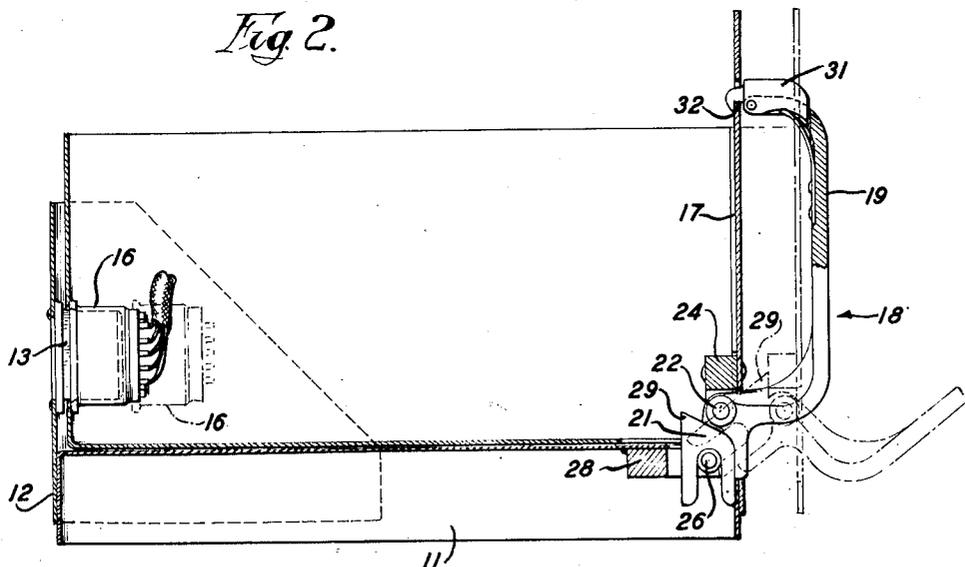


Fig. 2.



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MECHANICAL PRESSURE LATCH

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This invention relates to operating levers designed to increase the ease with which a movable member such as a cover plate may be placed on and removed from a base member. More particularly, the invention relates to a radio chassis in the form of a drawer which is slidable on the base, there being complementary connectors at the rear of the drawer and base respectively, which frictionally engage each other. The instant invention comprehends the provision of a lever at the front of the drawer which will enhance the force needed to engage and disengage the complementary connectors as the drawer is slid into and removed from the base.

In large electronic equipment, it is customary to place the several component units on a number of different chassis which are embodied in drawers slidable on corresponding base members in the frame of the equipment. In order to obviate the requirement of lengthly flexible connectors between each chassis drawer and the frame of the equipment, it is convenient to place complementary connectors or plug members at the rear of the base and the drawer, respectively, which connectors are automatically engaged as the drawer is pushed into position on the base. Such connectors generally comprise a large number of individual plug units, and therefore require a considerable force to engage and disengage.

It is an object of this invention to provide an operating lever at the front of such a chassis drawer which will produce multiplied force to aid in both the engagement and disengagement of the connectors at the rear of the drawer.

It is another object of this invention to provide a handle at the front of the radio chassis which will serve the double purpose, in a single movement, of forcefully disengaging the connectors at the rear of the drawer and of allowing the drawing to be slid from the base.

It is a further object of this invention to provide a drawer with a combined actuating lever or handle and lock member, by means of which the drawer may be positively held on the base until specific manual operating steps are applied to the lever to release it, whereupon it may be used successively as a force multiplying means for disengaging the drawer from the base, and then as a handle for withdrawing the drawer from the base.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following description.

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The instant invention is applied to a base member to which a movable member or cover plate is selectively mounted or removed. In accordance with this invention, an operating lever is mounted on the movable member, this lever consisting of a forked portion at one end and a handle portion at the other end, the mounting being achieved by a pivot pin pivotally mounting the lever to the movable member, and passing through the lever intermediate the forked and handle portions thereof. When applied to an assembly such as a drawer slidable on a base member, the operating lever is pivoted in an aperture in the front panel of the drawer, with the forked portion extending inside the panel, and the handle portion extending outside the panel.

A cross bar is mounted to the base member paralleling the front panel and engageable by the forked portion of the operating lever as the drawer is slid on or off the base member. Preferably the base member is recessed at the front to form a recess adjacent the cover plate or front panel, which is spanned by the cross bar so that the forked portion of the operating lever enters the recess and engages the cross bar as the lever is pivoted.

Outward pivoting of the handle portion of the lever causes the forked portion to bear against the cross bar in the base member, thereby initiating removal of the drawer from the base member. This is done with considerable force multiplication due to the difference in lever arms, so that the connectors which are frictionally engaged at the rear of the base member and drawer, respectively, are easily disengaged. After disengagement of the connectors, further outward pivoting of the lever handle results in the engagement or abutment of a shoulder formed on the forked portion, with a stop member secured to the inner face of the front panel. Further pivoting being thus prevented, the operating lever then becomes a drawer handle which may be used to slide the drawer from the base member.

In order to prevent accidental outward pivoting of the operating lever, a manually operated latch is mounted at the end of the handle portion, which engages a catch or lip formed on the cover plate, so that with the drawer once in place on the base member, it cannot be then removed until the latch is actuated and the operating lever pivoted outwardly on its pivot pin.

A specific embodiment of the invention described generally above will now be described in

detail with reference to the accompanying drawings, wherein:

Fig. 1 is a perspective view illustrating the invention as applied to a radio drawer chassis; and

Fig. 2 is a sectioned elevation showing somewhat more clearly certain details of the invention.

Referring to the drawing, 11 designates a base member having a rear wall 12 to which is mounted an inwardly extending, electrical connector 13. Slidable on the base member 11 is a drawer 14, particularly suited to contain an electronic chassis. At the rear of the drawer 14 is another electrical connector 16, adapted to frictionally engage the connector 13, and thereby produce the desired continuity of electrical connections between the drawer and the base member. The drawer 14 has a front panel or cover plate 17 which, in the broadest implications of the instant invention, constitutes a movable member which may be mounted on and removed from the base member 11. An operating lever 18, consisting of a handle portion 19 and a forked portion 21, is pivotally mounted to the front panel 17 by means of a pivot pin 22. This is achieved preferably by providing an aperture 23 near the bottom of the front panel 17, and mounting a U-shaped block 24 on the inside of the panel 17, embracing the aperture 23. The pivot pin 22 passes through the block 24 parallel to the plate 17 and across the aperture 23, so that the forked portion 21 of the lever 18 extends inside the panel 17, while the handle portion extends outside the panel.

Engageable by the forked portion 21 of the lever 18 is a cross bar 26 mounted either fixedly or rollably, as desired, on the base member 11, paralleling the panel 17. This mounting is preferably achieved by recessing the base member 11 at 27 to form a recess adjacent the aperture 23 and pivot pin 22. The cross bar 26 spans the recess 27, thereby providing operating room for the forked portion 21 as the lever 18 is pivoted. Mounting of the cross pin 26 is achieved by securing another U-shaped block 28 to the bottom surface of the base member 11, circumjacent the recess 27, the bar 26 running between the arms of the U 28, and thereby spanning the recess 27. The bar 26 is preferably generally circular in cross section and secured rotatably to the sides of the recess 27, although other suitable cross sections may be used as long as suitable room is left for entrance and withdrawal of the bifurcations of the forked portion 21.

In order that the lever 18 may be used as a regular handle to slide the drawer 14 from the base 11 after disengagement of the forked portion 21 from the bar 26, a shoulder 29 is provided on the forked portion 21, extending inwardly of the drawer. This shoulder engages or abuts against the upper portion of the U-block 24, as shown in dot-dash lines in Fig. 2, which thus constitutes a stop member for the shoulder 29, limiting outward pivoting of the lever 18, and permitting it to be used as a handle for withdrawal of the drawer.

In order to insure against accidental outward pivoting of the handle 18 when the drawer is in closed position, a latch 31 is pivotally mounted on the extended end of the handle portion 19, and a cooperating catch or lip 32 is provided by perforating the panel 17. In this way, the lever 18 may not be pivoted outward until the latch 31 is pressed downward by the thumb of the operator.

Operation

The instant invention is used in the following manner. It will be assumed that the drawer 14 is separated from the base 11. To mount it on the base 11, the lever 18 is pivoted out until engagement of shoulder 29 against stop 24. The drawer 14 is then slid in on the base 11 until the forked portion 21 is about to engage the cross bar 26. At this point, the panel 17 is still a short distance out from its seated position, and occupies the attitude shown in dot-dash lines in Fig. 2. Likewise, as shown in dot-dash lines in Fig. 2, the connector 16 is about to frictionally engage connector 13.

At this point, the lever 18 is pivoted up, or inward, thereby hooking the inner fork or bifurcation of the portion 21 over the bar 26, and drawing the pivot pin 22 and panel 17 steadily in against the resisting friction of the plugs 13 and 16. This cam or levering action continues with the forked portion 21 sliding down and inwardly to embrace the bar 26 until the latch 31 is snapped into position over the lip 32, at which point the drawer 14 has been fully seated on the base member 11, and the connectors 13 and 16 are fully engaged. In this position the drawer 14 is firmly latched onto the base member 11, separation of the two being prevented by the interlocking of the forked portion 21 over the bar 26.

Removal of the drawer from the base member can therefore be effectuated only by releasing the latch 31 and pivoting the operating lever 18 downward and outward. Upon such pivoting, a converse cam or lever action to that experienced upon closing the drawer is achieved, by virtue of the action of the outer fork or bifurcation of the portion 21 pushing against the bar 26. Outward pivoting on the lever 18 thus causes the outer fork of the portion 21 to cooperate with the pin 26 to push the pivot pin 22 and panel 17 away from the base member 11 in substantially the same way as the inner fork of the portion 21 pushed the drawer inward when the drawer was being inserted into the base member. Thus the plugs 13 and 16 are disengaged against their frictional resistance by the same type of cam or lever action as was employed to engage them.

By the time the lever 18 has been pivoted outward to the point where the shoulder 29 abuts the U-stop block 24, the inner fork of the portion 21 has been lifted clear of the bar 26, and the connectors 13 and 16 have been fully disengaged so that the drawer 14 may be easily slid outward on the base member 11, using the handle portion 19 in conventional fashion as a drawer pull.

It will be noted that as the drawer is pushed home onto the base member 11, the mechanical advantage of the operating lever steadily increases. This is due to the fact that the inner fork of the portion 21 steadily slides down the pin 26, thereby shortening the lower lever arm, represented by the distance between the bar 26 and the pivot pin 22, while the upper lever arm, represented by the handle portion 19, remains constant. In this way the maximum mechanical advantage, represented by the maximum mechanical lever ratio, is achieved just exactly where it is desired—namely, when the plugs 13 and 16 are fully engaged, and when their frictional resistance is therefore greatest.

Likewise, upon disengagement of the plugs 13 and 16, maximum force multiplication is achieved upon the start of disengagement, because then the lever arm distance between the bar 26 and

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the pivot pin 22 is least. As disengagement progresses, this lever arm is increased, lessening the mechanical advantage ratio, but at the same time, increasing the travel ratio, so that greater travel of the drawer is achieved for a given arc of pivoting of the lever 18. That is to say, the horizontal distance travelled by the drawer 14 in withdrawing from the base 11 is roughly proportional to the tangent of the pivot angle of the handle 19 as the latter is pivoted out to disengage the drawer. Thus, at the start of disengagement, the drawer travel per degree of handle pivoting is small; steadily increasing as the handle is pivoted, and reaching its maximum just prior to complete disengagement of the drawer from the base.

The instant invention thus produces maximum force multiplication where it is needed—namely, when the drawer is fully seated on the base member 11; without sacrificing travel distance advantage at the outer portion of the span when the plugs 13 and 16 are almost disengaged and large mechanical force ratio is not required.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. In the combination of a base, a drawer slidable on said base and having a front panel, the improvement which comprises an operating lever having a forked portion at one end and a handle portion at the other end, said forked portion extending thru an aperture in said front panel, and into an adjacent recess in said base, a pivot pin between said portions of said lever pivotally mounting said lever to said front panel, a cross bar secured to said base spanning the recess therein parallel to said front panel and adapted to be engaged by said forked portion upon pivoting of said lever, a shoulder extending from said forked portion inside said front panel, a stop member on said front panel adapted to engage said shoulder to limit said lever upon outward pivoting thereof, a latch on the end of said handle portion, and a lip on said front panel adapted to be engaged by said latch upon inward pivoting of said lever.

2. In the combination of a base, a drawer slidable on said base and having a front panel, the improvement which comprises an operating lever having a forked portion at one end and a handle portion at the other end, said forked portion extending thru an aperture in said front panel and into an adjacent recess in said base, a pivot pin between said portions of said lever pivotally mounting said lever to said front panel, a cross bar secured to said base spanning the recess therein parallel to said front panel and adapted to be engaged by said forked portion upon pivoting of said lever, a latch on the end of said handle portion, and a lip on said front panel adapted to be engaged by said latch upon inward pivoting of said lever.

3. In the combination of a base, a drawer slidable on said base and having a front panel, the improvement which comprises an operating lever having a forked portion at one end and

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a handle portion at the other end, said forked portion extending thru an aperture in said front panel and into an adjacent recess in said base, a pivot pin between said portions of said lever pivotally mounting said lever to said front panel, and a cross bar secured to said base spanning the recess therein parallel to said front panel and adapted to be engaged by said forked portion upon pivoting of said lever.

4. In the combination of a base, a drawer slidable on said base and having a front panel, the improvement which comprises an operating lever having a forked portion at one end and a handle portion at the other end, said forked portion extending thru an aperture in said front panel, a pivot pin between said portions of said lever pivotally mounting said lever to said front panel, and a cross bar secured to said base parallel to said front panel and adapted to be engaged by said forked portion upon pivoting of said lever.

5. In combination with a recessed base and a movable cover plate therefor, said plate having an opening therethrough adjacent the recess in said base, an operating lever having a handle portion and a forked portion, a pivot pin adjacent said opening and parallel to said plate pivotally mounting said lever to said plate with said handle portion outside said plate and said forked portion extending inside said plate and into said recess, a cross bar mounted to said base spanning said recess parallel to said pin and engageable by said forked portion as said lever is pivoted, a shoulder extending from said forked portion inside said plate, a stop member on said plate engageable by said shoulder to limit outward pivoting of said lever, a latch on the end of said handle portion, and a lip formed on said plate engageable by said latch upon inward pivoting of said lever.

6. In combination with a recessed base and a member slidable thereon comprising a cover plate, said plate having an opening therethrough adjacent the recess in said base, a normally upright operating lever having a handle portion and a forked portion, a pivot pin adjacent said opening and parallel to said plate pivotally mounting said lever to said plate with said handle portion outside said plate and said forked portion inside said plate, and a stop into said recess, a cross bar mounted to said base spanning said recess parallel to said pin and engageable by said forked portion as said lever is pivoted, a shoulder extending from said forked portion inside said plate, and a stop member on said plate engageable by said shoulder to limit outward pivoting of said lever when said handle portion has moved thru less than 90° from its upright position.

7. In combination with a recessed base and a movable cover plate therefor, said plate having an opening therethrough adjacent the recess in said base, an operating lever having a handle portion and a forked portion, a pivot pin adjacent said opening and parallel to said plate pivotally mounting said lever to said plate with said handle portion outside said plate and said forked portion extending inside said plate and into said recess, a cross bar mounted to said base spanning said recess parallel to said pin and engageable by said forked portion as said lever is pivoted, and a latch on said handle portion engageable with said plate upon inward pivoting movement of said lever.

8. In combination with a movable member

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and a recessed base member, an operating lever comprising a handle portion at one end and a forked portion at the other end, a pivot pin intermediate said portions pivotally mounting said lever to said movable member, a cross bar mounted to said base member spanning the recess therein parallel to the axis of said pin and adapted to be engaged by said forked portion as said lever is pivoted, a latch on the end of said handle portion, and a catch portion on said movable member adapted to be engaged by said latch.

9. Cabinet structure comprising a horizontal base and a container slidable thereon and including a vertical cover plate having an opening adjacent the level of said base, a horizontal cross bar on said base adjacent the level of said opening, a lever pivoted to said cover plate and including a handle normally extending parallel to and spaced outwardly from said cover plate and a fork normally in engagement with said cross bar but disengageable therefrom upon forward pivotal movement of said lever to a predetermined position, and a shoulder on said lever engageable with said cover plate when the lever has moved thru less than 90° from its upright position.

10. Cabinet structure comprising a base and a container horizontally slidable thereon and including an upright cover plate having an aperture adjacent the level of the base, a lever pivoted to said cover plate and including a handle normally extending parallel to and spaced outwardly from said cover plate, a cross bar on said base extending parallel to the pivot of said lever, a fork fixed to said lever normally engaging said cross bar to move the container inwardly or outwardly upon limited movement of the lever about its pivot but disengageable therefrom upon a predetermined degree of outward movement of the lever, and means limiting outward move-

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ment of the lever to a degree exceeding said predetermined movement but less than 90° from normal position.

11. Cabinet structure comprising a base and a container horizontally slidable thereon and including an apertured upright cover plate, a lever pivoted to said cover plate adjacent the aperture thereof and including a handle normally extending parallel to and spaced outwardly from said cover plate, a cross bar on said base parallel to the pivot of said lever, a fork fixed to said lever normally straddling said cross bar and coaxing therewith to move the container upon limited movement of the lever about its pivot but disengageable therefrom upon outward movement of the lever in excess of said limited movement, means limiting outward movement of the lever to a degree exceeding said limited movement but less than 90° from normal position, and latch means on said handle and cover plate for releasably retaining the handle in normal position.

12. The invention defined in claim 11, wherein said handle in normal position substantially bisects said cover plate and acts as a drawer pull when said limiting means is in operation.

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