March 7, 1961 J. H. WILLIAMS 2,973,664

PUSH ROD MECHANISM

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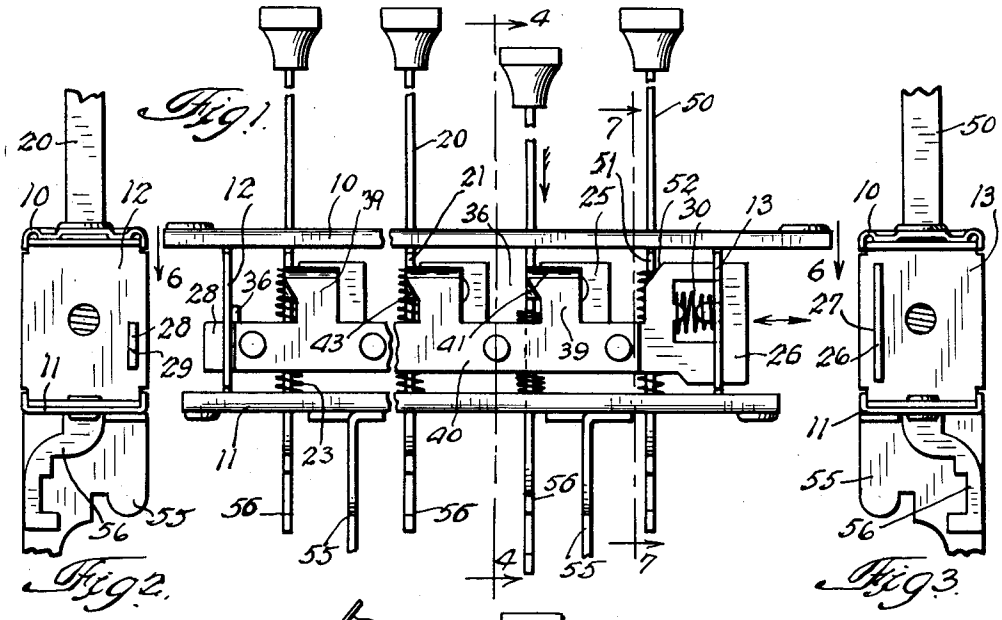


Fig. 1.

Fig. 2.

Fig. 3.

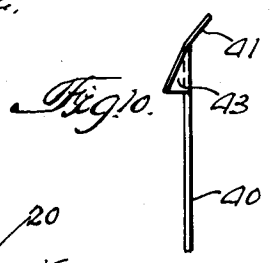


Fig. 10.

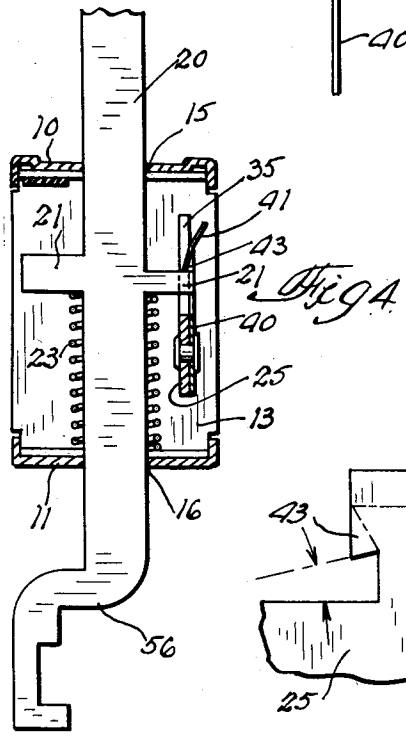


Fig. 4.

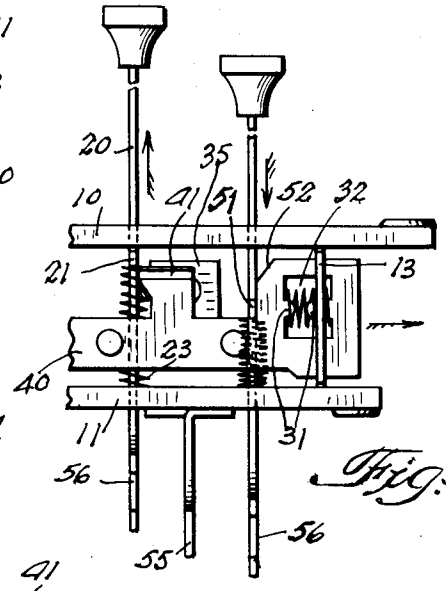


Fig. 5.

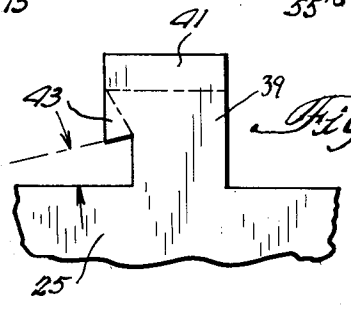


Fig. 9a.

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Fig. 6.

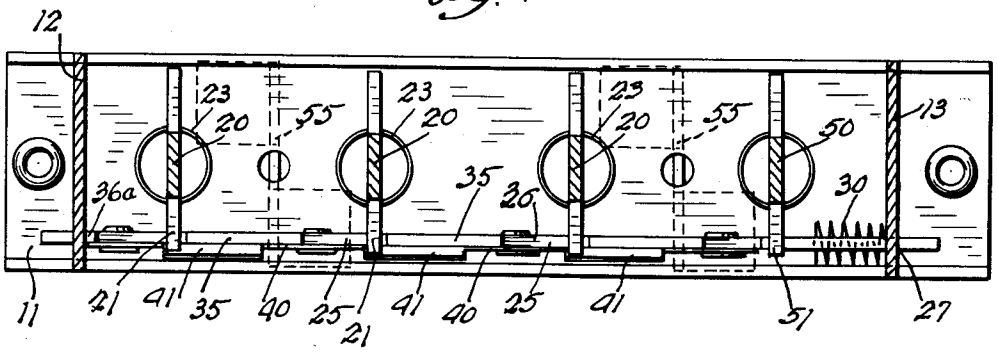


Fig. 7.

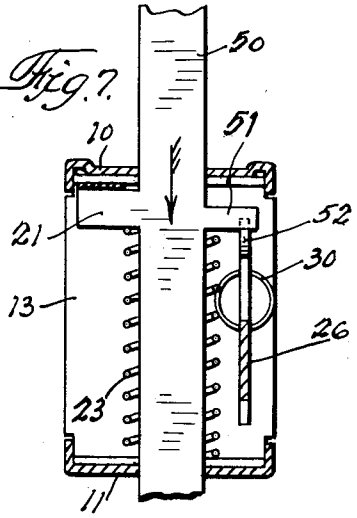
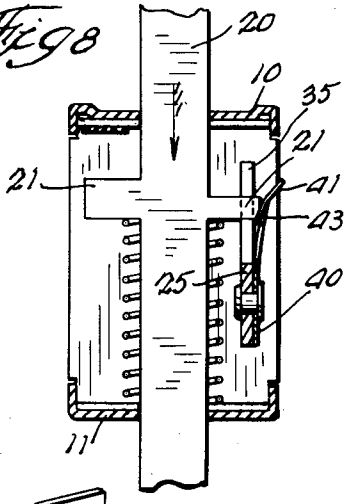


Fig. 8



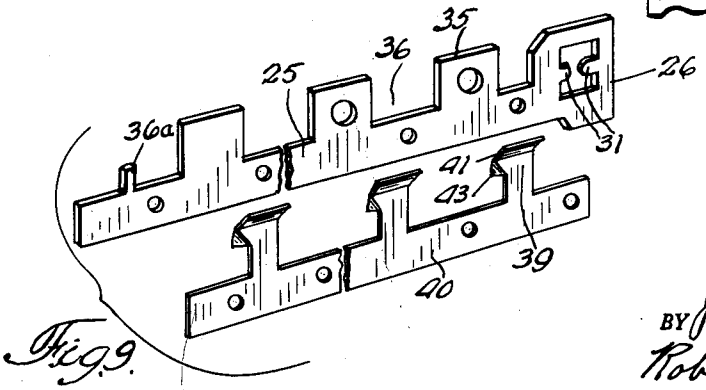


Fig. 9.

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PUSH ROD MECHANISM

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6 Claims. (Cl. 74—483)

This invention relates to a push rod mechanism and particularly to a mechanism having a plurality of push rods with means for locking the push rods to an "in" position and for unlocking said push rods to an "out" position.

Push rod mechanism for operating switches are well known and are widely used. As example of such mechanism is that disclosed in United States Patent No. 2,289,513, issued July 14, 1942. In the construction disclosed in said patent, a latch bar cooperating with a plurality of push rods is provided. Means are provided whereby a push rod, normally biased to an "out" position, may be locked to an "in" position. Unlocking means are provided for releasing the previously locked push rods.

This invention provides a simple and effective mechanism for accomplishing the locking and release of the push rods in a latch bar type of mechanism.

In order that the invention may be fully understood, it will now be explained in connection with the drawings wherein

Figure 1 is a side elevation of the mechanism embodying the present invention.

Figures 2 and 3 are end views from the adjacent ends of the structure illustrated in Figure 1.

Figure 4 is a section on line 4—4 of Figure 1.

Figure 5 is a detail of part of the mechanism illustrated in Figure 1 showing the unlocking push rod in an "in" position.

Figure 6 is a section on line 6—6 of Figure 1.

Figures 7 and 8 are transverse sections of the mechanism illustrating the "out" and "in" positions, respectively, of a push rod.

Figure 9 is an exploded view of the latch bar and spring strip normally attached thereto.

Figures 9*a* and 10 are details of the portions of the spring carried by the latch bar for locking a push rod.

The mechanism generally comprises front plate **10** and rear plate **11** maintained rigidly in spaced parallel relation by end plates **12** and **13**. Plates **10** and **11** have their edges bent to form small flanges for strengthening the plates.

Plates **10** and **11** are provided with registering slots **15** and **16** extending transversely across the plates. Each pair of registering slots in the front and rear plates cooperate to accommodate a slidably mounted push rod **20**. Push rod **20** has shoulders **21** which are disposed between front plate **10** and rear plate **11**. Coil spring **23** is disposed around the body of push rod **20** between rear plate **11** and shoulders **21**. The coil spring biases each push rod to an "out" position where the shoulders of the push rod rest against the inside face of front plate **10**.

Slidably disposed in end plates **12** and **13** is latch bar generally indicated by **25**. Latch bar **25** has head end **26** slidably disposed in slot **27** in end plate **13** and has free end **28** slidably disposed in slot **29** in end plate **12**. Latch bar **25** is biased to a normal locking position

by coil spring **30** disposed around spaced fingers **31** within cutout **32** in head end **26** of the latch bar. Coil spring **30** cooperates with the inside face of end plate **13** for biasing the latch bar.

Latch bar **25** is slotted to provide a plurality of rectangular portions **35** extending from the bottom part of the latch bar toward the inside face of top plate **10**. The spacing between rectangular portions **35** is such as to provide one rectangular portion **35** and an adjacent slot **36** between a pair of adjacent push rods **20**. Latch bar **25** may be so positioned as to have an edge of rectangular portion **35** of a latch bar engage the side of a shoulder **21** of a push rod in the normal locked position of the push rod. From this position, the latch bar and each rectangular portion **35** may be pushed or moved along the bar length to an unlocking position against the bias of spring **30** so that each rectangular projecting portion **35** moves away from its cooperating push rod shoulder. This cooperation between portion **35** and a shoulder is not too important since finger **36** on latch bar **25** is provided to cooperate with end plate **12** for stopping the latch bar.

Latch bar **25** is provided with a plurality of spring metal locking fingers **39**. Spring locking fingers **39** are conveniently disposed on spring body strip **40** riveted to latch bar **35** along the bottom portion of the latch bar at the side thereof. Spring locking fingers **39** are provided with bent cam edge **41** adjacent shoulder **21** of the push rods. Each spring locking finger **39** is also provided with stop portion **43**.

Each spring locking finger **39** is so shaped as to permit shoulder **21** of a push rod to slide underneath a spring finger, urging the spring finger outwardly away from the shoulder and permitting the shoulder to move beyond stop portion **43**. Thus, each push rod **20** may be locked to an "in" position by moving spring locking portion **39** laterally of the latch bar outwardly away from a push rod shoulder.

It is clear that any desired push rod may be deprived of its locking function by removing the corresponding spring locking portion.

In order to release any of the locked push rods, unlocking push rod **50** is provided. Push rod **50** is generally similar to push rods **20**. However, push rod **50** has shoulder portion **51** similar to shoulder **21** of rods **20** which cooperates with cam shaped edge **52** upon head end **26** of latch bar **25**. Cam shaped portion **52** is so shaped that inward movement of push rod **50** will cause latch bar **25** to be moved against its spring bias. This movement of the latch bar is sufficient to clear each spring portion **39** from any shoulder **21** of a push rod which may be in the locked position.

What is claimed is:

1. A push rod mechanism comprising at least one elongated plate having a plurality of laterally disposed transverse slots arranged in parallel relation, a push rod for each slot, spring means for biasing each push rod to an "out" position from which position it may be moved along its length to an "in" position, a latch bar, means for supporting said latch bar to extend across the side edges of the push rods, said latch bar being movable along its own length, means for biasing said latch bar to a normal locking position from which position said latch bar is movable to an unlocking position, said latch bar having a projecting portion which is at all times disposed between two adjacent push rods, a generally flat spring locking finger carried by said latch bar at the side thereof for cooperation with each push rod, said spring locking finger being biased to lie against said latch bar projecting portion and being deflectable laterally away from said latch bar projecting portion, means

on a push rod cooperating with a spring locking finger for latching a push rod to an "in" position, said means cooperating with the spring locking finger for springing said finger outwardly away from the latch bar projecting portion upon inward movement of said push rod and thereafter releasing said spring locking finger to return to its normal position to a locking condition and means for moving said latch bar to an unlocking position so that a push rod is clear of its cooperating locking finger permitting the rod to return to a normal "out" position.

2. The construction according to claim 1 wherein said means on a push rod cooperating with a spring locking finger comprises a shoulder portion for cooperation with a spring locking finger, said shoulder being movable with the push rod to lock against a locking finger for maintaining the push rod "in" against its bias.

3. A push rod mechanism comprising front and rear support plates, means for maintaining the same in opposed face to face parallel relation, said support plates having transverse slots therethrough so that said two support plates have a series of slot pairs, a push rod for each pair of slots, said push rod having portions extending through the slots and having a shoulder portion between said plates, said shoulder portion normally lying against the inside face of the front plate, a coil spring disposed around said push rod and extending between the shoulder and the rear plate for biasing said push rod to an "out" position from which position said push rod is manually movable to an "in" position, a flat latch bar disposed between said plates and extending longitudinally thereof, the plane of said latch bar being generally normal to the parallel planes of said plates, said latch bar having slots extending inwardly from the edge of the latch bar adjacent the front plate, a latch bar slot being located so that the shoulder of a push rod is always clear of said latch bar, a flat spring rigidly attached to said latch bar along the portion thereof adjacent the rear plate, said flat spring having spring locking fingers extending toward the front plate, each spring locking finger lying against a latch bar portion adjacent a slot, a spring locking finger however having a part overlying a latch bar slot, each spring locking finger being wide enough along the length of the latch bar so that in one latch bar position the push rod shoulder can physically engage a spring locking finger and in another latch bar position each spring locking finger is clear of a push rod shoulder so that the push rod shoulder is free in the latch bar slot, means for biasing said latch bar to said one position, each push rod shoulder being sufficiently long to extend into the latch bar slots and cooperating with a spring locking finger, each spring locking finger being shaped so that a push rod can be moved to an "in" position to spring said locking finger away from the latch bar and permit said push rod shoulder to clear the locking finger, each spring locking finger being shaped so that a push rod shoulder will be caught when the push rod is "in," said spring locking finger moving to its normal position against the latch bar and means for moving said latch bar to said other position to release any "in" push rods.

4. The construction according to claim 3 wherein the means for moving a latch bar comprises an additional push rod having a shoulder similar to the other push rods, said latch bar having a cam surface cooperating with said additional push rod shoulder so that when said additional push rod is moved to an "in" position, said latch bar is moved from its biased to its other position.

5. The construction according to claim 4 wherein said latch bar has means for defining the biased position of said latch bar, said biased position being selected so that the shoulder of each push rod lies in that portion of the slot of a latch bar which is covered by the spring finger.

6. The construction according to claim 5 wherein each spring finger is shaped so that the cooperating push rod shoulder can deflect the spring finger laterally as the push rod moves inwardly and wherein said spring finger has a notched portion for accommodating the shoulder when the push rod is fully "in" thereby permitting said spring finger to return to its normal position against the latch bar.

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