Sept. 2, 1958 J. E. SWANSTROM ET AL 2,849,908

LOCKING OPEN END WRENCH WITH LOCK RETAINING MEANS

Filed Aug. 6, 1957

FIG. 1

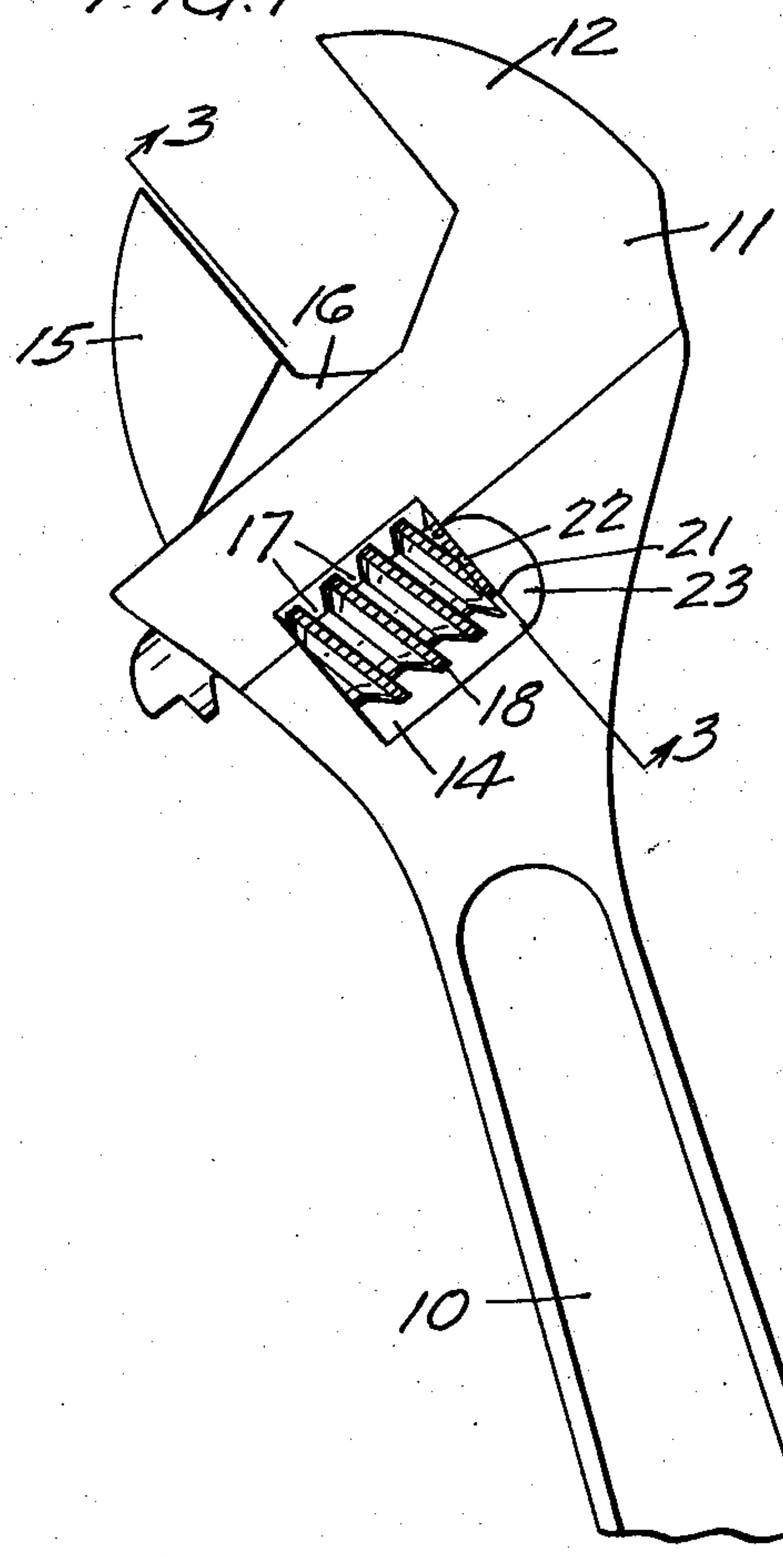

FIG. 2

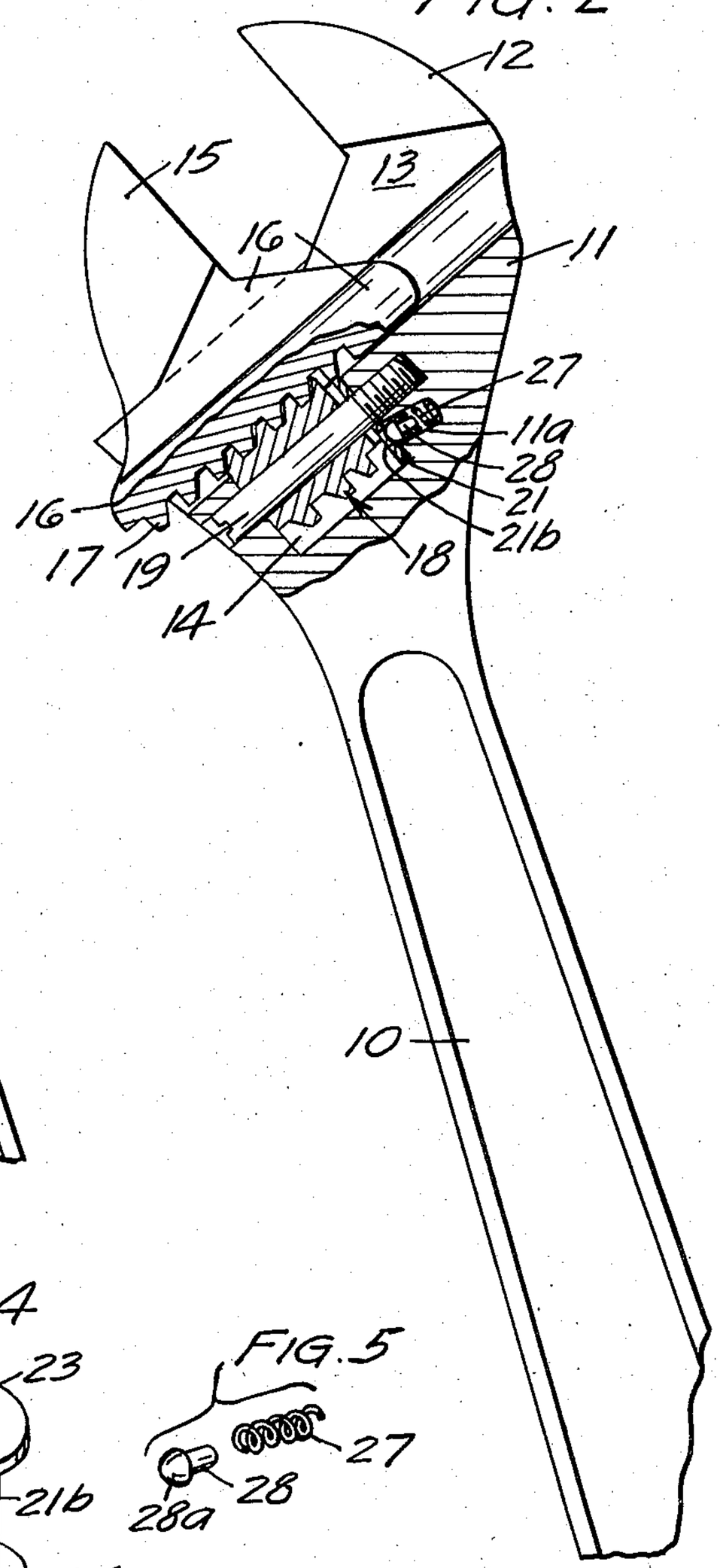

FIG. 3

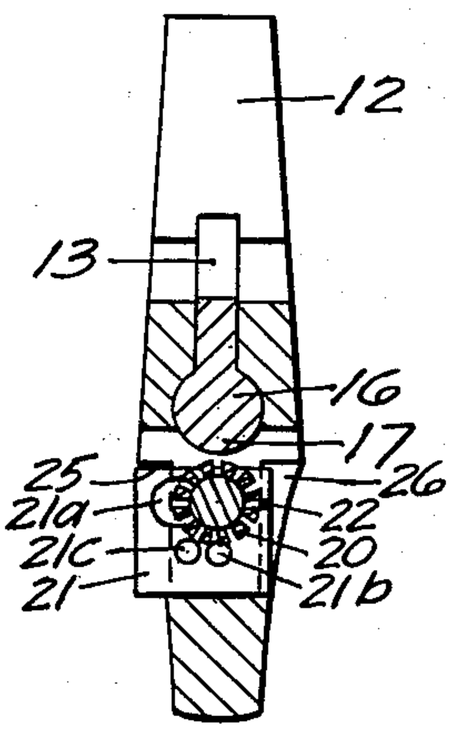

FIG. 4

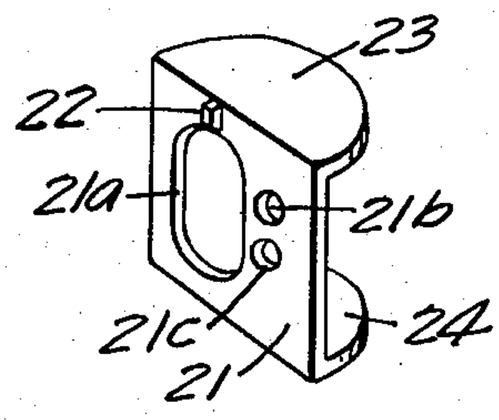

FIG. 5

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LOCKING OPEN END WRENCH WITH LOCK RETAINING MEANS

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7 Claims. (Cl. 81—165)

This invention relates to wrenches. More particularly it relates to adjustable open end wrenches having locking means associated therewith.

It is a common problem with wrenches having relatively adjustable jaws that the jaws have a tendency during use to shift to a smaller or larger size as a result of jarring, bumping, etc. Some wrenches have been designed to provide locking means for preventing such shifting of the movable jaw during use. An example is the open end wrench disclosed in U. S. Letters Patent No. 2,719,449. Such wrenches, however, have all had certain disadvantages in that they are either difficult and unhandy to lock and unlock, or are too cumbersome in construction, or require two hands to lock and unlock, or are unsound mechanically as evidenced by the fact that they become or are initially loose fitting and soon can be adjusted only with difficulty. In addition to the above, some wrenches have been provided with locking means which will shift between locking and unlocking position as a result of the wrench being used and jarred during such use. For example, it is a not too uncommon practice for the user of such a wrench to utilize the wrench somewhat as a hammer in order to strike an object upon which work is being performed a sharp blow. When the wrench is so used, the locking means will spring out of locking position into unlocking position with the result that the jaws will shift through further use. Our invention is designed to eliminate these disadvantages.

It is a general object of our invention to provide a novel and improved adjustable wrench having improved locking means of simple and inexpensive construction and operation and also having lock retaining means to preclude the locking mechanism from shifting to unlocked position during use of the wrench.

A more specific object is to provide a novel and improved adjustable wrench having improved locking means simple and inexpensive to manufacture and assemble, which can be operated easily, and which has inherent resilient mechanism for retaining the locking means in locked position as desired.

Another object is to provide a novel and improved adjustable wrench constructed so as to make it permissible to utilize the same in any desired manner without causing the locking means to shift to unlocked position.

Another object is to provide a novel and improved adjustable wrench having locking means which is positively and resiliently held in locking position so as to prevent the locking mechanism from shifting to unlocked position during the use of the wrench.

These and other objects and advantages of our invention will more fully appear from the following description, made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views and in which:

Fig. 1 is a fragmentary elevational view of a wrench embodying our invention;

Fig. 2 is a fragmentary elevational view of the same

wrench with parts broken away to better illustrate the novel features thereof;

Fig. 3 is a sectional view taken along lines 3—3 of Fig. 1;

Fig. 4 is a perspective view of the shiftable plate member which carries the worm-locking element; and

Fig. 5 is a perspective view of the spring and mushroom shaped pin which serve to lock the shiftable plate member which carries the worm-locking element against shifting movement.

The embodiment of our invention shown in Figs. 1–5 includes a handle member **10** provided with a head **11** having an integral jaw **12**, the top of the head being formed with a guide channel **13** of generally inverted T-shape in transverse cross-section and being also formed with a rectangular opening **14** which intersects the head of the T of the guide channel **13**. Slidably mounted in the guide channel **13** is a movable second jaw member **15** having an inverted T-portion **16**, the head of the T being provided with a rack **17**. Mounted within the rectangular opening **14** in the head is a worm **18** in mesh with the teeth of the rack **17**, the worm being supported on a shaft or pin **19** which is threaded at its inner end into the head **11** of the wrench. This shaft **19** is cylindrical in shape and of uniform diameter throughout its length. All of these parts as hereinbefore described are conventional in open end wrenches and are merely illustrative of the type of wrench in which the invention may be applied. The worm **18** is of somewhat different construction as will be hereinafter described.

It will be noted that the worm **18** is rotatably mounted in a fairly close fit upon the cylindrical pin or shaft **19**. This is important for it insures that upon slight wear there will not be sufficient play to cause the wrench to be worked with difficulty. One end portion of the worm **18** is provided with an annularly arranged rack **20** which is arranged so that its axis is the axis of the shaft **19**.

Mounted on the shaft **19** is a plate member **21**. This plate member **21** is positioned between the end portion of the worm **18** which carries the rack **20**, and the fixed jaw **12**. One side of the plate member **21** adjacent its peripheral portion carries a locking element or dog **22** which is adapted to fit into the recesses in the rack **20** to preclude rotation of the worm **18** about the shaft **19** when desired. The plate member **21** has an opening **21***a* which is elongated in the direction transversely of the head **11** so that the plate member **21** may be shifted radially of the shaft **19** and transversely of the head **11** to cause the locking element or dog **22** to engage and disengage the rack **20** of the worm **18**. At opposite sides of the plate member **21** there is one of a pair of ears **23** and **24** which extend normal to the plane of the plate member **21** and parallel to the exterior side surface of the head **11**. Each side surface of the head **11** is provided with one of a pair of recesses **25** and **26** which are shaped to conform to the ears **23** and **24** and are positioned to receive these ears therein when the plate member **21** is shifted to cause the locking element or dog **22** to shift between worm-locking and unlocking position.

As best shown in Fig. 4, the plate member **21** has a pair of spaced apertures **21***b* and **21***c* formed therethrough adjacent the opening **21***a*. These apertures **21***b* and **21***c*, or recesses as they may be considered, are spaced transversely of the head **11** and of the axis of rotation of the shaft **19** and, of course, they shift transversely of the head **11** as the plate member **21** is shifted by pressure upon the ears **23** or **24**.

As best shown in Fig. 2, the recesses **21***b* and **21***c* are so constructed and arranged as to be disposed opposite the retaining mechanism for the plate **21**. As shown in Fig. 2, the head **11** has a relatively small bore **11***a* formed therein immediately adjacent the threaded

bore which receives the shaft **19**. This bore communicates with the rectangular opening **14** and carries therein a small coiled spring **27** within which is mounted a mushroom shaped pin **28**. The head **28***a* of the mushroom shaped pin bears against the plate member **21** and is constantly urged outwardly by the spring **27**. The head **28***a* of the pin **28** slips into the recesses **21***b* or **21***c*, depending upon the position to which the plate member is moved.

When the wrench is assembled as shown in Figs. 1–3, the plate **21** is free to move relative to the shaft **19** through the application of pressure to either of the ears **23** or **24**. When the pressure is exerted upon the ear **23**, the plate member **21** moves radially of the shaft **19** and the lock element **22** slips into one of the recesses or openings between the teeth of the rack **20** which is formed on the adjacent end of the worm **18**. This serves to effectively lock the worm **18** against additional rotary movement and thereby locks the movable jaw **15** against shifting movement within the channel **13**. It will be noted that the ear **23** is disposed adjacent the end of the shaft **19** and worm **18** which are nearest the fixed jaw member **12**. The ear **23** is so located as to make it most convenient for the user in locking the worm **18** while using the wrench.

When pressure is applied to the ear **23**, the head **28***a* of the pin **28** is forced inwardly by the shifting action of the plate **21** and is caused to leave the recess **21***c* and slip into the recess **21***b*. In so doing, the plate **21** is positively held against any shifting action even though the wrench may be improperly used as a hammer or the like, for despite repeated pounding of an object with the head of the wrench, the mushroom shaped pin **28** will prevent the plate member **21** from shifting radially of the shaft **19** and thereby will preclude the worm **18** from rotating and permitting the movable jaw **15** to shift. The spring **27** constantly urges the pin **28** into one of the recesses **21***b* or **21***c* depending upon the position of the plate member **21** relative to the shaft **19**. When pressure is applied to the ear **24** the locking element **22** shifts outwardly with the plate **21** and out of locking relation with the rack **20** carried at the end of the worm **18**.

From the above it can be readily seen that we have provided a locking adjustable open end wrench which has inherent means for positively preventing the locking mechanism from shifting out of locking engagement with the worm **18**. The cooperative action between the mushroom shaped pin **28**, the coiled spring **27** and the recesses **21***b* and **21***c* positively prevent the plate member **21**, which carries the lock element **22**, from shifting out of the position to which it has been moved by the user, for no amount of jarring or pounding will cause the plate member **21** to shift out of the position in which it is being held by the lock retaining mechanism comprised of the spring **27**, the pin **28** and the recesses **21***b* and **21***c*.

It will also be readily seen that our improved wrench is extremely simple in construction and highly effective in operation. The cost of assembly is not appreciably increased while the advantages attained make the wrench substantially more desirable and efficient for use.

It will be noted that the bore **11***a* is not quite parallel to the threaded bore into which the shaft **19** is threaded. This is true because the bore **11***a* must be formed by passing the bore-forming tool through the opening provided to accommodate the outer end of the shaft **19**. We have found, however, that the slight angulation between the axis of the bore **11***a* and that of the openings which receive the shaft **19**, is not sufficient to hinder the operation or efficiency of the lock retaining mechanism which includes the spring **27** and the mushroom shaped pin **28**.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of our invention which consists of the matter shown and described herein and set forth in the appended claims.

What is claimed is:

1. A wrench comprising a head provided with a fixed jaw, a second jaw movable in said head and having a rack thereon, a worm rotatably mounted in said head in driving engagement with said rack, movable positive-action worm-locking means carried by said head in position to engage one end of said worm, said means being movable radially of said worm between worm-locking and unlocking positions as desired, and resilient retaining means carried by said head in worm-locking-means-engaging relation, whereby said worm-locking means will be positively prevented during use from being jarred from worm-locking position after having been moved to said position for such use.

2. A wrench comprising a head provided with a fixed jaw, a second jaw member movable in said head and having a rack thereon, a worm rotatably mounted in said head in driving engagement with said rack, and resiliently retained positive-action jaw-locking means carried by said head and movable radially of said worm within the confines of said head between jaw locking and unlocking positions and to positively prevent said movable jaw from becoming unlocked during use as a result of jarring of the wrench and the like after having been locked by said jaw locking means.

3. A wrench comprising a head provided with a fixed jaw, a second jaw movable in said head and having a rack thereon, a worm rotatably mounted in said head in driving engagement with said rack, shiftable positive-action worm-locking means carried by said head in position to engage one end only of said worm, said means being shiftable between worm-locking and unlocking positions in a direction transversely of the axis of rotation of said worm and of the general plane of said head, and resilient retaining means carried by said head in worm-locking-means-engaging relation, whereby said worm-locking means will be positively prevented from being jarred from worm-locking position during use after having been moved to said position for such use.

4. A wrench comprising a head provided with a fixed jaw, a second jaw movable in said head and having a rack thereon, a worm rotatably mounted in said head in driving engagement with said rack, locking-engaging means carried by said worm, a shaft mounted in said head and carrying said worm for rotation thereon, a plate member mounted on said shaft and having an opening through which said shaft extends, said plate member being shiftable radially of said shaft, a lock element carried by said plate member and shiftable therewith radially of said shaft into and out of locking engagement with said lock-engaging means on said worm, whereby the rotational movement of said worm may be prevented as desired, and resilient retaining means carried by said head in lock-element-retaining relation, whereby said lock element will be positively prevented during use from being jarred from locking position after having been moved to said position for such use.

5. The structure defined in claim 4 wherein said plate member is provided with a pair of recesses spaced transversely of the plane of said head and of the axis of rotation of said worm and disposed opposite said retaining means, said recesses being positioned and arranged so that said retaining means may slip into one of said recesses at each of said positions of said lock element.

6. The structure defined in claim 4 wherein said head has a bore adjacent said plate member and said retaining means includes a coiled spring mounted in said bore and a retaining pin mounted upon said spring and bearing against said plate member to positively prevent said plate member from being shifted by jarring and the like during use of the wrench.

7. A wrench comprising a head provided with a fixed jaw, a second jaw movable in said head and having a rack formed therein, a shaft mounted in said head adjacent said jaw, a worm rotatably mounted on said shaft in said head in driving engagement with said rack, a second rack mounted on one end portion of said worm in annular arrangement around said shaft, a plate member mounted on said shaft and having an opening through which said shaft extends and being shiftable radially of said shaft, a lock element carried by said plate member and being shiftable therewith radially of said shaft into and out of locking engagement with said worm rack whereby the rotational movement of said worm may be prevented, an ear member extending laterally of said plate member at one edge thereof and extending generally parallel to the general plane of said head, said ear member being movable inwardly toward said head to carry said lock element into locking engagement with said worm rack, said ear member being disposed adjacent the end of said worm nearest said fixed jaw, and resilient retaining

means carried by said head and engaging said plate member, whereby said plate member will be positively prevented during use of the wrench from being shifted by jarring and the like to carry said lock element out of locking engagement with said worm rack after having been moved to such position for such use.

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CERTIFICATE OF CORRECTION

September 2, 1958

Patent No. 2,849,908

John E. Swanstrom et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 46, for "locking-engaging" read -- lock-engaging --.

Signed and sealed this 25th day of November 1958.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents