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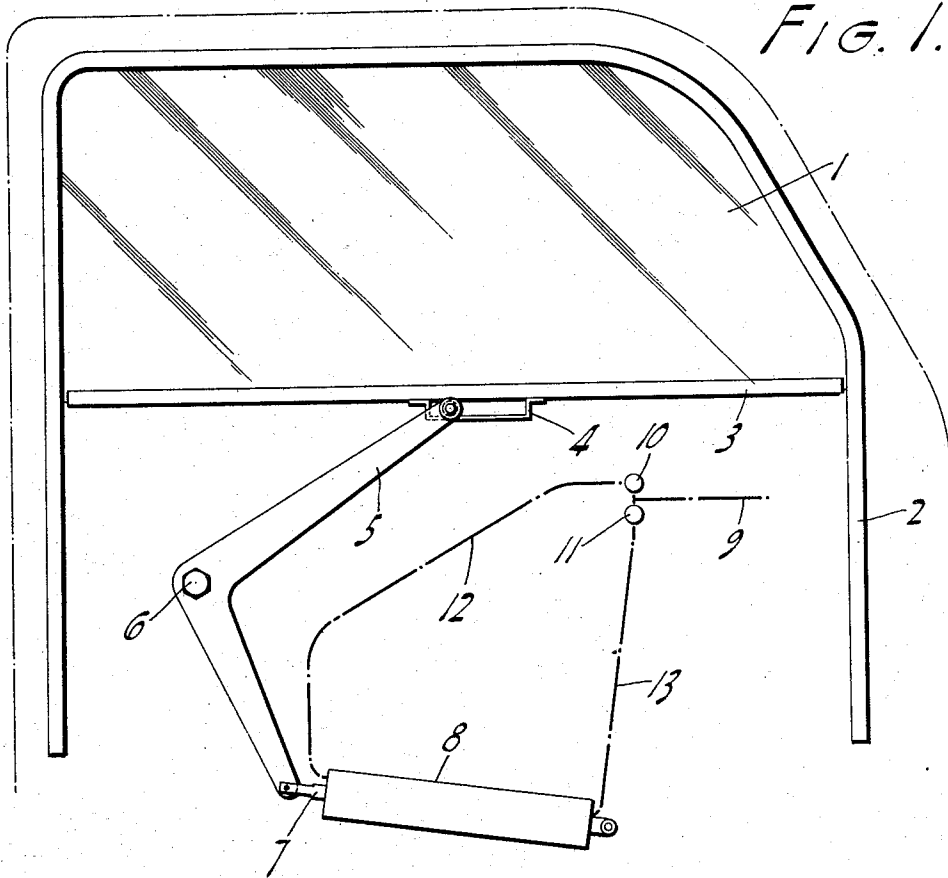
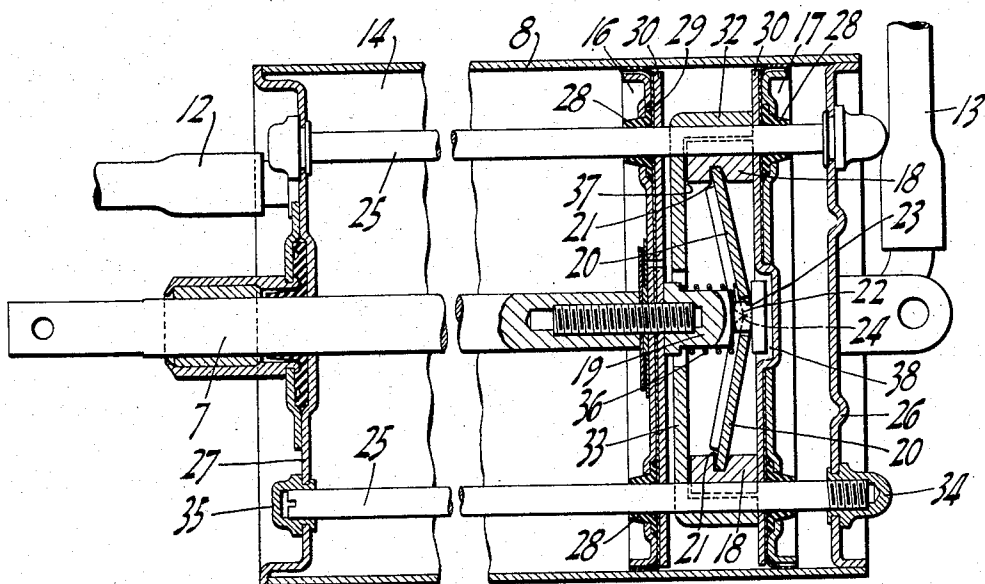
A. RAPPL

2,369,797

WINDOW OPERATOR

Filed May 4, 1942

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 3.

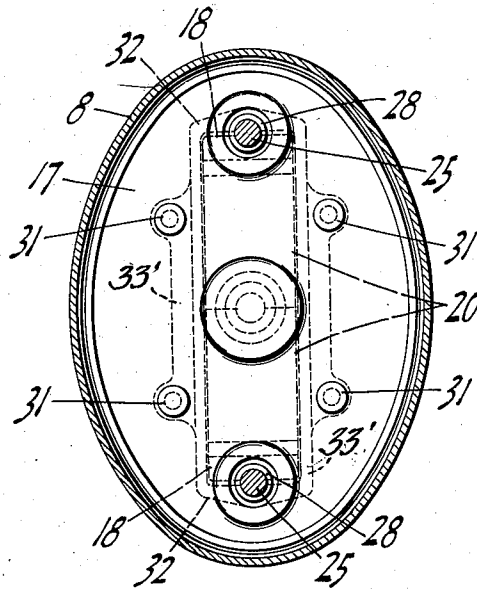
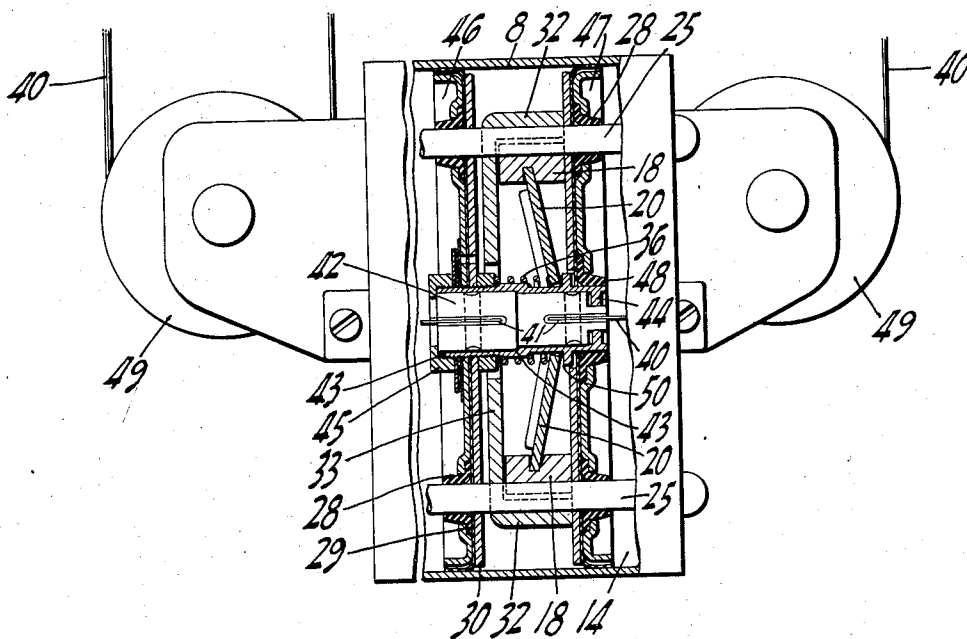


FIG. 4.

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WINDOW OPERATOR

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Application May 4, 1942, Serial No. 441,613

18 Claims. (Cl. 268—125)

This invention relates to window or closure operating systems for motor vehicles and more particularly to the fluid pressure type, such as that operable from the intake manifold as a source of suction.

It has heretofore been proposed to incorporate in the piston construction of the motor an expanding lock which exerts an outward force on the side wall of the motor chamber in order to frictionally secure the window against being opened from without the vehicle. In such construction the chamber wall was required to be of considerable thickness and strength to withstand the outward pressure against deformation of the chamber and a consequential inefficiency of the motor.

The primary object of the present invention is to utilize the piston incorporated window lock while at the same time having the locking effort applied to a part free of the chamber wall and thereby enabling the motor chamber to be formed from lighter stock. The invention further has for its object to provide a fluid motor of this type which is practical and efficient in use and one of economical design.

In the drawings,

Fig. 1 is a diagrammatic view showing the application of the improved motor to a vehicle window;

Fig. 2 is a fragmentary longitudinal section through the motor;

Fig. 3 is a transverse sectional view through the motor; and

Fig. 4 is a view similar to Fig. 2 depicting a modified formation.

Referring more particularly to the drawings, the numeral 1 designates a vehicle window which is slidable in the vertical guideways 2 and provided on its lower edge with a framing member 3 carrying a bracket 4. Slidably engaged in this bracket is one arm of a bell crank lever 5 pivotally mounted at 6, its other arm being pivotally connected to the piston rod 7 of a fluid motor 8. The pressure supply line 9, which may lead from the intake manifold as a source of operating pressure, branches through control valves 10 and 11 and branch conduits 12 and 13 to the opposite sides of the motor chamber 14, the control valves normally establishing communication with the pressure line 9 so that the piston will be balanced by the equalized pressures at the opposite sides thereof. When it is desired to open or close the window the corresponding one of the control valves will be operated to interrupt the pressure communication and vent the corresponding side

to the atmosphere for unbalancing the system pressure sufficient to move the piston.

The piston member comprises two relatively movable walls or sections, the section 16 being fixed to the inner end of the piston rod 7 while the section 17 is connected to the rod for relative movement to a limited extent which limited movement is utilized to free the piston for fluid operation.

The locking means for the motor as well as for the window comprises one or more shoes 18 movably carried by the floating section 17 and supported off the piston rod extension or head 19 by radiating toggle bars or arms 20. The outer ends of these arms engage in seats 21 in the back face of the shoes 18 while the adjacent inner ends of the arms engage in a groove 22 formed in the head 19. As shown in Fig. 3, these arms are formed at their inner ends with semi-circular recesses 23 for straddling the reduced diameter of the head and enabling the toggle arms to abut each other in mutual supporting relation as shown at 24 in Fig. 2. The abutting inner edges are somewhat convexed to provide in effect a knife edge bearing engagement to ease the pivotal movement of the arms on each other.

In lieu of having the lock shoes 18 acting expansively on the chamber wall there is provided one or more internal clutch or lock members 25 anchored to that part of the chamber or motor not traversed by the piston. These lock members are illustrated as comprising rods supported by the end walls 26 and 27 of the motor chamber. A shoe engages each rod, the outer face of the shoe being contoured to properly engage the rod, which latter extends through openings in the two piston sections which are packed by sealing flanges 28 to render the sliding joints fluid tight. These packing flanges have basal margins 29 clampingly embraced by the plate 30 secured in place by rivets 31. Sustaining lateral support is given the rods 25 in direct opposition to the expansive force of the lock shoes 18, such support being provided by abutments 32 upstanding from the floating piston section 17. Each abutment has a face contoured to the rod and slidable thereon. To relieve the piston section of undue strain the abutments are joined together at their upper portions by a tension bar 33 and along their sides by opposing walls 33' with the result that an inverted cup-shaped housing is provided for enclosing the toggle joint. This housing may be secured in position by the rivets 31, as shown in Fig. 3. By reason of this construction the abutments 32 which form the end walls of the housing are

braced to receive the outward thrust of the toggle arms 20 against the lock shoes 18. Consequently, the abutments cooperate with the shoes in gripping the rods. The rods may spread slightly into contact with the abutments as permitted by the fluid seals 28 and the clearance about the rods where they pass through the piston sections. Consequently the clutch or lock rods 25 may be of light design, sufficient to withstand the longitudinal pressure transmitted from the piston rod through the locking shoes when an attempt is made to pry the window open. The clutch or lock rods 25 may be secured in place in a suitable manner such as by threading one end of the rod into the anchor cap 34 while the opposite end of the rod is given free support within the cap 35 and thereby enables either head being removed.

A light spring 36 urges the lock shoes 18 outwardly into light engagement with the rods 25 so that any window imparted movement to the piston rod incidental to an effort to open the window from without will exert a pull on the piston rod and immediately augment the spring pressure sufficiently to lock the piston. The greater the pull the firmer will be the gripping embrace with the rods. However, fluid actuation of the motor will initially cause one piston section to move relative to the other sufficient to free the shoes from the rods 25, sufficient clearance being provided at 37 between the shoes and the tension bar to permit limited bodily movement of the shoes in a direction lengthwise of the rods for this releasing action. Fluid actuation of the piston 16 to the right as viewed in Fig. 2 will close the window, moving the piston rod head 19 into the recess 38 and against the floating piston section. Fluid operation of the floating piston section 17 to the left will idly carry the lock shoes 18 forwardly by reason of the clearance 37 until the lost motion has been absorbed and thereafter the driving contact with the piston rod will move the bell crank lever accordingly to open the window.

In the embodiment shown in Fig. 4 the piston rod is flexible, being in the form of a cable or tape 40 suitably anchored at both ends in the seats 41 provided in the opposite ends of the connector link 42 which latter serves to unite the opposite ends of the flexible member within the piston construction. This connector link is removably secured within a tubular piston sleeve 43 against an internal shoulder 44 by a removable nut 45, which latter also aids in clampingly securing the fixed piston section 46 to the sleeve. The opposite or head end of the sleeve slidably extends through a central aperture in the floating piston section 47 where it is fluid sealed by the packing flange 48.

The flexible transmission member or cable is operatively supported by the pulleys 49 in such manner that any attempt to open the window will exert a pull on the sleeve 43, to the left as viewed in Fig. 4, and thereby expand the lock shoes 18 outwardly into firm embrace with the rods 25, the sleeve being provided with a head shoulder or flange 50 against which the inner ends of the toggle arms 20 engage under the urge of the light spring 36.

From the foregoing it will be observed that the active thrust of the locking shoes is maintained free from the side wall of the chamber 14, the same being received by the lock rods 25 which are accorded lateral support by the abutments 32. Consequently, any attempt to force the window open will be transmitted through the lock shoes to the rods, the chamber wall being relieved of this

wall deforming expansive force. The term window is used herein broadly to include doors and other closures, and while the foregoing description has been given in detail it is obvious that the inventive principles herein involved are capable of assuming other physical embodiments without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. A fluid motor comprising a chamber and a piston therein having a rod, a clutch rod disposed within the chamber lengthwise of the piston movement and passing through the piston in sliding fluid sealed contact, and piston rod expansible locking means carried by the piston for gripping the clutch rod free and independent of the side walls of the chamber to hold the piston fixed in the chamber.

2. A fluid motor comprising a chamber, a piston-like member therein having a rod supported section and a floating section, means connecting the two sections for limited relative movement, each section adapted for fluid operation, a lock member fixed within the chamber, and expansible means operable by a rod imparted movement of the supported section for engaging the lock member to lock the motor inoperative, said locking means being rendered inoperative by and during fluid movement of either section and said lock member being spaced from the chamber wall portions traversed by the piston member whereby such wall portions will be free of any expansive action during the application of the expansible locking means.

3. A fluid motor comprising a chamber, a piston-like member therein having a piston rod supported section and a floating section, means connecting the two sections for limited relative movement, a lock rod within the chamber extending through the sections in a fluid sealed manner, a lock shoe movably supported on the floating section in a position to lockingly engage the lock rod, and means acted upon by a piston rod imparted movement of the supported section for causing the lock shoe to so engage the lock.

4. A fluid motor comprising a chamber, a piston-like member therein having a piston rod supported section and a floating section, means connecting the two sections for limited relative movement, a lock rod within the chamber extending through the sections in a fluid sealed manner, a lock shoe movably supported on the floating section in a position to lockingly engage the lock rod, an abutment carried by the floating section at the opposite side of the lock rod from the shoe to lend lateral support to lock the rod, and means for actuating the shoe by a piston rod imparted movement of the supported section.

5. A fluid motor comprising a chamber, a piston-like member therein having a piston rod supported section and a floating section, means connecting the two sections for limited relative movement, each section having a packing flange extending in a direction opposite to the flange of the other section whereby each section will be fluid operable in one direction only, a pair of lock rods within the chamber slidably extending through the sections with a fluid seal, a pair of shoe parts one associated with each lock rod and positioned to engage the same to arrest motion between the chamber and the piston member, and means interposed between the shoe parts and the piston rod and operable by the latter to engage the shoe parts with the lock rods.

6. A fluid motor having a chamber oval in cross

section and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element connected to said one member, means connecting the two members for limited relative movement and enabling said transmission element being operated by said companion member, a pair of rods fixed within the chamber, one on each side of the power transmission element in the narrow portion of the chamber, and means operable by such relative movement of one member as imparted to it by said transmission element and expansible radially along the major axis of the chamber for engaging the rods to lock the motor stationary.

7. A fluid motor having a chamber and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element connected to said one member, means connecting the two members for limited relative movement and enabling said transmission element being operated by said companion member, a pair of rods fixedly mounted in the chamber and slidable through the two members in a fluid tight manner, and motor locking means interposed between the rods and expansible outwardly thereagainst by and during such relative movement as imparted by said transmission element.

8. A fluid motor having a chamber and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element connected to said one member, means connecting the two members for limited relative movement and enabling said transmission element being operated by said companion member, a pair of rods fixedly mounted in the chamber and slidable through the two members in a fluid tight manner, spaced abutments carried by one of said spaced members adjacent the rods to give lateral support to the latter, and expansible and contractible shoe means carried by the abutment carrying member and coacting with the abutments in gripping the rods to lock the motor arrested.

9. A fluid motor having a chamber and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element connected to said one member, means connecting the two members for limited relative movement and enabling said transmission element being operated by said companion member, a pair of rods fixedly mounted in the chamber and slidable through the two members in a fluid tight manner, spaced abutments carried by said companion member adjacent the remote sides of the rods to give lateral support thereto, a tension member connecting the abutments to mutually brace the same against spreading, shoe parts slidable outwardly on said companion member beneath the tension member, and means effective to spread the shoe parts by and during element imparted movement of said one member and cause the shoe parts to grip the rods for arresting the motor.

10. A fluid motor having a chamber and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element con-

nected to said one member, means connecting the two members for limited relative movement and enabling said transmission element being operated by said companion member, a pair of rods fixedly mounted in the chamber and slidable through the two members in a fluid tight manner, spaced abutments carried by said companion member adjacent the remote sides of the rods to give lateral support thereto, a tension member connecting the abutments to mutually brace the same against spreading, shoe parts slidable outwardly on said companion member beneath the tension member, the shoe parts being spaced from the tension bar to permit of such relative movement for releasing the shoe parts for fluid operation of the motor, and expansive means connecting the shoe parts to the transmission element for rendering the shoe parts operative upon element imparted movement of said one member.

11. A fluid motor having a chamber and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element connected to said one member, means connecting the two members for limited relative movement and enabling said transmission element being operated by said companion member, a pair of rods fixedly mounted in the chamber and slidable through the two members in a fluid tight manner, spaced abutments carried by said companion member adjacent the remote sides of the rods to give lateral support thereto, a tension member connecting the abutments to mutually brace the same against spreading, shoe parts slidable outwardly on said companion member beneath the tension member, said one member having a portion provided with oppositely facing seats and the shoe parts also having seats in opposed relation to said first seats, and toggle arms each engaged at its opposite ends in the opposed seats on said portion and said shoe parts for spreading the latter operative upon an element imparted movement of the said one member.

12. A fluid motor having a chamber and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element connected to said one member, means connecting the two members for limited relative movement and enabling said transmission element being operated by said companion member, a pair of rods fixedly mounted in the chamber and slidable through the two members in a fluid tight manner, spaced abutments carried by one of said members adjacent the remote sides of the rods to give lateral support thereto, a tension member through which the rods extend and connecting the abutments to mutually brace the same, expansible means slidable outwardly on the abutment carrying member and guided by the tension member, and means effective to spread the expansible means by and during relative movement between said members thereby to cause the expansible means to grip the rods in cooperation with the abutments for arresting the motor.

13. A fluid motor having a chamber and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element connected to said one member, means connecting the two members for limited relative movement and

enabling said transmission element being operated by said companion member, a pair of rods fixedly mounted in the chamber and slidable through the two members in a fluid tight manner, spaced abutments carried by said companion member adjacent the remote sides of the rods to give lateral support thereto, a tension member through which the rods guidingly extend and connecting the abutments to mutually brace the same against spreading, expansible means on said companion member beneath the tension member cooperating with the abutments to clutch the rods, said one member having a part freely passing to a point beneath the tension member, and means beneath the latter and operable by such part for expanding said expansible means.

14. A fluid motor having a chamber and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element connected to said one member, means connecting the two members for limited relative movement and enabling said transmission element being operated by said companion member, a pair of rods fixedly mounted in the chamber and slidable through the two members in a fluid tight manner, spaced abutments carried by said companion member adjacent the remote sides of the rods to give lateral support thereto, expansible means cooperating with the abutments to clutch the rods, toggle means for so expanding said expansible means when said one member is moved by an external force and acting by and during relative movement between the two members under fluid pressure to free the expansible means, and spring means acting normally upon the toggle means to expand the expansible means lightly against the rods.

15. A fluid motor having a chamber and spaced members individually operable therein by fluid pressure, one member operable in one direction and the companion member operable in the opposite direction, a power transmission element connected to said one member, means connecting the two members for limited relative movement and enabling said transmission element being operated by said companion member, said chamber having opposite end walls, a pair of rods slidable

through the two members in a fluid tight manner, each rod at one end being threaded in one of the end walls for securement while the opposite end is supported with a sliding fit in the opposite end wall of the chamber, and motor locking means cooperating with the rods by and during such relative movement as imparted by said transmission element.

16. A fluid motor comprising a chamber, a piston therein, a power transmission element operable by the piston and arranged for limited independent movement, a pair of rods fixedly mounted in the chamber and slidable through the piston in a fluid tight manner, and motor locking means carried by the piston and operable against the rods by said power transmission means during such limited independent movement.

17. A fluid motor having a chamber, a piston therein, a power transmission element operable by the piston and having limited independent movement, a pair of rods fixedly mounted in the chamber and slidable through the piston in a fluid tight manner, spaced abutments carried by the piston adjacent the remote sides of the rods to give lateral support thereto, tension means connecting the abutments to mutually brace the same against spreading, slidably supported shoe parts engageable with said rods, and means enclosed by said tension means and effective to spread the shoe parts by and during such limited independent movement of said power transmission element to cause the shoe parts to grip the rods for arresting the motor.

18. A fluid motor having a chamber, a piston therein, a power transmission element operable by the piston and having limited independent movement, rod means mounted fixedly in the chamber and slidable through the piston in a fluid tight manner, means operable against the rod means for locking the piston against movement in the chamber, and toggle means carrying the locking means and operable by and during such limited independent movement of the power transmission element to so operate the locking means against said rod means, said locking means being releasable by and during fluid movement of said piston.

ANTON RAPPL.

CERTIFICATE OF CORRECTION.

Patent No. 2,369,797.

February 20, 1945.

ANTON RAPPL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 56, claim 4, for "lock the" read --the lock--; page 3, second column, line 66, claim 12, before the word "thereby" insert --and--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of June, A. D. 1945.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.