April 15, 1941. J. A. RUPP 2,238,754

COMBINED WINDOW REGULATOR AND DOOR LATCH OPERATOR

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Fig. 1

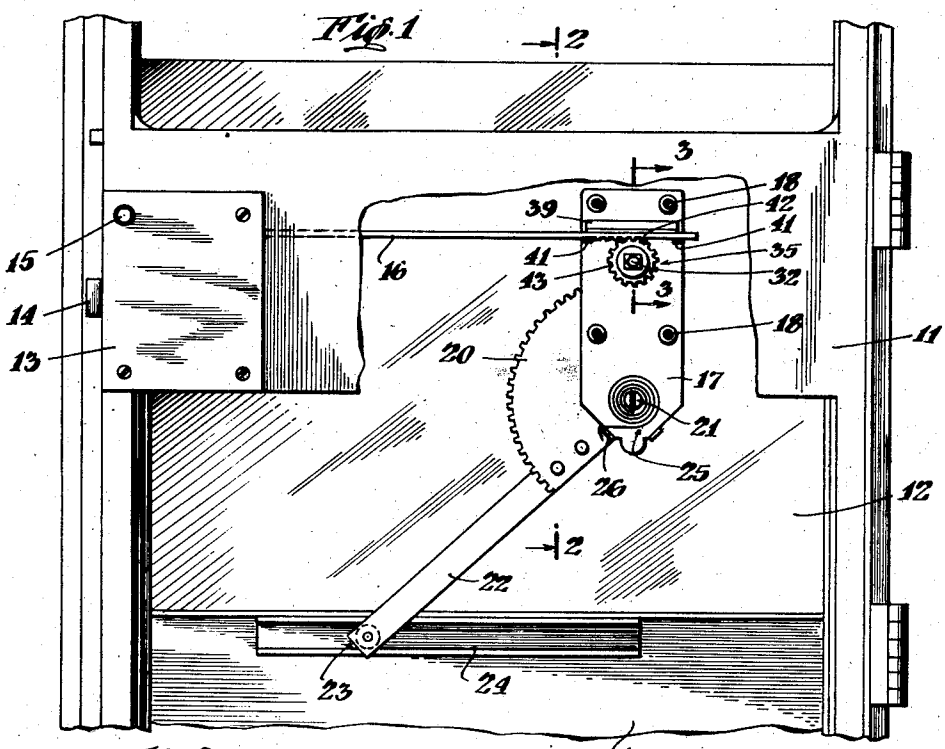


Fig. 2

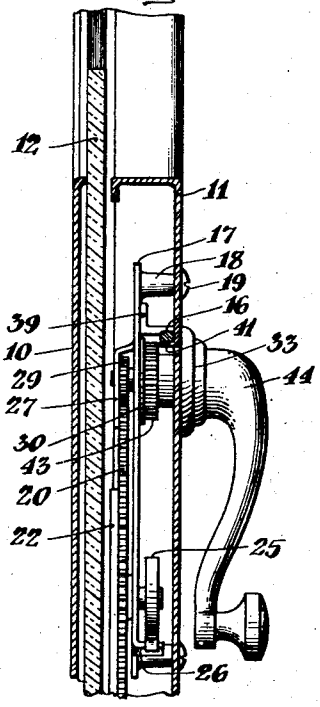


Fig. 3

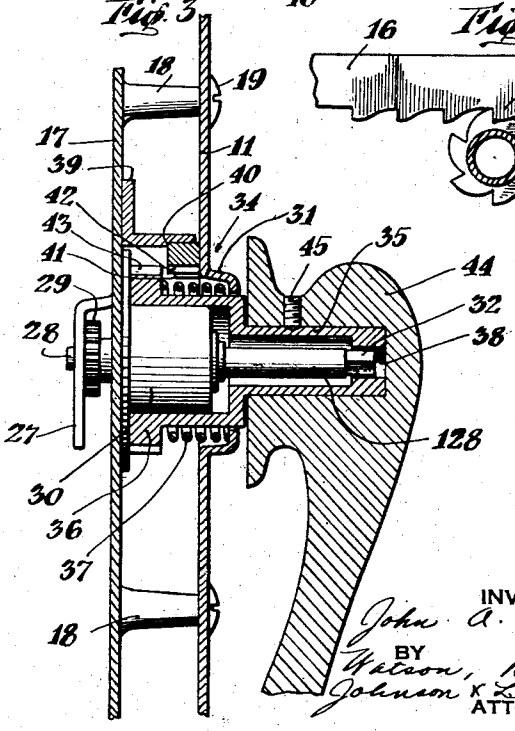


Fig. 4

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COMBINED WINDOW REGULATOR AND DOOR LATCH OPERATOR

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5 Claims. (Cl. 268—126)

The present invention relates to combined means for operating automobile door latch and window regulator mechanisms.

A general object of the invention is the provision of such improved means whereby a door latch and a window regulator may be effectively operated alternatively by a single operating member or crank arm and which comprise an unusually small number of parts, are exceedingly economical to manufacture, easy to assemble, simple to operate, provide a minimum number of projecting fittings or handles on the inside of the door which may catch in clothing and cause injury to occupants if violently thrown against the door, and insure a high measure of safety for occupants, especially children, in that normally the operating member is efficiently disengaged from the latch mechanism and is not subject to ready accidental engagement therewith.

Another object of the invention is the provision of such a device which includes a few simple, cheaply manufactured parts which may be easily and economically mounted into conventional window regulator mechanisms without necessitating changes of major proportions and permit the economical omission of latch operating parts normally used when separate operating members for the latch mechanism and window regulator mechanism are provided.

A more specific object of the invention is the provision of a simple unitary operating member capable of being rapidly and cheaply made in quantity production and a biasing means therefor which can be easily assembled with the parts of conventional window regulator mechanisms and in existing space between inside and outside door panels of present structures, the chief changes required being the substitution for the conventional latch mechanism operating rod of an operating rod sufficiently long to extend to the window regulator mechanism, provision on the rod of simple engaging means and the easy addition of rod guiding means.

A further object of the invention is the provision of such combined apparatus whereby the single operating member normally remains in engagement with the window regulator mechanism so that if the crank arm is rotated only raising or lowering of the window will be accomplished, it being necessary to effect operation of the latch mechanism for one to pull the crank arm out axially and then rotate it, the axial movement being resisted by biasing means which when the crank arm is released disengages the operating member from the latch mechanism and causes it again to engage the window regulator mechanism.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the acompanying drawing, in which:

Fig. 1 is an inner side elevational view of an automobile door with the inside fittings and upholstery omitted and parts of the door broken away, showing applied thereto conventional types of door latch and window regulator mechanisms modified in accordance with the teachings of the present invention;

Fig. 2 is a sectional view with parts broken away taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional view with parts broken away taken on line 3—3 of Fig. 1 and showing a slightly modified form of crank arm and associated fittings from those shown in Fig. 2; and

Fig. 4 is a front elevational view with parts broken away and in section of a modified structure for operating the door latch.

Prior to the present invention many attempts have been made effectively to operate both the door latch mechanism and the window regulator mechanism by manipulation of a single operating handle or crank arm. Such attempts have resulted from the desire to reduce the number of projecting fittings and crank arms on the inner sides of the automobile doors which tend to interfere with freedom of movement and comfort, to promote safety, and make for economy in production. These efforts for the most part have not been successful, the structures being either costly to produce and install and/or complicated and difficult to operate. Many such apparatuses are characterized by inherent tendencies of uncertain operation and frequent breakdowns which cause annoyance and necessitate repair expenditures. A further objection common to many of these prior art devices is that they are not as readily adaptable to conventional door structures and the latch and window regulator mechanisms with which they are now commonly equipped. These and other difficul-

ties are substantially eliminated by the present invention which efficiently attains the desired ends indicated above.

Most conventional types of window regulator mechanisms include a rotatable shaft suitably geared therein so as to raise and lower the window when the shaft is rotated. Such mechanisms are usually mounted on an inside panel supported on a door frame in spaced relation to the outside panel constituting the outer wall of the door. Suitable upholstery is provided to conceal from view the inside panel and mechanism supported thereon with the rotatable shaft projecting therethrough to carry an operating handle or crank arm on the inside of the door. The inside panel is also used for supporting conventional latch mechanism including a spring pressed latch bolt cooperating with a rollback operated by means of an outside handle and a latch operating rod extending substantially transversely of the door between the outside and inside panels. When separate handles are provided for operating the latch mechanism and the window regulator mechanism the latch rod is suitably geared to a shaft extending through the inside panel and upholstery with a suitable handle for rotating the same.

In accordance with the present invention the shaft for operating the window regulator mechanism is fitted with a simple unitary operating member which may be slid axially thereof from an innermost position to an outermost position. This unitary member is preferably spring biased to its innermost position and in such position has interfitting engagement with the shaft so that when the member is rotated the shaft will be rotated and the window regulator mechanism operated. The latch mechanism is provided with a suitably guided operating rod which extends to and through the window regulating mechanism. The rod is equipped with simple engaging means adapted to cooperate with engaging means on the unitary operating member when the latter is moved axially of the shaft to its outermost position so that rotation of the unitary member will cause the latch either to be retracted or to be locked in position depending upon the direction of rotation of the unitary member. The structure is so devised as to insure that the unitary operating member will have motion transmitting engagement with the rotatable shaft and with the latch rod only alternatively.

It will be understood from the following detailed description that the invention may readily be employed with many different conventional types of automobile door latch mechanisms and window regulator mechanisms. By way of example, in the drawing are shown rather well known conventional types of window regulator mechanism and latch mechanism.

Referring to the drawing, like parts bear like numerals throughout. The portion of the automobile door shown therein is of conventional construction and includes an outside panel **10** constituting the outer wall of the door and a relatively narrow horizontally arranged inside panel **11** mounted in the usual manner upon frame members in spaced apart relation to the outside panel. A window pane **12** is positioned for vertical movement between the outside and inside panels **10** and **11**.

Upon the inside panel **11** is supported an encased latch mechanism **13** from which projects a spring pressed latch bolt **14** operable by the usual rollback affixed to a shaft **15** upon which is mounted a handle on the outside of the door. The latch bolt **14** is retractable by a pull rod through suitable mechanism of known type. For the purpose of the present invention there has been substituted for the usual pull rod an extended pull rod **16** to be described later.

The conventional type of window regulator shown includes a metal base plate **17** secured in spaced relation to the inside panel **11** such as by internally threaded spacers **18—18** and screws **19—19**. A peripherally toothed sector plate **20** is pivotally mounted at **21** upon the lower end of the base plate **17** by a stud shaft adapted to rotate therewith. A window raising and lowering arm **22** is riveted to the toothed sector and the lower end of the arm carries a suitable roller **23** which is movable freely in a guide channel **24** attached to the lower horizontal edge of the window pane **12**. A spiral spring **25** has one end thereof secured to the stud shaft **21** and the other end thereof suitably anchored to the base plate **17** such as by hooking the end thereof over a stud **26**. Downward movement of the window winds up the spiral spring to place it under tension so as to compensate for the weight of the window and aid in the lifting thereof.

In the upper portion of the base plate **17** a support **27** is struck out therefrom to provide a bearing for one end of a stud shaft **28** which carries a pinion **29** adjacent the inner face of the base plate. To the opposite face of the base plate **17** is riveted a housing or casing **30** of a spring friction clutch of conventional type adapted to act as a friction brake. The parts of the spring friction clutch are suitably mounted upon the stud shaft **28** within the casing **30**. The outer end of a second stud shaft **128** suitably engaged with the stud shaft **28** to be rotatable therewith extends through a bearing in the end of the housing **30** as shown. The friction clutch acting as a brake is for the well known purpose of retaining the window in an adjusted position against downward gravitational movement.

In the conventional construction the stud shaft **128** extends through a hole in a boss **31** formed in the panel **11** has an outer end **32** thereof polygonally shaped in cross-section, such as hexagonal, to receive in interfitting engagement a suitable crank arm for rotating the shaft. Obviously the crank arm may be splined on the outer end **32** of the shaft or provided in any other suitable manner with interfitting engagement as desired. Frequently an escutcheon plate is placed about the shaft and/or the head of the crank arm, such as that shown at **33** in Fig. 2 to improve the appearance of the assembly. A space (not shown in Fig. 2) is to be provided between the escutcheon plate **33** and the panel **11** for accommodation of the upholstery which has been omitted. Such a space has been indicated at **34** in Fig. 3 wherein a skirted crank arm head is used in lieu of an escutcheon plate. In such a structure the skirted head overlies a grommeted hole in the upholstery.

In accordance with the present invention a sleeve member **35** is added to the previously described conventional structure. This sleeve member is shaped rotatably and slidably to accommodate the clutch housing **30** and the shaft **128** therewithin and is provided on the inner end thereof with a flange **36** between which and the inner face of the boss **31** is confined a biasing coil spring **37** for the purpose of normally retaining the sleeve in its innermost position, that is with flange **36** snugly riding against the base of the

brake housing 30. A section 38 of the inner walls of the sleeve 35 is shaped complementary to the shaft end 32 so that the shaft has interfitting engagement and may be rotated with the sleeve when the latter is in its innermost position. When the sleeve 35 is pulled out axially to an outermost position, determined by the inside face of the panel 11 or any other suitable stopping means, the shaped section 38 of the sleeve will be free from engagement with the shaped portion 32 of the shaft 128 so that the sleeve may be rotated relative to the shaft.

The latch operating rod 16 is guided for longitudinal movement by suitable upper and lower brackets mounted on the base plate 17 or stamped out from the panel 11 as desired. The upper bracket 39 is suitably recessed or shaped to provide a shoulder 40 between which and the panel 11 the rod 16 slides. Obviously in lieu of the shoulder 40 separate blocks or guiding members to cooperate with the bracket 39 may be mounted upon the base plate 17 or stamped out therefrom to hold the rod 16 adjacent the panel 11. The rod 16 is supported by any suitable means such as by brackets 41—41, preferably formed by striking out portions from the panel 11.

Within the confines of the window regulator mechanism the rod 16 is provided with a number of gear teeth or engaging projections 42—42 and the flange 36 on the sleeve 35 is provided around the periphery thereof with similar teeth or engaging projections 43—43 adapted to engage with the teeth or projections 42—42 when the sleeve is pulled to its outermost position. It will thus be seen that when the sleeve 35 is pulled to its outermost position thereby disengaging shaft 128 and engaging rod 16 the latter may be moved longitudinally in either direction by proper rotation of the sleeve. In conventional types of latch mechanisms the latch bolt is usually retracted by a pull on the rod and provision is frequently made for locking the latch bolt so that when the rod is moved forward relative to the bolt a projection is disposed beneath a portion of the rollback for dogging the latter. Such operations can be accomplished with the above described structure.

It will be understood that a variety of interfitting means may be used for causing the sleeve 35 to move the rod 16 longitudinally, e. g. as indicated in Fig. 4 a small number of spaced apart projections 142—142 of any suitable shape may be provided on the rod to be engaged by cooperating projections 143—143 on the sleeve 35.

The outer end of the sleeve 35 is suitably adapted to receive a crank arm 44. This may be accomplished by shaping the end thereof so that it is polygonal in cross-section, for example square, the shaped end being received in a complementary shaped socket in the head of the crank arm 44. The arm may be secured on the sleeve by any suitable means such as by a set screw 45. A number of different ways of securing the crank arm 44 upon the sleeve 35 will readily occur to one skilled in the art; e. g. the end of the sleeve 35 beyond the end of the shaft 28 may be closed off and an axially aligned hole therein threaded to receive a threaded stud projecting through the head of the arm 44, or the crank arm may be splined and suitably fastened on the sleeve.

The operation of the device described above by way of example is as follows: The single operating member or sleeve 35 normally is held in its innermost position by a biasing spring 37. In such position it has no motion transmitting engagement with any portion of the latch mechanism. It does, however, have rotation transmitting engagement with the shaft 128, the shaped end 32 of shaft interfitting with the shaped section 38 of the inner walls of the sleeve 35. Thus if the crank arm 44 be rotated in either direction the shafts 128 and 28 and the pinion 29 thereon will be rotated in like manner. This will cause rotation of the sector 20 so that the arm 22, the roller 23 carried thereon and the roller track 24 affixed to the bottom of the window will cooperate to raise or lower the latter. Since the sleeve 35 is biased by the spring 37 to its innermost position normal rotation of the crank in either direction will merely effect raising or lowering of the window, the door remaining latched shut by the latch bolt 14.

If it is desired to unlatch the door the operator grasps the handle or crank arm 44 and exerts a pull thereon to move the sleeve 35 axially of the shaft 28. When the sleeve 35 is pulled out to its outermost position the teeth or projections 43—43 engage with the teeth or projections 42—42 on the rod 16. As this is accomplished the shaped section 38 of the sleeve 35 is disengaged from the shaped portion 32 of the shaft 128 so that the sleeve may be rotated relative to the shaft. With the crank arm and sleeve held in the outermost position the arm may be rotated in the clockwise direction to exert a pull on the latch rod 16 thereby unlatching the door. If with the door latched shut it is desired to dog the rollback so that the door cannot be opened by manipulation of the handle on the outside the crank arm 44 may be rotated in a counterclockwise direction to push the latch rod 16 into a locking position. When the crank arm 44 is released the biasing spring 37 returns sleeve 35 to its innermost position so that it is again disengaged from the latch rod 16 and engaged with the window regulator mechanism.

It will thus be seen that the window regulator mechanism and the latch mechanism are alternatively operated by a single operating handle or crank arm and that normally the single operating member is in engagement with the window regulator mechanism. This is especially advantageous to occupants, particularly children, since accidental or unauthorized rotation of the crank arm will not effect opening of the door, a safety feature the importance of which will readily be appreciated. Safety is further insured by the fact that the arm must be pulled inwardly against the resisting force of a spring before the latch bolt can be withdrawn by rotation of the arm. Accordingly should an occupant be thrown violently against the arm during motion of the automobile there will be no accidental engagement with the latch operating mechanism which might result in the door flying open and an occupant being thrown from the automobile.

It will be understood that the end of sleeve 35 which carries the crank arm 44 and the end of the stud shaft 128 which is surrounded by the sleeve need not project through the hole in the panel 11. It is only necessary that the end of the sleeve 35 be accessible through a hole in panel 11 so that the crank arm may be mounted on the inside of the door and fitted to the end of the sleeve. If the end of the sleeve does not project the head of the crank arm may be shaped to project through the aperture in the panel 11 so as to be fitted to the sleeve. The form of structure

shown, however, is preferred since it has been adapted to existing structures of conventional types wherein the space between the outside and inside panels of the doors are limited in extent and in which the window regulator shaft usually projects through the inside door panel.

Accordingly to adapt the invention to conventional types of structure it has been necessary merely to enlarge the hole in the inside door panel, provide simple latch rod guides in the window regulator mechanism or inside door panel 11, substitute an economically made elongated latch rod extending to and through the window regulator mechanism for the latch rod found in the conventional type of latch mechanism, and add the sleeve, constituting a single operating member, and a biasing spring. The sleeve can be very economically made by die casting. The entire structure is easy to assemble and simple and positive in operation, is sturdy and will require little if any attention to keep it in operating order. The relatively low cost of the added parts is more than offset by the cost of the parts the omission of which is made possible by the present invention, and in fact a large saving in cost and installation is contemplated.

It will thus be seen that the objects set forth have been efficiently attained by the present invention and since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a door latch and a window regulator each having an actuating mechanism, of a rotatable shaft constituting a part of the window regulator actuating mechanism, a sleeve slidable on said shaft between innermost and outermost positions and spring-biased to its innermost position, means within said sleeve adapted to have rotation transmitting engagement with the shaft only when said sleeve is in its innermost position, means on the outside of said sleeve adapted to have motion transmitting engagement with the latch actuating mechanism when said sleeve is in its outermost position, said sleeve being adapted to have motion transmitting engagement with but one of the actuating mechanisms at a time, and a handle for rotating said sleeve.

2. The combination with conventional automobile outside and inside door panels carrying conventional door latch and window regulator mechanisms, of a rod for operating the latch, a rotatable shaft for operating the window regulator, a sleeve slidably mounted on said shaft and having an inner end positioned between the outside and inside door panels, a spring normally holding said sleeve in an innermost position, means on said inner end adapted to engage with means on the latch rod whereby the latch rod may be moved substantially longitudinally when said sleeve is moved axially to an outermost position and rotated on the shaft, and means within said sleeve adapted to have interfitting engagement with the shaft only when said sleeve is in its innermost position free from engagement with the latch rod whereby the shaft may be rotated by said sleeve when in the latter position, the outer end of said sleeve being accessible through a hole in the inside door panel and adapted to receive a conventional crank arm for rotating said sleeve alternatively to operate the latch and window regulator.

3. The combination with conventional automobile outside and inside door panels carrying conventional door latch and window regulator mechanisms, of a rod for operating the latch mechanism, a shaft and pinion thereon for operating the window regulator, a rotatable sleeve slidably mounted on said shaft and having an enlarged inner end positioned between the outside and inside door panels, a coil spring surrounding said sleeve and confined between the enlarged inner end thereof and the inside door panel biasing the sleeve to an innermost position, motion transmitting projections on the enlarged inner end adapted to engage means on the latch rod and cause the latter to be moved substantially longitudinally when said sleeve is moved axially to an outermost position and rotated on the shaft, said sleeve internally having rotation transmitting engagement with the shaft only when the former is in its innermost position and is free from engagement with the rod, the outer end of said sleeve being accessible through a hole in the inside door panel and carrying a crank arm on the outer side of said panel.

4. In combination with automobile outside and inside door panels carrying therebetween a door latch mechanism and a window regulator mechanism, a guided latch rod for retracting or locking the latch, a rotatable shaft for operating the regulator mechanism, a sleeve rotatably and slidably mounted on said shaft with its outer end accessible from the outer side of the door panel through a hole in said panel, a shoulder on the inner end of the sleeve, a coil spring surrounding said sleeve and confined between said shoulder and the inside door panel biasing the sleeve to an innermost position, teeth on the inner end of said sleeve adapted to engage teeth on the latch rod and cause the latter to operate latch mechanism when said sleeve is moved axially to an outermost position and rotated relative to the shaft in the proper direction, a portion of said shaft and a section of the inner walls of said sleeve being shaped complementary to each other so as to transmit rotary motion from the sleeve to the shaft when the sleeve is in its innermost position and the teeth thereon are free from engagement with the teeth on the latch rod, and a crank arm on the outer side of the inside door panel fitted to the outer end of said sleeve for rotating the latter.

5. In combination with automobile outside and inside door panels carrying therebetween a door latch mechanism and a window regulator mechanism, a latch rod guided for longitudinal movement to retract or lock the latch, a rotatable shaft adapted to rotate a pinion for operating the regulator mechanism, said shaft being provided with a suitably housed friction clutch of conventional type and having at least a portion of the outer end thereof shaped to receive a complementary part adapted to rotate the shaft when in engagement therewith, a sleeve rotatably and slidably mounted on said shaft with its outer end projecting through a hole in the

inside door panel, said sleeve being shaped to accommodate the friction clutch housing interiorly thereof, a flange on the inner end of said sleeve providing a shoulder, a coil spring surrounding said sleeve and confined between the shoulder and the inside door panel biasing the sleeve to an innermost position, a section of the inner walls of said sleeve being shaped complementary to the shaped portion of the shaft so as to engage therewith and rotate the shaft when said sleeve is in its innermost position, teeth on said flange, teeth on said latch rod adapted to be engaged by the flange teeth when said sleeve is moved axially to an outermost position so as to cause said sleeve when rotated relative to said shaft to move said rod longitudinally, and a crank arm on the outer side of the inside door panel fitted to the projecting outer end of said sleeve for rotating the latter.

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