

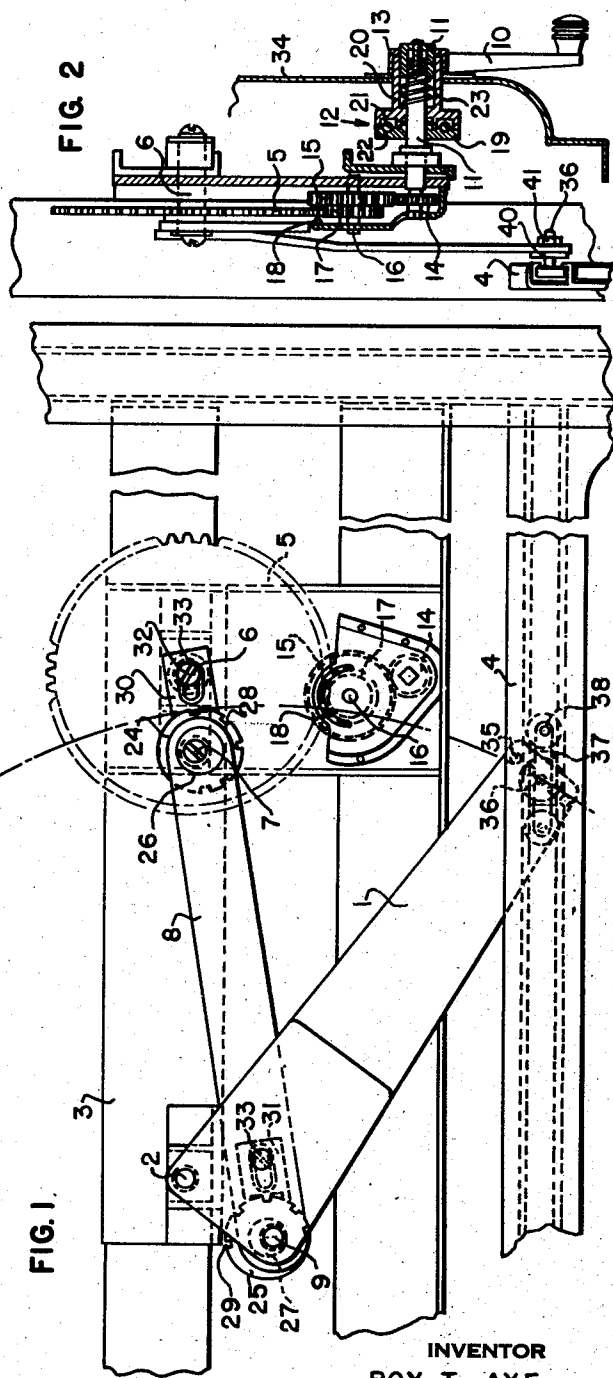
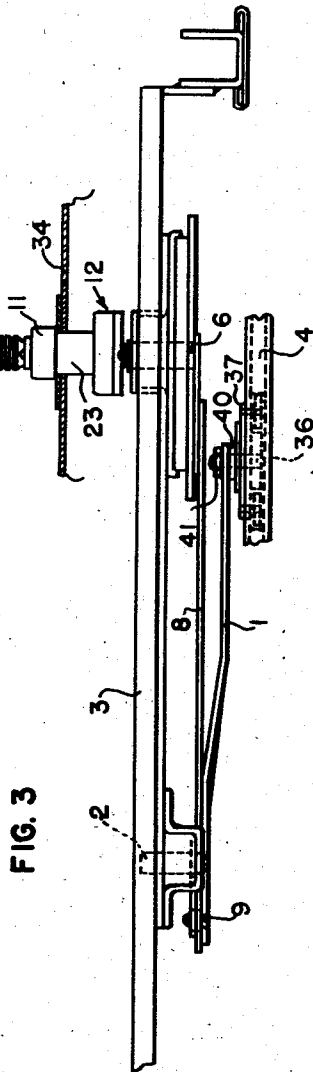
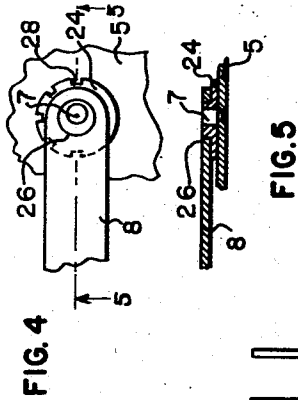
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SASH OPENING AND CLOSING MECHANISM

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## UNITED STATES PATENT OFFICE

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## SASH OPENING AND CLOSING MECHANISM

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3 Claims. (Cl. 268—126)

This invention relates to sash opening and closing or regulating mechanisms, such as the sash used in buses and other vehicles, which mechanism includes a lever arm, which is connected to one of the rails, as the top rail, of the sash at the median line of the sash, and means for actuating the lever including a rotatable element or wheel connected to the lever by a connecting rod, so arranged that movement of the connecting rod during one half of a reciprocation opens the sash and during the other half, closes the sash.

This invention has for its object an arrangement by which the lever arm may be readily and accurately adjusted to vary the starting and stopping or reversing positions in accordance with the position of the sash, when closed and fully open.

It further has for its object whereby the point of connection between the lever and the sash moves in an arc close to the chord of the arc or a straight line, which is a vertical line, in case of the sash, which raises and lowers, passing through the center of the sash vertically.

Other objects appear throughout the specification.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawing in which like characters designate corresponding parts in all the views.

Figure 1 is an elevation of this mechanism, the contiguous portion of the frame of the vehicle or bus being shown.

Figure 2 is a fragmentary elevation, partly in section, looking to the left in Figure 1.

Figure 3 is a fragmentary plan view looking downwardly in Figure 1.

Figures 4 and 5 are detail views of one of the eccentrics for effecting the adjustment of the lever arm, which is connected to the sash, Figure 5 being on the line of 5—5, Figure 4.

This mechanism comprises, generally, a motion transmitting lever pivoted to suitable framing in the vehicle or bus, above or below, or at one side or the other of the sash, dependent upon whether the sash opens vertically or horizontally, the lever being connected to the sash, a rotatable element or wheel mounted on the sash framing, the wheel having a crank pin, a connecting rod between the crank pin and the lever and connected to the lever at a point eccentric to the pivotal axis of the lever, a suitable handle, as a crank, and reduction gearing between the handle and the crank wheel, the handle transmitting its motion through a slip clutch, so that when the sash reaches the limit of its movement in either direction, force continued to be applied to the

crank handle causes the crank handle to slip or unclutch.

The mechanism further includes the adjustment features hereinafter specifically pointed out.

5 The mechanism here shown is adapted for a sash which raises and lowers vertically by a handle arranged above the top of the sash.

10 1 designates the motion transmitting lever, this being pivoted at 2 to the car framing 3, the lever being connected at its lower end to the top rail 4 of the sash through a carriage, which has a limited movement lengthwise of the top rail during the movement of the lever, that is, during the movement of its lower end in an arc.

15 5 designates the rotatable motion transmitting part or wheel suitably mounted on a spindle or shaft 6 on the framing 3, it having a crank pin 7. 8 designates a connecting rod having a bearing at one end on the crank pin, and also a bearing at its other end on a pin 9 located on the lever 1 eccentric to the pivotal axis 2 of the lever. The pivot 2, pin 9 and the free end of the lever are so relatively located that the lever is an angle lever having a long arm and a short arm, the short arm being pivoted at 2 at its end to the frame 3.

The wheel 5 is a gear and it is actuated from a suitable handle through a reduction gearing.

10 designates the handle, this being mounted on a spindle 11 connected thereto through a slip clutch 12, the spindle being mounted in a suitable casing 13 fixed to the frame and having a pinion 14 thereon meshing with an intermediate gear 15. A shaft 16 has a pinion 17 thereon which meshes with the gear 5. The gear 15 laps the gear 5. The casing having a projecting portion 18 presses against the side face of the gear wheel 5 opposite to that lapped by the gear 15 and acts as a brake to prevent movement of the sash under its own weight and momentum. The slip clutch 12 may be of any suitable construction, and is here shown as including a head 19 keyed to the spindle or shaft 11, an axially spring-pressed sleeve 20 and clutch members, as balls 21 between the sleeve and the head, the balls normally being seated in sockets 22 in the head 19. The force of the spring 23 on the sleeve is sufficient to hold the balls 21 clutched in the sockets 22 under normal operation, but should the operator continue to apply a turning force to the handle, when the sash has been returned to closed position, or has reached its fully open position, the balls will be cammed out of the sockets 22 and the handle 10 and its hub or sleeve 20 will rotate idly about the shaft 11. In this sash regulating mechanism, this does not occur after the connecting rod 8 is once properly adjusted and also after the arm 1 is properly adjusted relatively to the carriage 37 to cause the sash to be in fully closed or in fully open

position, when the connecting rod is at one end or the other of its throw or in position to reverse. However, it does occur under a certain condition, as when the sash encounters an obstruction or undue resistance when being opened or closed.

The bearings between the opposite ends of the connecting rod 8 and the crank pin 7 and pin 9 of the lever 1 are eccentric bearings and adjustable, one being adjustable to vary the lineal dimension of the connecting rod 8, and hence the throw of the lever 1, and the other being adjustable to vary the starting position of the free end of the lever 1 to conform to the fully closed position of the sash, that is, vary the effective radial angle of the long arm of the lever. This eccentric bearing consists of a disk or ring 24 or 25 eccentrically mounted on the pin 7 or 9 and fitting in a circular bearing hole 26 or 27 in one end or the other of the connecting rod 8. The disk or ring has suitable notches 28 or 29 therein for coacting with a retainer or dog 30 or 31 which is held in position by a suitable means as a screw 32 extending through a slot 33 in the dog. Obviously, the connecting rod may be adjusted in a lineal direction to vary the throw of the lever 1 by adjusting the eccentric 24 and the starting angular position of the lever or the initial position of the lower end of the lever 1 may be adjusted, if necessary, by turning the eccentric ring 25. However, these two adjustments, which are initial adjustments, may be omitted, because in some installations, they are not reachable without removing a finishing plate, as 34, in the vehicle, which oftentimes extends the full length of the bus or vehicle, and sometimes in case of the removal and replacement of the sash, an adjustment is necessary. Therefore, in addition to these initial adjustments, an additional adjustment may be provided at the lower end of the lever 1, to shift the connecting pivotal point between the lever and the carriage 37 in the general direction of the line of movement of the sash, that is, up or down, or the eccentric bearings may be omitted. This adjustment comprises a series of holes 35 arranged in an arc struck from the axis of the pivot 2 of the lever 1, any one of these holes being positioned to receive a stud 36 (Figure 1) on the carriage 37, the carriage working in a channel in the top rail 4 of the sash. The initial radial angle of the long arm of the lever 1 is different when the stud is located in different holes of the series. The carriage is elongated and provided with spaced apart rollers 38.

During the movement of the arm 5, this carriage moves crosswise of the median line of the sash with respect to the shifting movement, but the arc of movement of the free end of the lever 1 is so flat that the carriage during its movement never is located entirely on one side of the median line, which is the chord of the arc of movement of the free end of the lever 1.

The stud 36 is suitably mounted in the carriage 37 and has a head or disk 40 overlying the frame of the carriage. The end of the lever arm 1 extends between this disk 40 and a nut 41 threading on the stud.

In the mechanism here illustrated for raising and lowering the sash of vehicles and buses embody the handle, wheel and reduction gearing between the handle and the wheel, and also a crank mechanism, but the handle turns always in one

direction through repeated complete circles, and turning of the handle until the crank travels in a semi-circle will completely open the window sash and continued movement in the same direction.

By the adjustments of the connecting rod 8 and the arm 1, the connecting rod can be adjusted so that its bearings will come into position to reverse when the sash is fully open and fully closed, and by the adjustment of the arm 1 relatively to the carriage 37, the sash can be adjusted in such position that it will be accurately fully closed or open when the connecting rod is in reversing positions.

Also, in view of the arrangement of the arm 1 and the carriage in the rail of the sash, the force of the lever arm 1 is applied to the sash at all times very close to the median line of the sash, so that during the raising and lowering, the sash does not tilt or become jammed, because of the cockeyed movement of the sash.

What I claim is:

1. In a sash opening and closing mechanism, a lever pivoted at one end and having its other end connected to the sash at the median line thereof with respect to the direction of movement, actuating means for the lever including a wheel having a crank pin, a connecting rod between the crank pin and the lever and connected to the lever at a point eccentric to the pivotal axis of the lever, means for turning the wheel about its axis, and means for varying the effective starting radial angle of the lever arm relatively to the sash, the sash having a slide therein, and said means including mechanism for attaching the slide to the end of said arm at points in different radial angles of said arm with respect to the pivotal axis of the lever.

2. In a sash opening and closing mechanism, a lever pivoted at one end and having its other end connected to the sash at the median line thereof with respect to the direction of movement, actuating means for the lever including a wheel having a crank pin, a connecting rod between the crank pin and the lever and connected to the lever at a point eccentric to the pivotal axis of the lever, means for turning the wheel about its axis, and means for varying the effective starting radial angle of the lever arm relatively to the sash, the sash having a slide therein, and said means including mechanism for attaching the slide to the end of said arm at points in different radial angles of said arm with respect to the pivotal axis of the lever in different radial angles of said arm, said points being arranged in a series in a line extending in the general direction of the line of travel of the sash.

3. In a sash opening and closing mechanism, the combination with a sash rail formed with a way, a lever having an elongated carriage at one end movable in the way, the lever being pivoted to the carriage at a point intermediate the ends thereof, a rotatable motion transmitting part having a crank pin, a connecting rod having a bearing at one end on the crank pin and at its other end on the lever eccentric to the pivotal axis thereof, and means for adjusting the angle of the lever relatively to the pivotal connection between it and the carriage.

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