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DOOR HANDLE AND LATCH CONSTRUCTION

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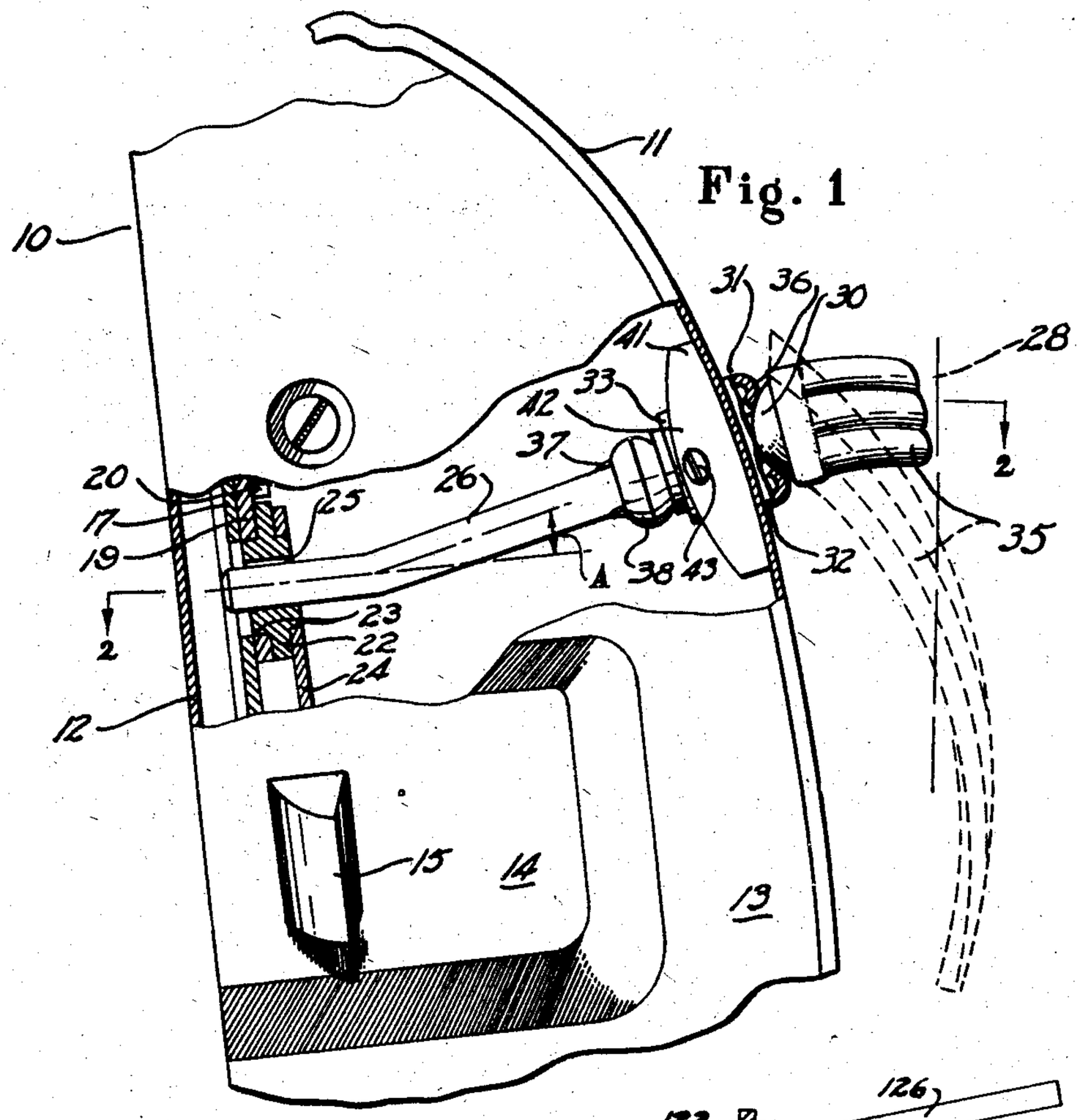

Fig. 1

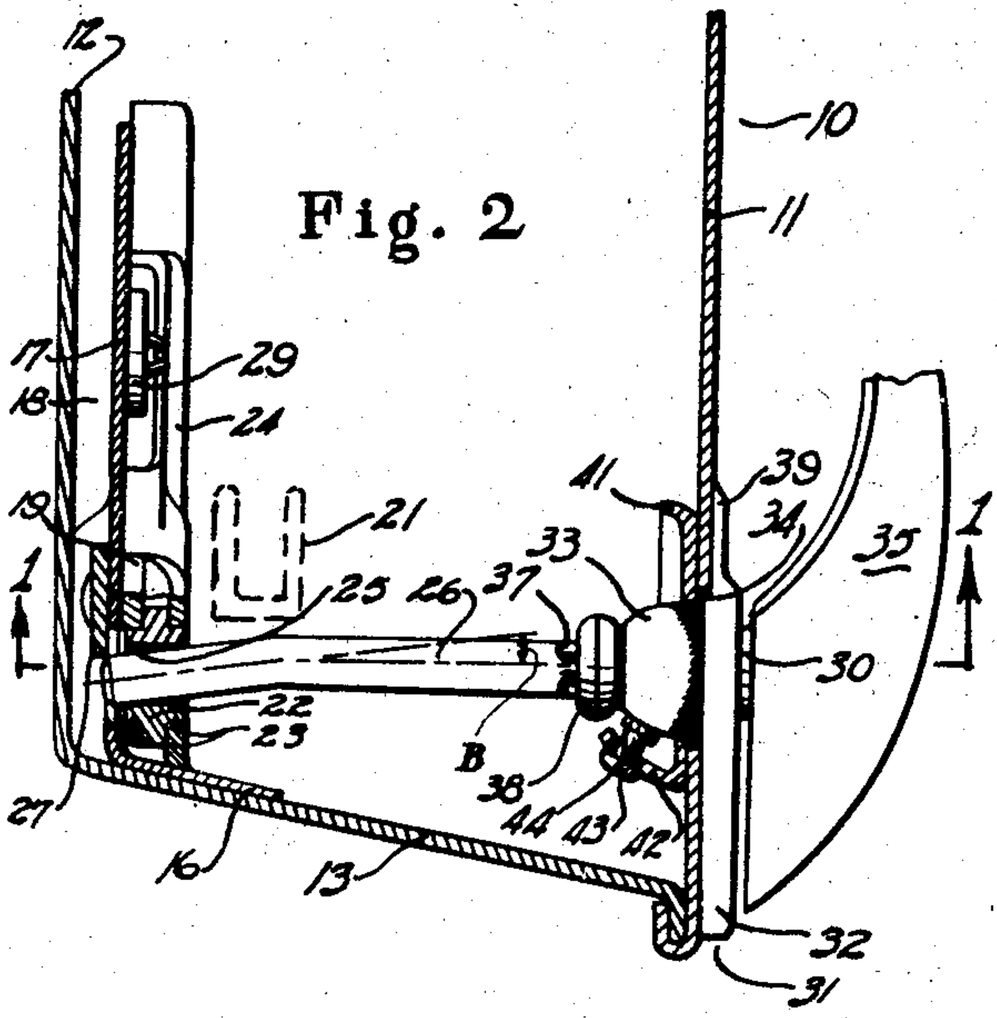

Fig. 2

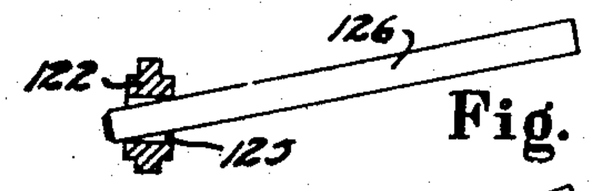

Fig. 3

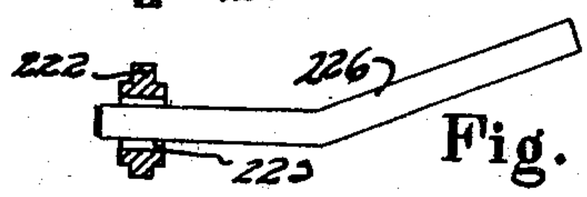

Fig. 4

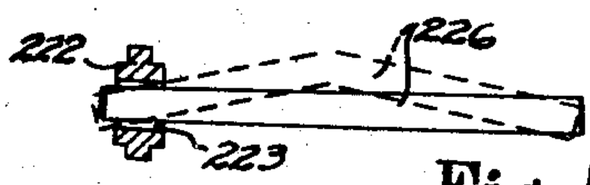

Fig. 5

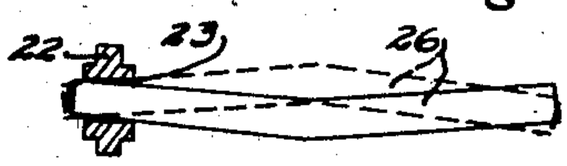

Fig. 6

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DOOR HANDLE AND LATCH CONSTRUCTION

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This invention relates to automotive body construction; and, more particularly, to a door handle and door latch mechanism, designed primarily for use on the doors of automobile bodies, although adaptable to other installations as well.

The present trend of automotive body design is such that instead of the outer door panel being inset a considerable distance from the side clearance line of the vehicle (which formerly was represented by the outer edge of the running board and fenders), the door panels themselves are now carried out to this line and the running board, as such, has disappeared—a smooth line being maintained from the front fender through the door and side panels to the rear fender. While this construction provides considerably more room inside the vehicle, and a more streamlined appearance to the exterior, it creates a difficult problem in the location and operation of the door handles. These, in the usual construction, must protrude a considerable distance outwardly of the door panel to provide an easy grasp and to give adequate room for rotation to operate the door latch. Obviously, in cars of present design, if the handles are mounted in this manner they will extend beyond the clearance line of the vehicle. This creates an additional hazard to pedestrians; and, indeed, in some states such projections beyond the clearance line are forbidden by law. In order to avoid these disadvantages, recourse has been had to operating the latch by an exterior push button set flush with the outer door panel or by recessing the conventional door handle within the door panel. Either of these expedients is considerably more expensive and has certain other features which are not entirely advantageous. Another expedient which has been suggested many times is the installation of the door handle on the extreme upper portion of the door panel. As the panel generally has a pronounced inward curve inwardly at this point, if the handle might be located high enough on this curve, it can be placed within the minimum clearance line of the vehicle. However, this leads to complications in positioning of the latch mechanism which, for a number of reasons, should be placed lower on the door. In addition, it is desirable to have the handle mechanism located substantially tangent to the surface upon which the handle is mounted and it is equally desirable to have the latch mechanism mounted parallel with the inner surface of the door. These two surfaces are far from parallel as was usually the case in the earlier constructions so that the connecting means between the handle and latch must make due allowance for the obliquity existing. In order to allow for these angular differences existing between the outer and inner door panels, it has been suggested that the latch operating shank extending between the latch mechanism and the handle incorporate a universal joint or other means permitting unimpeded transmission of the operating rotational force from the handle to the latch. Another expedient suggested has been to so change the latch mechanism that the operative portion thereof—generally known as the rollback—be offset from the latch plate and arranged generally parallel with the surface of the outer door panel, so that it will be normal to a straight shank leading from the handle to the rollback. Other proposals have also been advanced looking towards modification of the latch mechanism or of the shank construction or both—all with the idea of permitting free operation of the shaft despite the obliquity between the latch and handle.

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None of these proposals have found acceptance in the industry since the addition of universal joints to the shank would be expensive and introduce an element likely to give trouble in service. Nor has the redesigning of the latch mechanism itself met with favor, since these devices have long been standardized and have been so designed as to occupy the minimum possible transverse space to prevent interference with the window which is slidably mounted within the door and which must, when lowered, pass the lock mechanism. It has been found that any substantial change in the disposition of the various elements of the latch mechanism increases its over-all thickness and leads to interference with the window clearance. Recessed handles are expensive to manufacture, spoil the smooth body line, and rarely provide adequate hand clearance. Under these circumstances, the present invention has particular merit, since: first, it is no more expensive to manufacture and install than the conventional latch and handle mechanism; second, it permits the use of the regular latch mechanism without any change whatever; third, as it is entirely positive in operation and has no universal joint or other similar connection; fourth, it permits the handle to be located in a plane of considerable obliquity with the mounting plane of the latch mechanism; fifth, it permits free rotation to be transmitted from the handle to the latch even though these two elements are located in oblique planes.

It follows that the use of the invention permits

the mounting of the exterior handle on the upper curve of the door panel, so that it will be positioned well inwardly of the clearance line of the vehicle when the handle is in closed position. It also permits a conventional lock latch mechanism to be mounted on the inner panel of the door out of parallelism with the portion of the panel on which the handle itself is mounted. Thus, the handle has adequate protection while the car is in motion and though a part of the handle may swing outwardly of the clearance line when the latch is operated, this is perfectly permissible and presents no hazard. The mounting is such that adequate room is provided at all times to grasp the handle and at least this initial clearance may be maintained at all stages of the handle rotation. Thus, the inherent disadvantage of a recessed handle is avoided and there is no difficulty in providing the necessary clearance when the handle is at its extreme opened position. The latch mechanism is mounted in exactly the usual manner and the handle and shank are assembled with it just as had been done in conventional practice in the past.

With these and other objects in view, the invention consists in the arrangement, construction, and combination of the various elements comprising the structures described in the specification, claimed in the claims and illustrated in the accompanying drawings, in which:

Figure 1 is an end elevation of a portion of a vehicle door incorporating the improved latch and handle, a portion thereof being shown in section substantially on the line 1—1 of Figure 2.

Figure 2 is a partially sectioned plan view taken substantially on the line 2—2 of Figure 1.

Figure 3 is an elevation of a conventional straight shank shown in closed position and indicating the extreme clearance required in the rollback.

Figures 4 and 5 are an elevation and a plan view of a shank having a single intermediate bend shown in closed position in full line and in open position (Figure 5) in dotted line again illustrating the rollback clearance required.

Figure 6 is an elevation of the shank of this invention shown closed in full line and open in dotted line and indicating the reduced neecssary clearance.

Referring to Figures 1 and 2, the door section 10 has the outer panel 11, an inner panel 12, and an end panel 13 with a recess 14 through which extends the latch bolt 15. The latch mechanism is of the usual construction having a face plate 16 abutting the inner surface of the end panel 13 of the door and formed integrally with the base plate 17 abutting, for a portion of its length, against a depression 18 formed in the inner panel 12. The actuating lever 19 is rotatably mounted on the plate 17 and carries a pin 20 which is engaged by the actuating tip of the rollback 22. The rollback is in the usual form having extending trunnion portions 23 which are journaled in the lever 19 and cover plate 24 and a square central opening 25 adapted to receive the similarly shaped end of the shank 26, but being somewhat larger in dimension. A locking bar 27 is slidably mounted on the inner surface of the base plate 17 and has a right angle lip extending through the plate 17 and adapted to slide downwardly to restrain the lever 19 and lock it in closed position. A coil spring 29 mounted on the base plate 17 prevents rattling of the associated parts. The usual position of the window channel is shown at 21.

The handle mounting on the outer panel 11 comprises an escutcheon 31 which has (in this design) an outer plate 32 overlying the panel 11 and an abutment 33, which is generally ellipsoidal in cross section extending through an aperture 34. The shank 26 is permanently secured in the handle 35 which has a ball section 30 surrounding the shank adapted to seat in the concavity 36 in the escutcheon 31. The escutcheon 31 is held in position on the shank (on which it is rotatably mounted) by the staking 37, the interposed washers 38 reducing the frictional resistance. The remote end 39 of the escutcheon 31 is of reduced section to accommodate the installation of the usual belt molding. An anchor plate 41 is welded to the inner surface of the panel 11 and has a lip 42 through which the retaining bolt 43 passes to engage a threaded collar 44 on the abutment, thus securing the assembled escutcheon and handle in position with the shank 26 in the rollback 22. The dotted line 28 represents the clearance line of the body and it will be seen that the handle 35 in the closed position does not extend beyond it, while if the escutcheon were arranged in alignment with the rollback, there would be an objectionable degree of interference. When the handle 35 is operated to open the latch, it assumes the position shown on dotted line which may fall outside the clearance line 28; but it will be noted that there is still adequate room between the handle and the body panel to accommodate the user's hand.

Before considering the conformation of the shank 26, attention is directed to Figures 3 to 6. In Figure 3, approximately the same degree of obliquity is assumed as exists in Figures 1 and 2, but a straight shank 126 leads to the rollback 122. Assuming that a 90° rotation is required to operate the latch (actually somewhat less is usually required), Figure 3 would also represent the shank in rotated position and the exaggerated minimum clearance required in the opening 125 of the rollback 122. Such a clearance is structurally undesirable and would occasion undue wear and noise in the lock mechanism as well as being inefficient. In Figures 4 and 5, the same obliquity obtains, but the shank 226 is bent midway between the ends so that the ends are normal to the rollback and the plane of the handle, respectively. However, when the handle is rotated, as shown in dotted line in Figure 5, through 90°, precisely the same clearance in the opening 225 of the rollback 222 is required as in the case of the straight shank of Figure 3.

However, Figure 6 indicates the optimum condition obtaining when the shank 26 is bent in two normal planes at a point midway of its ends. In this arrangement, if the primary angle—indicated as A in the vertical plane (Figure 1)—is twice the secondary angle—indicated as B in the horizontal plane (Figure 2), the rollback end of the shank 26 will rotate without substantial axial deviation normal to the plane of the rollback. This is indicated in Figure 6 in which the two positions are shown in full and dotted line, and the diminution in clearance in the opening 25, in the rollback 22 over that prevailing in the other examples is at once apparent. Thus, the rotation of the shank 26 at the rollback 22 within the opening 25 follows a constantly precessing axis passing through a point at the rollback and more or less normal to the plane of the rollback. This is accomplished without the interposition of a universal joint or change in the configuration of the rollback even though considerable obliquity

exists between the plane of the outer panel at the handle and that of the rollback. In fact, the angle of the precessing axis is substantially less than that made with the rollback plane by the line between the handle and the rollback. The handle operates smoothly and without perceptible wear over the entire life of the vehicle. While the best conditions obtain when the bends are made at the midpoint of the shank, the particular condition of obliquity obtaining may require that there be considerably more deviation in one plane than in another. In such cases, the bend may be located elsewhere on the shaft—as in Figures 1 and 2 where the much greater vertical displacement requires that the bend be nearer the rollback end of the shank. This will increase the axial deviation at the rollback to some extent, but the conditions are still better than those obtaining with a straight shaft or one bent in but one plane.

It is apparent that certain changes may be made in the details of the construction shown, but it is the intention to cover by the claims such modifications as may be made within the scope thereof.

The invention claimed is:

1. A latch mechanism for a door having an outer panel with a latch actuating handle mounted thereon for rotation substantially in one plane comprising a latch member mounted on said door for reciprocation in a second plane oblique to said first plane, and a solid actuating shank extending between said handle and said latch member, said shank having its ends substantially normal to said respective planes and intermediately deformed so that rotation of said handle causes equivalent rotation of said shank about an axis passing through a fixed point at said latch member and having a constant angular relationship to said second plane substantially less than the angle between the line passing through said handle mounting and said point and said second plane and said shank being received at the large end in an opening substantially larger than the shank.

2. A latch mechanism for a door having an outer panel with a latch actuating handle mounted thereon for rotation substantially in one plane comprising a latch member mounted on said door for reciprocation in a second plane oblique to said first plane, a solid actuating shank extending between said handle and said latch member and having its ends substantially normal to said respective planes, said shank being intermediately angularly deformed in each of two normal planes, so that rotation of said handle causes equivalent rotation of said shank about a constantly precessing axis passing through a fixed point at said latch member, and said shank being received at the large end in an opening substantially larger than the shank.

3. A latch mechanism for a door having a curved outer panel with a latch actuating handle mounted thereon for rotation substantially in one plane, said mounting including a ball joint between said handle and said outer panel comprising a latch member mounted on an inner panel of said door for reciprocation in a second plane oblique to said first plane, a latch operating member rotatably mounted substantially in said second plane and relatively vertically displaced from said handle, a solid actuating shank extending between said handle and said latch operating member and having its ends substantially normal to said respective planes, said shank being intermediately

angularly bent in two normal planes, the angle of deformation in one said plane being substantially twice that of the angle of deformation in the other said plane, and said shank being received at the latch end in an opening in the rotatable latch operating member substantially larger than the shank.

4. A latch mechanism for a door having a curved outer panel with a latch actuating handle mounted thereon for rotation substantially in one plane comprising a latch member mounted on an inner panel of said door for reciprocation in a second plane oblique to said first plane, a latch operating mechanism rotatably mounted in said second plane, said latch operating mechanism being differentially displaced vertically and horizontally from said handle, a solid actuating shank extending between said handle and said latch member and having its ends substantially normal to said respective planes, said shank having angular bends therein in each of two normal planes conforming to said planes of displacement, the angle of said bend in said plane of greater displacement being substantially twice that of the angle of said bend in said other normal plane, and said shank being received at the latch end in an opening substantially larger than the shank.

5. A latch mechanism for a door having an inwardly curved outer panel with a latch actuating handle mounted thereon for rotation substantially in one plane comprising a latch having a back plate secured to an inner panel of said door in a second plane oblique to said first plane and carrying a latch member reciprocable in said second plane operated by a rollback rotatably mounted on said backing plate in parallelism with said second plane, said rollback being displaced a substantial distance vertically from said actuating handle, and a solid actuating shank extending between said handle and said rollback and having its ends substantially normal to said respective planes, said shank being intermediately deformed in each of two normal planes, so that rotation of said handle causes equivalent rotation of said shank and said rollback about a constantly precessing axis passing through a fixed point at said rollback, and said shank being received at the latch end in an opening in the rotatable latch operating member substantially larger than the shank.

6. In a vehicle door, a latch mechanism comprising a rollback rotatably mounted in a housing in a plane substantially conforming to that of an inner panel of said door, a curved outer panel of said door having an actuating handle mounted thereon for rotation substantially in a second plane oblique to said first plane, the axis of rotation of said handle being oblique to the axis of rotation of said rollback and said axes being laterally displaced, a solid shank fixedly secured to said handle at one end substantially normal to said second plane and having its other end extending to said rollback through an opening in the rollback substantially larger than the shank, said shank being bent intermediate its end in each of two normal planes, the angularity of the bend in one said normal plane being substantially twice that in the other said normal plane.

7. In a lock actuating mechanism, a handle, a solid shank fixed for rotation with said handle, a ball joint element on said handle, said shank being bent at a point intermediate its ends in each of two substantially normal planes, the angularity of the bend in one said normal plane being substantially twice the angularity of the bend in the

other said normal plane, the shank being received at the end remote from the handle in an opening substantially larger than the shank.

8. A lock actuating shank bent at a point intermediate its ends in each of two substantially normal planes, the angularity of the bend in one of said normal planes being twice the angularity of the bend in the other of said normal planes.

9. A lock actuating shank bent at a point intermediate its end in each of two angularly disposed planes, the angularity of the bend in one of said planes being substantially greater than the angularity of the bend in the other of said planes.

10. In a latch operating mechanism for a door having a curved outer panel with a latch actuating handle mounted thereon for rotation in one plane, said door having a latch member mounted on said door for reciprocation in a second plane oblique to the first plane, a solid actuating shank extending between said handle and said latch member, said shank having its ends substantially normal to said respective planes and intermediately deformed so that rotation of said handle causes equivalent rotation of said shank about an axis passing through a fixed point at said latch member and having a constant angular relationship to said second plane substantially less than the angle between the line passing through said handle mounting and said point and said second plane and said shank being received at the large end in an opening substantially larger than the shank.

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