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VAN DOOR WITH ADJUSTABLE LOAD-ENGAGING PLATE STRUCTURE

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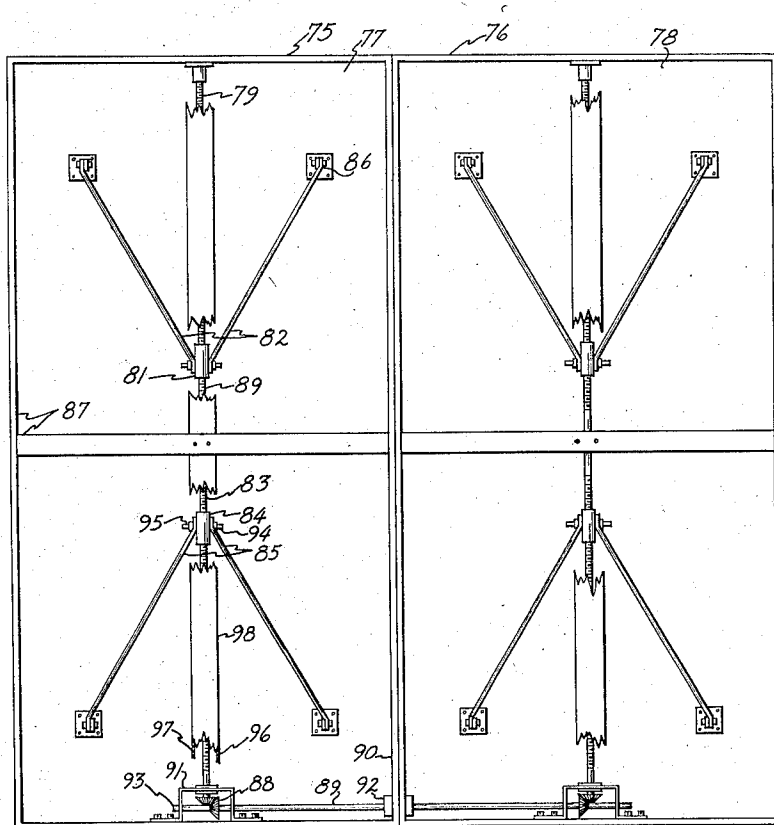


Fig. 6.

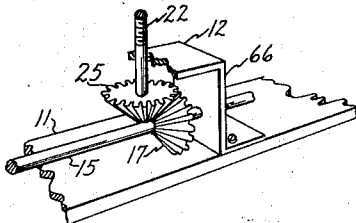


Fig. 5.

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VAN DOOR WITH ADJUSTABLE LOAD-
ENGAGING PLATE STRUCTURE

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3 Claims. (Cl. 280—179)

This invention pertains to van doors and particularly to a van door comprising an adjustable load-engaging plate.

An object of the invention is to provide improved means for preventing shifting of the load in a closed van.

A specific object of the invention is to provide an inexpensive, sturdy and readily adjustable mechanism, to be carried by the rear door of a van, operative to retain a plate adjustably in position against the load in the van.

Another specific object of the invention is to provide a mechanism operable from the swinging edge of a van door for moving a plate forwardly into the van body against the rearward end of the load therein, which mechanism is thereafter automatically retained in position against the load to prevent shifting thereof.

The novel features which are believed to be characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a rear elevation, partially broken away, of the rear doors and other portions of the rear of a freight van, showing a mechanism in accord with this invention applied to the doors;

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1 showing a door and adjusting mechanism in accord with the invention, including a plate engaged against the load of the van;

Fig. 3 is a perspective view, partially broken away, of a portion of one of the doors of Fig. 1;

Fig. 4 is a detail perspective view showing a fragment of the door and adjusting mechanism on an enlarged scale;

Fig. 5 is a fragmentary perspective view on an enlarged scale showing details of a portion of the adjusting mechanism; and

Fig. 6 is a rear elevation, partially broken away, of the rear doors of a van incorporating adjusting mechanism for a load-engageable plate, according to a modification of the invention.

As seen in Figs. 1 and 2 the van body 1 is closed at its rearward end 2 by a pair of doors 3 and 4 which are hinged, such as by hinge 5, to the van body. It will be understood that each door 3 and 4 is substantially identical, except that door 3 has a swinging inner edge portion 6 of its outer covering plate or skin 7 overlapping the joint 8 which exists, when the doors are closed, at the center rear of the van body between the inner edge frame members 9 and 10 of the respective doors, in accord with the usual construction.

According to the invention, the bottom frame member 11 has attached thereto three gear boxes 12, 13 and 14, and a shaft 15 extends between side edge frame members 9 and 16 of the door and through each of the gear boxes carrying, within the boxes, respective miter gears

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17, 18 and 19, each of which is fixed to the shaft for rotation therewith. An end bearing 20 is provided for shaft 15 at door frame edge member 16, while a bearing, driving and locking arrangement 21, shown in detail in Fig. 4 and hereafter described, is provided for the shaft at door frame member 9. A vertically extending shaft 22 extends into gear box 12, being provided with thrust collars 23 and 24 for retaining the shaft against vertical displacement with respect to the gear box, and the shaft carries at its lower end a miter gear 25 meshing with gear 17. The upper end of shaft 22 is anchored in a suitable bearing member 26 which, in turn, is attached to cross frame member 27 of the door structure. Shaft 22 is threaded and carries an internally threaded collar 28 thereon. Guide studs or posts, such as post 29, extend outwardly from opposite sides of collar 28 and engage portions of upright door frame members, such as member 30 in a manner to prevent rotation or turning of collar 28 as will be better understood from the description hereinafter set forth.

A pair of support arms or toggle bars 31 and 32, swingably mounted to collar 28 on posts 29, and preferably held thereon by means of nuts, such as nut 33, depend from the collar and are pivotally attached, such as by hinge assemblies 34 and 35, respectively, at the lower ends 36 and 37 of the respective support arms, to a movable plate 38. A substantially identical arrangement including externally threaded shaft 39 and collar 40 is identically associated with shaft 15 through gear 19, the arrangement being such that rotation of shaft 15 causes, through gears 17 and 19, corresponding rotation of shafts 22 and 39, and this rotation causes raising or lowering, in accord with the direction of rotation of shaft 15, of the collars 28 and 40.

A third vertical shaft 41 is arranged approximately midway between shafts 22 and 39 and extends throughout substantially the full height of the door, being anchored by a bearing 42 to the upper frame member 43 of the door. As shown in Fig. 2, an intermediate support for shaft 42 is provided by a guide bearing 44 mounted on cross member 27 of the door frame. Shaft 41 is externally threaded, and carries one internally threaded collar 45 below cross member 27 and a second collar 46 above the cross member. The two last mentioned collars cooperate with shaft 41 in the same manner in which collar 28 cooperates with shaft 22 and they are otherwise arranged to correspond thereto with the exception that support arms or toggle bars 47 and 48, which are swingably connected to collar 45, extend upwardly therefrom to hinge assemblies 49 and 50 which connect them to adjustable plate 38, collar 46 being similarly provided with upstanding support arms or toggle bars 51 and 52 connected by hinge assemblies 53 and 54 to an upper portion, generally identified at 55, of the plate 38. The direction of the screw threads of shaft 41 is the reverse of the direction of the threads of shafts 22 and 39 and, accordingly, is such that when the main drive shaft 15 is rotated in a direction to lower collars 28 and 40, the collars 45 and 46 are screwed upwardly along shaft 41. Thus, in one direction of rotation of shaft 15, all four collars are caused to approach the level of the hinge attachments to plate 38 of their arms, while opposite rotation of the shaft 15 will cause each of the collars to move away from the level of the respective hinge attachments to plate 38 of its respective support arms. Each of the collars engaged on shaft 41 comprises outwardly extending posts, such as post 56 of collar 46, to retain the respective collar against rotation, the posts being engageable with the adjacent vertical door frame member. Post 56, for example, is seen to be engageable with door frame member 57, while in Fig. 2, post 29 of collar 28 is engaged with flange

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58 of frame member 30, and in Fig. 3, post 59 of collar 40 is engaged with flange 60 of door frame member 61. The posts freely slide along the vertical frame member flanges but serve to retain the collars against rotation in either direction thus to prevent twisting stresses on the hinge connections, such as at 33, between the collars and the support arms, such as arm 32, when the shafts are being rotated. The posts 29, 56, 59 being in engagement with flanges, such as flanges 58 and 60, of the door frame, further add strength to the structure, preventing forces of the cargo against the plate 33 from bending the shafts which carry the collars.

The arrangement as shown in Fig. 1, wherein six support arms or toggle bars are connected to the plate below horizontal center frame member 27 and wherein only two toggle bars are attached above this member, is such as to provide greater strength toward the lower portions of the plate where the force of the load against the plate, when the load tends to shift, is greater than toward the upper end of the plate.

Movement of plate 38 between its forward position against the load, as shown in full lines in Fig. 2 and its intermediate retracted position shown in broken lines at 62, is accomplished by rotating shaft 15, rotation in one direction advancing the plate and rotation in the other direction retracting the plate toward the door frame. It will be apparent that further rotation of shaft 15 in the direction to retract the plate will cause the plate 38 finally to lie flush against the door frame members, such as against member 27. The plate 38 is shown in full lines in Fig. 3 advanced only a short distance from its fully retracted position.

Each vertical threaded shaft, such as shaft 22, carries at its lower end a bevel gear, and as shown in detail in Fig. 5, this gear 25, fixed to shaft 22 meshes with a co-operating bevel gear 17 fixed to shaft 15. The shaft 15 has a bearing in each end wall, such as wall 66, of the gear housing and shaft supporting structure 12.

The manner in which shaft 15 is rotated is best seen in Figs. 3 and 4. A small detachable crank or rotating handle 63 having a non-circular, preferably square shank 64 is engageable in the cooperating socket 64' of a hub 65, the hub or socket member 65 being rotatably carried in frame member 9 and socket 64' opening through the inner edge of door 3. The hub 65 is fixed to or comprises an extended end portion of shaft 15, and the locking disc 21 is fixed to the shaft 15 immediately inside of door frame edge member 9. The disc has a plurality of openings 67 extending therethrough selectively alignable with an opening 68 through member 9, and a removable locking pin 69 is inserted through opening 68 and into the selected one of openings 67 to lock disc 66, and thus to lock shaft 15, against rotation. Manual access finger grooves 70 extending into opening 68 may be formed in member 9 to permit pin 69 to be removed when it is desired to unlock disc 66, and a small knob portion 71 may be provided on the pin further to facilitate manual removal.

A van body is loaded by stacking the boxes, bags or other cargo indicated at 72 against the forward end of the van and progressively filling the van toward the rear. Finally a point is reached when another row of the cargo elements will not fit. Such a point has been reached in the case shown in Fig. 2, wherein another row of bags or boxes could not be stacked behind the load as shown without interfering with the closing of the doors. In accord with this invention, the door 3 is closed, with door 4 open, pin 69 is removed from opening 68 in door 3 to unlock the shaft 15 of door 3, handle 63 is engaged with hub 65 and rotated sufficiently, and in the proper direction, to move the collars along shafts 22, 41 and 39 far enough to advance plate 38 into position firmly against the load as shown in full lines in Fig. 2. The pin 69 is then set to retain shaft 15 of door 3 against rotation, and handle 63 is removed. Door 3 is next swung

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open, and door 4 is closed and its plate 73, which corresponds to, and is preferably identical to, plate 38, is adjusted and finally locked in the same manner, preferably using the same handle 63 and an identical pin (not shown). With plate 73 now engaging the cargo, door 3 is again swung into closed position, its plate 38 again engaging the load because of its previous adjustment. The doors are finally locked shut in any convenient desired manner.

Since the socket of each door, such as socket 64', opens through the inner edge of the door, it faces the inner edge of the other door when the doors are closed, each socket being thus covered by the inner edge of the other door. Accordingly, when the doors are shut, the sockets are not accessible to unauthorized persons. The locking pin, such as pin 69, which enters the inner edge of each door, is similarly guarded against unauthorized removal and is held against accidental loss or displacement by the presence of the inner edge of the other door when the doors are closed to bring the respective inner edges into juxtaposition.

A modified construction is shown in Fig. 6, wherein each of the doors 75 and 76 carries a respective movable one of plates 77 and 78. This modification being particularly adapted for lighter cargoes, only one vertical threaded shaft, such as shaft 79, is provided for each door, and this one shaft has two internally threaded sleeves or collars thereon. The upper portion 80 of the shaft engaged by sleeve 81 is threaded in one direction and has support legs 82 hinged thereto and diverging upwardly therefrom, while the lower portion 83 is reversely threaded and its collar 84 is hinged to downwardly diverging support legs 85. Legs 82 and 85, as in the previous embodiment, are all of the same length and each is hinged by a respective hinge, such as hinge 86, to the movable plate 77. Rotation of shaft 79 in one direction causes the collar 81 to rise and the collar 84 to be lowered thereby to move plate 77 away from the frame 87 of door 75, while opposite rotation retracts the plate toward the frame. Rotation of shaft 79 is accomplished through gears 88 and a drive shaft 89, corresponding to the similar elements of the previous embodiment. Edge frame member 90 rotatably supports shaft 89 at one end, while the other end has a bearing in gear box 91. A locking disc 92 on shaft 89 permits locking the shaft 89 against rotation as in the previously described embodiment. It has been found convenient in the embodiment shown in Fig. 6 to terminate the drive shaft 89 at an end 93 adjacent gear box 91, rather than extending the drive shaft completely across the door frame, although the construction of Figs. 1-5, wherein shaft 15 extends the full width of the door frame, provides a stronger overall construction.

As in the previous embodiment, each sleeve carries two outwardly extending guide posts, such as posts 94 and 95 of sleeve 84, and the posts are disposed slidably to contact flange portions 96 and 97, respectively, of vertical door frame member 98.

The preferred manner of adjusting the plates 77 and 78 to be engaged against the van cargo is identical to that set forth hereinabove for the first embodiment. It will be understood that the details shown in Fig. 4 in connection with the drive shaft 15, locking disc 21 and door frame inner edge member 9 are duplicated in connection with the corresponding drive shaft 89, locking disc 92 and door frame inner edge member 90 of the embodiment shown in Fig. 6.

With light loads it has been found unnecessary to provide a greater number of toggle bars for the lower than for the upper portion of the plate. While heavying of bars 85 of the Fig. 6 construction may permit use with somewhat heavier loads, it is to be noted that the provision of more than one vertical threaded shaft for supporting the plate will greatly increase resistance to twisting of the plate to one side. Thus the provision of shafts

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22 and 39 and their toggle bars in the Fig. 1 construction results in increased resistance to any forces tending to twist or rotate the plate about a vertical axis into a position not parallel to the plane of the door.

While only certain preferred embodiments of this invention have been shown and described by way of illustration, many modifications will occur to those skilled in the art and it is, therefore, desired that it be understood that it is intended in the appended claims to cover all such modifications as fall within the true spirit and scope of this invention.

What is claimed as new and what it is desired to secure by Letters Patent of the United States is:

1. In a cargo van, a door having a frame, an outer cover plate and a swinging edge, a horizontal shaft extending across said door and rotatably mounted on said frame adjacently along and inside of said outer plate, a plurality of vertical, externally threaded shafts rotatably carried by said frame adjacently along and inside of said outer plate, each said threaded shaft having a gear fixed thereon and said horizontal shaft having a respective gear fixed thereon operatively engaged with said threaded shaft gear, said gears being operative to rotate said vertical shafts in response to rotation of said horizontal shaft, means for rotating said horizontal shaft comprising a handle engageable with the shaft at said swinging edge of the door, at least one internally threaded collar on each said vertical shaft, a movable vertical plate disposed inwardly of said shafts and frame, and means connected to each said collar for retaining said collar in predetermined rotative alignment with the plane of said door and for supporting said movable plate in position adjustably spaced forwardly of said frame and shafts, said last means comprising at least one respective leg swingably connected at one of its ends to each said collar and each said leg being hingedly connected at its other end to said plate, said legs being movable from positions substantially parallel to the plane of said door with said movable plate supported by said legs in a rearward position, to forwardly inclined positions in which said mov-

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able plate is supported by the legs spacedly forward of the door in response to rotation of said horizontal shaft in a predetermined direction and said legs being returnable to said first mentioned positions in response to subsequent rotation of said horizontal shaft in the opposite direction thereby to return said plate to its said rearward position.

2. The combination according to claim 1 wherein a locking pin interconnects one of said shafts and said frame to prevent rotation of said shafts, said pin being removable therefrom to release said shafts for rotation.

3. In a cargo van, a pair of rear closure doors having respective inner edge portions which swing together and meet at the center rear of the van to close the body thereof, the inner edge portion of each said door being provided with a respective rotatable hub element with a socket opening therein disposed toward said inner edge portion of the other door when the doors are closed and each said socket opening being exposed for ready access when either one of said doors is swung into open position, an operating handle removably engageable selectively in one and the other of said sockets when one of said doors is open, a respective plate for each said door, adjustable support means on each door mounting said plate of the respective door interiorly of and parallel to the door, said support means comprising toggle bars and operating means therefor connected between the door and plate, said operating means being operable to swing said bars and thereby to position said plate in adjustable spaced relation interiorly of the door and parallel to the plane thereof, and a respective operating connection between each said hub element and said operating means of the respective door.

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