

Oct. 2, 1962

W. P. FEDERLINE ET AL
SECTIONAL DOOR FOR TRUCK BODIES

3,056,451

Filed July 13, 1956

5 Sheets-Sheet 1

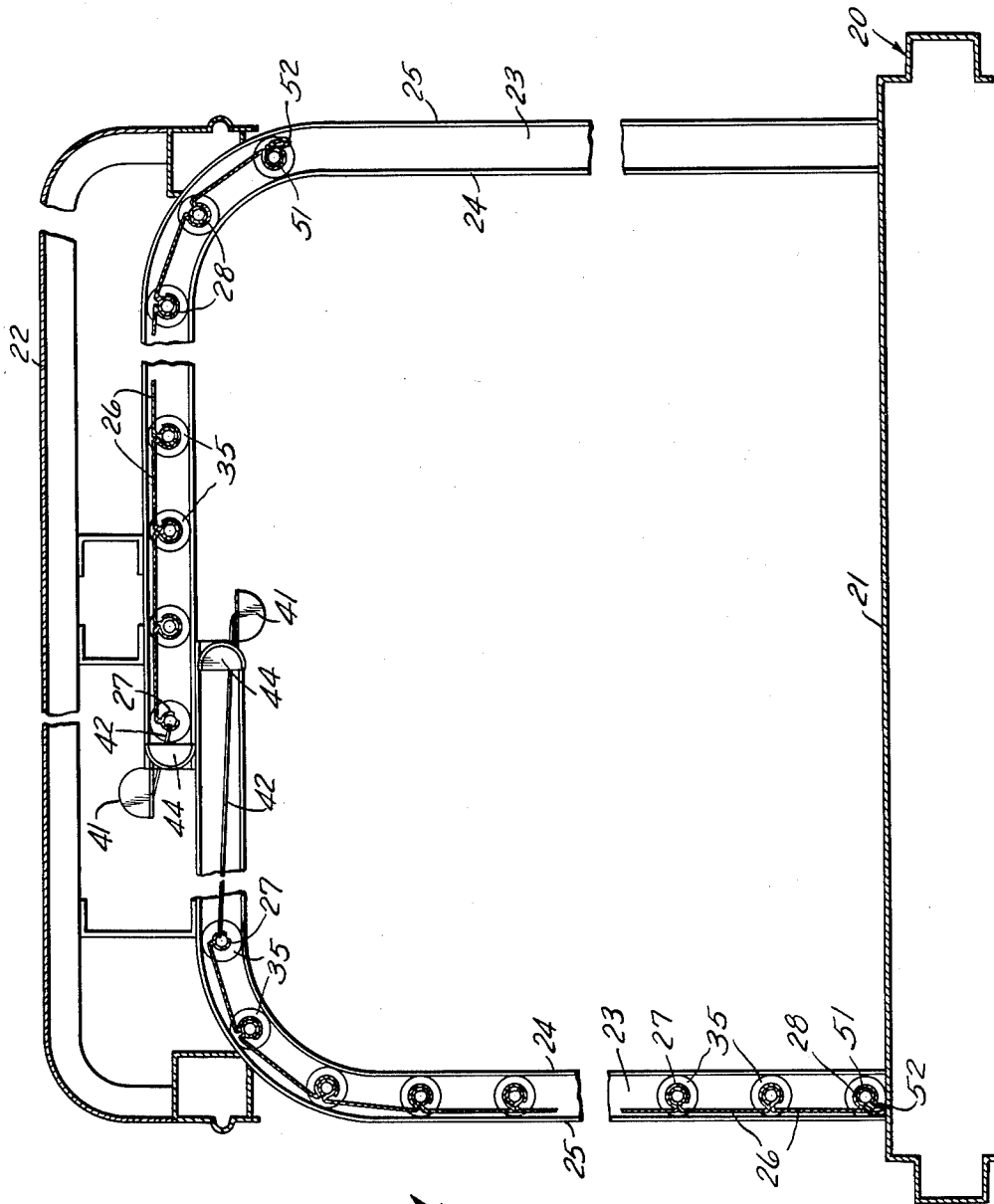


Fig. 1

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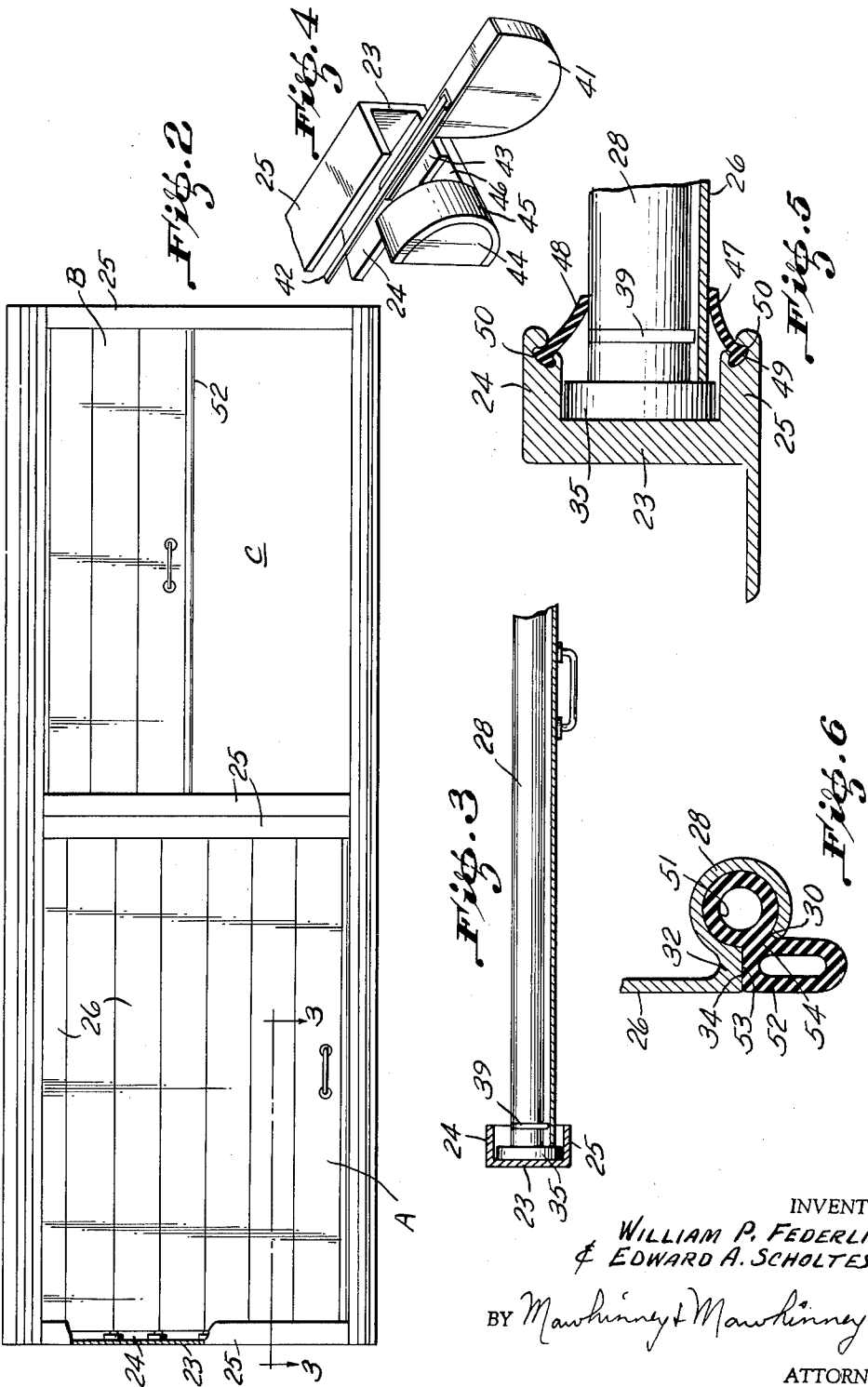
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Fig. 12

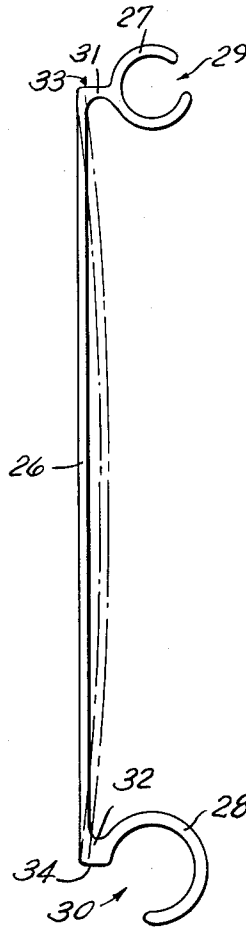
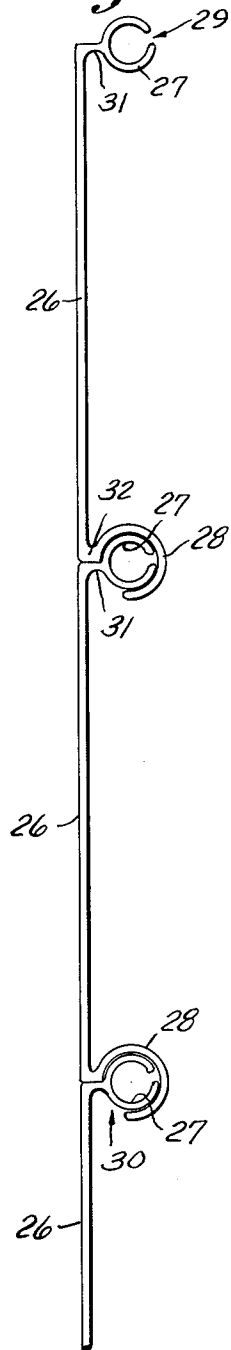


Fig. 13

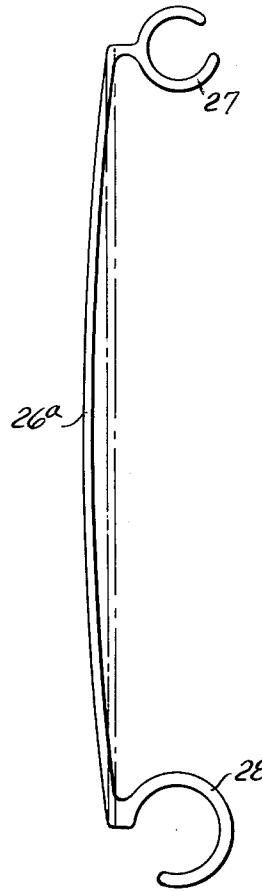


Fig. 14

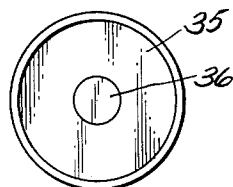


Fig. 16

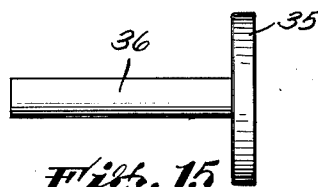


Fig. 15

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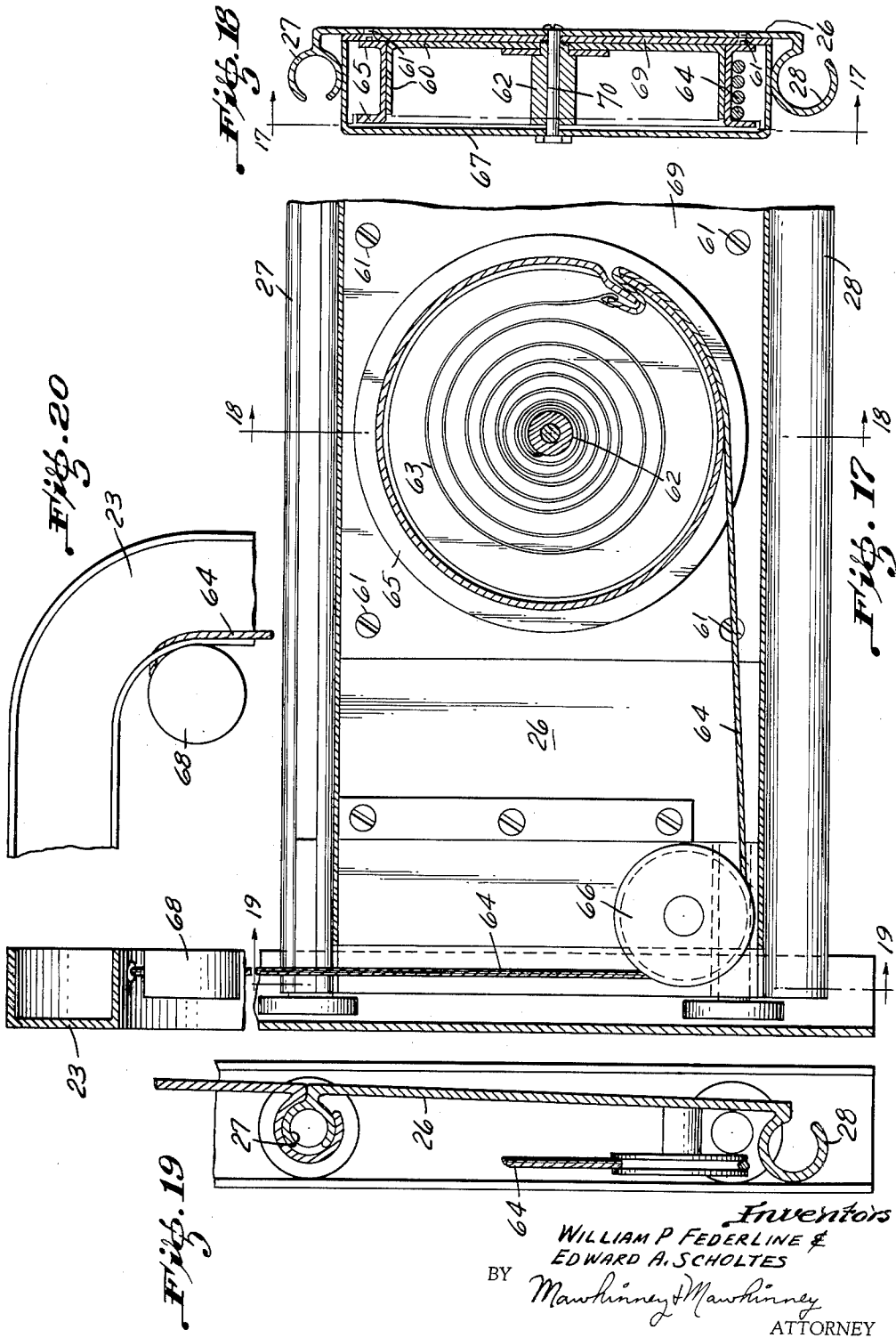
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3,056,451

SECTIONAL DOOR FOR TRUCK BODIES

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Filed July 13, 1956, Ser. No. 597,747
6 Claims. (Cl. 160-201)

The present invention relates to sectional door for truck bodies and is a continuation-in-part of our prior similarly entitled co-pending application Serial Number 496,177, filed March 23, 1955, now abandoned.

It is an object of the invention to provide a closure of a sectional form in which the sections or slats are flexibly connected to permit the slats to shift angularly relatively to one another under the compulsion of curved sections of tracks in which the end portions of the slats pass in moving between a substantially horizontal position in the upper portion of the truck body and a substantially vertical closed position in the sides of the truck body.

Where the flexible or hinged connections between adjacent slats are made by trunnions of one slat engaging in cylindrical bearings or sockets of an adjoining slat with the ends of the bearings open to admit the assembly of the slats by relative endwise movement of such slats and where the tracks at the sides of the frame or opening closed by the sectional door are the only means for restraining the slats from casual or accidental endwise relative movement during the course of the opening and closing movements of the slats, which casual or accidental movement has a tendency to bind the slats in the tracks and to cause canting or cocking of the individually endwise shiftable slats due to required looseness of play in the pivotal or hinged joints between the slats such as results in binding of the slats in the tracks, all of which is detrimental to the smooth and ready movement of the door or closure as a whole in moving back and forth between the open and closed positions, it is another object of the invention to impose a binding force on the slats against this relative endwise shifting movement of the slats, particularly when moving to the closed position without interfering with the continuously open condition of the bearings or sockets which would otherwise interfere with the ready assembly and disassembly of the individual slats into and out of the integrated door or closure member before the same is inserted into the tracks or after the same has been withdrawn from the tracks for purposes of repair or substitution of slats or for the repainting thereof.

It is another object of the invention to provide a sectional door structure for truck bodies and the like to provide against the rattling of the sections or slats incident to the movement of the truck, particularly over rough pavements, and generally it is an object of the invention to substantially eliminate noise-level vibration, particularly in the closed position of the door.

A further object of the invention is to provide a closure in which the individual slats are elastic with provision for distorting the same, particularly in the closed position for the purpose of inducing an elastic stress in the slats, which elastic stress will be reactive to set up frictional resistance to endwise movements of the slats in the jointed or pivotal surfaces of adjoining slats which come into contact with one another in such jointed or pivotal portions.

A further object of the invention is to provide complementary bearing and trunnion members between the adjoining slats of a closure which is moved by a motion of translation between open and closed positions around curved portions of directing tracks whereby the slats have not only a motion of translation but also pivotal move-

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ment with respect to one another and also relative endwise movement by which the trunnions are assembled to the bearings initially before the closure as a whole is introduced to the tracks which are fixed at opposite sides of a compartment, access to which is controlled by the closure device, with means to so tension the slats, particularly in the closed position of the door that such door comprising all of the slats for all purposes becomes a solid barrier substantially proof against rattling and against relative endwise movement of the slats.

The invention also contemplates various novel forms of pivotal connections by which the elastic slats, or parts thereof adjoining the connections, may be forcibly displaced to stress the same elastically to the end that the inherent elasticity in the slats in potentially attempting to regain original unsprung condition will react upon the members of the couplings to force the bearings surfaces together, at least in one direction, to set up a sufficiently high coefficient of friction between such surfaces to resist relative sliding of the slats endwise and also to tension the individual slats against relative movement in any other directions which would set up noise-level vibration.

The invention also contemplates the use of a novel form of confining track at the edges of the closure member of generally channel shape having flanges to overlap front and rear portions of the slats near the ends thereof and to engage with rollers journaled in the end portions of the hollow cylindrical trunnions of the joints to not only guide the door or closure and its component slats in a well defined path between open and closed positions but also to compel the stressing means between the joint members to become kinetic particularly when the closure is moved to the closed position which will ordinarily be in a single planar position.

A still further object of the invention is to provide a sectional door arrangement which, in addition to the friction loaded hinged joint connections or in the absence thereof, includes means for preventing the casual or accidental shifting endwise of one section or slat with respect to another which would have the adverse effect of destroying accurate registration in respect of lettering or design configurations painted or otherwise produced and displayed upon the exterior surfaces of the closure across the joints to the end that the attractive display of advertising or other matter appearing upon the sides of the truck will not be destroyed or depreciated.

A still further object of the invention is to provide rollers associated with the joints between adjacent slats for travelling in the channel or the tracks to ease the opening and closing motions of the door and to reduce the friction level in the movement of the door; an additional object of the invention being to so-associate the roller stud axials with the anti-lateral sliding means as to interlock such means by use of the studs so that ease of assembly and dismounting are provided for by both rollers and said means when the closure is removed from the restraint of the tracks and whereby the positioning of the device within the tracks has the effect to lock both the rollers and the anti-sliding means in place.

A still further object of the invention is to provide counter balance means for the door to contribute to the ease of lifting and lowering the same and appropriate gaskets of novel construction and mounting for cushioning the closing movement of the door and for also preventing access of moisture and foreign matter to the tracks, rollers, other movable parts and truck body contents.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

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In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views:

FIGURE 1 is a transverse vertical section taken through a form of truck body illustrating tracks and door constructions in accordance with the present invention.

FIGURE 2 is a side elevational view, with parts broken away and parts shown in section of a truck body showing one of the doors of the invention completely closed and the other partly opened to give access to a compartment within the body.

FIGURE 3 is a horizontal sectional view taken on the line 3—3 of FIGURE 2.

FIGURE 4 is a fragmentary isometric view of one track showing a spring counter balance device in association therewith.

FIGURE 5 is a cross-sectional view taken through a portion of the improved door and track on an enlarged scale and showing a form of gasket in association therewith.

FIGURE 6 is a fragmentary sectional view through the lower portion of a door showing a form of cushioning gasket associated therewith.

FIGURE 7 is a fragmentary side elevational view of one of the tracks showing three of the rollers mounted between the flanges thereof with the centers of the same in vertical alignment under the compulsion of the track with the slats in an elastically stressed condition.

FIGURE 8 is a similar view showing the rollers schematically disposed over but not within the track in which the center roller extends to the left partially beyond the left flange of the track and the slats in an unsprung condition.

FIGURE 9 is a fragmentary isometric view of adjacent slats with their trunnions and bearings interfitted and with the anti-sliding washer and roller and its stud axial exploded.

FIGURE 10 is a fragmentary plan view of portions of adjacent slats and the joint therebetween partially broken away and partially shown in section.

FIGURE 11 is a fragmentary end elevational view of a form of slat and joint connection similar to that illustrated in FIGURE 10 of our prior application aforesaid.

FIGURE 12 is a fragmentary end elevational view of a number of the slats indicating the method of endwise assembly.

FIGURE 13 is an end elevational view of one form of slat biased to an unsprung flat condition and shown in broken lines in the sprung condition.

FIGURE 14 is a similar view showing a form of slat in an initial bowed unsprung condition with the flat sprung condition indicated in broken lines.

FIGURE 15 is a side elevational view of a roller and its stud axle.

FIGURE 16 is an end elevational view of the same taken from the left end of FIGURE 15.

FIGURE 17 is a view taken on the line 17—17 of FIGURE 18 and showing a modified form of the spring counter balance.

FIGURE 18 is a cross sectional view taken through the line 18—18 in FIGURE 17.

FIGURE 19 is also a vertical cross sectional view taken on the line 19—19 in FIGURE 17.

FIGURE 20 is an elevational view looking from right toward left in the upper most portion of the track shown in FIGURE 17.

Referring more particularly to the drawings, 20 designates a truck body having a floor 21 and a roof 22, shown more particularly in FIGURE 1, and which may be provided with sectional doors A and B, as shown in FIGURE 2, in any appropriate number corresponding to the number of compartments C (FIGURE 2) that the builder may elect to include in the body. These compartments C may be accessible at the sides of the truck body or the improved door may be provided at the end of the truck body or elsewhere, as desired.

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The improved sectional doors adapted to slide in channel tracks at the sides of the compartment opening, such channel tracks being shown in FIGURE 1 as extending from the floor 21 vertically upward and then being continued in curved sections into the roof 22 of the body, the tracks from opposite sides of the body being overlapped so that the upper ends of the tracks may receive the end portions of the sectional doors hereinafter described.

Each track is preferably of channel form as best seen in FIGURES 3 and 5 in which 23 designates the base of the channel and 24 and 25 the inner and outer flanges thereof respectively.

The improved door comprises a number of slats or sections 26 made of metal, plastic or some other suitable material, possessing inherent elasticity. Each slat 26 is provided at one end with a trunnion 27 and at its other end with a cylindrical bearing 28.

The trunnions 27 are preferably hollow and externally cylindrical and have slots or gaps 29 therein preferably faced away from the slats. The bearings 28 also have slots or gaps 30 faced in the general direction of the slats and being of less width than the outside diameters of the trunnions 27 to prevent the trunnions from escaping through such slots or gaps 30.

Both the trunnions 27 and the bearings 28 are carried in off-set relation to the planes of the slats 26 by necks 31 and 32 respectively. These necks 31, 32 have heels or anvils 33, 34 which are adapted to come together as shown more particularly in FIGURE 12 to act as stops in relative rotary movement of the trunnions 27 and bearings 28 in relatively opposite senses. The external curved surfaces of the bearings 28 of all of the slats 26 are of a diameter preferably substantially smaller than the width between the flanges 24, 25 of the channel tracks 23 and likewise end portions of the slats 26 fit into the spaces between the flanges 24, 25 of the channel tracks 23 at opposite sides of the compartment openings.

The trunnions 27 and bearings 28 are open at the ends thereof so that the stub axles 36 of rollers 35 may be slidably fitted in an axially direction into the internal space of the trunnions 27 so that such internal spaces form bearings for the stub axles 36 in which such stub axles may rotate. The diameters of the rollers 35 are preferably greater than the diameters of the bearings 28. In other words the diameters of the rollers 35 are such as to fit within the flanges 24, 25 of the channel tracks 23 at both sides of the door whereby the door may roll up and down on the rollers 35 which will rotate in contact with such flanges 24, 25. The rollers will reduce the friction level incident to the movement of the door between open and closed positions and particularly around the curved sections of the channel tracks, during which movement the trunnions 27 and bearings 28 may relatively rotate in the direction of an opening movement between the webs or necks 31, 32 and the heels or anvils 33, 34, which movements is illustrated in FIGURE 1.

However when the slats 26 straighten out into substantial alignment in the straight portions of the tracks the heels or anvils 33, 34 come together and act as stops to limit further relative angular movement between the trunnions 27 and bearings 28. The trunnions 27 and bearings 28 therefor provide pivotal joints or hinge connections between adjacent slats 26 which, while uniting the slats into a coordinate door, still permit ample flexibility to enable the slats to negotiate the curved portions of the tracks.

As shown more particularly in FIGURE 13 the slats 26, in one form thereof may be spring biased to a substantially straight line or single planar position so that when stressed they will assume the bowed position indicated in broken lines:

Or, as shown in FIGURE 14, a modified slat may be provided in which the body 26^a thereof is bowed out-

wardly, that is it is bowed inherently to this position in the unsprung condition of the slat, so that when the elastic slat is stressed it will assume the substantially flatwise condition shown in the broken lines in this FIGURE 14.

FIGURE 8 is a schematic view which simply shows a number of the connected slats in an unsprung condition simply superimposed upon a track and therefor not under the compulsion of the flanges 24, 25 of the track 23; it being understood that the heels or anvils 33, 34 will meet initially and prevent the intermediate roller from lining up with the track and flanges thereof where the upper and lower rollers have been lined up with such track and flanges. In other words in order to bring the intermediate roller into a position where it may enter between the flanges of the track it will be necessary to apply a force in a right hand direction which through the anvils 33, 34 will stress the slats 26, or 26^a to the broken line positions of FIGURES 13 or 14. Thus the elastic slats must be stressed elastically in feeding the rollers into the upper ends of the tracks within the top 22 of the truck body.

FIGURE 7 shows the vertical alignment of the centers of the rollers showing all three rollers entered between the flanges of the track and brought under the compulsion thereof so as to maintain the stressed condition of such slats.

In FIGURE 8 the heels or anvils 33, 34 barely make contact with one another but they serve to form mutual stops resisting further rotary movement between the trunnions and the bearings. Thus the force referred to applied in a right hand direction to the intermediate joint in FIGURE 8 will have to result in a distortion of the elastic slats so as to place the same under stress or tension.

As the slats 26 and the rollers 35 are forced into the tracks at the upper ends of the same, in assembling the doors to the tracks, the bowed portions of the slats 26^a tend to flatten out accompanied by an elongation of the slats as to their overall lengths from center 37 to center. This spaces the centers 37 further apart than in the unsprung condition and it also places the slats under an elastic stress which communicates itself to the trunnions and bearings at the opposite ends of the slats. This stress develops thrusts at points which tend to move both the slats and the joints laterally or at substantially 90 degrees to the lengthwise direction of the tracks. If unconfined the slats and joints would therefore move out of the tracks but they are under the compulsion and restraint of the flanges 24, 25 and consequently a frictional resistance is developed between the internal surfaces of the track flanges and external surfaces of the rollers 35, which therefore tend to maintain the stressed condition of the slats. However the rolling movement of the rollers 35 will absorb this frictional resistance so far as it relates to the movement of the rollers in a motion of translation in the tracks. Similar frictional resistance to relative turning and endwise movement is developed between the contacting surfaces of the bearings and the trunnions.

In the form of the invention shown in FIGURE 13, in stressing the slats 26 from the full line to the broken line position the centers 37 will be moved closer together and the pressure to cause the deflection will take place between anvil 33 and anvil 34 in conjunction with the corresponding anvils of adjacent slats. The results however will be the same in that the stressing of the slats will create frictional resistance to axial or endwise sliding movement between the bearings and the trunnions.

From FIGURES 9 and 10 it will be apparent that the ends of the bearings 28 are open and the slats are assembled together by fitting an end of a trunnion 27 into an end of a cylindrical bearing 28 of the adjacent slat by a relative endwise movement of the slats, the web or neck 31 of one slat sliding axially along the mouth or gap 30 of the bearing 28 of an adjacent slat until the two slats brought into edgewise registry with one another. It will be noted that one slat may freely pivot or hinge

with respect to the other slat through the mouth or gap 30.

Now when the slats so assembled are fitted into channel tracks they are apt to accidentally or casually shift longitudinally with respect to one another, that is relatively in the directions of the centers or axes 37. This may cause the edge of one slat which may be projecting slightly beyond its bearing to be caught or jammed in the track and thus interfere with the free opening or closing movement of the door of which that slat is a component. It is therefore undesirable to have any permissible relative endwise shifting of the slats, at least in the closed position of the door.

Furthermore, it is necessary to pivotally connect the slats for a relative hinging movement to permit the slats to move around or be rolled up around the curved portions of the tracks so that the slats may assume in the closed position the vertical attitude and a horizontal position when in the upper part of the track, that is when open. This pivotal movement, and the relative sliding movement incident to assembly and disassembly of the slats, necessitate certain loose play between the slats which results in rattling of the slats by developing considerable annoying noise during movement of the vehicle and also having adverse effect on the door and on the sections thereof which may produce canting or cocking of individual slats such as to jam in the tracks as heretofore explained.

Consequently the frictional resistance developed between the trunnions and cylindrical bearings will oppose forces which tend to shift one slat relatively to another in the axial direction of the centers 37. This frictional resistance is induced by the spring loading of the slats to and through the joints. This frictional resistance to sliding of the slats is produced by a combination of the elastic slats and channel tracks in which those slats are fitted as to opposite end portions under a sprung compulsion.

However, it will be understood, particularly from a consideration of FIGURES 2, 7, 8 and 12, that the width of the flanges 24, 25 of the tracks 23 is of necessity very small compared with the entire width of the door and it is desirable therefore to provide means for continuing the stress characteristic all the way across the door as to each joint member between the slats. This is accomplished by means of the necks or webs 31, 32 and the anvil faces 33, 34, which latter contact one another all the way across the entire width of the door as to each and every slat. Thus the action of generating friction, initially developed in the side tracks, will be communicated all along the longitudinal edges of the slats and throughout all parts of the joints even at those parts at the center of the door which are remote from the side track. These anvils also perform a further function in that they act to resist any tendency of the door sections from bursting outwardly in the center thereof incident to a reaction from the confining influence of the tracks which are only in contact with the rollers 35.

The open ended bearings and trunnions, particularly where they are hollow, lend themselves to production by an extrusion process in which operation the slats or sections 26, 26^a may be produced integrally with the bearing at one end and the trunnion at the other end. By making the slats to and including the bearings and trunnions all in one piece, elasticity may extend to all of these parts. The extrusion process enables the production of slats or sections of any length desired. The slats may also be produced by stampings, castings, rolled sections and other methods. The slats may be formed of aluminum, sheet metal, plastic or other material.

Referring more particularly to FIGURE 11, which corresponds to FIGURE 10 of our pending application aforesaid, the upper and lower elastic slats 26^b have anvil arms 31^b and 32^b projecting at substantially right angles from the upper and lower edges respectively of the upper and lower slats. These arms may extend substantially at

ninety degrees from the plane of the slats 26^b. The upper anvil arm 32^b carries the cylindrical bearing 28 which encompasses the hollow trunnion 27^b which is carried by the inner end of the other anvil arm 31^b. In this instance the trunnion 27^b while hollow is solid round and is unprovided with the gap 29 shown in the form of invention illustrated in FIGURE 13.

Incident to counterclockwise rotation of the upper slat 26^b, the upper anvil arm 32^b will be brought down upon the lower anvil arm 31^b, setting up elastic stresses in all of the involved and entrained parts to increase frictional resistances between contacting surfaces of the trunnions, bearings and anvil surfaces.

The back pressure not only causes a binding or locking action within the sections themselves but also creates friction within the tracks or guides of the vertical or other portions of the tracks which might be referred to as a flat plane. The arrangement is such that the back pressure and friction hold all interlocked sections within that plane as a solid or entire unit. The back pressure of interlocking sections when in a flat plane eliminates rattles and wear.

Although material is not essential, by way of example might be mentioned aluminum or magnesium as possible desirable materials for the slats and joints therebetween. These materials lend themselves well to extrusion and these extruded metals do in fact possess elasticity.

It will be appreciated from the foregoing that the invention is operative to raise the friction factor in the contacting surfaces of adjoining sections in the joint to resist casual or accidental relative movement of the sections or slats.

It is also noted that the slats are free when moving around the curved portions of the tracks and can adjust themselves to the new positions of the tracks they are entering even though said tracks are not in perfect alignment with the tracks they have just left.

The trunnions 27, 27' may be solid round or provided with gaps 29, which latter permit the hollow elastic trunnions to expand under stress and to contact when relieved of the stress, as when the sections are moving around in the curved portions of the tracks.

Referring more particularly to FIGURES 9 and 10, near one end of each joint, the bearings 28 and trunnions 27 may be slotted or formed with cut-out portions 38 to receive therein lock or stop washers or rings 39 having openings 40 therethrough of a size to receive the stub axles 36 of the rollers 35. The radial width of the washers or rings 39 is such that it will engage the cutaway end portions of both trunnions 27 and bearings 28. These washers or rings 39 will therefore act as stop abutments to prevent relative axial shifting of the trunnions 27 and bearings 28, it being understood that where the outer surfaces of the slats which are exposed to public view will, or may be, lettered or painted or otherwise provided with some design or decorative configuration which would essentially spread across the joint lines between the slats and if the slats are permitted an endwise relative horizontal movement, the lettering and the design pattern would be disturbed in its proper registration and would lose its decorative characteristic and would appear unsightly. In this connection it is also to be noted that the stub axles 36 of the rollers 35 perform an additional function in engaging through the openings 40 of the lock or stop washers or rings 39 to retain these rings in their locked position in the cut-out portions 38. The rollers 35 are of course confined by the tracks 23 and the flanges 24, 25 thereof so that the washers or rings 39 cannot escape from the slots 38 until such time as the door is removed from the channel tracks.

Referring more particularly to FIGURE 4, 41 designates a spring reel of flexible metallic tape or cable 42, the reel being mounted by an attaching plate 43 to one flange 24 of the track 23 so that the tape or cable 42 issuing from the spring reel may be drawn out and at-

tached to the door. As the door is drawn down to a closed position it will pull out the tape or cable 42 winding the spring of the reel 41, which spring therefore acts as a counterbalance for the door and tends to hold the door in any set position without permitting the door to drop by gravity with great violence upon the floor 21 of the truck body. This device also acts as a counterbalance to ease the manual effort involved in raising and lowering the door to the open and closed positions.

As also shown in FIGURE 4 and also in FIGURE 1, rubber or other bumpers 44 are provided at the upper inner ends of the tracks, such bumpers being carried and reinforced by metal housings 45 with attaching plates 46 by which these rubber bumpers may be conveniently carried by flanges 24 of the tracks 23.

Preferably the rubber bumpers and the spring reels will be duplicated at the end of each track so that two of these devices will be supplied to each door.

Referring more particularly to FIGURE 5, rubber or other gaskets 47 and 48 having dove-tail edges 49 are adapted to be inserted into similar dove-tail slots in the track flanges 24, 25, the arrangement being such that the free end portions of these gaskets 47, 48 will bear against outer or flat portions of the slats. By providing the dove-tail slots 50 in both flanges 24, 25 the channel tracks 23 may be reversibly applied to either side of the truck body so that a rubber gasket 47, 48 may be applied in the outermost flange to bear against the outer or flat side of the door so as to exclude rain, snow, dust and foreign matter generally from the channels of the tracks and from internal parts of the joints, roller bearings, truck body contents, etc.

Referring more particularly to FIGURE 6, a buffer or bumper 52 of hollow or other form of rubber or other material is provided for the bottom edge of the door and it may be convenient to provide for this buffer or bumper 52 a carrier cylinder 51 also of the same material and also preferably hollow so as to be compressible, which carrier cylinder 51 may be shaped to fit conveniently into the lowermost bearing 28 of the door with a connecting web 54 between the parts 51 and 52 and a shoulder 53 to engage the lowermost anvil 34. Such bumper will cushion the descending movement of the door.

In designing this device we had to take into consideration the pressures exerted by restraining the load content of the truck body. As this was of utmost importance the design of parts 27, 28, 31 and 32 have been calculated and proven to restrain such load when applied from the inside or to the right in FIGURE 7. Also the elasticity of the extrusion has a very important part in giving added strength to the chosen sections. We have also arranged the anvils 33, 34 to make the entire horizontal joints water proof and dustproof. When the combination or number of slats are assembled and confined to the straight portion of the track, due to the fact that these slats are under elastic stress they will have more load resistance than if the sections were not so assembled and stressed.

Referring more particularly to FIGURES 17 to 20 inclusive, a modified form of spring counter balance is herein illustrated in which a spring drum 60 is rotatably mounted on hub 62 affixed to base plate 69. Base plate 69 is affixed to the lower most section 26 of the door as by screws 61 or other fasteners. A volute spring 63 is mounted in the space between the hub 62 and the outer rim of the spring drum 60. At its inner end the spring 63 is affixed to the stationary hub 62, while at its outer end the spring 63 is connected to the drum 60 by means of the cable 64 which is wound about the exterior of the drum 60 between the flanges 65. This cable 64 comes off the lower portion of the drum 60 and passes about a pulley or sheave 66, beyond which the cable 64 is directed vertically upward within the flanges 23, 24 of the track but offset from the bearings 28. The cable ascends to the upper portion of the track where the same is affixed to a spring tension adjusting device 68. A cover 67 is prefer-

ably provided for the drum. A bolt 70 is provided merely as means for affixing cover 67 to the assembly. This cover may be of aluminum or other suitable material and it preferably extends the full length of the bottom slat 26 in order to add strength to the bottom slats and to protect the counter balance assembly. Springs of different strengths may be employed to increase or decrease the lifting power.

FIGURES 17-20 inclusive show only one half of a bottom slat assembled in the track with rollers. As illustrated the right half of a door is represented as viewed from the inside out. The left side will be symmetrical with this right side arrangement.

Although we have disclosed herein the best form of the invention known to us at this time, we reserve the right to all such modifications and changes as may come within the scope of the following claims.

What we claim is:

1. In a closure, at least three elastic slats, complementary bearings and trunnions on the slats for pivotally connecting the same into a composite door, abutments between the slats adapted to come together in one angular position of such slats in which the centers of the pivotal connections of the slats are not in alignment, and tracks for the edges of the slats to compel the alignment of the centers to thereby elastically stress the slats and set up reactionary friction resistance between the bearings and trunnions to resist relative axial movement.

2. In a closure, slats, bearings and trunnions on adjacent portions of the slats fitted together for relative rotary movement, said bearings and trunnions having cut-out portions, stop members removably inserted in the cut-out portions and constructed to endwise engage both trunnions and bearings to resist casual axial movement therebetween, and means to lock the stop means in place.

3. In a closure, slats, inter-engaging trunnions and bearings on the slats for pivotally connecting the same, said bearings and trunnions having cut-out portions, stop rings removably mounted in the cutout portions and shaped to endwise engage both trunnions and bearings to resist casual axial movement relatively thereof, and means removably mounted through the trunnions and bearings and through said rings for removably retaining the rings in position.

4. In a closure, slats, inter-engaging trunnions and bearings on the slats for pivotally connecting the slats for relative angular movement, said trunnions being hollow, said bearings and trunnions having cut-out portions, stop rings removably mounted in the cut-out portions and

shaped to simultaneously engage edgewise both bearings and trunnions to resist casual endwise relative movement therebetween, rollers, stub axles on the rollers removably insertable in the trunnions and rings, and tracks at the sides of the closure positioned to receive the rollers and to retain the stub axles in interengaged position with the rings.

5. In a closure as claimed in claim 1 wherein rollers are rotatably carried by the pivotal connections, said tracks having spaced-apart flanges for receiving the rollers therebetween, the diameter of the rollers are substantially equal to the space between the track flanges so that the rollers are confined between the track flanges.

6. In a closure, at least three elastic slats, complementary bearings and trunnions on the slats for pivotally connecting the same into a composite door, abutments between the slats adapted to come together in one angular position of such slats in which the slats are unstressed and the centers of the pivotal connections of the slats are not in alignment, guides carried by the pivotal connections, tracks having outer and inner flanges spaced apart for confining the guides therebetween, the space between said flanges being such that the intermediate guides engage the outer flange and the end guides engage the inner flange when the centers of the pivotal connections are in substantial alignment thereby forcing the abutments into closer contact under pressure to place the slats under elastic stress and setting up reactionary frictional resistance between the bearings and trunnions to relative longitudinal movement.

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