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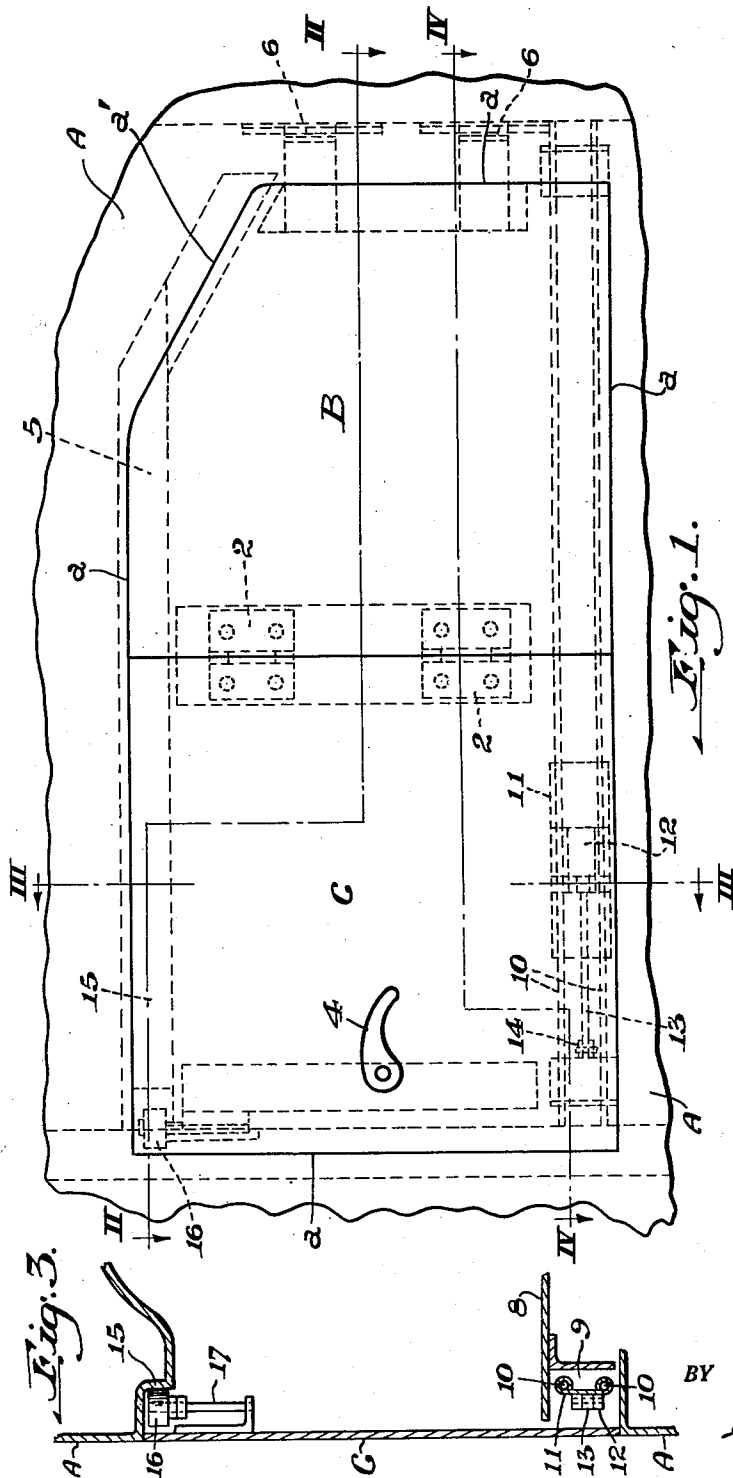
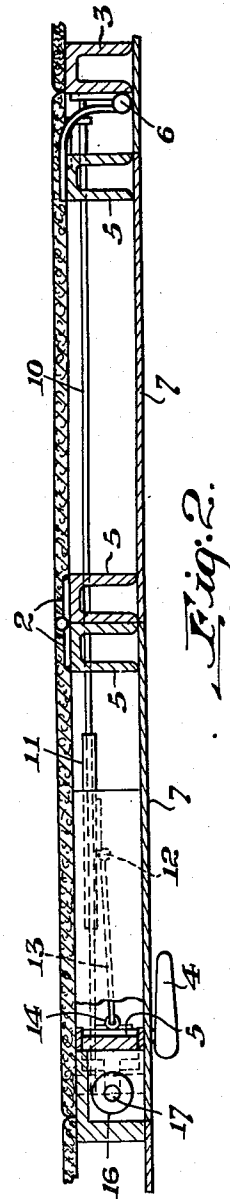
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2,581,797

FOLDING VEHICLE DOOR CONSTRUCTION

Filed July 24, 1947

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

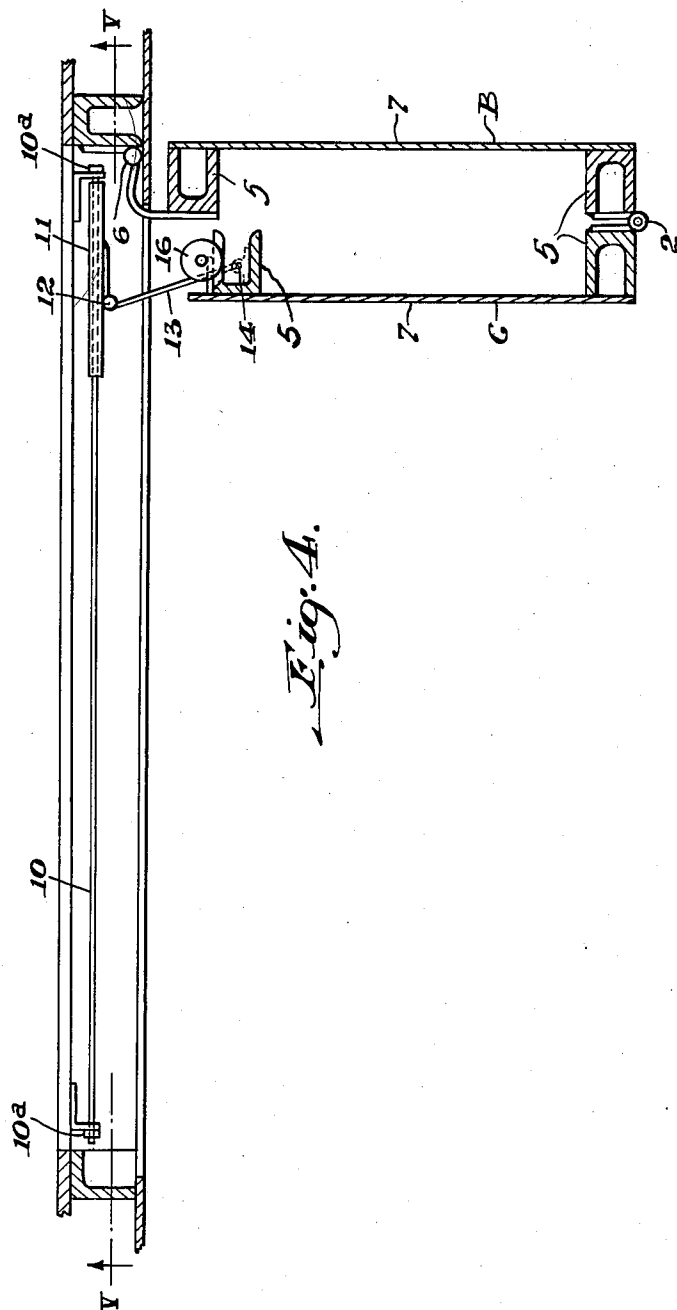


Fig. 4.



Fig. 5.

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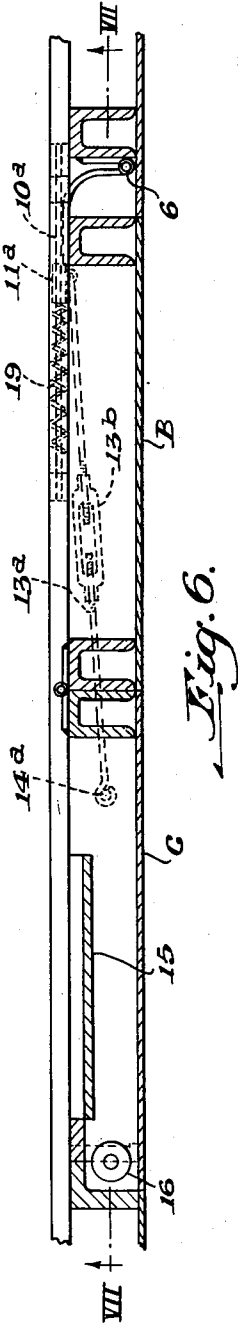
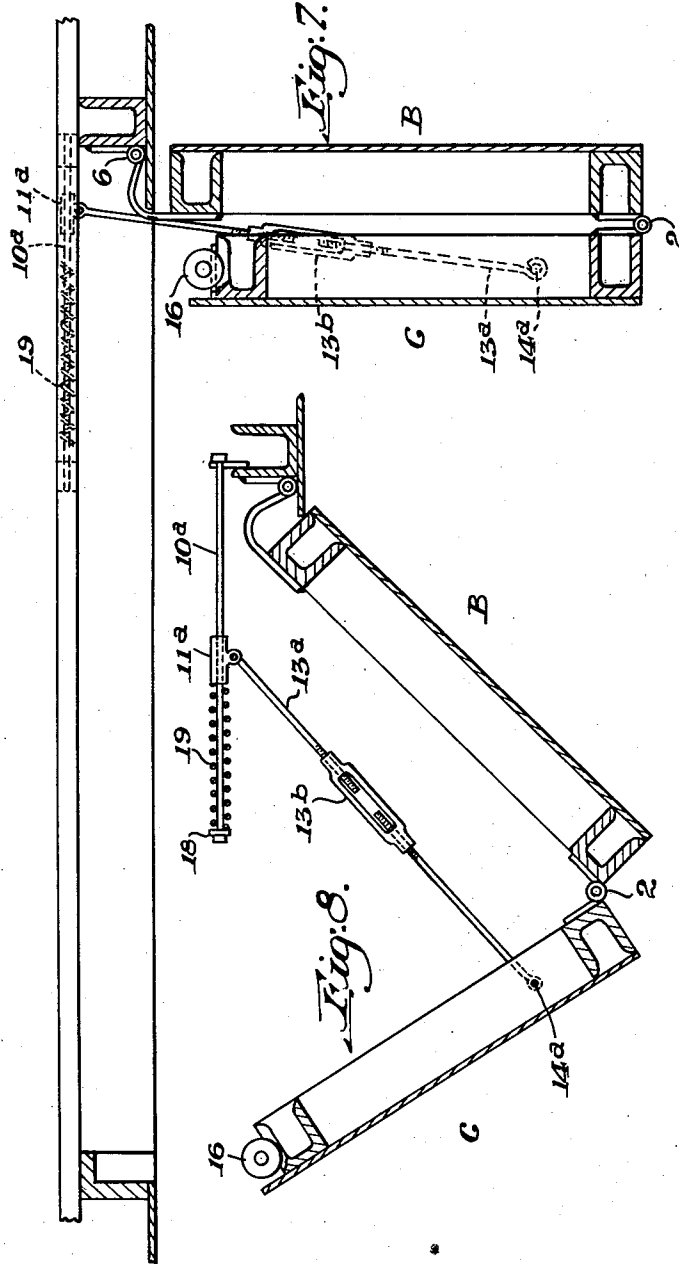
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FOLDING VEHICLE DOOR CONSTRUCTION

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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FOLDING VEHICLE DOOR CONSTRUCTION

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5 Claims. (Cl. 160—206)

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My invention is an improvement in the door construction of motor vehicles, especially of that modern type of passenger automobile, of the coupe or other models, provided with wide door openings.

In such vehicles, the usual outwardly swinging single door is a source of trouble and risk upon opening, due to extreme extension of the door laterally, especially in crowded traffic.

Also, the tendency of the door to swing backwardly, either on a level or sloping highway, is a well known detriment, in connection with either incoming or outgoing passengers.

My invention has in view to greatly reduce the door opening by making the door of two hinged sections, and providing means for opening and closing them together by the usual familiar handle unlocking operation.

Also of assistance, the present construction involves co-operating automatic resistance means for preventing inward swinging or closing, as hereinafter described.

Neither of such provisions are broadly new, per se, and various prior constructions have been heretofore known, disclosing various forms of double doors, and also for holding the door open.

My invention meets these problems in a satisfactory, efficient, and novel manner, as presented herein.

In the drawings showing certain preferred constructions:

Fig. 1 is a partial view in side elevation showing the door of an automobile, as closed.

Fig. 2 is a horizontal section on the line II—II of Fig. 1, showing the double doors as closed.

Fig. 3 is a vertical section on the line III—III of Fig. 1.

Fig. 4 is a horizontal section on the line IV—IV of Fig. 1, showing the double door sections collapsed, and extended, as when finally opened.

Fig. 5 is a vertical section on the line V—V of Fig. 4.

Fig. 6 is a horizontal section like Fig. 2, showing a modified construction, with the doors closed.

Fig. 7 is a similar view showing the doors collapsed, and open at approximately right angles to the body of the car.

Fig. 8 is a similar partial detail view showing the double door in an intermediate position.

The main body of the automobile A, of any suitable or standard construction, is provided, usually at opposite sides, with an approximately rectangular entrance and exit opening within the edge portions, generally indicated at *a*.

In the case of a low sloping portion, at rear or front, the edge opening, at either end, may be slopingly disposed, as at *a'*.

The compound door member consists of a front

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or end portion member B, and a companion section C, hinged together by hinges 2, while one end section, as B, is similarly connected with a vertical frame member, such as a structural column 3.

Door section C is provided with a locking and unlocking handle 4, on the outside and inside, of conventional type. Each of sections B and C is of usual rigid construction within the scope of vertical and upper and lower structural framing members 5, middle vertical pairs of such members being connected by the hinges 2.

Endmost member B is connected by suitable hinges 6 with column 3 for swinging it and member C outwardly or inwardly together, each having the usual outer thin metal sheathing 7 and the usual inner upholstery, not shown, but also conventional, as in Fig. 2.

Underneath the outer edge of floor 8 is a longitudinal clearance opening 9, along through which extends one or a pair of guide rods 10, suitably anchored at their ends, as at 10*a*. Slidably engaging such rod or rods is a door controlling carriage 11, to which is pivotally connected, as by hinge 12, an arm 13. Such arm 13 is pivotally connected by its terminal, as at 14, with the terminal framing member 5, or otherwise, whereby to cause the door section C to swing inwardly on its hinges 2.

Thus, as the double door is swung outwardly, upon opening, and front section B swings on its hinges 6, section C in following, will close on its hinges 2, toward section B.

As retained by arm 13 and sliding carriage 11, section C will finally assume a side by side position with relation to section B, as in Fig. 4.

As shown in Fig. 3, a reinforcing upper guide rail 15, of suitable form, as by an elongated offset portion of the roof, extends lengthwise above the door opening, and serves as a resisting trackway for section C in opening. The endmost framing column 5 of the free section is provided at its upper corner portion with a roller 16, pivotally carried by stem 17.

As the free section C, upon closing, with both sections tending to close together as in Fig. 7, carriage 11 is thrust forwardly, and arm 13 exerts an inward pulling pressure, tending to hold roller 16 against the surface of guide bar rail 15, for the main portion of its movement towards section B. Another advantage is that the door is maintained in position, and prevented from rubbing against any portion of the main frame.

There is shown in Figs. 6, 7 and 8, a generally similar construction in which the sliding carriage 11*a* is mounted for a more limited movement along a supporting rod 10*a*, suitably connected by its terminals, as in Fig. 8.

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Carriage 11a is pivotally connected with section C in the same manner generally, as at 14a, more closely adjacent to hinge connections 2. Connecting arm 13a is therefore considerably larger than arm 13, and the movement of carriage 11a is considerably shorter than that of carriage 11.

For the purpose of adjusting the length of arm 13a, it is preferably provided with a right and left hand thread turnbuckle 13b, connecting end sections of the arm, as shown.

Between carriage 11a and a resisting abutment fixture 18, is a coiled spring 19, subject to compression as the doors are closed, with inward movement of the carriage.

When the doors are released for opening, the compressed spring imparts outward movement to carriage 11a and with resulting inward tension on arm 13a, as the spring expands, thereby greatly assisting in outward movement and folding action of the door sections together, when fully opened, as in Fig. 7.

Such action also tends to hold roller 16 inwardly against the face of guide bar 15.

The operation of the door to and from its closed position may be effected in a manner quite similar to doors composed of a single pivoted section. In opening the door, it is merely necessary to operate the handle 4 to unlatch the door and then pull outwardly on the handle 4. The initial opening movement of the door is a combined pivotal movement of both sections C and B about the hinge 6. In response to initial opening movement, the link 13 pivots about the connection 12 and the carriage 11 moves to the right as viewed in Fig. 2. This combined pivotal movement of the link 13 and movement with the carriage transversely of the door frame is effective to pivot the sections B and C on each other to a folded position as illustrated in Fig. 4. This movement of the door sections to their folded position is accomplished by the continuous application of an outward pulling force to the handle 4. During this movement, it will be noted that the outer edge of the section C does not move substantially out of the plane of the door frame in which the door is mounted. In other words, as the door moves to and from its closed position, the outer or free edge of the door section C will be restrained by the link 13 against substantial movement away from the door frame.

The construction and operation of the invention will be readily understood and appreciated by those familiar with the art. It may be changed or varied in detail construction, or modified otherwise by the builder or skilled mechanic, within the scope of the following claims:

What I claim is:

1. In combination with the side wall of a vehicle having an entrance and exit opening, a double door consisting of a section hinged to the side wall at one end of the opening and a freely swinging section hinged to said section, an upper guide rail, a roller on the freely swinging section engaging said guide rail, a floor for the vehicle extending over an edgewise clearance opening, a fixed rod in said opening lengthwise of the vehicle, a resistance spring on said rod, a carriage slidably mounted on the rod engageable with the resistance spring, and a two piece arm pivotally connected with the carriage and the freely swinging section provided with an adjusting turnbuckle for varying the length of the arm.

2. In a folding door having two sections hinged together and a mounting hinge for connecting one

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of said sections to a supporting door frame for pivotal movement to and from a closed position, a control apparatus for controlling the folding movement of said doors as they are moved to and from a closed position comprising a carriage, a trackway on which said carriage is mounted for a guided rectilinear movement with respect to the door frame, and a control link having a first pivotal connection with said carriage and a second pivotal connection with the other of said sections.

3. In a folding door having two sections hinged together and a mounting hinge for connecting one of said sections to a supporting door frame for pivotal movement to and from a closed position, a control apparatus for controlling the folding movement of said doors as they are moved to and from a closed position comprising a stationary guide rod mounted in a horizontal position, a carriage slidable on said rod, and a control link having a first pivotal connection with said carriage and a second pivotal connection with the other of said sections.

4. In a folding door having two sections hinged together and a mounting hinge for connecting one of said sections to a supporting door frame for pivotal movement to and from a closed position, a carriage, a trackway on which said carriage is mounted for a guided rectilinear movement transversely of the door frame, and a control link having a first pivotal connection with said carriage and a second pivotal connection with the other of said sections, said link moving pivotally about said first connection and transversely of said door frame with said carriage in response to opening and closing movements of said door about its mounting hinge and being thereby effective to fold and unfold said door sections on each other while restraining the outer edge of said other door section against substantial movement away from said door frame.

5. In a folding door having two sections hinged together and a mounting hinge for connecting one of said sections to a supporting door frame for pivotal movement to and from a closed position, a carriage, a trackway on which said carriage is mounted for a guided rectilinear movement transversely of the door frame, and a control link having a first pivotal connection with said carriage and a second pivotal connection with the other of said sections, said link having a length and the location of said pivot connections being such that said door sections are folded upon each other without substantial movement of the free edge of said door away from said frame in response to opening and closing movements of the door by a force applied solely to said other door section.

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