

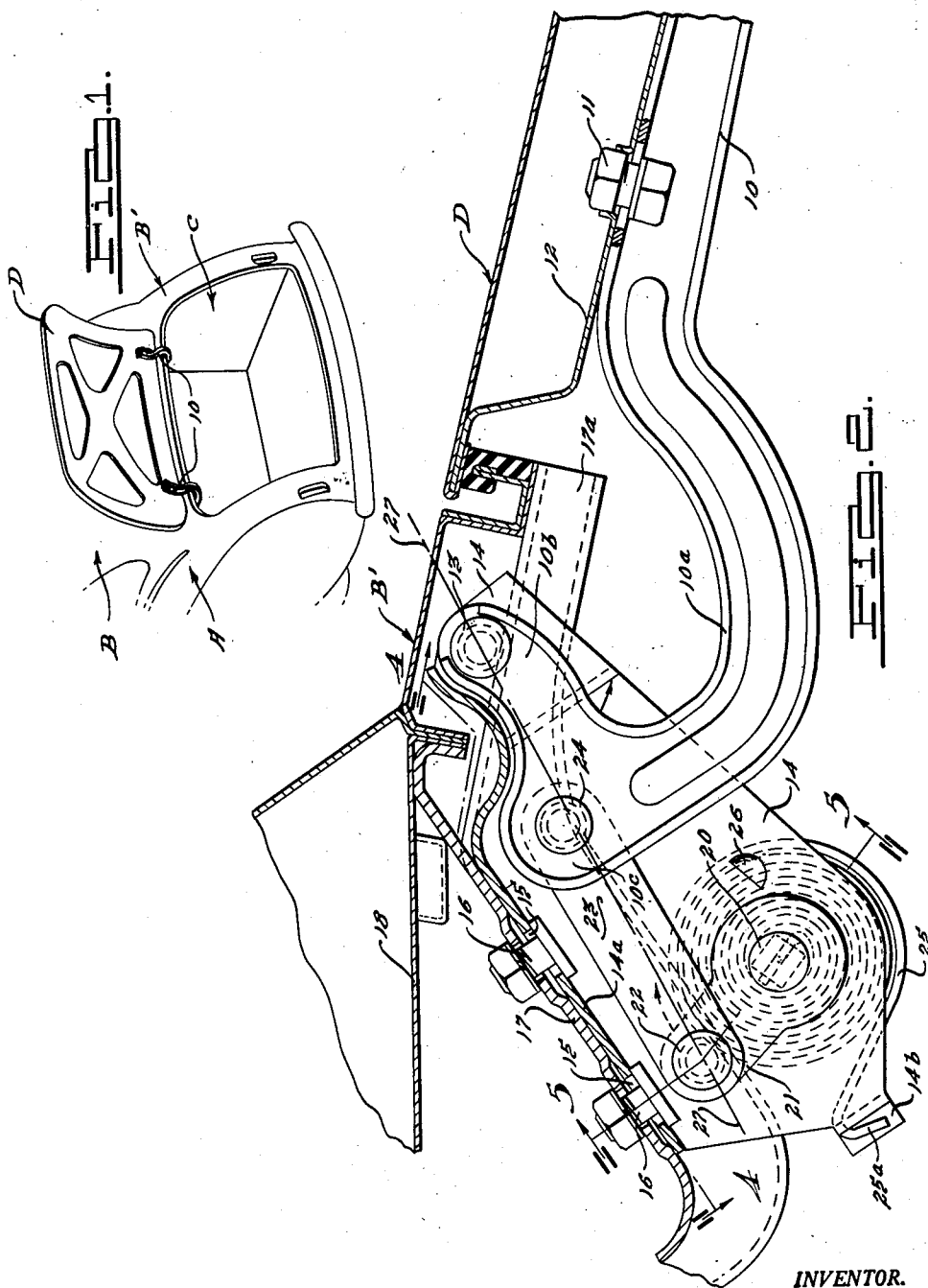
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J. H. ROETHEL
DECK LID HINGE

2,612,651

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2 SHEETS—SHEET 1



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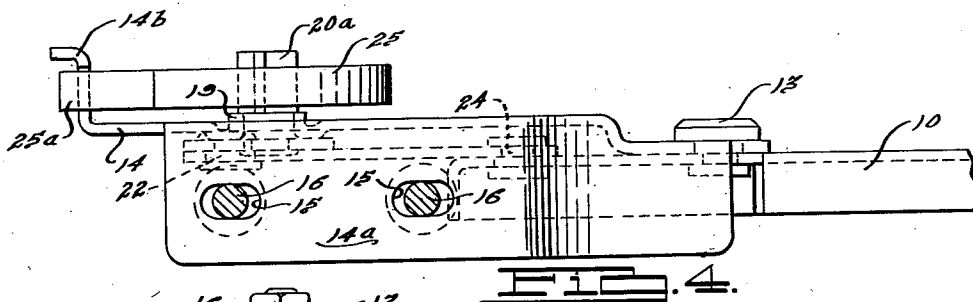
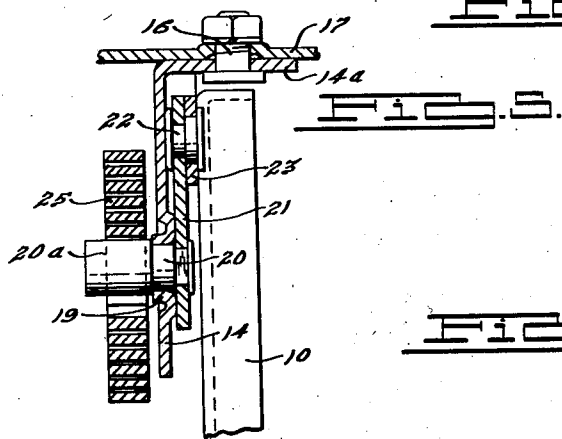
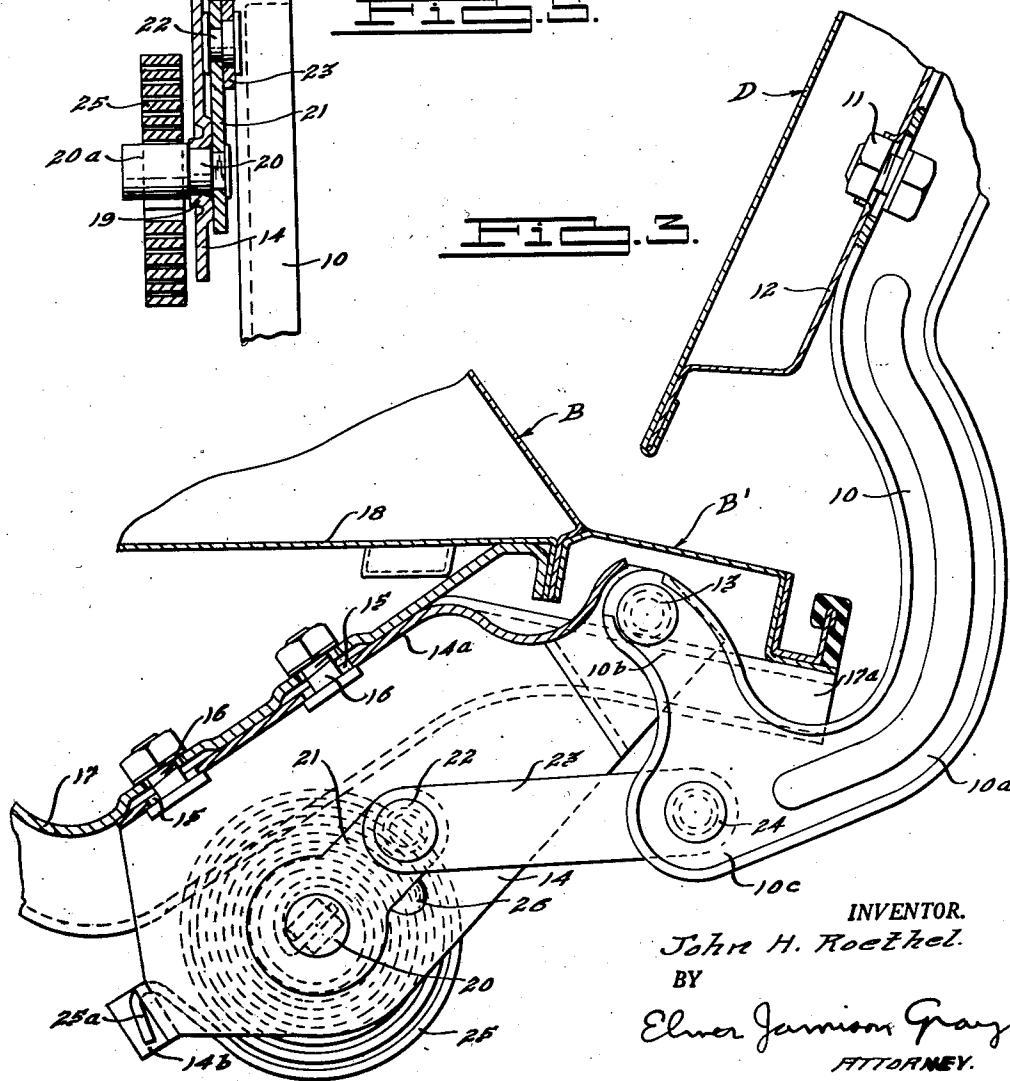
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2 SHEETS—SHEET 2



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DECK LID HINGE

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5 Claims. (Cl. 16—135)

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This invention relates to hinges for upwardly swinging lids or closures such, for example, as hinges useful in vehicle or automobile bodies in connection with the deck lids, bonnets and trunk lids thereof.

An object of the invention is to provide a hinge device for an upwardly swinging lid or closure having improved spring controlled means for counterbalancing the weight of the lid, assisting in raising the same, and maintaining the lid in raised position.

A further object of the invention is to provide a hinge device for a swinging lid, such as a deck lid, in which the pivoted hinge member attached to the lid is actuated in improved and positive manner through the medium of a link connected to a crank arm controlled by a spiral clock-type spring, the improved relation of the crank arm and link to the hinge arm being such as to provide very effective and powerful lifting action substantially throughout the range of movement of the lid thereby relieving the operator of any appreciable effort in opening the lid.

Another object of the invention is to provide an improved spring device for imparting swinging motion to the pivoted hinge member for the deck lid or closure, such device comprising a spring actuated crank arm connected by an endwise shiftable link to the hinge member and being characterized by the fact that the crank arm, in the closed position of the lid, extends upwardly from its pivot oppositely to the hinge member and has during opening movement of the lid a rotative or pivotal motion in a direction opposite to the rotative or pivotal motion of the hinge member. By virtue of this improved construction the maximum effort of the spring and the maximum leverage effort of the crank arm are taken advantage of and utilized.

Still another object of the invention is to provide a spring controlled hinge device for an upwardly swinging lid which is compact, strong and relatively light in construction, economical to manufacture, and constructed in improved manner to reduce to a minimum the manual effort required to operate the lid.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a fragmentary perspective view of the rear end of an automobile body illustrating a lid or closure hinged to the body by means of a

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hinge structure or device constructed in accordance with the present invention.

Fig. 2 is a longitudinal vertical sectional view taken through the body and deck lid and illustrating the hinge structure or device in side elevation with the deck lid in closed position.

Fig. 3 is a view similar to Fig. 2 illustrating the position of the hinge device with the deck lid in open position.

Fig. 4 is a view taken substantially through lines 4—4 of Fig. 2 looking in the direction of the arrows.

Fig. 5 is a section taken substantially through lines 5—5 of Fig. 2 looking in the direction of the arrows.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

In the drawings there is illustrated, by way of example, one embodiment of a hinge device or hinge structure in accordance with the present invention as applied to an upwardly swinging closure, such as the deck lid of an automobile body. It will be understood that the hinge of the present invention may be utilized in connection with other closures such, for example, as the swinging hood lid or bonnet of a vehicle body. In the present embodiment of the invention the hinge structure is applied to an automobile body A which has a metal roof panel which may be formed as a single stamping or, as illustrated, may comprise a main panel B joined by spot welding to a rear sloping deck panel B'. Within the latter is a compartment having an opening C into the compartment which is adapted to be closed by means of a swinging lid or closure member D.

The hinge structure in the illustrated embodiment comprises a stamped or pressed metal hinge arm or member 10 which is flanged along its edges and longitudinally ribbed for reinforcement purposes. In the present embodiment two hinge devices are utilized for supporting the deck lid D and these devices, which are identical in construction, are spaced apart transversely of the lid. The outer portion of each hinge member 10 underlies the upper edge of the deck lid and is bolted at 11 to the inner metal panel 12 of the

deck lid. Each hinge member or hinge arm 10 is of generally goose-neck construction, as shown at 10a, so as to permit the hinge member to swing about and clear the upper edge of the deck lid compartment C. The inner end portion 10b of the hinge member thus extends within the deck lid compartment and terminates near but immediately behind the rear upper edge thereof. This end portion 10b is pivoted at 13 through the medium of a shoulder rivet to the outer end of a pressed metal angle bracket 14.

The bracket 14 of the hinge structure is provided with an upper laterally extending flange 14a provided with slots 15 to receive bolts 16 by means of which the bracket 14 is rigidly secured to an angle bracket structure 17 mounted within and secured to the roof panel 18 of the deck lid compartment C, this bracket having an extension 17a spot welded to the rear flanged edge of the panel B'. The slots 15 permit any needed adjustment of the hinge bracket 14 during installation thereof. It will be understood that the hinge bracket 14 of the hinge device will be designed to suit the particular car and may be mounted within the roof of the rear deck compartment in any suitable manner.

The depending web of the hinge bracket 14, as shown in Fig. 5, is formed with an aperture flanged at 19 to provide a bearing for the cylindrical portion of a shoulder rivet 20 rigidly secured to the inner or lower end of a crank or lever arm 21. This crank arm extends from the rivet 20 upwardly and somewhat rearwardly in an angular direction and the upper end thereof is pivoted through the medium of a shoulder rivet 22 to the rear end of a link 23. The opposite end of this link is pivoted through the medium of a shoulder rivet 24 to a rearwardly offset portion 10c of the hinge member 10. Thus, in the closed position of the deck lid D the link 23 extends from the pivot 22 in the general direction of the pivot or hinge 13 of the hinge member 10 and is positioned above the rivet 20 of the crank arm 21 preferably quite closely to the upper flanged edge 14a of the hinge bracket 14.

The shoulder rivet or stud 20, forming the pivot for the crank or lever arm 21, is provided with an integral extension 20a formed with a transverse slot or kerf within which is anchored the inner end of a spirally wound clock-type spring 25. This spring is provided with a number of convolutions and is selected as to strength so as to furnish, where two hinge devices are used, the required effort to fully counterbalance one-half the weight of the deck lid D. The outer hooked end 25a of the clock-type spring 25 is anchored in a notch formed in a lug 14b struck out from the metal of the hinge bracket 14. From closed position of the deck lid, shown in Fig. 2, to fully open position, shown in Fig. 3, the crank arm 21 will swing from the position of Fig. 2 to the position of Fig. 3. I prefer to limit the range of opening movement by providing a stop 26 which may take the form of a lug embossed from the metal of the hinge bracket 14 and engaged by the crank arm 21 as shown in Fig. 3.

During operation, as the deck lid is lowered from the position of Fig. 3 the pivot 24 will move toward the dead center line 27 passing through pivots 22 and 13. During this time the crank arm will be rotated or swung in a counterclockwise direction, as viewed in the drawings, through the action of the hinge member 10 and the endwise shiftable link 23, thus progressively loading or winding up the spring 25. The construction

is preferably such that the center of the pivot 24 will pass slightly above the dead center line 27 thereby holding the lid in its closed position shown in Fig. 2 and rendering the spring 25 substantially ineffective, or nearly so, to exert any effort through crank arm 21 and link 23 on the hinge arm 10 tending to swing it in either direction. Very little effective effort of the spring is, therefore, exerted when the lid is closed and but little lifting movement of the lid is necessary to move the pivot 24 below the dead center line where the full effort of the spring may be brought into play to assist in raising the lid.

Thus, during the initial lifting of the lid from its fully closed position in Fig. 2 very little effort is required to raise it the short distance needed to position the pivot 24 below dead center line 27. When this occurs the spring 25 exerts an effective lifting action which assists in raising the lid to the fully open position and holding it in such position, the spring being constantly under predetermined load and installed in such condition. Lifting action of the spring rotates the stud or shaft 20 and swings the crank arm 21 in a clockwise direction, as viewed in the drawings. Due to the initial upwardly directed position of the crank arm its maximum leverage effort will be transmitted to the link 23 within the range of angular travel of hinge arm 10. The present hinge device is, therefore, characterized by the swinging or rotation of the crank arm 21 in a direction opposite to the rotative or swinging motion of the hinge arm 10.

The above mentioned advantage in operation of the present hinge device is achieved while at the same time enabling use of a relatively short link 23 and a construction which is more compact and stronger, lighter in weight, occupying less room within the compartment and adapted to be mounted so as to offer less obstruction to baggage or other articles stored therein.

I claim:

1. A hinge device for a swinging lid or closure adapted to be raised and lowered to open and close an opening, comprising a fixed support, a hinge member pivoted to the support and adapted to be secured to the lid or closure, a crank arm pivoted to the support at a point spaced from the pivot of said hinge member, a wound spring having one end connected to the crank arm and its other end connected to the support, and a control link pivoted to the outer end of the crank arm and also pivoted to said hinge member at a point spaced from the axis of swinging thereof, said control link being disposed in the closed position of the lid entirely above a line passing through the axes of swinging of the crank arm and hinge member, said crank arm being adapted to swing in a direction opposite to the direction of swinging of the hinge member during raising and lowering of the lid, and said spring acting to counterbalance the weight of said lid during raising and lowering movement thereof.

2. A hinge device for a swinging lid or closure adapted to be raised and lowered to open and close an opening, comprising a fixed support having a base portion, a hinge member pivoted to the support and adapted to be secured to the lid or closure, a crank arm pivoted to the support at a point spaced from the pivot of said hinge member, a spirally wound spring having its inner end connected to the crank arm and its outer end connected to the support, and a control link pivoted to the free end of the crank arm and also pivoted to said hinge member at

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a point spaced from the axis of swinging thereof, said control link being disposed in the closed position of the lid entirely above a line passing through the axes of swinging of the crank arm and hinge member, said crank arm extending toward said base portion from its pivot axis and adapted to swing in a direction opposite to the direction of swinging of the hinge member during raising and lowering of the lid, and said spring acting to counterbalance the weight of said lid during raising and lowering movement thereof.

3. A hinge device for a swinging lid or closure adapted to be raised and lowered to open and close an opening, comprising a fixed support having a base portion, a hinge member pivoted to the support and adapted to be secured to the lid, a crank arm pivotally connected to the support and extending toward said base portion, a spring connected to the crank arm and the support to yieldingly restrain pivotal movement of the crank arm relative to the support, and a control member connecting said crank arm to the hinge member at a point spaced from the axis of swinging of said hinge member, said control member being disposed in the closed position of the lid entirely above a line passing through the axes of swinging of the crank arm and hinge member, the axis of swinging of the crank arm in the closed position of the lid being further from the pivotal axis of the hinge member than from said point of connection of the control member to said hinge member, said crank arm being adapted to swing in a direction opposite to the direction of swinging of the hinge member during raising and lowering of the lid.

4. A hinge device for a swinging lid or closure adapted to be raised and lowered to open and close an opening, comprising a fixed support having a base portion and a flange portion and adapted to be located within a compartment with said base portion connected to a wall of the latter, a hinge member pivoted to the flange portion at one end thereof, a spring connected to the flange portion at the other end thereof, an end-

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wise shiftable link pivoted at one end to the hinge member at a point spaced from the axis of swinging of said hinge member, and means for connecting the other end of said link to the spring, said means including a swinging member pivotally connected at its lower end to the flange and at its upper end to said other end of said link, said link being disposed in the closed position of the lid entirely above a line passing through the axes of swinging of the swinging member and hinge member.

5. A hinge device for a swinging lid or closure adapted to be raised and lowered to open and close an opening, comprising a fixed support having a base portion and a vertically extending flange portion adapted to be located within a compartment with said base portion connected to a wall of the latter, a hinge member pivoted to the flange at one end thereof, a spring connected to the flange at the other end thereof, and a control member pivoted at one end to the hinge member at a point spaced from the axis of swinging of said hinge member, a crank arm connected to the spring at a point spaced from the pivot of said hinge member, said crank arm being pivoted at its lower end to the flange portion and being pivoted at its upper end to the other end of said control member, said spring acting to counterbalance the weight of said lid or closure during raising and lowering movement thereof, said control member being disposed in the closed position of the lid entirely above a line passing through the axes of swinging of the crank arm and the hinge member.

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