Jan. 8, 1924. 1,480,095

E. A. MOLLER

RADIATOR SHUTTER

Filed May 5, 1921

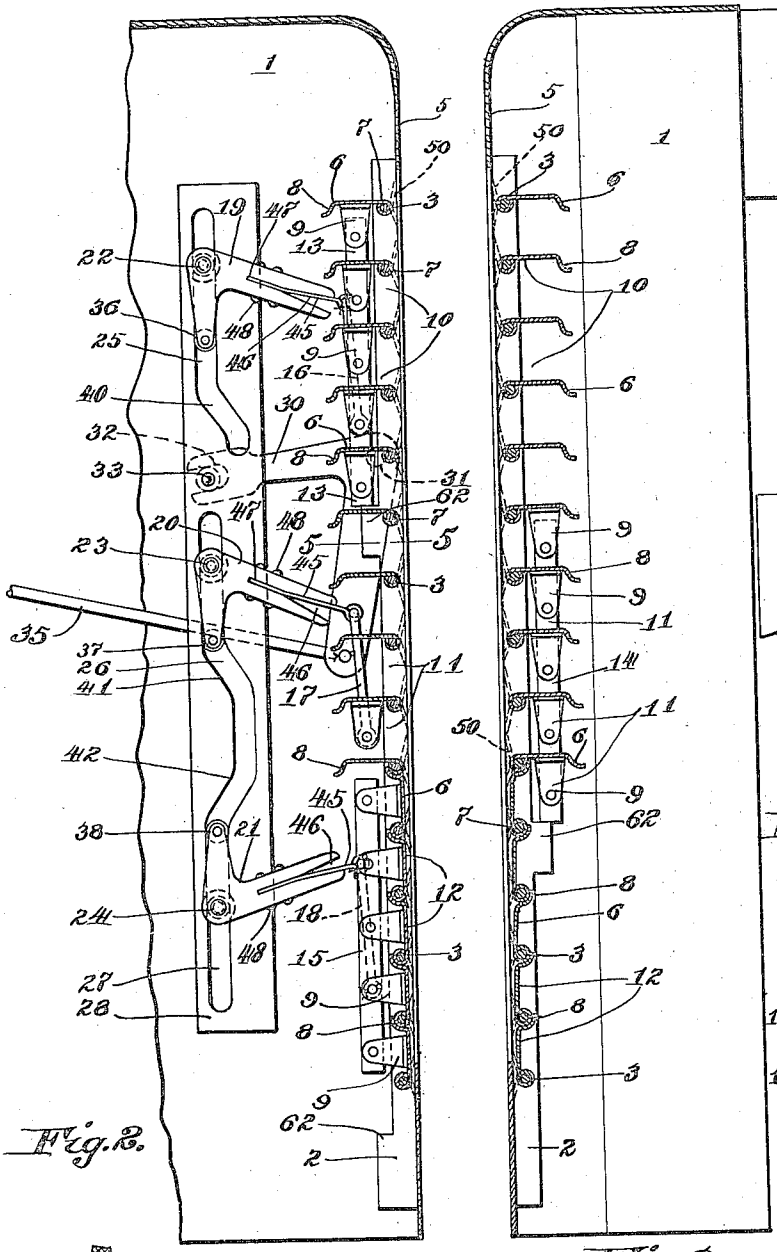


Fig. 2.

Fig. 3.

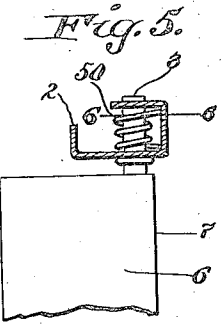


Fig. 5.

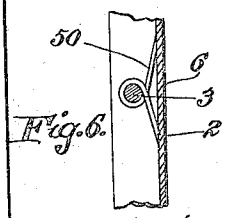


Fig. 6.

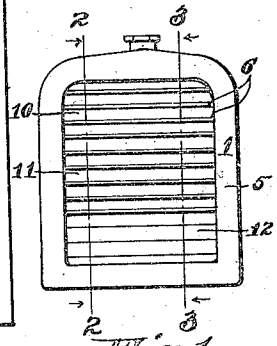


Fig. 1.

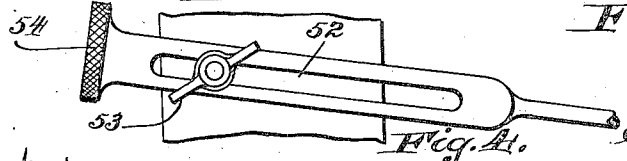


Fig. 4.

Witnesses
Porter F. Hall
Marjory Slater

Inventor
Edward A. Moller
By Edward Pennell
Attorney

Patented Jan. 8, 1924. 1,480,095

UNITED STATES PATENT OFFICE.

EDWARD A. MOLLER, OF BALTIMORE, MARYLAND.

RADIATOR SHUTTER.

Application filed May 5, 1921. Serial No. 467,083.

To all whom it may concern:

Be it known that I, EDWARD A. MOLLER, a citizen of the United States of America, residing in the city of Baltimore, State of Maryland, have invented certain new and useful Improvements in Radiator Shutters, of which the following is a specification.

The use of radiator shutters to regulate the draft which passes over the cooling surface of the radiators of automobiles and similar machines is well understood. Such shutters are stock equipment supplied with certain makes of automobiles. These shutters are ordinarily supplied with actuating means by which they may be opened and closed from the dash or some point within the convenient reach of the driver. Such controlling mechanism is ordinarily so arranged that the shutters as a whole may be held at different angles so that there are various points of adjustment whereby the opening may be varied between the full open and the closed positions. As a certain amount of cooling of the water near the top of the radiator is desirable to assist in circulation, particularly in thermosyphon systems and further in view of the fact that excess cooling and freezing if they occur, take place first at the bottom of the radiator or in the bottom radiator connection so that it is desirable to cut off the air draft, the applicant has arranged his shutter plates in a series of sections or groups which groups are arranged one above the other and for convenience and also on account of the principle already stated these sections are connected to a single actuating means which operates them successively closing first the bottom section, then the next and so on to the top of the radiator and until the entire shutter is closed and opening them in the inverse order. These different adjustments provide for different atmospheric temperatures and for different conditions of the motor and cooling system as to warming up in starting the motor. The invention also includes different details of the structure which appear in the description.

In the accompanying drawings I have illustrated a radiator shutter constructed in accordance with my invention.

In the drawings:—

Fig. 1 is a front elevation on a small scale of the radiator with the shutter in position.

Fig. 2 is a section on the line 2, 2 of Fig. 1.

Fig. 3 is a section on the line 3, 3 of Fig. 1.

Fig. 4 is a detail showing the preferred manner of securing the control rod at the driver or operator's end.

Fig. 5 is a fragmentary horizontal section on the line 5, 5 of Fig. 2.

Fig. 6 is a section on line 6, 6 of Fig. 5.

Referring to the drawings by numerals I have illustrated a radiator shell 1, to which are secured at each side upright channels 2, which may be of L-shaped cross section as illustrated, particularly in Fig. 5, that is one of the side webs may be elongated and flanged though this is not of great importance, the main object being to provide a support for the ends of the pins or journals 3 of the shutter slats or plates 6. These journals are formed on the ends of rods extending horizontally across the radiator preferably being set just to the rear of the front 5 of the shell. As shown each rod carries a plate or shutter slat 6, the rods or pivots being spaced by a distance little less than the width of the plates which latter as shown are bent or turned about the rods at their rear or pivot edges or otherwise secured thereto at 7, the front or swinging edges 8 being preferably secured thereto at 7, the front or swinging edges 8 being preferably and as shown bent to the circumference of the rods for any preferred arc as illustrated, the same being approximately 90° so the swinging edges of each plate fit closely against and about the pivot rod of the next plate.

In the form of the invention shown there are fifteen plates or shutter slats 6, which are divided into three groups of five each, each plate or slat 6 having secured thereto an actuating arm 9 at right angles to the surface of the plate, which arm extends to the rear when the shutter is closed. In the present instance the shutter plates or slats swing upward to closed position in which position they form a vertical wall at the front of the radiator and in opening they swing downward preferably each of them into a horizontal plane so that they offer practically no obstruction to the draft. The three groups referred to are indicated by reference characters 10, 11 and 12. The group 10 includes the five plates nearest the top, the group 11 includes the next five plates lower down and the group 12 includes the

five plates at the bottom. The respective groups are made up by pivotally connecting the arms 9 of the respective plates of each group to a single link, that is, the arms 9 of the plates or shutter heads 10 are pivotally connected to a link 13. The arms 9 of the shutter slats or plates 11 (see Fig. 3) are pivotally connected to a corresponding link 14 and the arms 9 of the shutter slats or plates 12 are pivotally connected to a corresponding link 15. Each link 13, 14, 15 is connected by means of a corresponding rod 16, 17, 18 to and with a corresponding bell crank lever, the same being indicated by reference characters 19, 20 and 21 respectively. Each of the bell crank levers 19, 20 and 21 is pivoted at its axis on a corresponding stud 22, 23, 24, each of which studs pass through corresponding slots 25, 26, 27 in a sliding rod 28, the latter two short slots being in the present form of the invention drawn so that they form a single slot 26, 27 but this is a mechanical expedient of little importance from an inventive standpoint.

The studs 22, 23, 24 are seated at convenient supporting points in the radiator shell or in supporting means provided for that purpose. The slots 25, 26, 27 provide for a vertical motion of the sliding rod or plate 28 on and relatively to the studs which guide and support it, the vertical motion of the plate is in the form of the invention shown accomplished by means of a bell crank 30 pivoted at its vertex or axis 31 on a suitable support which may be connected to the radiator shell, this bell crank lever is provided with a slot 32 at the end of its horizontal arm which engages a pin 33 just above the center of the plate 28 and the vertical arm of the bell crank lever is pivotally connected at its lower or swinging extremity to the forward end of the controller or actuating rod 35. It is evident that by thrusting the rod 35 forward which may be done from the dash, the bell crank lever 30 is rotated in left hand phase, the plate 28 being depressed and that by drawing the rod 35 backward the plate 28 is raised and that as shown the plate 28 is slightly below mid position. The closing of shutter plates or slats 6 in the groups 10, 11 and 12 is accomplished through the respective bell cranks 19, 20 and 21 and the links 13, 14 and 15 by the engagement of the respective followers 36, 37, 38 mounted at the swinging ends of the respective bell crank levers 19, 20, 21 and operating in the slots 25, 26 and 27, it being understood that the links 13, 14 and 15 are connected to what may be termed the horizontal arms of the bell crank levers 19, 20 and 21.

It will be noted that the slots 25, 26, 27 beyond the rectilineal vertical portions of said slots, occupied by the studs 22, 23 and 24, are deflected. The inclined portions 40, 41 and 42 of the said slots have a cam action in connection with said followers. It will also be noted that while the upper bell cranks 19 and 20 have their vertical arms depending, the lower bell crank 21 has its vertical arm upright. It will also be noted that the sliding plate which may be referred to as a cam plate 28 having been partially raised, the lower set 12 of shutter plates is in closed or vertical position, the roller 38 having passed through the inclined portion 42 of the slot 28. The second set of plates 11 is in horizontal or open position, the roller 37 being at the upper end of the inclined portion of the slot 26 and that the cam action as to the lever 20 will take place immediately if the plate 28 be moved upwardly and that the follower 36 of the bell crank 19 is in the straight portion of the slot 25 spaced back a considerable distance from the inclined portion 40 of the slot 25 so that it will not enter this inclined portion until the follower 37 has passed through the inclined portion of the slot 26. In other words, in the operation of the device, as the rod 35 is withdrawn the bottom set of plates is first closed and when it is completely closed the middle set of plates is closed and when the middle set of plates is completely closed and the rod 35 is further withdrawn the top set of plates is closed or moved into vertical position.

A detail of structure which is of some importance consists in the provision of a spring plate 45 forming the end of the horizontal arm of each bell crank lever 19, 20 and 21, the eye at the end of the arm which engages the corresponding connecting rod 16, 17, 18 being formed on said spring plate. In the form shown the arms of the bell crank levers are slotted at 46 to receive the plate, the end of the slot 47 being shaped to receive and fit the plate which may be held by bolts or rivets 48. The spring plate is so arranged as to be oppositely deflected at the two ends of the swing of the bell crank lever to take up all lost motion in the mechanism and prevent rattling. A provision for preventing the rattle due to looseness of the pins is shown in Figs. 5 and 6 in the form of a spring wire 50, one of said spring wires being wrapped around each end of each pivoted rod 7 and permitted to bear at its ends against the bottom of the channel 6 as illustrated in plan and vertical section in Figs. 5 and 6. This device takes up the play or rattle of the rods in their bearings.

The spring plates 45 among other functions eliminate the tendency of the plates to rattle against each other when closed and the tendency of the link and connecting rod mechanism to rattle when the links are open. They also have a toggle effect locking the shutter in open and closed position.

Springs 45 are under tension at each end of the swing. The channels are formed with stops 62 limiting the throw of the connecting rods or links.

In Fig. 4 I have illustrated the end of the controller or actuating rod 35 adjacent the operator. As shown the end of this rod is flattened and slotted at 52, the slot being engaged by a bolt and thumb nut 53 and the end of the rod being preferably flattened and rounded in a plane at right angles to the rod and knurled for convenience of manual engagement, the same being indicated by reference character 54.

I have thus described specifically and in detail a single embodiment of my invention in order that the nature and operation of the same may be clearly understood. However the specific terms herein are used in a descriptive rather than in a limiting sense, the scope of the invention being defined in the claims.

What I claim and desire to secure by Letters Patent is:—

1. In a radiator shutter, swinging shutter slats and operating means therefor including a spring arm having stops thereon to limit the play of the spring.

2. In a radiator shutter in combination, a series of swinging plates mounted to open and close and means for moving them from open to closed position and vice versa, the same comprising a plurality of members, the plates being divided into a corresponding number of groups of adjacent plates and means connecting each of the plates of each group to the said corresponding member, a plurality of operating members, one for each said group and a means for actuating said operating members successively.

3. In a radiator shutter in combination, a series of swinging plates mounted to open and close and means for moving them from open to closed position and vice versa, the same comprising a plurality of members, the plates being divided into a corresponding number of groups of adjacent plates and means for connecting each of the plates of each group to the said corresponding member and a plurality of operating members, one for each said group and means for operating said members successively whereby the respective groups of plates from the bottom to the top are closed successively and opened in reverse order.

4. A radiator shutter composed of a series of plates mounted to move from open to closed position, opening and closing the draft passage through the radiator, said series of plates comprising a plurality of groups covering successive areas of the cross section of the draft passage from the bottom to the top of the same, means connecting the plates of each group to operate simultaneously and operating means connected to each said means for operating the groups successively and a single controller for said operating means.

5. A radiator shutter composed of a series of plates mounted to move from open to closed position opening and closing the draft passage through the radiator, the said series of plates comprising a plurality of groups covering successive areas of the cross section of the draft passage from the bottom to the top of the same, means connecting the plates of each group to operate simultaneously and operating means connected to each said means for operating the groups successively and a single controller for said operating means, the operating means consisting of a bell crank lever for each group, a cam member having cam surfaces to engage each of said bell crank levers and means for moving said cam member to cause the respective cam surfaces to engage said bell crank levers successively.

6. A radiator shutter composed of a series of plates mounted to move from open to closed position, opening and closing the draft passage through the radiator, said series of plates comprising a plurality of groups covering successive areas of the cross section of the draft passage from the bottom to the top of the same, means connecting the plates of each group to operate simultaneously and operating means connected to each said means for operating the groups successively and a single controller for said operating means, said operating means including a plurality of swinging levers, one connected to each group, said levers each having a spring arm which is under tension at each end of its swing.

7. In a radiator shutter in combination, swinging shutter slats, means connecting the same in groups to move simultaneously and operating means for actuating the groups of plates to move successively and a single controller therefor.

8. In a radiator shutter in combination, swinging shutter slats, means connecting the same in groups to move simultaneously and operating means for actuating the groups of plates to move successively and a single controller therefor, said actuating means consisting of a lever for each group, a sliding cam member having a cam surface for each said group, each said respective cam surface being arranged to engage the corresponding lever, the operation of said levers and cam surfaces being successive in predetermined order and means for actuating said cam members.

9. In a radiator shutter in combination, swinging shutter slats, means connecting the same in groups, operating means for actuating the groups of plates to move successively and a single controller therefor, said actuating means consisting of sliding cam

member having a cam surface for each said group, said means engaging each said cam surface and connected to the corresponding group, the operation of said engaging means and cam surfaces being successive in predetermined order,

10. In a radiator shutter in combination, swinging shutter slats, means connecting the same in groups, operating means for actuating the groups or plates to move successively and a single controller therefor, said actuating means consisting of sliding cam member having a cam surface for each said group, means engaging each said cam surface and connected to the corresponding group, the operation of said engaging means and cam surfaces being successive in predetermined order and means in the form of a bell crank lever and connecting rod for moving said member.

11. A radiator shutter having a series of swinging plates arranged in a plurality of groups, means for each group connecting the plates in that group to move simultaneously, and means for operating said groups successively including a lever for each group having a spring arm which is under tension in both the open and closed position of the shutter, said lever also including means for limiting the flexing of the spring arm.

12. A radiator shutter having a series of swinging plates arranged in a plurality of groups, means for each group connecting the plates in that group to move simultaneously, and means for operating said groups successively including a lever for each group having a spring arm which is under tension in both the open and closed positions of the shutter, said lever also including means for limiting the flexing of the spring arm, said means being in the form of jaws enclosing the spring.

13. A radiator shutter having a series of swinging plates, actuating means for swinging the plates including means for connecting the plates together and a swinging lever having a spring arm and two stops one on each side of the arm to limit the play of the arm in both directions whereby the said members are kept under tension for preventing rattling.

14. In a radiator shutter, a support swinging shutter members, means for actuating the same and an anti-rattling device for each shutter member consisting of a coil wire spring, the coil encircling a portion of the shutter member and the ends bearing against the support.

15. In a radiator shutter in combination, a series of swinging shutter members mounted to open and close, means for moving them from open to closed position and vice versa, anti-rattling means controlling the said shutter members, and said opening and closing means including a lever having a resilient yielding arm.

Signed by me at Baltimore, Maryland, this 25th day of April, 1921.

EDWARD A. MOLLER.

Witnesses:
PORTER H. FLAUTT,
FREDERICA HOFFMANN.