Feb. 21, 1928.

1,660,146

D. M. WINANS

CONTROL SHUTTER FOR ENGINE RADIATORS

Filed June 21, 1926 2 Sheets-Sheet 1

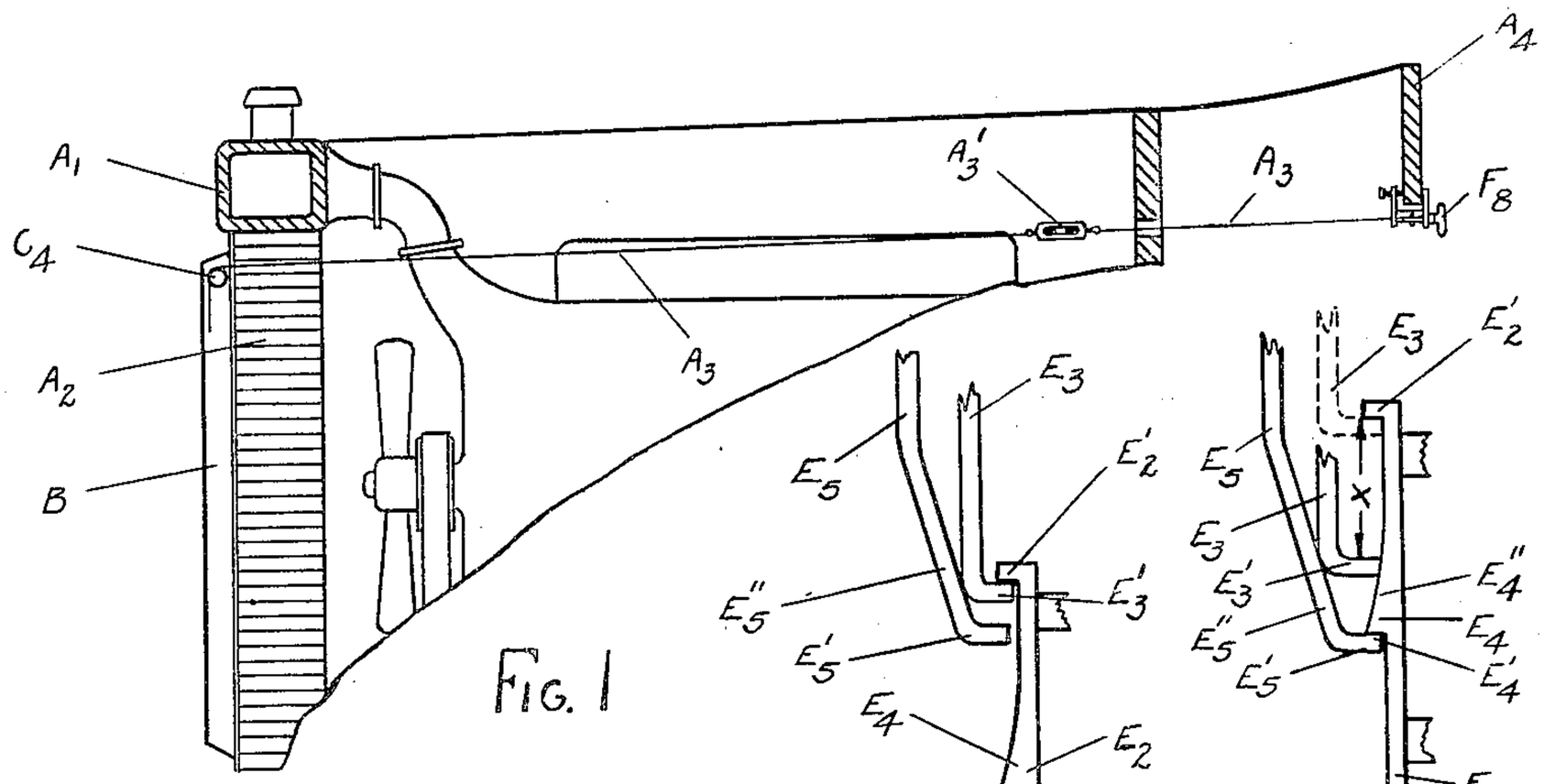
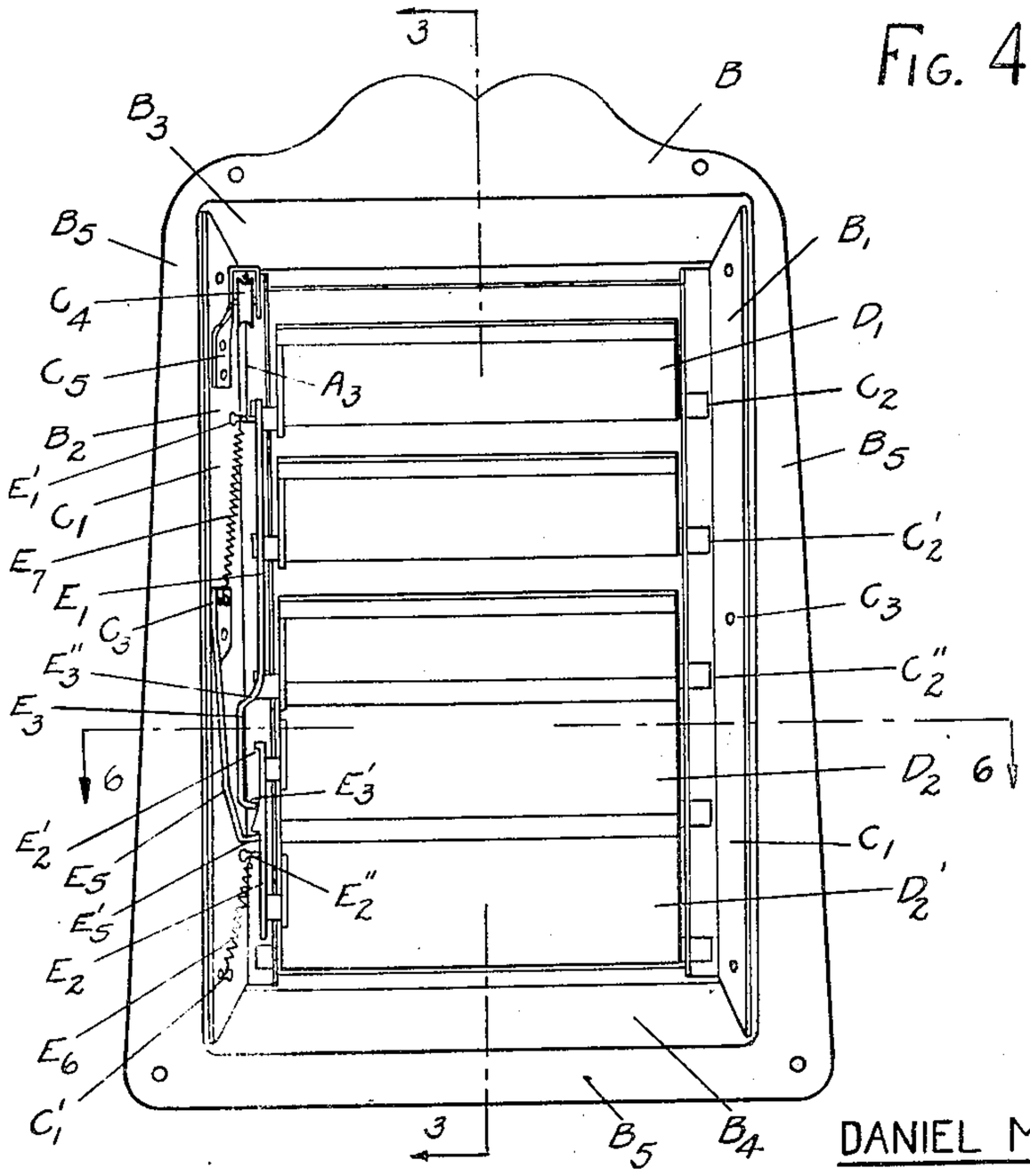


FIG. 1

FIG. 4A

FIG. 4B



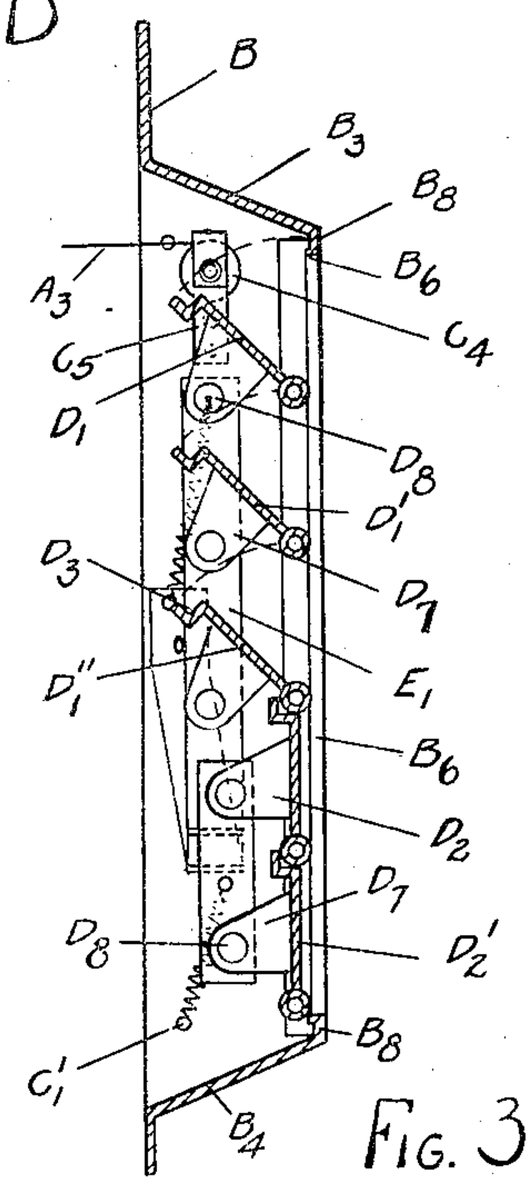


FIG. 3

FIG. 2

DANIEL M. WINANS INVENTOR.

BY Louis Ellmer

ATTORNEY

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D. M. WINANS

CONTROL SHUTTER FOR ENGINE RADIATORS

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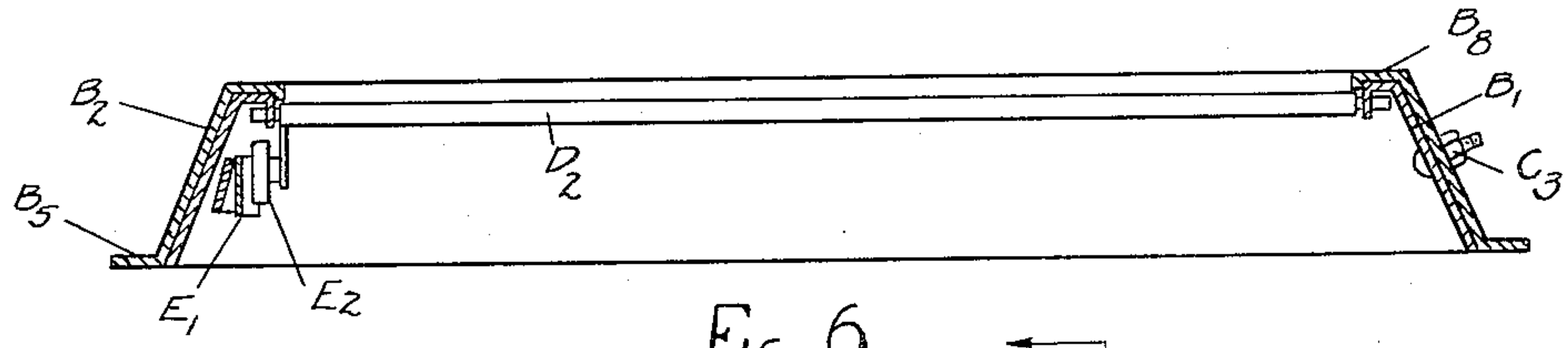

FIG. 6

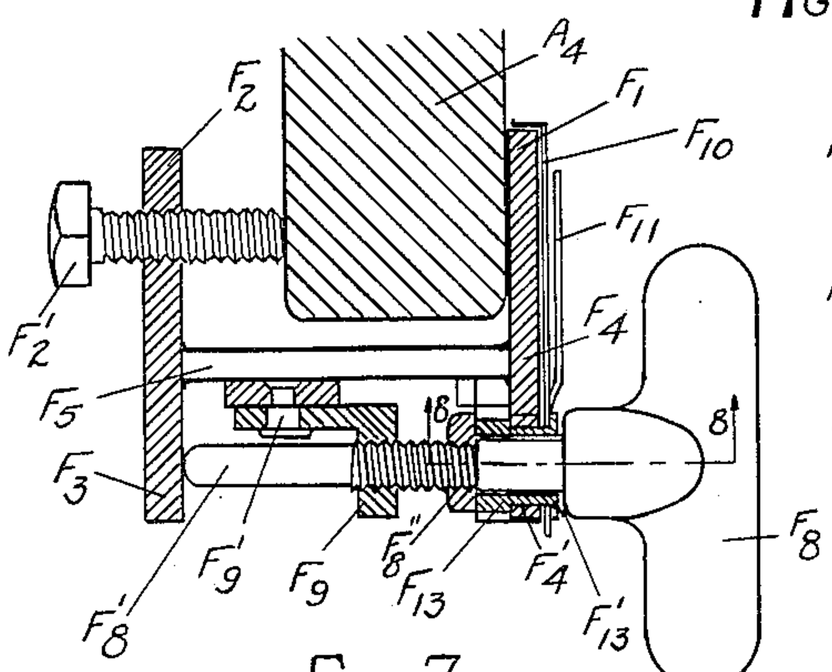

FIG. 7

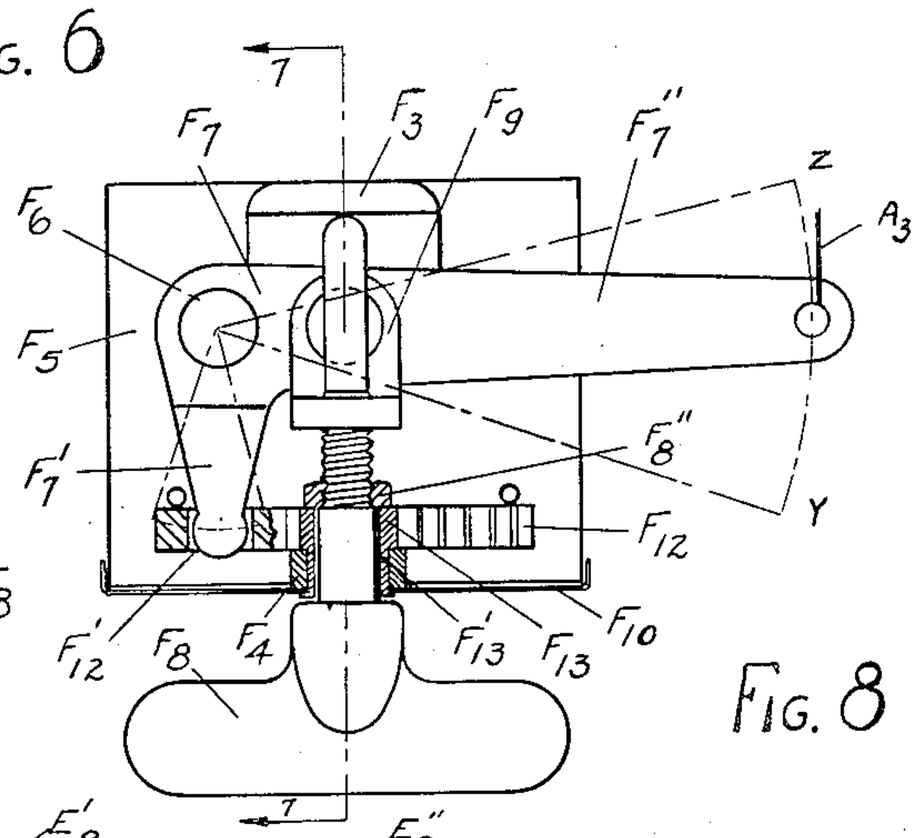

FIG. 8

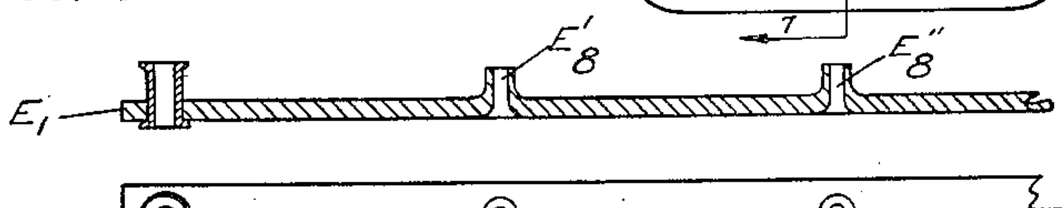

FIG. 11

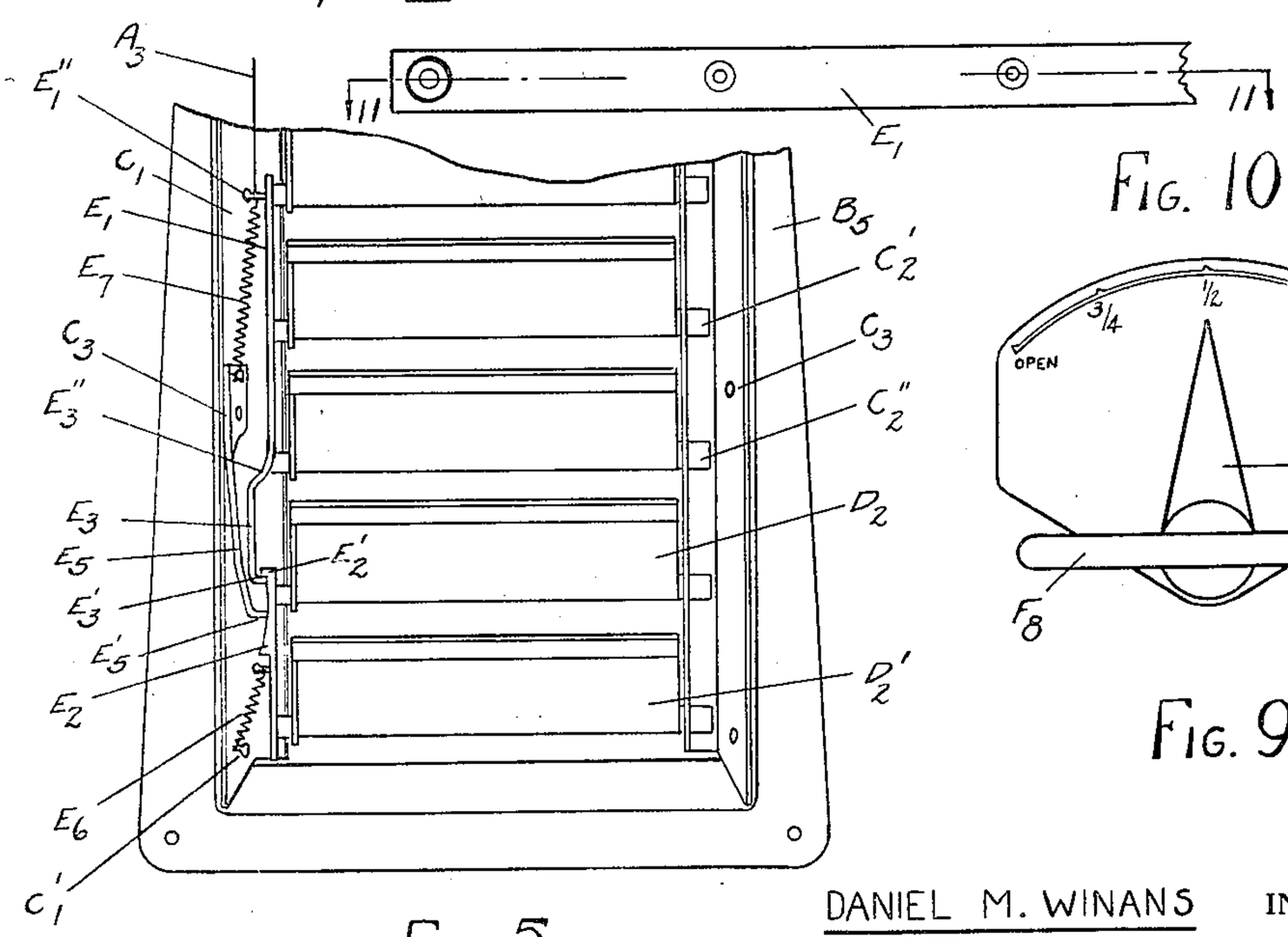

FIG. 5

FIG. 10

FIG. 9

DANIEL M. WINANS INVENTOR.

BY Louis Delmer

ATTORNEY.

Patented Feb. 21, 1928. 1,660,146

UNITED STATES PATENT OFFICE.

DANIEL M. WINANS, OF BINGHAMTON, NEW YORK, ASSIGNOR TO THE BREWER-TITCHENER CORPORATION, OF CORTLAND, NEW YORK, A CORPORATION OF NEW YORK.

CONTROL SHUTTER FOR ENGINE RADIATORS.

Application filed June 21, 1926. Serial No. 117,287.

This invention more particularly relates to improvements in manually-operated dash-controlled shields or shutter fronts as applied to air-cooled radiators for motor vehicles, especially such in which a supplemental shutter supporting frame is adapted for convenient attachment to or removal from the engine radiator without requiring constructive changes in existing cars. One of its objects is to provide a simple, durable and compact apparatus of this character by means of which the temperature of the motor jacket water may be regulated by air flow control through the radiator core openings and thus maintain the engine under better winter operating condition and guard against freezing of the engine cooling medium.

A further important object is to provide for simple and improved means to selectively close and cut off the air draft through the bottom half of the radiator core passages where incipient freezing is most likely to occur. The plural shutters of the present device have therefore been divided to operate in distinct sections or groups, and these are each equipt with independent but interlockable manipulating tie-bar means embodying certain improved clutch-like devices of the slip type adapted to couple or uncouple said bars and regulably actuate said shutter sections in different combinations. Said tie bars are preferably disposed to lie in substantial endwise alignment and the adjoining ends thereof are made to cooperate by means of a detachable clutch device in such fashion as to bring about synchronous movement between said bars and to interrupt such common movement at will. If desired, all of the shutters may be made to close simultaneously but when expedient the upper slat section may be kept operative while the lower group of shutters is detached therefrom and is left standing in closed position for the purpose of better protecting the lower portion of the radiator against freezing in extremely cold weather. Said detached lower shutter section may however be re-engaged at will by manipulating my improved control mechanism from the vehicle seat in order to make all the shutters again operate in unison; in this respect the present invention represents a modified mode of operation over that disclosed in my co-pending application Serial No. 112,771, filed June 1, 1926. Improved distant control means are also herein provided for conveniently and effectively adjusting the slat positions to meet various changes in atmospheric or road travel conditions, and when all the shutters are kept fully closed, this allows the cooling system to warm up more rapidly upon starting the motor.

To this end and the accomplishment of other new and useful results, the invention further consists in novel constructive features, combination and arrangement of its several parts, all of which will hereinafter be more fully described.

Reference is had to the accompanying two sheets of drawings which are illustrative of a specific embodiment of my invention as applied to a motor radiator, in which like characters of reference indicate like parts, and in which drawings:—

Fig. 1 is a vertical elevation taken in partial section to show the general arrangement of my shutter frame as applied to the front face of an automobile radiator and also the hand-operated actuating devices of which the control is carried up to the instrument board of the vehicle.

Fig. 2 represents an elevational rear view of my assembled shutter frame showing the upper group of slats standing in open position while the bottom slat group is disengaged and thrown into its inoperative or closed position.

Fig. 3 is a sectional view as taken along line 3—3 of Fig. 2.

Fig. 4^{A} is an enlarged partial detail of the tie-bar arrangement and trip device as applied to the slat setting in Fig. 2, while Fig. 4^{B} represents a similar enlargement as applied to Fig. 5.

Fig. 5 is an elevational view of my assembled shutter frame similar to Fig. 2 except that the actuating bar for the upper groups of slats is now hooked into engagement with the lower tie-bar so as to close the lower slat section in unison with the upper section.

Fig. 6 is a sectional view as taken along line 6—6 of Fig. 2.

Fig. 7 represents an elevational side view taken in section along line 7—7 of Fig. 8 showing screw actuated distant control devices for adjusting the shutter slats as applied to the instrument board of an automobile.

Fig. 8 is a bottom view of Fig. 7 taken in

partial section along line 8—8 thereof to better indicate the arrangement of my control lever and its actuating gear.

Fig. 9 shows an elevational front view of Fig. 7 and is illustrative of my pointer and dial device for indicating the shutter setting.

Fig. 10, is a side view of my tie-bar intended to bring out certain novel constructive features thereof.

Fig. 11, is a sectional view as taken along line 10—10 of Fig. 10.

Referring more particularly to said drawings, A_1 denotes a motor vehicle radiator tank or casing which circumscribes a honeycomb or other cellular core A_2, said core being preferably provided with a plurality of rather closely spaced horizontal air flow openings in the conventional manner. The shield or shutter frame may be held in place by the usual long bolts extending through the core with its flared flat flange or frame brim fitting snugly against the front of the core face so as to substantially cover the core openings and permit of controlling the flow of cooling air therethrough.

My pressed-up endless rectangular housing or supporting frame designated in its entirety by the letter B, comprises two spaced side pieces B_1 and B_2 preferably of cross-sectional Z shaped profile, the respective ends of which pieces may be cross connected by integral top and bottom end pieces of similar profile, such as B_3 and B_4. This hollow housing structure may further comprise an outwardly disposed brim portion B_5 inscribing the upstanding web pieces of the aforesaid Z shaped members while the respective inwardly disposed leg pieces thereof preferably form a continuous flat open face B_8 which is spaced from and lies substantially parallel to the plane of said brim.

Removably fitted against each inner face of the respective side pieces by means of suitable bolts C_3 or the like, is inserted a slat rack C_1, and this rack is provided with a series of spaced trunnion apertures or bearings such as C_2, C_2', etc. The disposition of said racks is indicated in the frame assembly Fig. 2 and it will be observed that in this preferred illustrative disclosure, there have been only two groups of damper slats or shutters provided, namely an upper slat group or distinct sectional unit preferably comprising the consecutive slats D_1, D_1', D_1'', etc., and a lower slat group or distinct sectional unit comprising the consecutive slats D_2, D_2', etc., the respective trunnions thereof being rotatably mounted in the apertures C_2, C_2', etc. of said complementary slat racks. Each such shutter group may be provided with independent tie-bar linkages so that the respective sections may be separately manipulated in the manner presently to be described from which it will become obvious that the same underlying principle may also be applied to more than two such shutter sections and that the slats thereof need not necessarily be grouped in consecutive order.

When fully closed, the adjacent edges of the parallelly mounted shutters preferably overlap each other somewhat to effectively seal the radiator core against air flow. As used in my shutter sections, the slats respectively designated as D_1 or D_2, may be similarly constructed and each equipt with a substantially flat body portion having an offset marginal L shaped stiffening rib or bead D_3 disposed along the outer swinging edge of the slat while the opposite longitudinal edge thereof may be rounded into a tubular shape tangentially disposed out of the flat face of the slat and made to terminate in trunnions overhanging the respective slat ends. When closed, the offset swinging edge of one slat may be made to substantially abut the outer surface of the adjoining tubular trunnion portion of the next adjacent slat in the fashion indicated by the lower closed section in Fig. 2; it will be further observed that the slats are kept relatively narrow to admit of opening them inward toward the radiator core face but without interference therewith.

The complementary demountable slat racks such as C_1 may be snugly inserted and nested within the oppositely disposed side pieces B_1 and B_2 of the supporting frame. One of the transverse slat edges may further be equipt with an actuating arm D_7 initially stamped out integrally therewith and then bent up in a normal relation to the slat face as indicated. Each such arm D_7 is provided with a perforated hole or reenforcing boss D_8 freely fulcrumed to a common tie-bar and operated thereby.

As shown in Fig. 11, my tie-bars such as E_1 or E_2 further embody certain novel constructive features in that either may be equipt with spaced integral tubular trunnions such as E_8', E_8'', etc., which tubes may be formed directly out of the side bar stock and adapted to fit into the aligned spaced holes D_8 of the respective slat arms D_7 to pivotally actuate the same. In order to hold said trunnioned tie-bars in place against lateral trunnion displacement, certain bearings of each tie-bar may be equipt with a headed tubular rivet as indicated in Fig. 11, or if preferred, all of the trunnions may be made in tubular fashion and some particular bearing or bearings of this type may have a headed bolt or split rivet inserted therethrough for lateral securing purposes.

All slats of each separate group are connected together into a unit section for the purpose of opening or closing the upper and lower slat sections independently of each other. If desired, both slat sections may

also be operated simultaneously from a single actuating cord or cable A_3 and to this end, the slats D_1, D_1', etc., making up the upper section, are connected together through the upper tie-bar E_1 which imparts a common pivotal movement to all such slats about their respective trunnions and cause them to be held in any desired fixed pivotal position. In a like manner, the slats D_2, D_2', etc., comprising the lower section, are connected together through a separate lower tie-bar E_2 which similarly actuates in unison all the slats D_2, D_2', etc. The adjacent end portions of the respective tie-bars are made to overlap for co-operative coupling purposes. It will be observed that said tie-bars are arranged in a substantially aligned tandem relation and that the adjacent ends of the bars proper are kept sufficiently spaced to allow of independent movement without interference between these straight bar portions when oppositely rocked into either of their respective extreme positions. One of these tie-bars carries an offset hook-ended extension member such as E_3 adapted to span or bridge the adjacent end of the complementary bar and maintain a slidable overlapping relation with respect to said other bar end, and the indicated slip type of coupling is preferably disposed between said overlapping bar portions.

Accordingly, the lower portion of the upper tie-bar E_1 has been outwardly offset at E_3'' and preferably fashioned into a depending trip arm E_3. The extremity of this arm may be bent inwardly into the grab hook of which the short upturned hook end is in the present disclosure also utilized as a drift piece E_3'. The lower tie-bar E_2 is on the other hand extended upwardly with its outer face arranged to ride alongside the overhung free edge of said grab hook or drift piece E_3' as shown, with the upper extremity of said bar E_2 bent outwardly to constitute the lift hook E_2' and this may be coupled to the said grab hook to function as a detachable clutch-like member. In the adjusted slat positions applying to Figs. 2 and 3, all of the upper slats of the section D_1 have nearly reached their fully open position while the lower slat section still stands closed and is locked in this position by latch means as will appear presently; as a consequence, the grab hook E_3' will have been lowered with respect to its uppermost position shown by dotted lines in Fig. 4^A and this brings about limited freedom or slip action between the hooks E_2' and E_3' as measured by the gap distance "X". Should the lower slat section now be unlatched and allowed to open, this will cause the lift hook E_2' to come into engagement with the grab hook E_3' and take up said gap or play "X", whereupon the lower slat section becomes coupled to the upper slat section and may be carried back into closed position in unison therewith. When both shutter sections have reached their fully open position, the tie-bars E_1 and E_2 will then both assume their lowermost coupled positions as indicated in Fig. 4^B.

In the present disclosure, the upper end portion of the lower tie-bar E_2 is further equipt with a tripping latch or releasing device comprising two interlocking members of which one such is made to move in unison with one of the tie-bars while the other member may be fixedly mounted upon a suitable frame portion. As herein exemplified, a beveled catch member E_4 may either be secured to or struck up from said bar E_2 and said catch may be provided with an inclined side face E_4'' arranged with a bottom toe face having a protrusive knife edge or locking abutment E_4' said toe being preferably so placed that when the grab hook E_3' assumes its lowermost position, it will not reach said locking edge.

Cooperating with said toe knife edge is a latch spring E_5 or its equivalent which in the present instance is shown as fashioned from resilient flat stock of which one end portion may be secured to the stationary rivet post C_3 and is made removable with the slat rack C_1, while the other latch spring end may be shaped up into an overhanging locking trigger E_5' which is sprung outwardly from said rack and adapted to exert a side thrust against the tie-bar member E_2. The disposition of said trigger is preferably such that it will automatically drop under the knife edge E_4' whenever the tie-bar E_2 reaches its uppermost position, that is to say every time the lower slat section D_2 is brought into substantially closed position. This condition is represented in Figs. 2 and 4^A and it will be seen that the trigger E_5' is now interlocked with the knife edge E_4' and that said lower slat section cannot again be opened until this latched engagement has been released or tripped, it being apparent that the elements E_4' and E_5' together constitute a latch mechanism.

In the present improvements, such disengagement of my latch or locking device is preferably accomplished by the relative actuating displacement set up by movement on part of the upper tie-bar E_1 while the lower tie-bar E_2 is latched or locked in place. This in turn, causes the short drift piece E_3' to move toward or away from the engaged trigger E_5'; in order that said trigger may be more readily withdrawn out of locked engagement from the knife edge, two complementary wedge faces may be resorted to, namely E_4'' of the latch and E_5'' of the latch spring, which are set to converge toward a common point for the purpose of forming a unitary wedge element into which the drift piece E_3' is adapted to enter and such coöp-

erating wedge elements in turn constitute my latch tripping device. As a result, said wedge action will serve to release said latch trigger device whenever the upper slat section D_1 is allowed to approach its fully open position while the bottom slat section D_2 still remains standing in closed position.

For the purpose of imparting an automatic opening to the released lower slat section D_2, its tie-bar E_2 is preferably provided with an overhung pin E_2'' adapted to engage a hook end of the helical spring E_6 or other suitable resilient tensioning means, while the other end of this spring may be attached to the fixed post C_1', preferably riveted into the inserted slat rack C_1 and also made removable therewith. Said spring may be initially stretched between said spaced pins E_2'' and C_1' and made to exert a substantial opening tendency on part of all the shutters making up the lowermost slat section. In a similar manner, the upper tie-bar E_1 is equipt with a separate spring E_7 of which one end is secured to the stanchion E_1' while the other spring end may be fastened to the overhung rack post C_3 as shown to constitute tension means urging this upper set of slats into open position.

Attached to the upper end of the tie-bar E_1 through the stanchion E_1' or otherwise, is a flexible cable A_3 or other suitable actuating means which extends upwardly and runs over the guide pulley C_4, the latter being preferably secured to one of the racks by means of the bracket C_5 as shown in Fig. 2 and made removable therewith. Said cable A_3 may then be carried laterally and run back to the vehicle instrument board A_4 through an adjustable turn buckle A_3' in the manner indicated in Fig. 1, which leaves the free end of said cable conveniently operable from the driver's seat, through the use of my distant control devices.

As detailed in Figs. 7 and 8, such distant shutter control device preferably comprises a stamped forked clamp portion having spaced jaws F_1 and F_2 adapted to straddle said board A_4 and secured thereto by means of a lock screw F_2' or the like. Said clamp may further be equipt with two similarly spaced depending lugs F_3 and F_4 which may be tied together in any suitable manner but preferably by a web or body plate F_5. To the underside of said plate is secured a fulcrum pin F_6 and mounted thereon is a bell-crank type of control lever F_7 of which the longer arm F_7'' is provided with an aperture into which the free end of the cable A_3 may be secured as indicated. Said fulcrum is preferably offset with respect to the longitudinal center line of the body plate F_5 and for the purpose of selectively rocking the bell-crank, its arm F_7'' may be swivelly engaged by a centrally disposed adjusting screw F_8. The threaded shank of this wing screw is preferably made to turn through a suitable aperture F_4' formed in the depending clamp lug F_4; said screw threads are adapted to engage with the upstanding leg of an L shaped swivel link F_9 while the other link leg is pivotally secured upon the longer lever arm F_7'' by the pin F_9', this pin being offset from the fulcrum F_6 and positioned to align with the shank F_8' of the thumb screw F_8 as shown. The extended free end of the said screw shank thrusts against and is adapted to turn upon the oppositely disposed clamp lug F_3 as indicated in Fig. 7.

When the thumb screw F_8 is adjustably set against cable tension, this will move the upstanding leg of the link F_9 away from said lug F_3 and ultimately turn the bell-crank lever F_7 about its fulcrum F_6 into the extreme dotted position denoted as "Y" in Fig. 8. Conversely, by unscrewing the adjusting member F_8, the lever F_7'' may be brought into its opposite extreme position denoted as Z. It will be obvious that such manipulation of the screw F_8 adjustably turns the pivoted bell-crank and thus exerts a sufficiently strong take-up pull upon the cable A_3 to lift the top end of the tie-bar E_1 and thereby open the upper slat section against the resistance of its relatively stiff spring E_7; on the other hand when the lever is allowed to recede, said stiff spring will cause said shutter slats to close with certainty.

It is preferred to separately maintain a sufficiently strong and vigorous closing tension upon each of the tie-bars E_1 and E_2 in order to be able to hold the slats in any desired adjusted position against high wind disturbances or the like. The mechanical advantage gained by my screw adjusting means not only allows of making the required adjustment with ease, but serves to impart a delicate vernier-like control that accurately sets the shutters in any desired position, all without being obliged to resort to step-wise or similar coarse slat regulation. It may be further pointed out that as applied to the described linked grouping of plural slats into sectional units, my adjusting screw F_8 by actuating the intermediary cable A_3 through said multiplying lever F_7 does not need to make an inordinate number of turns to effect successive full slat opening from their closed position, such as would otherwise be required were each individual slat opened in successive order.

For the purpose of visually indicating or registering the adjusted slat position of my shutter front at the distant instrument board control as used in connection with my improved screw devices, I provide for a dial plate F_{10} preferably embodying a sector-like shape as shown in Fig. 9. This plate may be radially mounted with respect to the adjusting screw F_8 and fixedly secured to trim the outer face of the aligned jaw and lug

members F_1 and F_4. Furthermore, the dial may serve as a name plate and may be graduated with suitable indices to designate the corresponding slat adjustments, the pointer F_{11} being used to cooperate with said plate and indicate the prevailing slat setting. My pointer actuating mechanism is such that the indicator oscillates through a single stroke or swing to maintain slat registry while the adjusting screw F_8 is permitted to make more than one turn in moving the shutters between their open and closed positions.

Said pointer is preferably interlocked to respond to the swing of the control lever F_7 and in the present instance, such coordinated movement is carried out by means of a rack and pinion mechanism. The rack F_{12} may be transversely disposed with respect to the axis of the adjusting screw F_8 and mounted in any suitable manner to slide along the bottom face of the body plate F_5. A bored pinion F_{13} adapted to freely surround the shank of said screw, is provided with an extension sleeve-like bearing member F_{13}' that projects through and is rotatably mounted in the lug aperture F_4' to allow of independent movement between these telescoped parts. The pointer F_{11} is secured to the free end of said pinion extension and adapted to oscillate as a fulcrum thereon. One end of said rack F_{12} is provided with a rack slot F_{12}' adapted to engage the rounded knob-like extremity of the short bell-crank arm F_7' and reciprocate said rack in unison therewith. Hence any rocking of the lever F_7 in turn swings the pointer F_{11} into an indicating position that correctly registers the adjusted setting of the upper shutter slats and allows of unrestrictedly turning the adjusting screw without sacrificing the desired visable registry at the driver's seat of prevailing slat position. The pointer not only positively responds to the setting of the upper shutter section, but serves a further novel purpose in that the operator is thereby enabled to avoid unintentional opening of the lower shutter section which latter opening is not intended to occur until after the pointer has approached a predetermined dial position preferably lying adjacent to and ahead of extreme opening travel of the pointer.

It is further pointed out that a stop nut F_8'' may be provided to protect the rack and pinion against any undue binding action on part of the upstanding link member F_9. Said stop unit is preferably jammed against a shoulder formed at one threaded end of the shank F_8' and is mounted intermediate the pinion F_{13} and the upstanding link leg to serve as a stop member when the lever F_7 is swung into its extreme position designated "Y".

Having described the constructive features underlying my shutter actuating devices, the manner in which they are intended to function may be traced as follows:

Assuming that for the time being the shutters are adjustably set into the relation indicated by Fig. 2, the upper slat section D_1 will then have been almost but not entirely opened; the tie-bar of the lower slat section D_2 will still be standing in locked engagement with the latch trigger E_5' which prevents the spring C_6 from automatically throwing open the lower shutters. It will further be apparent that the pointer will accordingly register intermediate its ¾ and full open dial position and the transverse drift piece E_3' will also have started to enter between the beveled latch face E_4'' and its complementary wedge face E_5''. When therefore, the adjusting screw F_8 is still further turned to bring the upper slat section into extreme open position, this will cause said drift piece to complete its descent and finally force the latch trigger E_5' out of engagement with the knife edge E_4', whereupon the lower slat section becomes released and this in turn allows the spring E_6 to unobstructedly act upon said tripped lower slat section and throw the same into full open position. As a consequence, the lift hook E_2' will drop into engagement with the grab-hook E_3' and the knife edge E_4' will fall below the trigger E_5', thus allowing both slat sections to assume their full open positions.

Should it now be desired to close both of these slat sections and adjustably actuate all of the shutters in unison, this may be accomplished by manipulating the adjusting thumb screw F_8 so as to draw the pointer back toward its "shut" dial position. During this operation, the grab-hook remains engaged with said lift hook, and accordingly the upper tie-bar is made to pick up the lower tie-bar and simultaneously fully close both slat sections against the resisting pull exerted by the common cable A_3 which is then obliged to overcome the combined tension of both tie-bar springs E_6 and E_7 When the lower slat section approaches its fully closed position, the rising beveled latch face E_4'' will push the trigger E_5' away from the tie-bar E_2; after the full closed slat position has been reached, the knife edge E_4' will have been raised sufficiently to allow the trigger to fall into engagement therewith and again positively lock the lower shutters in closed position.

It will be apparent therefore that by means of my improved shutter actuating devices, I am enabled to selectively adjust the upper slats into any predetermined position from my distant instrument board control while the detached lower slat section remains inoperate and is locked in place against unintentional opening because of

road jars or like causes. Should it however be deemed advisable to augment such limited shutter opening, the discribed latch mechanism may readily be tripped or released by moving said indicator pointer past its ¾th marking which will allow the lower section to be thrown into open position by action of the spring E_6 and thus conveniently attain the full benefit of maximum air flow through the shutters when so desired. Furthermore, by thereupon drawing the slat sections back toward their closed position, all the shutters are caused to move in synchronism and may at will be given a common setting in the conventional manner. In case of extremely cold weather conditions, it will naturally be preferred to keep the lower slat section locked in place and work only with the upper slat section. A distinctive feature of the described mode of operation lies in successively opening the respective shutter sections and then during the closing movement keeping all of the slats thereof in substantial parallelism or synchronized relation, thus simultaneously bringing all of said sections into a common partially or fully closed slat position instead of having said sections reach their closed slat position in successive order as is the conventional practice with shutters of the interconnected sectional type.

In conjunction with the described shutter devices, it is further preferred to provide effective means for taking up any undue wear on part of the slat trunnions and otherwise to facilitate holding the disengaged lower slat section in closed position against any excessive car vibration or jar. Suitable devices of this kind have been explicitly set forth in my copending application hereinbefore identified, and they may consist in the use of a continuous strip of flexible material extending transversely across the respective trunnion ends to resiliently bear thereagainst in a follow-up fashion.

It will be understood that various changes in the details and arrangement of my device may be resorted to, such for instance as utilizing the more conventional control means for operating my shutters from the vehicle seat, or the dividing of the plural slats into more than two separate sections and the like, all without departing from the spirit and scope of my invention heretofore described and more particularly pointed out in the appended claims.

I claim—

1. In a vehicle radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of parallelly disposed shutter slats pivotally mounted therein which slats are divided into distinct groups of several slats each constituting separate sectional units, independent tie-bar means interconnecting the respective slats comprised in each such group, means for simultaneously closing all of said shutter sections, said means comprising coupling members of the slip type acting between said tie bars adapted when disengaged to render a sectional unit inoperative while allowing the remaining sectional unit to operate normally between its respective closed and partially open slat position, and manipulating means adapted to complete the opening of the aforesaid remaining unit and bring about engagement of the said coupling members, whereupon said one unit is again made to close in synchronism with said remaining unit.

2. In a vehicle radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of parallelly disposed shutter slats pivotally mounted therein which slats are divided into distinct groups of several slats each constituting separate sectional units, independent tie-bar means interconnecting the respective slats comprised in each such group, means for simultaneously closing all of said shutter sections, said means comprising coupling members of the slip type acting between said tie-bars adapted when disengaged to render a sectional unit inoperative while allowing the remaining sectional unit to operate normally between its respective closed and partially open slat position, manipulating means adapted to complete the opening of the aforesaid remaining unit and bring about engagement of the said coupling members, whereupon said one unit is again made to close in synchronism with said remaining unit, and latch means for releasably locking said inoperative unit when brought into its closed shutter position.

3. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein and adapted to move between open and closed positions, said slats being divided into distinct groups of several slats each to constitute separate sectional units, independent tie-bar means for interconnecting the respective slats comprised in each such sectional unit, a locking device including a trigger cooperating with a knife edge member on one of said tie-bars to latch said tie-bar in closed slat position, spring means exerting an opening tension upon said one tie-bar, and means for releasing said locking device.

4. In a vehicle radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein which slats are divided into a number of distinct groups of several slats each to constitute separate sectional units, independent tie-bar means for interconnecting the respective

slats comprised in each such sectional unit, means for actuating said tie-bars, means including a latch device adapted to releasably lock one of said units in closed position, and control means operable from the vehicle seat serving to release said latch device.

5. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein which slats are divided into a number of distinct groups of several slats each to constitute separate sectional units, independent tie-bar means for interconnecting the respective slats comprised in each such sectional unit, a latch device adapted to interlock one of said tie-bars with the frame, and control means serving to release said latch device.

6. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein which slats are divided into two distinct groups of several slats each to constitute separate upper and lower sectional units, independent spring controlled tie-bar means interconnecting the respective slats comprised in each such sectional unit, actuating means connected to the upper one of said bars, which bars are interconnected through coupling members adapted to permit the upper unit to continue operating while the lower unit remains inoperative, latch means for holding said inoperative unit in fixed position, and distant control means adapted to release said latch at will.

7. In a radiator shutter adapted to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into two groups comprising several slats each constituting separate upper and lower sectional units, means for successively opening said units, including a reciprocative tie-bar for each of said units of which one such bar is provided with an extended portion slidably disposed in overlapping relation to the adjacent end of the other bar, cooperating means between the respective overlapping end portions of said bars arranged to engage when the slats of both units are similarly positioned but to separate and provide for a gap therebetween when the upper unit is opened in advance of the lower unit.

8. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein and adapted to move between open and closed positions, said slats being divided into two groups comprising several slats each constituting separate upper and lower sectional units, independent tie-bar means for each of said units, tension means urging said slat units into open position, actuating means adapted to adjust the setting of said upper unit in any desired position against the aforesaid tension means, and means for detachably interconnecting said tie-bars to close both units in unison and allow of opening the upper unit in advance of said lower unit.

9. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein and adapted to move between open and closed positions, said slats being divided into two groups comprising several slats each constituting separate upper and lower sectional units, independent tie-bar means for each of said units, tension means urging each of said slat units into open position, actuating means adapted to adjust the setting of said upper unit in any desired position against the aforesaid tension means, means for detachably interconnecting said tie-bars to close both units in unison, and co-operating means including a latch device adapted to hold the lower unit in closed slat position until the upper unit approaches its open slat position, whereupon further movement of the upper tie-rod serves to release said latch device and subsequently permits the aforesaid tension means to open said lower unit.

10. In a vehicle radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein and adapted to move between open and closed positions, said slats being divided into two groups comprising several slats each constituting separate upper and lower sectional units, independent tie-bar means for each of said units which bars are equipt with an intermediary clutch member adapted to couple and uncouple said bars, actuating means operatively connected to one of said tie-bars and adapted to simultaneously adjust the setting of all of the slats, distant control means operable from the vehicle seat adapted to bring about disengagement of said units, and means to lock the lower unit in its closed position while the upper unit remains operative.

11. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein and adapted to move between open and closed positions, said slats being divided into two groups comprising several slats each constituting separate upper and lower sectional units, independent tie-bar means for each of said units, actuating means including cooperative clutch-like means disposed between said tie-bars adapted to adjustably set all of the slats into one and the same position, and

control means for disengaging the lower unit from the upper unit to allow of independently actuating the latter.

12. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein and adapted to move between open and closed positions, said slats being divided into two groups comprising several slats each constituting separate upper and lower sectional units, independent tie-bar means for each of said units, actuating means operatively connected to the upper tie-bar and serving to close the lower unit through the medium of said upper tie-bars, distant control means operable from the vehicle seat adapted to successively open said units, and a latch device associated with one of said units adapted to lock the same in closed position until the other unit has been partially opened.

13. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member comprising a pair of spaced side pieces having an apertured slat rack secured to each of the respective side pieces, a plurality of parallelly mounted shutter slats of which the respective ends are pivotally mounted in said rack apertures, said slats being divided into two groups comprising several slats each to constitute separate upper and lower sectional units, independent tie-bar means for each of said units, means for successively opening said slat sections and for closing both units in unison, a latch device having a locking edge associated with the lower tie-bar, and a latch member secured to one of said racks and adapted to interlock with said edge when the lower tie-bar is brought into substantially closed shutter position.

14. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member comprising a pair of spaced side pieces having apertures therein; a plurality of parallelly mounted shutters or slats of which the respective ends are pivotally mounted in said apertures, said slats being divided into two groups comprising several slats each constituting separate upper and lower sectional units, independent tie-bar means for each of said units, means for moving the aforesaid slat sections between their respective open and closed positions, a latch device provided with a locking edge associated with the lower tie-bar, a latch member mounted upon said frame and adapted to interlock with said edge whenever the lower unit is brought into substantially closed shutter position, and means movable with the upper tie-bar serving to release the aforesaid latched unit whenever said tie-bars are moved toward each other into predetermined relation.

15. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member comprising a pair of spaced side pieces, an apertured slat rack demountably secured to each of the respective side pieces, a plurality of shutter slats of which the respective ends are pivotally mounted in said rack aperture, said slats being divided into two groups comprising several slats each constituting separate upper and lower sectional units, independent tie-bar means for each of said units, means for moving the aforesaid slat sections between their respective open and closed positions, a latch device provided with a locking edge associated with the lower tie-bar, a latch member secured to one of said racks and adapted to interlock with said edge whenever the lower tie-bar is brought into substantially closed shutter position, and means movable with the upper tie-bar serving to release said latch member when said tie-bars are moved toward each other into predetermined relations, said plural slats and the tie-bars together with the aforesaid latching mechanism being made removable with said demountable racks.

16. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into two distinct groups of several slats each constituting separate sectional units, independent spring controlled tie-bar means for interconnecting the respective slats comprised in each such sectional unit, intermediary clutch members adapted to couple and uncouple said bars to render one of said units inoperative while the other remains operative, cable means attached to one of said bars and adapted to open said operative unit against spring tension, latch means for releasably locking said inoperative unit into closed shutter position, a distant control device operatively connected with said cable and adapted to selectively set said operative sectional unit into desired slat opening, a pointer interconnected to swing in unison with and register said slat openings, and means for releasing said latch whenever said pointer approaches a predetermined position.

17. In a shutter for an automobile radiator front arranged to be adjustably controlled from the driver's seat, a frame member provided with a plurality of shutter slats pivotally mounted therein and adapted to move between open and closed positions, and slats being divided into two groups constituting separate sectional units, independent tie-bars interconnecting the respective slats comprised in each such unit and which bars are equipt with intermediary coupling members adapted to allow of opening one unit in advance of the other, a

distant control device including a lever and a cooperating self-locking adjusting screw located rearwardly of the radiator in juxtaposition to the driver's seat, said lever being operatively connected with said shutter and adapted to selectively set the first opened of said slat units, a pointer means adapted to swing in unison with said lever and indicate the prevailing slat setting, and a dial plate indexed to register the approximate position where further pointer movement will result in opening the other of said slat units.

18. In a shutter apparatus adapted to control airflow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into groups of several slats each, independent tie-bars interconnecting the respective slats comprised in each such group and which bars are equipt with intermediary coupling means adapted to allow of opening one such group in advance of another, a self-locking screw means for selectively setting said slats, said screw turning through more than a single revolution between extreme slat positions, and an indexed pointer means oscillated by said screw adapted to register the prevailing slat position of the first opened shutter group and signify where the next succeeding shutter group is intended to open.

19. In a shutter apparatus for an automobile radiator adapted to control airflow from the driver's seat, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being adapted to be opened successively, a self-locking screw means located rearward of the radiator in juxtaposition to the driver's seat and operatively connected by cable means to adjust the first opened slat from closed into open position by turning the screw more than one revolution, and a pivotally mounted indexed pointer means geared to rock in one and the same direction while turning the screw through the aforesaid plural revolutions, said pointer serving to register the prevailing slat position and signify where the next succeeding slat is intended to open.

20. In a shutter apparatus adapted to control airflow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into groups adapted to be opened successively, a self-locking screw means adapted to selectively set the slats, said screw means comprising a rockable lever provided with a swivel link and a cooperating screw adapted to turn through more than one revolution to move the lever from one into the other of its extreme rocking positions, and an indexed pointer means operatively interconnected with said lever to register the prevailing slat position of the first opened shutter group and serving to signify where the next succeeding shutter group is intended to open.

21. In a shutter apparatus for an automobile radiator adapted to control airflow from the driver's seat, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into groups adapted to be opened successively, means exerting an opening tension on certain of said slats, cable means reaching rearward of the radiator for manipulation from the driver's seat serving to actuate said slats and close the same against spring tension, a screw control device comprising a rockable lever operatively connected with the rear of said cable and a cooperating screw adapted to selectively rock the lever, and an indexed pointer means geared to rock in unison with said lever to register the prevailing slat position of the first opened shutter group and signify where the next succeeding shutter group is intended to open.

22. In a shutter apparatus for an automobile radiator adapted to control air flow from the driver's seat, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being adapted to open successively, cable means reaching rearwardly for manipulation from the driver's seat serving to actuate said slats between open and closed positions, a screw control device disposed within reach of said seat and comprising a rockable lever connected with the rear of said cable together with a cooperating link engaged by the screw for selectively setting the lever, said screw being adapted to make more than one turn to rock said lever from one into the other of its extreme positions, an index pointer means including a pinion-like member actuated by said screw, said pointer being rocked through in single stroke by the aforesaid plural screw turns to register the prevailing slat position of the first opened shutter slat and signify where the next succeeding shutter slat is intended to open, and stop nut means interposed between said link and the pinion for the purpose specified.

23. In a radiator shutter adapted to adjustably control airflow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into groups, and control means of the slip type adapted to open said groups in successive order and to automatically pick up and normally close said groups

in substantial unison, the slats in all of said groups being maintained in substantial coincident parallel relation during their entire closing movement.

24. In a radiator shutter adapted to adjustably control airflow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into groups, and means for successively opening said groups and for closing them in substantial unison, said means comprising a coupling of the slip type.

25. In a radiator shutter adapted to adjustably control airflow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into groups, and means comprising a coupling of the slip type for successively opening said groups and for fully closing them in substantial unison, and a latch means which holds one of said groups closed while the other group remains inoperative.

26. In a radiator shutter adapted to adjustably control airflow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into groups, means comprising a coupling of the slip type for successively opening said groups and for closing them in substantial unison, and a latch which holds one of said groups closed, the aforesaid coupling being adapted to release said latch and allow said one group to open subsequent to the opening of another group of slats.

27. In a radiator shutter adapted to control air-flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into two groups comprising several slats each constituting sectional units, separate complementary tie-bar means for each of said units, said complementary bars being arranged in tandem and the adjacent ends thereof being kept spaced to rock in a reciprocative relation about their respective slat pivots, and centralized control means for normally opening said units in fixed successive order from their respective closed slat positions, said means including an intermediary extension element reciprocated by one of said tie-bars and maintained in an overlapping bridged relation with respect to the adjacent end portion of the complementary tie-bar, there being a coupling means of the slip type provided to interlock said tie-bars and limit the separating movement thereof while the slats are being closed but allowing of unobstructedly augmenting said overlapping relation of said bridging element when one of said units is opened in advance of the other.

28. In a radiator shutter adapted to control air-flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein to move between open and closed positions, said slats being divided into two groups comprising several slats each constituting sectional units, separate complimentary tie-bar means for each of said units, said complementary bars being arranged in tandem and the adjacent ends thereof being kept spaced to rock in a reciprocative relation about their respective slat pivots, spring means for each of the sections urging the respective slat units into open position, and centralized control means for bringing said units into closed position against spring tension and for allowing said spring means to successively return said units into their respective open positions in fixed sequence, said control means including an intermediary extension element reciprocated by one of said tie-bars and maintained in overlapping bridged relation with respect to the adjacent end portion of the complementary tie-bar, there being provided a releasable coupling means of the slip type for interlocking and limiting relative movement between said tie-bars during the closing of the slat units while upon release of said coupled tie-bars, one of the spring means is allowed to open its sectional unit in advance of the other unit.

29. In a shutter apparatus for an automobile radiator adapted to control airflow therethrough, a frame member provided with a plurality of parallel shutter slats pivotally mounted therein to rock between open and closed positions, said slats being divided into two groups comprising several consecutive slats each, constituting separate sectional units, tie-bar means for each of said units of which the adjacent bar ends are kept spaced apart and interconnected by tie-means of the slip type to allow of opening one such unit in advance of the other, and shutter manipulating means including indicating means which latter means is adapted to register the prevailing slat position of the first opened unit and is provided with a critical marking serving to visualize where further manipulation is intended to open the other of said units, the aforesaid means being mounted rearward of the radiator in juxtaposition to the driver's seat and having an operative connection with one of said tie-bars.

30. In a shutter apparatus for an automobile radiator adapted to control airflow therethrough, a frame member provided with a plurality of parallel shutter slats pivotally mounted therein to rock between open and closed positions, said slats being

divided into two groups comprising several consecutive slats each, constituting separate sectional units, tie-bar means for each of said units of which the adjacent bar ends are kept spaced apart and interconnected by tie-means of the slip type to allow of opening one such unit in advance of the other, latch means adapted to hold closed one of said units while the other is being opened in advance thereof, and manipulative control means operatively connected with said shutter units and which means includes a device for registering the prevailing slat position of the first opened unit, said device being provided with a marking to visualize a critical control point beyond which further manipulation of said control results in opening the other of said units.

31. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein, spring controlled tie-bar means serving to operate said slats in unison, cable means adapted to actuate said bar and close said slats against spring tension, and a distant control device comprising a body member provided with a fulcrumed lever of which the operative end is connected with said cable, a swivel link pivoted to said lever intermediate the ends thereof, and means including a self-locking adjusting screw adapted to cooperate with said link for selectively setting said lever and to correspondingly position said slats.

32. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein, spring controlled tie-bar means serving to operate said slats in unison, cable means adapted to actuate said bar and close said slats against spring tension, a distant control device comprising a body member equipt with spaced lugs of which one such lug is apertured, a lever disposed between said lugs and fulcrumed to said body while the operative lever end is connected to said cable, an L shaped swivel link of which one leg is pivoted to the lever intermediate its fulcrum and said operative lever end while the other link leg is provided with a threaded hole, and an adjusting screw having a threaded shank extending through both said apertured lug and said threaded link hole to thrust against the other of said lugs, said screw serving to swing said lever about its pivot and selectively fix the setting of said slats between their open and closed position.

33. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein, spring controlled tie-bar means serving to operate said slats in unison, cable means adapted to actuate said bar and close said slats against spring tension, and a distant control device comprising a fulcrumed bell-crank lever of which one arm is operatively connected to said cable, means including an adjusting screw adapted to selectively set said lever for any desired slat opening, a pivotally mounted pointer means equipt with a pinion, said pointer being adapted to visually indicate adjusted slat positions, and a rack actuated by the other arm of said bell-crank serving to rotate said pinion and cause the pointer to register lever movements by said pointer.

34. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein, spring controlled tie-bar means serving to operate said slats in unison, cable means adapted to actuate said bar and close said slats against spring tension, a distant control device comprising an apertured lug and a fulcrumed bell-crank lever having one arm thereof connected to said cable, an adjusting screw entered through the lug aperture and adapted to swivelly engage said one lever arm, a bored pinion provided with an extension sleeve telescoping the adjusting screw shank, a pointer means secured to said pinion sleeve and serving to register the prevailing slat settings, and rack means engaging said pinion, said rack being disposed transversely of the screw axis and adapted to be actuated by the other arm of the bell-crank lever.

35. In a radiator shutter arranged to adjustably control air flow therethrough, a frame member provided with a plurality of shutter slats pivotally mounted therein, spring controlled tie-bar means serving to operate said slats in unison, cable means adapted to actuate said bar and close said slats against spring tension, a distant control device comprising spaced lugs of which one such lug is apertured, a fulcrumed bell-crank lever disposed between said lugs having one arm thereof connected to said cable, a swivel link pivoted to said one lever arm, an adjusting screw entered through said lug aperture and adapted to engage said swivel link, a bored pinion mounted to telescope the shank of said screw, rack means meshing with the pinion, said rack being actuated by the other arm of the bell-crank lever, pointer means serving to register pinion movements, and a stop nut for said screw, said nut being interposed between link and the pinion.

In testimony whereof, I have herewith set my hand this 18th day of June, 1926.

DANIEL M. WINANS.

CERTIFICATE OF CORRECTION.

Patent No. 1,660,146. Granted February 21, 1928, to

DANIEL M. WINANS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 8, line 124, claim 17, for the word "and" read "said"; page 10, lines 25 and 26, claim 25, for the word "inoperative" read "operative"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of May, A. D. 1928.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)