This invention relates generally to devices for controlling the flow in air circulatory systems and more particularly is concerned with provision of a novel structure for an adjustable register device whereby air may be diverted from a main air stream and directed into a chosen area.

Register devices are used to control the flow in air circulatory systems designed to heat and/or cool various areas such as homes, offices and the like and generally comprise means whereby a certain quantity of air is diverted through directional means into the area to be serviced. Such diversion means are placed in the path of a main air stream while the directional means are disposed in a framework set into a conduit between the duct carrying the main air stream and the room area to be serviced. Herebefore devices of this character have been generally bulky in configuration, the framework and louvers often protruding into the room area from the plates of the wall opening, while the diversonary means extend so far into the air stream as to often decrease the air flow unnecessarily elsewhere in the system. In addition, substantial quantities of energy are wasted out of the main air stream because of the amount used up heating or cooling the structure which must be set therein.

Prior structures of the character described comprised an assemblage of numerous small component parts giving rise to considerable difficulty in assembling same because of their size, number and the particular manner in which certain of these components required installation. Complicated control means, levers, and the like were required to control the extension of baffle or shutter members usually comprising the diversonary means referred to. For adequate adjustability, such means required accurate bearing juntures and highly accurate assembly. The louver members which comprise the directional means utilized, were elongate flat strips of metal inserted vertically in the mouth of the duct, spaced from each other, and secured either fixedly at a chosen angle to a frame member or journaled in said frame member for individual adjustment to said chosen angle. Because of these factors, the manufacturing process required individual insertion of each slat and possibly necessitated the provision of intricate linkages for adjusting the angles thereof both for uniformity and direction of the air flow. Such linkages, both for the shutter or baffle means and the directional means or louvers have been complex and herebefore required a large framing enclosure for said register. Where space is a premium, as for example in vehicles, such prior registers could not be efficient.

It is a primary object of this invention to provide a structure for an adjustable register of the character described wherein all of the disadvantages enumerated above are substantially eliminated. The structure herein provided is relatively simple to fabricate, requires a minimum of moving parts, adapts easily to ready assembly, and is particularly characterized by its relatively flat appearance.

Another object of the invention is to provide a construction for an air register of the character described which comprises a cover plate, a unitary housing and louvre structure, shutter means associated therewith, actuating means for said shutter means, and linkage means connecting said shutter means with said actuating means whereby actuation of one of the shutters will result in like actuation of the other shutter members.

Another object of the invention is the provision of an adjustable air register which includes means for attachment to a wall, of a housing, louvre means associated with said housing, a frame and louvers formed as a unitary body and secured permanently to said means for attachment to a wall opening, shutter means operatively associated with said housing, and actuating means operatively installed within said unitary body whereby the extension of said shutter means into the air stream may be controlled and adjusted from the exterior of said register.

It is a further object of the invention to provide said shutter means and actuator means with novel linkage means whereby not only may at least one pair of shutters be operated simultaneously but wherein said linkage means also comprises stop means whereby the shutters are prevented from moving further than their position of maximum opening.

Another object of the invention is the provision in an air register of the character described of a housing with louvers therein capable of being formed from a single metal blank whereby the resulting louvers are integral with said housing and fixedly positioned at chosen like angles relative the opening in said housing.

Still another object of the invention is to provide a novel construction for an air register for air circulatory systems wherein there are a minimum of separate component parts and which is also characterized by relatively simple pivot means for the shutters and for the linkage therebetween.

Still other objects and advantages of the invention will occur to those skilled in the art as a description of a preferred embodiment thereof is set forth hereinafter in detail in compliance with the patent statutes. It is understood that the choice of this embodiment is not to be held as a limitation to the scope of the invention and numerous variations in size, dimensions, and the like may be made by the skilled artisan without departing from the scope and tenor of my invention.

Referring now to the drawings:

FIG. 1 is a front elevational view of an air register embodying my invention and the shutters therein in a closed position shown operationally disposed in a wall opening.

FIG. 2 is a sectional view taken through the plane 2—2 of FIG. 1 and in the direction indicated by the arrows, but with the shutters in an open position and with end portions broken away to show interior construction.

FIG. 3 is a sectional view taken along line 3—3 of FIG. 1.

FIG. 4 is a detail of FIG. 3 showing the shutter linkage when shutters are open.

FIG. 5 is an end elevational fragmentary view of the actuating means and linkage of FIG. 3 but in open shutter position.

FIG. 6 is a section taken along lines 6—6 of FIG. 5 in the direction indicated.

FIG. 7 is a section taken along the lines 7—7 of FIG. 4 and in the direction indicated.

FIG. 8 is a fragmentary section taken along the lines 8—8 of FIG. 5 in the direction indicated.

FIG. 9 is a diagrammatic side sectional view of a wall containing an air stream duct having the novel register control associated therewith and showing the operation of said register in the air circulatory system.

FIG. 10 is a fragmentary perspective view of the blank shown in FIG. 11 after forming.

FIG. 11 is a partially developed top plan view of the blank from which the unitary housing structure is made, said blank shown after cutting but prior to forming.
The invention is generally characterized by the provision of an adjustable register device which includes a housing 12 for containing a register 10 having a plurality of angled louvers integral therewith. Said housing has at least one pair of shutter or baffle members journaled for limited rotation therein and located to be able to close off one end of said housing. Actuating means are provided including a linkage between said shutter members and actuating means whereby the area of said shutter can be opened or closed simultaneously from exterior of said device.

Said linkage has stop means for limiting pivotal movement of said shutter members so that the actuating means will always be accessible from exterior of the device.

Referring now to FIG. 1, the register embodying the invention is designated generally by the reference character 10 and is shown in operative position set into a wall 11 which may be part of any typical air circulatory system capable of either heating or cooling an area such as a room. The principal elements of the register 10 comprises generally a cover plate 12, a housing 14, actuating means 16 and shutter means 18.

The cover plate 12 comprises a relatively flat rectangular stamping preferably of sheet metal having a rectangular window 13 therein. Suitable openings 15 are provided in plate 12 for accommodating fasteners 17 for securing said cover plate to a wall 20. The marginal edges 21 of the plate 12 may be beveled and the slots 15 may be countersunk so as to preserve the relatively flat appearance of the register 10 as viewed from the room in which it is installed.

The housing 14 preferably is of integral construction and may be formed as by stamping, from a single sheet of metal as subsequently will be described. Said housing 14 is of substantially rectangular box-like configuration and has a front wall provided by a pair of laterally spaced apart coplanar members 22 and 23, a top wall 24, a bottom wall 25 substantially parallel to said top wall and a pair of substantially parallel side walls 26 and 27. A series of louvres 28 are disposed in equal spaced relation between said members 22 and 23 and integral therewith. Said louvre members are arranged in parallel planes between said members 22 and 23 and extend substantially the entire length of said members 22 and 23. Typically, the front wall of the housing is formed by the pair of flat walls 22 and 23 and the louvres 28 which are integral with said walls. All of the louvres are arranged at substantially the same angle relative to the plane of said walls 22 and 23.

The walls 24, 25, 26 and 27 of the housing 14 are integrally provided for a flat front wall and arranged substantially perpendicular thereto. Each of the side walls 26 and 27 has a bearing opening 31 for journauling of the shutters 18 between said side walls. The shutters 18 are provided by a pair of relatively flat sheet metal members 34 and 36 which are substantially identical. Each of said members has an arcuate, longitudinally extending strengthening rib 38 which protrudes beyond each of the opposite lateral edges of the member to provide a pair of journals 32 adapted to be seated in the oppositely aligned bearing openings 31. Each of said members 34 and 36 can be pivoted into a coplanar relationship one relative to the other for the purpose of closing off the rear end of the housing 12. Each of the shutter members has an integral tab 41 bent substantially perpendicular thereto and adjacent a corner thereof. Each shutter member also may have a second strengthening rib 42 extending substantially perpendicular thereto and adjacent a corner thereof. Secured to shutter member 36 which will be referred to as the actuating shutter, is the actuating means 46, said means being located within the housing and accessible through window 13. Said means 46 comprises a sheet metal member 45 formed with an arcuate flange 47 along an arcuate edge thereof and substantially perpendicular thereto. The arcuate flange 47 has a corrugated surface 48 along at least a portion of its length to provide friction grip means whereby the actuating means may be manually moved from the exterior of said housing 12. The straight edge of member 45 is adapted to ride over the arcuate flange 47 of the perpendicular tab member 49 integral therewith and adjacent one corner of member 45 and an additional tab member 51 spaced from said tab 49 and adjacent the opposite corner of said member 45. The member 45 is adapted to fit over the rib 38, said rib being accommodated within the housing 12. The tab 49 is rigidly secured to the shutter member 36 as by welding on one side of rib 38 while tab 51 has a portion thereof bearing against the shutter member 36 on the opposite side of the rib 38.

The tabs 41, each of the shutters 18 are provided with openings 57 and are linked by means 60 comprising a flat rectangular plate 52. Said plate 52 has a narrow flange member 54 integral therewith and substantially perpendicular thereto. Said plate 52 is also provided with openings 55 therein and the edges of said openings are provided with short integral cylindrical extensions 56 facing in the same direction as the flange 47 and each adapted to pass through openings 55 in the tab members 41 of the shutters 18. The cylindrical extensions 56 are adapted to be journaled in said openings 55 and then the edges of said extensions are bent so as to overlap the inner edges of the openings 55 thereby forming an arcuate bearing surface whereby both tabs may be simultaneously pivoted upon actuation of the means 16. The flange member 54 serves as a stop member to limit the movement of the shutters 18 preventing same from being opened past the point at which the planes of both shutters are parallel and where said planes are perpendicular to the vertical plane of the register 10. At this point, one edge of the tabs bears against the flange 54 thereby preventing movement past this point of maximum opening of the shutters. During the movement of the shutters 18, the linkage 60 moves in a direction whereby the said flange 54 remains always parallel to the vertical plane of the register 10. The surface planes of said shutters 18 remain parallel to each other, proceed from substantially coplanar positions when said shutters are closed, to spaced but parallel planes when the shutters are fully opened.

Spring washers 57 are placed between the journals 32 of the actuating shutter 36 and the bearing openings 31 of the side walls thereby assuring a firm axial engagement to enable any desired disposition of shutters frictionally to be maintained. Actuation of the plate 45 will cause the actuating shutter 36 to pivot on its journals 32 and cause the simultaneous pivoting of the second or follower shutter 34 by means of the linkage means 60. Thus, the shutters 34 and 36 are opened and/or closed in tandem. The shutters 18 are arranged so that their surface planes are parallel when closed, and that the edge of the actuating shutter 36 nearest the elongate rib 38 slightly overlaps the lower edge of the follower shutter 34, and the lower edge of the actuator shutter slightly overlaps the edge of the bottom wall 25 of the enclosure. Attention is now called to the FIG. 11 wherein is the blank member 70 of the one piece housing 14 shown at a stage in the manufacture thereof. A series of parallel evenly spaced U-shaped cuts 71 are made across the width of said register 10 and said member 70. The cut length thereof to the other end, the last cut being rectangular shaped with the legs of the U being parallel to each other forming opening 72. The blank 70 is then placed in a press and the louvre members 25 are formed by bending back the cut portions at the particular angle desired. The only connections exist between the louvres and the frame is the uncut portions 73. At the same time, said flanges 24 and 25 are bent back whereby they are extending rearwardly and perpendicular to said portion as walls 24 and 25. Side flanges 26 and 27 likewise bend so that this surface plane is perpendicular to that of portions 22 and 23; however, the flange 26 may be rearwardly bent at an angle not quite 90° whereby the
side edge 74 thereof is spaced a slight distance from the side edge of the top and bottom walls 24 and 25, permitting easier insertion of the extensions 32 of the shutters into bearing openings 31 of said walls. The spring washers 57 prevent the extensions from being axially displaced from their journeled positions.

In FIG. 9 the register device is shown as installed in a typical system including an air duct 80 which is set into a wall and separated by layers of wall board and plaster 20. The duct has an opening 81 defined by walls 82. The register 10 is secured in place in the wall 20 covering the opening. The air travels up the duct and is intercepted by the shutters 34 and 36 shown fully open and extending in the air path as indicated by the arrows. A portion of the air is diverted through the paths created by the shutters 34 and 36 with their surfaces parallel and spaced from each other by the linkage means 60 with which said shutters are pivotally associated. The diverted air passes through the register 10 and is directed in a circulatory pattern by the louvre members 28 disposed in the housing 14. Notice that the cover plate 12 is only slightly extended into the area serviced while the main body of the register 10 does not extend into the main air path. The amount of air in the area 100 therein and adapted for measurement is a window therein and adapted for measurement to a wall substantially flush with said wall and over an air duct opening, an integral housing fixedly secured to the undersurface of said cover plate member, said housing having a series of louvres integral therewith, at least one pair of shutters disposed within said housing and journeled for limited rotation therein, said actuating means also disposed within said housing whereby said shutters may be opened or closed from the exterior of said register device, each of said shutters comprising a flat rectangular relatively thin member having an arcuate rib formed therein along the length thereof parallel to one edge and spaced a short distance from said edge, extended portions integral with said rib and at both ends thereof, extended portions journeled in openings provided in said ends of the housing, a tab member integral with said shutter and disposed perpendicular to the surface thereof extending rearwardly relative said cover plate, said tab member located at a corner said edge of said shutter adjacent the corner thereof, and said shutters disposed whereby said tab members extend in the same plane, each of said tab members being provided with openings therein and linkage means engageable therewith whereby actuating of one shutter will simultaneously actuate the second shutter in like manner, said linkage means comprising a rectangular plate member, said member being provided with openings at each end thereof, and each opening having a cylindrical flange along its edge, said flange extending perpendicular to the flat surface of said plate member and adapted to be journeled for pivotal rotation in the openings formed in said tabs with their edges overlapping the inner surface of said tabs at said openings and stop means associated with said plate member to prevent said shutters from being moved further than their maximum open position, said stop means comprising an integral right angle narrow flange member extending from the elongate edge of said plate parallel to said front wall of said housing and facing inward from the edge thereof, said linkage plate member adapted to be moved in a direction whereby the edge flange thereof remains within its surface parallel to the undersurface of said cover plate member.

2. A register device for controlling air flow in an air circulatory system comprising a cover plate member having a window therein and adapted for measurement to a wall substantially flush with said wall and over an air duct opening, an integral housing fixedly secured to the undersurface of said cover plate member, said housing having a series of louvres integral therewith, at least one pair of shutters disposed within said housing and journeled for limited rotation therein, said actuating means also disposed within said housing whereby said shutters may be opened or closed from the exterior of said register device, each of said shutters comprising a flat rectangular relatively thin member having an arcuate rib formed therein along the length thereof parallel to one edge and spaced a short distance from said edge, extended portions integral with said rib and at both ends thereof, extended portions journeled in openings provided in said ends of the housing, a tab member integral with said shutter and disposed perpendicular to the surface thereof extending rearwardly relative said cover plate, said tab member located at a corner said edge of said shutter adjacent the corner thereof, and said shutters disposed whereby said tab members extend in the same plane, each of said tab members being provided with openings therein and linkage means are provided between said shutter members, said linkage means comprising a rectangular plate member, said member being provided with openings at each end thereof, and each opening having a cylindrical flange along its edge, said flange extending perpendicular to the surface of said plate member, said cylindrical flange being journeled for pivotal rotation in the openings formed in said tabs with their edges overlapping the inner surface of said tabs at said openings, and stop means associated with said plate member engageable with said tabs to prevent said shutters from being moved further than their maximum open position.

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