June 10, 1958 W. C. DE ROO 2,837,991

DAMPER CONSTRUCTION FOR AIR OUTLETS

Filed March 30. 1954 3 Sheets-Sheet 1

FIG. 1

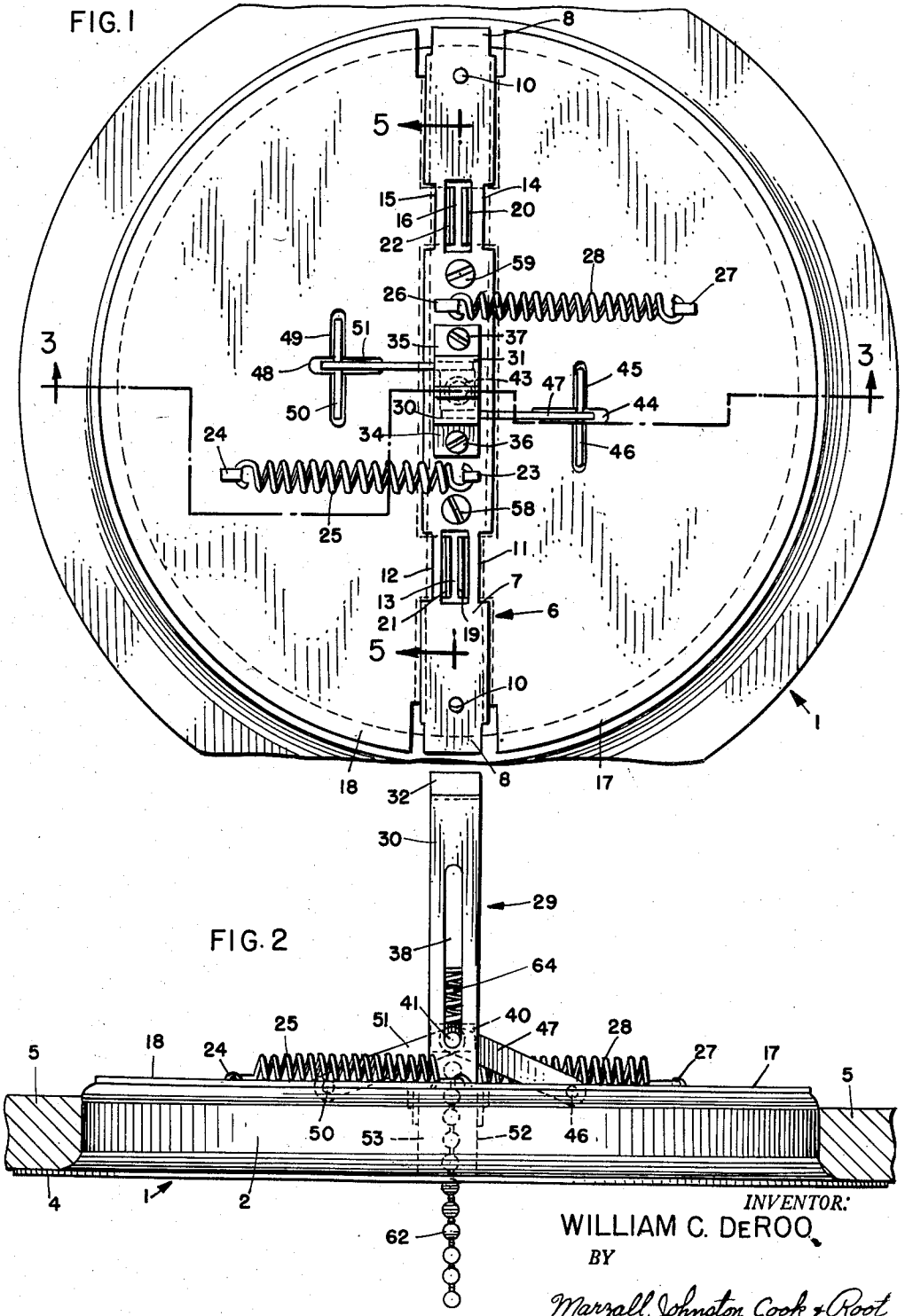


FIG. 2

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FIG. 3

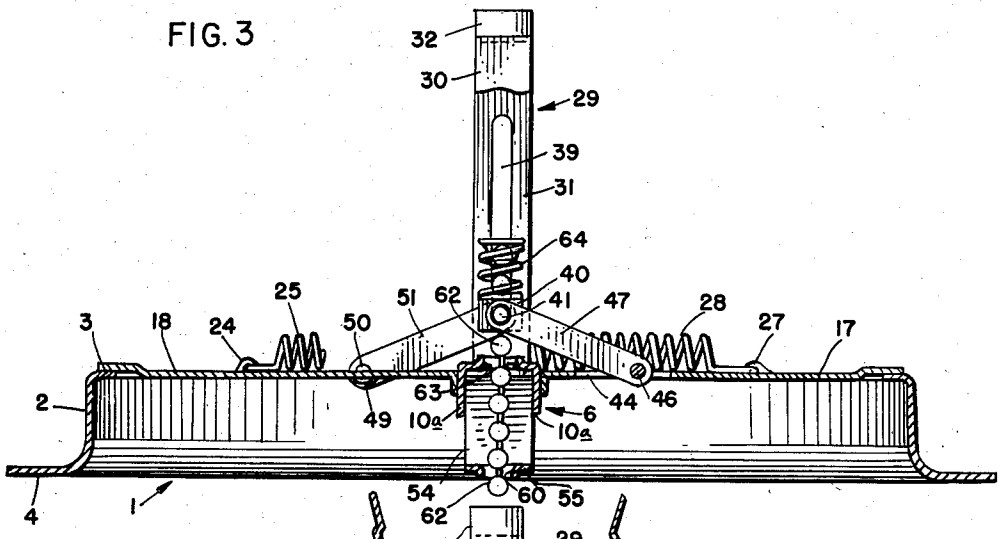


FIG. 4

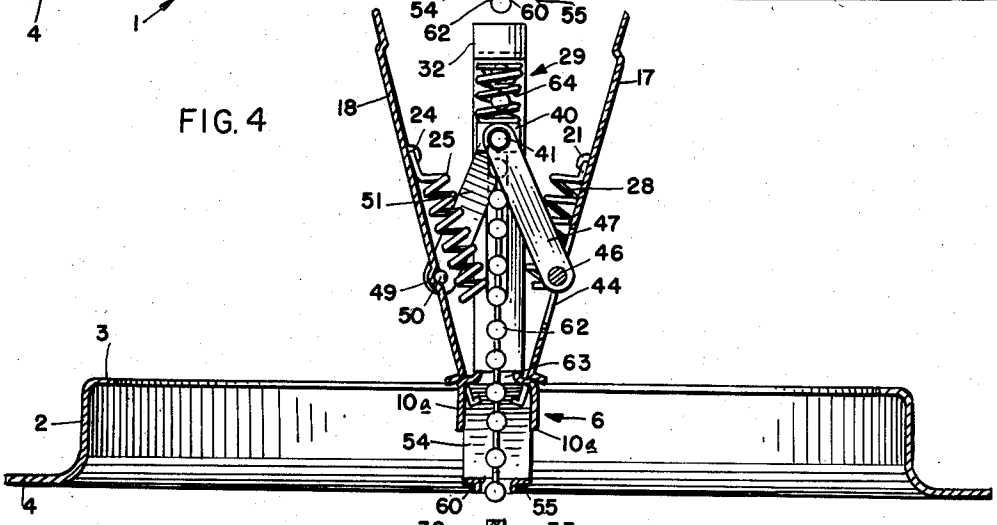


FIG. 6

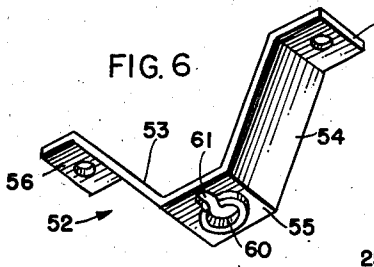


FIG. 7

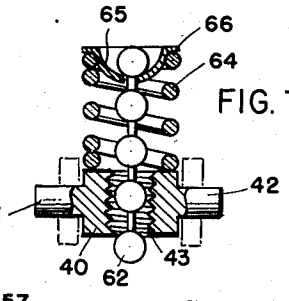


FIG. 5

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DAMPER CONSTRUCTION FOR AIR OUTLETS

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FIG. 8

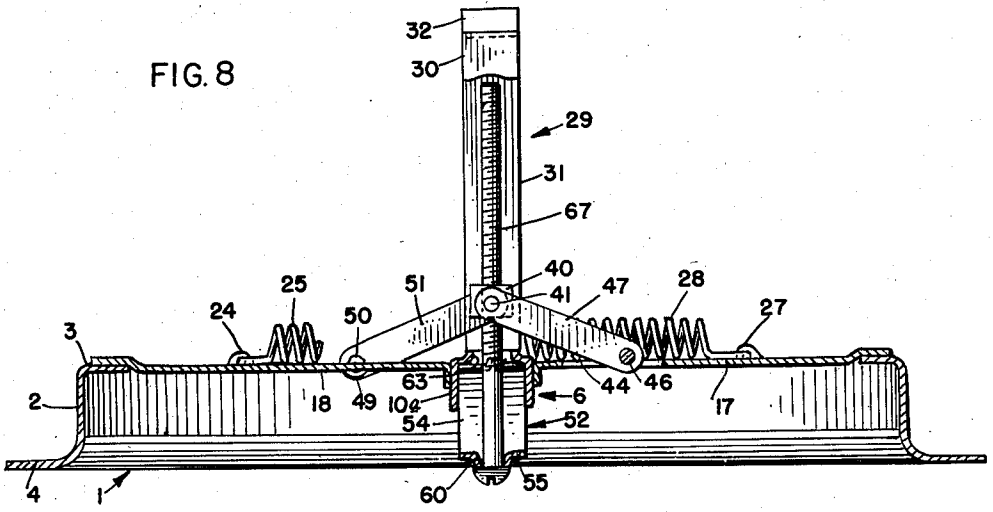


FIG. 9

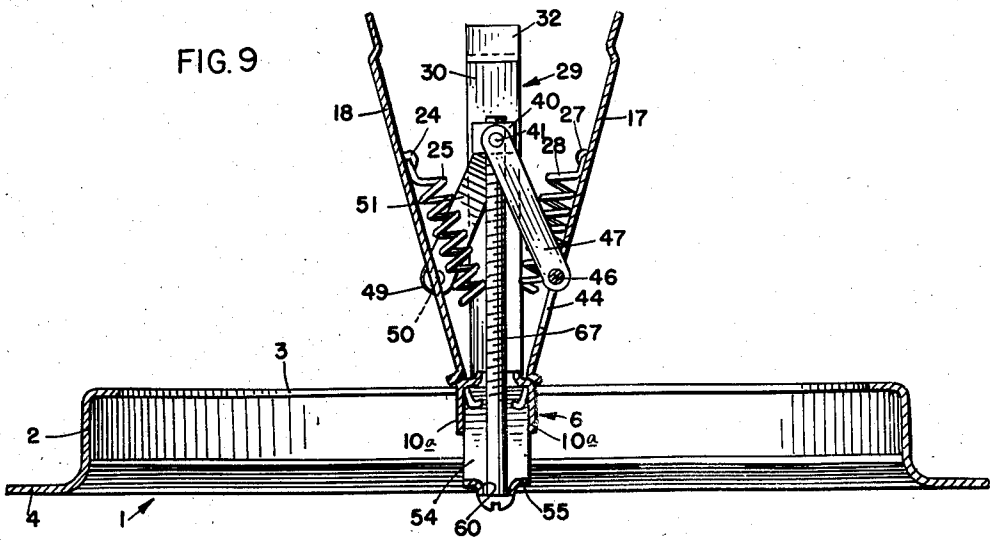
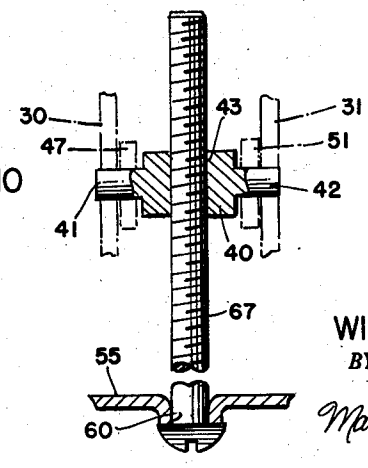


FIG. 10



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DAMPER CONSTRUCTION FOR AIR OUTLETS

William C. De Roo, Holland, Mich., assignor to Hart & Cooley Manufacturing Co., Holland, Mich., a corporation of Delaware

Application March 30, 1954, Serial No. 419,761

12 Claims. (Cl. 98—40)

This invention relates in general to a damper construction for use in regulating the outlets in air conditioning systems where either warm or cold air may pass therethrough, and is particularly directed to a novel damper construction for use with ceiling diffusers.

When a heating or air conditioning system is installed, the particular circumstances encountered on the job itself dictate the type of damper control best suited for that system. In many instances it is desirable for the person installing the system to permanently adjust the damper of the ceiling diffuser so that the damper will remain in that position at all times so that the system will be maintained in balance. In other instances it may be desirable to provide a damper control whereby the damper may be adjusted at will by the occupant of the space being heated or cooled.

Heretofore it has been necessary to provide one type of diffuser and damper construction which can be more or less permanently adjusted and still a different type of construction which can be adjusted by the occupant of the space. In most instances which type of diffuser and damper control is to be used cannot be determined until the time of installation. This obviously presents problems in having on hand a number of both types.

These problems have been overcome in the present invention since the damper construction herein is so designed that it can be used whether a permanent or temporary adjustment is to be made, and a mere substitution of specific control means may take place "on the job" since the damper construction will adapt itself readily to either type.

In view of the foregoing, it is a principal object of the present invention to provide a damper construction for outlets whereby the damper may be set alternately in a position for balancing the system and permitted to remain in that position or may be moved between closed and open positions manually as and when desired by the occupant of the space being heated or cooled.

Another object of the invention is to provide a damper construction for outlets wherein an arrangement of parts is adaptde to be operated by one means for positively retaining the damper in adjusted position, and to be operated by another means which will enable the damper to be moved as and when desired between open and closed positions, said latter means also being arranged to retain the damper temporarily in adjusted position.

A further object of the invention is to provide a damper construction for ceiling diffusers which includes a pair of damper blades normally urged toward open position and an operating mechanism for moving said blades wherein said mechanism is so arranged and constructed that it may be operated by either one of two devices, one of which is designed to retain the blades in an adjusted position to balance the system in which the diffuser is used, and the other of which is designed to permit manual adjustment of the blades as and when desired and to retain the blades in such position temporarily.

Still another object of the invention is to provide a damper construction for ceiling diffusers which includes a pair of damper blades normally urged toward open position and an operating mechanism for said blades including a member having a threaded opening therethrough and movable bodily in one direction to open the blades, and another direction to close the blades, whereby said member may receive either a screw operable to adjust and retain the blades in a position to balance the system in which the diffuser is used, or a chain device operable manually by an occupant of the space to adjust the blades as and when desired and to retain the blades in adjusted position temporarily.

Other objects and advantages of the invention will become apparent upon reading the following description taken in conjunction with the accompanying drawings, in which—

Fig. 1 is a plan view of a ceiling diffuser embodying the present invention with the damper blades shown in closed position;

Fig. 2 is an elevational view of the device of Fig. 1;

Fig. 3 is a transverse vertical sectional view taken along the plane of line 3—3 of Fig. 1;

Fig. 4 is a view similar to Fig. 3 but showing the damper blades in open position;

Fig. 5 is a fragmentary vertical sectional view taken along the plane of line 5—5 of Fig. 1;

Fig. 6 is a perspective view of a bracket used as a part of the construction;

Fig. 7 is a fragmentary enlarged detail of a part of the blade actuating means;

Fig. 8 is a view similar to Fig. 3 but showing the blade actuating mechanism operated by screw means rather than a chain pull;

Fig. 9 is a view similar to Fig. 8 showing the blades in open position, and

Fig. 10 is a somewhat enlarged fragmentary view of a detail of the blade actuating mechanism of Figs. 8 and 9.

Briefly described, the invention may be said to consist of a damper and damper actuating mechanism capable of being used and operated by two distinctly different types of operating means. For example, one common way of adjusting a damper for a warm air outlet is by means of a chain pull whereby the damper may be completely closed or completely opened or may be retained in any position between those two extremes by locking the chain in the desired position. It is thus convenient for the occupant of the space to adjust the damper at will.

Another means which may be used for adjusting the damper of an outlet is to insert an elongated screw into an actuating device for the damper so that when the screw is rotated the damper will be opened or closed. Although it may be possible for the occupant of the space to adjust the damper in this manner, it is inconvenient because he must obtain and use a tool, such as a screw driver. This latter type is used primarily when the person installing the system wishes to balance the system and thus maintain the damper permanently in adjusted position. The terms "permanent" and "temporary" as used herein with respect to the adjustment of the damper are relative terms since it is a matter of convenience that the occupant may utilize the chain pull at any time for adjusting the blades and thus the maintenance of the damper in adjusted position is only temporary. On the other hand, the use of the screw means is permanent to the extent that the inconvenience of adjusting the blades by an occupant of the space would be such that the damper would remain in the position in which it was placed by the person installing the system at all times.

With the present construction the arrangement of parts is such that either a chain pull or a screw means may be applied for the purpose of adjusting the damper, thereby avoiding the necessity of having two different damper constructions, one for each type of adjustment.

Referring now more particularly to the drawings, the diffuser itself consists of a frame generally indicated by the numeral **1** which is customarily, although not necessarily, circular. The preferred form of such a diffuser frame includes a substantially vertical intermediate portion **2** having an inturned flange **3** at its upper edge, and an outturned flange **4** at its bottom edge. The frame may thus be inserted into an opening in the ceiling or wall **5** of a room so that the bottom flange **4** thereof will bear upwardly against the inner face of the ceiling or wall.

In the present construction a support member generally indicated at **6** extends between opposed sides of the frame and acts not only as a support but also as a pivot for the damper blades. This support member **6** has a substantially flat upper surface **7** and ends **8** which overlie the flange **3** on the main frame. The support may be secured to the frame in any suitable manner, such as by welding or by mechanical means like that shown in Fig. 5. A suitable retainer **9** which may be in the form of an angle as shown, or a washer, may have a part thereof extending below the flange **3** and then secured to the support **6** by means such as screws **10**. The support is thus securely clamped in place and secured to the frame. In the embodiment shown, the support **6** also is provided with downwardly extending spaced side members **10***a*.

Suitable recesses are provided in the support **6** for the reception of ears formed in the damper blades thereby to provide means for pivoting the blades. The means for pivotally mounting the blades on the support may assume any desired and suitable form, but for purposes of illustration such means may be seen in Fig. 1 as used in the present embodiment.

A recess or slot **11** is cut in one side of the support **6** at the juncture of the top **7** and the adjacent downwardly extending side **10***a*. A similar slot **12** is cut in the opposite side of the support **6** and an intermediate opening or slot **13** is placed in the top **7** of the support between the slots **11** and **12**. A similar arrangement is provided adjacent the opposite end of the support where it will be seen that a slot **14** is located at one side of the support, a similar slot **15** is cut at the opposite side thereof, and an intermediate slot **16** is positioned therebetween.

The damper in the present instance consists of two blades **17** and **18**, each of which is substantially semi-circular, and are formed to overlie the flange **3** of the frame when the blades are in closed position. The damper blade **17** is provided with an ear **19** on its inner edge which is received by the slot **11** and which terminates in an upwardly extending flange received by the slot **13** when the blade is in closed position. A similar ear **20** on blade **17** is received by the slot **14** in the support and has its flanged edge received by the slot **16** when in closed position.

Similarly, the damper blade **18** is provided with like ears **21** and **22**, the ear **21** being received by slot **12** and terminating upwardly in slot **13**, and ear **22** being received by slot **15** and having its upturned end received by slot **16** when the blade is in closed position.

It is thus seen that the damper blades **17** and **18** are mounted for pivotal movement on the support **6** so that they may be moved downwardly into contact with the flange **3** on the frame when in closed position and may be pivoted upwardly toward each other to the open position thereof.

Suitable means are provided to urge both damper blades normally to open position toward each other. In the present instance such means includes for damper blade **18** an eye **23** formed in the upper surface **7** of support **6**, and another eye **24** extending upwardly from damper blade **18** between which a tension spring **25** is secured. The curved ends of the spring **25** are received within the eyes **23** and **24** and will thus urge the blade **18** upwardly. A similar arrangement is provided for damper blade **17**. An eye **26** extends upwardly from the support **6** and another eye **27** is formed in blade **17**. The curved ends of a tension spring **28** are received by these respective eyes so that blade **17** will also be urged upwardly to an open position.

A guide member **29** extends upwardly from the support **6** and is mounted thereon for the purpose of guiding the damper blade actuating means. For purposes of illustration, the guide **29** is shown more clearly in Fig. 5 as including the spaced strips of metal **30** and **31** which at their upper ends extend toward each other and are then flanged upwardly in abutting relation, as at **32** and **33**, and are then secured together in this position. The bottom ends of the spaced straps or side members **30** and **31** are flanged outwardly as at **34** and **35**, respectively, and are secured to the upper face **7** of the support **6** by means such as the screws **36** and **37**.

Elongated vertically extending slots **38** and **39** are provided in the respective side members **30** and **31** for the purpose of guiding an actuating member **40** as it moves in a vertical direction.

The actuating member **40** for adjusting the blades preferably consists of a square nut having small trunnions **41** and **42** extending outwardly from opposite sides thereof which are received by the slots **38** and **39** and which traverse those slots when moved. The nut **40** also has an opening **43** therethrough which is preferably internally threaded for a purpose which will be pointed out more fully hereinafter.

Suitable links are provided and secured between the actuating member or nut **40** and the respective damper blades so that movement of member **40** in a vertical direction will cause the blades to rotate about their pivots to open or closed position. In the present instance the link arrangement for damper blade **17** includes a slot **44** stamped out of the blade and an elongated depression **45** extending transversely of said slot. A pivot pin **46** is secured in the depression **45** and has mounted thereon one end of a link **47**. The opposite end of link **47** is mounted on trunnion **41** of the actuating member or nut **40** and may be clearly seen in the various figures of the drawing.

A similar arrangement is provided for damper blade **18** where it will be noted that slot **48** is provided through the blade, and the depressed portion **49** extends at right angles thereto and across the slot. A pivot pin **50** rests in the slot and is suitably secured thereto and has mounted thereon one end of a link **51**. The opposite end of this link is then mounted upon the opposite trunnion **42** of the actuating member **40** so that movement thereof will operate the blade **18**.

Thus far then, it will be seen that the springs **25** and **28** will normally urge the damper blades **17** and **18** upwardly to the open position shown in Figs. 4 and 9. When the blades are in this open position the links **47** and **51**, being connected with the actuating member **40**, will have moved this member upwardly to the upper limit defined by the slots **38** and **39**. If the member **40** is forced downwardly by any suitable means, it will be evident that the links **47** and **51** will urge the blades downwardly against the tension of the springs **25** and **28**.

To complete the basic structure a substantially U-shaped bracket **52** is mounted on the underside of the support **6** between the sides **10***a* thereof. This bracket is clearly shown in Fig. 6 and is illustrated as applied to the support in Fig. 5.

This bracket **52** includes the spaced legs **53** and **54** which are connected at their lower ends by the web **55**. The upper ends of the legs are flanged outwardly as at **56** and **57** so that the bracket may be secured to the support **6**. In assembling the bracket the flanges **56** and **57** are placed upwardly against the underside of the support **6** and secured thereto by means of the screws **58** and **59**.

The web **55** connecting the lower ends of the legs of this bracket is provided with a keyhole opening **60** having the slot **61** extending from one side thereof so that

when a chain pull is used the slot may cooperate with the chain for locking it in any suitable position.

The structure described thus far constitutes the basic structure which may be utilized in a heating or air conditioning system regardless of what means may later be determined as proper for adjusting the position of the blades. That is to say, this basic structure is the same whether the chain pull is used or whether a more permanent setting of the blades is deemed necessary by the use of a screw means.

Figs. 1 to 7 inclusive illustrate the invention as used with a chain pull, whereas Figs. 8, 9 and 10 illustrate the same basic structure with the use of an elongated screw to adjust the blades. A typical chain is illustrated at **62** in the various figures and is shown as passing downwardly through the opening **43** in the actuating member **40**, and opening **63** through the support **6**, and the opening **60** in the bracket **52**. A small coiled compression spring **64** is positioned on top of the actuating member **40** and a cup **65** is flanged, as at **66**, to rest upon the upper end of the spring. The chain **62** has the upper bead thereof within the cup **65** so that a downward pull on the chain will urge the actuating member **40** downwardly to close the damper blades as described above. The purpose of spring **64** is merely to insure that when the blades are in completely closed position, the chain may be given a slight extra pull to permit a link between adjacent beads to be received by the slot **61**, whereupon the chain will be locked against the upward pull of the springs **25** and **28**.

The foregoing arrangement is adopted by the person installing the system when it is desirable to allow the damper blades to be adjusted at will by the occupant of the space where the particular diffuser is being used. If the engineer determines that it is preferable to balance the system and to maintain the damper blades in an adjusted position more or less permanently, he then dispenses with the chain **62** and its associated spring **64** and cup **65**, and may use in the place thereof the screw arrangement shown in Figs. 8, 9 and 10, to which reference will now be made.

In these latter figures the parts shown are identical with those shown in Figs. 1 to 6 inclusive, except for the chain **62**, spring **64** and cup **65**. Identical reference numerals have been used to indicate identical parts. In this embodiment of the invention an elongated screw **67** is inserted upwardly through the opening **60** in the bracket, the opening **63** in the support **6** and threadedly engages the opening **43** in the actuating member **40**. It will be evident that if the damper blades **17** and **18** are opened by action of springs **25** and **28** as shown in Fig. 9, and the screw **67** is rotated in the normal clockwise direction, the actuating member **40** will move downwardly because the tension of the springs **25** and **28** will tend to maintain the head of the screw in contact with the web **55** of bracket **52**.

When the screw **67** is rotated to move the actuating member **40** downwardly, the trunnions **41** and **42** will traverse the slots **38** and **39** respectively and the damper blades **17** and **18** will be moved downwardly toward closed position by their respective pivots on the support **6**.

It will thus be seen that one who installs the system can utilize the screw **67** to position the damper blades properly for balancing the system. When this device is used it is contemplated that the damper blades will be retained more or less permanently in the position to which they have been adjusted.

By furnishing to the engineer installing this system the basic structure together with the chain and spring as well as the screw, he may utilize either device he deems necessary at the time of installation. It is unnecessary for him to carry one type of diffuser which can be permanently adjusted and another type of diffuser adapted for utilizing a chain pull. The present invention, therefore, has numerous advantages over structures known at the present time not only from the standpoint of compactness and ease of operation, but also from the standpoint that fewer parts need be stocked since the same structure adapts itself for use for either purpose.

Changes may be made in the form, construction and arrangement of parts from those disclosed herein without in any way departing from the spirit of the invention or sacrificing any of the attendant advantages thereof, provided, however, that such changes fall within the scope of the claims appended hereto.

The invention is hereby claimed as follows:

1. A damper construction for ceiling diffusers and the like comprising, a frame member having an opening therethrough for the passage of air, a pair of opposed damper blades mounted for pivotal movement along the adjacent edges thereof toward each other and away from said frame to open position, and away from each other toward said frame to closed position, means for continually urging said blades toward each other, guide means, a movable damper actuating member slidably mounted in said guide means, a link connected to each damper blade and to said actuating member, whereby movement of the actuating member toward said frame will close said damper blades, and movement thereof away from said frame will open said blades, and a threaded opening through siad actuating member adapted to receive and threadedly engage a screw for permanently adjusting the position of said blades, said threaded opening also being adapted to have a chain extend therethrough in place of the screw for adjusting said blades and maintaining them temporarily in adjusted position.

2. A damper construction for ceiling diffusers and the like comprising, a frame member having an opening therethrough for the passage of air, a pair of opposed damper blades mounted on said frame along the adjacent edges thereof for pivotal movement toward each other away from said frame to open position, and away from each other toward said frame to closed position, yieldable means continually urging said blades toward each other, guide means extending upwardly from said frame at substantially the center thereof and having opposed slots therein, a damper actuating member movable in said guide means, opposed pins on said actuating member adapted to traverse said slots, a link connected to each damper blade and to said actuating member, whereby movement of said actuating member in said guide means toward said frame will close said blades, and movement thereof in said guide means away from said frame will open said blades, and a threaded opening through said actuating member adapted to receive and threadedly engage a screw for permanently adjusting the position of said blades, said threaded opening also being adapted to have a chain extend therethrough in place of the screw for adjusting said blades and maintaining them temporarily in adjusted position.

3. A damper construction for ceiling diffusers and the like comprising, a frame member having an opening therethrough for the passage of air, a support extending between opposed sides of said frame member and having an opening therethrough, a substantially U-shaped bracket secured to the underside of said support and extending downwardly therefrom and having an opening therethrough in alignment with the opening in said support, damper means movable toward and away from said frame to closed and open positions respectively, a damper actuating member for moving said damper toward and away from said frame, and a threaded opening through said actuating member and in alignment with the openings in said bracket and support and adapted to receive and threadedly engage, through said openings, a screw for permanently adjusting the position of said damper, said three last named openings also being adapted to have a chain extend therethrough in place of the screw and secured to said actuating member for adjusting said damper and maintaining it temporarily in adjusted position.

4. A damper construction for ceiling diffusers and the like comprising, a frame member having an opening

therethrough for the passage of air, a support extending between opposed sides of said frame member and having an opening therethrough, a substantially U-shaped bracket secured to the underside of said support and extending downwardly therefrom and having a keyhole opening therethrough in alignment with the opening in said support, a pair of opposed damper blades pivotally mounted on said support and movable toward each other to open position and away from each other to closed position, a damper actuating member for moving said blades toward and away from each other, and a threaded opening through said actuating member and in alignment with the openings in said bracket and support and adapted to receive and threadedly engage, through said openings, a screw for permanently adjusting the position of said blades, said three last named openings also being adapted to have a chain extend therethrough in place of the screw and secured to said actuating member for adjusting said blades, said keyhole opening cooperating with the chain for maintaining said blades temporarily in adjusted position.

5. A damper construction for ceiling diffusers and the like comprising, a frame member having an opening therethrough for the passage of air, a support extending between opposed sides of said frame member and having an opening therethrough, a substantially U-shaped bracket secured to the underside of said support and extending downwardly therefrom and having an opening therethrough in alignment with the opening in said support, a pair of opposed damper blades pivotally mounted on said support and movable toward each other to open position and away from each other to closed position, guide means mounted on said support and extending upwardly therefrom, a damper actuating member movable upwardly and downwardly in said guide means, means connecting said actuating member with said blades, a threaded opening in said actuating member, and an elongated screw extending through the openings in said bracket and support and threadedly engaging the opening in said actuating member, whereby rotation of said screw will adjust said blades.

6. A damper construction for ceiling diffusers and the like comprising, a frame member having an opening therethrough for the passage of air, a support extending between opposed sides of said frame member and having an opening therethrough, a substantially U-shaped bracket secured to the underside of said support and extending downwardly therefrom and having a keyhole opening therethrough in alignment with the opening in said support, a pair of opposed damper blades pivotally mounted on said support and movable toward each other to open position and away from each other to closed position, yieldable means normally urging said blades toward each other, guide means mounted on said support and extending upwardly therefrom, a damper actuating member movable in said guide means, means connecting said actuating member with said blades, an opening through said actuating member, a yieldable member on said actuating member, and a chain device attached to said yieldable member and passing downwardly through the openings in said actuating member, support and bracket, thereby to move said actuating member and adjust said blades, said keyhole opening adapted to receive said chain in the slot thereof to maintain said blades in adjusted position.

7. A damper unit for regulating the outlets in air conditioning systems comprising, a frame member having an opening therethrough for the passage of air, at least one damper blade pivoted to said frame member, means for normally urging said damper blade to open position, guide means, a movable damper actuating member slidably mounted in said guide means, a link interconnecting said damper blade and actuating member, whereby movement of said actuating member toward said frame member will close said damper blade, and control means connected to said actuating member and coacting with said frame member to selectively adjust the damper blade between open and closed positions.

8. A damper unit for regulating the outlets in air conditioning systems comprising, a frame member having an opening therethrough for the passage of air, a pair of damper blades pivoted to said frame member and sized to collectively cover said opening, means for normally urging said damper blades toward each other into open position, a movable damper actuating member, elongated guide means for said actuating member secured to said frame member and operatively engaged with said actuating member for guiding said actuating member for movement longitudinally of said guide means, links connecting said actuating member with each damper blade, whereby movement of said actuating member will selectively open or close said damper blades, and control means engaging said actuating member and coacting with said frame member to selectively adjust the damper blades between open and closed positions.

9. A damper unit for regulating the outlets in air conditioning systems comprising, a frame member having an opening therethrough for the passage of air, a cross support traversing said opening and secured at opposite ends thereof to said frame member, a pair of damper blades pivoted to said support and sized to collectively cover said opening, means for normally urging said damper blades into open position, guide means upstanding from said cross support, a damper actuating member guidably received by said guide means for movement upwardly and downwardly relative thereto, a pair of links pivoted to said actuating member, one each pivoted to a damper blade, whereby movement of said actuating member will selectively open or close said damper blades, a bar member secured to the side of said cross support opposite said guide means and spaced therefrom, and control means engaging said actuating member and coacting with said bar member for selectively adjusting the damper blades to any position between open and closed positions.

10. A damper unit for regulating the outlets in air conditioning systems comprising, a frame member having an opening therethrough for the passage of air, a cross support traversing said opening and secured at opposite ends thereof to said frame member, a pair of damper blades pivoted to said support and sized to collectively cover said opening, means for normally urging said damper blades into open position, guide means upstanding from said cross support, a damper actuating member guidably received by said guide means for movement upwardly and downwardly relative thereto, a pair of links pivoted to said actuating member, one each pivoted to a damper blade, whereby movement of said actuating member will selectively open or close said damper blades, and control means engaging said actuating member and coacting with said cross support for selectively adjusting the damper blades to any position between open and closed positions.

11. A damper unit for regulating the outlets in air conditioning systems comprising, a frame member having an opening therethrough for the passage of air, a cross support traversing said opening and secured at opposite ends thereof to said frame member, a pair of damper blades pivoted to said support and sized to collectively cover said opening, means for normally urging said damper blades into open position, elongated guide means upstanding from said cross support, a damper actuating member guidably received by said guide means for movement longitudinally of the latter, a pair of links pivoted to said actuating member, one each pivoted to a damper blade, whereby movement of said actuating member will selectively open or close said damper blades, a bar member secured to the side of said cross support opposite said guide means and spaced therefrom, and control means engaging said actuating member and coacting with said bar member for selectively adjusting the damper blades to any position between open and closed positions, said control means including a threaded screw having a head

bearing against the side of said bar member remote from said cross support and a threaded shank threadedly engaging said actuating member.

12. A damper unit for regulating the outlets in air conditioning systems comprising, a frame member having an opening therethrough for the passage of air, a cross support traversing said opening and secured at opposite ends thereof to said frame member, a pair of damper blades pivoted to said support and sized to collectively cover said opening, means for normally urging said damper blades into open position, guide means upstanding from said cross support, a damper actuating member guidably received by said guide means, a pair of links pivoted to said actuating member, one each pivoted to a damper blade, whereby movement of said actuating member will selectively open or close said damper blades, a bar member secured to the side of said cross support opposite said guide means and spaced therefrom, and control means engaging said actuating member and coacting with said bar member for selectively adjusting the damper blades

to any position between open and closed positions, said control means including a chain connected at one end to said actuating member and selectively engaging said bar member to lock the actuating member and damper blades in a desired position.

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